Bonfiglioli
Riduttori

VF-W IE2 series

Wormgears

Bonfiglioli
power, control and green solutions

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Revisions

Refer to page 296 for the catalogue revision index. Visit www.bonfiglioli.com to search for catalogues with up-to-date revisions.

GENERAL INFORMATION

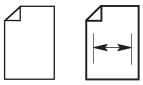
1 SYMBOLS AND UNITS OF MEASUREMENT

Symbols	Units of Measure	Description
$A_{N\ 1,2}$	[N]	Permissible axial force
f_s	–	Service factor
f_T	–	Thermal factor
f_{TP}	–	Temperature factor
i	–	Gear ratio
I	–	Cyclic duration factor
J_C	[Kgm^2]	Mass moment of inertia to be driven
J_M	[Kgm^2]	Motor mass moment of inertia
J_R	[Kgm^2]	Mass moment of inertia for the gear unit
K	–	Mass acceleration factor
K_r	–	Transmission element factor
$M_{1,2}$	[Nm]	Torque
$M_{c\ 1,2}$	[Nm]	Calculated torque
$M_{n\ 1,2}$	[Nm]	Rated torque
$M_{r\ 1,2}$	[Nm]	Torque demand

Symbols	Units of Measure	Description
$n_{1,2}$	[min^{-1}]	Speed
$P_{1,2}$	[kW]	Power
$P_{N\ 1,2}$	[kW]	Rated power
$P_{R\ 1,2}$	[kW]	Power demand
$R_{C\ 1,2}$	[N]	Calculated radial force
$R_{N\ 1,2}$	[N]	Permissible overhung load
S	–	Safety factor
t_a	[°C]	Ambient temperature
t_f	[min]	Work time under constant load
t_r	[min]	Rest time
η_d	–	Dynamic efficiency
η_s	–	Static efficiency

$_1$ value applies to input shaft

$_2$ value applies to output shaft

	This symbol indicates important technical information.
	This symbol indicates situations of danger which, if ignored, may result in risks to personal health and safety.
	The symbol shows the page the information can be sorted from.

	This symbol refers to the angle the overhung load applies (viewing from drive end).
	Symbol refers to weight of gearmotors and speed reducers. Figure for gearmotors incorporates the weight of the 4-pole motor and for life lubricated units, where applicable, the weight of the oil.

2 DEFINITIONS

2.1 TORQUE

Rated torque M_{n2} [Nm]
The torque that can be transmitted continuously through the output shaft, with the gear unit operated under a service factor f_s = 1.
Rating is speed sensitive.

Required torque M_{r2} [Nm]
The torque demand based on application requirement. It is recommended to be equal to or less than torque $\mathbf{M_{n2}}$ the gearbox under study is rated for.

Calculated torque M_{c2} [Nm]
Computational torque value to be used when selecting the gearbox.
It is calculated considering the required torque $\mathbf{M_{r2}}$ and service factor $\mathbf{f_s}$, as per the relationship here after:

$$M_{c2} = M_{r2} \times f_s \leq M_{n2} \quad (1)$$

2.2 POWER

Rated input power P_{n1} [kW]
The parameter can be found in the gearbox rating charts and represents the kW that can be safely transmitted to the gearbox, based on input speed $\mathbf{n_1}$ and service factor f_s= 1.

2.3 EFFICIENCY

Dynamic efficiency [η_d]

The dynamic efficiency is the relationship of power delivered at output shaft $\mathbf{P_2}$ to power applied at input shaft $\mathbf{P_1}$:

$$\eta_d = \frac{P_2}{P_1} \quad (2)$$

It may be worth highlighting that values of rated torque $\mathbf{M_{n2}}$ given in the catalogue take the dynamic efficiency into consideration. Values of ηd are calculated for gearboxes after a sufficiently long running-in period.

After the running-in period the surface temperature in operation reduces and finally stabilises.

The operating temperature is affected by both the duty and the ambient temperature and may result into values, measured onto the gear case in the area of the worm shaft, in the range of 80-100 °C without this affecting the operation of the gear unit adversely. If however, surface temperatures in the 90-100 °C range are to be expected it is recommended that oil seals in Fluoro elastomer compound are specified at the time of order through option **PV**.

Static efficiency [η_S]

Efficiency applicable at start-up of the gearbox. Although this is generally not a significant factor for helical gears, it may be instead critical when selecting worm gearmotors operating under intermittent duty (e.g. Hoisting).

2.4 GEAR RATIO [i]

The value for the gear ratio is referred to with the letter [**i**] and calculated through the relationship of the input speed $\mathbf{n_1}$ to the output speed $\mathbf{n_2}$:

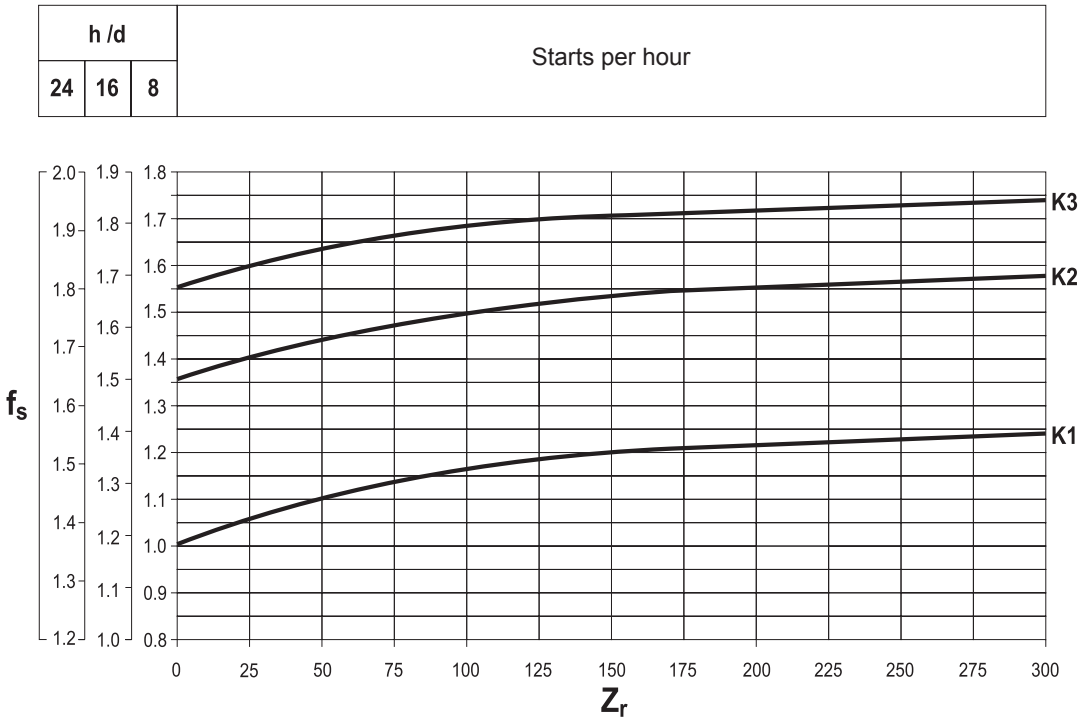
$$i = \frac{n_1}{n_2} \quad (3)$$

2.5 MOMENT OF INERTIA J_r [kgm^2]

Moments of inertia specified in the catalogue refer to the input shaft of the gear unit and, as such, they can be simply added to the inertia of the motor, when this is combined.

2.6 SERVICE FACTOR [f_s]

This factor is the numeric value describing reducer service duty. It takes into consideration, with unavoidable approximation, daily operating conditions, load variations and overloads connected with reducer application. In the graph below, after selecting proper “daily working hours” column, the service factor is given by intersecting the number of starts per hour and one of the K1, K2 or K3 curves. K_ curves are linked with the service nature (approximately: uniform, medium and heavy) through the acceleration factor of masses K, connected to the ratio between driven masses and motor inertia values. Regardless to the value given for the service factor, we would like to remind that in some applications, which for example involve lifting of parts, failure of the reducer may expose the operators to the risk of injuries.
If in doubt, please contact Bonfiglioli’s Technical Service.



Acceleration factor of masses, [K]

This parameter serves for selecting the right curve for the type of load. The value is given by the following ratio:

$$K = \frac{J_c}{J_m} \qquad (4)$$

$K = \frac{J_c}{J_m}$	→ J_c =	Moment of inertia of driven masses referred to motor drive shaft
		J_m = Motor moment of inertia

K ≤ 0,25	→ **K1**	Uniform load
0.25 < K ≤ 3	→ **K2**	Moderate shock load
3 < K ≤ 10	→ **K3**	Heavy shock load
K > 10	→	please contact Bonfiglioli’s Technical Service

3 MAINTENANCE

Life lubricated gearboxes do not require any periodical oil changes.
For other types of gearboxes, the oil must be first changed after approx. 300 hours of operation, carefully flushing the gear unit using suitable detergents.
Do not mix mineral oils with synthetic oils.
Check oil level regularly and change oil at the intervals shown in the table.

Oil temperature [°C]	Oil change interval [h]	
	mineral oil	synthetic oil
< 65	8000	25000
65 - 80	4000	15000
80 - 95	2000	12500

4 SELECTION

4.1 Selecting a gearmotor

a) Determine service factor $\mathbf{f_s}$ as formerly specified.

b) Determine power required at gearbox input shaft:

$$P_{r1} = \frac{M_{r2} \times n_2}{9550 \times \eta_d} \quad [kW] \qquad (5)$$

c) Consult the gearmotor rating charts and locate the table corresponding to normalised power $\mathbf{P_n}$:

$$P_n \geq P_{r1} \qquad (6)$$

Unless otherwise specified, power $\mathbf{P_n}$ of motors indicated
in the catalogue refers to continuous duty S1.
For motors used in conditions other than S1, the type of duty required by reference to CEI 2-3/IEC 34-1 Standards must be mentioned. For duties from S2 to S8 in particular and for motor frame 132 or smaller, extra power output can be obtained with respect to continuous duty.
Accordingly the following condition must be satisfied:

$$P_n \geq \frac{P_{r1}}{f_m} \quad (7)$$

The adjusting factor $\mathbf{f_m}$ can be obtained from table here after.

Intermittence ratio

$$I = \frac{t_f}{t_f + t_r} \times 100 \quad (8)$$

t_f = work time at constant load

t_r = rest time

	DUTY						
	S2			**S3***			**S4 - S8**
	Cycle duration [min]			Cyclic duration factor (I)			Please contact us
	10	**30**	**60**	**25%**	**40%**	**60%**	
f_m	1.35	1.15	1.05	1.25	1.15	1.1	

* Cycle duration, in any event, must be 10 minutes or less. If it is longer, please contact our Technical Service.

Next, refer to the appropriate $\mathbf{P_n}$ section within the gearmotor selection charts and locate the unit that features the desired output speed $\mathbf{n_2}$, or closest to, along with a safety factor **S** that meets or exceeds the applicable service factor $\mathbf{f_s}$.

$$S \geq f_s \quad (9)$$

The safety factor is so defined:

$$S = \frac{M_{n2}}{M_2} = \frac{P_{n1}}{P_1} \quad (10)$$

As standard, gear and motor Combinations are implemented with 2, 4 and 6 pole motors, 50 Hz supplied.
Should the drive speed be different from 2800, 1400 or 900 min^{-1}, base the selection on the gear unit nominal rating.

4.2 Selecting a speed reducer

a) Determine service factor $\mathbf{f_s}$.

b) Determine the computational torque $\mathbf{M_{c2}}$:

$$M_{c2} = M_{r2} \times f_s \quad (11)$$

c) Determine the required gear ratio:

$$i = \frac{n_1}{n_2} \quad (12)$$

d) Consult the «Speed reducer rating charts» and locate the frame size that, for drive speed **n1** and gear ratio closest to **[i]** features a rated torque M_{n2} that satisfies the following condition:

$$M_{n2} \geq M_{c2} \quad (13)$$

Check applicability of the electric motor selected at chapter: «Motor availability».

5 VERIFICATION

After the selection of the speed reducer, or gearmotor, is complete it is recommended that the following verifications are Conducted:

a) Maximum torque
The maximum torque (intended as instantaneous peak load) applicable to the gearbox must not, in general, exceed 300% of rated torque $\mathbf{M_{n2}}$. Therefore, check that this limit is not exceeded, using suitable torque limiting devices, if necessary. For three-phase switch-pole motors, it is recommended to pay attention to the switching torque which is generated when switching from high to low speed, because it could be significantly higher than maximum torque.
A simple, economical way to minimize overloading is to power only two phases of the motor during switch-over (power-up time on two phases can be controlled with a time-relay):

Switching torque $\mathbf{Mg_2 = 0.5 \times Mg_3}$	
$\mathbf{Mg_2}$	Switching torque with two phase power-up
$\mathbf{Mg_3}$	Switching torque with three-phase power-up

b) Radial loads
Make sure that radial forces applying on input and/or output shaft are within permittend catalogue values. If they were higher consider designing a different bearing arrangement before switching to a larger gear unit.
Catalogue values for rated overhung loads refer to mid-point of shaft under study.
Should application point of the overhung load be localised further out the revised loading capability must be adjusted as per instructions given in this manual.

c) Thrust loads
Actual thrust load must be found within 20% of the equivalent overhung load capacity.
Should an extremely high thrust, or a combination of radial and axial load apply, consult Bonfiglioli Technical Service.

d) Starts per hour
For duties featuring a high number of switches the actual starting capability in loaded condition [Z] must be calculated.
Actual number of starts per hour must be lower than value so calculated.

6 INSTALLATION

6.1 General instructions

a) Make sure that the gearbox is securely bolted to avoid vibrations in operation. If shocks or overloads are expected, fit hydraulic couplings, clutches, torque limiters, etc.

b) Before being paint coated, any machined surfaces and the outer face of the oil seals must be protected to prevent paint drying out the rubber and jeopardising the sealing function.

c) Parts fitted on the gearbox output shaft must be machined to ISO H7 tolerance to prevent interference fits that could damage the gearbox itself. Further, to mount or remove such parts, use suitable pullers or extraction devices using the tapped hole located at the top of the shaft extension.

d) Mating surfaces must be cleaned and treated with suitable protective products before mounting to avoid oxidation and, as a result, seizure of parts.

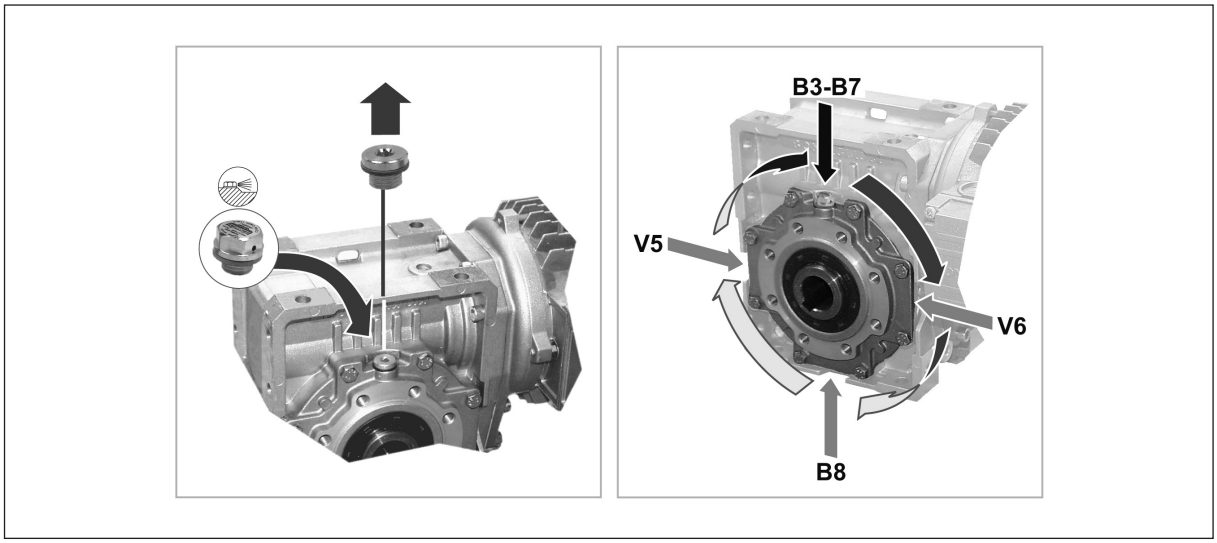
e) Prior to putting the gear unit into operation make sure that the equipment that incorporates the same complies with the current revision of the Machines Directive 2006/42/CE.

f) Before starting up the machine, make sure that oil level is suitable for the mounting position specified for the gear unit and the viscosity is adequate.

g) For outdoor installation provide adequate guards in order to protect the drive from rainfalls as well as direct sun radiation.

6.2 Commissioning of W gear units

Gear units type W63, W75 and W86 feature a side cover carrying a blank plug for transportation purposes.
Prior to putting the gearbox into service the blank plug must be replaced by the breather plug that is supplied with each unit.
See figure below:



Note that the blind plug MUST BE LEFT IN PLACE when the reducer is fitted in mounting position B6.

7 STORAGE

Observe the following instructions to ensure correct storage of the products:

a) Do not store outdoors, in areas exposed to weather or with excessive humidity.

b) Always place boards, wood or other material between the products and the floor.
The gearboxes should not have direct contact with the floor.

c) In case of long-term storage all machined surfaces such as flanges, shafts and couplings must be coated with a suitable rust inhibiting product (Mobilarma 248 or equivalent).
Furthermore gear units must be placed with the fill plug in the highest position and filled up with oil.
Before putting the units into operation the appropriate quantity, and type, of oil must be restored.

8 CONDITIONS OF SUPPLY

Gear units are supplied as follows:

a) configured for installation in the mounting position specified at the time of order;

b) tested to manufacturer specifications;
c) mating machined surfaces come unpainted;

d) nuts and bolts for mounting motors are provided;

e) shafts are protected during transportation by plastic caps;

f) supplied with lifting lug (where applicable).

9 DESIGN FEATURES

9.1 Key features common to all Bonfiglioli worm gears

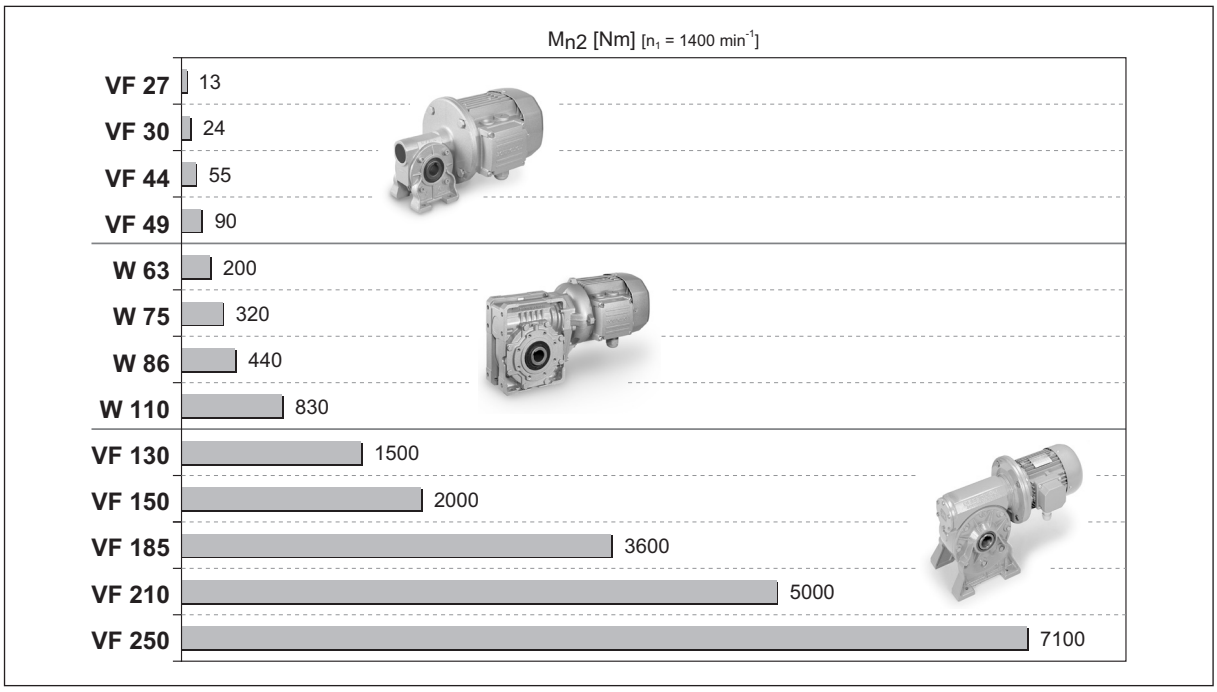
− Symmetrical hollow output shaft for facilitated mounting of the gear unit and plug-in shafts (after-sales kit only) on either side.
− Ground finished wormshafts and precise machining lend optimal efficiency and extremely low noise in operation.
− Numerous product configurations allow for foot, flange or shaft mounting. Torque arm is available as an option.
− Extensive customisation possible through the range of standard options available.

9.2 Key features of VF-style worm gears

− Die cast aluminium gear cases for VF27, VF30, VF44 and VF49. Sturdy cast iron for VF130 through VF250. The latter group is paint coated with thermo setting epoxy powder.

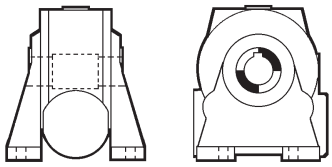
9.3 Key features of W-style worm gears

− Rigid monobloc gear case made from Aluminium.
− The cubic shape of the gear case and machining of all sides lend extreme flexibility for the installation of the gearbox and ancillary devices.
− The integral gearmotor configuration is lightweight, compact and price effective.
− Input shaft oil seal of W63, W75 and W86 units is located internally, and made from a Fluoro elastomer compound for improved durability and extended lifetime.



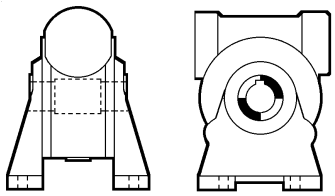
10 VERSIONS

VF_



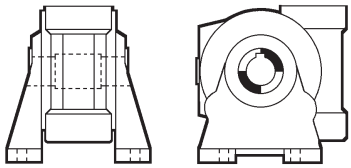
N **VF 27 ... VF 250**

Foot mounted, underdriven



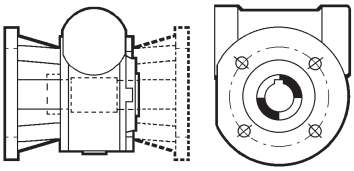
A **VF 27 ... VF 250**

Foot mounted, overdriven



V **VF 27 ... VF 250**

Foot mounted,
wormshaft vertical



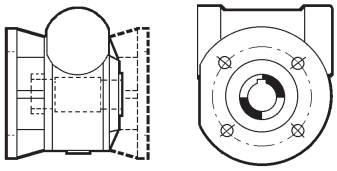
F 1 F 2
FA 1 FA 2

F **VF 27 ... VF 185**

Standard flange

FA **VF 44 ... VF 49**

Extended output flange



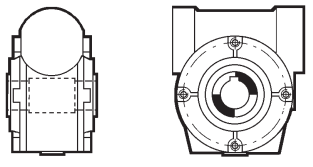
FC 1 FC 2
FR 1 FR 2

FC **VF 130 ... VF 185**

Short flange

FR **VF 130 ... VF 185**

Short flange and reinforced bearings

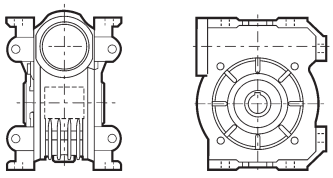


P 1 P 2
(VF 30...VF 250) (VF 130...VF 185)

P **VF 30 ... VF 250**

Side cover for shaft mounting

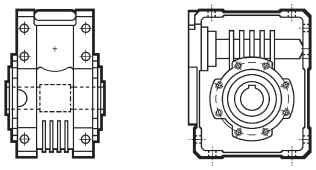
P1 = P2	VF 30 ... VF 49 VF 210, VF 250



U **VF 30 ... VF 49**

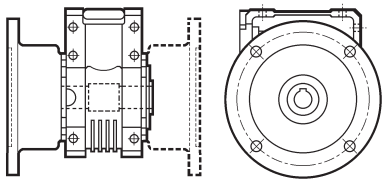
Foot mount

W_



U **W 63 ... W 110**

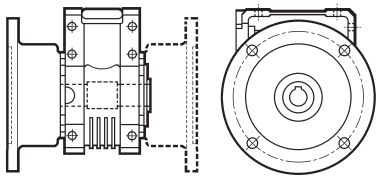
Universal gear case



UF 1 UF 2

UF **W 63 ... W 110**

Standard mounting flange



UFC 1 UFC 2
UFCR 1 UFCR 2

UFC **W 63 ... W 110**

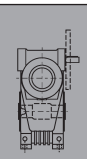
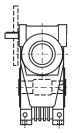
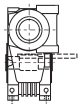
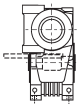
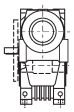
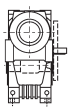
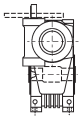
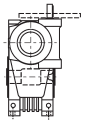
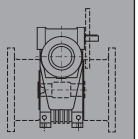
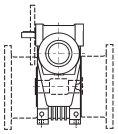
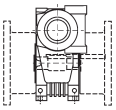
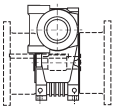
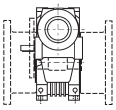
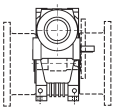
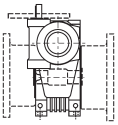
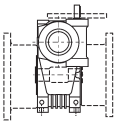
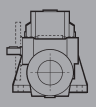
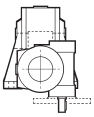
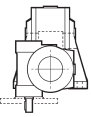
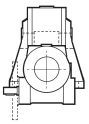
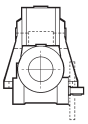
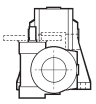
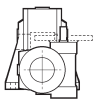
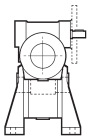
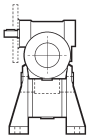
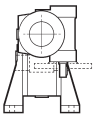
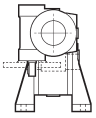
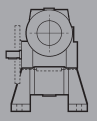
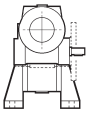
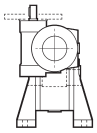
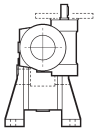
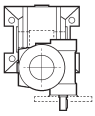
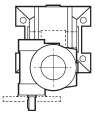
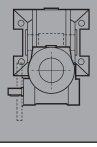
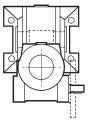
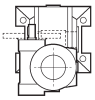
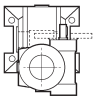
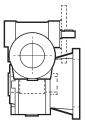
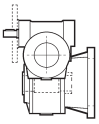
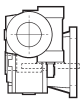
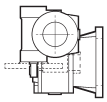
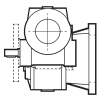
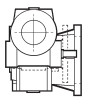
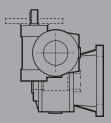
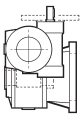
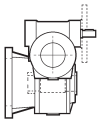
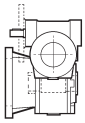
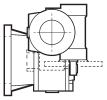
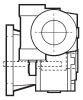
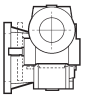
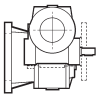
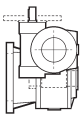
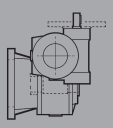
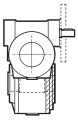
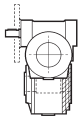
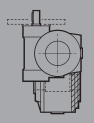
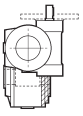
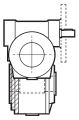
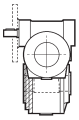
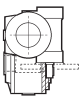
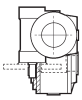
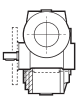
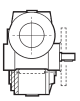
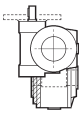
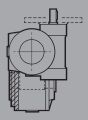
Mounting flange reduced in length

UFCR **W 75**

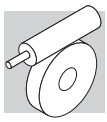
Mounting flange reduced in length and diameter

11 ARRANGEMENTS

For combined worm gear units, unless otherwise specified at the time of ordering, the arrangements highlighted in grey in the diagrams below will be configured at the factory.

	CW1	CCW1	CW2	CCW2	CW3	CCW3	CW4	CCW4
U								
UF_ UFC_ UFRC_								
N								
A								
V								
F1 FA1 FC1 FR1								
F2 FA2 FC2 FR2								
P1								
P2								

Shaft-mount cover

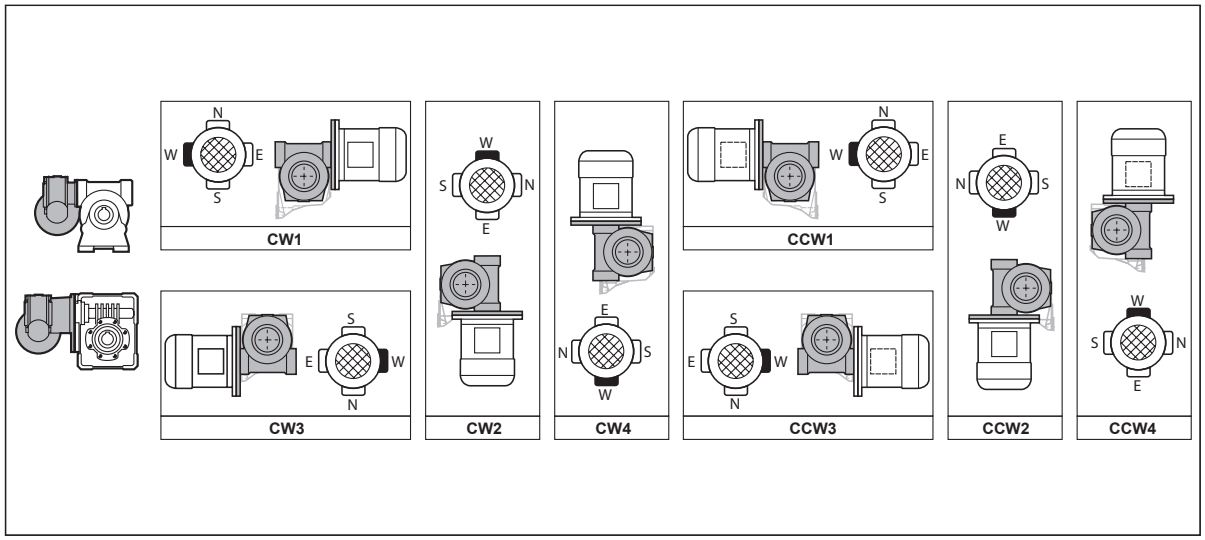


For units with the HS input (free shaft), all the mounting options shown are available.
For units with the P (IEC), certain mounting options can be obtained only by using IEC flanges (B5 or B14) of the same size or smaller than those shown in following table.

		CW1 CCW1	CW2 CCW2	CW3	CCW3	CW4 CCW4
VF/VF30/44	A, N, V, P1	63B14	63B14	63B14	63B14	63B14
	F-FA					
VF/VF30/49	A, N, V, P1	63B14	63B14	63B14	63B14	63B14
	F-FA					
VF/W30/63	U	63B5-63B14	63B5-63B14	63B5-63B14	63B5-63B14	63B5-63B14
	UF-UFC					
VF/W44/75	U	71B5-71B14	71B5-71B14	71B5-71B14	71B5-71B14	71B5-71B14
	UF-UFC-UFCR					
VF/W44/86	U	71B5-71B14	71B5-71B14	71B5-71B14	71B5-71B14	71B5-71B14
	UF-UFC					
VF/W49/110	U	80B5-80B14	80B5-80B14	80B5-80B14	80B5-80B14	80B5-80B14
	UF-UFC					
W/VF63/130	N	71B5-90B14	90B5-90B14	71B5-90B14	71B5-90B14	71B5-90B14
	A	90B5-90B14	71B5-90B14	90B5-90B14	90B5-90B14	90B5-90B14
	V		90B5-90B14			—
	F1	90B5-90B14	71B5-90B14	90B5-90B14	71B5-90B14	90B5-90B14
	FC1-FR1					
	P1				90B5-90B14	
	F2	90B5-90B14	71B5-90B14	71B5-90B14	90B5-90B14	90B5-90B14
	FC2-FR2					
	P2			90B5-90B14		
W/VF86/150	N	112B5-112B14	112B5-112B14	71B5-112B14	71B5-112B14	71B5-112B14
	A	71B5-112B14	71B5-112B14	112B5-112B14	112B5-112B14	112B5-112B14
	V	112B5-90B14	112B5-90B14			71B5-112B14
	F1	112B5-112B14	71B5-90B14	112B5-112B14	71B5-90B14	112B5-112B14
	FC1-FR1					
	P1		90B5-112B14		112B5-112B14	
	F2	112B5-112B14	71B5-90B14	71B5-90B14	112B5-112B14	112B5-112B14
	FC2-FR2					
	P2		90B5-112B14	112B5-112B14		
W/VF86/185	N	112B5-112B14	112B5-112B14	90B5-112B14	90B5-112B14	90B5-112B14
	A	90B5-112B14		112B5-112B14	112B5-112B14	112B5-112B14
	V	112B5-90B14	90B5-112B14			90B5-112B14
	F1	112B5-112B14	90B5-112B14	112B5-112B14	90B5-112B14	112B5-112B14
	FC1-FR1					
	P1				112B5-112B14	
	F2	112B5-112B14	90B5-112B14	90B5-112B14	112B5-112B14	112B5-112B14
	FC2-FR2					
	P2			112B5-112B14		
VF/VF130/210	N	#	132B5	#	#	#
	A	132B5	#	132B5	132B5	132B5
	V					
	P					
VF/VF130/250	N	#	132B5	#	#	#
	A	132B5	#	132B5	132B5	132B5
	V		132B5			
	P		#			

Consult our Technical Service

11.1 Terminal box position



12 DESIGNATION

GEAR UNIT

W 63 L1 UF1 — 24 S2 — B3 ....

OPTIONS 20

MOUNTING ARRANGEMENT

VF/VF, VF/W, W/VF	**CW (1, 2, 3, 4)** **CCW (1, 2, 3, 4)**

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MOUNTING POSITION

VF 27...VF 49 VFR 44, VFR 49	**B3**
W, WR VF 130...VF 250 VFR 130...VFR 250	**B3** (default), **B6**, **B7**, **B8**, **V5**, **V6**
VF/VF VF/W W/VF	**B3** (default), **B6**, **B7**, **B8**, **V5**, **V6**

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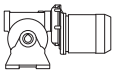
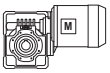
MOTOR MOUNTING

B5	(VF 30...VF 250, VFR 49...VFR 250, W, WR)
B14	(VF 30…VF 49, W)

90 91

INPUT CONFIGURATION

	VF	VFR	W	WR	VF/VF	VF/W	W/VF
P(IEC)	P27 (VF 27 only), P56...P225	P63, P80...P160	P71...P132	P63...P112	P56, P63, P90...P132	P56...P80	P71...P112
S_	⛔	 S44 (VFR 44 only)	 S1...S3	⛔	⛔	⛔	S1...S3
HS							

90 91 | 91 | 165 ... 168

GEAR RATIO

SHAFT BORE

W 75 VF/W 44/75	**D30** (default), **D28** (on request)

VERSION 14

TORQUE LIMITER

VF, VFR W, WR	**L1**, **L2**	VF/VF	**LF**

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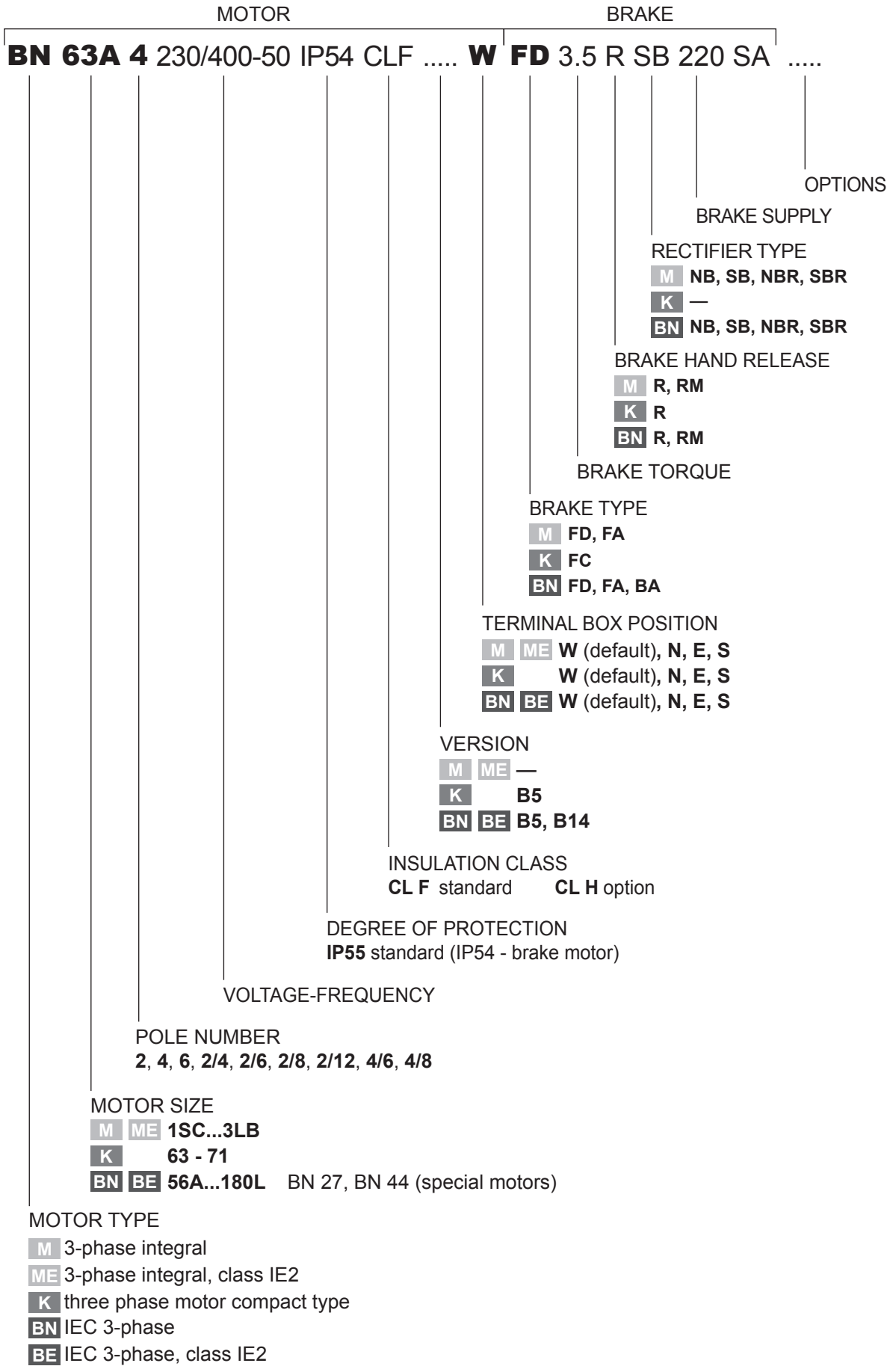
GEAR FRAME SIZE

VF	**27**, **30**, **44**, **49**, **130**, **150**, **185**, **210**, **250**	VF/VF	**30/44**, **30/49**, **130/210**, **130/250**
VFR	**44**, **49**, **130**, **150**, **185**, **210**, **250**	VF/W	**30/63**, **44/75**, **44/86**, **49/110**
W, WR	**63**, **75**, **86**, **110**	W/VF	**63/130**, **86/150**, **86/185**

GEAR TYP

VF, **W**	Worm gearbox
VFR, **WR**	Helical-worm gear unit
VF/VF, **VF/W**, **W/VF**	Combined gearbox


MOTOR
BRAKE
BN 63A 4 230/400-50 IP54 CLF ..... W FD 3.5 R SB 220 SA .....
OPTIONS
BRAKE SUPPLY
RECTIFIER TYPE
M NB, SB, NBR, SBR
K —
BN NB, SB, NBR, SBR
BRAKE HAND RELEASE
M R, RM
K R
BN R, RM
BRAKE TORQUE
BRAKE TYPE
M FD, FA
K FC
BN FD, FA, BA
TERMINAL BOX POSITION
M ME W (default), N, E, S
K W (default), N, E, S
BN BE W (default), N, E, S
VERSION
M ME —
K B5
BN BE B5, B14
INSULATION CLASS
CL F standard CL H option
DEGREE OF PROTECTION
IP55 standard (IP54 - brake motor)
VOLTAGE-FREQUENCY
POLE NUMBER
2, 4, 6, 2/4, 2/6, 2/8, 2/12, 4/6, 4/8
MOTOR SIZE
M ME 1SC...3LB
K 63 - 71
BN BE 56A...180L BN 27, BN 44 (special motors)
MOTOR TYPE
M 3-phase integral
ME 3-phase integral, class IE2
K three phase motor compact type
BN IEC 3-phase
BE IEC 3-phase, class IE2

13 GEARBOX OPTIONS

SO

Gear units VF 30 ... VF 49, W 63 ... W 86, usually factory filled with oil, are, in this case, supplied unlubricated.

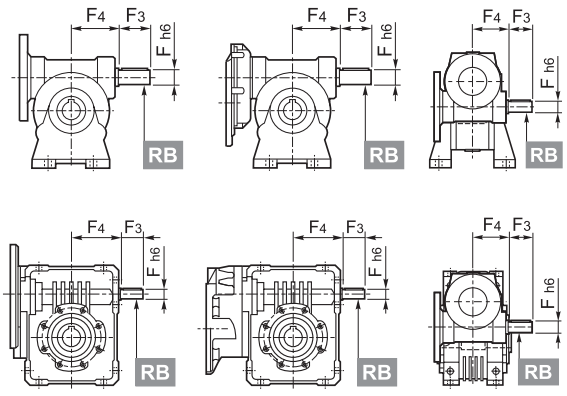
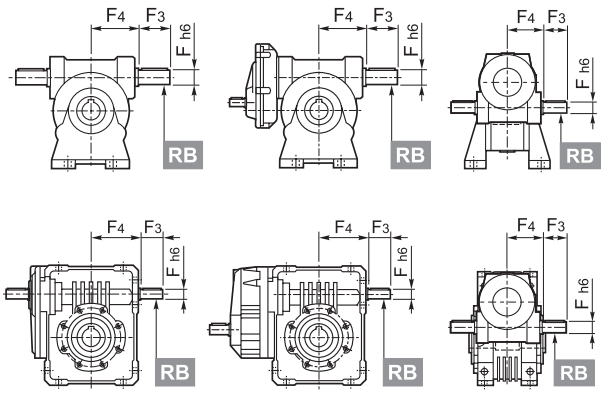
LO

Gearboxes VF 130…VF 250 and W 110, usually supplied unlubricated, to be filled with synthetic oil currently used by BONFIGLIOLI RIDUTTORI according to the mounting position specified.
The applicability of the LO option is described in the table below.

	LO					
	Mounting position					
	B3	B6	B7	B8	V5	V6
W 110 U-UF-UFC	X	X	X	X	⛔	⛔
VF 130 A-N-P-F-FC	X	X	X	X	⛔	⛔
VF 130 V	⛔	X	X	⛔	X	X
VF 130 FR	X	⛔	⛔	X	⛔	⛔
VF 150 A-N-P-F-FC	X	X	X	X	⛔	⛔
VF 150 V	⛔	X	X	⛔	X	X
VF 150 FR	X	⛔	⛔	X	⛔	⛔
VF 185 A-N-P-F-FC	X	X	X	X	⛔	⛔
VF 185 V	⛔	X	X	⛔	X	X
VF 185 FR	X	⛔	⛔	X	⛔	⛔
VF 210 A-N-P	X	⛔	⛔	X	⛔	⛔
VF 210 V	⛔	⛔	⛔	⛔	X	X
VF 250 A-N-P	X	⛔	⛔	X	⛔	⛔
VF 250 V	⛔	⛔	⛔	⛔	X	X

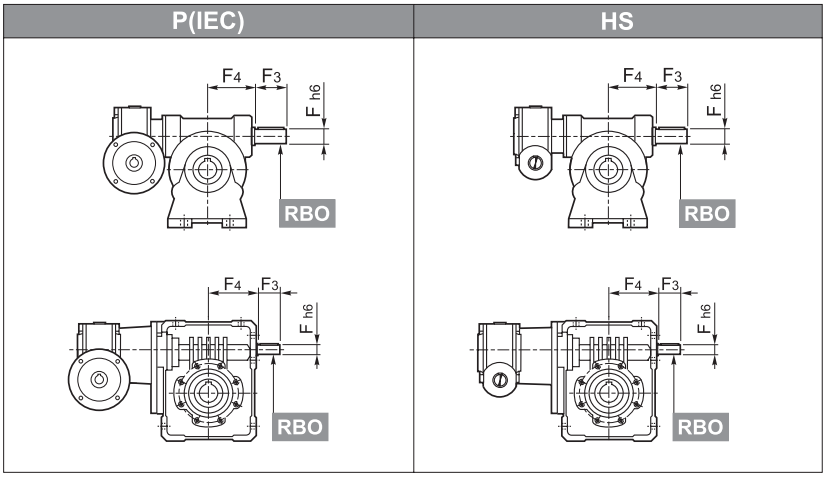
RB

Double-ended input shaft at non-drive- end (with the exception of VF 27).

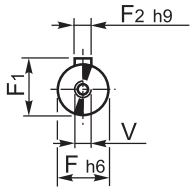
P(IEC)	HS
	

Bonfiglioli Riduttori

RBO
Double-ended input shaft at N.D.E. of 2nd gearbox (combined execution only)



Extended input shaft dimensions (options RB and RBO)



		F	F1	F2	F3	F4	V
VF VFR VF/VF	30	9	10.2	3	20	50	—
	44	11	12.5	4	30	56	—
	49	16	18	5	40	65	M6
W WR VF/W	63	18	20.5	6	40	74	M6
	75	19	21.5	6	40	88.5	M6
	86	25	28	8	50	101.5	M8
	110	25	28	8	60	127.5	M8
VF VFR W/VF	130	30	33	8	60	160	M8
	150	35	38	10	65	185	M8
	185	40	43	12	70	214.5	M8
	210	48	51.5	14	82	185	M16x40
	250	55	59	16	82	228	M16x40

A and **P** versions of VF 210 and VF 250 feature the fan cooling as a standard, however forced ventilation is not feasible should the **RB** option be specified.

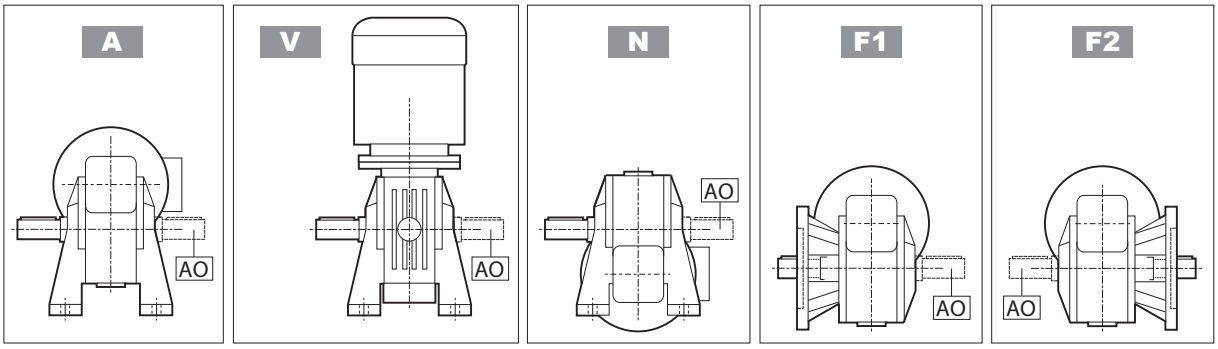
VV
Fluoro elastomer oil seal on input shaft. The option is available for W110 and for units of the VF series, barring all VF 30's c/w option RB and VF 30_HS.

PV
Oil seals from Fluoro elastomer compound on both the input and the output shaft, barring all VF 30's c/w option RB and VF 30_HS.

KA
VF_A interchangeability kit. Option is available for units W 63 to W 110.

KV
VF_V interchangeability kit (barring W + option RB). Option is available for units W 63 to W 110.

AO
Output shaft on side opposite to standard (VF 27).



Motor options
For more detailed information please consult the Electric Motor section in this book.

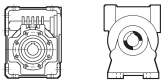
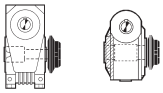
14 LUBRICATION

14.1 Lubrication for W and VF

Frame sizes VF 27 ... VF 49, W 63 ... W 86 are supplied by the factory, or by authorized dealers, already filled with “long life” synthetic oil. On request, these units can be supplied unlubricated, in which case, the option **SO** must be specified on the order. The applicability of the option is described in the chapter “GEARBOX OPTIONS”.
Unless otherwise specified, units type VF 130 ... VF 250 and W 110 are generally supplied unlubricated at it is the customer’ responsibility to fill them with oil prior to putting them into operation. By requesting the **LO** option at the time of order, these units will be factory filled with synthetic lubricant in the quantity relevant to the mounting position that was specified in the purchase order. The applicability of the option is described in the chapter “GEARBOX OPTIONS”.
Double worm gears type VF/VF, VF/W and W/VF consist of two separate units, independently lubricated.
For the reference charts of oil plugs placement and quantity of lubricant, refer to the Installation, Operation and Maintenance Manual (available on www.bonfiglioli.com).
In the absence of contamination, the “long life” synthetic lubricant supplied by the factory, does not require periodical changes throughout the lifetime of the gear unit.
Operation of gear units is permitted at ambient temperatures between -20°C and +40°C. However, for temperatures between -20°C and -10°C unit may only start up after it has been progressively and evenly pre-heated, or otherwise initially operated unloaded.
Load may then be connected to the output shaft when the gear unit has reached the temperature of -10°C, or higher.

14.2 Type of lubricant

When using a lubricant other than the recommended SHELL lubricant, be sure it is a synthetic lubricant with equivalent viscosity and composition and added with adequate anti-foaming agents.
For the chart of recommended/permitted lubricants refer to the Installation, Operation and Maintenance Manual (available on www.bonfiglioli.com).

			mounting position	
			B3 - B6 - B7 - B8 - V5	**V6**
	Helical reduction	**WR 63...WR 86**	**OMALA S4 WE 320**	**GADUS S5 V142W 00**
		VFR 44...VFR 250 WR 110	**OMALA S4 WE 320**	
	Worm gear unit	**W 63...W 110 VF 44...VF 250**	**OMALA S4 WE 320**	
	Worm gear unit c/w torque limiter	**W 63...W 110 VF 44...VF 49**	**OMALA S4 WE 460**	

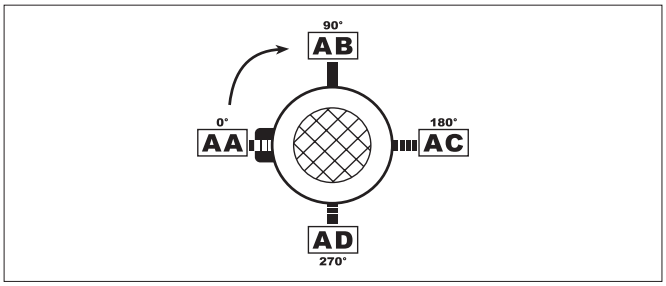
15 MOUNTING POSITION AND TERMINAL BOX ANGULAR LOCATION

Location of motor terminal box can be specified by viewing the motor from the fan side; standard location is shown in black (W).

The terminal box positions indicated do not apply to VFR 44. Please refer to page 19 and pages 110-111 for designation and identification of design version.

Angular location of the brake release lever.

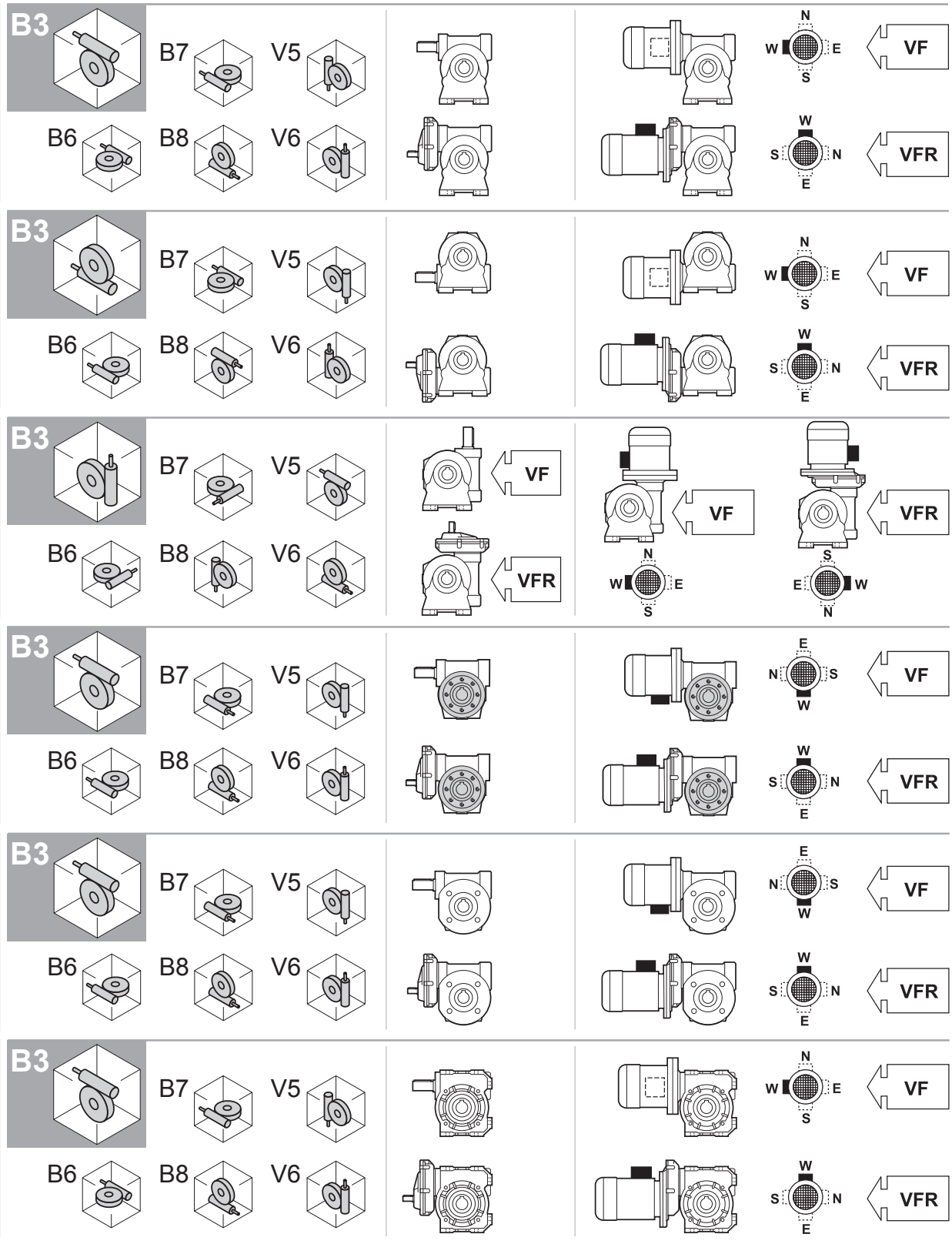
Unless otherwise specified, brake motors have the manual device side located, 90° apart from terminal box.
Different angles can be specified through the relevant options available.



The following pages describe the mounting positions of VF and W series gearboxes.

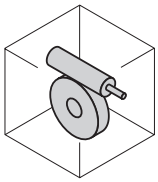
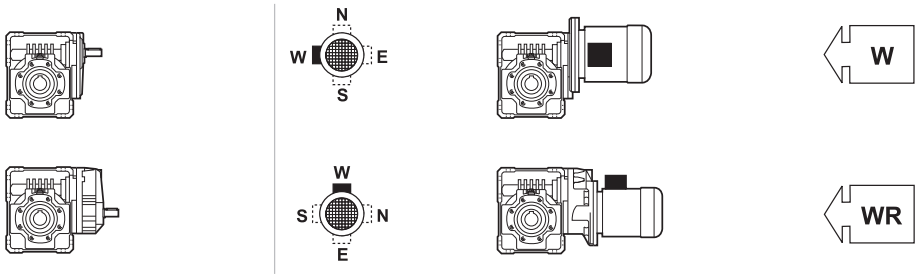
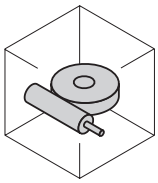
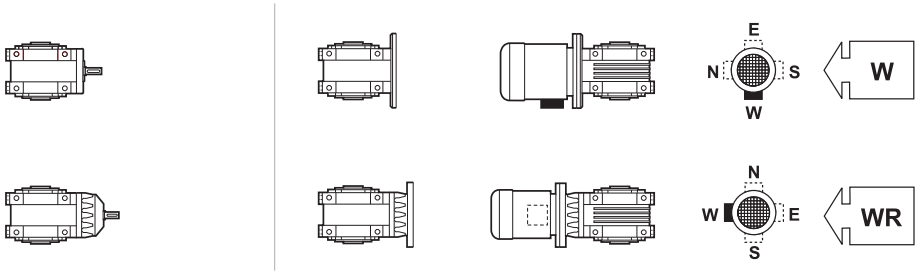
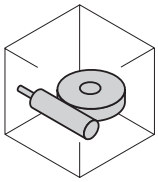
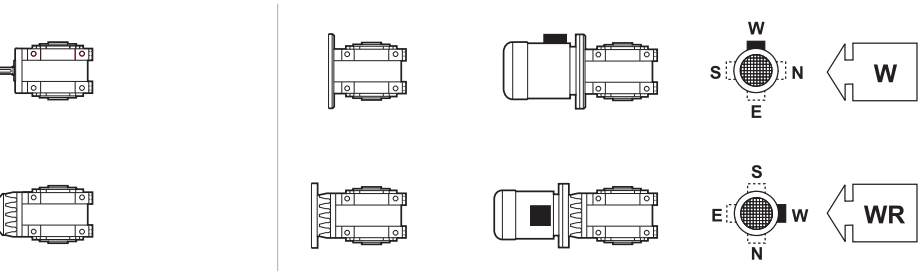
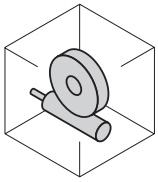
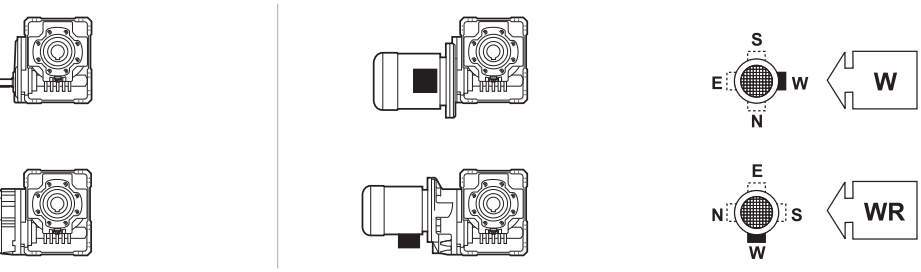
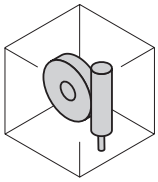
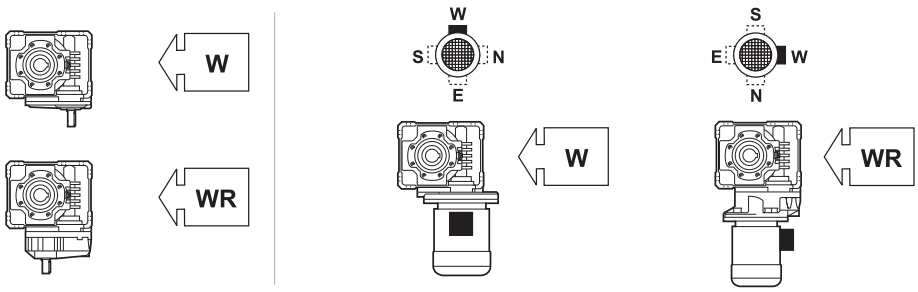
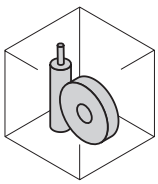
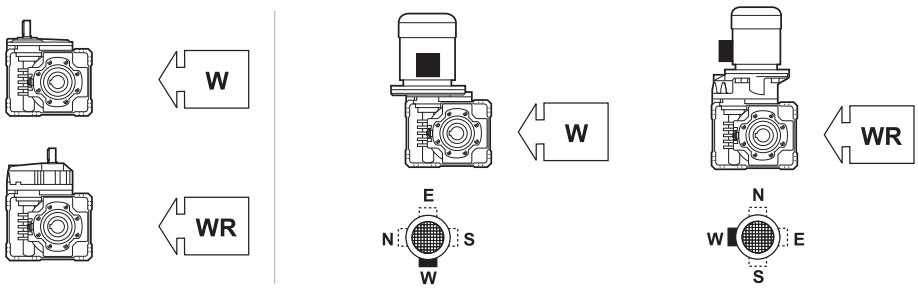
In the case of VF/VF, VF/W and W/VF gearbox combinations, mounting positions refer to the second (machine side) gearbox. Refer to the “Mounting version” chapter for details of the first (input side) gearbox.

VF 27 _ ... VF 49 _ VFR 44 _ , VFR 49 _

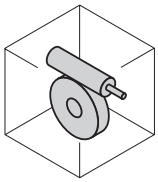
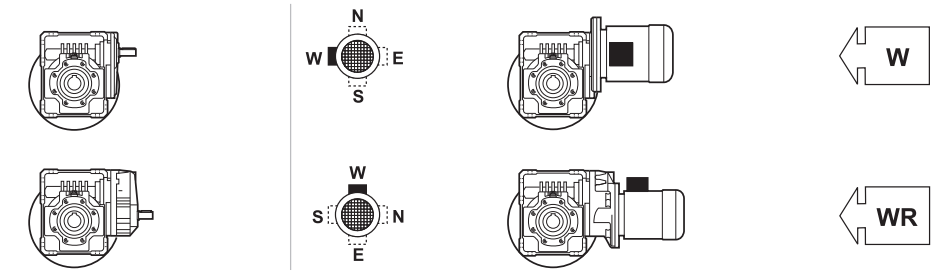
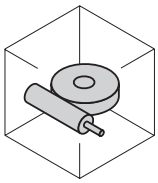
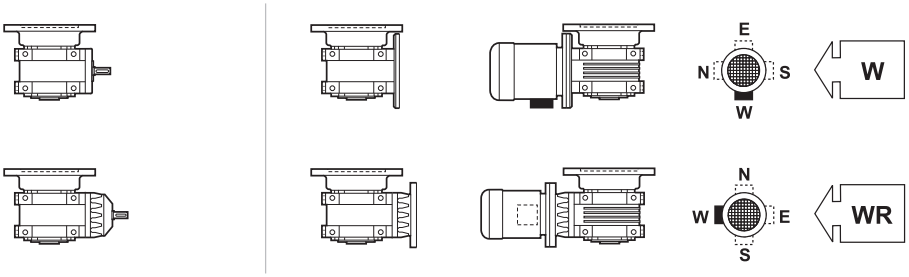
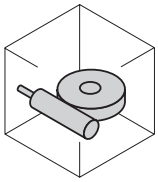
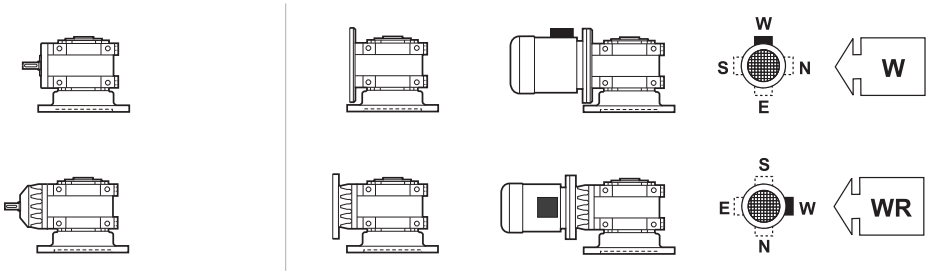
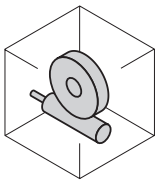
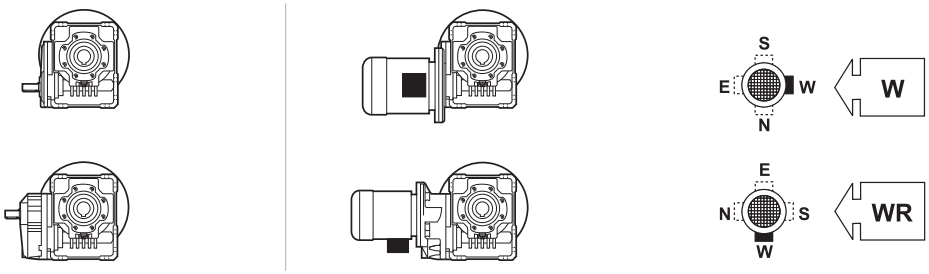
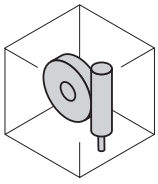
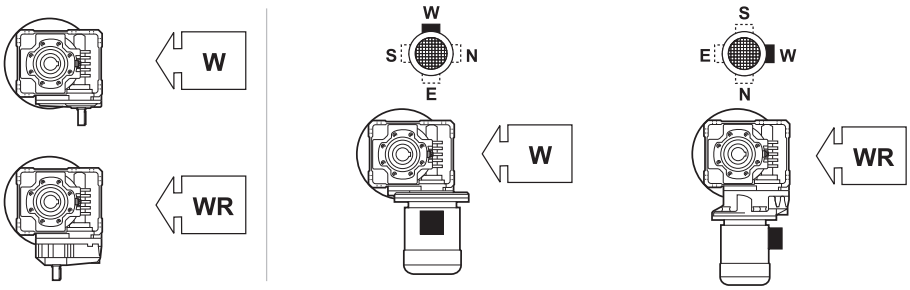
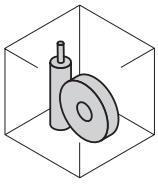
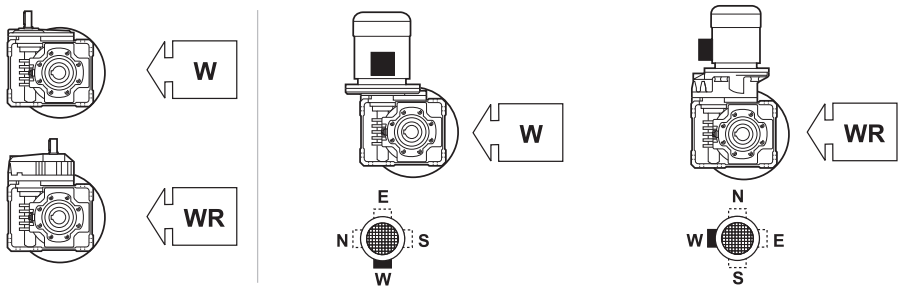


Base mounting position.
Gearboxes are plated only for base mounting position (B3). They can nevertheless also be installed in any of the derived positions (B6, B7, B8, V5, V6). Mounting position may not be changed after installation.

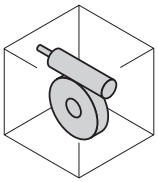
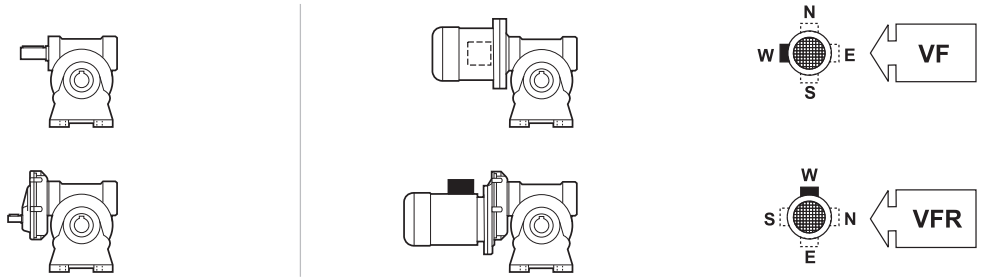
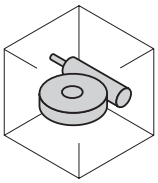
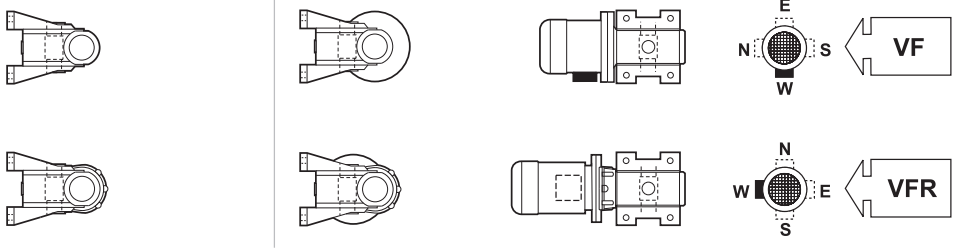
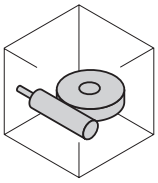
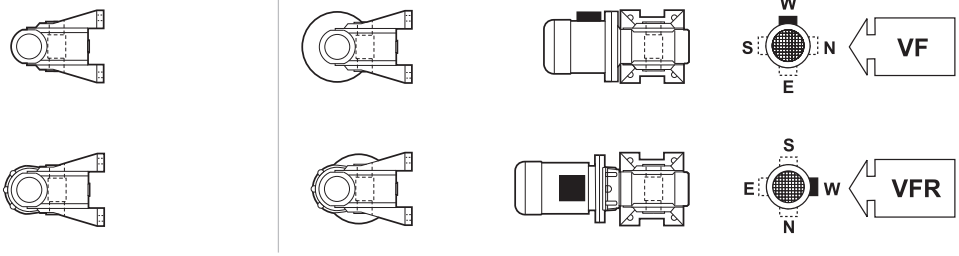
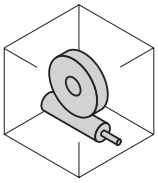
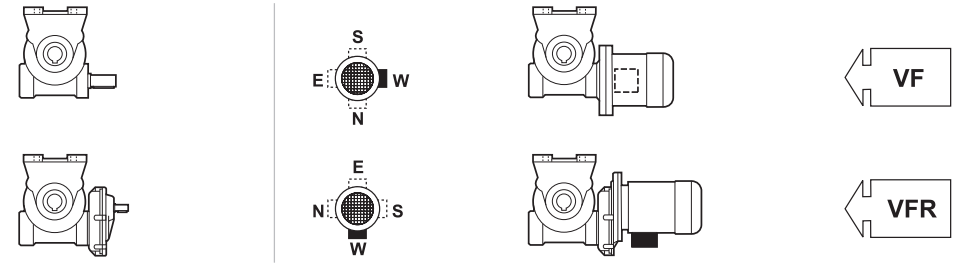
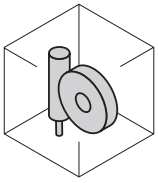
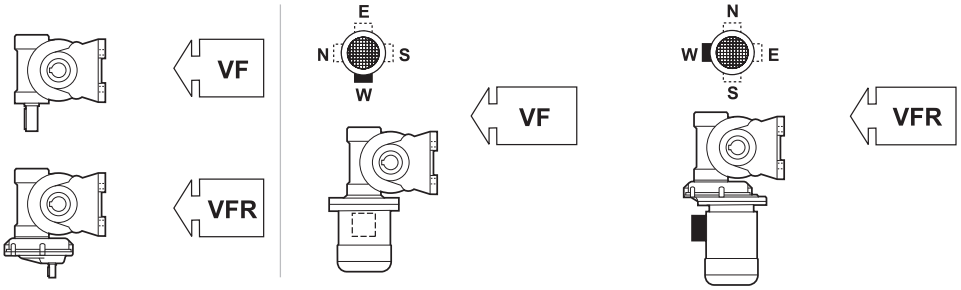
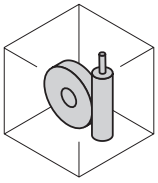
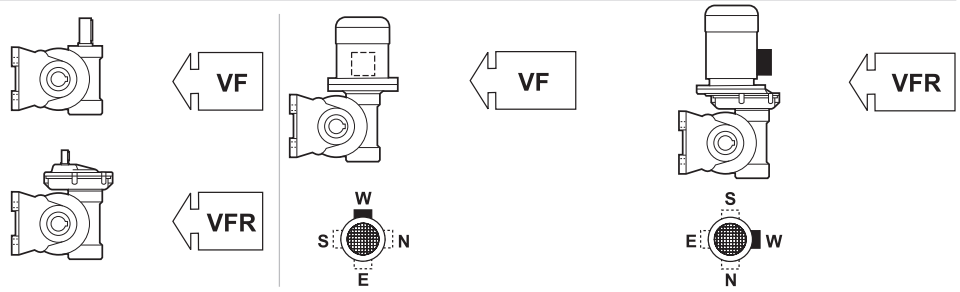
W 63 U ... W 110 U WR 63 U ... WR 110 U

	_HS	_S - _P (IEC)
B3		
B6		
B7		
B8		
V5		
V6		

W 63 UF/UFC ... W 110 UF/UFC WR 63 UF/UFC ... WR 110 UF/UFC

	_HS	_S - _P (IEC)
B3		
B6		
B7		
B8		
V5		
V6		

VF 130 A ... VF 250 A VFR 130 A ... VFR 250 A

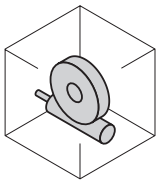
	_HS	_P (IEC)
B3		
B6		
B7		
B8		
V5		
V6		

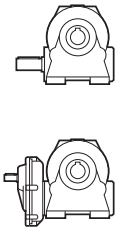
VF 130 N ... VF 250 N VFR 130 N ... VFR 250 N

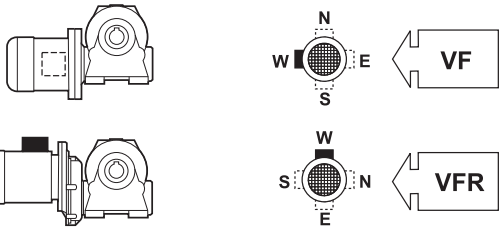
_HS

_P (IEC)

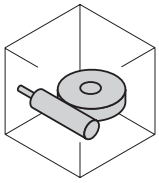
B3

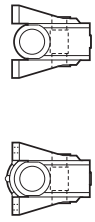


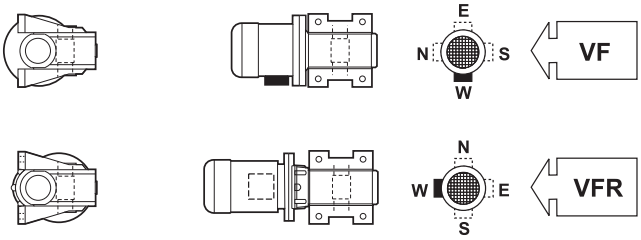




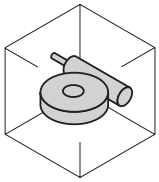
B6

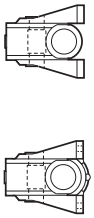


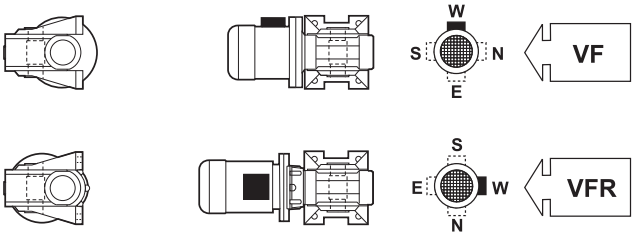




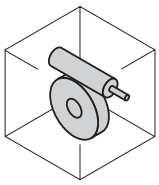
B7

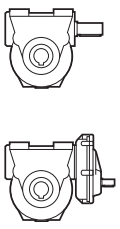


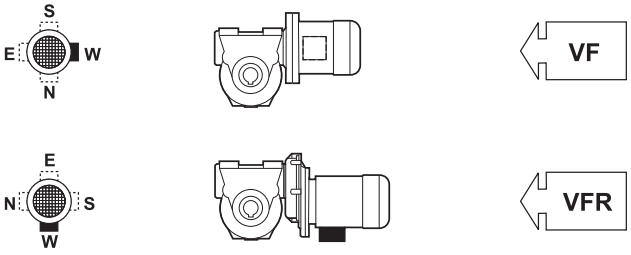




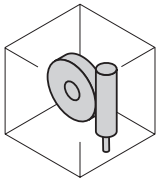
B8

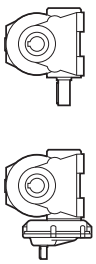


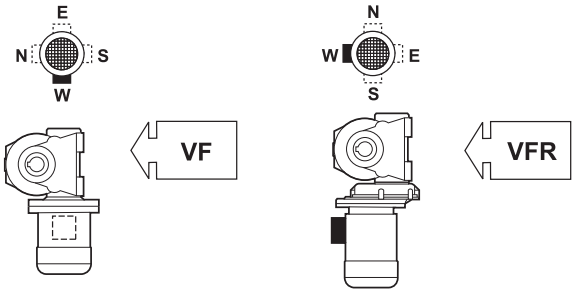




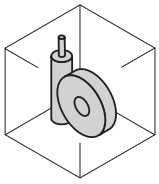
V5

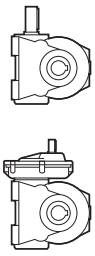


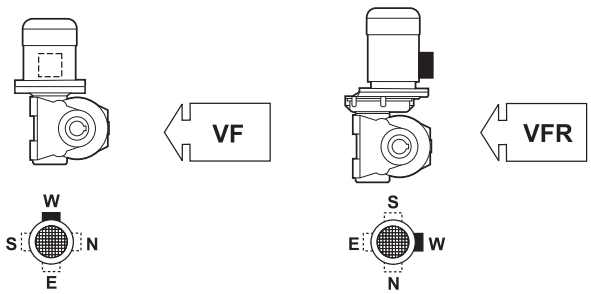




V6

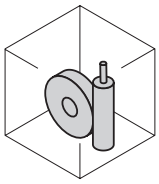
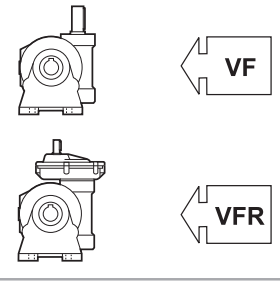
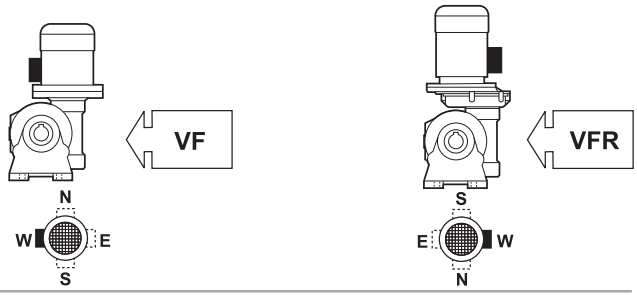
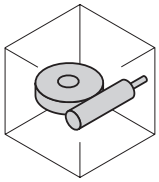
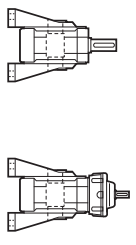
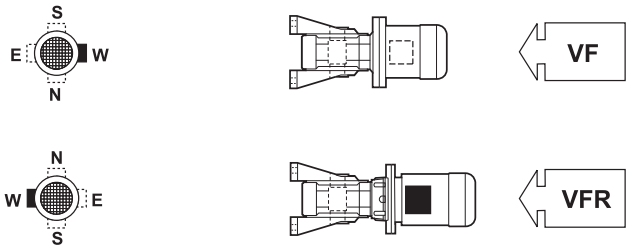
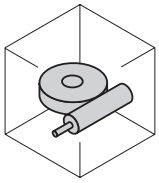
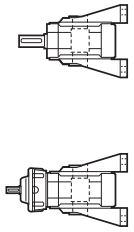
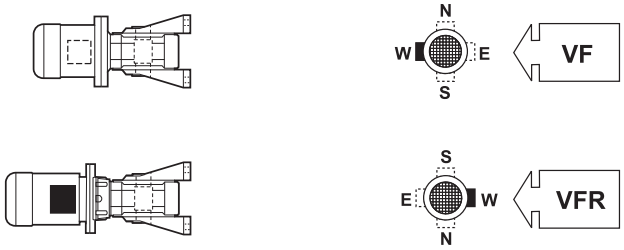
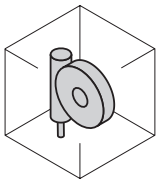
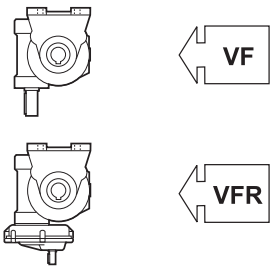
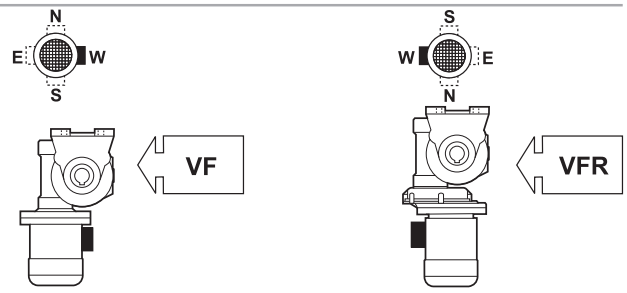
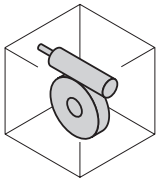
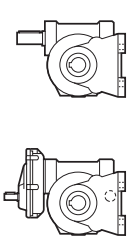
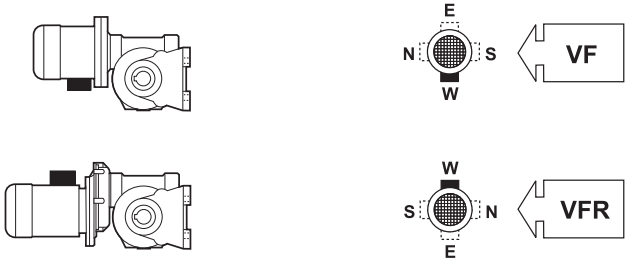
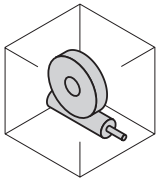
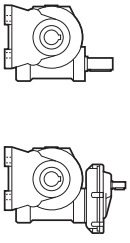
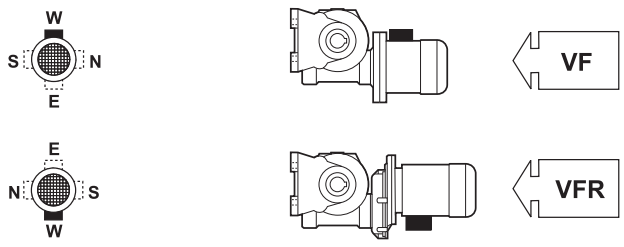




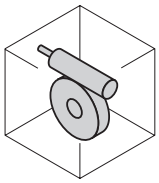
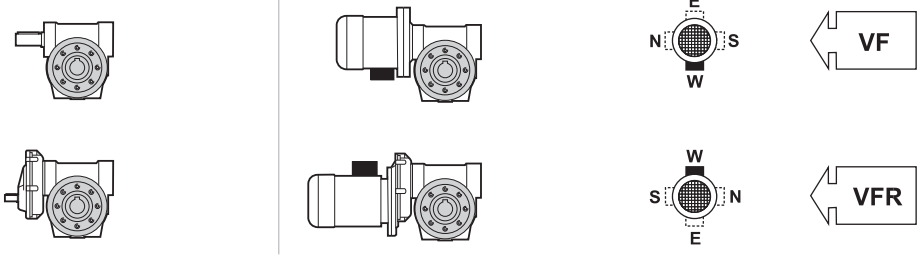
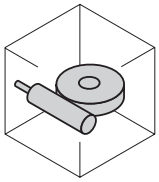
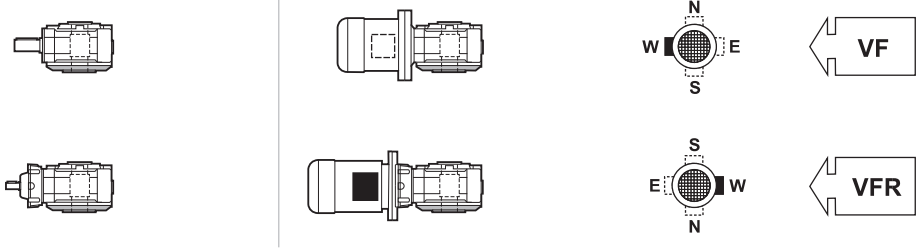
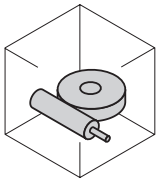
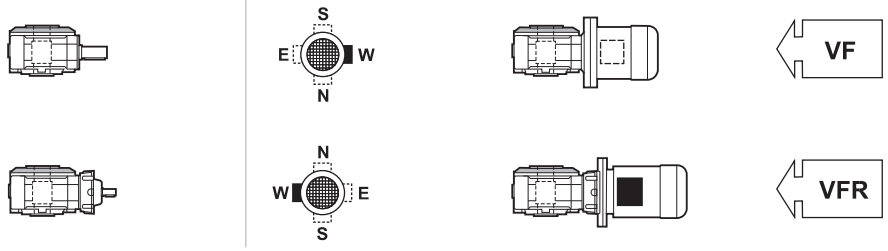
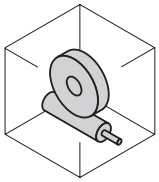
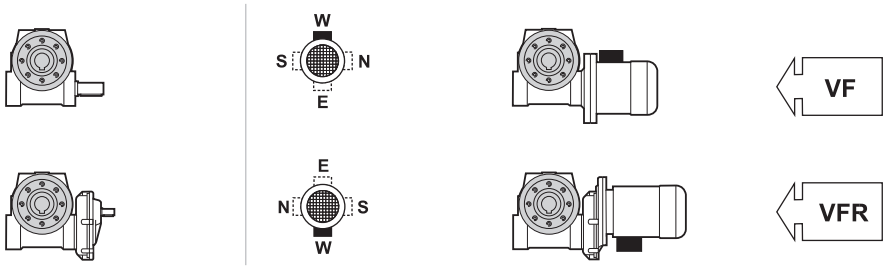
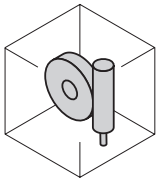
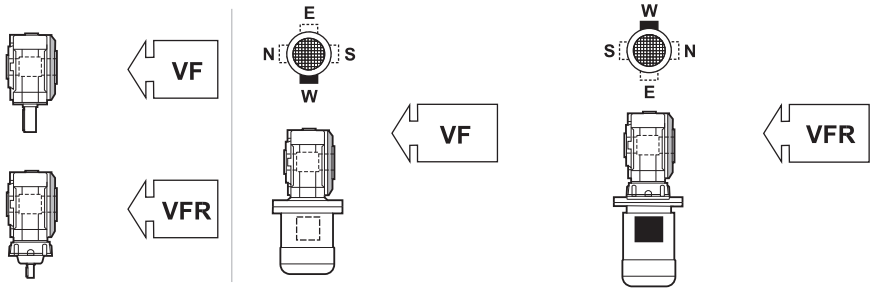
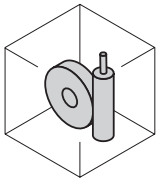
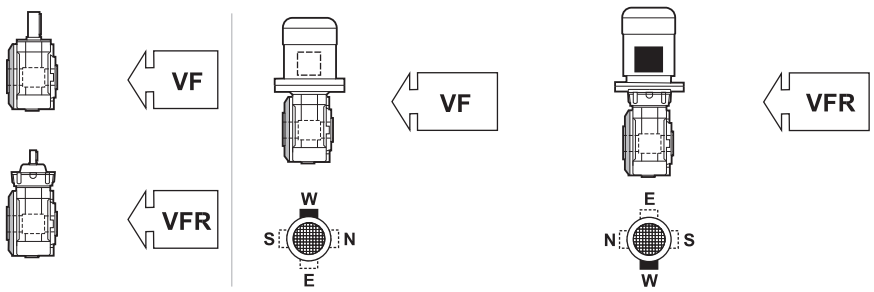


Bonfiglioli Riduttori

VF 130 V ... VF 250 V VFR 130 V ... VFR 250 V

	_HS	_P (IEC)	
B3			
B6			
B7			
B8			
V5			
V6			

VF 130 P ... VF 250 P VFR 130 P ... VFR 250 P

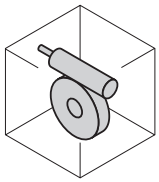
	_HS	_P (IEC)
B3		
B6		
B7		
B8		
V5		
V6		

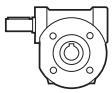
VF 130 F ... VF 250 F VFR 130 F ... VFR 250 F

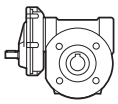
_HS

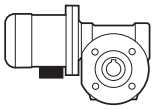
_P (IEC)

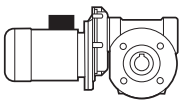
B3







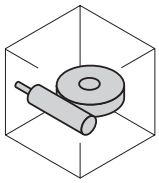


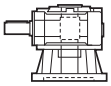


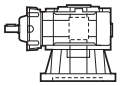
VF

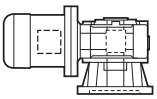
VFR

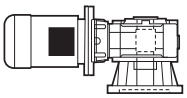
B6

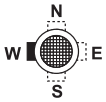




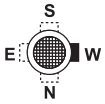






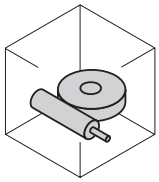


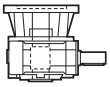
VF

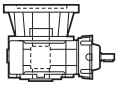


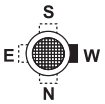
VFR

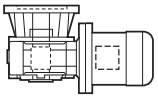
B7



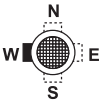


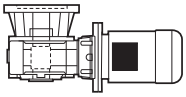






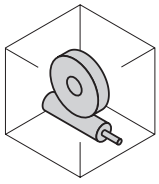
VF

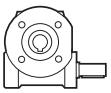


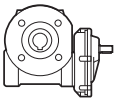


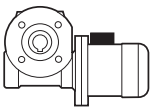
VFR

B8

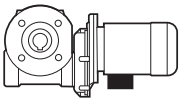






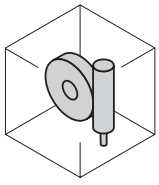


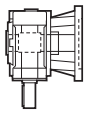
VF



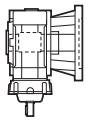
VFR

V5

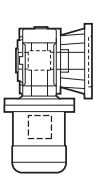




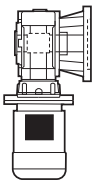
VF



VFR

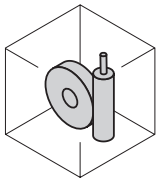


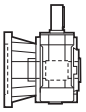
VF



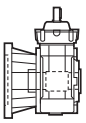
VFR

V6



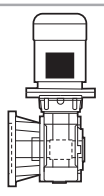


VF



VFR

VF



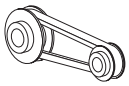
VFR

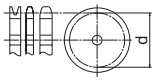
16 OVERHUNG LOADS

16.1 Calculating the resulting overhung load

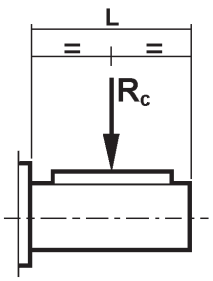
External transmissions keyed onto input and/or output shaft generate loads that act radially onto same shaft.
Resulting shaft loading must be compatible with both the bearing and the shaft capacity.
Namely shaft loading (R_{c1} for input shaft, R_{c2} for output shaft), must be equal or lower than admissible overhung load capacity for shaft under study (R_{n1} for input shaft, R_{n2} for output shaft). OHL capability listed in the rating chart section.
In the formulas given below, index (1) applies to parameters relating to input shaft, whereas index (2) refers to output shaft.
The load generated by an external transmission can be calculated with close approximation by the following equation:

$$R_c = \frac{2000 \times M \times K_r}{d}$$

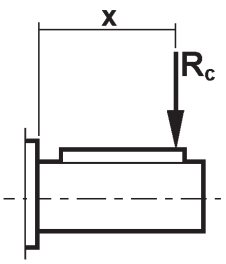
$K_r = 1$	
$K_r = 1.25$	
$K_r = 1.5 - 2.0$	

M [Nm]	
d [mm]	

16.2 Overhung loading verification



$R_c \leq R_n$



$R_x = R_n \times \frac{a}{b + x}$

$R_c \leq R_x$

16.3 Load location factor

	Output shaft		R_{n2} max [N]
	a	b	
VF 27	56	44	600
VF 30	60	45	1700
VF 44 - VFR 44 - VF/VF 30/44	71	51	2500
VF 49 - VFR 49 - VF/VF 30/49	99	69	3450
W 63 - WR 63 - VF/W 30/63	132	102	5000
W 75 - WR 75 - VF/W 44/75	139	109	6200
W 86 - WR 86 - VF/W 44/86	149	119	7000
W 110 - WR 110 - VF/W 49/110	173	136	8000
VF 130 - VFR 130 - W/VF 63/130	182	142	13800
VF 150 - VFR 150 - W/VF 86/150	198	155	16000
VF 185 - VFR 185 - W/VF 86/185	220	170	19500
VF 210 - VFR 210 - W/VF 130/210	268	203	34500
VF 250 - VFR 250 - W/VF 130/250	334	252	52000

17 THRUST LOADS

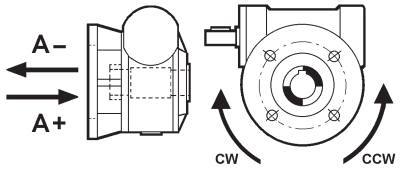
Permissible thrust loads on input [An1] and output [An2] shafts are obtained from the radial loading for the shaft under consideration [Rn1] and [Rn2] through the following equation:

$$A_{n1} = R_{n1} \times 0,2$$
$$A_{n2} = R_{n2} \times 0,2 \quad (14)$$

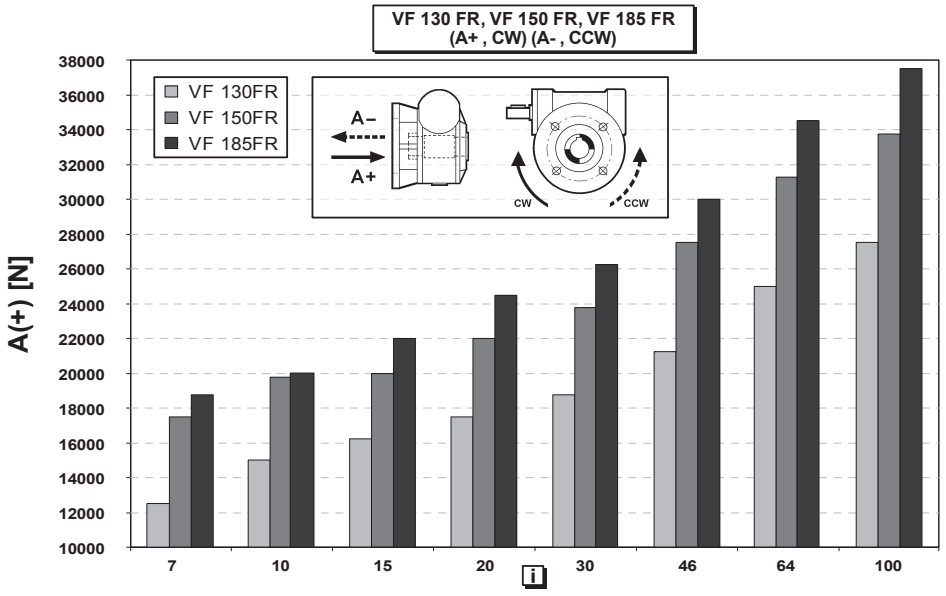
The thrust loads calculated through these formulas apply to thrust forces occurring at the same time as rated radial loads.
In the only case that no overhung load acts on the shaft the value of the admissible thrust load [A_n] amounts to 50% of rated OHL [R_n] on same shaft.
Where thrust loads exceed permissible value or largely prevail over radial loads, contact Bonfiglioli Riduttori for an in-depth analysis of the application.

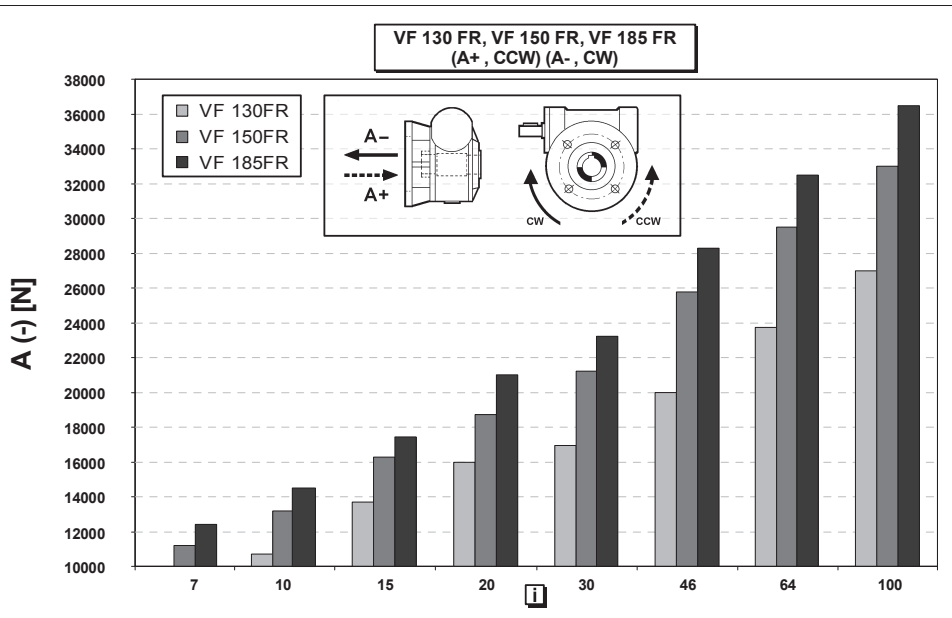
17.1 Maximum axial loading for FR version

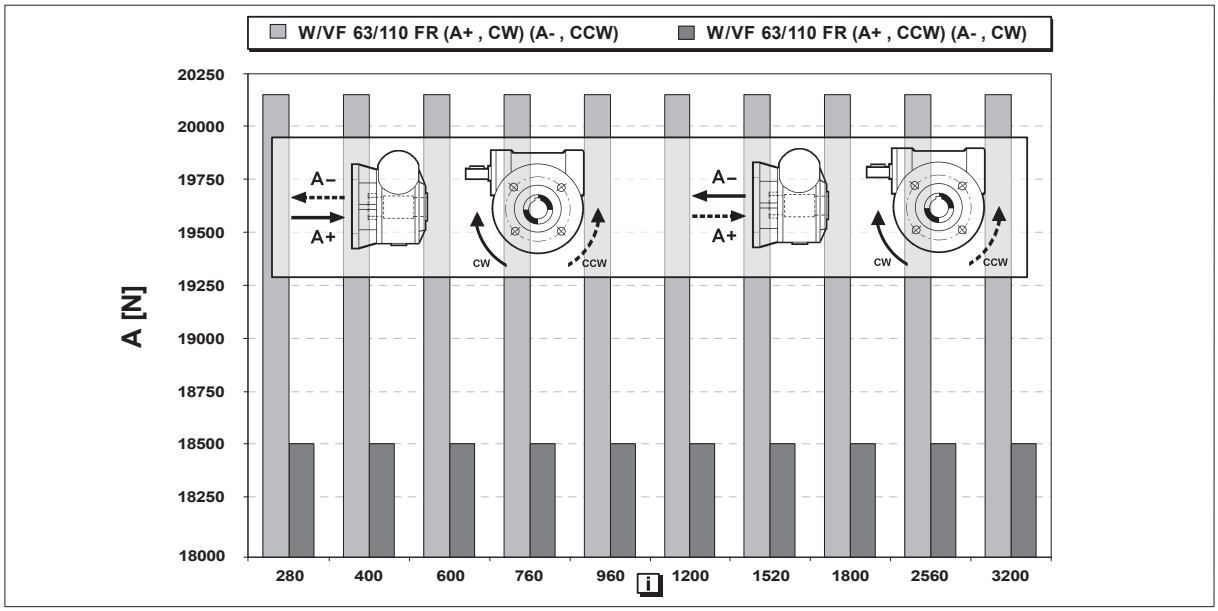
The FR version is designed to meet the requirements of applications entailing very high axial loads. It is available for units size 130, 150 and 185.
This version, within the same external dimensions as the FC version, is capable of bearing axial loads (well above those of the standard versions) indicated in the table below referred to the output shaft, gear ratio [i] and +/- direction of rotation.

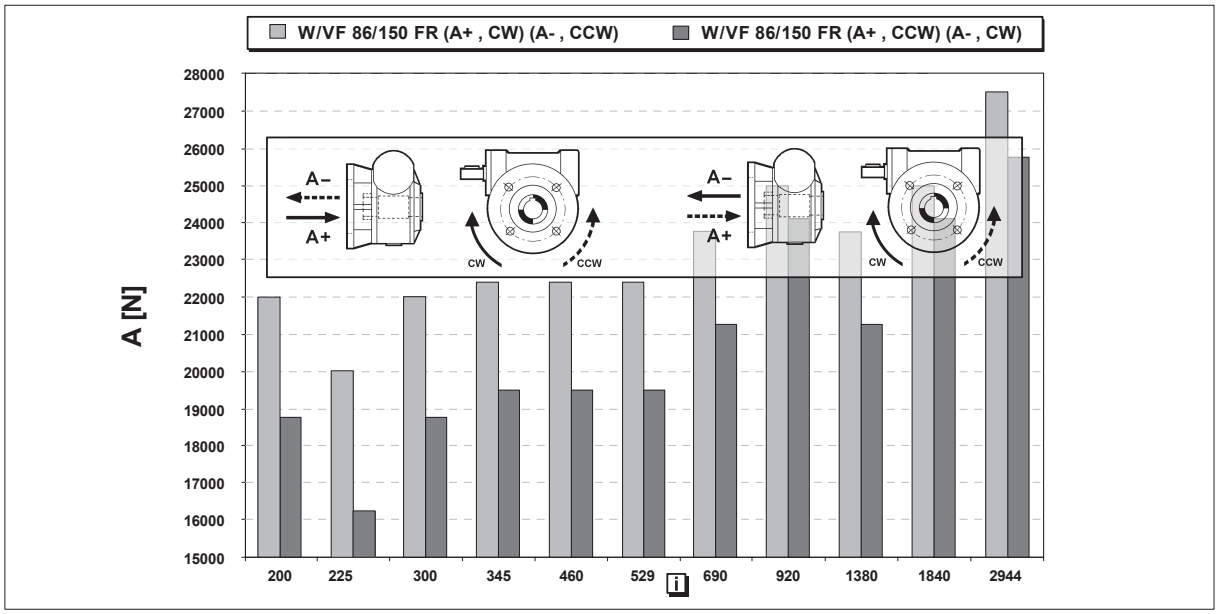


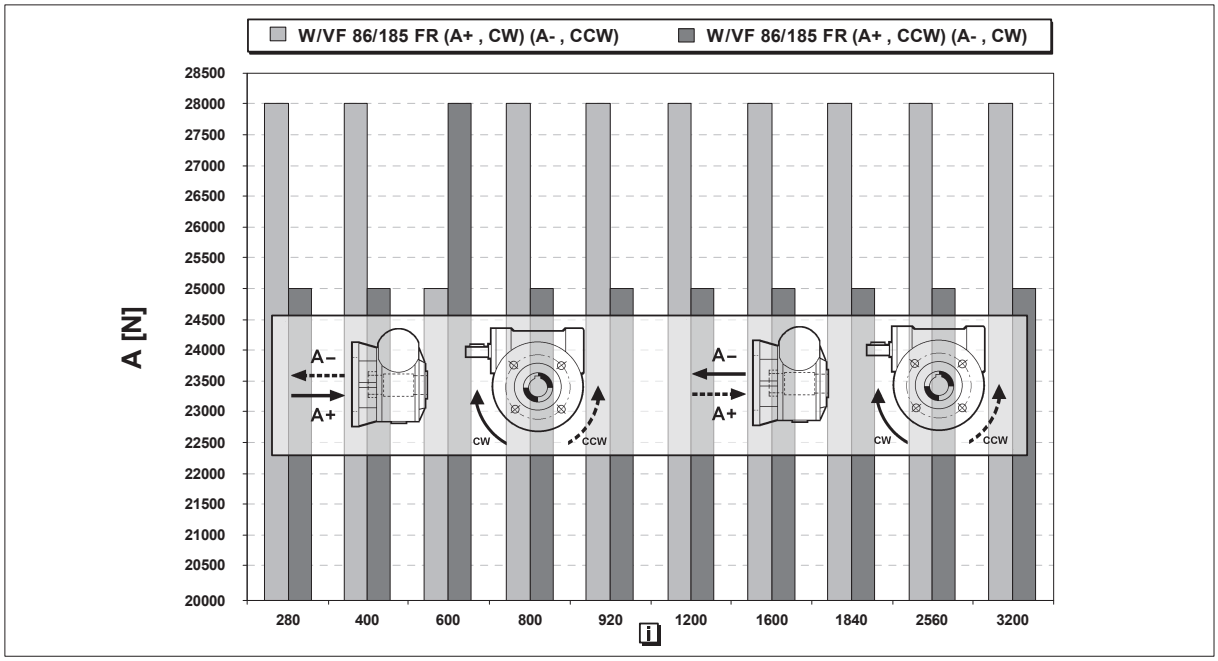
A+ = Compressive load
A- = Pull load
CW = Clockwise rotation
CCW = Counterclockwise rotation






W/VF 63/110 FR (A+ , CW) (A- , CCW)
W/VF 63/110 FR (A+ , CCW) (A- , CW)
A [N]
20250
20000
19750
19500
19250
19000
18750
18500
18250
18000
280
400
600
760
960
1200
1520
1800
2560
3200
A–
A+
CW
CCW

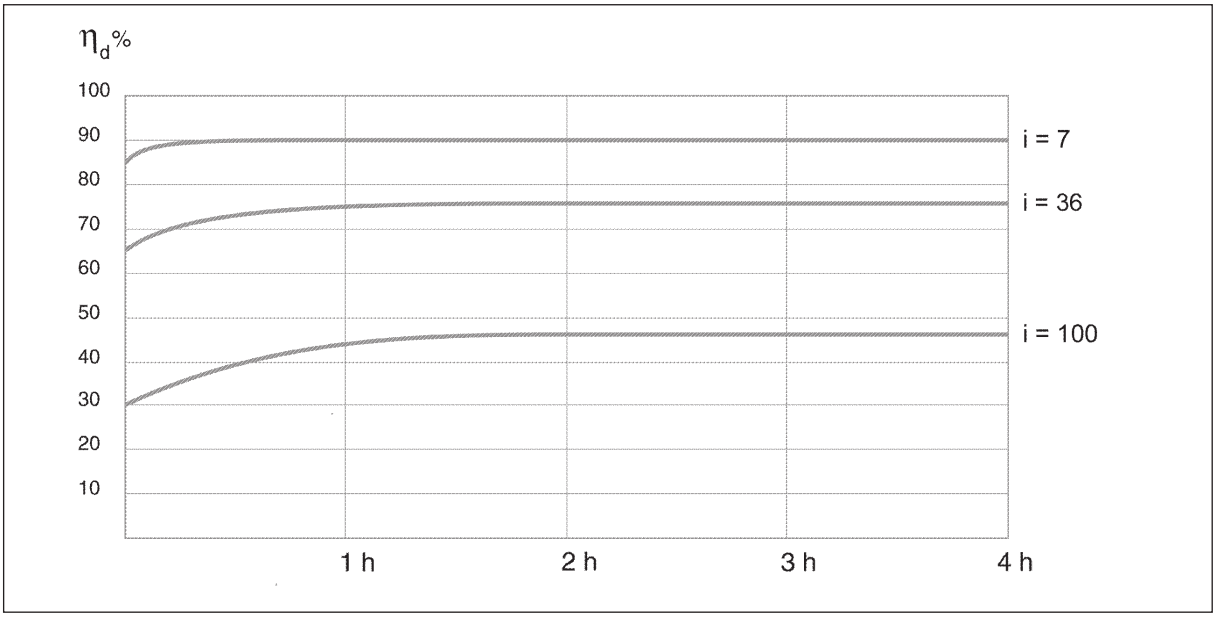

W/VF 86/150 FR (A+ , CW) (A- , CCW)
W/VF 86/150 FR (A+ , CCW) (A- , CW)
A [N]
28000
27000
26000
25000
24000
23000
22000
21000
20000
19000
18000
17000
16000
15000
200
225
300
345
460
529
690
920
1380
1840
2944
A–
A+
CW
CCW


W/VF 86/185 FR (A+ , CW) (A- , CCW)
W/VF 86/185 FR (A+ , CCW) (A- , CW)
A [N]
28500
28000
27500
27000
26500
26000
25500
25000
24500
24000
23500
23000
22500
22000
21500
21000
20500
20000
280
400
600
800
920
1200
1600
1840
2560
3200
A–
A+
CW
CCW

18 EFFICIENCY

Efficiency [η] depends on the following parameters:
- helix angle of gearing
- driving speed
- running-in of gearing

In this connection, remember that the optimum value is reached after several hours of running-in and is reached later on in steady-state operating gearboxes as shown in the table below.
Therefore, in applications calling for intermittent duty (e.g. hoisting, drives, etc.), motor power must be adequately increased to compensate for the gearbox's low efficiency at start-up.
Torque values $\mathbf{M_{n2}}$ indicated in the catalogue are calculated by considering the steady-state performance of the gearboxes.
The diagram shows indicatively the time required to reach the maximum value of dynamic efficiency.



19 NON-REVERSING

Some applications may require occasionally the gearbox to be back-driven by the load through the output shaft, some others instead require the gearbox to lock and hold the load when electric power switches off.
The factor affecting reversibility of worm gears the most is the efficiency with more precisely static efficiency η_s affecting static reversibility and dynamic efficiency η_d affecting dynamic reversibility.
Generally only gear ratios i=64 and higher offer locking properties with the grater ratios being totally non reversible.

19.1 Static non-reversing

In this condition the gear units cannot be driven back from the output shaft, however slow running-back may still occur if the worm gears are subject to vibrations.
The theoretical condition for the static non-reversing to occur is:

$$\eta_s < 0.4 - 0.5 \quad (15)$$

the η_s value for each worm gear can be found in the respective rating chart.
The opposite situation, i.e. static reversibility applies, theoretically when:

$$\eta_s > 0.5 \quad (16)$$

19.2 Dynamic non-reversing

The load-holding capability is dependent on drive speed, dynamic efficiency and, if any, vibrations. The result of non-reversibility is the locking of the output shaft is no longer driven. Partial or total non reversibility should be taken into consideration particularly when high inertia loads are driven, because of the considerable overloads that may apply to the gearbox.

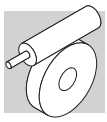
$$\eta_d < 0.5 \quad (17)$$

Where η_d is the value for the dynamic efficiency of the gear unit in the actual operating conditions. Value can be found in the speed reducer rating chart.
The opposite condition, i.e. dynamic reversing is physically possible when:

$$\eta_d > 0.5 \quad (18)$$

Table below is a guideline to the various degrees of reversibility for each drive size and gear ratio (data refer to the worm gearing only).
Values for reversibility are indicative as this may be affected by vibrations, operating temperature, lubricating conditions, gear wear, etc.

As it is virtually impossible to provide and guarantee total non reversing, we recommend the use of an external brake with sufficient capability to prevent vibrations induced starting, where these circumstances are required.



Backdriving														
		VF				W				VF				
Static reversing	Dynamic reversing	27	30	44	49	63	75	86	110	130	150	185	210	250
yes	**yes**	—	—	7	7	7	7	7	7	7	7	7	7	7
yes	**yes**	7 10	7 10	10 14	10 14	10 12 15	10 15	10 15 20 23	10 15 20 23	10 15 20 23	10 15 20 23	10 15 20	10 15 20	10 15 20
uncertain	**yes**	15 20 30	15 20 30	20 28 35	18 24 28 36	19 24 30 38	20 25 30 40	30 40 46 56	30 40 46 56	30 40 46 56 64	30 40 46 56 64	30 40 50 60	30 40 50	30 40 50 60
no	**low**	40 60	40 60	46 60 70	45 60 70	45 64 80	50 60 80	64 80 100	64 80 100	80 100	80 100	80 100	60 80 100	80 100
no	**no**	70	70	100	80 100	100	100	—	—	—	—	—	—	—

20 ANGULAR BACKLASH

The following chart shows indicative values for the angular backlash at output shaft of W gear units (input blocked).
Measurement is taken with 5 Nm torque applying to output shaft.

Angular backlash (input shaft locked)		
	$\Delta\gamma$ **[']**	$\Delta\gamma$ **[rad]**
VF 30	33' ± 10'	0.00873 ± 0.00291
VF 44	25' ± 7'	0.00728 ± 0.00145
VFR 44	30' ± 10'	0.00873 ± 0.00291
VF 49	22' ± 7'	0.00728 ± 0.00145
VFR 49	30' ± 10'	0.00873 ± 0.00291
W 63	20' ± 4'	0.00582 ± 0.00145
WR 63	25' ± 5'	0.00728 ± 0.00145
W 75	18' ± 4'	0.00582 ± 0.00145
WR 75	22' ± 5'	0.00640 ± 0.00145
W 86	15' ± 4'	0.00436 ± 0.00145
WR 86	20' ± 5'	0.00582 ± 0.00145
W 110	9' ± 2'	0.00436 ± 0.00145
WR 110	18' ± 5'	0.00524 ± 0.00145
VF 130	12' ± 3'	0.00349 ± 0.00087
VFR 130	15' ± 3'	0.00436 ± 0.00087
VF 150	12' ± 3'	0.00349 ± 0.00087
VFR 150	15' ± 3'	0.00436 ± 0.00087
VF 185	10' ± 3'	0.00291 ± 0.00087
VFR 185	13' ± 3'	0.00378 ± 0.00087
VF 210	Consult factory	
VFR 210		
VF 250		
VFR 250		

21 GEARMOTOR RATING CHARTS

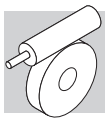
The selection of **motors without brake** takes into account the requirements of Regulation EC 640/2009 (see chapter **M1.1** of this catalogue): in case the rated power is greater than or equal to 0.75kW, BE/ME motors must be provided (see section **M1** of this catalogue). When the motor rated power is above 0.75kW, BN/M motors can be provided (see section **M2** of this catalogue). Considering that the Regulation EC 640/2009 shall not apply to the motors equipped with brake, the brakemotor selection takes into account BN/M motors only, without taking into account the rated power. BE/ME brakemotors are available on request.

0.04 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N			IEC		
19.3	9	1.0	70	600		**VF 27_70**	**P27**	**BN27A4**	105
22.5	8	1.1	60	600		**VF 27_60**	**P27**	**BN27A4**	105
34	6	1.4	40	600		**VF 27_40**	**P27**	**BN27A4**	105
45	5	1.7	30	600		**VF 27_30**	**P27**	**BN27A4**	105
68	4	2.2	20	600		**VF 27_20**	**P27**	**BN27A4**	105
90	3	2.8	15	600		**VF 27_15**	**P27**	**BN27A4**	105
135	2	3.8	10	600		**VF 27_10**	**P27**	**BN27A4**	105
193	2	5.5	7	600		**VF 27_7**	**P27**	**BN27A4**	105

0.06 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N			IEC		
0.59	203	1.0	2280	5000		**VF/W 30/63_2280**	**P56**	**BN56A4**	123
0.89	155	1.4	1520	5000		**VF/W 30/63_1520**	**P56**	**BN56A4**	123
1.1	122	1.7	1200	5000		**VF/W 30/63_1200**	**P56**	**BN56A4**	123
1.5	115	1.8	900	5000		**VF/W 30/63_900**	**P56**	**BN56A4**	123
1.9	113	1.9	720	5000		**VF/W 30/63_720**	**P56**	**BN56A4**	123
2.5	85	1.1	540	3450		**VF/VF 30/49_540**	**P56**	**BN56A4**	118
2.8	50	1.0	500	5000		**VFR 44_500**	**S44**	**BN44B4**	110
3.2	73	1.3	420	3450		**VF/VF 30/49_420**	**P56**	**BN56A4**	118
4.0	54	1.0	350	5000		**VFR 44_350**	**S44**	**BN44B4**	110
4.3	53	1.8	315	3450		**VF/VF 30/49_315**	**P56**	**BN56A4**	118
4.5	59	1.0	300	2500		**VFR 44_300**	**S44**	**BN44B4**	110
5.8	50	1.2	230	2500		**VFR 44_230**	**S44**	**BN44B4**	110
7.7	42	1.5	175	2500		**VFR 44_175**	**S44**	**BN44B4**	110
9.6	36	1.4	140	2500		**VFR 44_140**	**S44**	**BN44B4**	110
13.4	29	1.8	100	2500		**VFR 44_100**	**S44**	**BN44B4**	110
19.1	22	1.8	70	2500		**VFR 44_70**	**S44**	**BN44B4**	110
19.3	14	1.1	70	1600		**VF 30_70**	**P56**	**BN56A4**	106
22.5	13	1.5	60	1600		**VF 30_60**	**P56**	**BN56A4**	106
34	10	0.9	40	600		**VF 27_40**	**P27**	**BN27B4**	105
34	10	1.9	40	1650		**VF 30_40**	**P56**	**BN56A4**	106

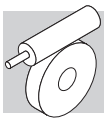


0.06 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N			IEC		
45	8	1.1	30	600			**VF 27_30**	**P27**	**BN27B4**	105
45	8	2.4	30	1340			**VF 30_30**	**P56**	**BN56A4**	106
68	6	1.5	20	600			**VF 27_20**	**P27**	**BN27B4**	105
68	6	2.9	20	1180			**VF 30_20**	**P56**	**BN56A4**	106
90	5	1.9	15	600			**VF 27_15**	**P27**	**BN27B4**	105
90	5	3.7	15	1080			**VF 30_15**	**P56**	**BN56A4**	106
135	4	2.6	10	590			**VF 27_10**	**P27**	**BN27B4**	105
135	3	4.7	10	950			**VF 30_10**	**P56**	**BN56A4**	106
193	2	3.6	7	530			**VF 27_7**	**P27**	**BN27B4**	105
193	2	6.4	7	840			**VF 30_7**	**P56**	**BN56A4**	106

0.09 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N			IEC		
0.31	574	1.8	2800	8000			**VF/W 49/110_2800**	**P63**	**BN63A6**	135
0.42	579	1.0	2116	7000			**VF/W 44/86_2116**	**P63**	**BN63A6**	131
0.43	505	2.1	2070	8000			**VF/W 49/110_2070**	**P63**	**BN63A6**	135
0.48	503	1.1	1840	7000			**VF/W 44/86_1840**	**P63**	**BN63A6**	131
0.53	485	2.2	1656	8000			**VF/W 49/110_1656**	**P63**	**BN63A6**	135
0.64	377	1.5	1380	7000			**VF/W 44/86_1380**	**P63**	**BN63A6**	131
0.65	369	2.8	1350	8000			**VF/W 49/110_1350**	**P63**	**BN63A6**	135
0.73	363	1.1	1200	5750			**VF/W 44/75_1200**	**P63**	**BN63A6**	127
0.81	316	3.3	1080	8000			**VF/W 49/110_1080**	**P63**	**BN63A6**	135
0.89	232	0.9	1520	5000			**VF/W 30/63_1520**	**P56**	**BN56B4**	123
0.96	323	1.2	920	5750			**VF/W 44/75_920**	**P63**	**BN63A6**	127
0.96	332	1.7	920	7000			**VF/W 44/86_920**	**P63**	**BN63A6**	131
0.98	255	0.9	900	5000			**VF/W 30/63_900**	**P63**	**BN63A6**	123
1.1	183	1.1	1200	5000			**VF/W 30/63_1200**	**P56**	**BN56B4**	123
1.2	225	1.0	720	5000			**VF/W 30/63_720**	**P63**	**BN63A6**	123
1.3	267	1.5	700	5750			**VF/W 44/75_700**	**P63**	**BN63A6**	127
1.3	253	2.2	700	7000			**VF/W 44/86_700**	**P63**	**BN63A6**	131
1.5	172	1.2	900	5000			**VF/W 30/63_900**	**P56**	**BN56B4**	123
1.7	210	1.9	525	5750			**VF/W 44/75_525**	**P63**	**BN63A6**	127
1.7	200	2.8	525	7000			**VF/W 44/86_525**	**P63**	**BN63A6**	131
1.9	170	1.2	720	5000			**VF/W 30/63_720**	**P56**	**BN56B4**	123
2.2	164	2.4	400	5750			**VF/W 44/75_400**	**P63**	**BN63A6**	127
2.2	160	3.4	400	7000			**VF/W 44/86_400**	**P63**	**BN63A6**	131
2.4	145	1.4	570	5000			**VF/W 30/63_570**	**P56**	**BN56B4**	123
2.9	111	1.2	300	5000			**WR 63_300**	**P63**	**BN63A6**	122
2.9	120	1.7	300	6200			**WR 75_300**	**P63**	**BN63A6**	126
2.9	132	2.4	300	7000			**WR 86_300**	**P63**	**BN63A6**	130
3.0	117	1.8	450	5000			**VF/W 30/63_450**	**P56**	**BN56B4**	123
3.2	110	0.9	420	3450			**VF/VF 30/49_420**	**P56**	**BN56B4**	118
3.7	101	1.4	240	5000			**WR 63_240**	**P63**	**BN63A6**	122
3.7	105	2.1	240	6200			**WR 75_240**	**P63**	**BN63A6**	126
3.7	117	2.6	240	7000			**WR 86_240**	**P63**	**BN63A6**	130
4.2	84	0.9	210	3450			**VFR 49_210**	**P63**	**BN63A6**	116
4.3	80	1.2	315	3450			**VF/VF 30/49_315**	**P56**	**BN56B4**	118
4.3	84	2.5	315	5000			**VF/W 30/63_315**	**P56**	**BN56B4**	123
4.6	88	1.7	192	5000			**WR 63_192**	**P63**	**BN63A6**	122
4.9	79	0.9	180	3450			**VFR 49_180**	**P63**	**BN63A6**	116
4.9	90	3.1	180	6200			**WR 75_180**	**P63**	**BN63A6**	126
5.2	94	4.2	168	7000			**WR 86_168**	**P63**	**BN63A6**	130
5.5	62	1.0	245	2500			**VF/VF 30/44_245**	**P56**	**BN56B4**	112
6.5	66	1.2	135	3450			**VFR 49_135**	**P63**	**BN63A6**	116
6.5	71	2.5	135	5000			**WR 63_135**	**P63**	**BN63A6**	122
7.7	63	1.0	175	2900			**VFR 44_175**	**S44**	**BN44C4**	110
7.7	65	3.1	114	5000			**WR 63_114**	**P63**	**BN63A6**	122
8.1	58	1.4	108	3450			**VFR 49_108**	**P63**	**BN63A6**	116
8.8	41	1.3	100	3300	**VF 49_100 P63 K63A6**	114	**VF 49_100**	**P63**	**BN63A6**	114
9.6	54	0.9	140	2900			**VFR 44_140**	**S44**	**BN44C4**	110
9.8	55	3.8	90	5000			**WR 63_90**	**P63**	**BN63A6**	122
10.5	48	1.9	84	3450			**VFR 49_84**	**P63**	**BN63A6**	116
11.0	37	1.6	80	3300	**VF 49_80 P63 K63A6**	114	**VF 49_80**	**P63**	**BN63A6**	114
12.2	45	1.8	72	3450			**VFR 49_72**	**P63**	**BN63A6**	116
12.2	48	4.0	72	5000			**WR 63_72**	**P63**	**BN63A6**	122



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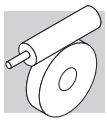
n_2 min-1	M_2 Nm	S	i	R_{n2} N					IEC			
12.6	35	1.1	70	2300	**VF 44_70**	**P63**	**K63A6**	108	**VF 44_70**	**P63**	**BN63A6**	108
12.6	34	1.8	70	3300	**VF 49_70**	**P63**	**K63A6**	114	**VF 49_70**	**P63**	**BN63A6**	114
13.4	43	1.2	100	2900					**VFR 44_100**	**S44**	**BN44C4**	110
14.7	32	1.4	60	2300	**VF 44_60**	**P63**	**K63A6**	108	**VF 44_60**	**P63**	**BN63A6**	108
14.7	34	1.7	60	3300	**VF 49_60**	**P63**	**K63A6**	114	**VF 49_60**	**P63**	**BN63A6**	114
16.3	36	2.2	54	3450					**VFR 49_54**	**P63**	**BN63A6**	116
19.1	33	1.2	70	2900					**VFR 44_70**	**S44**	**BN44C4**	110
19.1	27	1.8	46	2300	**VF 44_46**	**P63**	**K63A6**	108	**VF 44_46**	**P63**	**BN63A6**	108
19.6	26	2.7	45	3300	**VF 49_45**	**P63**	**K63A6**	114	**VF 49_45**	**P63**	**BN63A6**	114
21.0	30	2.8	42	3360					**VFR 49_42**	**P63**	**BN63A6**	116
22.0	22	0.9	40	1560	**VF 30_40**	**P63**	**K63A6**	106	**VF 30_40**	**P63**	**BN63A6**	106
22.5	19	1.0	60	1600					**VF 30_60**	**P56**	**BN56B4**	106
24.4	22	3.4	36	3300	**VF 49_36**	**P63**	**K63A6**	114	**VF 49_36**	**P63**	**BN63A6**	114
25.1	22	2.2	35	2300	**VF 44_35**	**P63**	**K63A6**	108	**VF 44_35**	**P63**	**BN63A6**	108
29.3	18	1.2	30	1440	**VF 30_30**	**P63**	**K63A6**	106	**VF 30_30**	**P63**	**BN63A6**	106
31	18	2.7	28	2300	**VF 44_28**	**P63**	**K63A6**	108	**VF 44_28**	**P63**	**BN63A6**	108
34	15	1.2	40	1410					**VF 30_40**	**P56**	**BN56B4**	106
44	14	1.5	20	1230	**VF 30_20**	**P63**	**K63A6**	106	**VF 30_20**	**P63**	**BN63A6**	106
44	14	3.1	20	2300	**VF 44_20**	**P63**	**K63A6**	108	**VF 44_20**	**P63**	**BN63A6**	108
45	12	1.6	30	1290					**VF 30_30**	**P56**	**BN56B4**	106
59	11	1.8	15	1170	**VF 30_15**	**P63**	**K63A6**	106	**VF 30_15**	**P63**	**BN63A6**	106
68	9	1.9	20	1140					**VF 30_20**	**P56**	**BN56B4**	106
69	9	1.0	20	600					**VF 27_20**	**P27**	**BN27C4**	105
88	8	2.3	10	1050	**VF 30_10**	**P63**	**K63A6**	106	**VF 30_10**	**P63**	**BN63A6**	106
90	7	2.5	15	1050					**VF 30_15**	**P56**	**BN56B4**	106
92	7	1.3	15	600					**VF 27_15**	**P27**	**BN27C4**	105
126	6	3.2	7	920	**VF 30_7**	**P63**	**K63A6**	106	**VF 30_7**	**P63**	**BN63A6**	106
135	5	3.1	10	920					**VF 30_10**	**P56**	**BN56B4**	106
138	5	1.7	10	565					**VF 27_10**	**P27**	**BN27C4**	105
193	4	4.3	7	820					**VF 30_7**	**P56**	**BN56B4**	106
197	4	2.5	7	510					**VF 27_7**	**P27**	**BN27C4**	105

0.12 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N					IEC			
0.31	775	1.4	2800	8000					**VF/W 49/110_2800**	**P63**	**BN63B6**	135
0.47	588	1.7	2800	8000					**VF/W 49/110_2800**	**P63**	**BN63A4**	135
0.53	654	1.6	1656	8000					**VF/W 49/110_1656**	**P63**	**BN63B6**	135
0.62	518	1.0	2116	7000					**VF/W 44/86_2116**	**P63**	**BN63A4**	131
0.63	507	2.0	2070	8000					**VF/W 49/110_2070**	**P63**	**BN63A4**	135
0.71	483	1.0	1840	7000					**VF/W 44/86_1840**	**P63**	**BN63A4**	131
0.79	435	2.3	1656	8000					**VF/W 49/110_1656**	**P63**	**BN63A4**	135
0.95	386	1.3	1380	7000					**VF/W 44/86_1380**	**P63**	**BN63A4**	131
0.97	354	2.8	1350	8000					**VF/W 49/110_1350**	**P63**	**BN63A4**	135
1.2	293	3.4	1080	8000					**VF/W 49/110_1080**	**P63**	**BN63A4**	135
1.4	322	1.1	920	5750					**VF/W 44/75_920**	**P63**	**BN63A4**	127
1.4	322	1.6	920	7000					**VF/W 44/86_920**	**P63**	**BN63A4**	131
1.5	236	0.9	900	5000					**VF/W 30/63_900**	**P63**	**BN63A4**	123
1.8	233	0.9	720	5000					**VF/W 30/63_720**	**P63**	**BN63A4**	123
1.9	257	1.4	700	5750					**VF/W 44/75_700**	**P63**	**BN63A4**	127
1.9	239	2.1	700	7000					**VF/W 44/86_700**	**P63**	**BN63A4**	131
2.3	199	1.1	570	5000					**VF/W 30/63_570**	**P63**	**BN63A4**	123
2.5	202	1.8	525	5750					**VF/W 44/75_525**	**P63**	**BN63A4**	127
2.5	193	2.6	525	7000					**VF/W 44/86_525**	**P63**	**BN63A4**	131
2.9	150	0.9	300	5000					**WR 63_300**	**P63**	**BN63B6**	122
2.9	162	1.2	300	6200					**WR 75_300**	**P63**	**BN63B6**	126
2.9	178	1.7	300	7000					**WR 86_300**	**P63**	**BN63B6**	130
2.9	161	1.3	450	5000					**VF/W 30/63_450**	**P63**	**BN63A4**	123
3.3	161	2.3	400	5750					**VF/W 44/75_400**	**P63**	**BN63A4**	127
3.3	143	3.5	400	7000					**VF/W 44/86_400**	**P63**	**BN63A4**	131
3.6	136	1.0	240	5000					**WR 63_240**	**P63**	**BN63B6**	122
3.6	142	1.5	240	6200					**WR 75_240**	**P63**	**BN63B6**	126
3.6	142	1.6	240	5000					**VF/W 30/63_240**	**P63**	**BN63B6**	123
3.6	158	2.0	240	7000					**WR 86_240**	**P63**	**BN63B6**	130
4.2	110	0.9	315	3450					**VF/VF 30/49_315**	**P63**	**BN63A4**	118
4.2	116	1.8	315	5000					**VF/W 30/63_315**	**P63**	**BN63A4**	123



0.12 kW

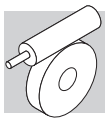
n_2 min-1	M_2 Nm	S	i	R_{n2} N						IEC			
4.4	108	1.2	300	5000						**WR 63_300**	**P63**	**BN63A4**	122
4.4	115	1.6	300	6200						**WR 75_300**	**P63**	**BN63A4**	126
4.4	129	2.1	300	7000						**WR 86_300**	**P63**	**BN63A4**	130
4.4	134	2.8	300	5750						**VF/W 44/75_300**	**P63**	**BN63A4**	127
4.8	121	2.3	180	6200						**WR 75_180**	**P63**	**BN63B6**	126
5.2	126	3.1	168	7000						**WR 86_168**	**P63**	**BN63B6**	130
5.2	125	3.0	250	5750						**VF/W 44/75_250**	**P63**	**BN63A4**	127
5.5	94	1.0	240	3450						**VF/VF 30/49_240**	**P63**	**BN63A4**	118
5.5	97	1.4	240	5000						**WR 63_240**	**P63**	**BN63A4**	122
5.5	103	2.1	240	6200						**WR 75_240**	**P63**	**BN63A4**	126
5.5	99	2.1	240	5000						**VF/W 30/63_240**	**P63**	**BN63A4**	123
5.5	111	2.7	240	7000						**WR 86_240**	**P63**	**BN63A4**	130
5.8	109	2.9	150	6200						**WR 75_150**	**P63**	**BN63B6**	126
6.4	89	0.9	135	3300						**VFR 49_135**	**P63**	**BN63B6**	116
6.4	96	1.9	135	5000						**WR 63_135**	**P63**	**BN63B6**	122
6.8	86	1.8	192	5000						**WR 63_192**	**P63**	**BN63A4**	122
7.3	76	0.9	180	3300						**VFR 49_180**	**P63**	**BN63A4**	116
7.3	87	2.7	180	6200						**WR 75_180**	**P63**	**BN63A4**	126
8.7	55	0.9	100	3300	**VF 49_100**	**P63**	**K63B6**	114		**VF 49_100**	**P63**	**BN63B6**	114
9.7	64	1.4	135	3450						**VFR 49_135**	**P63**	**BN63A4**	116
9.7	68	2.5	135	5000						**WR 63_135**	**P63**	**BN63A4**	122
10.9	50	1.2	80	3300	**VF 49_80**	**P63**	**K63B6**	114		**VF 49_80**	**P63**	**BN63B6**	114
11.5	61	3.0	114	5000						**WR 63_114**	**P63**	**BN63A4**	122
12.1	55	1.5	108	3450						**VFR 49_108**	**P63**	**BN63A4**	116
13.1	41	1.2	100	3150	**VF 49_100**	**P63**	**K63A4**	114		**VF 49_100**	**P63**	**BN63A4**	114
14.5	43	1.1	60	2300	**VF 44_60**	**P63**	**K63B6**	108		**VF 44_60**	**P63**	**BN63B6**	108
15.3	53	3.6	57	5000						**WR 63_57**	**P63**	**BN63B6**	122
15.6	46	1.9	84	3450						**VFR 49_84**	**P63**	**BN63A4**	116
16.4	36	1.5	80	3150	**VF 49_80**	**P63**	**K63A4**	114		**VF 49_80**	**P63**	**BN63A4**	114
18.2	42	1.8	72	3430						**VFR 49_72**	**P63**	**BN63A4**	116
18.7	34	0.9	70	3300						**VF 44_70**	**P63**	**BN63A4**	108
18.7	33	1.7	70	3150	**VF 49_70**	**P63**	**K63A4**	114		**VF 49_70**	**P63**	**BN63A4**	114
21.8	30	1.3	60	2300	**VF 44_60**	**P63**	**K63A4**	108		**VF 44_60**	**P63**	**BN63A4**	108
21.8	30	1.9	60	3150	**VF 49_60**	**P63**	**K63A4**	114		**VF 49_60**	**P63**	**BN63A4**	114
24.3	34	2.2	54	3140						**VFR 49_54**	**P63**	**BN63A4**	116
28.5	25	1.5	46	2300	**VF 44_46**	**P63**	**K63A4**	108		**VF 44_46**	**P63**	**BN63A4**	108
29.0	24	0.9	30	1360	**VF 30_30**	**P63**	**K63B6**	106		**VF 30_30**	**P63**	**BN63B6**	106
29.1	25	2.6	45	3040	**VF 49_45**	**P63**	**K63A4**	114		**VF 49_45**	**P63**	**BN63A4**	114
31	27	2.9	42	2920						**VFR 49_42**	**P63**	**BN63A4**	116
33	21	0.9	40	1360	**VF 30_40**	**P63**	**K63A4**	106		**VF 30_40**	**P63**	**BN63A4**	106
36	21	3.3	36	2830	**VF 49_36**	**P63**	**K63A4**	114		**VF 49_36**	**P63**	**BN63A4**	114
37	21	1.9	35	2300	**VF 44_35**	**P63**	**K63A4**	108		**VF 44_35**	**P63**	**BN63A4**	108
44	17	1.2	30	1250	**VF 30_30**	**P63**	**K63A4**	106		**VF 30_30**	**P63**	**BN63A4**	106
47	17	2.2	28	2300	**VF 44_28**	**P63**	**K63A4**	108		**VF 44_28**	**P63**	**BN63A4**	108
58	15	1.4	15	1130	**VF 30_15**	**P63**	**K63B6**	106		**VF 30_15**	**P63**	**BN63B6**	106
62	14	2.7	14	2150	**VF 44_14**	**P63**	**K63B6**	108		**VF 44_14**	**P63**	**BN63B6**	108
66	13	1.4	20	1110	**VF 30_20**	**P63**	**K63A4**	106		**VF 30_20**	**P63**	**BN63A4**	106
66	13	2.9	20	2100	**VF 44_20**	**P63**	**K63A4**	108		**VF 44_20**	**P63**	**BN63A4**	108
87	10	1.8	15	1020	**VF 30_15**	**P63**	**K63A4**	106		**VF 30_15**	**P63**	**BN63A4**	106
94	10	2.9	14	1870	**VF 44_14**	**P63**	**K63A4**	108		**VF 44_14**	**P63**	**BN63A4**	108
124	8	2.4	7	900	**VF 30_7**	**P63**	**K63B6**	106		**VF 30_7**	**P63**	**BN63B6**	106
131	7	2.3	10	900	**VF 30_10**	**P63**	**K63A4**	106		**VF 30_10**	**P63**	**BN63A4**	106
138	6	1.1	20	560						**VF 27_20**	**P27**	**BN27C2**	105
138	7	2.2	20	840						**VF 30_20**	**P56**	**BN56B2**	106
183	5	1.4	15	520						**VF 27_15**	**P27**	**BN27C2**	105
187	5	3.1	7	810	**VF 30_7**	**P63**	**K63A4**	106		**VF 30_7**	**P63**	**BN63A4**	106
275	4	2.0	10	460						**VF 27_10**	**P27**	**BN27C2**	105
275	4	3.4	10	740						**VF 30_10**	**P56**	**BN56B2**	106
393	3	2.8	7	410						**VF 27_7**	**P27**	**BN27C2**	105
393	3	4.7	7	660						**VF 30_7**	**P56**	**BN56B2**	106

0.18 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N						IEC			
0.28	978	1.9	3200	13800						**W/VF 63/130_3200**	**P71**	**BN71A6**	141
0.28	1345	3.3	3200	19500						**W/VF 86/185_3200**	**P71**	**BN71A6**	153

0.18 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N					IEC		
0.31	1406	1.9	2944	16000					**W/VF 86/150_2944**	**P71**	**BN71A6**	147
0.35	1027	1.8	2560	13800					**W/VF 63/130_2560**	**P71**	**BN71A6**	141
0.35	1320	3.3	2560	19500					**W/VF 86/185_2560**	**P71**	**BN71A6**	153
0.47	875	1.1	2800	8000					**VF/W 49/110_2800**	**P63**	**BN63B4**	135
0.49	1265	2.1	1840	16000					**W/VF 86/150_1840**	**P71**	**BN71A6**	147
0.50	894	2.1	1800	13800					**W/VF 63/130_1800**	**P71**	**BN71A6**	141
0.54	949	1.1	1656	8000					**VF/W 49/110_1656**	**P71**	**BN71A6**	135
0.59	871	2.1	1520	13800					**W/VF 63/130_1520**	**P71**	**BN71A6**	141
0.64	755	1.3	2070	8000					**VF/W 49/110_2070**	**P63**	**BN63B4**	135
0.65	1054	2.6	1380	16000					**W/VF 86/150_1380**	**P71**	**BN71A6**	147
0.75	733	2.5	1200	13800					**W/VF 63/130_1200**	**P71**	**BN71A6**	141
0.80	647	1.5	1656	8000					**VF/W 49/110_1656**	**P63**	**BN63B4**	135
0.94	642	2.9	960	13800					**W/VF 63/130_960**	**P71**	**BN71A6**	141
0.98	527	1.9	1350	8000					**VF/W 49/110_1350**	**P63**	**BN63B4**	135
0.98	756	3.6	920	16000					**W/VF 86/150_920**	**P71**	**BN71A6**	147
1.2	537	3.4	760	13800					**W/VF 63/130_760**	**P71**	**BN71A6**	141
1.2	436	2.3	1080	8000					**VF/W 49/110_1080**	**P63**	**BN63B4**	135
1.4	479	1.0	920	7000					**VF/W 44/86_920**	**P63**	**BN63B4**	131
1.7	391	1.4	525	7000					**VF/W 44/86_525**	**P71**	**BN71A6**	131
1.8	375	2.7	720	8000					**VF/W 49/110_720**	**P63**	**BN63B4**	135
1.9	356	1.4	700	7000					**VF/W 44/86_700**	**P63**	**BN63B4**	131
2.3	321	1.2	400	5750					**VF/W 44/75_400**	**P71**	**BN71A6**	127
2.3	313	1.8	400	7000					**VF/W 44/86_400**	**P71**	**BN71A6**	131
2.3	344	3.1	400	8000					**VF/W 49/110_400**	**P71**	**BN71A6**	135
2.4	288	3.5	540	8000					**VF/W 49/110_540**	**P63**	**BN63B4**	135
2.5	301	1.2	525	5750					**VF/W 44/75_525**	**P63**	**BN63B4**	127
2.5	287	1.7	525	7000					**VF/W 44/86_525**	**P63**	**BN63B4**	131
3.0	258	1.2	300	7000					**WR 86_300**	**P71**	**BN71A6**	130
3.0	264	1.5	300	5750					**VF/W 44/75_300**	**P71**	**BN71A6**	127
3.0	275	2.1	300	8000					**WR 110_300**	**P71**	**BN71A6**	134
3.0	241	2.3	300	7000					**VF/W 44/86_300**	**P71**	**BN71A6**	131
3.0	269	3.9	300	8000					**VF/W 49/110_300**	**P71**	**BN71A6**	135
3.3	240	1.5	400	5750					**VF/W 44/75_400**	**P63**	**BN63B4**	127
3.3	214	2.3	400	7000					**VF/W 44/86_400**	**P63**	**BN63B4**	131
3.8	206	1.1	240	6200					**WR 75_240**	**P71**	**BN71A6**	126
3.8	229	1.4	240	7000					**WR 86_240**	**P71**	**BN71A6**	130
3.8	243	2.4	240	8000					**WR 110_240**	**P71**	**BN71A6**	134
3.9	233	2.4	230	7000					**VF/W 44/86_230**	**P71**	**BN71A6**	131
4.2	172	1.2	315	5000					**VF/W 30/63_315**	**P63**	**BN63B4**	123
4.4	172	1.0	300	6200					**WR 75_300**	**P63**	**BN63B4**	126
4.4	191	1.4	300	7000					**WR 86_300**	**P63**	**BN63B4**	130
4.4	199	1.9	300	5750					**VF/W 44/75_300**	**P63**	**BN63B4**	127
4.4	176	2.8	300	7000					**VF/W 44/86_300**	**P63**	**BN63B4**	131
4.7	202	1.9	192	7000					**WR 86_192**	**P71**	**BN71A6**	130
5.0	175	1.6	180	6200					**WR 75_180**	**P71**	**BN71A6**	126
5.3	186	2.0	250	5750					**VF/W 44/75_250**	**P63**	**BN63B4**	127
5.4	183	2.1	168	7000					**WR 86_168**	**P71**	**BN71A6**	130
5.5	144	0.9	240	5000					**WR 63_240**	**P63**	**BN63B4**	122
5.5	153	1.4	240	6200					**WR 75_240**	**P63**	**BN63B4**	126
5.5	147	1.4	240	5000					**VF/W 30/63_240**	**P63**	**BN63B4**	123
5.5	166	1.8	240	7000					**WR 86_240**	**P63**	**BN63B4**	130
5.7	162	3.1	230	7000					**VF/W 44/86_230**	**P63**	**BN63B4**	131
6.0	158	2.0	150	6200					**WR 75_150**	**P71**	**BN71A6**	126
6.5	161	2.7	138	7000					**WR 86_138**	**P71**	**BN71A6**	130
6.9	128	1.2	192	5000					**WR 63_192**	**P63**	**BN63B4**	122
6.9	145	2.3	192	7000					**WR 86_192**	**P63**	**BN63B4**	130
7.3	129	1.8	180	6200					**WR 75_180**	**P63**	**BN63B4**	126
7.5	138	2.4	120	6200					**WR 75_120**	**P71**	**BN71A6**	126
7.9	131	2.7	168	7000					**WR 86_168**	**P63**	**BN63B4**	130
7.9	126	1.6	114	5000					**WR 63_114**	**P71**	**BN71A6**	122
8.8	113	2.3	150	6200					**WR 75_150**	**P63**	**BN63B4**	126
9.0	88	1.4	100	5000	**W 63_100**	**S1**	**M1SC6**	120	**W 63_100**	**P71**	**BN71A6**	122
9.0	96	1.7	100	6200	**W 75_100**	**S1**	**M1SC6**	124	**W 75_100**	**P71**	**BN71A6**	125
9.0	105	2.4	100	7000	**W 86_100**	**S1**	**M1SC6**	128	**W 86_100**	**P71**	**BN71A6**	129
9.8	102	1.7	135	5000					**WR 63_135**	**P63**	**BN63B4**	122
10.0	107	1.9	90	5000					**WR 63_90**	**P71**	**BN71A6**	122
11.0	98	3.1	120	6200					**WR 75_120**	**P63**	**BN63B4**	126
11.3	79	1.6	80	5000	**W 63_80**	**S1**	**M1SC6**	120	**W 63_80**	**P71**	**BN71A6**	122
11.3	83	2.4	80	6200	**W 75_80**	**S1**	**M1SC6**	124	**W 75_80**	**P71**	**BN71A6**	125



0.18 kW

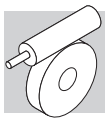
n_2 min-1	M_2 Nm	S	i	R_{n2} N						IEC			
11.3	90	3.1	80	7000	**W 86_80**	**S1**	**M1SC6**	128	**W 86_80**	**P71**	**BN71A6**	129
11.6	91	2.0	114	5000					**WR 63_114**	**P63**	**BN63B4**	122
12.0	100	3.3	75	6200					**WR 75_75**	**P71**	**BN71A6**	126
12.2	82	1.0	108	3450					**VFR 49_108**	**P63**	**BN63B4**	116
14.7	75	2.5	90	5000					**WR 63_90**	**P63**	**BN63B4**	122
15.0	61	1.1	60	3000	**VF 49_60**	**P71**	**K71A6**	114	**VF 49_60**	**P71**	**BN71A6**	114
15.0	60	1.1	180	3300					**VFR 49_180**	**P63**	**BN63A2**	116
15.7	68	1.3	84	3420					**VFR 49_84**	**P63**	**BN63B4**	116
16.5	54	1.0	80	3150	**VF 49_80**	**P63**	**K63B4**	114	**VF 49_80**	**P63**	**BN63B4**	114
18.3	63	1.2	72	3270					**VFR 49_72**	**P63**	**BN63B4**	116
18.3	66	2.8	72	5000					**WR 63_72**	**P63**	**BN63B4**	122
18.9	49	1.1	70	3150	**VF 49_70**	**P63**	**K63B4**	114	**VF 49_70**	**P63**	**BN63B4**	114
20.0	50	1.4	135	3280					**VFR 49_135**	**P63**	**BN63A2**	116
20.0	54	2.9	45	5000	**W 63_45**	**S1**	**M1SC6**	122	**W 63_45**	**P71**	**BN71A6**	122
22.0	45	0.9	60	2300					**VF 44_60**	**P63**	**BN63B4**	108
22.0	45	1.3	60	3150	**VF 49_60**	**P63**	**K63B4**	114	**VF 49_60**	**P63**	**BN63B4**	114
23.2	54	3.3	57	4910				122	**WR 63_57**	**P63**	**BN63B4**	122
24.4	50	1.5	54	3010				116	**VFR 49_54**	**P63**	**BN63B4**	116
28.7	38	1.0	46	2500	**VF 44_46**	**P63**	**K63B4**	108	**VF 44_46**	**P63**	**BN63B4**	108
29.3	37	1.8	45	2300	**VF 49_45**	**P63**	**K63B4**	114	**VF 49_45**	**P63**	**BN63B4**	114
31	40	1.9	42	2810					**VFR 49_42**	**P63**	**BN63B4**	116
32	36	1.4	28	2290	**VF 44_28**	**P71**	**K71A6**	108	**VF 44_28**	**P71**	**BN71A6**	108
37	31	2.2	36	2760	**VF 49_36**	**P63**	**K63B4**	114	**VF 49_36**	**P63**	**BN63B4**	114
38	31	1.3	35	2430	**VF 44_35**	**P63**	**K63B4**	108	**VF 44_35**	**P63**	**BN63B4**	108
47	26	1.5	28	2270	**VF 44_28**	**P63**	**K63B4**	108	**VF 44_28**	**P63**	**BN63B4**	108
47	26	2.9	28	2560	**VF 49_28**	**P63**	**K63B4**	114	**VF 49_28**	**P63**	**BN63B4**	114
55	23	2.7	24	2430	**VF 49_24**	**P63**	**K63B4**	114	**VF 49_24**	**P63**	**BN63B4**	114
66	19	0.9	20	1040	**VF 30_20**	**P63**	**K63B4**	106	**VF 30_20**	**P63**	**BN63B4**	106
66	20	1.9	20	2040	**VF 44_20**	**P63**	**K63B4**	108	**VF 44_20**	**P63**	**BN63B4**	108
73	18	3.2	18	2230	**VF 49_18**	**P63**	**K63B4**	114	**VF 49_18**	**P63**	**BN63B4**	114
77	16	1.8	35	1970	**VF 44_35**	**P63**	**K63A2**	108	**VF 44_35**	**P63**	**BN63A2**	108
88	15	1.2	15	960	**VF 30_15**	**P63**	**K63B4**	106	**VF 30_15**	**P63**	**BN63B4**	106
94	15	2.0	14	1830	**VF 44_14**	**P63**	**K63B4**	108	**VF 44_14**	**P63**	**BN63B4**	108
132	11	1.5	10	860	**VF 30_10**	**P63**	**K63B4**	106	**VF 30_10**	**P63**	**BN63B4**	106
132	11	2.7	10	1640	**VF 44_10**	**P63**	**K63B4**	108	**VF 44_10**	**P63**	**BN63B4**	108
189	8	2.1	7	770	**VF 30_7**	**P63**	**K63B4**	106	**VF 30_7**	**P63**	**BN63B4**	106
193	7	2.9	14	1470	**VF 44_14**	**P63**	**K63A2**	108	**VF 44_14**	**P63**	**BN63A2**	108
270	5	2.2	10	710	**VF 30_10**	**P63**	**K63A2**	106	**VF 30_10**	**P63**	**BN63A2**	106
386	4	3.1	7	640	**VF 30_7**	**P63**	**K63A2**	106	**VF 30_7**	**P63**	**BN63A2**	106

0.25 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N		IEC			
0.28	1358	1.4	3200	13800		**W/VF 63/130_3200**	**P71**	**BN71B6**	141
0.28	1868	2.4	3200	19500		**W/VF 86/185_3200**	**P71**	**BN71B6**	153
0.31	1952	1.4	2944	16000		**W/VF 86/150_2944**	**P71**	**BN71B6**	147
0.43	945	1.9	3200	13800		**W/VF 63/130_3200**	**P71**	**BN71A4**	141
0.43	1334	3.1	3200	19500		**W/VF 86/185_3200**	**P71**	**BN71A4**	153
0.47	1380	1.9	2944	16000		**W/VF 86/150_2944**	**P71**	**BN71A4**	147
0.49	1562	2.8	1840	19500		**W/VF 86/185_1840**	**P71**	**BN71B6**	153
0.54	1022	1.8	2560	13800		**W/VF 63/130_2560**	**P71**	**BN71A4**	141
0.54	1289	3.3	2560	19500		**W/VF 86/185_2560**	**P71**	**BN71A4**	153
0.65	1464	1.8	1380	16000		**W/VF 86/150_1380**	**P71**	**BN71B6**	147
0.66	1006	1.0	2070	8000		**VF/W 49/110_2070**	**P71**	**BN71A4**	135
0.75	1214	2.1	1840	16000		**W/VF 86/150_1840**	**P71**	**BN71A4**	147
0.75	1019	1.8	1200	13800		**W/VF 63/130_1200**	**P71**	**BN71B6**	141
0.76	875	2.1	1800	13800		**W/VF 63/130_1800**	**P71**	**BN71A4**	141
0.83	863	1.2	1656	8000		**VF/W 49/110_1656**	**P71**	**BN71A4**	135
0.90	845	2.1	1520	13800		**W/VF 63/130_1520**	**P71**	**BN71A4**	141
0.98	1049	2.6	920	16000		**W/VF 86/150_920**	**P71**	**BN71B6**	147
1.0	1006	2.6	1380	16000		**W/VF 86/150_1380**	**P71**	**BN71A4**	147
1.0	703	1.4	1350	8000		**VF/W 49/110_1350**	**P71**	**BN71A4**	135
1.1	708	2.5	1200	13800		**W/VF 63/130_1200**	**P71**	**BN71A4**	141
1.2	746	2.5	760	13800		**W/VF 63/130_760**	**P71**	**BN71B6**	141

0.25 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N						IEC			
1.3	581	1.7	1080	8000					**VF/W 49/110_1080**	**P71**	**BN71A4**	135
1.3	860	3.1	690	16000					**W/VF 86/150_690**	**P71**	**BN71B6**	147
1.4	617	2.9	960	13800					**W/VF 63/130_960**	**P71**	**BN71A4**	141
1.7	544	1.9	540	8000					**VF/W 49/110_540**	**P71**	**BN71B6**	135
1.7	543	1.0	525	7000					**VF/W 44/86_525**	**P71**	**BN71B6**	131
1.8	515	3.5	760	13800					**W/VF 63/130_760**	**P71**	**BN71A4**	141
1.9	500	2.0	720	8000					**VF/W 49/110_720**	**P71**	**BN71A4**	135
2.0	474	1.1	700	7000					**VF/W 44/86_700**	**P71**	**BN71A4**	131
2.5	384	2.6	540	8000					**VF/W 49/110_540**	**P71**	**BN71A4**	135
2.6	383	1.3	525	7000					**VF/W 44/86_525**	**P71**	**BN71A4**	131
3.0	366	1.1	300	5750					**VF/W 44/75_300**	**P71**	**BN71B6**	127
3.0	382	1.5	300	8000					**WR 110_300**	**P71**	**BN71B6**	134
3.0	374	2.8	300	8000					**VF/W 49/110_300**	**P71**	**BN71B6**	135
3.4	319	1.2	400	5750					**VF/W 44/75_400**	**P71**	**BN71A4**	127
3.4	285	1.8	400	7000					**VF/W 44/86_400**	**P71**	**BN71A4**	131
3.4	313	3.2	400	8000					**VF/W 49/110_400**	**P71**	**BN71A4**	135
3.8	318	1.0	240	7000					**WR 86_240**	**P71**	**BN71B6**	130
3.8	337	1.7	240	8000					**WR 110_240**	**P71**	**BN71B6**	134
3.9	323	1.7	230	7000					**VF/W 44/86_230**	**P71**	**BN71B6**	131
3.9	311	3.4	230	8000					**VF/W 49/110_230**	**P71**	**BN71B6**	135
4.6	255	1.1	300	7000					**WR 86_300**	**P71**	**BN71A4**	130
4.6	266	1.4	300	5750					**VF/W 44/75_300**	**P71**	**BN71A4**	127
4.6	266	2.1	300	8000					**WR 110_300**	**P71**	**BN71A4**	134
4.6	234	2.1	300	7000					**VF/W 44/86_300**	**P71**	**BN71A4**	131
4.7	280	1.4	192	7000					**WR 86_192**	**P71**	**BN71B6**	130
5.5	247	1.5	250	5750					**VF/W 44/75_250**	**P71**	**BN71A4**	127
5.7	204	1.1	240	6200					**WR 75_240**	**P71**	**BN71A4**	126
5.7	221	1.4	240	7000					**WR 86_240**	**P71**	**BN71A4**	130
5.7	233	2.4	240	8000					**WR 110_240**	**P71**	**BN71A4**	134
6.0	216	2.3	230	7000					**VF/W 44/86_230**	**P71**	**BN71A4**	131
6.0	219	1.4	150	6200					**WR 75_150**	**P71**	**BN71B6**	126
6.7	193	0.9	135	5000					**WR 63_135**	**P71**	**BN71B6**	122
7.2	193	1.7	192	7000					**WR 86_192**	**P71**	**BN71A4**	130
7.2	200	3.1	192	8000					**WR 110_192**	**P71**	**BN71A4**	134
7.6	172	1.4	180	6200					**WR 75_180**	**P71**	**BN71A4**	126
7.9	175	1.1	114	5000					**WR 63_114**	**P71**	**BN71B6**	122
8.2	175	2.0	168	7000					**WR 86_168**	**P71**	**BN71A4**	130
9.0	122	1.0	100	5000	**W 63_100**	**S1**	**M1SD6**	120				
9.0	133	1.2	100	6200	**W 75_100**	**S1**	**M1SD6**	124	**W 75_100**	**P71**	**BN71B6**	125
9.0	146	1.7	100	7000	**W 86_100**	**S1**	**M1SD6**	128	**W 86_100**	**P71**	**BN71B6**	129
9.2	151	1.7	150	6200					**WR 75_150**	**P71**	**BN71A4**	126
10.0	151	2.7	138	7000					**WR 86_138**	**P71**	**BN71A4**	130
10.0	160	2.3	90	6200					**WR 75_90**	**P71**	**BN71B6**	126
10.2	136	1.3	135	5000					**WR 63_135**	**P71**	**BN71A4**	122
11.3	110	1.1	80	5000	**W 63_80**	**S1**	**M1SD6**	120				
11.3	115	1.7	80	6200	**W 75_80**	**S1**	**M1SD6**	124	**W 75_80**	**P71**	**BN71B6**	125
11.3	125	2.2	80	7000	**W 86_80**	**S1**	**M1SD6**	128	**W 86_80**	**P71**	**BN71B6**	129
11.5	131	2.3	120	6200					**WR 75_120**	**P71**	**BN71A4**	126
11.5	138	2.8	120	7000					**WR 86_120**	**P71**	**BN71A4**	130
12.1	121	1.5	114	5000					**WR 63_114**	**P71**	**BN71A4**	122
13.8	89	1.3	100	5000					**W 63_100**	**P71**	**BN71A4**	122
13.8	96	1.6	100	6200					**W 75_100**	**P71**	**BN71A4**	125
13.8	102	2.2	100	7000					**W 86_100**	**P71**	**BN71A4**	129
15.3	100	1.9	90	5000					**WR 63_90**	**P71**	**BN71A4**	122
15.3	108	3.0	90	6200					**WR 75_90**	**P71**	**BN71A4**	126
17.2	78	1.5	80	5000					**W 63_80**	**P71**	**BN71A4**	122
17.2	82	2.2	80	6200					**W 75_80**	**P71**	**BN71A4**	125
17.2	89	2.9	80	7000					**W 86_80**	**P71**	**BN71A4**	129
18.3	95	3.1	75	6200					**WR 75_75**	**P71**	**BN71A4**	126
19.1	88	2.1	72	5000					**WR 63_72**	**P71**	**BN71A4**	122
20.0	70	1.0	45	3150	**VF 49_45**	**P71**	**K71B6**	114				
21.5	68	1.8	64	5000					**W 63_64**	**P71**	**BN71A4**	122
22.0	63	0.9	60	3150	**VF 49_60**	**P63**	**K63C4**	114				
22.9	68	3.0	60	6200					**W 75_60**	**P71**	**BN71A4**	125
24.1	72	2.5	57	4780					**WR 63_57**	**P71**	**BN71A4**	122
29.3	51	1.3	45	2850	**VF 49_45**	**P63**	**K63C4**	114				
31	52	2.8	45	4550					**W 63_45**	**P71**	**BN71A4**	122
31	59	3.0	45	4460					**WR 63_45**	**P71**	**BN71A4**	122



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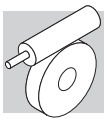
n_2 min-1	M_2 Nm	S	i	R_{n2} N									
32	50	1.0	28	2300	**VF 44_28**	**P71**	**K71B6**	108	**VF 44_28**	**P71**	**BN71B6**	108
36	46	3.4	38	4320					**W 63_38**	**P71**	**BN71A4**	122
37	44	1.6	36	2670	**VF 49_36**	**P63**	**K63C4**	114	**VF 49_36**	**P71**	**BN71A4**	114
38	43	0.9	35	2300	**VF 44_35**	**P63**	**K63C4**	108	**VF 44_35**	**P71**	**BN71A4**	108
38	49	3.3	36	4160					**WR 63_36**	**P71**	**BN71A4**	122
45	39	1.1	20	2190	**VF 44_20**	**P71**	**K71B6**	108	**VF 44_20**	**P71**	**BN71B6**	108
47	36	1.1	28	2190	**VF 44_28**	**P63**	**K63C4**	108	**VF 44_28**	**P71**	**BN71A4**	108
47	36	2.1	28	2480	**VF 49_28**	**P63**	**K63C4**	114	**VF 49_28**	**P71**	**BN71A4**	114
55	33	1.9	24	2360	**VF 49_24**	**P63**	**K63C4**	114	**VF 49_24**	**P71**	**BN71A4**	114
64	29	1.3	14	1980	**VF 44_14**	**P71**	**K71B6**	108	**VF 44_14**	**P71**	**BN71B6**	108
64	29	2.5	14	2260	**VF 49_14**	**P71**	**K71B6**	114	**VF 49_14**	**P71**	**BN71B6**	114
66	28	1.4	20	1970	**VF 44_20**	**P63**	**K63C4**	108	**VF 44_20**	**P71**	**BN71A4**	108
73	25	2.3	18	2170	**VF 49_18**	**P63**	**K63C4**	114	**VF 49_18**	**P71**	**BN71A4**	114
77	23	1.3	35	1930	**VF 44_35**	**P63**	**K63B2**	108	**VF 44_35**	**P63**	**BN63B2**	108
90	22	1.8	10	1780	**VF 44_10**	**P71**	**K71B6**	108	**VF 44_10**	**P71**	**BN71B6**	108
90	22	2.9	10	2040	**VF 49_10**	**P71**	**K71B6**	114	**VF 49_10**	**P71**	**BN71B6**	114
94	21	1.4	14	1770	**VF 44_14**	**P63**	**K63C4**	108	**VF 44_14**	**P71**	**BN71A4**	108
94	21	3.2	14	2010	**VF 49_14**	**P63**	**K63C4**	114	**VF 49_14**	**P71**	**BN71A4**	114
113	17	2.8	24	1930	**VF 49_24**	**P63**	**K63B2**	114	**VF 49_24**	**P63**	**BN63B2**	114
129	16	2.5	7	1590	**VF 44_7**	**P71**	**K71B6**	108	**VF 44_7**	**P71**	**BN71B6**	108
132	15	1.9	10	1590	**VF 44_10**	**P63**	**K63C4**	108	**VF 44_10**	**P71**	**BN71A4**	108
135	14	1.0	20	840	**VF 30_20**	**P63**	**K63B2**	106	**VF 30_20**	**P63**	**BN63B2**	106
180	11	1.3	15	780	**VF 30_15**	**P63**	**K63B2**	106	**VF 30_15**	**P63**	**BN63B2**	106
189	11	2.7	7	1420	**VF 44_7**	**P63**	**K63C4**	108	**VF 44_7**	**P71**	**BN71A4**	108
270	8	1.6	10	690	**VF 30_10**	**P63**	**K63B2**	106	**VF 30_10**	**P63**	**BN63B2**	106
270	8	2.9	10	1300	**VF 44_10**	**P63**	**K63B2**	108	**VF 44_10**	**P63**	**BN63B2**	108
386	5	2.2	7	620	**VF 30_7**	**P63**	**K63B2**	106	**VF 30_7**	**P63**	**BN63B2**	106

0.37 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N									
0.28	2734	1.6	3200	19500					**W/VF 86/185_3200**	**P80**	**BN80A6**	153
0.31	2858	0.9	2944	16000					**W/VF 86/150_2944**	**P80**	**BN80A6**	147
0.36	2684	1.6	2560	19500					**W/VF 86/185_2560**	**P80**	**BN80A6**	153
0.43	1403	1.3	3200	13800					**W/VF 63/130_3200**	**P71**	**BN71B4**	141
0.43	1981	2.1	3200	19500					**W/VF 86/185_3200**	**P71**	**BN71B4**	153
0.47	2050	1.3	2944	16000					**W/VF 86/150_2944**	**P71**	**BN71B4**	147
0.54	1519	1.2	2560	13800					**W/VF 63/130_2560**	**P71**	**BN71B4**	141
0.54	1915	2.2	2560	19500					**W/VF 86/185_2560**	**P71**	**BN71B4**	153
0.60	1771	1.0	1520	13800					**W/VF 63/130_1520**	**P80**	**BN80A6**	141
0.66	2143	1.3	1380	16000					**W/VF 86/150_1380**	**P80**	**BN80A6**	147
0.74	1803	1.4	1840	16000					**W/VF 86/150_1840**	**P71**	**BN71B4**	147
0.74	1614	2.6	1840	19500					**W/VF 86/185_1840**	**P71**	**BN71B4**	153
0.76	1300	1.4	1800	13800					**W/VF 63/130_1800**	**P71**	**BN71B4**	141
0.86	1444	2.9	1600	19500					**W/VF 86/185_1600**	**P71**	**BN71B4**	153
0.90	1255	1.4	1520	13800					**W/VF 63/130_1520**	**P71**	**BN71B4**	141
0.99	1357	3.2	920	19500					**W/VF 86/185_920**	**P80**	**BN80A6**	153
1.0	1495	1.7	1380	16000					**W/VF 86/150_1380**	**P71**	**BN71B4**	147
1.0	1045	1.0	1350	8000					**VF/W 49/110_1350**	**P71**	**BN71B4**	135
1.1	1052	1.7	1200	13800					**W/VF 63/130_1200**	**P71**	**BN71B4**	141
1.3	864	1.2	1080	8000					**VF/W 49/110_1080**	**P71**	**BN71B4**	135
1.3	1259	2.1	690	16000					**W/VF 86/150_690**	**P80**	**BN80A6**	147
1.4	916	2.0	960	13800					**W/VF 63/130_960**	**P71**	**BN71B4**	141
1.5	1068	2.4	920	16000					**W/VF 86/150_920**	**P71**	**BN71B4**	147
1.7	797	1.3	540	8000					**VF/W 49/110_540**	**P80**	**BN80A6**	135
1.7	1068	2.5	529	16000					**W/VF 86/150_529**	**P80**	**BN80A6**	147
1.8	764	2.4	760	13800					**W/VF 63/130_760**	**P71**	**BN71B4**	141
1.9	743	1.3	720	8000					**VF/W 49/110_720**	**P71**	**BN71B4**	135
2.0	890	2.9	690	16000					**W/VF 86/150_690**	**P71**	**BN71B4**	147
2.3	619	2.9	600	13800					**W/VF 63/130_600**	**P71**	**BN71B4**	141
2.5	571	1.8	540	8000					**VF/W 49/110_540**	**P71**	**BN71B4**	135
2.6	750	3.5	529	16000					**W/VF 86/150_529**	**P71**	**BN71B4**	147



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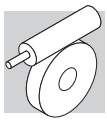
n_2 min-1	M_2 Nm	S	i	R_{n2} N					IEC		
3.0	559	1.0	300	8000					**WR 110_300**	**P80**	**BN80A6**	134
3.0	571	1.8	300	13800					**VFR 130_300**	**P80**	**BN80A6**	138
3.0	547	1.9	300	8000					**VF/W 49/110_300**	**P80**	**BN80A6**	135
3.4	423	1.2	400	7000					**VF/W 44/86_400**	**P71**	**BN71B4**	131
3.4	464	2.2	400	8000					**VF/W 49/110_400**	**P71**	**BN71B4**	135
3.8	494	1.2	240	8000					**WR 110_240**	**P80**	**BN80A6**	134
3.8	503	2.4	240	13800					**VFR 130_240**	**P80**	**BN80A6**	138
4.0	455	2.3	230	8000					**VF/W 49/110_230**	**P80**	**BN80A6**	135
4.6	395	1.4	300	8000					**WR 110_300**	**P71**	**BN71B4**	134
4.6	348	1.4	300	7000					**VF/W 44/86_300**	**P71**	**BN71B4**	131
4.6	371	2.7	300	8000					**VF/W 49/110_300**	**P71**	**BN71B4**	135
4.7	410	1.0	192	7000					**WR 86_192**	**P80**	**BN80A6**	130
4.7	425	1.6	192	8000					**WR 110_192**	**P80**	**BN80A6**	134
4.7	432	3.0	192	13800					**VFR 130_192**	**P80**	**BN80A6**	138
5.4	372	1.0	168	7000					**WR 86_168**	**P80**	**BN80A6**	130
5.4	391	2.0	168	8000					**WR 110_168**	**P80**	**BN80A6**	134
5.4	391	3.4	168	13800					**VFR 130_168**	**P80**	**BN80A6**	138
5.7	328	0.9	240	7000					**WR 86_240**	**P71**	**BN71B4**	130
5.7	347	1.6	240	8000					**WR 110_240**	**P71**	**BN71B4**	134
6.0	320	1.6	230	7000					**VF/W 44/86_230**	**P71**	**BN71B4**	131
6.0	308	3.2	230	8000					**VF/W 49/110_230**	**P71**	**BN71B4**	135
6.1	320	1.0	150	6200					**WR 75_150**	**P80**	**BN80A6**	126
6.6	327	1.3	138	7000					**WR 86_138**	**P80**	**BN80A6**	130
6.6	338	2.4	138	8000					**WR 110_138**	**P80**	**BN80A6**	134
7.1	287	1.1	192	7000					**WR 86_192**	**P71**	**BN71B4**	130
7.1	297	2.1	192	8000					**WR 110_192**	**P71**	**BN71B4**	134
7.6	294	1.5	120	7000					**WR 86_120**	**P80**	**BN80A6**	130
7.6	303	2.9	120	8000					**WR 110_120**	**P80**	**BN80A6**	134
7.6	255	0.9	180	6200					**WR 75_180**	**P71**	**BN71B4**	126
8.2	260	1.4	168	7000					**WR 86_168**	**P71**	**BN71B4**	130
8.2	273	2.6	168	8000					**WR 110_168**	**P71**	**BN71B4**	134
9.1	214	1.2	100	7000	**W 86_100**	**S1**	**M1LA6**	128	**W 86_100**	**P80**	**BN80A6**	129
9.1	224	1.2	150	6200					**WR 75_150**	**P71**	**BN71B4**	126
9.9	224	1.8	138	7000					**WR 86_138**	**P71**	**BN71B4**	130
9.9	235	3.0	138	8000					**WR 110_138**	**P71**	**BN71B4**	134
10.1	234	1.6	90	6200					**WR 75_90**	**P80**	**BN80A6**	126
11.4	168	1.2	80	6200	**W 75_80**	**S1**	**M1LA6**	124	**W 75_80**	**P80**	**BN80A6**	125
11.4	183	1.5	80	7000	**W 86_80**	**S1**	**M1LA6**	128	**W 86_80**	**P80**	**BN80A6**	129
11.4	195	1.6	120	6200					**WR 75_120**	**P71**	**BN71B4**	126
11.4	204	1.9	120	7000					**WR 86_120**	**P71**	**BN71B4**	130
12.0	179	1.0	114	5000					**WR 63_114**	**P71**	**BN71B4**	122
12.1	204	1.6	75	6200					**WR 75_75**	**P80**	**BN80A6**	126
13.2	196	2.0	69	7000					**WR 86_69**	**P80**	**BN80A6**	130
13.7	142	1.1	100	6200	**W 75_100**	**S1**	**M1SD4**	124	**W 75_100**	**P71**	**BN71B4**	125
13.7	152	1.5	100	7000	**W 86_100**	**S1**	**M1SD4**	128	**W 86_100**	**P71**	**BN71B4**	129
14.2	139	1.0	64	5000	**W 63_64**	**S1**	**M1LA6**	120	**W 63_64**	**P80**	**BN80A6**	122
15.2	140	1.5	60	6200	**W 75_60**	**S1**	**M1LA6**	124	**W 75_60**	**P80**	**BN80A6**	125
15.2	149	1.3	90	5000					**WR 63_90**	**P71**	**BN71B4**	122
15.2	160	2.0	90	6200					**WR 75_90**	**P71**	**BN71B4**	126
15.2	156	2.8	90	7000					**WR 86_90**	**P71**	**BN71B4**	130
16.3	144	2.3	56	7000	**W 86_56**	**S1**	**M1LA6**	128	**W 86_56**	**P80**	**BN80A6**	129
17.1	116	1.0	80	5000	**W 63_80**	**S1**	**M1SD4**	120	**W 63_80**	**P71**	**BN71B4**	122
17.1	122	1.5	80	6200	**W 75_80**	**S1**	**M1SD4**	124	**W 75_80**	**P71**	**BN71B4**	125
17.1	132	1.9	80	7000	**W 86_80**	**S1**	**M1SD4**	128	**W 86_80**	**P71**	**BN71B4**	129
18.3	141	2.1	75	6200					**WR 75_75**	**P71**	**BN71B4**	126
19.0	130	1.4	72	4830					**WR 63_72**	**P71**	**BN71B4**	122
19.9	133	2.8	69	7000					**WR 86_69**	**P71**	**BN71B4**	130
20.2	136	2.6	45	6200					**WR 75_45**	**P80**	**BN80A6**	126
21.4	101	1.2	64	4870	**W 63_64**	**S1**	**M1SD4**	120	**W 63_64**	**P71**	**BN71B4**	122
21.4	112	2.5	64	7000	**W 86_64**	**S1**	**M1SD4**	128	**W 86_64**	**P71**	**BN71B4**	129
22.8	101	2.0	60	6200	**W 75_60**	**S1**	**M1SD4**	124	**W 75_60**	**P71**	**BN71B4**	125
22.8	119	2.5	60	6200					**WR 75_60**	**P71**	**BN71B4**	126
22.8	119	3.2	60	7000					**WR 86_60**	**P71**	**BN71B4**	130
24.0	107	1.7	57	4540					**WR 63_57**	**P71**	**BN71B4**	122
24.5	101	3.0	56	7000	**W 86_56**	**S1**	**M1SD4**	128	**W 86_56**	**P71**	**BN71B4**	129



0.37 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N					IEC			
27.4	88	2.5	50	6200	**W 75_50**	**S1**	**M1SD4**	124	**W 75_50**	**P71**	**BN71B4**	125
30	73	0.9	45	2680	**VF 49_45**	**P71**	**K71B4**	114	**VF 49_45**	**P71**	**BN71B4**	114
30	78	1.9	45	4400	**W 63_45**	**S1**	**M1SD4**	120	**W 63_45**	**P71**	**BN71B4**	122
30	88	2.0	45	4250					**WR 63_45**	**P71**	**BN71B4**	122
30	93	3.2	45	5880					**WR 75_45**	**P71**	**BN71B4**	126
34	74	3.4	40	5820	**W 75_40**	**S1**	**M1SD4**	124	**W 75_40**	**P71**	**BN71B4**	125
36	69	2.3	38	4180	**W 63_38**	**S1**	**M1SD4**	120	**W 63_38**	**P71**	**BN71B4**	122
38	62	1.1	36	2530	**VF 49_36**	**P71**	**K71B4**	114	**VF 49_36**	**P71**	**BN71B4**	114
38	73	2.2	36	3980					**WR 63_36**	**P71**	**BN71B4**	122
46	57	2.8	30	3900	**W 63_30**	**S1**	**M1SD4**	120	**W 63_30**	**P71**	**BN71B4**	122
49	51	1.4	28	2360	**VF 49_28**	**P71**	**K71B4**	114	**VF 49_28**	**P71**	**BN71B4**	114
57	46	1.4	24	2250	**VF 49_24**	**P71**	**K71B4**	114	**VF 49_24**	**P71**	**BN71B4**	114
57	48	3.2	24	3650	**W 63_24**	**S1**	**M1SD4**	120	**W 63_24**	**P71**	**BN71B4**	122
65	42	1.7	14	1940	**VF 49_14**	**P71**	**K71C6**	114	**VF 49_14**	**P80**	**BN80A6**	114
69	40	1.0	20	1870	**VF 44_20**	**P71**	**K71B4**	108	**VF 44_20**	**P71**	**BN71B4**	108
72	40	3.8	19	3400	**W 63_19**	**S1**	**M1SD4**	120	**W 63_19**	**P71**	**BN71B4**	122
76	36	1.6	18	2080	**VF 49_18**	**P71**	**K71B4**	114	**VF 49_18**	**P71**	**BN71B4**	114
79	33	0.9	35	1860	**VF 44_35**	**P63**	**K63C2**	108	**VF 44_35**	**P71**	**BN71A2**	108
91	32	2.0	10	1930	**VF 49_10**	**P71**	**K71C6**	114	**VF 49_10**	**P80**	**BN80A6**	114
98	29	1.0	14	1690	**VF 44_14**	**P71**	**K71B4**	108	**VF 44_14**	**P71**	**BN71B4**	108
98	29	2.2	14	1940	**VF 49_14**	**P71**	**K71B4**	114	**VF 49_14**	**P71**	**BN71B4**	114
117	24	2.0	24	1880	**VF 49_24**	**P63**	**K63C2**	114	**VF 49_24**	**P71**	**BN71A2**	114
137	22	1.3	10	1520	**VF 44_10**	**P71**	**K71B4**	108	**VF 44_10**	**P71**	**BN71B4**	108
137	22	2.7	10	1750	**VF 49_10**	**P71**	**K71B4**	114	**VF 49_10**	**P71**	**BN71B4**	114
138	21	1.4	20	1570	**VF 44_20**	**P63**	**K63C2**	108	**VF 44_20**	**P71**	**BN71A2**	108
153	19	2.3	18	1720	**VF 49_18**	**P63**	**K63C2**	114	**VF 49_18**	**P71**	**BN71A2**	114
196	16	1.9	7	1360	**VF 44_7**	**P71**	**K71B4**	108	**VF 44_7**	**P71**	**BN71B4**	108
196	16	3.5	7	1570	**VF 49_7**	**P71**	**K71B4**	114	**VF 49_7**	**P71**	**BN71B4**	114
275	11	2.0	10	1260	**VF 44_10**	**P63**	**K63C2**	108	**VF 44_10**	**P71**	**BN71A2**	108
393	8	2.8	7	1120	**VF 44_7**	**P63**	**K63C2**	108	**VF 44_7**	**P71**	**BN71A2**	108

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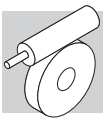
n_2 min-1	M_2 Nm	S	i	R_{n2} N					IEC			
0.29	4019	1.1	3200	19500					**W/VF 86/185_3200**	**P80**	**BN80B6**	153
0.36	3946	1.1	2560	19500					**W/VF 86/185_2560**	**P80**	**BN80B6**	153
0.43	2902	1.4	3200	19500					**W/VF 86/185_3200**	**P80**	**BN80A4**	153
0.47	3004	0.9	2944	16000					**W/VF 86/150_2944**	**P80**	**BN80A4**	147
0.50	3362	1.3	1840	19500					**W/VF 86/185_1840**	**P80**	**BN80B6**	153
0.54	2805	1.5	2560	19500					**W/VF 86/185_2560**	**P80**	**BN80A4**	153
0.76	2642	1.0	1840	16000					**W/VF 86/150_1840**	**P80**	**BN80A4**	147
0.76	2364	1.8	1840	19500					**W/VF 86/185_1840**	**P80**	**BN80A4**	153
0.77	1905	0.9	1800	13800					**W/VF 63/130_1800**	**P80**	**BN80A4**	141
0.87	2116	2.0	1600	19500					**W/VF 86/185_1600**	**P80**	**BN80A4**	153
0.91	1838	1.0	1520	13800					**W/VF 63/130_1520**	**P80**	**BN80A4**	141
1.0	1996	2.2	920	19500					**W/VF 86/185_920**	**P80**	**BN80B6**	153
1.0	2190	1.2	1380	16000					**W/VF 86/150_1380**	**P80**	**BN80A4**	147
1.2	1542	1.2	1200	13800					**W/VF 63/130_1200**	**P80**	**BN80A4**	141
1.2	1542	2.7	1200	19500					**W/VF 86/185_1200**	**P80**	**BN80A4**	153
1.3	1852	1.5	690	16000					**W/VF 86/150_690**	**P80**	**BN80B6**	147
1.4	1342	1.3	960	13800					**W/VF 63/130_960**	**P80**	**BN80A4**	141
1.5	1564	1.7	920	16000					**W/VF 86/150_920**	**P80**	**BN80A4**	147
1.5	1460	2.9	920	19500					**W/VF 86/185_920**	**P80**	**BN80A4**	153
1.5	1473	3.0	600	19500					**W/VF 86/185_600**	**P80**	**BN80B6**	153
1.7	1300	3.2	800	19500					**W/VF 86/185_800**	**P80**	**BN80A4**	153
1.7	1570	1.7	529	16000					**W/VF 86/150_529**	**P80**	**BN80B6**	147
1.8	1120	1.6	760	13800					**W/VF 63/130_760**	**P80**	**BN80A4**	141
2.0	1304	2.0	690	16000					**W/VF 86/150_690**	**P80**	**BN80A4**	147
2.3	1028	1.0	400	8000					**VF/W 49/110_400**	**P80**	**BN80B6**	135
2.3	907	2.0	600	13800					**W/VF 63/130_600**	**P80**	**BN80A4**	141
2.6	837	1.2	540	8000					**VF/W 49/110_540**	**P80**	**BN80A4**	135



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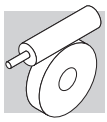
n_2 min-1	M_2 Nm	S	i	R_{n2} N						IEC		
2.6	1099	2.4	529	16000					**W/VF 86/150_529**	**P80**	**BN80A4**	147
3.0	956	2.7	460	16000					**W/VF 86/150_460**	**P80**	**BN80A4**	147
3.1	839	1.2	300	13800					**VFR 130_300**	**P80**	**BN80B6**	138
3.1	805	1.3	300	8000					**VF/W 49/110_300**	**P80**	**BN80B6**	135
3.5	680	1.5	400	8000					**VF/W 49/110_400**	**P80**	**BN80A4**	135
3.5	665	2.7	400	13800					**W/VF 63/130_400**	**P80**	**BN80A4**	141
3.8	740	1.6	240	13800					**VFR 130_240**	**P80**	**BN80B6**	138
4.0	670	1.6	230	8000					**VF/W 49/110_230**	**P80**	**BN80B6**	135
4.0	756	3.4	345	16000					**W/VF 86/150_345**	**P80**	**BN80A4**	147
4.6	578	0.9	300	8000					**WR 110_300**	**P80**	**BN80A4**	134
4.6	601	1.5	300	13800					**VFR 130_300**	**P80**	**BN80A4**	138
4.6	544	1.8	300	8000					**VF/W 49/110_300**	**P80**	**BN80A4**	135
4.8	625	1.1	192	8000					**WR 110_192**	**P80**	**BN80B6**	134
5.0	529	3.4	280	13800					**W/VF 63/130_280**	**P80**	**BN80A4**	141
5.8	508	1.1	240	8000					**WR 110_240**	**P80**	**BN80A4**	134
5.8	517	2.2	240	13800					**VFR 130_240**	**P80**	**BN80A4**	138
6.0	452	2.2	230	8000					**VF/W 49/110_230**	**P80**	**BN80A4**	135
6.7	504	3.0	138	13800					**VFR 130_138**	**P80**	**BN80B6**	138
7.2	435	1.4	192	8000					**WR 110_192**	**P80**	**BN80A4**	134
7.2	443	2.7	192	13800					**VFR 130_192**	**P80**	**BN80A4**	138
7.7	432	1.0	120	7000					**WR 86_120**	**P80**	**BN80B6**	130
8.3	381	0.9	168	7000					**WR 86_168**	**P80**	**BN80A4**	130
8.3	400	1.8	168	8000					**WR 110_168**	**P80**	**BN80A4**	134
8.3	406	3.0	168	13800					**VFR 130_168**	**P80**	**BN80A4**	138
9.2	325	1.5	100	8000	**W 110_100**	**S2**	**M2SA6**	132	**W 110_100**	**P80**	**BN80B6**	133
10.1	329	1.2	138	7000					**WR 86_138**	**P80**	**BN80A4**	130
10.1	344	2.1	138	8000					**WR 110_138**	**P80**	**BN80A4**	134
10.2	344	1.1	90	6200					**WR 75_90**	**P80**	**BN80B6**	126
11.5	269	1.0	80	7000	**W 86_80**	**S2**	**M2SA6**	128	**W 86_80**	**P80**	**BN80B6**	129
11.6	286	1.1	120	6200					**WR 75_120**	**P80**	**BN80A4**	126
11.6	299	1.3	120	7000					**WR 86_120**	**P80**	**BN80A4**	130
11.6	308	2.6	120	8000					**WR 110_120**	**P80**	**BN80A4**	134
12.3	300	1.1	75	6200					**WR 75_75**	**P80**	**BN80B6**	126
13.3	288	1.4	69	7000					**WR 86_69**	**P80**	**BN80B6**	130
13.3	295	2.5	69	8000					**WR 110_69**	**P80**	**BN80B6**	134
13.8	225	1.0	100	7000	**W 86_100**	**S1**	**M1LA4**	128	**W 86_100**	**P80**	**BN80A4**	129
15.4	235	1.4	90	6200					**WR 75_90**	**P80**	**BN80A4**	126
15.4	228	1.9	90	7000					**WR 86_90**	**P80**	**BN80A4**	130
15.4	238	3.5	90	8000					**WR 110_90**	**P80**	**BN80A4**	134
16.4	211	1.5	56	7000	**W 86_56**	**S2**	**M2SA6**	128	**W 86_56**	**P80**	**BN80B6**	129
17.3	180	1.0	80	6200	**W 75_80**	**S1**	**M1LA4**	124	**W 75_80**	**P80**	**BN80A4**	125
17.3	195	1.3	80	7000	**W 86_80**	**S1**	**M1LA4**	128	**W 86_80**	**P80**	**BN80A4**	129
18.5	207	1.4	75	6200					**WR 75_75**	**P80**	**BN80A4**	126
20.1	196	1.9	69	7000					**WR 86_69**	**P80**	**BN80A4**	130
20.1	201	3.2	69	8000					**WR 110_69**	**P80**	**BN80A4**	134
20.4	162	1.0	45	4540	**W 63_45**	**S2**	**M2SA6**	120	**W 63_45**	**P80**	**BN80B6**	122
21.6	166	1.7	64	7000	**W 86_64**	**S1**	**M1LA4**	128	**W 86_64**	**P80**	**BN80A4**	129
23.0	148	1.3	60	6200	**W 75_60**	**S1**	**M1LA4**	124	**W 75_60**	**P80**	**BN80A4**	125
23.0	162	2.2	40	7000	**W 86_40**	**S2**	**M2SA6**	128	**W 86_40**	**P80**	**BN80B6**	129
23.2	175	1.7	60	6040					**WR 75_60**	**P80**	**BN80A4**	126
23.2	175	2.2	60	7000					**WR 86_60**	**P80**	**BN80A4**	130
24.2	143	1.2	38	4340	**W 63_38**	**S2**	**M2SA6**	120	**W 63_38**	**P80**	**BN80B6**	122
24.6	149	2.0	56	7000	**W 86_56**	**S1**	**M1LA4**	128	**W 86_56**	**P80**	**BN80A4**	129
27.6	129	1.7	50	5960	**W 75_50**	**S1**	**M1LA4**	124	**W 75_50**	**P80**	**BN80A4**	125
30	128	2.7	46	7000	**W 86_46**	**S1**	**M1LA4**	128	**W 86_46**	**P80**	**BN80A4**	129
31	115	1.3	45	4140	**W 63_45**	**S1**	**M1LA4**	120	**W 63_45**	**P80**	**BN80A4**	122
31	136	2.2	45	5580					**WR 75_45**	**P80**	**BN80A4**	126
31	133	2.9	45	7000					**WR 86_45**	**P80**	**BN80A4**	130
35	110	2.3	40	5610	**W 75_40**	**S1**	**M1LA4**	124	**W 75_40**	**P80**	**BN80A4**	125
35	114	2.9	40	7000	**W 86_40**	**S1**	**M1LA4**	128	**W 86_40**	**P80**	**BN80A4**	129
36	101	1.5	38	3950	**W 63_38**	**S1**	**M1LA4**	120	**W 63_38**	**P80**	**BN80A4**	122
40	105	3.3	23	7000	**W 86_23**	**S2**	**M2SA6**	128	**W 86_23**	**P80**	**BN80B6**	129
46	84	1.9	30	3700	**W 63_30**	**S1**	**M1LA4**	120	**W 63_30**	**P80**	**BN80A4**	122
46	88	3.1	30	5150	**W 75_30**	**S1**	**M1LA4**	124	**W 75_30**	**P80**	**BN80A4**	125
46	95	2.9	30	4950					**WR 75_30**	**P80**	**BN80A4**	126



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n_2 min-1	M_2 Nm	S	i	R_{n2} N										
49	76	1.0	28	2170	**VF 49_28**	**P71**	**K71C4**	114	**VF 49_28**	**P80**	**BN80A4**	114
55	76	3.3	25	4880	**W 75_25**	**S1**	**M1LA4**	124	**W 75_25**	**P80**	**BN80A4**	125
58	69	0.9	24	2080	**VF 49_24**	**P71**	**K71C4**	114	**VF 49_24**	**P80**	**BN80A4**	114
58	71	2.2	24	3480	**W 63_24**	**S1**	**M1LA4**	120	**W 63_24**	**P80**	**BN80A4**	122
66	62	1.1	14	1960					**VF 49_14**	**P80**	**BN80B6**	114
73	59	2.6	19	3260	**W 63_19**	**S1**	**M1LA4**	120	**W 63_19**	**P80**	**BN80A4**	122
77	53	1.1	18	1930	**VF 49_18**	**P71**	**K71C4**	114	**VF 49_18**	**P80**	**BN80A4**	114
92	47	1.4	10	1800					**VF 49_10**	**P80**	**BN80B6**	114
92	47	3.2	15	3050	**W 63_15**	**S1**	**M1LA4**	120	**W 63_15**	**P80**	**BN80A4**	122
99	43	1.5	14	1810	**VF 49_14**	**P71**	**K71C4**	114	**VF 49_14**	**P80**	**BN80A4**	114
115	39	3.6	12	2850	**W 63_12**	**S1**	**M1LA4**	120	**W 63_12**	**P80**	**BN80A4**	122
117	35	1.3	24	1800	**VF 49_24**	**P71**	**K71B2**	114	**VF 49_24**	**P71**	**BN71B2**	114
131	35	3.7	7	2700	**W 63_7**	**S2**	**M2SA6**	120	**W 63_7**	**P80**	**BN80B6**	122
138	32	1.8	10	1650	**VF 49_10**	**P71**	**K71C4**	114	**VF 49_10**	**P80**	**BN80A4**	114
141	30	1.0	20	1490	**VF 44_20**	**P71**	**K71B2**	108	**VF 44_20**	**P71**	**BN71B2**	108
156	28	1.6	18	1650	**VF 49_18**	**P71**	**K71B2**	114	**VF 49_18**	**P71**	**BN71B2**	114
197	23	2.4	7	1480	**VF 49_7**	**P71**	**K71C4**	114	**VF 49_7**	**P80**	**BN80A4**	114
281	16	1.4	10	1210	**VF 44_10**	**P71**	**K71B2**	108	**VF 44_10**	**P71**	**BN71B2**	108
281	16	2.7	10	1390	**VF 49_10**	**P71**	**K71B2**	114	**VF 49_10**	**P71**	**BN71B2**	114
401	12	1.9	7	1080	**VF 44_7**	**P71**	**K71B2**	108	**VF 44_7**	**P71**	**BN71B2**	108

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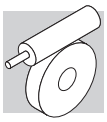
n_2 min-1	M_2 Nm	S	i	R_{n2} N										
0.29	4867	1.3	3200	34500					**VF/VF 130/210_3200**	**P90**	**BE90S6**	158
0.29	4623	1.9	3200	52000					**VF/VF 130/250_3200**	**P90**	**BE90S6**	164
0.37	4672	1.4	2560	34500					**VF/VF 130/210_2560**	**P90**	**BE90S6**	158
0.37	4478	2.0	2560	52000					**VF/VF 130/250_2560**	**P90**	**BE90S6**	164
0.45	3852	1.1	3200	19500					**W /VF 86/185_3200**	**P80**	**BE80B4**	153
0.51	4478	1.0	1840	19500					**W /VF 86/185_1840**	**P90**	**BE90S6**	153
0.51	3918	1.6	1840	34500					**VF/VF 130/210_1840**	**P90**	**BE90S6**	158
0.51	4058	2.3	1840	52000					**VF/VF 130/250_1840**	**P90**	**BE90S6**	164
0.56	3724	1.1	2560	19500					**W /VF 86/185_2560**	**P80**	**BE80B4**	153
0.78	3138	1.3	1840	19500					**W /VF 86/185_1840**	**P80**	**BE80B4**	153
0.90	2809	1.5	1600	19500					**W /VF 86/185_1600**	**P80**	**BE80B4**	153
1.0	2659	1.6	920	19500					**W /VF 86/185_920**	**P90**	**BE90S6**	153
1.2	2046	0.9	1200	13800					**W /VF 63/130_1200**	**P80**	**BE80B4**	141
1.2	2046	2.0	1200	19500					**W /VF 86/185_1200**	**P80**	**BE80B4**	153
1.4	2466	1.1	690	16000					**W /VF 86/150_690**	**P90**	**BE90S6**	147
1.5	1781	1.0	960	13800					**W /VF 63/130_960**	**P80**	**BE80B4**	141
1.5	2076	1.2	920	16000					**W /VF 86/150_920**	**P80**	**BE80B4**	147
1.5	1938	2.1	920	19500					**W /VF 86/185_920**	**P80**	**BE80B4**	153
1.8	2092	1.3	529	16000					**W /VF 86/150_529**	**P90**	**BE90S6**	147
1.8	1725	2.4	800	19500					**W /VF 86/185_800**	**P80**	**BE80B4**	153
1.8	1486	1.2	760	13800					**W /VF 63/130_760**	**P80**	**BE80B4**	141
2.0	1730	1.5	690	16000					**W /VF 86/150_690**	**P80**	**BE80B4**	147
2.3	1204	1.5	600	13800					**W /VF 63/130_600**	**P80**	**BE80B4**	141
2.3	1354	3.1	600	19500					**W /VF 86/185_600**	**P80**	**BE80B4**	153
2.7	1460	1.7	529	16000					**W /VF 86/150_529**	**P80**	**BE80B4**	147
3.1	1269	2.0	460	16000					**W /VF 86/150_460**	**P80**	**BE80B4**	147
3.1	1140	1.2	300	16000					**VFR 150_300**	**P90**	**BE90S6**	144
3.1	1141	2.1	300	19500					**VFR 185_300**	**P90**	**BE90S6**	150
3.6	903	1.1	400	8000					**VF/W 49/110_400**	**P80**	**BE80B4**	135
3.6	882	2.0	400	13800					**W /VF 63/130_400**	**P80**	**BE80B4**	141
3.9	986	1.2	240	13800					**VFR 130_240**	**P90**	**BE90S6**	138
3.9	986	1.7	240	16000					**VFR 150_240**	**P90**	**BE90S6**	144
3.9	986	2.9	240	19500					**VFR 185_240**	**P90**	**BE90S6**	150
4.2	1004	2.6	345	16000					**W /VF 86/150_345**	**P80**	**BE80B4**	147
4.8	797	1.1	300	13800					**VFR 130_300**	**P80**	**BE80B4**	138
4.8	723	1.4	300	8000					**VF/W 49/110_300**	**P80**	**BE80B4**	135
4.8	873	3.0	300	16000					**W /VF 86/150_300**	**P80**	**BE80B4**	147



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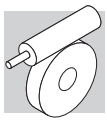
n_2 min-1	M_2 Nm	S	i	R_{n2} N					IEC		
4.9	862	2.3	192	16000					**VFR 150_192**	**P90**	**BE90S6**	144
5.1	702	2.6	280	13800					**W /VF 63/130_280**	**P80**	**BE80B4**	141
5.6	767	1.0	168	8000					**WR 110_168**	**P90**	**BE90S6**	134
5.6	661	1.2	168	16000					**VFR 150_168**	**P90**	**BE90S6**	144
5.9	394	1.9	240	13800					**VFR 130_240**	**P80**	**BE80B4**	138
6.2	267	1.3	230	8000					**VF/W 49/110_230**	**P80**	**BE80B4**	135
6.8	661	1.2	138	8000					**WR 110_138**	**P90**	**BE90S6**	134
6.8	672	2.3	138	13800					**VFR 130_138**	**P90**	**BE90S6**	138
7.4	577	1.1	192	8000					**WR 110_192**	**P80**	**BE80B4**	134
7.5	587	2.0	192	13800					**VFR 130_192**	**P80**	**BE80B4**	138
8.5	530	1.3	168	8000					**WR 110_168**	**P80**	**BE80B4**	134
8.5	539	2.2	168	13800					**VFR 130_168**	**P80**	**BE80B4**	138
9.4	434	1.1	100	8000	**W110_100**	**S3**	**ME3SA6**	132	**W 110_100**	**P90**	**BE90S6**	133
9.4	448	1.7	100	13200					**VF 130_100**	**P90**	**BE90S6**	136
10.4	436	0.9	138	7000					**WR 86_138**	**P80**	**BE80B4**	130
10.4	455	1.6	138	8000					**WR 110_138**	**P80**	**BE80B4**	134
10.3	464	3.0	138	13800					**VFR 130_138**	**P80**	**BE80B4**	138
11.8	372	1.4	80	8000	**W110_80**	**S3**	**ME3SA6**	132	**W 110_80**	**P90**	**BE90S6**	133
11.8	390	2.5	80	13200					**VF 130_80**	**P90**	**BE90S6**	136
12.0	397	1.0	120	7000					**WR 86_120**	**P80**	**BE80B4**	130
12.0	409	1.9	120	8000					**WR 110_120**	**P80**	**BE80B4**	134
12.0	403	3.5	120	13800					**VFR 130_120**	**P80**	**BE80B4**	138
13.6	394	1.9	69	8000					**WR 110_69**	**P90**	**BE90S6**	134
14.3	311	1.5	100	8000	**W110_100**	**S2**	**ME2SB4**	132	**W 110_100**	**P80**	**BE80B4**	133
14.7	307	1.0	64	7000	**W86_64**	**S3**	**ME3SA6**	128	**W 86_64**	**P90**	**BE90S6**	129
14.7	331	3.2	64	13200					**VF 130_64**	**P90**	**BE90S6**	136
15.9	312	1.0	90	6200					**WR 75_90**	**P80**	**BE80B4**	126
15.9	302	1.5	90	7000					**WR 86_90**	**P80**	**BE80B4**	130
15.9	316	2.6	90	8000					**WR 110_90**	**P80**	**BE80B4**	134
16.8	281	1.2	56	7000	**W86_56**	**S3**	**ME3SA6**	128	**W 86_56**	**P90**	**BE90S6**	129
16.8	289	2.2	56	8000	**W110_56**	**S3**	**ME3SA6**	132	**W 110_56**	**P90**	**BE90S6**	133
17.9	257	1.0	80	7000	**W86_80**	**S2**	**ME2SB4**	128	**W 86_80**	**P80**	**BE80B4**	129
17.9	265	1.8	80	8000	**W110_80**	**S2**	**ME2SB4**	132	**W 110_80**	**P80**	**BE80B4**	133
18.8	239	1.0	50	6200	**W75_50**	**S3**	**ME3SA6**	124	**W 75_50**	**P90**	**BE90S6**	125
19.1	275	1.1	75	5980					**WR 75_75**	**P80**	**BE80B4**	126
20.7	260	1.5	69	7000					**WR 86_69**	**P80**	**BE80B4**	130
20.7	267	2.4	69	8000					**WR 110_69**	**P80**	**BE80B4**	134
20.9	267	1.3	45	6010					**WR 75_45**	**P90**	**BE90S6**	126
22.4	219	1.3	64	7000	**W86_64**	**S2**	**ME2SB4**	128	**W 86_64**	**P80**	**BE80B4**	129
22.4	225	2.4	64	8000	**W110_64**	**S2**	**ME2SB4**	132	**W 110_64**	**P80**	**BE80B4**	133
23.5	207	1.3	40	5930	**W75_40**	**S3**	**ME3SA6**	124	**W 75_40**	**P90**	**BE90S6**	125
23.8	196	1.0	60	5960	**W75_60**	**S2**	**ME2SB4**	124	**W 75_60**	**P80**	**BE80B4**	125
23.8	231	1.3	60	5640					**WR 75_60**	**P80**	**BE80B4**	126
23.8	231	1.6	60	7000					**WR 86_60**	**P80**	**BE80B4**	130
23.8	238	2.8	60	8000					**WR 110_60**	**P80**	**BE80B4**	134
25.5	197	1.5	56	7000	**W86_56**	**S2**	**ME2SB4**	128	**W 86_56**	**P80**	**BE80B4**	129
25.5	202	3.0	56	8000	**W110_56**	**S2**	**ME2SB4**	132	**W 110_56**	**P80**	**BE80B4**	133
28.6	171	1.3	50	5670	**W75_50**	**S2**	**ME2SB4**	124	**W 75_50**	**P80**	**BE80B4**	125
30.6	169	2.0	46	7000	**W86_46**	**S2**	**ME2SB4**	128	**W 86_46**	**P80**	**BE80B4**	129
30.6	171	3.5	46	8000	**W110_46**	**S2**	**ME2SB4**	132	**W 110_46**	**P80**	**BE80B4**	133
32	151	1.0	45	3860	**W63_45**	**S2**	**ME2SB4**	120	**W 63_45**	**P80**	**BE80B4**	122
32	180	1.6	45	5250					**WR 75_45**	**P80**	**BE80B4**	126
32	176	2.2	45	7000					**WR 86_45**	**P80**	**BE80B4**	130
36	144	1.8	40	5370	**W75_40**	**S2**	**ME2SB4**	124	**W 75_40**	**P80**	**BE80B4**	125
36	150	2.2	40	7000	**W86_40**	**S2**	**ME2SB4**	128	**W 86_40**	**P80**	**BE80B4**	129
38	133	1.2	38	3700	**W63_38**	**S2**	**ME2SB4**	120	**W 63_38**	**P80**	**BE80B4**	122
41	140	2.5	23	7000	**W86_23**	**S3**	**ME3SA6**	128	**W 86_23**	**P90**	**BE90S6**	129
48	112	1.4	30	3490	**W63_30**	**S2**	**ME2SB4**	120	**W 63_30**	**P80**	**BE80B4**	122
48	126	2.2	30	4680					**WR 75_30**	**P80**	**BE80B4**	126
48	116	2.3	30	4950	**W75_30**	**S2**	**ME2SB4**	124	**W 75_30**	**P80**	**BE80B4**	125
48	115	3.3	30	7000	**W86_30**	**S2**	**ME2SB4**	128	**W 86_30**	**P80**	**BE80B4**	129
57	100	2.5	25	4700	**W75_25**	**S2**	**ME2SB4**	124	**W 75_25**	**P80**	**BE80B4**	125
60	94	1.7	24	3290	**W63_24**	**S2**	**ME2SB4**	120	**W 63_24**	**P80**	**BE80B4**	122
62	94	3.4	23	7000	**W86_23**	**S2**	**ME2SB4**	128	**W 86_23**	**P80**	**BE80B4**	129
72	83	3.0	20	4400	**W75_20**	**S2**	**ME2SB4**	124	**W 75_20**	**P80**	**BE80B4**	125



0.75 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N						IEC			
75	77	1.9	19	3100	**W63_19**	**S2**	**ME2SB4**	120	**W 63_19**	**P80**	**BE80B4**	122
95	63	2.4	15	2910	**W63_15**	**S2**	**ME2SB4**	120	**W 63_15**	**P80**	**BE80B4**	122
102	57	1.1	14	1690					**VF 49_14**	**P80**	**BE80B4**	114
119	47	1.0	24	1710					**VF 49_24**	**P80**	**BE80A2**	114
119	51	2.7	12	2740	**W63_12**	**S2**	**ME2SB4**	120	**W 63_12**	**P80**	**BE80B4**	122
134	46	2.8	7	2590					**W 63_7**	**P90**	**BE90S6**	122
143	42	1.4	10	1540					**VF 49_10**	**P80**	**BE80B4**	114
143	43	3.3	10	2600	**W63_10**	**S2**	**ME2SB4**	120	**W 63_10**	**P80**	**BE80B4**	122
190	32	3.9	15	2440	**W 63_15**	**S2**	**ME2SA2**	120	**W 63_15**	**P80**	**BE80A2**	122
204	30	1.8	7	1400					**VF 49_7**	**P80**	**BE80B4**	114
204	31	3.9	7	2340	**W63_7**	**S2**	**ME2SB4**	120	**W 63_7**	**P80**	**BE80B4**	122
285	21	2.1	10	1340					**VF 49_10**	**P80**	**BE80A2**	114
407	15.5	2.7	7	1200					**VF 49_7**	**P80**	**BE80A2**	114

1.1 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N						IEC			
0.30	7126	0.9	3200	34500					**VF/VF 130/210_3200**	**P100**	**BE100M6**	158
0.30	6769	1.3	3200	52000					**VF/VF 130/250_3200**	**P100**	**BE100M6**	164
0.37	6841	0.9	2560	34500					**VF/VF 130/210_2560**	**P100**	**BE100M6**	158
0.37	6555	1.4	2560	52000					**VF/VF 130/250_2560**	**P100**	**BE100M6**	164
0.45	5213	1.2	3200	34500					**VF/VF 130/210_3200**	**P90**	**BE90S4**	158
0.45	4975	1.8	3200	52000					**VF/VF 130/250_3200**	**P90**	**BE90S4**	164
0.51	6965	0.9	1840	34500					**VF/VF 130/210_1840**	**P100**	**BE100M6**	158
0.51	5941	1.5	1840	52000					**VF/VF 130/250_1840**	**P100**	**BE100M6**	164
0.56	4549	1.4	2560	34500					**VF/VF 130/210_2560**	**P90**	**BE90S4**	158
0.56	4738	1.9	2560	52000					**VF/VF 130/250_2560**	**P90**	**BE90S4**	164
0.78	4631	0.9	1840	19500					**W /VF 86/185_1840**	**P90**	**BE90S4**	153
0.78	4768	1.3	1840	34500					**VF/VF 130/210_1840**	**P90**	**BE90S4**	158
0.78	4223	2.1	1840	52000					**VF/VF 130/250_1840**	**P90**	**BE90S4**	164
0.90	4146	1.0	1600	19500					**W /VF 86/185_1600**	**P90**	**BE90S4**	153
1.0	3892	1.1	920	19500					**W /VF 86/185_920**	**P100**	**BE100M6**	153
1.2	3020	1.4	1200	19500					**W /VF 86/185_1200**	**P90**	**BE90S4**	153
1.5	2860	1.4	920	19500					**W /VF 86/185_920**	**P90**	**BE90S4**	153
1.8	2547	1.6	800	19500					**W /VF 86/185_800**	**P90**	**BE90S4**	153
2.0	2554	1.0	690	16000					**W /VF 86/150_690**	**P90**	**BE90S4**	147
2.3	1777	1.0	600	13800					**W /VF 63/130_600**	**P90**	**BE90S4**	141
2.3	1999	2.1	600	19500					**W /VF 86/185_600**	**P90**	**BE90S4**	153
2.7	2154	1.2	529	16000					**W /VF 86/150_529**	**P90**	**BE90S4**	147
3.1	1873	1.4	460	16000					**W /VF 86/150_460**	**P90**	**BE90S4**	147
3.2	1670	1.4	300	19500					**VFR 185_300**	**P100**	**BE100M6**	150
3.6	1303	1.4	400	13800					**W /VF 63/130_400**	**P90**	**BE90S4**	141
3.6	1422	2.9	400	19500					**W /VF 86/185_400**	**P90**	**BE90S4**	153
3.9	1443	1.1	240	16000					**VFR 150_240**	**P100**	**BE100M6**	144
3.9	1443	1.9	240	19500					**VFR 185_240**	**P100**	**BE100M6**	150
4.2	1481	1.7	345	16000					**W /VF 86/150_345**	**P90**	**BE90S4**	147
4.8	1206	1.1	300	16000					**VFR 150_300**	**P90**	**BE90S4**	144
4.8	1221	1.9	300	19500					**VFR 185_300**	**P90**	**BE90S4**	150
4.8	1289	2.0	300	16000					**W /VF 86/150_300**	**P90**	**BE90S4**	147
4.9	1240	1.0	192	13800					**VFR 130_192**	**P100**	**BE100M6**	138
5.1	1037	1.7	280	13800					**W /VF 63/130_280**	**P90**	**BE90S4**	141
5.9	1012	1.1	240	13800					**VFR 130_240**	**P90**	**BE90S4**	138
5.9	1030	1.5	240	16000					**VFR 150_240**	**P90**	**BE90S4**	144
5.9	1049	2.6	240	19500					**VFR 185_240**	**P90**	**BE90S4**	150
6.3	1050	2.4	225	16000					**W /VF 86/150_225**	**P90**	**BE90S4**	147
6.8	983	1.5	138	13800					**VFR 130_138**	**P100**	**BE100M6**	138
6.8	983	2.3	138	16000					**VFR 150_138**	**P100**	**BE100M6**	144
7.2	947	2.7	200	16000					**W /VF 86/150_200**	**P90**	**BE90S4**	147
7.5	867	1.4	192	13800					**VFR 130_192**	**P90**	**BE90S4**	138
7.5	881	1.9	192	16000					**VFR 150_192**	**P90**	**BE90S4**	144
7.9	869	1.0	120	8000					**WR 110_120**	**P100**	**BE100M6**	134

1.1 kW

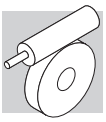
n_2 min-1	M_2 Nm	S	i	R_{n2} N					IEC			
8.0	866	3.4	180	19500					**VFR 185_180**	**P90**	**BE90S4**	150
8.5	796	1.5	168	13800					**VFR 130_168**	**P90**	**BE90S4**	138
8.5	808	2.1	168	16000					**VFR 150_168**	**P90**	**BE90S4**	144
9.5	657	1.2	100	13200					**VF 130_100**	**P100**	**BE100M6**	136
10.3	674	1.1	138	8000					**WR 110_138**	**P90**	**BE90S4**	134
10.3	685	1.9	138	13800					**VFR 130_138**	**P90**	**BE90S4**	138
10.3	695	2.8	138	16000					**VFR 150_138**	**P90**	**BE90S4**	144
10.5	661	1.4	90	8000					**WR 110_90**	**P100**	**BE100M6**	134
11.8	570	1.6	80	13200					**VF 130_80**	**P100**	**BE100M6**	136
12.0	604	1.3	120	8000					**WR 110_120**	**P90**	**BE90S4**	134
12.0	595	2.3	120	13800					**VFR 130_120**	**P90**	**BE90S4**	138
12.0	604	3.3	120	16000					**VFR 150_120**	**P90**	**BE90S4**	144
14.3	459	1.0	100	8000	**W110_100**	**S3**	**ME3SA4**	132	**W 110_100**	**P90**	**BE90S4**	133
14.3	518	1.1	100	12600					**VF 130_100**	**P90**	**BE90S4**	136
15.9	467	1.8	90	8000					**WR 110_90**	**P90**	**BE90S4**	134
15.9	473	3.1	90	13800					**VFR 130_90**	**P90**	**BE90S4**	138
17.9	391	1.2	80	8000	**W110_80**	**S3**	**ME3SA4**	132	**W 110_80**	**P90**	**BE90S4**	133
17.9	403	2.2	80	12600					**VF 130_80**	**P90**	**BE90S4**	136
20.5	353	1.0	46	7000	**W86_46**	**S3**	**ME3LA6**	128	**W 86_46**	**P100**	**BE100M6**	129
20.5	373	3.1	46	13200					**VF 130_46**	**P100**	**BE100M6**	136
20.7	383	1.0	69	7000					**WR 86_69**	**P90**	**BE90S4**	130
20.7	394	1.6	69	8000					**WR 110_69**	**P90**	**BE90S4**	134
20.7	388	3.3	69	13800					**VFR 130_69**	**P90**	**BE90S4**	138
22.4	332	1.6	64	8000	**W110_64**	**S3**	**ME3SA4**	132	**W 110_64**	**P90**	**BE90S4**	133
22.4	336	2.7	64	12600					**VF 130_64**	**P90**	**BE90S4**	136
23.6	316	1.1	40	7000	**W86_40**	**S3**	**ME3LA6**	128	**W 86_40**	**P100**	**BE100M6**	129
23.8	342	1.1	60	7000					**WR 86_60**	**P90**	**BE90S4**	130
23.8	351	1.9	60	8000					**WR 110_60**	**P90**	**BE90S4**	134
25.5	290	1.0	56	7000	**W86_56**	**S3**	**ME3SA4**	128	**W 86_56**	**P90**	**BE90S4**	129
25.5	299	2.0	56	8000	**W110_56**	**S3**	**ME3SA4**	132	**W 110_56**	**P90**	**BE90S4**	133
25.5	303	3.1	56	12600					**VF 130_56**	**P90**	**BE90S4**	136
31	249	1.4	46	7000	**W86_46**	**S3**	**ME3SA4**	128	**W 86_46**	**P90**	**BE90S4**	129
31	252	2.4	46	8000	**W110_46**	**S3**	**ME3SA4**	132	**W 110_46**	**P90**	**BE90S4**	133
32	266	1.1	45	5010					**WR 75_45**	**P90**	**BE90S4**	126
32	259	1.5	45	7000					**WR 86_45**	**P90**	**BE90S4**	130
32	266	2.7	45	8000					**WR 110_45**	**P90**	**BE90S4**	134
36	213	1.2	40	4980	**W75_40**	**S3**	**ME3SA4**	124	**W 75_40**	**P90**	**BE90S4**	125
36	222	1.5	40	7000	**W86_40**	**S3**	**ME3SA4**	128	**W 86_40**	**P90**	**BE90S4**	129
36	225	3.0	40	8000	**W110_40**	**S3**	**ME3SA4**	132	**W 110_40**	**P90**	**BE90S4**	133
38	214	1.3	38	4790					**WR 75_37.5**	**P90**	**BE90S4**	126
41	205	1.6	23	7000	**W86_23**	**S3**	**ME3LA6**	128	**W 86_23**	**P100**	**BE100M6**	129
41	204	1.7	35	7000					**WR 86_34.5**	**P90**	**BE90S4**	130
48	165	1.0	30	3130					**W 63_30**	**P90**	**BE90S4**	122
48	186	1.5	30	4530					**WR 75_30**	**P90**	**BE90S4**	126
48	171	1.6	30	4640	**W75_30**	**S3**	**ME3SA4**	124	**W 75_30**	**P90**	**BE90S4**	125
48	183	1.9	30	7000					**WR 86_30**	**P90**	**BE90S4**	130
48	169	2.2	30	7000	**W86_30**	**S3**	**ME3SA4**	128	**W 86_30**	**P90**	**BE90S4**	129
57	148	1.7	25	4420	**W75_25**	**S3**	**ME3SA4**	124	**W 75_25**	**P90**	**BE90S4**	125
59	138	1.1	24	2990					**W 63_24**	**P90**	**BE90S4**	122
62	140	2.3	23	7000	**W86_23**	**S3**	**ME3SA4**	128	**W 86_23**	**P90**	**BE90S4**	129
72	123	2.0	20	4160	**W75_20**	**S3**	**ME3SA4**	124	**W 75_20**	**P90**	**BE90S4**	125
72	124	2.6	20	7000	**W86_20**	**S3**	**ME3SA4**	128	**W 86_20**	**P90**	**BE90S4**	129
76	113	1.3	19	2840					**W 63_19**	**P90**	**BE90S4**	122
95	92	1.6	15	2690					**W 63_15**	**P90**	**BE90S4**	122
95	95	2.6	15	3850	**W75_15**	**S3**	**ME3SA4**	124	**W 75_15**	**P90**	**BE90S4**	125
95	95	3.4	15	6820	**W86_15**	**S3**	**ME3SA4**	128	**W 86_15**	**P90**	**BE90S4**	129
119	75	1.9	12	2550					**W 63_12**	**P90**	**BE90S4**	122
143	64	2.2	10	2440					**W 63_10**	**P90**	**BE90S4**	122
143	65	3.5	10	3420	**W75_10**	**S3**	**ME3SA4**	124	**W 75_10**	**P90**	**BE90S4**	125
189	47	2.6	15	2330	**W63_15**	**S2**	**ME2SB2**	120	**W 63_15**	**P90**	**BE90B2**	122
202	43	1.1	14	1370					**VF 49_14**	**P90**	**BE90B2**	114
204	45	2.6	7	2210					**W 63_7**	**P90**	**BE90S4**	122
236	38	3.3	12	2190	**W63_12**	**S2**	**ME2SB2**	120	**W 63_12**	**P90**	**BE90B2**	122
283	31	1.4	10	1250					**VF 49_10**	**P90**	**BE90B2**	114
283	32	3.9	10	2080	**W63_10**	**S2**	**ME2SB2**	120	**W 63_10**	**P90**	**BE90B2**	122

1.1 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N				IEC		
404	22	1.8	7	1130			**VF 49_7**	**P90**	**BE90B2**	114

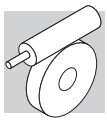
1.5 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N				IEC		
0.30	9240	1.0	3200	52000			**VF/VF 130/250_3200**	**P100**	**BE100LA6**	164
0.37	8948	1.0	2560	52000			**VF/VF 130/250_2560**	**P100**	**BE100LA6**	164
0.45	7012	0.9	3200	34500			**VF/VF 130/210_3200**	**P90**	**BE90LA4**	158
0.45	6693	1.3	3200	52000			**VF/VF 130/250_3200**	**P90**	**BE90LA4**	164
0.51	8109	1.1	1840	52000			**VF/VF 130/250_1840**	**P100**	**BE100LA6**	164
0.56	6120	1.0	2560	34500			**VF/VF 130/210_2560**	**P90**	**BE90LA4**	158
0.56	6375	1.4	2560	52000			**VF/VF 130/250_2560**	**P90**	**BE90LA4**	164
0.78	6415	1.0	1840	34500			**VF/VF 130/210_1840**	**P90**	**BE90LA4**	158
0.78	5681	1.6	1840	52000			**VF/VF 130/250_1840**	**P90**	**BE90LA4**	164
1.0	4893	1.3	920	34500			**VF/VF 130/210_920**	**P100**	**BE100LA6**	158
1.0	4893	1.9	920	52000			**VF/VF 130/250_920**	**P100**	**BE100LA6**	164
1.2	4064	1.0	1200	19500			**W /VF 86/185_1200**	**P90**	**BE90LA4**	153
1.2	4620	1.4	800	34500			**VF/VF 130/210_800**	**P100**	**BE100LA6**	158
1.2	4863	1.9	800	52000			**VF/VF 130/250_800**	**P100**	**BE100LA6**	164
1.5	3849	1.1	920	19500			**W /VF 86/185_920**	**P90**	**BE90LA4**	153
1.6	3921	1.7	600	34500			**VF/VF 130/210_600**	**P100**	**BE100LA6**	158
1.6	3921	2.3	600	52000			**VF/VF 130/250_600**	**P100**	**BE100LA6**	164
1.8	3426	1.2	800	19500			**W /VF 86/185_800**	**P90**	**BE90LA4**	153
2.4	2689	1.5	600	19500			**W /VF 86/185_600**	**P90**	**BE90LA4**	153
2.4	2918	2.2	400	34500			**VF/VF 130/210_400**	**P100**	**BE100LA6**	158
2.4	2857	3.2	400	52000			**VF/VF 130/250_400**	**P100**	**BE100LA6**	164
2.7	2898	0.9	529	16000			**W /VF 86/150_529**	**P90**	**BE90LA4**	147
3.1	2520	1.0	460	16000			**W /VF 86/150_460**	**P90**	**BE90LA4**	147
3.2	2280	1.0	300	19500			**VFR 185_300**	**P100**	**BE100LA6**	150
3.2	2234	1.6	300	34500			**VFR 210_300**	**P100**	**BE100LA6**	156
3.2	2370	2.2	300	52000			**VFR 250_300**	**P100**	**BE100LA6**	162
3.4	2128	3.0	280	34500			**VF/VF 130/210_280**	**P100**	**BE100LA6**	158
3.5	1753	1.0	400	13800			**W /VF 63/130_400**	**P90**	**BE90LA4**	141
3.5	1913	2.2	400	19500			**W /VF 86/185_400**	**P90**	**BE90LA4**	153
3.9	1969	0.9	240	16000			**VFR 150_240**	**P100**	**BE100LA6**	144
3.9	1969	1.4	240	19500			**VFR 185_240**	**P100**	**BE100LA6**	150
3.9	1969	2.2	240	34500			**VFR 210_240**	**P100**	**BE100LA6**	156
4.2	1993	1.3	345	16000			**W /VF 86/150_345**	**P90**	**BE90LA4**	147
4.8	1643	1.4	300	19500			**VFR 185_300**	**P90**	**BE90LA4**	150
4.8	1733	1.5	300	16000			**W /VF 86/150_300**	**P90**	**BE90LA4**	147
4.9	1721	1.1	192	16000			**VFR 150_192**	**P100**	**BE100LA6**	144
5.1	1394	1.3	280	13800			**W /VF 63/130_280**	**P90**	**BE90LA4**	141
5.1	1450	2.9	280	19500			**W /VF 86/185_280**	**P90**	**BE90LA4**	153
5.3	1641	2.0	180	19500			**VFR 185_180**	**P100**	**BE100LA6**	150
5.3	1477	3.3	180	34500			**VFR 210_180**	**P100**	**BE100LA6**	156
5.6	1532	0.9	168	13800			**VFR 130_168**	**P100**	**BE100LA6**	138
6.0	1386	1.1	240	16000			**VFR 150_240**	**P90**	**BE90LA4**	144
6.0	1411	1.9	240	19500			**VFR 185_240**	**P90**	**BE90LA4**	150
6.4	1412	1.8	225	16000			**W /VF 86/150_225**	**P90**	**BE90LA4**	147
7.2	1275	2.0	200	16000			**W /VF 86/150_200**	**P90**	**BE90LA4**	147
7.4	1167	1.0	192	13800			**VFR 130_192**	**P90**	**BE90LA4**	138
7.4	1185	1.4	192	16000			**VFR 150_192**	**P90**	**BE90LA4**	144
7.9	1166	2.6	180	19500			**VFR 185_180**	**P90**	**BE90LA4**	150
8.5	1071	1.1	168	13800			**VFR 130_168**	**P90**	**BE90LA4**	138
8.5	1087	1.6	168	16000			**VFR 150_168**	**P90**	**BE90LA4**	144
9.5	927	1.2	100	15500			**VF 150_100**	**P100**	**BE100LA6**	142
9.5	942	2.1	100	19500			**VF 185_100**	**P100**	**BE100LA6**	148
9.5	1001	3.3	150	16000			**VFR 185_150**	**P90**	**BE90LA4**	150
10.3	921	1.4	138	13800			**VFR 130_138**	**P90**	**BE90LA4**	138
10.3	934	2.1	138	16000			**VFR 150_138**	**P90**	**BE90LA4**	144
10.5	902	1.0	90	8000			**WR 110_90**	**P100**	**BE100LA6**	134



1.5 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N						IEC			
10.5	998	3.2	90	19500					**VFR 185_90**	**P100**	**BE100LA6**	150
11.8	778	1.2	80	13200					**VF 130_80**	**P100**	**BE100LA6**	136
11.8	790	1.7	80	15500					**VF 150_80**	**P100**	**BE100LA6**	142
11.9	816	1.0	120	8000					**WR 110_120**	**P90**	**BE90LA4**	134
12.0	801	1.7	120	13800					**VFR 130_120**	**P90**	**BE90LA4**	138
12.0	813	2.4	120	16000					**VFR 150_120**	**P90**	**BE90LA4**	144
13.7	787	1.0	69	8000					**WR 110_69**	**P100**	**BE100LA6**	134
13.7	776	1.9	69	13800					**VFR 130_69**	**P100**	**BE100LA6**	138
13.7	776	2.6	69	16000					**VFR 150_69**	**P100**	**BE100LA6**	144
14.8	671	2.2	64	15500					**VF 150_64**	**P100**	**BE100LA6**	142
15.9	627	1.3	90	8000					**WR 110_90**	**P90**	**BE90LA4**	134
15.9	636	2.3	90	13800					**VFR 130_90**	**P90**	**BE90LA4**	138
15.9	645	3.1	90	16000					**VFR 150_90**	**P90**	**BE90LA4**	144
16.9	578	1.1	56	8000	**W110_56**	**S3**	**ME3LB6**	132	**W 110_56**	**P100**	**BE100LA6**	133
16.9	595	1.8	56	13200					**VF 130_56**	**P100**	**BE100LA6**	136
16.9	604	2.5	56	15500					**VF 150_56**	**P100**	**BE100LA6**	142
17.8	542	1.6	80	12600					**VF 130_80**	**P90**	**BE90LA4**	136
20.5	497	1.3	46	8000	**W110_46**	**S3**	**ME3LB6**	132	**W 110_46**	**P100**	**BE100LA6**	133
20.5	518	3.4	46	15500					**VF 150_46**	**P100**	**BE100LA6**	142
20.7	529	1.2	69	8000					**WR 110_69**	**P90**	**BE90LA4**	134
20.7	523	2.4	69	13800					**VFR 130_69**	**P90**	**BE90LA4**	138
20.7	529	3.5	69	16000					**VFR 150_69**	**P90**	**BE90LA4**	144
22.3	446	1.2	64	8000	**W110_64**	**S3**	**ME3SB4**	132	**W 110_64**	**P90**	**BE90LA4**	133
22.3	453	2.0	64	12600					**VF 130_64**	**P90**	**BE90LA4**	136
23.6	444	2.7	40	13200					**VF 130_40**	**P100**	**BE100LA6**	136
23.8	473	1.4	60	8000					**WR 110_60**	**P90**	**BE90LA4**	134
23.8	466	2.9	60	13800					**VFR 130_60**	**P90**	**BE90LA4**	138
25.6	402	1.5	56	8000	**W110_56**	**S3**	**ME3SB4**	132	**W 110_56**	**P90**	**BE90LA4**	133
25.6	407	2.3	56	12600					**VF 130_56**	**P90**	**BE90LA4**	136
31	334	1.0	46	7000	**W86_46**	**S3**	**ME3SB4**	128	**W 86_46**	**P90**	**BE90LA4**	129
31	339	1.8	46	8000	**W110_46**	**S3**	**ME3SB4**	132	**W 110_46**	**P90**	**BE90LA4**	133
31	348	3.1	46	12600					**VF 130_46**	**P90**	**BE90LA4**	136
32	350	1.1	45	7000					**WR 86_45**	**P90**	**BE90LA4**	130
32	359	2.0	45	8000					**WR 110_45**	**P90**	**BE90LA4**	134
35	299	1.1	40	7000	**W86_40**	**S3**	**ME3SB4**	128	**W 86_40**	**P90**	**BE90LA4**	129
35	303	2.2	40	8000	**W110_40**	**S3**	**ME3SB4**	132	**W 110_40**	**P90**	**BE90LA4**	133
38	292	0.9	25	4330	**W75_25**	**S3**	**ME3LB6**	124	**W 75_25**	**P100**	**BE100LA6**	125
38	287	0.9	38	4330					**WR 75_37.5**	**P90**	**BE90LA4**	126
41	279	1.2	23	7000	**W86_23**	**S3**	**ME3LB6**	128	**W 86_23**	**P100**	**BE100LA6**	129
41	275	1.3	35	7000					**WR 86_34.5**	**P90**	**BE90LA4**	130
48	251	1.1	30	4130					**WR 75_30**	**P90**	**BE90LA4**	126
48	230	1.2	30	4270	**W75_30**	**S3**	**ME3SB4**	124	**W 75_30**	**P90**	**BE90LA4**	125
48	245	1.4	30	7000					**WR 86_30**	**P90**	**BE90LA4**	130
48	227	1.6	30	7000	**W86_30**	**S3**	**ME3SB4**	128	**W 86_30**	**P90**	**BE90LA4**	129
48	230	3.1	30	8000	**W110_30**	**S3**	**ME3SB4**	132	**W 110_30**	**P90**	**BE90LA4**	133
57	199	1.3	25	4100	**W75_25**	**S3**	**ME3SB4**	124	**W 75_25**	**P90**	**BE90LA4**	125
62	188	1.7	23	7000	**W86_23**	**S3**	**ME3SB4**	128	**W 86_23**	**P90**	**BE90LA4**	129
62	190	2.8	23	8000	**W110_23**	**S3**	**ME3SB4**	132	**W 110_23**	**P90**	**BE90LA4**	133
72	166	1.5	20	3880	**W75_20**	**S3**	**ME3SB4**	124	**W 75_20**	**P90**	**BE90LA4**	125
72	168	1.9	20	7000	**W86_20**	**S3**	**ME3SB4**	128	**W 86_20**	**P90**	**BE90LA4**	129
72	168	3.4	20	8000	**W110_20**	**S3**	**ME3SB4**	132	**W 110_20**	**P90**	**BE90LA4**	133
75	153	1.0	19	2550					**W 63_19**	**P90**	**BE90LA4**	122
95	124	1.2	15	2450					**W 63_15**	**P90**	**BE90LA4**	122
95	127	2.0	15	3630	**W75_15**	**S3**	**ME3SB4**	124	**W 75_15**	**P90**	**BE90LA4**	125
95	128	2.4	15	6520					**WR 86_15**	**P90**	**BE90LA4**	130
95	127	2.6	15	6610	**W86_15**	**S3**	**ME3SB4**	128	**W 86_15**	**P90**	**BE90LA4**	129
120	102	1.4	12	2340					**W 63_12**	**P90**	**BE90LA4**	122
135	94	2.2	7	3150	**W75_7**	**S3**	**ME3LB6**	124	**W 75_7**	**P100**	**BE100LA6**	125
143	85	1.6	10	2250					**W 63_10**	**P90**	**BE90LA4**	122
143	87	2.6	10	3250	**W75_10**	**S3**	**ME3SB4**	124	**W 75_10**	**P90**	**BE90LA4**	125
143	87	3.3	10	5850	**W86_10**	**S3**	**ME3SB4**	128	**W 86_10**	**P90**	**BE90LA4**	129
190	65	1.9	15	2200					**W 63_15**	**P90**	**BE90SA2**	122
190	67	3.4	15	3120	**W75_15**	**S3**	**ME3SA2**	124	**W 75_15**	**P90**	**BE90SA2**	125
204	62	1.9	7	2060					**W 63_7**	**P90**	**BE90LA4**	122
204	63	3.1	7	2920	**W75_7**	**S3**	**ME3SB4**	124	**W 75_7**	**P90**	**BE90LA4**	125



1.5 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N						IEC			
204	62	4.0	7	5240	**W86_7**	**S3**	**ME3SB4**	128	**W 86_7**	**P90**	**BE90LA4**	129
238	52	2.4	12	2080					**W 63_12**	**P90**	**BE90SA2**	122
286	44	2.8	10	1980	**W63_10**	**S3**	**ME3SA2**	120	**W 63_10**	**P90**	**BE90SA2**	122

2.2 kW

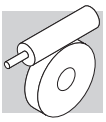
n_2 min-1	M_2 Nm	S	i	R_{n2} N						IEC			
0.45	9879	0.9	3200	52000					**VF/VF 130/250_3200**	**P100**	**BE100LA4**	164
0.56	9408	0.9	2560	52000					**VF/VF 130/250_2560**	**P100**	**BE100LA4**	164
0.78	8385	1.1	1840	52000					**VF/VF 130/250_1840**	**P100**	**BE100LA4**	164
0.89	7527	1.2	1600	52000					**VF/VF 130/250_1600**	**P100**	**BE100LA4**	164
1.0	6884	0.9	920	34500					**VF/VF 130/210_920**	**P112**	**BE112M6**	158
1.0	6884	1.4	920	52000					**VF/VF 130/250_920**	**P112**	**BE112M6**	164
1.2	6174	1.0	1200	34500					**VF/VF 130/210_1200**	**P100**	**BE100LA4**	158
1.2	6174	1.4	1200	52000					**VF/VF 130/250_1200**	**P100**	**BE100LA4**	164
1.5	5004	1.2	920	34500					**VF/VF 130/210_920**	**P100**	**BE100LA4**	158
1.5	5004	1.8	920	52000					**VF/VF 130/250_920**	**P100**	**BE100LA4**	164
1.8	4821	1.3	800	34500					**VF/VF 130/210_800**	**P100**	**BE100LA4**	158
1.8	4940	1.8	800	52000					**VF/VF 130/250_800**	**P100**	**BE100LA4**	164
2.4	3969	1.0	600	19500					**W /VF 86/185_600**	**P100**	**BE100LA4**	153
2.4	3792	1.6	600	34500					**VF/VF 130/210_600**	**P100**	**BE100LA4**	158
2.4	3881	2.3	600	52000					**VF/VF 130/250_600**	**P100**	**BE100LA4**	164
3.2	3143	1.2	300	34500					**VFR 210_300**	**P112**	**BE112M6**	156
3.2	3335	1.6	300	52000					**VFR 250_300**	**P112**	**BE112M6**	162
3.5	2823	1.5	400	19500					**W /VF 86/185_400**	**P100**	**BE100LA4**	153
3.5	2940	2.1	400	34500					**VF/VF 130/210_400**	**P100**	**BE100LA4**	158
3.5	2882	3.1	400	52000					**VF/VF 130/250_400**	**P100**	**BE100LA4**	164
4.0	2771	1.0	240	19500					**VFR 185_240**	**P112**	**BE112M6**	150
4.0	2771	1.6	240	34500					**VFR 210_240**	**P112**	**BE112M6**	156
4.0	2873	2.0	240	52000					**VFR 250_240**	**P112**	**BE112M6**	162
4.8	2426	0.9	300	19500					**VFR 185_300**	**P100**	**BE100LA4**	150
4.8	2426	1.4	300	34500					**VFR 210_300**	**P100**	**BE100LA4**	156
4.8	2514	2.0	300	52000					**VFR 250_300**	**P100**	**BE100LA4**	162
5.1	2141	1.9	280	19500					**W /VF 86/185_280**	**P100**	**BE100LA4**	153
5.1	2141	2.9	280	34500					**VF/VF 130/210_280**	**P100**	**BE100LA4**	158
5.7	2191	0.9	168	16000					**VFR 150_168**	**P112**	**BE112M6**	144
6.0	2082	1.3	240	19500					**VFR 185_240**	**P100**	**BE100LA4**	150
6.0	2082	1.8	240	34500					**VFR 210_240**	**P100**	**BE100LA4**	156
6.0	2152	2.5	240	52000					**VFR 250_240**	**P100**	**BE100LA4**	162
7.4	1750	1.0	192	16000					**VFR 150_192**	**P100**	**BE100LA4**	144
7.9	1720	1.7	180	19500					**VFR 185_180**	**P100**	**BE100LA4**	150
7.9	1694	2.5	180	34500					**VFR 210_180**	**P100**	**BE100LA4**	156
7.9	1773	3.5	180	52000					**VFR 250_180**	**P100**	**BE100LA4**	162
8.0	1616	0.9	120	13800					**VFR 130_120**	**P112**	**BE112M6**	138
8.5	1605	1.1	168	16000					**VFR 150_168**	**P100**	**BE100LA4**	144
9.5	1478	2.2	150	19500					**VFR 185_150**	**P100**	**BE100LA4**	150
9.5	1478	3.0	150	34500					**VFR 210_150**	**P100**	**BE100LA4**	156
9.6	1326	1.5	100	19000					**VF 185_100**	**P112**	**BE112M6**	148
10.3	1360	1.0	138	13800					**VFR 130_138**	**P100**	**BE100LA4**	138
10.3	1379	1.4	138	16000					**VFR 150_138**	**P100**	**BE100LA4**	144
10.6	1404	2.3	90	19500					**VFR 185_90**	**P112**	**BE112M6**	150
10.6	1385	3.3	90	34500					**VFR 210_90**	**P112**	**BE112M6**	156
11.9	1111	1.3	80	15500					**VF 150_80**	**P112**	**BE112M6**	142
11.9	1129	2.1	80	19000					**VF 185_80**	**P112**	**BE112M6**	148
12.0	1182	1.2	120	13800					**VFR 130_120**	**P100**	**BE100LA4**	138
12.0	1200	1.6	120	16000					**VFR 150_120**	**P100**	**BE100LA4**	144
12.0	1235	2.9	120	19500					**VFR 185_120**	**P100**	**BE100LA4**	150
12.0	1235	4.1	120	34500					**VFR 210_120**	**P100**	**BE100LA4**	156
13.8	1091	1.4	69	13800					**VFR 130_69**	**P112**	**BE112M6**	138
13.8	1091	1.9	69	16000					**VFR 150_69**	**P112**	**BE112M6**	144
14.3	956	1.2	100	14700					**VF 150_100**	**P100**	**BE100LA4**	142

2.2 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N						IEC			
14.3	956	2.0	100	18000					**VF 185_100**	**P100**	**BE100LA4**	148
14.9	931	1.2	64	13200					**VF 130_64**	**P112**	**BE112M6**	136
15.9	939	1.6	90	13800					**VFR 130_90**	**P100**	**BE100LA4**	138
15.9	953	2.0	90	16000					**VFR 150_90**	**P100**	**BE100LA4**	144
15.9	911	2.8	60	19000					**VF 185_60**	**P112**	**BE112M6**	148
15.9	1005	2.7	90	19500					**VFR 185_90**	**P100**	**BE100LA4**	150
17.1	838	1.3	56	13200					**VF 130_56**	**P112**	**BE112M6**	136
17.8	800	1.1	80	12600					**VF 130_80**	**P100**	**BE100LA4**	136
17.8	812	1.5	80	14700					**VF 150_80**	**P100**	**BE100LA4**	142
17.8	812	2.6	80	18000					**VF 185_80**	**P100**	**BE100LA4**	148
20.7	771	1.7	69	13800					**VFR 130_69**	**P100**	**BE100LA4**	138
20.7	781	2.3	69	16000					**VFR 150_69**	**P100**	**BE100LA4**	144
20.8	718	1.6	46	13200					**VF 130_46**	**P112**	**BE112M6**	136
20.8	728	2.4	46	15500					**VF 150_46**	**P112**	**BE112M6**	142
21.2	762	1.1	45	8000					**WR 110_45**	**P112**	**BE112M6**	134
22.3	668	1.4	64	12600					**VF 130_64**	**P100**	**BE100LA4**	136
22.3	678	1.9	64	14700					**VF 150_64**	**P100**	**BE100LA4**	142
23.8	697	1.0	60	8000					**WR 110_60**	**P100**	**BE100LA4**	134
23.8	688	1.9	60	13800					**VFR 130_60**	**P100**	**BE100LA4**	138
23.8	697	2.7	60	16000					**VFR 150_60**	**P100**	**BE100LA4**	144
23.8	653	3.4	60	18000					**VF 185_60**	**P100**	**BE100LA4**	148
23.9	631	1.2	40	8000					**W 110_40**	**P112**	**BE112M6**	133
25.6	593	1.0	56	8000	**W110_56**	**S3**	**ME3LA4**	132	**W 110_56**	**P100**	**BE100LA4**	133
25.6	601	1.6	56	12600					**VF 130_56**	**P100**	**BE100LA4**	136
25.6	609	2.2	56	14200					**VF 150_56**	**P100**	**BE100LA4**	142
31	500	1.2	46	8000	**W110_46**	**S3**	**ME3LA4**	132	**W 110_46**	**P100**	**BE100LA4**	133
31	514	2.0	46	12600					**VF 130_46**	**P100**	**BE100LA4**	136
31	521	2.9	46	14700					**VF 150_46**	**P100**	**BE100LA4**	142
32	529	1.3	45	8000					**WR 110_45**	**P100**	**BE100LA4**	134
31	543	3.1	45	16000					**VFR 150_45**	**P100**	**BE100LA4**	144
35	447	1.5	40	8000	**W110_40**	**S3**	**ME3LA4**	132	**W 110_40**	**P100**	**BE100LA4**	133
35	447	2.4	40	12600					**VF 130_40**	**P100**	**BE100LA4**	136
35	453	3.4	40	14700					**VF 150_40**	**P100**	**BE100LA4**	142
42	398	2.6	23	13200					**VF 130_23**	**P112**	**BE112M6**	136
48	335	1.1	30	7000	**W86_30**	**S3**	**ME3LA4**	128	**W 86_30**	**P100**	**BE100LA4**	129
48	339	2.1	30	8000	**W110_30**	**S3**	**ME3LA4**	132	**W 110_30**	**P100**	**BE100LA4**	133
48	348	3.0	30	12600					**VF 130_30**	**P100**	**BE100LA4**	136
62	277	1.2	23	6990	**W86_23**	**S3**	**ME3LA4**	128	**W 86_23**	**P100**	**BE100LA4**	129
62	280	1.9	23	8000	**W110_23**	**S3**	**ME3LA4**	132	**W 110_23**	**P100**	**BE100LA4**	133
62	280	3.1	23	12600					**VF 130_23**	**P100**	**BE100LA4**	136
72	244	1.0	20	3410	**W75_20**	**S3**	**ME3LA4**	124	**W 75_20**	**P100**	**BE100LA4**	125
72	247	1.3	20	6730	**W86_20**	**S3**	**ME3LA4**	128	**W 86_20**	**P100**	**BE100LA4**	129
72	247	2.3	20	8000	**W110_20**	**S3**	**ME3LA4**	132	**W 110_20**	**P100**	**BE100LA4**	133
95	187	1.3	15	3240	**W75_15**	**S3**	**ME3LA4**	124	**W 75_15**	**P100**	**BE100LA4**	125
95	187	1.8	15	6270	**W86_15**	**S3**	**ME3LA4**	128	**W 86_15**	**P100**	**BE100LA4**	129
95	185	3.2	15	8000	**W110_15**	**S3**	**ME3LA4**	132	**W 110_15**	**P100**	**BE100LA4**	133
136	133	1.6	7	2780					**W 75_7**	**P112**	**BE112M6**	125
136	133	2.0	7	5540					**W 86_7**	**P112**	**BE112M6**	129
143	129	1.8	10	2940	**W75_10**	**S3**	**ME3LA4**	124	**W 75_10**	**P100**	**BE100LA4**	125
143	129	2.2	10	5590	**W86_10**	**S3**	**ME3LA4**	128	**W 86_10**	**P100**	**BE100LA4**	129
191	98	2.3	15	2920	**W75_15**	**S3**	**ME3LA2**	124	**W 75_15**	**P90**	**BE90L2**	125
191	93	1.3	15	1980					**W 63_15**	**P90**	**BE90L2**	122
204	93	2.1	7	2660	**W75_7**	**S3**	**ME3LA4**	124	**W 75_7**	**P100**	**BE100LA4**	125
204	92	2.7	7	5030	**W86_7**	**S3**	**ME3LA4**	128	**W 86_7**	**P100**	**BE100LA4**	129
239	75	1.6	12	1890					**W 63_12**	**P90**	**BE90L2**	122
287	66	3.0	10	2610	**W75_10**	**S3**	**ME3LA2**	124	**W 75_10**	**P90**	**BE90L2**	125
287	63	1.9	10	1820					**W 63_10**	**P90**	**BE90L2**	122
409	48	3.6	7	2350	**W75_7**	**S3**	**ME3LA2**	124	**W 75_7**	**P90**	**BE90L2**	125
409	46	2.3	7	1660					**W 63_7**	**P90**	**BE90L2**	122

3 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N					IEC		
0.90	10403	0.9	1600	52000					**VF/VF 130/250_1600**	**P100**	**BE100LB4**	164
1.0	9813	0.9	920	52000					**VF/VF 130/250_920**	**P132**	**BE132S6**	164
1.2	8534	1.1	1200	52000					**VF/VF 130/250_1200**	**P100**	**BE100LB4**	164
1.5	6917	0.9	920	34500					**VF/VF 130/210_920**	**P100**	**BE100LB4**	158
1.5	6917	1.3	920	52000					**VF/VF 130/250_920**	**P100**	**BE100LB4**	164
1.8	6665	0.9	800	34500					**VF/VF 130/210_800**	**P100**	**BE100LB4**	158
1.8	6827	1.3	800	52000					**VF/VF 130/250_800**	**P100**	**BE100LB4**	164
2.5	5242	1.2	600	34500					**VF/VF 130/210_600**	**P100**	**BE100LB4**	158
2.5	5364	1.7	600	52000					**VF/VF 130/250_600**	**P100**	**BE100LB4**	164
3.2	4755	1.1	300	52000					**VFR 250_300**	**P132**	**BE132S6**	162
3.6	3901	1.1	400	19500					**W /VF 86/185_400**	**P100**	**BE100LB4**	153
3.6	4064	1.6	400	34500					**VF/VF 130/210_400**	**P100**	**BE100LB4**	158
3.6	3983	2.3	400	52000					**VF/VF 130/250_400**	**P100**	**BE100LB4**	164
4.0	3950	1.1	240	34500					**VFR 210_240**	**P132**	**BE132S6**	156
4.0	4096	1.4	240	52000					**VFR 250_240**	**P132**	**BE132S6**	162
4.8	3353	1.0	300	34500					**VFR 210_300**	**P100**	**BE100LB4**	156
4.8	3475	1.4	300	52000					**VFR 250_300**	**P100**	**BE100LB4**	162
5.1	2958	1.4	280	19500					**W /VF 86/185_280**	**P100**	**BE100LB4**	153
5.1	2958	2.1	280	34500					**VF/VF 130/210_280**	**P100**	**BE100LB4**	158
5.1	3015	3.0	280	52000					**VF/VF 130/250_280**	**P100**	**BE100LB4**	164
6.0	2877	1.0	240	19500					**VFR 185_240**	**P100**	**BE100LB4**	150
6.0	2877	1.4	240	34500					**VFR 210_240**	**P100**	**BE100LB4**	156
6.0	2975	1.8	240	52000					**VFR 250_240**	**P100**	**BE100LB4**	162
8.0	2377	1.3	180	19500					**VFR 185_180**	**P100**	**BE100LB4**	150
8.0	2341	1.8	180	34500					**VFR 210_180**	**P100**	**BE100LB4**	156
8.0	2450	2.6	180	52000					**VFR 250_180**	**P100**	**BE100LB4**	162
9.6	2042	1.6	150	19500					**VFR 185_150**	**P100**	**BE100LB4**	150
9.6	1859	1.6	100	33000					**VF 210_100**	**P132**	**BE132S6**	154
9.6	2042	2.2	150	34500					**VFR 210_150**	**P100**	**BE100LB4**	156
9.6	1920	2.5	100	50000					**VF 250_100**	**P132**	**BE132S6**	160
9.6	2042	3.2	150	52000					**VFR 250_150**	**P100**	**BE100LB4**	162
10.4	1907	1.0	138	16000					**VFR 150_138**	**P100**	**BE100LB4**	144
11.9	1609	1.5	80	19000					**VF 185_80**	**P132**	**BE132S6**	148
11.9	1585	2.1	80	33000					**VF 210_80**	**P132**	**BE132S6**	154
12.1	1634	0.9	120	13800					**VFR 130_120**	**P100**	**BE100LB4**	138
12.1	1658	1.2	120	16000					**VFR 150_120**	**P100**	**BE100LB4**	144
12.1	1707	2.1	120	19500					**VFR 185_120**	**P100**	**BE100LB4**	150
12.1	1707	2.9	120	34500					**VFR 210_120**	**P100**	**BE100LB4**	156
12.1	1731	4.0	120	52000					**VFR 250_120**	**P100**	**BE100LB4**	162
14.4	1321	0.9	100	14700					**VF 150_100**	**P100**	**BE100LB4**	142
14.4	1321	1.4	100	18000					**VF 185_100**	**P100**	**BE100LB4**	148
15.9	1298	2.0	60	19000					**VF 185_60**	**P132**	**BE132S6**	148
15.9	1280	2.9	60	33000					**VF 210_60**	**P132**	**BE132S6**	154
16.0	1298	1.2	90	13800					**VFR 130_90**	**P100**	**BE100LB4**	138
16.0	1317	1.5	90	16000					**VFR 150_90**	**P100**	**BE100LB4**	144
16.0	1390	2.0	90	19500					**VFR 185_90**	**P100**	**BE100LB4**	150
16.0	1390	2.9	90	34500					**VFR 210_90**	**P100**	**BE100LB4**	156
18.0	1122	1.1	80	14700					**VF 150_80**	**P100**	**BE100LB4**	142
18.0	1122	1.9	80	18000					**VF 185_80**	**P100**	**BE100LB4**	148
20.8	1066	1.2	69	13800					**VFR 130_69**	**P100**	**BE100LB4**	138
20.8	1080	1.7	69	16000					**VFR 150_69**	**P100**	**BE100LB4**	144
22.5	923	1.0	64	12600					**VF 130_64**	**P100**	**BE100LB4**	136
22.5	936	1.4	64	14700					**VF 150_64**	**P100**	**BE100LB4**	142
24.0	951	1.4	60	13800					**VFR 130_60**	**P100**	**BE100LB4**	138
24.0	963	2.0	60	16000					**VFR 150_60**	**P100**	**BE100LB4**	144
24.0	902	2.5	60	18000					**VF 185_60**	**P100**	**BE100LB4**	148
25.7	831	1.2	56	12600					**VF 130_56**	**P100**	**BE100LB4**	136
25.7	842	1.6	56	14700					**VF 150_56**	**P100**	**BE100LB4**	142
28.8	772	3.2	50	18000					**VF 185_50**	**P100**	**BE100LB4**	148
32	710	1.5	46	12600					**VF 130_46**	**P100**	**BE100LB4**	136
32	720	2.2	46	14700					**VF 150_46**	**P100**	**BE100LB4**	142
32	720	1.0	45	8000					**WR 110_45**	**P100**	**BE100LB4**	134
32	750	2.3	45	16000					**VFR 150_45**	**P100**	**BE100LB4**	144
36	608	1.1	40	8000	**W110_40**	**S3**	**ME3LB4**	132	**W 110_40**	**P100**	**BE100LB4**	133
36	618	1.8	40	12600					**VF 130_40**	**P100**	**BE100LB4**	136



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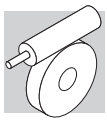
n_2 min-1	M_2 Nm	S	i	R_{n2} N					IEC		
36	626	2.5	40	14700					**VF 150_40**	**P100**	**BE100LB4**	142
42	568	1.0	23	8000					**W 110_23**	**P132**	**BE132S6**	133
42	568	1.8	23	13200					**VF 130_23**	**P132**	**BE132S6**	136
48	462	1.5	30	8000	**W110_30**	**S3**	**ME3LB4**	132	**W 110_30**	**P100**	**BE100LB4**	133
48	482	2.2	30	12600					**VF 130_30**	**P100**	**BE100LB4**	136
48	488	2.8	30	14700					**VF 150_30**	**P100**	**BE100LB4**	142
48	518	2.9	30	16000					**VFR 150_30**	**P100**	**BE100LB4**	144
62	382	1.4	23	8000	**W110_23**	**S3**	**ME3LB4**	132	**W 110_23**	**P100**	**BE100LB4**	133
62	388	2.3	23	12600					**VF 130_23**	**P100**	**BE100LB4**	136
62	388	3.3	23	14700					**VF 150_23**	**P100**	**BE100LB4**	142
72	336	1.0	20	6240	**W86_20**	**S3**	**ME3LB4**	128	**W 86_20**	**P100**	**BE100LB4**	129
72	336	1.7	20	8000	**W110_20**	**S3**	**ME3LB4**	132	**W 110_20**	**P100**	**BE100LB4**	133
73	341	2.6	20	12600					**VF 130_20**	**P100**	**BE100LB4**	136
96	259	1.0	15	2800	**W75_15**	**S3**	**ME3LB4**	124	**W 75_15**	**P100**	**BE100LB4**	125
96	259	1.3	15	5890	**W86_15**	**S3**	**ME3LB4**	128	**W 86_15**	**P100**	**BE100LB4**	129
96	256	2.4	15	8000	**W110_15**	**S3**	**ME3LB4**	132	**W 110_15**	**P100**	**BE100LB4**	133
96	262	3.5	15	11800					**VF 130_15**	**P100**	**BE100LB4**	136
125	197	3.4	23	11000					**VF 130_23**	**P100**	**BE100L2**	136
144	179	1.3	10	2600	**W75_10**	**S3**	**ME3LB4**	124	**W 75_10**	**P100**	**BE100LB4**	125
144	179	1.6	10	5300	**W86_10**	**S3**	**ME3LB4**	128	**W 86_10**	**P100**	**BE100LB4**	129
144	177	3.1	10	8000	**W110_10**	**S3**	**ME3LB4**	132	**W 110_10**	**P100**	**BE100LB4**	133
192	131	1.7	15	2680	**W75_15**	**S3**	**ME3LB2**	124	**W 75_15**	**P100**	**BE100L2**	125
192	130	2.3	15	5070	**W86_15**	**S3**	**ME3LB2**	128	**W 86_15**	**P100**	**BE100L2**	129
206	128	1.5	7	2380	**W75_7**	**S3**	**ME3LB4**	124	**W 75_7**	**P100**	**BE100LB4**	125
206	127	2.0	7	4780	**W86_7**	**S3**	**ME3LB4**	128	**W 86_7**	**P100**	**BE100LB4**	129
288	90	2.3	10	2430	**W75_10**	**S3**	**ME3LB2**	124	**W 75_10**	**P100**	**BE100L2**	125
288	90	2.9	10	4510	**W86_10**	**S3**	**ME3LB2**	128	**W 86_10**	**P100**	**BE100L2**	129
411	64	2.7	7	2190	**W75_7**	**S3**	**ME3LB2**	124	**W 75_7**	**P100**	**BE100L2**	125
411	64	3.5	7	4040	**W86_7**	**S3**	**ME3LB2**	128	**W 86_7**	**P100**	**BE100L2**	129

4 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N			IEC		
1.5	9157	1.0	920	52000			**VF/VF 130/250_920**	**P112**	**BE112M4**	164
1.9	9039	1.0	800	52000			**VF/VF 130/250_800**	**P112**	**BE112M4**	164
2.5	6941	0.9	600	34500			**VF/VF 130/210_600**	**P112**	**BE112M4**	158
2.5	7102	1.3	600	52000			**VF/VF 130/250_600**	**P112**	**BE112M4**	164
3.7	5380	1.2	400	34500			**VF/VF 130/210_400**	**P112**	**BE112M4**	158
3.7	5273	1.7	400	52000			**VF/VF 130/250_400**	**P112**	**BE112M4**	164
4.0	5348	1.1	240	52000			**VFR 250_240**	**P132**	**BE132MA6**	162
4.8	4600	1.1	300	52000			**VFR 250_300**	**P112**	**BE112M4**	162
5.2	3917	1.1	280	19500			**W /VF 86/185_280**	**P112**	**BE112M4**	153
5.2	3917	1.6	280	34500			**VF/VF 130/210_280**	**P112**	**BE112M4**	158
5.2	3992	2.3	280	52000			**VF/VF 130/250_280**	**P112**	**BE112M4**	164
5.4	3867	1.3	180	34500			**VFR 210_180**	**P132**	**BE132MA6**	156
5.4	4440	1.5	180	52000			**VFR 250_180**	**P132**	**BE132MA6**	162
6.1	3809	1.0	240	34500			**VFR 210_240**	**P112**	**BE112M4**	156
6.1	3938	1.4	240	52000			**VFR 250_240**	**P112**	**BE112M4**	162
8.1	3147	1.0	180	19500			**VFR 185_180**	**P112**	**BE112M4**	150
8.1	3099	1.4	180	34500			**VFR 210_180**	**P112**	**BE112M4**	156
8.1	3244	1.9	180	52000			**VFR 250_180**	**P112**	**BE112M4**	162
9.7	2427	1.2	100	33000			**VF 210_100**	**P132**	**BE132MA6**	154
9.7	2507	1.9	100	50000			**VF 250_100**	**P132**	**BE132MA6**	160
9.8	2704	1.2	150	19500			**VFR 185_150**	**P112**	**BE112M4**	150
9.8	2704	1.7	150	34500			**VFR 210_150**	**P112**	**BE112M4**	156
9.8	2704	2.4	150	52000			**VFR 250_150**	**P112**	**BE112M4**	162
12.1	2195	0.9	120	16000			**VFR 150_120**	**P112**	**BE112M4**	144
12.1	2260	1.6	120	19500			**VFR 185_120**	**P112**	**BE112M4**	150
12.1	2260	2.2	120	34500			**VFR 210_120**	**P112**	**BE112M4**	156
12.1	2292	3.1	120	52000			**VFR 250_120**	**P112**	**BE112M4**	162
14.6	1749	1.1	100	18000			**VF 185_100**	**P112**	**BE112M4**	148



4 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N				IEC		
16.1	1695	1.5	60	19000			**VF 185_60**	**P132**	**BE132MA6**	148
16.1	1671	2.2	60	33000			**VF 210_60**	**P132**	**BE132MA6**	154
16.1	1719	3.2	60	50000			**VF 250_60**	**P132**	**BE132MA6**	160
16.3	1719	0.9	90	13800			**VFR 130_90**	**P112**	**BE112M4**	138
16.3	1743	1.1	90	16000			**VFR 150_90**	**P112**	**BE112M4**	144
16.3	1840	1.5	90	19500			**VFR 185_90**	**P112**	**BE112M4**	150
16.3	1840	2.2	90	34500			**VFR 210_90**	**P112**	**BE112M4**	156
16.3	1888	3.2	90	52000			**VFR 250_90**	**P112**	**BE112M4**	162
18.3	1485	1.4	80	18000			**VF 185_80**	**P112**	**BE112M4**	148
21.0	1355	1.3	46	15500			**VF 150_46**	**P132**	**BE132MA6**	142
21.2	1411	0.9	69	13800			**VFR 130_69**	**P112**	**BE112M4**	138
21.2	1429	1.3	69	16000			**VFR 150_69**	**P112**	**BE112M4**	144
21.4	1433	3.4	45	34500			**VFR 210_45**	**P132**	**BE132MA6**	156
22.8	1240	1.1	64	14700			**VF 150_64**	**P112**	**BE112M4**	142
24.1	1162	1.0	40	13200			**VF 130_40**	**P132**	**BE132MA6**	136
24.1	1193	3.6	40	33000			**VF 210_40**	**P132**	**BE132MA6**	154
24.4	1259	1.1	60	13800			**VFR 130_60**	**P112**	**BE112M4**	138
24.4	1275	1.5	60	16000			**VFR 150_60**	**P112**	**BE112M4**	144
24.4	1194	1.9	60	18000			**VF 185_60**	**P112**	**BE112M4**	148
24.4	1307	2.5	60	19500			**VFR 185_60**	**P112**	**BE112M4**	150
24.4	1291	3.6	60	34500			**VFR 210_60**	**P112**	**BE112M4**	156
26.1	1100	0.9	56	12500			**VF 130_56**	**P112**	**BE112M4**	136
26.1	1115	1.2	56	14700			**VF 150_56**	**P112**	**BE112M4**	142
29.2	1022	2.4	50	18000			**VF 185_50**	**P112**	**BE112M4**	148
32	940	1.1	46	12600			**VF 130_46**	**P112**	**BE112M4**	136
32	953	1.6	46	14700			**VF 150_46**	**P112**	**BE112M4**	142
32	967	2.5	30	19000			**VF 185_30**	**P132**	**BE132MA6**	148
32	955	3.5	30	33000			**VF 210_30**	**P132**	**BE132MA6**	154
33	993	1.7	45	16000			**VFR 150_45**	**P112**	**BE112M4**	144
33	1017	2.8	45	19500			**VFR 185_45**	**P112**	**BE112M4**	150
36	762	0.9	80	12600			**VF 130_80**	**P112**	**BE112M2**	136
37	818	1.3	40	12600			**VF 130_40**	**P112**	**BE112M4**	136
37	829	1.9	40	14700			**VF 150_40**	**P112**	**BE112M4**	142
42	741	1.4	23	13200			**VF 130_23**	**P132**	**BE132MA6**	136
42	750	2.0	23	13200			**VF 150_23**	**P132**	**BE132MA6**	142
45	635	1.1	64	12600			**VF 130_64**	**P112**	**BE112M2**	136
48	624	1.1	30	8000			**W 110_30**	**P112**	**BE112M4**	133
48	638	1.6	30	12600			**VF 130_30**	**P112**	**BE112M4**	136
48	646	2.1	30	14700			**VF 150_30**	**P112**	**BE112M4**	142
48	686	2.2	30	16000			**VFR 150_30**	**P112**	**BE112M4**	144
63	515	1.0	23	8000			**W 110_23**	**P112**	**BE112M4**	133
63	480	1.6	46	12600			**VF 130_46**	**P112**	**BE112M2**	136
64	514	1.7	23	12600			**VF 130_23**	**P112**	**BE112M4**	136
64	514	2.5	23	14700			**VF 150_23**	**P112**	**BE112M4**	142
72	454	1.3	20	8000			**W 110_20**	**P112**	**BE112M4**	133
73	452	2.0	20	12400			**VF 130_20**	**P112**	**BE112M4**	136
96	344	1.0	15	5410			**W 86_15**	**P112**	**BE112M4**	129
96	340	1.8	15	8000			**W 110_15**	**P112**	**BE112M4**	133
97	346	3.4	10	12700			**VF 150_10**	**P132**	**BE132MA6**	142
98	347	2.7	15	11400			**VF 130_15**	**P112**	**BE112M4**	136
144	238	1.0	10	2160			**W 75_10**	**P112**	**BE112M4**	125
144	238	1.2	10	4940			**W 86_10**	**P112**	**BE112M4**	129
144	235	2.3	10	7840			**W 110_10**	**P112**	**BE112M4**	133
146	237	3.3	10	10100			**VF 130_10**	**P112**	**BE112M4**	136
193	174	1.3	15	2400			**W 75_15**	**P112**	**BE112M2**	125
193	172	1.7	15	4820			**W 86_15**	**P112**	**BE112M2**	129
206	173	1.1	7	1900			**W 75_7**	**P112**	**BE112M4**	125
206	171	1.5	7	4490			**W 86_7**	**P112**	**BE112M4**	129
206	171	3.0	7	7040			**W 110_7**	**P112**	**BE112M4**	133
290	119	1.7	10	2210			**W 75_10**	**P112**	**BE112M2**	125
290	119	2.2	10	4320			**W 86_10**	**P112**	**BE112M2**	129
414	84	2.0	7	2010			**W 75_7**	**P112**	**BE112M2**	125
414	84	2.7	7	3890			**W 86_7**	**P112**	**BE112M2**	129

5.5 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N			IEC		
2.4	9630	0.9	600	52000			**VF/VF 130/250_600**	**P132** **BE132S4**	164
3.4	7714	1.2	280	52000			**VF/VF 130/250_280**	**P160** **BE160MA6**	164
3.7	7295	0.9	400	34500			**VF/VF 130/210_400**	**P132** **BE132S4**	158
3.7	7149	1.3	400	52000			**VF/VF 130/250_400**	**P132** **BE132S4**	164
5.2	5311	1.2	280	34500			**VF/VF 130/210_280**	**P132** **BE132S4**	158
5.2	5413	1.7	280	52000			**VF/VF 130/250_280**	**P132** **BE132S4**	164
5.4	6029	1.1	180	52000			**VFR 250_180**	**P160** **BE160MA6**	162
6.4	5024	1.0	150	34500			**VFR 210_150**	**P160** **BE160MA6**	156
6.4	5105	1.3	150	52000			**VFR 250_150**	**P160** **BE160MA6**	162
8.1	4202	1.0	180	34500			**VFR 210_180**	**P132** **BE132S4**	156
8.1	4399	1.4	180	52000			**VFR 250_180**	**P132** **BE132S4**	162
9.7	3296	0.9	100	33000			**VF 210_100**	**P160** **BE160MA6**	154
9.7	3666	1.2	150	34500			**VFR 210_150**	**P132** **BE132S4**	156
9.7	3666	1.8	150	52000			**VFR 250_150**	**P132** **BE132S4**	162
12.1	2809	1.1	80	33000			**VF 210_80**	**P160** **BE160MA6**	154
12.1	2895	1.7	80	50000			**VF 250_80**	**P160** **BE160MA6**	160
12.2	3064	1.6	120	34500			**VFR 210_120**	**P132** **BE132S4**	156
12.2	3108	2.3	120	52000			**VFR 250_120**	**P132** **BE132S4**	162
14.6	2371	1.1	100	31500			**VF 210_100**	**P132** **BE132S4**	154
14.6	2590	1.4	100	19500			**VFR 185_100**	**P132** **BE132S4**	150
14.6	2480	1.5	100	47000			**VF 250_100**	**P132** **BE132S4**	160
16.1	2301	1.1	60	19000			**VF 185_60**	**P160** **BE160MA6**	148
16.1	2268	1.6	60	33000			**VF 210_60**	**P160** **BE160MA6**	154
16.1	2334	2.4	60	50000			**VF 250_60**	**P160** **BE160MA6**	160
16.2	2495	1.6	90	34500			**VFR 210_90**	**P132** **BE132S4**	156
16.2	2561	2.3	90	52000			**VFR 250_90**	**P132** **BE132S4**	162
18.3	2013	1.1	80	18000			**VF 185_80**	**P132** **BE132S4**	148
18.3	2013	1.4	80	31500			**VF 210_80**	**P132** **BE132S4**	154
18.3	2072	1.9	80	47000			**VF 250_80**	**P132** **BE132S4**	160
19.5	2106	1.3	75	19500			**VFR 185_75**	**P132** **BE132S4**	150
21.0	1839	0.9	46	15500			**VF 150_46**	**P160** **BE160MA6**	142
21.4	1945	2.5	45	34500			**VFR 210_45**	**P160** **BE160MA6**	156
21.4	1993	3.4	45	52000			**VFR 250_45**	**P160** **BE160MA6**	162
24.1	1599	1.1	40	15500			**VF 150_40**	**P160** **BE160MA6**	142
24.3	1620	1.4	60	18000			**VF 185_60**	**P132** **BE132S4**	148
24.3	1598	1.9	60	31500			**VF 210_60**	**P132** **BE132S4**	154
24.3	1751	2.7	60	34500			**VFR 210_60**	**P132** **BE132S4**	156
24.3	1663	2.7	60	47000			**VF 250_60**	**P132** **BE132S4**	160
24.3	1773	4.0	60	52000			**VFR 250_60**	**P132** **BE132S4**	162
29.2	1430	1.3	50	15940			**VFR 150_50**	**P132** **BE132S4**	144
29.2	1386	1.8	50	18000			**VF 185_50**	**P132** **BE132S4**	148
29.2	1477	2.2	50	19500			**VFR 185_50**	**P132** **BE132S4**	150
29.2	1386	2.4	50	31500			**VF 210_50**	**P132** **BE132S4**	154
29.2	1386	3.2	50	47000			**VF 250_50**	**P132** **BE132S4**	160
31	1292	1.2	46	14700			**VF 150_46**	**P132** **BE132S4**	142
32	1248	1.0	30	13200			**VF 130_30**	**P160** **BE160MA6**	136
32	1362	3.0	45	34500			**VFR 210_45**	**P132** **BE132S4**	156
37	1109	1.0	40	12600			**VF 130_40**	**P132** **BE132S4**	136
37	1123	1.4	40	14700			**VF 150_40**	**P132** **BE132S4**	142
37	1138	2.3	40	18000			**VF 185_40**	**P132** **BE132S4**	148
37	1138	3.1	40	31500			**VF 210_40**	**P132** **BE132S4**	154
39	1101	1.5	38	15400			**VFR 150_37.5**	**P132** **BE132S4**	144
39	1149	2.4	38	19500			**VFR 185_37.5**	**P132** **BE132S4**	150
42	1006	1.0	23	13000			**VF 130_23**	**P160** **BE160MA6**	136
42	1019	1.4	23	15300			**VF 150_23**	**P160** **BE160MA6**	142
49	864	1.2	30	12600			**VF 130_30**	**P132** **BE132S4**	136
49	875	1.6	30	14700			**VF 150_30**	**P132** **BE132S4**	142
49	908	2.2	30	18000			**VF 185_30**	**P132** **BE132S4**	148
49	908	3.4	30	31500			**VF 210_30**	**P132** **BE132S4**	154
59	775	1.9	25	13400			**VFR 150_25**	**P132** **BE132S4**	144
59	784	3.3	25	19500			**VFR 185_25**	**P132** **BE132S4**	150
64	673	0.9	15	8000			**W 110_15**	**P160** **BE160MA6**	133
64	696	1.3	23	12100			**VF 130_23**	**P132** **BE132S4**	136
64	696	1.8	23	14000			**VF 150_23**	**P132** **BE132S4**	142
73	605	0.9	20	8000			**W 110_20**	**P132** **BE132S4**	133

5.5 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N			IEC		
73	613	1.5	20	11700			**VF 130_20**	**P132**	**BE132S4**	136
73	613	2.1	20	13500			**VF 150_20**	**P132**	**BE132S4**	142
97	454	1.3	15	8000			**W 110_15**	**P132**	**BE132S4**	133
97	471	2.0	15	12800			**VF 130_15**	**P132**	**BE132S4**	136
97	476	2.4	15	12400			**VF 150_15**	**P132**	**BE132S4**	142
127	354	1.9	23	10400			**VF 130_23**	**P132**	**BE132SA2**	136
127	354	2.7	23	11800			**VF 150_23**	**P132**	**BE132SA2**	142
146	313	1.8	10	7330			**W 110_10**	**P132**	**BE132S4**	133
146	321	2.5	10	9680			**VF 130_10**	**P132**	**BE132S4**	136
146	321	3.3	10	11000			**VF 150_10**	**P132**	**BE132S4**	142
195	234	2.3	15	7060			**W 110_15**	**P132**	**BE132SA2**	133
209	227	2.2	7	6600			**W 110_7**	**P132**	**BE132S4**	133
209	227	3.3	7	8650			**VF 130_7**	**P132**	**BE132S4**	136
293	160	3.0	10	6290			**W 110_10**	**P132**	**BE132SA2**	133
293	162	3.6	10	8110			**VF 130_10**	**P132**	**BE132SA2**	136
418	113	4.0	7	5640			**W 110_7**	**P132**	**BE132SA2**	133
418	114	4.9	7	7230			**VF 130_7**	**P132**	**BE132SA2**	136

7.5 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N			IEC		
3.6	9554	0.9	400	52000			**VF/VF 130/250_400**	**P132**	**BE132MA4**	164
5.2	7097	0.9	280	34500			**VF/VF 130/210_280**	**P132**	**BE132MA4**	158
5.2	7233	1.2	280	52000			**VF/VF 130/250_280**	**P132**	**BE132MA4**	164
6.4	7014	1.0	150	52000			**VFR 250_150**	**P160**	**BE160MB6**	162
8.0	5878	1.0	120	34500			**VFR 210_120**	**P160**	**BE160MB6**	156
8.1	5879	1.1	180	52000			**VFR 250_180**	**P132**	**BE132MA4**	162
9.7	4676	1.0	100	50000			**VF 250_100**	**P160**	**BE160MB6**	160
9.7	4899	1.3	150	52000			**VFR 250_150**	**P132**	**BE132MA4**	162
10.7	4809	0.9	90	34500			**VFR 210_90**	**P160**	**BE160MB6**	156
12.1	3978	1.3	80	50000			**VF 250_80**	**P160**	**BE160MB6**	160
12.1	4094	1.2	120	34500			**VFR 210_120**	**P132**	**BE132MA4**	156
12.1	4153	1.7	120	52000			**VFR 250_120**	**P132**	**BE132MA4**	162
14.6	3461	1.0	100	19500			**VFR 185_100**	**P132**	**BE132MA4**	150
14.6	3314	1.1	100	47000			**VF 250_100**	**P132**	**BE132MA4**	160
16.1	3117	1.2	60	33000			**VF 210_60**	**P160**	**BE160MB6**	154
16.2	3334	1.2	90	34500			**VFR 210_90**	**P132**	**BE132MA4**	156
16.2	3422	1.7	90	52000			**VFR 250_90**	**P132**	**BE132MA4**	162
18.2	2691	1.1	80	31500			**VF 210_80**	**P132**	**BE132MA4**	154
18.2	2769	1.4	80	47000			**VF 250_80**	**P132**	**BE132MA4**	160
19.4	2815	1.0	75	19500			**VFR 185_75**	**P132**	**BE132MA4**	150
21.4	2672	1.8	45	34500			**VFR 210_45**	**P160**	**BE160MB6**	156
21.4	2739	2.5	45	52000			**VFR 250_45**	**P160**	**BE160MB6**	162
24.3	2164	1.0	60	18000			**VF 185_60**	**P132**	**BE132MA4**	148
24.3	2135	1.4	60	31500			**VF 210_60**	**P132**	**BE132MA4**	154
24.3	2340	2.0	60	31500			**VFR 210_60**	**P132**	**BE132MA4**	156
24.3	2223	2.0	60	47000			**VF 250_60**	**P132**	**BE132MA4**	160
24.3	2369	3.0	60	52000			**VFR 250_60**	**P132**	**BE132MA4**	162
29.1	1911	1.0	50	14100			**VFR 150_50**	**P132**	**BE132MA4**	144
29.1	1852	1.3	50	18000			**VF 185_50**	**P132**	**BE132MA4**	148
29.1	1974	1.6	50	19500			**VFR 185_50**	**P132**	**BE132MA4**	150
29.1	1852	1.7	50	31500			**VF 210_50**	**P132**	**BE132MA4**	154
29.1	1852	2.4	50	47000			**VF 250_50**	**P132**	**BE132MA4**	160
31	1727	0.9	46	14700			**VF 150_46**	**P132**	**BE132MA4**	142
32	1821	2.2	45	34500			**VFR 210_45**	**P132**	**BE132MA4**	156
32	1842	3.5	45	48800			**VFR 250_45**	**P132**	**BE132MA4**	162
36	1501	1.0	40	14700			**VF 150_40**	**P132**	**BE132MA4**	142
36	1521	1.7	40	18000			**VF 185_40**	**P132**	**BE132MA4**	148
36	1521	2.3	40	31500			**VF 210_40**	**P132**	**BE132MA4**	154
36	1541	3.2	40	47000			**VF 250_40**	**P132**	**BE132MA4**	160
38	1471	1.1	38	13200			**VFR 150_37.5**	**P132**	**BE132MA4**	144

7.5 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N			IEC		
38	1536	1.8	38	18300			**VFR 185_37.5**	**P132**	**BE132MA4**	150
49	1155	0.9	30	11900			**VF 130_30**	**P132**	**BE132MA4**	136
49	1170	1.1	30	14200			**VF 150_30**	**P132**	**BE132MA4**	142
49	1214	1.6	30	18000			**VF 185_30**	**P132**	**BE132MA4**	148
49	1214	2.6	30	31500			**VF 210_30**	**P132**	**BE132MA4**	154
49	1257	3.1	30	33400			**VFR 210_30**	**P132**	**BE132MA4**	156
49	1228	3.3	30	4440			**VF 250_30**	**P132**	**BE132MA4**	160
59	1036	1.4	25	11000			**VFR 150_25**	**P132**	**BE132MA4**	144
59	1048	2.4	25	16700			**VFR 185_25**	**P132**	**BE132MA4**	150
64	931	0.9	23	11200			**VF 130_23**	**P132**	**BE132MA4**	136
64	931	1.3	23	13200			**VF 150_23**	**P132**	**BE132MA4**	142
64	958	2.3	15	16700			**VF 185_15**	**P160**	**BE160MB6**	148
73	819	1.1	20	10800			**VF 130_20**	**P132**	**BE132MA4**	136
73	819	1.6	20	12700			**VF 150_20**	**P132**	**BE132MA4**	142
97	614	1.0	15	7370			**W 110_15**	**P132**	**BE132MA4**	133
97	629	1.4	15	10200			**VF 130_15**	**P132**	**BE132MA4**	136
97	636	1.8	15	11700			**VF 150_15**	**P132**	**BE132MA4**	142
127	479	1.4	23	9900			**VF 130_23**	**P132**	**BE132SB2**	136
127	479	2.0	23	11400			**VF 150_23**	**P132**	**BE132SB2**	142
138	462	2.5	7	10200			**VF 150_7**	**P160**	**BE160MB6**	142
146	424	1.3	10	6720			**W 110_10**	**P132**	**BE132MA4**	133
146	429	1.8	10	9150			**VF 130_10**	**P132**	**BE132MA4**	136
146	429	2.4	10	10500			**VF 150_10**	**P132**	**BE132MA4**	142
195	320	1.7	15	6660			**W 110_15**	**P132**	**BE132SB2**	133
208	304	1.6	7	6100			**W 110_7**	**P132**	**BE132MA4**	133
208	304	2.4	7	8210			**VF 130_7**	**P132**	**BE132MA4**	136
208	307	3.3	7	9400			**VF 150_7**	**P132**	**BE132MA4**	142
293	215	2.2	10	5980			**W 110_10**	**P132**	**BE132SB2**	133
293	217	2.8	10	7840			**VF 130_10**	**P132**	**BE132SB2**	136
418	153	2.9	7	5380			**W 110_7**	**P132**	**BE132SB2**	133
418	154	3.6	7	7010			**VF 130_7**	**P132**	**BE132SB2**	136

9.2 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N			IEC		
5.1	9054	1.0	280	52000			**VF/VF 130/250_280**	**P132**	**BE132MB4**	164
9.7	6132	1.1	150	52000			**VFR 250_150**	**P132**	**BE132MB4**	162
12.1	5198	1.3	120	52000			**VFR 250_120**	**P132**	**BE132MB4**	162
14.5	4149	0.9	100	47000			**VF 250_100**	**P132**	**BE132MB4**	160
16.1	4173	1.0	90	34500			**VFR 210_90**	**P132**	**BE132MB4**	156
16.1	4283	1.4	90	52000			**VFR 250_90**	**P132**	**BE132MB4**	162
18.1	3368	0.9	80	31500			**VF 210_80**	**P132**	**BE132MB4**	154
18.1	3466	1.1	80	47000			**VF 250_80**	**P132**	**BE132MB4**	160
24.2	2672	1.1	60	31500			**VF 210_60**	**P132**	**BE132MB4**	154
24.2	2929	1.6	60	34500			**VFR 210_60**	**P132**	**BE132MB4**	156
24.2	2782	1.6	60	47000			**VF 250_60**	**P132**	**BE132MB4**	160
24.2	2965	2.4	60	51900			**VFR 250_60**	**P132**	**BE132MB4**	162
29.0	2319	1.1	50	18000			**VF 185_50**	**P132**	**BE132MB4**	148
29.0	2471	1.3	50	18600			**VFR 185_50**	**P132**	**BE132MB4**	150
29.0	2319	1.4	50	31500			**VF 210_50**	**P132**	**BE132MB4**	154
29.0	2319	1.9	50	47000			**VF 250_50**	**P132**	**BE132MB4**	160
32	2279	1.8	45	34500			**VFR 210_45**	**P132**	**BE132MB4**	156
32	2306	2.8	45	48000			**VFR 250_45**	**P132**	**BE132MB4**	162
36	1904	1.4	40	18000			**VF 185_40**	**P132**	**BE132MB4**	148
36	1904	1.8	40	31500			**VF 210_40**	**P132**	**BE132MB4**	154
36	1928	2.5	40	47000			**VF 250_40**	**P132**	**BE132MB4**	160
38	1884	0.9	38	11900			**VFR 150_37.5**	**P132**	**BE132MB4**	144
38	1922	1.5	38	17200			**VFR 185_37.5**	**P132**	**BE132MB4**	150
48	1464	0.9	30	11300			**VF 150_30**	**P132**	**BE132MB4**	142
48	1519	1.3	30	17900			**VF 185_30**	**P132**	**BE132MB4**	148
48	1519	2.0	30	31500			**VF 210_30**	**P132**	**BE132MB4**	154

9.2 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N			IEC		
48	1574	2.4	30	32600			**VFR 210_30**	**P132**	**BE132MB4**	156
48	1538	2.6	30	43900			**VF 250_30**	**P132**	**BE132MB4**	160
48	1574	3.8	30	42800			**VFR 250_30**	**P132**	**BE132MB4**	162
58	1297	1.2	25	11200			**VFR 150_25**	**P132**	**BE132MB4**	144
58	1312	2.0	25	15800			**VFR 185_25**	**P132**	**BE132MB4**	150
63	1165	1.1	23	12500			**VF 150_23**	**P132**	**BE132MB4**	142
73	1025	0.9	20	10100			**VF 130_20**	**P132**	**BE132MB4**	136
73	1025	1.3	20	12100			**VF 150_20**	**P132**	**BE132MB4**	142
73	1037	3.0	20	30400			**VF 210_20**	**P132**	**BE132MB4**	154
97	787	1.2	15	9560			**VF 130_15**	**P132**	**BE132MB4**	136
97	796	1.4	15	11200			**VF 150_15**	**P132**	**BE132MB4**	142
127	601	1.1	23	9510			**VF 130_23**	**P132**	**BE132MB2**	136
127	601	1.6	23	11000			**VF 150_23**	**P132**	**BE132MB2**	142
145	531	1.0	10	6210			**W 110_10**	**P132**	**BE132MB4**	133
145	537	1.5	10	8690			**VF 130_10**	**P132**	**BE132MB4**	136
145	537	2.0	10	16100			**VF 150_10**	**P132**	**BE132MB4**	142
195	396	1.4	15	6320			**W 110_15**	**P132**	**BE132MB2**	133
207	380	1.3	7	5670			**W 110_7**	**P132**	**BE132MB4**	133
207	380	1.9	7	7820			**VF 130_7**	**P132**	**BE132MB4**	136
207	384	2.6	7	9030			**VF 150_7**	**P132**	**BE132MB4**	142
292	271	1.8	10	5720			**W 110_10**	**P132**	**BE132MB2**	133
292	274	2.2	10	7620			**VF 130_10**	**P132**	**BE132MB2**	136
292	274	2.9	10	8690			**VF 150_10**	**P132**	**BE132MB2**	142
417	192	2.3	7	5170			**W 110_7**	**P132**	**BE132MB2**	133
417	194	2.9	7	6820			**VF 130_7**	**P132**	**BE132MB2**	136

11 kW

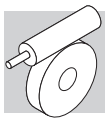
n_2 min-1	M_2 Nm	S	i	R_{n2} N			IEC		
12.3	6130	1.1	120	52000			**VFR 250_120**	**P160**	**BE160M4**	162
16.3	5051	1.2	90	52000			**VFR 250_90**	**P160**	**BE160M4**	162
18.4	4087	0.9	80	47000			**VF 250_80**	**P160**	**BE160M4**	160
24.5	3151	0.9	60	31500			**VF 210_60**	**P160**	**BE160M4**	154
24.5	3454	1.3	60	34500			**VFR 210_60**	**P160**	**BE160M4**	156
24.5	3281	1.4	60	47000			**VF 250_60**	**P160**	**BE160M4**	160
24.5	3496	2.0	60	50900			**VFR 250_60**	**P160**	**BE160M4**	162
29.4	2734	1.2	50	31500			**VF 210_50**	**P160**	**BE160M4**	154
29.4	2734	1.6	50	47000			**VF 250_50**	**P160**	**BE160M4**	160
33	2688	1.5	45	34500			**VFR 210_45**	**P160**	**BE160M4**	156
33	2720	2.3	45	47100			**VFR 250_45**	**P160**	**BE160M4**	162
37	2245	1.2	40	18500			**VF 185_40**	**P160**	**BE160M4**	148
37	2245	1.5	40	31500			**VF 210_40**	**P160**	**BE160M4**	154
37	2273	2.1	40	47000			**VF 250_40**	**P160**	**BE160M4**	160
49	1791	1.1	30	17200			**VF 185_30**	**P160**	**BE160M4**	148
49	1791	1.7	30	31500			**VF 210_30**	**P160**	**BE160M4**	154
49	1856	2.0	30	31800			**VFR 210_30**	**P160**	**BE160M4**	156
49	1813	2.2	30	43400			**VF 250_30**	**P160**	**BE160M4**	160
49	1856	3.2	30	42100			**VFR 250_30**	**P160**	**BE160M4**	162
74	1209	1.1	20	11400			**VF 150_20**	**P160**	**BE160M4**	142
74	1223	1.8	20	15600			**VF 185_20**	**P160**	**BE160M4**	148
74	1223	2.5	20	30000			**VF 210_20**	**P160**	**BE160M4**	154
98	939	1.2	15	10600			**VF 150_15**	**P160**	**BE160M4**	142
98	950	1.9	15	14200			**VF 185_15**	**P160**	**BE160M4**	148
98	950	3.0	15	27700			**VF 210_15**	**P160**	**BE160M4**	154
147	630	2.7	20	13300			**VF 185_20**	**P160**	**BE160MA2**	148
147	633	1.6	10	9670			**VF 150_10**	**P160**	**BE160M4**	142
196	478	2.9	15	12200			**VF 185_15**	**P160**	**BE160MA2**	148
210	454	2.2	7	8660			**VF 150_7**	**P160**	**BE160M4**	142
294	323	2.4	10	8440			**VF 150_10**	**P160**	**BE160MA2**	142
420	228	3.3	7	7530			**VF 150_7**	**P160**	**BE160MA2**	142

15 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N				IEC		
24.5	4474	1.0	60	47000			**VF 250_60**	**P160**	**BE160L4**	160
24.5	4768	1.5	60	48700			**VFR 250_60**	**P160**	**BE160L4**	162
29.4	3728	0.9	50	31500			**VF 210_50**	**P160**	**BE160L4**	154
29.4	3728	1.2	50	47000			**VF 250_50**	**P160**	**BE160L4**	160
32	3665	1.1	45	33200			**VFR 210_45**	**P160**	**BE160L4**	156
32	3709	1.7	45	45200			**VFR 250_45**	**P160**	**BE160L4**	162
37	3061	0.9	40	16600			**VF 185_40**	**P160**	**BE160L4**	148
37	3061	1.1	40	31500			**VF 210_40**	**P160**	**BE160L4**	154
37	3100	1.5	40	45900			**VF 250_40**	**P160**	**BE160L4**	160
49	2443	1.2	30	31500			**VF 210_30**	**P160**	**BE160L4**	154
49	2531	1.5	30	30000			**VFR 210_30**	**P160**	**BE160L4**	156
49	2473	1.6	30	42400			**VF 250_30**	**P160**	**BE160L4**	160
49	2531	2.4	30	40600			**VFR 250_30**	**P160**	**BE160L4**	162
74	1668	1.4	20	14300			**VF 185_20**	**P160**	**BE160L4**	148
74	1668	1.9	20	29100			**VF 210_20**	**P160**	**BE160L4**	154
74	1688	2.6	20	38100			**VF 250_20**	**P160**	**BE160L4**	160
98	1280	0.9	15	9360			**VF 150_15**	**P160**	**BE160L4**	142
98	1295	1.4	15	13200			**VF 185_15**	**P160**	**BE160L4**	148
98	1295	2.2	15	27000			**VF 210_15**	**P160**	**BE160L4**	154
98	1295	3.1	15	35100			**VF 250_15**	**P160**	**BE160L4**	160
147	855	2.0	20	12700			**VF 185_20**	**P160**	**BE160MB2**	148
147	863	1.2	10	8720			**VF 150_10**	**P160**	**BE160L4**	142
147	873	3.0	10	24000			**VF 210_10**	**P160**	**BE160L4**	154
196	649	2.1	15	11600			**VF 185_15**	**P160**	**BE160MB2**	148
196	649	3.3	15	22700			**VF 210_15**	**P160**	**BE160MB2**	154
210	618	1.6	7	7840			**VF 150_7**	**P160**	**BE160L4**	142
294	437	1.8	10	7960			**VF 150_10**	**P160**	**BE160MB2**	142
420	309	2.4	7	7120			**VF 150_7**	**P160**	**BE160MB2**	142

18.5 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N				IEC		
29.4	4560	1.0	50	47000			**VF 250_50**	**P180**	**BE180M4**	160
37	3745	0.9	40	31500			**VF 210_40**	**P180**	**BE180M4**	154
37	3792	1.3	40	44900			**VF 250_40**	**P180**	**BE180M4**	160
49	2988	1.0	30	31200			**VF 210_30**	**P180**	**BE180M4**	154
49	3024	1.3	30	41500			**VF 250_30**	**P180**	**BE180M4**	160
74	2040	1.1	20	13200			**VF 185_20**	**P180**	**BE180M4**	148
74	2040	1.5	20	28300			**VF 210_20**	**P180**	**BE180M4**	154
74	2064	2.1	20	37400			**VF 250_20**	**P180**	**BE180M4**	160
98	1584	1.2	15	12200			**VF 185_15**	**P180**	**BE180M4**	148
98	1584	1.8	15	26200			**VF 210_15**	**P180**	**BE180M4**	154
98	1584	2.5	15	34500			**VF 250_15**	**P180**	**BE180M4**	160
147	1068	1.7	10	11400			**VF 185_10**	**P180**	**BE180M4**	148
147	1068	2.5	10	23400			**VF 210_10**	**P180**	**BE180M4**	154
147	1080	3.4	10	37800			**VF 250_10**	**P180**	**BE180M4**	160
196	805	1.1	15	8260			**VF 150_15**	**P160**	**BE160L2**	142
210	756	2.3	7	10100			**VF 185_7**	**P180**	**BE180M4**	148
210	756	3.0	7	21200			**VF 210_7**	**P180**	**BE180M4**	154
295	543	1.5	10	7550			**VF 150_10**	**P160**	**BE160L2**	142
421	384	2.0	7	6760			**VF 150_7**	**P160**	**BE160L2**	142



22 kW

n_2 min-1	M_2 Nm	S	i	R_{n2} N				IEC		
37	4501	1.1	40	43900			**VF 250_40**	**P180**	**BE180L4**	160
49	3546	0.9	30	30200			**VF 210_30**	**P180**	**BE180L4**	154
49	3589	1.1	30	44700			**VF 250_30**	**P180**	**BE180L4**	160
74	2421	0.9	20	12200			**VF 185_20**	**P180**	**BE180L4**	148
74	2421	1.3	20	27500			**VF 210_20**	**P180**	**BE180L4**	154
74	2450	1.8	20	36700			**VF 250_20**	**P180**	**BE180L4**	160
99	1880	1.0	15	11300			**VF 185_15**	**P180**	**BE180L4**	148
99	1880	1.5	15	25500			**VF 210_15**	**P180**	**BE180L4**	154
99	1880	2.1	15	33900			**VF 250_15**	**P180**	**BE180L4**	160
148	1267	1.4	10	10700			**VF 185_10**	**P180**	**BE180L4**	148
148	1267	2.1	10	22900			**VF 210_10**	**P180**	**BE180L4**	154
148	1282	2.9	10	30300			**VF 250_10**	**P180**	**BE180L4**	160
210	898	1.9	7	9510			**VF 185_7**	**P180**	**BE180L4**	148
210	898	2.5	7	20800			**VF 210_7**	**P180**	**BE180L4**	154
210	908	3.5	7	27500			**VF 250_7**	**P180**	**BE180L4**	160

VF 27

13 Nm

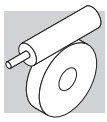
		i	η_s %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
VF 27	**VF 27_7**	7	67	400	7	0.34	—	330	86	200	9	0.23	35	410	83	166
	VF 27_10	10	62	280	7	0.24	—	400	84	140	9	0.16	30	500	80	
	VF 27_15	15	54	187	7	0.17	—	480	79	93	9	0.12	—	600	75	
	VF 27_20	20	49	140	7	0.14	—	540	76	70	9	0.09	—	600	71	
	VF 27_30	30	38	93	7	0.10	—	600	69	47	9	0.07	—	600	62	
	VF 27_40	40	33	70	7	0.08	—	600	64	35	9	0.06	—	600	57	
	VF 27_60	60	26	47	7	0.06	—	600	56	23.3	9	0.04	—	600	49	
	VF 27_70	70	24	40	7	0.06	—	600	53	20.0	9	0.04	—	600	45	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	VF 27_7	7	67	129	10	0.17	90	480	81	71	11	0.11	90	600	79	166
	VF 27_10	10	62	90	11	0.13	20	570	78	50	12	0.08	90	600	76	
	VF 27_15	15	54	60	11	0.09	—	600	72	33	12	0.06	90	600	69	
	VF 27_20	20	49	45	11	0.08	—	600	68	25.0	12	0.05	90	600	65	
	VF 27_30	30	38	30.0	11	0.06	—	600	59	16.7	13	0.04	—	600	55	
	VF 27_40	40	33	22.5	11	0.05	—	600	54	12.5	13	0.04	—	600	50	
	VF 27_60	60	26	15.0	11	0.04	—	600	45	8.3	12	0.02	—	600	41	
	VF 27_70	70	24	12.9	10	0.03	—	600	42	7.1	11	0.02	—	600	38	

VF 30

24 Nm

		i	η_s %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
VF 30	**VF 30_7**	7	69	400	12	0.58	120	510	87	200	16	0.41	140	630	84	166
	VF 30_10	10	64	280	12	0.41	70	620	85	140	16	0.30	80	770	81	
	VF 30_15	15	56	187	14	0.34	—	720	81	93	18	0.24	—	910	76	
	VF 30_20	20	51	140	14	0.26	—	820	78	70	18	0.19	—	1030	73	
	VF 30_30	30	41	93	15	0.21	—	960	71	47	20	0.15	—	1200	65	
	VF 30_40	40	36	70	14	0.16	—	1090	66	35	19	0.12	—	1360	60	
	VF 30_60	60	29	47	14	0.12	—	1270	59	23.3	19	0.09	—	1590	51	
	VF 30_70	70	26	40	11	0.08	—	1380	55	20.0	15	0.07	—	1600	48	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	VF 30_7	7	69	129	18	0.30	150	730	82	71	20	0.19	150	920	81	166
	VF 30_10	10	64	90	18	0.22	150	900	79	50	20	0.14	150	1120	77	
	VF 30_15	15	56	60	20	0.17	—	1060	74	33	22	0.11	150	1320	71	
	VF 30_20	20	51	45	20	0.14	—	1200	70	25.0	22	0.09	150	1490	67	
	VF 30_30	30	41	30	22	0.12	—	1400	61	16.7	24	0.07	—	1700	58	
	VF 30_40	40	36	23	20	0.09	—	1590	56	12.5	22	0.06	—	1700	53	
	VF 30_60	60	29	15	20	0.07	—	1650	48	8.3	22	0.05	—	1700	44	
	VF 30_70	70	26	13	17	0.05	—	1700	45	7.0	19	0.04	—	1700	41	

(–) Contact our technical service department advising radial load data (rotation direction, load angle, offset)



VF 44 - VF/VF 30/44

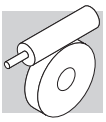
55 Nm

		i	η_s %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
VF 44	**VF 44_7**	7	71	400	22	1.1	220	950	88	200	29	0.71	220	1180	86	166
	VF 44_10	10	66	280	22	0.74	220	1150	87	140	29	0.51	220	1430	84	
	VF 44_14	14	60	200	22	0.55	220	1340	84	100	29	0.37	220	1680	81	
	VF 44_20	20	55	140	29	0.52	220	1490	81	70	39	0.37	220	1860	77	
	VF 44_28	28	45	100	29	0.40	220	1710	76	50	39	0.29	220	2140	71	
	VF 44_35	35	42	80	29	0.33	220	1870	73	40	39	0.25	220	2300	68	
	VF 44_46	46	37	61	29	0.27	220	2080	69	30.0	39	0.19	220	2300	63	
	VF 44_60	60	32	47	29	0.22	220	2290	65	23.3	39	0.16	220	2300	58	
	VF 44_70	70	30	40	22	0.15	220	2300	62	20.0	29	0.11	220	2300	55	
	VF 44_100	100	24	28	21	0.11	220	2300	55	14.0	28	0.09	220	2300	47	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	VF 44_7	7	71	129	39	0.63	220	1300	85	71	45	0.41	220	1610	83	166
	VF 44_10	10	66	90	39	0.45	220	1610	82	50	45	0.29	220	1980	80	
	VF 44_14	14	60	64	39	0.34	220	1890	78	36	50	0.25	220	2280	76	
	VF 44_20	20	55	45	45	0.29	220	2160	74	25.0	50	0.18	220	2500	72	
	VF 44_28	28	45	32	49	0.24	220	2300	67	17.9	55	0.16	220	2500	64	
	VF 44_35	35	42	25.7	49	0.20	220	2300	64	14.3	55	0.14	220	2500	60	
	VF 44_46	46	37	19.6	49	0.17	220	2300	59	10.9	50	0.10	220	2500	55	
	VF 44_60	60	32	15.0	45	0.13	200	2300	54	8.3	50	0.09	220	2500	50	
	VF 44_70	70	30	12.9	39	0.10	220	2300	51	7.1	45	0.07	220	2500	47	
	VF 44_100	100	24	9.0	30	0.06	220	2300	43	5.0	32	0.04	220	2500	39	

70 Nm

		i	η_s %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 1400 min^{-1}						n_1 = 900 min^{-1}						
VF/VF 30/44	**VF/VF 30/44 _245**	245	29	5.7	60	0.09	140	2500	40	3.7	70	0.07	150	2500	38	168
	VF/VF 30/44 _350	350	27	4.0	60	0.07	80	2500	36	2.6	70	0.05	150	2500	38	
	VF/VF 30/44 _420	420	25	3.3	60	0.06	—	2500	35	2.1	70	0.04	—	2500	39	
	VF/VF 30/44 _560	560	23	2.5	60	0.05	—	2500	31	1.6	70	0.04	—	2500	29	
	VF/VF 30/44 _700	700	21	2.0	60	0.04	—	2500	31	1.3	70	0.03	—	2500	31	
	VF/VF 30/44 _840	840	18	1.7	60	0.04	—	2500	26	1.1	70	0.03	—	2500	26	
	VF/VF 30/44 _1120	1120	16	1.3	60	0.03	—	2500	26	0.80	70	0.02	—	2500	29	
	VF/VF 30/44 _1680	1680	13	0.83	60	0.02	—	2500	26	0.54	70	0.02	—	2500	20	
	VF/VF 30/44 _2100	2100	12	0.67	60	0.02	—	2500	21	0.43	70	0.02	—	2500	16	

(–) Contact our technical service department advising radial load data (rotation direction, load angle, offset)



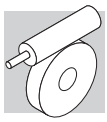
VF 49 - VFR 49

88 Nm

		i	ηS %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	ηd %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	ηd %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
VF 49	VF 49_7	7	70	400	41	2.0	400	950	88	200	54	1.3	400	1170	86	166
	VF 49_10	10	65	280	44	1.5	400	1140	86	140	59	1.0	400	1410	84	
	VF 49_14	14	59	200	49	1.2	400	1310	84	100	65	0.90	400	1630	81	
	VF 49_18	18	55	156	44	0.87	400	1520	82	78	59	0.60	400	1890	78	
	VF 49_24	24	50	117	47	0.73	400	1670	79	58	63	0.50	400	2110	75	
	VF 49_28	28	43	100	56	0.78	400	1740	75	50	74	0.55	400	2170	71	
	VF 49_36	36	39	78	52	0.59	400	1970	72	39	69	0.42	400	2460	67	
	VF 49_45	45	35	62	49	0.46	400	2180	69	31	65	0.33	400	2725	63	
	VF 49_60	60	30	47	44	0.34	400	2480	64	23.3	59	0.25	400	3100	58	
	VF 49_70	70	28	40	41	0.28	400	2650	61	20.0	55	0.21	400	3150	54	
	VF 49_80	80	25	35	41	0.25	400	2780	59	17.5	54	0.19	400	3150	52	
	VF 49_100	100	22	28.0	37	0.20	400	3050	54	14.0	49	0.13	400	3150	47	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	VF 49_7	7	70	129	61	0.97	400	1370	85	71	74	0.67	400	1670	83	166
	VF 49_10	10	65	90	64	0.75	400	1670	82	50	74	0.49	400	2060	80	
	VF 49_14	14	59	64	71	0.61	400	1920	78	36	78	0.39	400	2400	75	
	VF 49_18	18	55	50	68	0.47	400	2190	75	27.8	74	0.30	400	2730	72	
	VF 49_24	24	50	38	68	0.36	400	2480	71	20.8	74	0.24	400	3090	68	
	VF 49_28	28	43	32	82	0.41	400	2540	67	17.9	88	0.26	400	3180	63	
	VF 49_36	36	39	25.0	75	0.31	400	2880	63	13.9	80	0.20	400	3450	59	
	VF 49_45	45	35	20.0	71	0.25	400	3190	59	11.1	78	0.17	400	3450	55	
	VF 49_60	60	30	15.0	64	0.19	400	3300	53	8.3	69	0.12	400	3450	49	
	VF 49_70	70	28	12.9	60	0.16	400	3300	50	7.1	69	0.11	400	3450	46	
	VF 49_80	80	25	11.3	58	0.14	400	3300	47	6.3	59	0.09	400	3450	43	
	VF 49_100	100	22	9.0	52	0.11	400	3300	42	5.0	59	0.08	400	3450	38	

95 Nm

		i	ηS %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	ηd %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	ηd %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
VFR 49	VFR 49 _42	42	58	67	71	0.65	230	1920	76	33	78	0.37	230	2500	74	167
	VFR 49 _54	54	54	52	68	0.50	230	2180	74	25.9	74	0.28	230	2830	71	
	VFR 49 _72	72	49	39	68	0.40	230	2470	70	19.4	74	0.22	230	3190	67	
	VFR 49 _84	84	42	33	82	0.44	230	2520	66	16.6	88	0.25	230	3290	62	
	VFR 49 _108	108	38	25.9	75	0.33	230	2860	62	12.9	80	0.19	230	3450	58	
	VFR 49 _135	135	34	20.7	71	0.27	230	3160	58	10.3	88	0.18	230	3450	54	
	VFR 49 _180	180	29	15.6	64	0.20	230	3300	52	7.7	69	0.12	230	3450	48	
	VFR 49 _210	210	27	13.3	60	0.17	230	3300	49	6.6	69	0.11	230	3450	45	
	VFR 49 _240	240	25	11.7	58	0.15	230	3300	46	5.8	59	0.09	230	3450	42	
	VFR 49 _300	300	22	9.3	52	0.12	230	3300	41	4.7	59	0.08	230	3450	37	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	VFR 49 _42	42	58	21.4	82	0.26	230	2960	72	11.9	90	0.16	230	3450	70	167
	VFR 49 _54	54	54	16.7	79	0.20	230	3330	69	9.3	83	0.12	230	3450	67	
	VFR 49 _72	72	49	12.5	79	0.16	230	3450	64	6.9	83	0.10	230	3450	62	
	VFR 49 _84	84	42	10.7	91	0.17	230	3450	59	6.0	95	0.10	230	3450	57	
	VFR 49 _108	108	38	8.3	84	0.13	230	3450	55	4.6	90	0.08	230	3450	52	
	VFR 49 _135	135	34	6.7	82	0.11	230	3450	50	3.7	90	0.07	230	3450	48	
	VFR 49 _180	180	29	5.0	75	0.09	230	3450	45	2.8	78	0.05	230	3450	42	
	VFR 49 _210	210	27	4.3	75	0.08	230	3450	41	2.4	78	0.05	230	3450	39	
	VFR 49 _240	240	25	3.8	64	0.06	230	3450	39	2.1	68	0.04	230	3450	36	
	VFR 49 _300	300	22	3.0	63	0.06	230	3450	34	1.7	65	0.04	230	3450	32	



VF/VF 30/49

100 Nm

		i	η_S	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	
				min^{-1}	Nm	kW	N	N	%	min^{-1}	Nm	kW	N	N	%	
				n_1 = 1400 min^{-1}						n_1 = 900 min^{-1}						
VF/VF 30/49	**VF/VF 30/49_240**	240	32	5.8	95	0.13	80	3450	45	3.8	100	0.09	150	3450	44	168
	VF/VF 30/49_315	315	24	4.4	95	0.11	140	3450	40	2.9	100	0.07	150	3450	43	
	VF/VF 30/49_420	420	24	3.3	95	0.08	—	3450	41	2.1	100	0.06	—	3450	37	
	VF/VF 30/49_540	540	22	2.6	95	0.07	—	3450	37	1.7	100	0.05	—	3450	35	
	VF/VF 30/49_720	720	20	1.9	95	0.05	—	3450	39	1.3	100	0.04	—	3450	33	
	VF/VF 30/49_900	900	18	1.6	95	0.05	—	3450	31	1.0	100	0.04	—	3450	26	
	VF/VF 30/49_1120	1120	15	1.3	95	0.04	—	3450	31	0.80	100	0.03	—	3450	28	
	VF/VF 30/49_1440	1440	14	0.97	95	0.04	—	3450	24	0.63	100	0.03	—	3450	22	
	VF/VF 30/49_2160	2160	11	0.65	95	0.03	—	3450	21	0.42	100	0.02	—	3450	22	
	VF/VF 30/49_2700	2700	10	0.52	95	0.03	—	3450	17	0.33	100	0.02	—	3450	17	

(–) Contact our technical service department advising radial load data (rotation direction, load angle, offset)

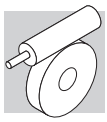
W 63 - WR 63

190 Nm

		i	η_s %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
W 63	**W 63_7**	7	70	400	105	4.9	480	1010	90	200	120	2.9	480	1550	88	166
	W 63_10	10	66	280	125	4.2	370	1360	88	140	140	2.4	480	1840	86	
	W 63_12	12	63	233	125	3.5	435	1540	87	117	140	2.0	480	2070	85	
	W 63_15	15	59	187	125	2.8	410	1770	86	93	150	1.8	480	2280	83	
	W 63_19	19	55	147	130	2.4	310	1990	84	74	150	1.4	480	2600	81	
	W 63_24	24	52	117	130	1.9	370	2250	82	58	155	1.2	480	2890	78	
	W 63_30	30	44	93	125	1.6	440	2540	78	47	160	1.1	460	3170	74	
	W 63_38	38	40	74	130	1.3	330	2800	75	37	155	0.85	480	3580	70	
	W 63_45	45	37	62	130	1.2	380	3020	73	31	145	0.71	480	3920	67	
	W 63_64	64	31	44	110	0.75	480	3650	67	21.9	125	0.47	480	4680	61	
	W 63_80	80	27	35	100	0.59	480	4050	62	17.5	115	0.38	480	5000	56	
	W 63_100	100	23	28	100	0.51	480	4420	58	14.0	115	0.33	480	5000	51	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
W 63	**W 63_7**	7	70	129	130	2.0	480	1870	87	71	140	1.2	480	2420	84	166
	W 63_10	10	66	90	150	1.7	480	2220	84	50	165	1.1	480	2830	81	
	W 63_12	12	63	75	150	1.4	480	2480	82	42	165	0.92	480	3140	79	
	W 63_15	15	59	60	160	1.3	480	2740	80	33	180	0.83	480	3430	76	
	W 63_19	19	55	47	160	1.0	480	3100	78	26.3	180	0.68	480	3860	73	
	W 63_24	24	52	38	165	0.86	480	3440	75	20.8	185	0.58	480	4280	70	
	W 63_30	30	44	30	170	0.76	480	3770	70	16.7	190	0.52	480	4690	64	
	W 63_38	38	40	23.7	165	0.62	480	4240	66	13.2	185	0.42	480	5000	61	
	W 63_45	45	37	20.0	155	0.52	480	4630	63	11.1	170	0.34	480	5000	58	
	W 63_64	64	31	14.1	135	0.35	480	5000	56	7.8	150	0.24	480	5000	51	
	W 63_80	80	27	11.3	125	0.28	480	5000	52	6.3	135	0.19	480	5000	46	
	W 63_100	100	23	9.0	120	0.25	480	5000	46	5.0	130	0.17	480	5000	41	

220 Nm

		i	η_s %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
WR 63	**WR 63_21**	21	69	133	130	2.1	180	1840	87	67	140	1.2	320	2510	84	167
	WR 63_30	30	65	93	150	1.7	300	2180	84	47	165	1.0	320	2920	81	
	WR 63_36	36	62	78	150	1.5	320	2430	82	39	165	0.85	320	3240	79	
	WR 63_45	45	58	62	160	1.3	320	2690	80	31	180	0.77	320	3540	76	
	WR 63_57	57	54	49	160	1.1	320	3050	78	24.6	180	0.63	320	3980	73	
	WR 63_72	72	51	39	165	0.90	320	3390	75	19.4	185	0.54	320	4410	70	
	WR 63_90	90	44	31	170	0.79	320	3710	70	15.6	190	0.48	320	4830	64	
	WR 63_114	114	39	24.6	165	0.62	320	4170	68	12.3	185	0.39	320	5000	61	
	WR 63_135	135	36	20.7	155	0.53	320	4560	63	10.4	170	0.32	320	5000	58	
	WR 63_192	192	30	14.6	135	0.37	320	5000	56	7.3	150	0.22	320	5000	51	
	WR 63_240	240	26	11.7	125	0.29	320	5000	52	5.8	135	0.18	320	5000	46	
	WR 63_300	300	22	9.3	120	0.25	320	5000	46	4.7	130	0.15	320	5000	41	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
WR 63	**WR 63_21**	21	69	43	155	0.85	320	2960	82	23.8	170	0.53	320	3750	80	167
	WR 63_30	30	65	30	180	0.72	320	3470	79	16.7	200	0.45	320	4360	77	
	WR 63_36	36	62	25.0	180	0.61	320	3830	77	14.0	200	0.40	320	4790	74	
	WR 63_45	45	58	20.0	190	0.54	320	4230	74	11.1	200	0.33	320	5000	71	
	WR 63_57	57	54	15.8	190	0.44	320	4740	71	8.8	200	0.27	320	5000	68	
	WR 63_72	72	51	12.5	190	0.37	320	5000	68	6.9	190	0.22	320	5000	64	
	WR 63_90	90	44	10.0	205	0.35	320	5000	62	5.6	220	0.22	320	5000	58	
	WR 63_114	114	39	7.9	200	0.29	320	5000	58	4.4	210	0.18	320	5000	54	
	WR 63_135	135	36	6.7	180	0.23	320	5000	54	3.7	190	0.15	320	5000	50	
	WR 63_192	192	30	4.7	150	0.16	320	5000	47	2.6	150	0.10	320	5000	43	
	WR 63_240	240	26	3.8	140	0.13	320	5000	43	2.1	140	0.08	320	5000	39	
	WR 63_300	300	22	3.0	130	0.11	320	5000	38	1.7	130	0.07	320	5000	34	



VF/W 30/63

230 Nm

		i	η_S	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	
				min^{-1}	Nm	kW	N	N	%	min^{-1}	Nm	kW	N	N	%	
			%	$n_1 = 1400\ min^{-1}$						$n_1 = 900\ min^{-1}$						
VF/W 30/63	**VF/W 30/63_240**	240	33	5.8	210	0.27	80	5000	47	3.8	230	0.20	150	5000	45	168
	VF/W 30/63_315	315	26	4.4	210	0.23	140	5000	42	2.9	230	0.17	150	5000	41	
	VF/W 30/63_450	450	25	3.1	210	0.17	—	5000	41	2.0	230	0.11	—	5000	42	
	VF/W 30/63_570	570	22	2.5	210	0.14	—	5000	40	1.6	230	0.11	—	5000	36	
	VF/W 30/63_720	720	21	1.9	210	0.12	—	5000	37	1.3	230	0.09	—	5000	32	
	VF/W 30/63_900	900	18	1.6	210	0.11	—	5000	30	1.0	230	0.08	—	5000	29	
	VF/W 30/63_1200	1200	16	1.2	210	0.11	—	5000	24	0.75	230	0.07	—	5000	25	
	VF/W 30/63_1520	1520	14	0.92	210	0.08	—	5000	24	0.59	230	0.06	—	5000	23	
	VF/W 30/63_2280	2280	12	0.61	210	0.06	—	5000	21	0.39	230	0.04	—	5000	23	
	VF/W 30/63_2700	2700	11	0.52	210	0.05	—	5000	22	0.33	230	0.04	—	5000	19	

(–) Contact our technical service department advising radial load data (rotation direction, load angle, offset)

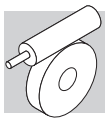
W 75 - WR 75

320 Nm

		i	η_S %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
W 75	**W 75_7**	7	71	400	170	7.8	750	700	91	200	190	4.4	750	1530	90	166
	W 75_10	10	67	280	205	6.7	750	1610	90	140	230	3.8	750	2240	88	
	W 75_15	15	60	187	225	5.0	750	2120	88	93	250	2.9	750	2870	85	
	W 75_20	20	56	140	225	3.8	750	2550	86	70	250	2.2	750	3410	83	
	W 75_25	25	52	112	225	3.2	750	2900	83	56	250	1.8	750	3840	80	
	W 75_30	30	45	93	240	2.9	750	3100	81	47	270	1.7	750	4090	77	
	W 75_40	40	40	70	225	2.1	750	3660	77	35	255	1.3	750	4770	72	
	W 75_50	50	36	56	195	1.6	750	4180	73	28.0	220	0.95	750	5410	68	
	W 75_60	60	33	47	180	1.3	750	4610	70	23.3	200	0.75	750	5960	65	
	W 75_80	80	28	35	160	0.90	750	5310	65	17.5	180	0.56	750	6200	59	
	W 75_100	100	25	28.0	135	0.65	750	5960	61	14.0	150	0.40	750	6200	55	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	W 75_7	7	71	129	205	3.1	750	2120	88	71	225	2.0	750	2940	86	166
	W 75_10	10	67	90	250	2.7	750	2700	86	50	275	1.7	750	3480	84	
	W 75_15	15	60	60	270	2.0	750	3440	83	33	295	1.3	750	4380	80	
	W 75_20	20	56	45	270	1.6	750	4050	80	25.0	295	1.0	750	5120	77	
	W 75_25	25	52	36	270	1.3	750	4550	77	20.0	295	0.85	750	5720	73	
	W 75_30	30	45	30	290	1.2	750	4860	74	16.7	320	0.81	750	6080	69	
	W 75_40	40	40	22.5	275	1.0	750	5630	68	12.5	305	0.63	750	6200	63	
	W 75_50	50	36	18.0	235	0.70	750	6200	63	10.0	260	0.47	750	6200	58	
	W 75_60	60	33	15.0	215	0.56	750	6200	60	8.3	235	0.37	750	6200	55	
	W 75_80	80	28	11.3	195	0.43	750	6200	54	6.3	215	0.29	750	6200	49	
	W 75_100	100	25	9.0	160	0.30	750	6200	50	5.0	180	0.21	750	6200	44	

420 Nm

		i	η_S %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
WR 75	**WR 75_21**	21	70	133	205	3.3	500	2030	88	67	225	1.8	500	3060	86	167
	WR 75_30	30	66	93	250	2.8	500	2640	86	47	275	1.6	500	3610	84	
	WR 75_45	45	59	62	270	2.1	500	3380	83	31	295	1.2	500	4530	80	
	WR 75_60	60	55	47	270	1.6	500	3980	80	23.3	295	0.94	500	5280	77	
	WR 75_75	75	51	37	270	1.4	500	4480	77	18.7	295	0.79	500	5890	73	
	WR 75_90	90	44	31	290	1.3	500	4780	74	15.6	320	0.76	500	6200	69	
	WR 75_120	120	39	23.3	275	1.0	500	5540	68	11.7	305	0.59	500	6200	63	
	WR 75_150	150	35	18.7	235	0.73	500	6200	63	9.3	260	0.44	500	6200	58	
	WR 75_180	180	32	15.6	215	0.58	500	6200	60	7.8	235	0.35	500	6200	55	
	WR 75_240	240	27	11.7	195	0.44	500	6200	54	5.8	215	0.27	500	6200	49	
	WR 75_300	300	24	9.3	160	0.31	500	6200	50	4.7	180	0.20	500	6200	44	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	WR 75_21	21	70	43	245	1.3	500	3660	85	23.8	270	0.82	500	4660	82	167
	WR 75_30	30	66	30	330	1.3	500	4070	82	16.7	370	0.81	500	5160	80	
	WR 75_45	45	59	20.0	350	0.94	500	5180	78	11.1	400	0.62	500	6200	75	
	WR 75_60	60	55	15.0	330	0.69	500	6180	75	8.3	370	0.45	500	6200	71	
	WR 75_75	75	51	12.0	330	0.59	500	6200	70	6.7	350	0.37	500	6200	66	
	WR 75_90	90	44	10.0	370	0.58	500	6200	67	5.6	420	0.39	500	6200	63	
	WR 75_120	120	39	7.5	330	0.43	500	6200	60	4.2	380	0.30	500	6200	56	
	WR 75_150	150	35	6.0	310	0.35	500	6200	55	3.3	350	0.24	500	6200	51	
	WR 75_180	180	32	5.0	280	0.29	500	6200	51	2.8	320	0.20	500	6200	47	
	WR 75_240	240	27	3.8	220	0.19	500	6200	45	2.1	280	0.15	500	6200	41	
	WR 75_300	300	24	3.0	200	0.15	500	6200	41	1.7	260	0.12	500	6200	37	



WR 75 - VF/W 44/75

370 Nm

		i	η_s %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
WR 75_P90 B5	**WR 75_15**	15	66	187	220	4.8	—	1960	89	93	250	2.8	—	2640	86	167
	WR 75_22.5	22.5	59	124	240	3.6	—	2530	86	62	270	2.1	—	3380	83	
	WR 75_30	30	55	93	240	2.8	—	3020	84	47	270	1.6	—	3980	80	
	WR 75_37.5	37.5	51	75	240	2.3	—	3410	81	37	270	1.4	—	4480	77	
	WR 75_45	45	44	62	255	2.1	—	3660	79	31	290	1.3	—	4780	74	
	WR 75_60	60	39	47	240	1.6	—	4290	74	23.3	275	1.0	—	5540	68	
	WR 75_75	75	35	37	210	1.2	—	4860	70	18.7	235	0.73	—	6200	63	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	WR 75_15	15	66	60	275	2.1	—	3150	84	33	330	1.4	—	3850	82	167
	WR 75_22.5	22.5	59	40	295	1.5	—	4010	80	22.2	350	1.0	—	4920	78	
	WR 75_30	30	55	30	295	1.2	—	4710	77	16.7	330	0.77	—	5890	75	
	WR 75_37.5	37.5	51	24	295	1.0	—	5280	73	13.3	330	0.66	—	6200	70	
	WR 75_45	45	44	20	320	1.0	—	5610	69	11.1	370	0.64	—	6200	67	
	WR 75_60	60	39	15	305	0.76	—	6200	63	8.3	330	0.48	—	6200	60	
	WR 75_75	75	35	12	260	0.56	—	6200	58	6.7	310	0.39	—	6200	55	

400 Nm

		i	η_s %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 1400 min^{-1}						n_1 = 900 min^{-1}						
VF/W 44/75	**VF/W 44/75_250**	250	34	5.6	370	0.38	220	4560	57	3.6	400	0.29	220	4660	52	168
	VF/W 44/75_300	300	30	4.7	370	0.35	220	5160	51	3.0	400	0.27	220	5150	46	
	VF/W 44/75_400	400	26	3.5	370	0.29	220	6200	46	2.3	400	0.22	220	6200	42	
	VF/W 44/75_525	525	25	2.7	370	0.23	220	6200	44	1.7	400	0.18	220	6200	41	
	VF/W 44/75_700	700	24	2.0	370	0.18	220	6200	42	1.3	400	0.14	220	6200	39	
	VF/W 44/75_920	920	21	1.5	370	0.15	—	6200	40	1.0	400	0.11	60	6200	36	
	VF/W 44/75_1200	1200	18	1.2	370	0.12	—	6200	37	0.75	400	0.10	220	6200	31	
	VF/W 44/75_1500	1500	17	0.93	370	0.10	220	6200	37	0.60	400	0.09	220	6200	29	
	VF/W 44/75_2100	2100	14	0.67	370	0.09	220	6200	30	0.43	400	0.07	220	6200	24	
	VF/W 44/75_2800	2800	12	0.50	370	0.07	220	6200	26	0.32	400	0.06	220	6200	22	

(–) Contact our technical service department advising radial load data (rotation direction, load angle, offset)

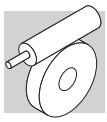
W 86 - WR 86

440 Nm

		i	η_s %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
W 86	**W 86_7**	7	71	400	225	10.4	850	2930	91	200	250	5.9	850	3920	89	166
	W 86_10	10	67	280	260	8.5	850	3490	90	140	290	4.8	850	4620	88	
	W 86_15	15	60	187	295	6.6	850	4200	87	93	330	3.8	850	5510	85	
	W 86_20	20	60	140	285	4.9	850	4900	86	70	320	2.8	850	6380	84	
	W 86_23	23	58	122	285	4.3	850	5250	85	61	320	2.5	850	6800	82	
	W 86_30	30	45	93	320	3.9	850	5740	81	47	370	2.4	850	7000	76	
	W 86_40	40	45	70	295	2.7	850	6670	79	35	330	1.6	850	7000	75	
	W 86_46	46	43	61	305	2.5	850	7000	77	30	340	1.5	850	7000	73	
	W 86_56	56	39	50	265	1.8	850	7000	75	25.0	300	1.1	850	7000	70	
	W 86_64	64	37	44	250	1.6	850	7000	73	21.9	280	0.94	850	7000	68	
	W 86_80	80	33	35	225	1.2	850	7000	69	17.5	255	0.73	850	7000	64	
	W 86_100	100	29	28.0	205	0.92	850	7000	65	14.0	230	0.57	850	7000	59	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	W 86_7	7	71	129	270	4.1	850	4670	88	71	295	2.6	850	5890	85	166
	W 86_10	10	67	90	310	3.4	850	5500	86	50	345	2.2	850	6860	82	
	W 86_15	15	60	60	355	2.7	850	6520	82	33	390	1.7	850	7000	78	
	W 86_20	20	60	45	345	2.0	850	7000	81	25.0	380	1.3	850	7000	77	
	W 86_23	23	58	39	345	1.8	850	7000	80	21.7	380	1.2	850	7000	75	
	W 86_30	30	45	30	400	1.7	850	7000	73	16.7	440	1.1	850	7000	67	
	W 86_40	40	45	22.5	355	1.2	850	7000	71	12.5	390	0.77	850	7000	66	
	W 86_46	46	43	19.6	365	1.1	850	7000	69	10.9	405	0.73	850	7000	63	
	W 86_56	56	39	16.1	325	0.83	850	7000	66	8.9	355	0.55	850	7000	60	
	W 86_64	64	37	14.1	300	0.70	850	7000	63	7.8	330	0.47	850	7000	58	
	W 86_80	80	33	11.3	275	0.55	850	7000	59	6.3	305	0.38	850	7000	53	
	W 86_100	100	29	9.0	250	0.43	850	7000	55	5.0	275	0.29	850	7000	49	

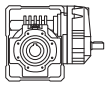
550 Nm

		i	η_s %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
WR 86	**WR 86_21**	21	70	133	270	4.3	500	4590	88	67	295	2.4	500	6070	85	167
	WR 86_30	30	66	93	310	3.5	500	5410	86	47	345	2.1	500	7000	82	
	WR 86_45	45	59	62	355	2.8	500	6420	82	31	390	1.6	500	7000	78	
	WR 86_60	60	59	47	345	2.1	500	7000	81	23.3	380	1.2	500	7000	77	
	WR 86_69	69	57	41	345	1.8	500	7000	80	20.3	380	1.1	500	7000	75	
	WR 86_90	90	44	31	400	1.8	500	7000	73	15.6	440	1.1	500	7000	67	
	WR 86_120	120	44	23.3	355	1.2	500	7000	71	11.7	390	0.72	500	7000	66	
	WR 86_138	138	42	20.3	365	1.1	500	7000	69	10.1	405	0.68	500	7000	63	
	WR 86_168	168	38	16.7	325	0.86	500	7000	66	8.3	355	0.52	500	7000	60	
	WR 86_192	192	36	14.6	300	0.73	500	7000	63	7.3	330	0.43	500	7000	58	
	WR 86_240	240	32	11.7	275	0.57	500	7000	59	5.8	305	0.35	500	7000	53	
	WR 86_300	300	28	9.3	250	0.44	500	7000	55	4.7	275	0.27	500	7000	49	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	WR 86_21	21	70	43	325	1.8	500	7000	83	23.8	355	1.1	500	7000	81	167
	WR 86_30	30	66	30	375	1.5	500	7000	81	16.7	415	0.93	500	7000	78	
	WR 86_45	45	59	20.0	450	1.2	500	7000	76	11.1	500	0.80	500	7000	73	
	WR 86_60	60	59	15.0	430	0.90	500	7000	75	8.3	440	0.53	500	7000	72	
	WR 86_69	69	57	13.0	390	0.73	500	7000	73	7.2	400	0.43	500	7000	70	
	WR 86_90	90	44	10.0	500	0.82	500	7000	64	5.6	550	0.53	500	7000	60	
	WR 86_120	120	44	7.5	440	0.55	500	7000	63	4.2	470	0.35	500	7000	59	
	WR 86_138	138	42	6.5	430	0.48	500	7000	61	3.6	440	0.30	500	7000	56	
	WR 86_168	168	38	5.4	390	0.38	500	7000	57	3.0	410	0.24	500	7000	53	
	WR 86_192	192	36	4.7	390	0.35	500	7000	55	2.6	410	0.22	500	7000	50	
	WR 86_240	240	32	3.8	310	0.24	500	7000	50	2.1	320	0.15	500	7000	46	
	WR 86_300	300	28	3.0	310	0.22	500	7000	45	1.7	320	0.14	500	7000	41	



WR 86 - VF/W 44/86

500 Nm

		i	η_S %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
WR 86_P90 B5	**WR 86_15**	15	66	187	275	6.1	—	4130	88	93	310	3.5	—	5410	86	167
	WR 86_22.5	22.5	59	124	315	4.8	—	4920	86	62	355	2.8	—	6420	82	
	WR 86_30	30	59	93	305	3.5	—	5720	85	47	345	2.1	—	7000	81	
	WR 86_34.5	34.5	57	81	305	3.1	—	6110	84	41	345	1.8	—	7000	80	
	WR 86_45	45	44	62	350	3.0	—	6640	77	31	400	1.8	—	7000	73	
	WR 86_60	60	44	47	315	2.0	—	7000	77	23.3	355	1.2	—	7000	71	
	WR 86_69	69	42	41	325	1.8	—	7000	75	20.3	365	1.1	—	7000	69	
	WR 86_84	84	38	33	285	1.4		7000	72	16.7	325	0.86		7000	66	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	WR 86_15	15	66	60	345	2.6	—	6330	82	33	375	1.6	—	7000	81	167
	WR 86_22.5	22.5	59	40	390	2.1	—	7000	78	22.2	450	1.4	—	7000	76	
	WR 86_30	30	59	30	380	1.6	—	7000	77	16.7	430	1.0	—	7000	75	
	WR 86_34.5	34.5	57	26.1	380	1.4	—	7000	75	14.5	390	0.8	—	7000	73	
	WR 86_45	45	44	20.0	440	1.4	—	7000	67	11.1	500	0.9	—	7000	64	
	WR 86_60	60	44	15.0	390	0.93	—	7000	66	8.3	440	0.61	—	7000	63	
	WR 86_69	69	42	13.0	405	0.88	—	7000	63	7.2	430	0.53	—	7000	61	
	WR 86_84	84	38	10.7	355	0.66		7000	60	6.0	390	0.43		7000	57	

550 Nm

		i	η_S %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 1400 min^{-1}						n_1 = 900 min^{-1}						
VF/W 44/86	**VF/W 44/86_230**	230	38	6.1	500	0.59	220	7000	54	3.9	550	0.43	220	7000	53	168
	VF/W 44/86_300	300	30	4.7	500	0.54	220	7000	45	3.0	550	0.41	220	7000	42	
	VF/W 44/86_400	400	30	3.5	500	0.45	220	7000	41	2.3	550	0.32	220	7000	41	
	VF/W 44/86_525	525	25	2.7	500	0.33	220	7000	42	1.7	550	0.25	220	7000	39	
	VF/W 44/86_700	700	25	2.0	500	0.27	220	7000	39	1.3	550	0.20	220	7000	37	
	VF/W 44/86_920	920	22	1.5	500	0.20	220	7000	40	1.0	550	0.15	—	7000	37	
	VF/W 44/86_1380	1380	17	1.0	500	0.17	220	7000	32	0.65	550	0.13	—	7000	28	
	VF/W 44/86_1840	1840	17	0.76	500	0.13	220	7000	30	0.49	550	0.10	—	7000	28	
	VF/W 44/86_2116	2116	16	0.66	500	0.12	220	7000	28	0.43	550	0.09	220	7000	28	
	VF/W 44/86_2760	2760	14	0.51	500	0.11	—	7000	24	0.33	550	0.08	220	7000	24	

(–) Contact our technical service department advising radial load data (rotation direction, load angle, offset)

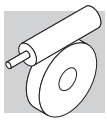
W 110 - WR 110

830 Nm

			n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	
	i	η_S %	min^{-1}	Nm	kW	N	N	%	min^{-1}	Nm	kW	N	N	%	
			n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
W 110	**W 110_7**	7	71	400	445	20.7	1200	3710	90	200	500	11.8	1200	5020	89	166
	W 110_10	10	67	280	490	16.1	1200	4650	89	140	550	9.3	1200	6190	87	
	W 110_15	15	60	187	535	12.0	1200	5770	87	93	600	7.0	1200	7590	84	
	W 110_20	20	61	140	510	8.7	1200	6790	86	70	570	5.0	1200	8000	84	
	W 110_23	23	59	122	480	7.1	1200	7430	86	61	540	4.1	1200	8000	83	
	W 110_30	30	45	93	625	7.5	1200	7780	81	47	700	4.4	1200	8000	77	
	W 110_40	40	46	70	595	5.5	1200	8000	80	35	670	3.2	1200	8000	76	
	W 110_46	46	44	61	535	4.3	1200	8000	79	30	600	2.6	1200	8000	74	
	W 110_56	56	41	50	535	3.7	1200	8000	76	25.0	600	2.2	1200	8000	72	
	W 110_64	64	38	44	470	2.9	1200	8000	74	21.9	530	1.7	1200	8000	70	
	W 110_80	80	34	35	420	2.2	1200	8000	71	17.5	470	1.3	1200	8000	66	
	W 110_100	100	30	28.0	410	1.8	1200	8000	67	14.0	460	1.1	1200	8000	62	
			n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
W 110	**W 110_7**	7	71	129	540	8.3	1200	6040	88	71	595	5.2	1200	7680	86	166
	W 110_10	10	67	90	590	6.5	1200	7410	86	50	655	4.1	1200	8000	84	
	W 110_15	15	60	60	645	4.9	1200	8000	83	33	710	3.1	1200	8000	80	
	W 110_20	20	61	45	615	3.5	1200	8000	82	25.0	675	2.2	1200	8000	79	
	W 110_23	23	59	39	580	2.9	1200	8000	81	21.7	640	1.9	1200	8000	77	
	W 110_30	30	45	30	755	3.2	1200	8000	74	16.7	830	2.1	1200	8000	70	
	W 110_40	40	46	22.5	720	2.3	1200	8000	73	12.5	795	1.5	1200	8000	68	
	W 110_46	46	44	19.6	645	1.9	1200	8000	71	10.9	710	1.2	1200	8000	66	
	W 110_56	56	41	16.1	645	1.6	1200	8000	68	8.9	710	1.1	1200	8000	63	
	W 110_64	64	38	14.1	570	1.3	1200	8000	65	7.8	630	0.86	1200	8000	60	
	W 110_80	80	34	11.3	505	0.98	1200	8000	61	6.3	560	0.65	1200	8000	56	
	W 110_100	100	30	9.0	495	0.82	1200	8000	57	5.0	545	0.56	1200	8000	51	

1000 Nm

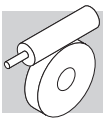
			n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	
	i	η_S %	min^{-1}	Nm	kW	N	N	%	min^{-1}	Nm	kW	N	N	%	
			n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
WR 110	**WR 110_21**	21	70	133	540	8.6	700	5930	88	67	595	4.8	700	7950	86	167
	WR 110_30	30	66	93	590	6.7	700	7280	86	47	655	3.8	700	8000	84	
	WR 110_45	45	59	62	645	5.1	700	8000	83	31	710	2.9	700	8000	80	
	WR 110_60	60	60	47	615	3.7	700	8000	82	23.3	675	2.1	700	8000	79	
	WR 110_69	69	58	41	580	3.0	700	8000	81	20.3	640	1.8	700	8000	77	
	WR 110_90	90	44	31	755	3.3	700	8000	74	15.6	830	1.9	700	8000	70	
	WR 110_120	120	45	23.3	720	2.4	700	8000	73	11.7	795	1.4	700	8000	68	
	WR 110_138	138	43	20.3	645	1.9	700	8000	71	10.1	710	1.1	700	8000	66	
	WR 110_168	168	40	16.7	645	1.7	700	8000	68	8.3	710	0.98	700	8000	63	
	WR 110_192	192	37	14.6	570	1.3	700	8000	65	7.3	630	0.80	700	8000	60	
	WR 110_240	240	33	11.7	505	1.0	700	8000	61	5.8	560	0.61	700	8000	56	
	WR 110_300	300	29	9.3	495	0.85	700	8000	57	4.7	545	0.52	700	8000	51	
			n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
WR 110	**WR 110_21**	21	70	43	645	3.4	700	8000	84	23.8	715	2.2	700	8000	82	167
	WR 110_30	30	66	30	710	2.8	700	8000	81	16.7	785	1.7	700	8000	79	
	WR 110_45	45	59	20.0	870	2.4	700	8000	77	11.1	950	1.5	700	8000	75	
	WR 110_60	60	60	15.0	800	1.6	700	8000	77	8.3	850	1.0	700	8000	74	
	WR 110_69	69	58	13.0	750	1.4	700	8000	75	7.2	820	0.86	700	8000	72	
	WR 110_90	90	44	10.0	900	1.4	700	8000	66	5.6	1000	0.94	700	8000	62	
	WR 110_120	120	45	7.5	870	1.1	700	8000	65	4.2	950	0.68	700	8000	61	
	WR 110_138	138	43	6.5	800	0.87	700	8000	63	3.6	900	0.58	700	8000	59	
	WR 110_168	168	40	5.4	775	0.72	700	8000	60	3.0	800	0.45	700	8000	55	
	WR 110_192	192	37	4.7	685	0.59	700	8000	57	2.6	720	0.37	700	8000	53	
	WR 110_240	240	33	3.8	590	0.44	700	8000	53	2.1	620	0.28	700	8000	48	
	WR 110_300	300	29	3.0	570	0.37	700	8000	48	1.7	600	0.24	700	8000	44	



VF/W 49/110

1050 Nm

		i	η_S	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	
			%	min^{-1}	Nm	kW	N	N	%	min^{-1}	Nm	kW	N	N	%	
				n_1 = 1400 min^{-1}						n_1 = 900 min^{-1}						
VF/W 49/110	**VF/W 49/110_230**	230	38	6.1	1000	1.2	400	8000	52	3.9	1050	0.84	400	8000	51	168
	VF/W 49/110_300	300	29	4.7	1000	1.0	400	8000	48	3.0	1050	0.70	400	8000	47	
	VF/W 49/110_400	400	30	3.5	1000	0.81	400	8000	45	2.3	1050	0.55	400	8000	45	
	VF/W 49/110_540	540	25	2.6	1000	0.66	400	8000	41	1.7	1050	0.48	400	8000	38	
	VF/W 49/110_720	720	24	1.9	1000	0.51	400	8000	40	1.3	1050	0.36	400	8000	38	
	VF/W 49/110_1080	1080	18	1.3	1000	0.44	400	8000	31	0.83	1050	0.28	400	8000	30	
	VF/W 49/110_1350	1350	16	1.0	1000	0.36	400	8000	30	0.67	1050	0.26	400	8000	28	
	VF/W 49/110_1656	1656	17	0.85	1000	0.30	400	8000	30	0.54	1050	0.20	400	8000	30	
	VF/W 49/110_2070	2070	15	0.68	1000	0.25	400	8000	28	0.43	1050	0.19	400	8000	25	
	VF/W 49/110_2800	2800	13	0.50	1000	0.22	400	8000	24	0.32	1050	0.17	400	8000	21	



VF 130 - VFR 130

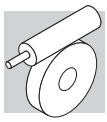
1500 Nm

		i	η_s %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
VF 130	**VF 130_7**	7	71	400	555	25	1500	4930	91	200	740	17.4	1500	5990	89	166
	VF 130_10	10	67	280	593	19.3	1500	6210	90	140	790	13.3	1500	7620	88	
	VF 130_15	15	63	187	690	15.3	1500	7390	88	93	920	10.6	1500	9100	86	
	VF 130_20	20	59	140	675	11.4	1500	8670	87	70	900	8.0	1500	10700	84	
	VF 130_23	23	57	122	668	9.9	1500	9300	86	61	890	6.9	1500	11500	83	
	VF 130_30	30	49	93	788	9.3	1040	10100	83	47	1050	6.6	—	12500	79	
	VF 130_40	40	44	70	825	7.6	—	11400	80	35	1100	5.4	—	12600	76	
	VF 130_46	46	45	61	788	6.3	1290	12200	80	30.0	1050	4.5	—	12600	76	
	VF 130_56	56	42	50	720	4.8	1500	12600	78	25.0	960	3.4	940	12600	73	
	VF 130_64	64	39	44	698	4.2	1500	12600	76	21.9	930	3.0	1220	12600	71	
	VF 130_80	80	35	35	660	3.3	1500	12600	73	17.5	880	2.4	1500	12600	68	
	VF 130_100	100	31	28	585	2.5	1500	12600	70	14.0	780	1.8	1500	12600	64	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	VF 130_7	7	71	129	850	13.0	1500	6980	88	71	1000	8.8	1500	8670	86	166
	VF 130_10	10	67	90	900	9.9	1500	8900	87	50	1100	6.9	1500	10800	84	
	VF 130_15	15	63	60	1080	8.1	1500	10490	84	33	1350	5.9	1500	12600	81	
	VF 130_20	20	59	45	1050	6.1	1500	12400	82	25.0	1350	4.6	1500	13800	79	
	VF 130_23	23	57	39	1050	5.4	1500	13200	81	21.7	1300	3.9	1500	13800	77	
	VF 130_30	30	49	30.0	1250	5.2	—	13200	77	16.7	1500	3.7	—	13800	72	
	VF 130_40	40	44	22.5	1200	3.9	—	13200	73	12.5	1400	2.8	—	13800	68	
	VF 130_46	46	45	19.6	1150	3.3	490	13200	73	10.9	1350	2.3	1270	13800	68	
	VF 130_56	56	42	16.1	1080	2.7	1500	13200	70	8.9	1200	1.8	1500	13800	65	
	VF 130_64	64	39	14.1	1050	2.4	1500	13200	68	7.8	1200	1.6	1500	13800	62	
	VF 130_80	80	35	11.3	950	1.8	1500	13200	64	6.3	1150	1.3	1500	13800	58	
	VF 130_100	100	31	9.0	800	1.3	1500	13200	59	5.0	900	0.91	1500	13800	54	

1800 Nm

		i	η_s %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
VFR 130	**VFR 130 _60**	60	58	47	1050	6.4	1000	12400	81	23.3	1350	4.3	1000	13800	78	167
	VFR 130 _69	69	56	41	1050	5.6	1000	13200	80	20.3	1300	3.7	1000	13800	76	
	VFR 130 _90	90	48	31	1250	5.4	1000	13200	76	15.6	1500	3.5	1000	13800	71	
	VFR 130 _120	120	43	23.3	1200	4.1	1000	13200	72	11.7	1400	2.6	1000	13800	67	
	VFR 130 _138	138	44	20.3	1150	3.4	1000	13200	72	10.1	1350	2.2	1000	13800	67	
	VFR 130 _168	168	41	16.7	1080	2.7	1000	13200	69	8.3	1200	1.6	1000	13800	64	
	VFR 130 _192	192	38	14.6	1050	2.4	1000	13200	67	7.3	1200	1.5	1000	13800	61	
	VFR 130 _240	240	34	11.7	950	1.9	1000	13200	63	5.8	1150	1.2	1000	13800	57	
	VFR 130 _300	300	30	9.3	800	1.4	1000	13200	58	4.7	900	0.83	1000	13800	53	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	VFR 130 _60	60	58	15.0	1450	3.1	1000	13800	75	8.3	1600	1.9	1000	13800	74	167
	VFR 130 _69	69	56	13.0	1450	2.7	1000	13800	74	7.2	1550	1.6	1000	13800	72	
	VFR 130 _90	90	48	10.0	1600	2.5	1000	13800	68	5.6	1800	1.6	1000	13800	66	
	VFR 130 _120	120	43	7.5	1600	2.0	1000	13800	63	4.2	1800	1.3	1000	13800	61	
	VFR 130 _138	138	44	6.5	1500	1.6	1000	13800	64	3.6	1600	1.0	1000	13800	61	
	VFR 130 _168	168	41	5.4	1350	1.3	1000	13800	60	3.0	1450	0.78	1000	13800	58	
	VFR 130 _192	192	38	4.7	1300	1.1	1000	13800	58	2.6	1400	0.70	1000	13800	55	
	VFR 130 _240	240	34	3.8	1200	0.87	1000	13800	54	2.1	1250	0.54	1000	13800	51	
	VFR 130 _300	300	30	3.0	1000	0.64	1000	13800	49	1.7	1100	0.41	1000	13800	47	

(–) Contact our technical service department advising radial load data (rotation direction, load angle, offset)

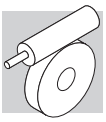


W/VF 63/130

1850 Nm

		i	η_s %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 1400 min^{-1}						n_1 = 900 min^{-1}						
W/VF 63/130	**W/VF 63/130_280**	280	31	5.0	1800	1.9	480	13800	50	3.2	1850	1.3	480	13800	48	168
	W/VF 63/130_400	400	29	3.5	1800	1.5	480	13800	44	2.3	1850	0.99	480	13800	44	
	W/VF 63/130_600	600	26	2.3	1800	1.1	480	13800	40	1.5	1850	0.73	480	13800	40	
	W/VF 63/130_760	760	24	1.8	1800	0.89	480	13800	39	1.2	1850	0.62	480	13800	37	
	W/VF 63/130_960	960	23	1.5	1800	0.74	480	13800	37	0.94	1850	0.52	480	13800	35	
	W/VF 63/130_1200	1200	19	1.2	1800	0.65	—	13800	34	0.75	1850	0.45	—	13800	32	
	W/VF 63/130_1520	1520	18	0.92	1800	0.55	—	13800	32	0.59	1850	0.38	—	13800	30	
	W/VF 63/130_1800	1800	16	0.78	1800	0.52	—	13800	28	0.50	1850	0.37	—	13800	26	
	W/VF 63/130_2560	2560	14	0.55	1800	0.45	—	13800	23	0.35	1850	0.32	—	13800	21	
	W/VF 63/130_3200	3200	12	0.44	1800	0.49	—	13800	17	0.28	1850	0.34	480	13800	16	

(–) Contact our technical service department advising radial load data (rotation direction, load angle, offset)



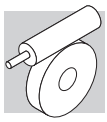
VF 150 - VFR 150

2000 Nm

		i	ηs %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
VF 150	VF 150_7	7	72	400	750	35	2200	5010	91	200	1000	24	2200	6040	90	166
	VF 150_10	10	68	280	788	25	2200	6630	90	140	1050	17.5	2200	8120	88	
	VF 150_15	15	64	187	863	19.0	2200	8110	89	93	1150	13.1	2200	9990	87	
	VF 150_20	20	59	140	975	16.4	2200	9170	87	70	1300	11.3	2200	11300	84	
	VF 150_23	23	57	122	953	14.1	2200	9940	86	61	1270	9.8	2200	12300	83	
	VF 150_30	30	48	93	1028	12.1	2200	11100	83	47	1370	8.5	2200	13700	80	
	VF 150_40	40	44	70	1155	10.5	2200	12300	81	35	1540	7.4	830	14700	77	
	VF 150_46	46	45	61	1163	9.2	2200	13100	81	30.0	1550	6.5	1400	14700	77	
	VF 150_56	56	42	50	1028	6.8	2200	14600	79	25.0	1370	4.9	2200	14700	74	
	VF 150_64	64	39	44	998	5.9	2200	14700	77	21.9	1330	4.2	2200	14700	72	
	VF 150_80	80	35	35	938	4.6	2200	14700	74	17.5	1250	3.4	2200	14700	69	
	VF 150_100	100	31	28	863	3.6	2200	14700	71	14.0	1150	2.6	2200	14700	65	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	VF 150_7	7	72	129	1150	17.6	2200	7040	89	71	1400	12.2	2200	8560	87	166
	VF 150_10	10	68	90	1200	13.0	2200	9480	87	50	1500	9.4	2200	11400	85	
	VF 150_15	15	64	60	1350	10.0	2200	11500	85	33	1700	7.3	2200	13800	83	
	VF 150_20	20	59	45	1500	8.6	2200	13100	83	25.0	1900	6.4	2200	15700	80	
	VF 150_23	23	57	39	1500	7.6	2200	14200	82	21.7	1850	5.5	2200	16000	78	
	VF 150_30	30	48	30.0	1600	6.5	2200	15500	77	16.7	1950	4.8	2200	16000	73	
	VF 150_40	40	44	22.5	1750	5.6	1150	15500	74	12.5	2000	3.9	2200	16000	69	
	VF 150_46	46	45	19.6	1750	4.9	2100	15500	74	10.9	2000	3.4	2200	16000	69	
	VF 150_56	56	42	16.1	1500	3.7	2200	15500	71	8.9	1750	2.6	2200	16000	66	
	VF 150_64	64	39	14.1	1450	3.2	2200	15500	69	7.8	1700	2.3	2200	16000	63	
	VF 150_80	80	35	11.3	1350	2.5	2200	15500	65	6.3	1550	1.8	2200	16000	59	
	VF 150_100	100	31	9.0	1150	1.8	2200	15500	61	5.0	1300	1.3	2200	16000	55	

2600 Nm

		i	ηs %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
VFR 150	VFR 150 _45	45	63	62	1350	10.6	1500	11600	84	31	1700	6.8	1500	14600	82	167
	VFR 150 _60	60	58	47	1500	9.0	1500	13100	82	23.3	1900	5.9	1500	16000	79	
	VFR 150 _69	69	56	41	1500	7.9	1500	14100	81	20.3	1850	5.1	1500	16000	77	
	VFR 150 _90	90	47	31	1600	6.9	1500	15500	76	15.6	1950	4.4	1500	16000	72	
	VFR 150 _120	120	43	23.3	1750	5.9	1500	15500	73	11.7	2000	3.6	1500	16000	68	
	VFR 150 _138	138	44	20.3	1750	5.1	1500	15500	73	10.1	2000	3.1	1500	16000	68	
	VFR 150 _168	168	41	16.7	1500	3.8	1500	15500	70	8.3	1750	2.4	1500	16000	65	
	VFR 150 _192	192	38	14.6	1450	3.3	1500	15500	68	7.3	1700	2.1	1500	16000	62	
	VFR 150 _240	240	34	11.7	1350	2.6	1500	15500	64	5.8	1550	1.6	1500	16000	58	
	VFR 150 _300	300	30	9.3	1150	1.9	1500	15500	60	4.7	1300	1.2	1500	16000	54	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	VFR 150 _45	45	63	20.0	1950	5.2	1500	16000	79	11.1	2100	3.2	1500	16000	78	167
	VFR 150 _60	60	58	15.0	2100	4.4	1500	16000	76	8.3	2300	2.7	1500	16000	74	
	VFR 150 _69	69	56	13.0	2050	3.8	1500	16000	74	7.2	2200	2.3	1500	16000	72	
	VFR 150 _90	90	47	10.0	2200	3.4	1500	16000	69	5.6	2400	2.1	1500	16000	66	
	VFR 150 _120	120	43	7.5	2300	2.8	1500	16000	64	4.2	2600	1.8	1500	16000	62	
	VFR 150 _138	138	44	6.5	2200	2.4	1500	16000	64	3.6	2400	1.5	1500	16000	62	
	VFR 150 _168	168	41	5.4	1950	1.8	1500	16000	61	3.0	2100	1.1	1500	16000	59	
	VFR 150 _192	192	38	4.7	1900	1.6	1500	16000	59	2.6	2000	1.0	1500	16000	56	
	VFR 150 _240	240	34	3.8	1700	1.2	1500	16000	54	2.1	1800	0.76	1500	16000	52	
	VFR 150 _300	300	30	3.0	1350	0.85	1500	16000	50	1.7	1450	0.54	1500	16000	47	



W/VF 86/150

2700 Nm

		i	η_s %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 1400 min^{-1}						n_1 = 900 min^{-1}						
W/VF 86/150	**W/VF 86/150_200**	200	29	7.0	2600	3.0	850	16000	64	4.5	2700	2.1	850	16000	61	168
	W/VF 86/150_225	225	26	6.2	2600	2.7	850	16000	63	4.0	2700	1.9	850	16000	60	
	W/VF 86/150_300	300	26	4.7	2600	2.2	850	16000	58	3.0	2700	1.5	850	16000	57	
	W/VF 86/150_345	345	26	4.1	2600	1.9	850	16000	58	2.6	2700	1.3	850	16000	57	
	W/VF 86/150_460	460	26	3.0	2600	1.5	850	16000	55	2.0	2700	1.0	850	16000	55	
	W/VF 86/150_529	529	26	2.6	2600	1.3	850	16000	55	1.7	2700	0.93	850	16000	52	
	W/VF 86/150_690	690	26	2.0	2600	1.1	850	16000	50	1.3	2700	0.78	850	16000	47	
	W/VF 86/150_920	920	26	1.5	2600	0.92	850	16000	45	0.98	2700	0.64	850	16000	43	
	W/VF 86/150_1380	1380	19	1.0	2600	0.66	850	16000	42	0.65	2700	0.46	850	16000	40	
	W/VF 86/150_1840	1840	19	0.76	2600	0.55	850	16000	38	0.49	2700	0.38	850	16000	36	
	W/VF 86/150_2944	2944	16	0.48	2600	0.48	850	16000	27	0.31	2700	0.35	850	16000	25	

VF 185 - VFR 185

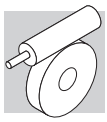
3600 Nm

		i	ηs %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	ηd %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	ηd %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
VF 185	VF 185_7	7	72	400	1313	60	2800	4670	91	200	1750	41	2800	5570	90	166
	VF 185_10	10	68	280	1365	44	2800	7390	90	140	1820	30	2800	8960	89	
	VF 185_15	15	66	187	1388	30	2800	9460	89	93	1850	21	2800	11600	88	
	VF 185_20	20	59	140	1703	28	2800	10500	88	70	2270	19.6	2800	12900	85	
	VF 185_30	30	54	93	1485	16.9	2800	13700	86	47	1980	11.8	2800	16900	83	
	VF 185_40	40	44	70	1973	17.6	—	14500	82	35	2630	12.4	—	17900	78	
	VF 185_50	50	41	56	1875	13.7	—	16300	80	28.0	2500	9.8	—	18000	76	
	VF 185_60	60	39	47	1703	10.7	2800	18000	78	23.3	2270	7.6	770	18000	74	
	VF 185_80	80	33	35	1590	7.8	2800	18000	75	17.5	2120	5.6	1140	18000	69	
	VF 185_100	100	30	28.0	1425	5.8	2800	18000	72	14.0	1900	4.3	2800	18000	65	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
VF 185	VF 185_7	7	72	129	2000	30	2800	7120	89	71	2450	21	2800	8730	88	166
	VF 185_10	10	68	90	2150	23	2800	10200	88	50	2600	16.0	2800	12500	86	
	VF 185_15	15	66	60	2250	16.4	2800	13100	86	33	2800	11.8	2800	15700	84	
	VF 185_20	20	59	45	2750	15.6	2800	14600	84	25.0	3300	10.9	2800	17900	81	
	VF 185_30	30	54	30.0	2400	9.4	2800	19000	81	16.7	2800	6.5	2800	19500	77	
	VF 185_40	40	44	22.5	3100	9.7	—	19000	76	12.5	3600	6.8	—	19500	71	
	VF 185_50	50	41	18.0	2900	7.6	—	19000	73	10.0	3300	5.2	—	19500	68	
	VF 185_60	60	39	15.0	2600	5.8	700	19000	71	8.3	3000	4.2	2800	19500	66	
	VF 185_80	80	33	11.3	2400	4.3	1770	19000	66	6.3	2800	3.2	2800	19500	60	
	VF 185_100	100	30	9.0	2000	3.0	2800	19000	62	5.0	2300	2.1	2800	19500	56	

4200 Nm

		i	ηs %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	ηd %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	ηd %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
VFR 185	VFR 185 _90	90	53	31	2400	9.9	1700	19000	80	15.6	2800	6.0	1700	19500	76	167
	VFR 185 _120	120	43	23.3	3100	10.2	1700	19000	75	11.7	3600	6.3	1700	19500	70	
	VFR 185 _150	150	40	18.7	2900	7.9	1700	19000	72	9.3	3300	4.8	1700	19500	67	
	VFR 185 _180	180	38	15.6	2600	6.1	1700	19000	70	7.8	3000	3.8	1700	19500	65	
	VFR 185 _240	240	32	11.7	2400	4.5	1700	19000	65	5.8	2800	2.9	1700	19500	59	
	VFR 185 _300	300	29	9.3	2000	3.2	1700	19000	61	4.7	2300	2.0	1700	19500	55	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
VFR 185	VFR 185 _90	90	53	10.0	3200	4.6	1700	19500	73	5.6	3500	2.9	1700	19500	71	167
	VFR 185 _120	120	43	7.5	3800	4.5	1700	19500	66	4.2	4200	2.9	1700	19500	63	
	VFR 185 _150	150	40	6.0	3400	3.4	1700	19500	63	3.3	3700	2.2	1700	19500	60	
	VFR 185 _180	180	38	5.0	3300	2.9	1700	19500	60	2.8	3600	1.8	1700	19500	57	
	VFR 185 _240	240	32	3.8	2800	2.0	1700	19500	54	2.1	2900	1.2	1700	19500	53	
	VFR 185 _300	300	29	3.0	2400	1.5	1700	19500	50	1.7	2500	0.91	1700	19500	48	

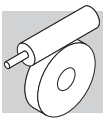
(–) Contact our technical service department advising radial load data (rotation direction, load angle, offset)



W/VF 86/185

4400 Nm

		i	η_s %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 1400 min^{-1}						n_1 = 900 min^{-1}						
W/VF 86/185	**W/VF 86/185_280**	280	31	5.0	4200	4.2	850	19500	52	3.2	4400	3.0	850	19500	49	168
	W/VF 86/185_400	400	29	3.5	4200	3.2	850	19500	48	2.3	4400	2.3	850	19500	45	
	W/VF 86/185_600	600	26	2.3	4200	2.3	850	19500	45	1.5	4400	1.6	850	19500	43	
	W/VF 86/185_800	800	26	1.8	4200	1.8	850	19500	43	1.1	4400	1.3	850	19500	40	
	W/VF 86/185_920	920	26	1.5	4200	1.6	850	19500	42	1.0	4400	1.2	850	19500	38	
	W/VF 86/185_1200	1200	20	1.2	4200	1.5	850	19500	34	0.75	4400	0.99	850	19500	35	
	W/VF 86/185_1600	1600	20	0.88	4200	1.1	850	19500	35	0.56	4400	0.79	850	19500	33	
	W/VF 86/185_1840	1840	19	0.76	4200	0.98	850	19500	34	0.49	4400	0.70	850	19500	32	
	W/VF 86/185_2560	2560	16	0.55	4200	0.83	850	19500	29	0.35	4400	0.60	850	19500	27	
	W/VF 86/185_3200	3200	15	0.44	4200	0.80	850	19500	24	0.28	4400	0.59	850	19500	22	



VF 210 - VFR 210

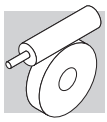
5000 Nm

		i	ηs %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
VF 210	VF 210_7	7	71	400	1725	79	5300	14000	91	200	2300	54	5300	16700	90	166
	VF 210_10	10	69	280	1988	65	5300	16300	90	140	2650	44	5300	19500	89	
	VF 210_15	15	63	187	2138	47	5300	19700	89	93	2850	32	5300	23700	88	
	VF 210_20	20	57	140	2325	39	4970	22000	87	70	3100	27	1100	26600	85	
	VF 210_30	30	51	93	2288	26	5300	25900	85	47	3050	18.5	1760	31500	83	
	VF 210_40	40	42	70	2625	23	—	28300	81	35	3500	17.0	—	31500	78	
	VF 210_50	50	39	56	2475	18.4	—	31000	79	28.0	3300	13.0	—	31500	76	
	VF 210_60	60	36	47	2363	15.0	—	31500	77	23.3	3015	10.0	—	31500	73	
	VF 210_80	80	31	35	2175	10.9	—	31500	73	17.5	2900	7.7	—	31500	69	
	VF 210_100	100	27	28	2025	8.5	950	31500	70	14.0	2700	6.0	—	31500	65	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	VF 210_7	7	71	129	2700	41	5300	18800	89	71	3400	29	5300	21800	88	166
	VF 210_10	10	69	90	3150	34	5300	21900	88	50	3800	23	5300	26000	87	
	VF 210_15	15	63	60	3300	24	5300	27000	86	33	4100	17.2	5300	31800	84	
	VF 210_20	20	57	45	3800	22	—	29900	83	25.0	4700	15.4	—	34500	81	
	VF 210_30	30	51	30.0	3400	13.4	3750	33000	80	16.7	4000	9.3	5300	34500	77	
	VF 210_40	40	42	22.5	4300	13.5	—	33000	75	12.5	5000	9.4	—	34500	71	
	VF 210_50	50	39	18.0	4000	10.5	—	33000	72	10.0	4500	7.1	—	34500	68	
	VF 210_60	60	36	15.0	3720	8.5	—	33000	70	8.3	4300	6.0	—	34500	65	
	VF 210_80	80	31	11.3	3300	6.0	—	33000	65	6.3	3900	4.4	—	34500	60	
	VF 210_100	100	27	9.0	3000	4.6	—	33000	61	5.0	3400	3.4	1470	34500	56	

6300 Nm

		i	ηs %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
VFR 210	VFR 210 _30	30	68	93	3150	36	1800	22100	87	47	3800	21.8	2200	27400	86	167
	VFR 210 _45	45	62	62	3300	25	1800	27000	85	31	4100	16.2	2200	33200	83	
	VFR 210 _60	60	56	47	3800	22	1800	29900	82	23.0	4700	14.5	2200	34500	80	
	VFR 210 _90	90	50	31	3400	14.1	1800	33000	79	15.6	4000	8.6	2200	34500	76	
	VFR 210 _120	120	41	23.3	4300	14.3	1800	33000	74	11.7	5000	8.8	2200	34500	70	
	VFR 210 _150	150	38	18.7	4000	11.1	1800	33000	71	9.3	4500	6.6	2200	34500	67	
	VFR 210 _180	180	35	15.6	3720	8.8	1800	33000	69	7.8	4300	5.5	2200	34500	64	
	VFR 210 _240	240	30	11.7	3300	6.3	1800	33000	64	5.8	3900	4.1	2200	34500	59	
	VFR 210 _300	300	26	9.3	3000	4.9	1800	33000	60	4.7	3400	3.0	2200	34500	55	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
	VFR 210 _30	30	68	30.0	4800	18.1	2300	30100	84	16.7	5500	11.8	2650	34500	82	167
	VFR 210 _45	45	62	20.0	4900	12.9	2300	34500	80	11.1	5600	8.4	2650	34500	78	
	VFR 210 _60	60	56	15.0	5400	11.1	2300	34500	77	8.3	6000	7.1	2650	34500	74	
	VFR 210 _90	90	50	10.0	4600	6.7	2300	34500	72	5.6	5150	4.3	2650	34500	70	
	VFR 210 _120	120	41	7.5	5900	7.1	2300	34500	66	4.2	6300	4.4	2650	34500	63	
	VFR 210 _150	150	38	6.0	5300	5.4	2300	34500	62	3.3	5900	3.5	2650	34500	59	
	VFR 210 _180	180	35	5.0	4900	4.4	2300	34500	59	2.8	5400	2.8	2650	34500	56	
	VFR 210 _240	240	30	3.8	4400	3.2	2300	34500	54	2.1	4800	2.1	2650	34500	50	
	VFR 210 _300	300	26	3.0	3600	2.3	2300	34500	49	1.7	4000	1.5	2650	34500	46	

(–) Contact our technical service department advising radial load data (rotation direction, load angle, offset)

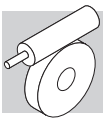


VF/VF 130/210

6500 Nm

		i	η_S	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	
				min^{-1}	Nm	kW	N	N	%	min^{-1}	Nm	kW	N	N	%	
				$n_1 = 1400\ min^{-1}$						$n_1 = 900\ min^{-1}$						
VF/VF 130/210	**VF/VF 130/210_280**	280	30	5.0	6300	6.3	1500	34500	52	3.2	6500	4.4	1500	34500	50	168
	VF/VF 130/210_400	400	28	3.5	6300	4.6	1500	34500	50	2.3	6500	3.2	1500	34500	48	
	VF/VF 130/210_600	600	26	2.3	6300	3.6	1500	34500	43	1.5	6500	2.4	1500	34500	43	
	VF/VF 130/210_800	800	25	1.8	6300	2.8	1500	34500	41	1.1	6500	2.0	1500	34500	38	
	VF/VF 130/210_920	920	24	1.5	6300	2.7	1500	34500	37	1.0	6500	1.9	1500	34500	35	
	VF/VF 130/210_1200	1200	21	1.2	6300	2.2	—	34500	35	0.75	6500	1.5	—	34500	34	
	VF/VF 130/210_1600	1600	18	0.88	6300	1.8	—	34500	32	0.56	6500	1.2	—	34500	32	
	VF/VF 130/210_1840	1840	19	0.76	6300	1.7	—	34500	30	0.49	6500	1.2	490	34500	28	
	VF/VF 130/210_2560	2560	16	0.55	6300	1.5	1220	34500	24	0.35	6500	1.0	1500	34500	24	
	VF/VF 130/210_3200	3200	15	0.44	6300	1.3	1500	34500	22	0.28	6500	0.96	1500	34500	20	

(–) Contact our technical service department advising radial load data (rotation direction, load angle, offset)



VF 250 - VFR 250

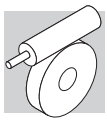
7100 Nm

		i	ηs %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
VF 250	VF 250_7	7	71	400	2400	109	7000	18300	92	200	3200	75	7000	21900	91	166
	VF 250_10	10	69	280	2775	89	7000	21100	91	140	3700	61	7000	25300	90	
	VF 250_15	15	64	187	3000	65	7000	25100	90	93	4000	45	7000	30300	88	
	VF 250_20	20	59	140	3338	56	7000	28000	88	70	4450	38	7000	33900	86	
	VF 250_30	30	53	93	3000	34	7000	33400	86	47	4000	23	7000	40600	84	
	VF 250_40	40	41	70	3600	32	4680	36200	82	35	4800	22	—	44000	79	
	VF 250_50	50	36	56	3375	25	6370	39500	79	28.0	4500	17.0	—	47000	76	
	VF 250_60	60	38	47	3375	20.6	7000	42100	80	23.3	4500	15.0	—	47000	76	
	VF 250_80	80	32	35	2925	14.1	7000	47000	76	17.5	3900	10.0	—	47000	71	
	VF 250_100	100	29	28	2738	11.0	7000	47000	73	14.0	3650	7.8	3010	47000	68	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
VF 250	VF 250_7	7	71	129	4150	63	7000	23700	90	71	5200	44	7000	27600	88	166
	VF 250_10	10	69	90	4800	51	7000	27600	89	50	6000	36	7000	32300	87	
	VF 250_15	15	64	60	5300	39	7000	33200	87	33	6400	27	7000	39500	85	
	VF 250_20	20	59	45	5950	33	1640	37200	85	25.0	7100	24	1910	44400	82	
	VF 250_30	30	53	30.0	5500	21	7000	44900	81	16.7	6000	14.7	7000	52000	79	
	VF 250_40	40	41	22.5	6500	20.0	—	48800	76	12.5	7000	13.6	—	52000	72	
	VF 250_50	50	36	18.0	6200	16.2	—	50000	73	10.0	6500	11.1	—	52000	68	
	VF 250_60	60	38	15.0	5600	12.2	—	50000	72	8.3	6300	8.6	4350	52000	68	
	VF 250_80	80	32	11.3	5200	9.3	—	50000	67	6.3	5400	6.8	7000	52000	62	
	VF 250_100	100	29	9.0	4800	7.2	3010	50000	63	5.0	5000	5.3	4160	52000	58	

9000 Nm

		i	ηs %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	n_2 min^{-1}	M_{n2} Nm	P_{n1} kW	R_{n1} N	R_{n2} N	η_d %	
				n_1 = 2800 min^{-1}						n_1 = 1400 min^{-1}						
VFR 250	VFR 250 _30	30	68	93	4800	54	2800	27800	89	47	6000	34	3500	34000	86	167
	VFR 250 _45	45	63	62	5300	41	2800	33300	87	31	6400	25	3500	41300	84	
	VFR 250 _60	60	58	47	5950	35	2800	37200	85	23.0	7100	21	3500	46100	81	
	VFR 250 _90	90	52	31	5500	22	2800	44700	81	15.6	6000	12.6	3500	52000	78	
	VFR 250 _120	120	40	23.3	6500	21.3	2800	48500	76	11.7	7000	12.1	3500	52000	71	
	VFR 250 _150	150	35	18.7	6200	16.9	2800	50000	73	9.3	6500	9.5	3500	52000	67	
	VFR 250 _180	180	37	15.6	5600	12.9	2800	50000	72	7.8	6300	7.7	3500	52000	67	
	VFR 250 _240	240	31	11.7	5200	9.7	2800	50000	67	5.8	5400	5.4	3500	52000	61	
	VFR 250 _300	300	28	9.3	4800	7.6	2800	50000	63	4.7	5000	4.3	3500	52000	57	
				n_1 = 900 min^{-1}						n_1 = 500 min^{-1}						
VFR 250	VFR 250 _30	30	68	30.0	6500	24	3700	39600	84	16.7	7600	16.1	4200	47600	83	167
	VFR 250 _45	45	63	20.0	6800	17.5	3700	48000	82	11.1	7900	11.6	3500	52000	80	
	VFR 250 _60	60	58	15.0	7600	15.2	3700	52000	79	8.3	8600	9.9	3500	52000	76	
	VFR 250 _90	90	52	10.0	6500	9.3	3700	52000	74	5.6	7400	6.1	3500	52000	71	
	VFR 250 _120	120	40	7.5	7500	8.8	3700	52000	67	4.2	9000	6.2	3500	52000	64	
	VFR 250 _150	150	35	6.0	7000	7.0	3700	52000	63	3.3	8600	5.1	3500	52000	59	
	VFR 250 _180	180	37	5.0	6700	5.7	3700	52000	62	2.8	7600	3.8	3500	52000	59	
	VFR 250 _240	240	31	3.8	5800	4.1	3700	52000	56	2.1	6500	2.7	3500	52000	52	
	VFR 250 _300	300	28	3.0	5300	3.2	3700	52000	52	1.7	6000	2.2	3500	52000	48	

(–) Contact our technical service department advising radial load data (rotation direction, load angle, offset)



VF/VF 130/250

9200 Nm

		i	η_S	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	
				min^{-1}	Nm	kW	N	N	%	min^{-1}	Nm	kW	N	N	%	
				n_1 = 1400 min^{-1}						n_1 = 900 min^{-1}						
VF/VF 130/250	**VF/VF 130/250_280**	280	29	5.0	9000	8.9	1500	52000	53	3.2	9200	6.1	1500	52000	51	168
	VF/VF 130/250_400	400	27	3.5	9000	6.7	1500	52000	49	2.3	9200	4.6	1500	52000	47	
	VF/VF 130/250_600	600	26	2.3	9000	5.0	1500	52000	44	1.5	9200	3.4	1500	52000	43	
	VF/VF 130/250_800	800	24	1.8	9000	3.9	1500	52000	42	1.1	9200	2.7	1500	52000	40	
	VF/VF 130/250_920	920	23	1.5	9000	3.9	1500	52000	37	0.98	9200	2.7	1500	52000	35	
	VF/VF 130/250_1200	1200	20	1.2	9000	3.1	—	52000	35	0.75	9200	2.2	—	52000	33	
	VF/VF 130/250_1600	1600	18	0.88	9000	2.6	—	52000	32	0.56	9200	1.8	—	52000	30	
	VF/VF 130/250_1840	1840	18	0.76	9000	2.3	—	52000	31	0.49	9200	1.6	490	52000	29	
	VF/VF 130/250_2560	2560	16	0.55	9000	2.1	1500	52000	25	0.35	9200	1.5	1500	52000	23	
	VF/VF 130/250_3200	3200	14	0.44	9000	2.0	1500	52000	21	0.28	9200	1.4	1500	52000	19	

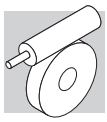
(–) Contact our technical service department advising radial load data (rotation direction, load angle, offset)

23 RATIO DISTRIBUTION FOR VF/VF, VF/W, W/VF SERIES GEARBOXES

	Ratios											i max
VF/VF 30/44	**245**	**350**	**420**	**560**	**700**	**840**	**1120**	**1680**	**2100**			**6000**
VF 30	7	10	15	20	20	30	40	60	60			60
VF 44	35	35	28	28	35	28	28	28	35			100
VF/VF 30/49	**240**	**315**	**420**	**540**	**720**	**900**	**1120**	**1440**	**2160**	**2700**		**6000**
VF 30	10	7	15	15	20	20	40	40	60	60		60
VF 49	24	45	28	36	36	45	28	36	36	45		100
VF/W 30/63	**240**	**315**	**450**	**570**	**720**	**900**	**1200**	**1520**	**2280**	**2700**		**7000**
VF 30	10	7	15	15	30	30	40	40	60	60		70
W 63	24	45	30	38	24	30	30	38	38	45		100
VF/W 44/75	**250**	**300**	**400**	**525**	**700**	**920**	**1200**	**1500**	**2100**	**2800**		**10000**
VF 44	10	10	10	35	35	46	60	60	70	70		100
W 75	25	30	40	15	20	20	20	25	30	40		100
VF/W 44/86	**230**	**300**	**400**	**525**	**700**	**920**	**1380**	**1840**	**2116**	**2760**		**10000**
VF 44	10	10	10	35	35	46	46	46	46	60		100
W 86	23	30	40	15	20	20	30	40	46	46		100
VF/W 49/110	**230**	**300**	**400**	**540**	**720**	**1080**	**1350**	**1656**	**2070**	**2800**		**10000**
VF 49	10	10	10	18	36	36	45	36	45	70		100
W 110	23	30	40	30	20	30	30	46	46	40		100
W/VF 63/130	**280**	**400**	**600**	**760**	**960**	**1200**	**1520**	**1800**	**2560**	**3200**		**10000**
W 63	7	10	15	19	24	30	38	45	64	80		100
VF 130	40	40	40	40	40	40	40	40	40	40		100
W/VF 86/150	**200**	**225**	**300**	**345**	**460**	**529**	**690**	**920**	**1380**	**1840**	**2944**	**10000**
W 86	10	15	15	15	20	23	23	23	46	46	64	100
VF 150	20	15	20	23	23	23	30	40	30	40	46	100
W/VF 86/185	**280**	**400**	**600**	**800**	**920**	**1200**	**1600**	**1840**	**2560**	**3200**		**10000**
W 86	7	10	15	20	23	30	40	46	64	80		100
VF 185	40	40	40	40	40	40	40	40	40	40		100
VF/VF 130/210	**280**	**400**	**600**	**800**	**920**	**1200**	**1600**	**1840**	**2560**	**3200**		**10000**
VF 130	7	10	15	20	23	30	40	46	64	80		100
VF 210	40	40	40	40	40	40	40	40	40	40		100
VF/VF 130/250	**280**	**400**	**600**	**800**	**920**	**1200**	**1600**	**1840**	**2560**	**3200**		**10000**
VF 130	7	10	15	20	23	30	40	46	64	80		100
VF 250	40	40	40	40	40	40	40	40	40	40		100

The ratio combinations that are listed in the chart are those recommended by the manufacturer.

If requested, the Bonfiglioli Technical Service will consider feasibility of combinations that are not listed, as long as these are lower in value than maximum ratio listed in the chart.



24 MOTOR AVAILABILITY

24.1 Motors to IEC standard

Motor-gearbox combinations resulting from charts are purely based on geometrical compatibility.
When selecting a gearmotor, refer to procedure specified at para: "Selection" and observe particularly the condition S ≥ f_s.

IEC		VF 27	VF 30	VF 44	VF 49	W 63	W 75	W 86	W 110	VF 130	VF 150	VF 185	VF 210	VF 250
P27	—	7...70	—	—	—	—	—	—	—	—	—	—	—	—
P56	B5	—	7...70	—	—	—	—	—	—	—	—	—	—	—
	B14													
P63	B5	—	7...60	7...100	7...100	—	—	—	—	—	—	—	—	—
	B14													
P71	B5	—	—	7...35	7...60	7...100	7...100	7...100	—	—	—	—	—	—
	B14						—	—						
P80	B5	—	—	—	7...28	7...100	7...100	7...100	7...100	—	—	—	—	—
	B14													
P90	B5	—	—	—	—	7...30	7...100	7...100	7...100	46...100	—	—	—	—
	B14									—				
P100	B5	—	—	—	—	—	7...100	7...100	7...100	7...80	23...100	50...100	—	—
	B14									—	—	—		
P112	B5	—	—	—	—	—	7...100	7...100	7...100	7...40	23...100	50...100	—	—
	B14									—	—	—		
P132	B5	—	—	—	—	—	—	—	7...100	7...40 #	7...46	30...80	7...100	7...100
P160	B5	—	—	—	—	—	—	—	—	—	7...20 #	15...40	7...100	7...100
P180	B5	—	—	—	—	—	—	—	—	—	—	7...20 #	7...100	7...100
P200	B5	—	—	—	—	—	—	—	—	—	—	—	7...100	7...100
P225	B5	—	—	—	—	—	—	—	—	—	—	—	7...100	7...100

IEC		VFR 44	VRF 49	WR 63	WR 75	WR 86	WR 110	VFR 130	VFR 150	VFR 185	VFR 210	VFR 250
S44	—	70...500	—	—	—	—	—	—	—	—	—	—
P63	B5	—	30...300	21...300	21...300	21...300	—	—	—	—	—	—
P71	B5	—	—	21...300	21...300	21...300	21...300	—	—	—	—	—
P80	B5	—	—	—	21...300	21...300	21...300	30...300	—	—	—	—
P90	B5	—	—	—	15...150	15...150	21...300	30...300	30...300	30...300	—	—
P100	B5	—	—	—	—	—	21...300	30...300 #	30...300	30...300	30...300	30...300
P112	B5	—	—	—	—	—	21...300	30...300 #	30...300	30...300	30...300	30...300
P132	B5	—	—	—	—	—	—	—	25...50 #	25...100 #	30...300	30...300

Gear ratio of the helical pre-stage i = 1.5

Motor-gearbox combinations marked with [#] feature a lowered key, supplied with the reducer.

IEC		VF/VF 30/44	VF/VF 30/49	VF/W 30/63	VF/W 44/75	VF/W 44/86	VF/W 49/110	W/VF 63/130	W/VF 86/150	W/VF 86/185	VF/VF 130/210	VF/VF 130/250
P56	B5	245...2100	240...2700	240...2700	—	—	—	—	—	—	—	—
	B14											
P63	B5	245...2100	240...2700	240...2700	250...2800	230...2760	230...2800	—	—	—	—	—
	B14											
P71	B5	—	—	—	250...700	230...700	230...2400	280...3200	200...2944	280...3200	—	—
	B14								—	—		
P80	B5	—	—	—	—	—	230...540	280...3200	200...2944	280...3200	—	—
	B14											
P90	B5	—	—	—	—	—	—	280...1200	200...2944	280...3200	280...3200	280...3200
	B14										—	—
P100	B5	—	—	—	—	—	—	—	200...2944	280...3200	280...3200	280...3200
	B14										—	—
P112	B5	—	—	—	—	—	—	—	200...2944	280...3200	280...3200	280...3200
	B14										—	—
P132	B5	—	—	—	—	—	—	—	—	—	280...1600 #	280...1600 #

Motor-gearbox combinations marked with [#] feature a lowered key, supplied with the reducer.

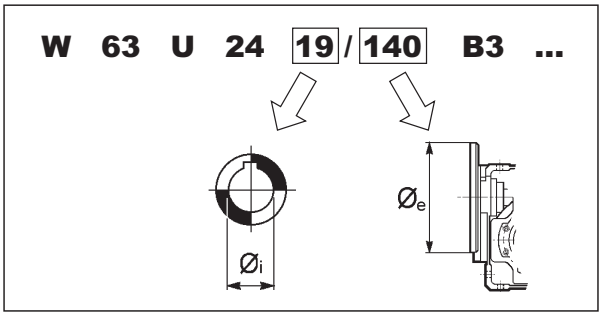
24.2 Compact motor

	M1	M2 - ME2	ME3
W 63	7 ... 100	7 ... 100	⛔
W 75	7 ... 100	7 ... 100	7 ... 100
W 86	7 ... 100	7 ... 100	7 ... 100
W 110	⛔	7 ... 100	7 ... 100

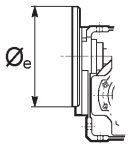
	M1	ME2	ME3
W/VF 63/130	280 ... 3200	280 ... 3200	⛔
W/VF 86/150	200 ... 2944	200 ... 2944	200 ... 2944
W/VF 86/185	280 ... 3200	280 ... 3200	280 ... 3200

24.3 Motors not to IEC standard

For coupling with non-normalized electric motors, the motor coupling end of VF and W speed reducers may be configured with hybrid (i.e., non IEC) input shaft and flange combinations.
Shaft and flange combinations are illustrated below. The table shows the diameters in millimetres for each selection.



The following table lists available configurations, as well as their limited ranges of gear ratios.

								
		80	**90**	**105**	**120**	**140**	**160**	**200**
VF 30	**9**		7 ≤ i ≤ 70	⛔		7 ≤ i ≤ 70	⛔	⛔
	11	7 ≤ i ≤ 60		⛔	7 ≤ i ≤ 60		⛔	⛔
VF 44	**HS**	⛔	7 ≤ i ≤ 100	7 ≤ i ≤ 100	⛔	7 ≤ i ≤ 100	7 ≤ i ≤ 100	⛔
	11	⛔		7 ≤ i ≤ 100	⛔		7 ≤ i ≤ 100	⛔
	14	⛔	7 ≤ i ≤ 35		⛔	7 ≤ i ≤ 35		⛔
VF 49	**HS**	⛔	7 ≤ i ≤ 100	7 ≤ i ≤ 100	7 ≤ i ≤ 100	7 ≤ i ≤ 100	7 ≤ i ≤ 100	7 ≤ i ≤ 100
	11	⛔		7 ≤ i ≤ 100	7 ≤ i ≤ 100		7 ≤ i ≤ 100	7 ≤ i ≤ 100
	14	⛔	7 ≤ i ≤ 60		7 ≤ i ≤ 60	7 ≤ i ≤ 60		7 ≤ i ≤ 60
	19	⛔	7 ≤ i ≤ 28	7 ≤ i ≤ 28		7 ≤ i ≤ 28	7 ≤ i ≤ 28	
W 63	**19**	⛔	⛔	⛔	⛔	7 ≤ i ≤ 100	⛔	
W 75	**14**	⛔	⛔	⛔	⛔	⛔		7 ≤ i ≤ 100
	19	⛔	⛔	⛔		7 ≤ i ≤ 100	7 ≤ i ≤ 100	
	24	⛔	⛔	⛔	7 ≤ i ≤ 100		7 ≤ i ≤ 100	
W 86	**14**	⛔	⛔	⛔	⛔	⛔		7 ≤ i ≤ 100
	19	⛔	⛔	⛔		7 ≤ i ≤ 100	7 ≤ i ≤ 100	
	24	⛔	⛔	⛔	7 ≤ i ≤ 100		7 ≤ i ≤ 100	
W 110	**19**	⛔	⛔	⛔		7 ≤ i ≤ 100	⛔	⛔
	24	⛔	⛔	⛔	7 ≤ i ≤ 100		⛔	⛔

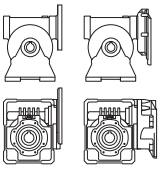
Standard arrangement

Some hybrid shaft/flange combinations are also possible for VF reduction units with center distance greater than 130 mm. Please contact Bonfiglioli Technical Service.
The table above report possible configurations strictly based on geometric criteria.
To determine the compatibility of a motor-gear unit assembly in terms of mechanical factors, double-check the selected configuration against the rating charts for power/speed.
Be sure to avoid those combinations that yield a safety factor S < 0.9.

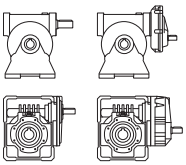
25 MOMENT OF INERTIA

The following charts indicate the mass moment of inertia J_r [Kgm²] referred to gear unit with high speed solid shaft. A key to the symbols used follows:

Values of the moment of inertia refer to compact gearmotors, less the motor inertia. To obtain the overall moment of inertia for the gearmotor just add the value of the inertia for the specific compact motor, given in the relevant rating chart.



Values refer to gearmotors, IEC style, less the motor.



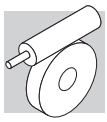
Values refer to speed reducers (solid input shaft).

VF 27

		i	J (•10⁻⁴) [kgm²]					
			P27					HS
VF 27	VF 27_7	7	0.02	—	—	—	—	0.02
	VF 27_10	10	0.01	—	—	—	—	0.01
	VF 27_15	15	0.01	—	—	—	—	0.01
	VF 27_20	20	0.01	—	—	—	—	0.01
	VF 27_30	30	0.01	—	—	—	—	0.01
	VF 27_40	40	0.01	—	—	—	—	0.01
	VF 27_60	60	0.01	—	—	—	—	0.01
	VF 27_70	70	0.01	—	—	—	—	0.01

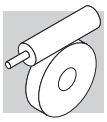
VF 30

		i	J (•10⁻⁴) [kgm²]					
			P56	P63				HS
VF 30	VF 30_7	7	0.08	0.07	—	—	—	0.04
	VF 30_10	10	0.07	0.06	—	—	—	0.03
	VF 30_15	15	0.07	0.06	—	—	—	0.03
	VF 30_20	20	0.06	0.06	—	—	—	0.03
	VF 30_30	30	0.06	0.06	—	—	—	0.03
	VF 30_40	40	0.06	0.06	—	—	—	0.03
	VF 30_60	60	0.06	0.05	—	—	—	0.02
	VF 30_70	70	0.06	—	—	—	—	0.02



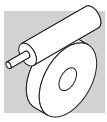
VF 44 - VFR 44

		i	J (•10^{-4}) [kgm^2]					
			S44	P63	P71			HS
VF 44	VF 44_7	7	—	0.29	0.27	—	—	0.18
	VF 44_10	10	—	0.24	0.22	—	—	0.14
	VF 44_14	14	—	0.23	0.21	—	—	0.12
	VF 44_20	20	—	0.19	0.18	—	—	0.09
	VF 44_28	28	—	0.21	0.19	—	—	0.11
	VF 44_35	35	—	0.19	0.18	—	—	0.09
	VF 44_46	46	—	0.18	—	—	—	0.08
	VF 44_60	60	—	0.17	—	—	—	0.07
	VF 44_70	70	—	0.17	—	—	—	0.07
	VF 44_100	100	—	0.17	—	—	—	0.07
VFR 44	VFR 44_70	70	0.21	—	—	—	—	—
	VFR 44_100	100	0.20	—	—	—	—	—
	VFR 44_140	140	0.20	—	—	—	—	—
	VFR 44_175	175	0.20	—	—	—	—	—
	VFR 44_230	230	0.20	—	—	—	—	—
	VFR 44_300	300	0.20	—	—	—	—	—
	VFR 44_350	350	0.20	—	—	—	—	—
	VFR 44_500	500	0.20	—	—	—	—	—



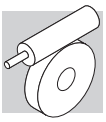
VF 49 - VFR 49

		i	J (•10-4) [kgm2]					
			P63	P71	P80			HS
VF 49	VF 49_7	7	0.69	0.67	0.61	—	—	0.42
	VF 49_10	10	0.61	0.60	0.53	—	—	0.34
	VF 49_14	14	0.58	0.57	0.5	—	—	0.31
	VF 49_18	18	0.54	0.53	0.46	—	—	0.27
	VF 49_24	24	0.52	0.5	0.44	—	—	0.24
	VF 49_28	28	0.56	0.54	0.48	—	—	0.28
	VF 49_36	36	0.53	0.51	—	—	—	0.25
	VF 49_45	45	0.51	0.49	—	—	—	0.24
	VF 49_60	60	0.50	0.48	—	—	—	0.23
	VF 49_70	70	0.50	—	—	—	—	0.22
	VF 49_80	80	0.49	—	—	—	—	0.22
	VF 49_100	100	0.49	—	—	—	—	0.22
VFR 49	VFR 49_30	30	0.74	—	—	—	—	0.94
	VFR 49_42	42	0.73	—	—	—	—	0.93
	VFR 49_54	54	0.73	—	—	—	—	0.93
	VFR 49_72	72	0.73	—	—	—	—	0.93
	VFR 49_84	84	0.73	—	—	—	—	0.93
	VFR 49_108	108	0.73	—	—	—	—	0.93
	VFR 49_135	135	0.73	—	—	—	—	0.93
	VFR 49_180	180	0.73	—	—	—	—	0.93
	VFR 49_210	210	0.72	—	—	—	—	0.92
	VFR 49_240	240	0.72	—	—	—	—	0.92
	VFR 49_300	300	0.72	—	—	—	—	0.92



W 63 - WR 63

		i	J (•10-4) [kgm2]									
			S1	S2	S3	P63	P71	P80	P90			HS
W 63	**W 63_7**	7	3.4	3.6	—	—	3.5	3.5	3.5	—	—	3.6
	W 63_10	10	3.1	3.3	—	—	3.2	3.3	3.2	—	—	3.3
	W 63_12	12	3.1	3.3	—	—	3.1	3.2	3.1	—	—	3.3
	W 63_15	15	3.0	3.2	—	—	3.0	3.1	3.0	—	—	3.2
	W 63_19	19	2.9	3.1	—	—	2.9	3.0	2.9	—	—	3.1
	W 63_24	24	2.8	3.1	—	—	2.9	3.0	2.9	—	—	3.0
	W 63_30	30	2.9	3.1	—	—	2.9	3.0	2.9	—	—	3.1
	W 63_38	38	2.8	3.1	—	—	2.9	3.0	2.9	—	—	3.0
	W 63_45	45	2.8	3.0	—	—	2.9	2.9	2.9	—	—	3.0
	W 63_64	64	2.8	3.0	—	—	2.8	2.9	2.8	—	—	3.0
	W 63_80	80	2.8	3.0	—	—	2.8	2.9	2.8	—	—	3.0
	W 63_100	100	2.8	3.0	—	—	2.8	2.9	2.8	—	—	2.9
WR 63	**WR 63_21**	21	—	—	—	0.84	0.83	—	—	—	—	0.81
	WR 63_30	30	—	—	—	0.81	0.80	—	—	—	—	0.78
	WR 63_36	36	—	—	—	0.81	0.80	—	—	—	—	0.77
	WR 63_45	45	—	—	—	0.80	0.79	—	—	—	—	0.76
	WR 63_57	57	—	—	—	0.79	0.78	—	—	—	—	0.75
	WR 63_72	72	—	—	—	0.78	0.77	—	—	—	—	0.74
	WR 63_90	90	—	—	—	0.79	0.78	—	—	—	—	0.75
	WR 63_114	114	—	—	—	0.78	0.77	—	—	—	—	0.74
	WR 63_135	135	—	—	—	0.78	0.77	—	—	—	—	0.74
	WR 63_192	192	—	—	—	0.77	0.76	—	—	—	—	0.74
	WR 63_240	240	—	—	—	0.77	0.76	—	—	—	—	0.74
	WR 63_300	300	—	—	—	0.77	0.76	—	—	—	—	0.73



W 75 - WR 75

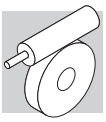
		i	J (•10-4) [kgm2]									
			S1	S2	S3	P63	P71	P80	P90	P100	P112	HS
W 75	W 75_7	7	6.9	6.6	6.6	—	6.9	7.0	6.9	6.9	6.9	7.3
	W 75_10	10	6.4	6.1	6.1	—	6.4	6.4	6.3	5.7	5.7	6.8
	W 75_15	15	6.1	5.8	5.8	—	6.1	6.1	6.0	5.3	5.3	6.5
	W 75_20	20	5.9	5.6	5.6	—	5.9	5.9	5.9	5.2	5.2	6.3
	W 75_25	25	5.9	5.6	5.6	—	6.0	6.0	5.9	5.2	5.2	6.3
	W 75_30	30	5.9	5.6	5.6	—	5.9	5.9	5.9	5.2	5.2	6.3
	W 75_40	40	5.9	5.6	5.6	—	5.9	5.9	5.8	5.2	5.2	6.3
	W 75_50	50	5.9	5.6	5.6	—	5.9	5.9	5.8	5.1	5.1	6.2
	W 75_60	60	5.8	5.5	5.5	—	5.8	5.9	5.8	5.1	5.1	6.2
	W 75_80	80	5.8	5.5	5.5	—	5.8	5.8	5.8	5.1	5.1	6.2
	W 75_100	100	5.8	5.5	5.5	—	5.8	5.8	5.7	5.0	5.0	6.2
WR 75	WR 75_21	21	—	—	—	1.2	1.2	2.1	—	—	—	1.9
	WR 75_30	30	—	—	—	1.1	1.1	2.1	—	—	—	1.1
	WR 75_45	45	—	—	—	1.1	1.1	2.0	—	—	—	1.1
	WR 75_60	60	—	—	—	1.1	1.1	2.0	—	—	—	1.0
	WR 75_75	75	—	—	—	1.1	1.1	2.0	—	—	—	1.0
	WR 75_90	90	—	—	—	1.1	1.1	2.0	—	—	—	1.0
	WR 75_120	120	—	—	—	1.1	1.1	2.0	—	—	—	1.0
	WR 75_150	150	—	—	—	1.1	1.1	2.0	—	—	—	1.0
	WR 75_180	180	—	—	—	1.1	1.1	2.0	—	—	—	1.0
	WR 75_240	240	—	—	—	1.1	1.1	2.0	—	—	—	1.0
	WR 75_300	300	—	—	—	1.1	1.1	2.0	—	—	—	1.0

		i	J (•10-4) [kgm2]
			P90
WR 75_P90 B5	WR 75_15	15	6.0
	WR 75_22.5	22.5	5.9
	WR 75_30	30	5.8
	WR 75_37.5	37.5	5.8
	WR 75_45	45	5.8
	WR 75_60	60	5.8
	WR 75_75	75	5.8

W 86 - WR 86

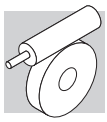
		i	J (•10-4) [kgm2]									
			S1	S2	S3	P63	P71	P80	P90	P100		HS
W 86	W 86_7	7	9.7	9.4	9.4	—	9.7	9.7	9.6	9.6	—	10.1
	W 86_10	10	8.4	8.1	8.1	—	8.4	8.4	8.3	7.7	—	8.9
	W 86_15	15	7.7	7.4	7.4	—	7.7	7.7	7.7	7.0	—	8.2
	W 86_20	20	6.9	6.6	6.6	—	6.9	7.0	6.9	6.2	—	7.4
	W 86_23	23	6.8	6.5	6.5	—	6.8	6.9	6.8	6.1	—	7.3
	W 86_30	30	7.3	7.0	7.0	—	7.3	7.3	7.3	6.6	—	7.8
	W 86_40	40	6.7	6.4	6.4	—	6.7	6.7	6.6	6.0	—	7.2
	W 86_46	46	6.7	6.4	6.4	—	6.7	6.7	6.6	5.9	—	7.1
	W 86_56	56	6.6	6.3	6.3	—	6.6	6.7	6.6	5.9	—	7.1
	W 86_64	64	6.6	6.3	6.3	—	6.6	6.6	6.5	5.9	—	7.1
	W 86_80	80	6.6	6.3	6.3	—	6.6	6.6	6.5	5.9	—	7.1
	W 86_100	100	6.4	6.1	6.1	—	6.4	6.5	6.4	5.7	—	6.9
WR 86	WR 86_21	21	—	—	—	1.5	1.5	2.4	—	—	—	2.2
	WR 86_30	30	—	—	—	1.4	1.3	2.3	—	—	—	1.3
	WR 86_45	45	—	—	—	1.3	1.3	2.2	—	—	—	1.2
	WR 86_60	60	—	—	—	1.2	1.2	2.1	—	—	—	1.2
	WR 86_69	69	—	—	—	1.2	1.2	2.1	—	—	—	1.1
	WR 86_90	90	—	—	—	1.2	1.2	2.2	—	—	—	1.2
	WR 86_120	120	—	—	—	1.2	1.2	2.1	—	—	—	1.1
	WR 86_138	138	—	—	—	1.2	1.2	2.1	—	—	—	1.1
	WR 86_168	168	—	—	—	1.2	1.2	2.1	—	—	—	1.1
	WR 86_192	192	—	—	—	1.2	1.1	2.1	—	—	—	1.1
	WR 86_240	240	—	—	—	1.2	1.1	2.1	—	—	—	1.1
	WR 86_300	300	—	—	—	1.1	1.1	2.1	—	—	—	1.1

		i	J (•10-4) [kgm2]
			P90
WR 86_P90 B5	WR 86_15	15	6.9
	WR 86_22.5	22.5	6.6
	WR 86_30	30	6.3
	WR 86_34.5	34.5	6.2
	WR 86_45	45	6.4
	WR 86_60	60	6.2
	WR 86_69	69	6.1
	WR 86_84	84	6.1



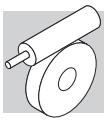
W 110 - WR 110

		i	J (•10-4) [kgm2]									
			S1	S2	S3	P63	P71	P80	P90	P100	P132	HS
W 110	**W 110_7**	7	—	22	22	—	—	23	23	23	28	23
	W 110_10	10	—	19	19	—	—	19	19	24	24	20
	W 110_15	15	—	17	17	—	—	17	17	22	22	17
	W 110_20	20	—	14	14	—	—	14	14	19	19	15
	W 110_23	23	—	14	14	—	—	14	14	19	19	15
	W 110_30	30	—	15	15	—	—	16	16	20	20	16
	W 110_40	40	—	13	13	—	—	14	14	19	19	14
	W 110_46	46	—	13	13	—	—	13	13	18	18	14
	W 110_56	56	—	13	13	—	—	13	13	18	18	14
	W 110_64	64	—	13	13	—	—	13	13	18	18	14
	W 110_80	80	—	13	13	—	—	13	13	18	18	14
	W 110_100	100	—	13	13	—	—	13	13	18	18	14
WR 110	**WR 110_21**	21	—	—	—	—	3.0	9.0	8.8	8.9	—	9.2
	WR 110_30	30	—	—	—	—	2.5	8.6	8.4	8.4	—	8.8
	WR 110_45	45	—	—	—	—	2.3	8.3	8.2	8.2	—	8.5
	WR 110_60	60	—	—	—	—	2.0	8.1	7.9	7.9	—	8.3
	WR 110_69	69	—	—	—	—	2.0	8.0	7.9	7.9	—	8.2
	WR 110_90	90	—	—	—	—	2.2	8.2	8.1	8.1	—	8.4
	WR 110_120	120	—	—	—	—	1.9	8.0	7.8	7.9	—	8.2
	WR 110_138	138	—	—	—	—	1.9	8.0	7.8	7.8	—	8.2
	WR 110_168	168	—	—	—	—	1.9	8.0	7.8	7.8	—	8.1
	WR 110_192	192	—	—	—	—	1.9	7.9	7.8	7.8	—	8.1
	WR 110_240	240	—	—	—	—	1.9	7.9	7.8	7.8	—	8.1
	WR 110_300	300	—	—	—	—	1.9	7.9	7.8	7.8	—	8.1



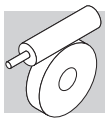
VF 130 - VFR 130

		i	J (•10-4) [kgm2]					
			P80	P90	P100	P112	P132	HS
VF 130	VF 130_7	7	—	—	36	36	35	31
	VF 130_10	10	—	—	27	27	25	22
	VF 130_15	15	—	—	20	20	18	15
	VF 130_20	20	—	—	17	17	15	11
	VF 130_23	23	—	—	16	16	14	11
	VF 130_30	30	—	—	17	17	15	12
	VF 130_40	40	—	—	15	15	14	9.9
	VF 130_46	46	—	14	14	—	—	8.2
	VF 130_56	56	—	13	13	—	—	7.8
	VF 130_64	64	—	13	13	—	—	7.4
	VF 130_80	80	—	13	12	—	—	7.0
	VF 130_100	100	—	13	—	—	—	8.9
VFR 130	VFR 130_30	30	5.3	5.3	5.2	5.2	—	5.7
	VFR 130_45	45	4.5	4.5	4.4	4.4	—	4.9
	VFR 130_60	60	4.2	4.1	4.1	4.1	—	4.6
	VFR 130_69	69	4.1	4.0	4.0	4.0	—	4.5
	VFR 130_90	90	4.2	4.1	4.1	4.1	—	4.6
	VFR 130_120	120	4.0	3.9	4.0	4.0	—	4.4
	VFR 130_138	138	3.8	3.8	3.7	3.7	—	4.2
	VFR 130_168	168	3.8	3.7	3.7	3.7	—	4.1
	VFR 130_192	192	3.7	3.7	3.6	3.6	—	4.1
	VFR 130_240	240	3.7	3.6	3.6	3.6	—	4.1
	VFR 130_300	300	3.9	3.8	3.8	3.8	—	4.3



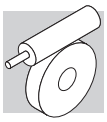
VF 150 - VFR 150

		i	J (•10-4) [kgm2]					
			P80	P90	P100	P112	P132	HS
VF 150	VF 150_7	7	—	—	—	—	58	50
	VF 150_10	10	—	—	—	—	44	35
	VF 150_15	15	—	—	—	—	29	21
	VF 150_20	20	—	—	—	—	27	19
	VF 150_23	23	—	—	28	28	26	17
	VF 150_30	30	—	—	31	31	29	21
	VF 150_40	40	—	—	26	26	24	16
	VF 150_46	46	—	—	24	24	22	13
	VF 150_56	56	—	25	24	24	—	13
	VF 150_64	64	—	24	23	23	—	12
	VF 150_80	80	—	23	22	22	—	11
	VF 150_100	100	—	23	22	22	—	11
VFR 150	VFR 150_25	25	—	—	—	15	—	—
	VFR 150_30	30	10	10	10	—	—	11
	VFR 150_37.5	37.5	—	—	—	13	—	—
	VFR 150_45	45	8.8	8.8	8.8	—	—	9.7
	VFR 150_50	50	—	—	—	12	—	—
	VFR 150_60	60	8.4	8.3	8.3	—	—	9.2
	VFR 150_69	69	8.4	8.4	8.4	—	—	9.3
	VFR 150_90	90	8.3	8.7	8.7	—	—	9.7
	VFR 150_120	120	8.3	8.2	8.2	—	—	9.2
	VFR 150_138	138	8.0	7.9	7.9	—	—	8.9
	VFR 150_168	168	7.9	7.9	7.9	—	—	8.9
	VFR 150_192	192	7.9	7.8	7.8	—	—	8.8
	VFR 150_240	240	7.7	7.7	7.7	—	—	8.6
	VFR 150_300	300	7.7	7.7	7.7	—	—	8.6



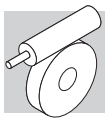
VF 185 - VFR 185

		i	J (•10-4) [kgm2]						
			P90	P100	P112	P132	P160	P180	HS
VF 185	VF 185_7	7	—	—	—	—	—	146	128
	VF 185_10	10	—	—	—	—	—	108	91
	VF 185_15	15	—	—	—	—	70	88	50
	VF 185_20	20	—	—	—	—	69	66	48
	VF 185_30	30	—	—	—	58	54	—	34
	VF 185_40	40	—	—	—	63	61	—	41
	VF 185_50	50	—	59	59	58	—	—	35
	VF 185_60	60	—	55	55	53	—	—	31
	VF 185_80	80	—	52	52	51	—	—	28
	VF 185_100	100	—	51	51	—	—	—	27
VFR 185	VFR 185_25	25	—	—	—	24	—	—	—
	VFR 185_37.5	37.5	—	—	—	17	—	—	—
	VFR 185_50	50	—	—	—	17	—	—	—
	VFR 185_75	75	—	—	—	15	—	—	—
	VFR 185_100	100	—	—	—	16	—	—	—
	VFR 185_30	30	17	17	17	—	—	—	18
	VFR 185_45	45	12	12	12	—	—	—	13
	VFR 185_60	60	12	12	12	—	—	—	13
	VFR 185_90	90	10	10	10	—	—	—	11
	VFR 185_120	120	11	11	11	—	—	—	12
	VFR 185_150	150	10	10	10	—	—	—	11
	VFR 185_180	180	9.9	9.9	9.9	—	—	—	11
	VFR 185_240	240	9.6	9.6	9.6	—	—	—	11
	VFR 185_300	300	9.5	9.4	9.4	—	—	—	10



VF 210 - VFR 210

		i	J (•10-4) [kgm2]							
			P100	P112	P132	P160	P180	P200	P225	HS
VF 210	VF 210_7	7	—	—	286	286	286	286	286	286
	VF 210_10	10	—	—	177	177	177	177	177	177
	VF 210_15	15	—	—	120	120	120	120	120	120
	VF 210_20	20	—	—	116	116	116	116	116	116
	VF 210_30	30	—	—	81	81	81	81	81	81
	VF 210_40	40	—	—	98	98	98	98	98	98
	VF 210_50	50	—	—	84	84	84	84	84	84
	VF 210_60	60	—	—	75	75	75	75	75	75
	VF 210_80	80	—	—	68	68	68	68	68	68
	VF 210_100	100	—	—	63	63	63	63	63	63
VFR 210	VFR 210_30	30	48	48	47	47	—	—	—	51
	VFR 210_45	45	41	41	41	41	—	—	—	45
	VFR 210_60	60	41	41	41	40	—	—	—	45
	VFR 210_90	90	37	37	37	36	—	—	—	41
	VFR 210_120	120	39	39	39	38	—	—	—	43
	VFR 210_150	150	37	37	37	37	—	—	—	41
	VFR 210_180	180	36	36	36	36	—	—	—	40
	VFR 210_240	240	36	36	36	35	—	—	—	39
	VFR 210_300	300	35	35	35	34	—	—	—	39

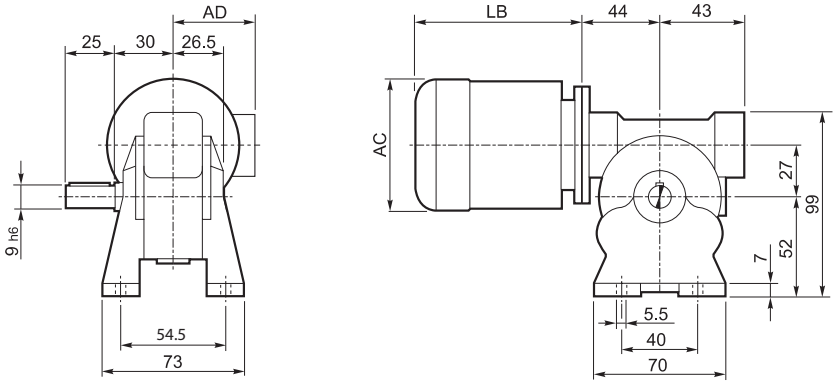


VF 250 - VFR 250

		i	J (•10-4) [kgm2]							
			P100	P112	P132	P160	P180	P200	P225	HS
VF 250	VF 250_7	7	—	—	620	620	620	620	620	620
	VF 250_10	10	—	—	387	387	387	387	387	387
	VF 250_15	15	—	—	266	266	266	266	266	266
	VF 250_20	20	—	—	242	242	242	242	242	242
	VF 250_30	30	—	—	184	184	184	184	184	184
	VF 250_40	40	—	—	241	241	241	241	241	241
	VF 250_50	50	—	—	240	240	240	240	240	240
	VF 250_60	60	—	—	158	158	158	158	158	158
	VF 250_80	80	—	—	160	160	160	160	160	160
	VF 250_100	100	—	—	149	149	149	149	149	149
VFR 250	VFR 250_30	30	71	71	71	70	—	—	—	75
	VFR 250_45	45	58	58	57	57	—	—	—	61
	VFR 250_60	60	55	55	55	54	—	—	—	58
	VFR 250_90	90	48	48	48	48	—	—	—	52
	VFR 250_120	120	55	55	54	54	—	—	—	58
	VFR 250_150	150	55	55	54	54	—	—	—	58
	VFR 250_180	180	46	46	45	45	—	—	—	49
	VFR 250_240	240	46	46	45	45	—	—	—	49
	VFR 250_300	300	45	45	44	44	—	—	—	48

VF 27...BN27

A



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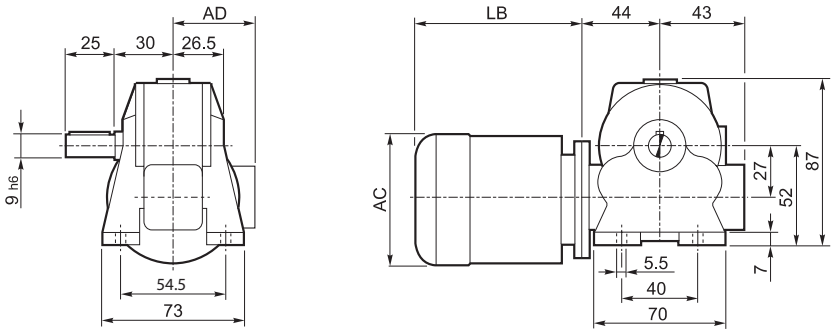

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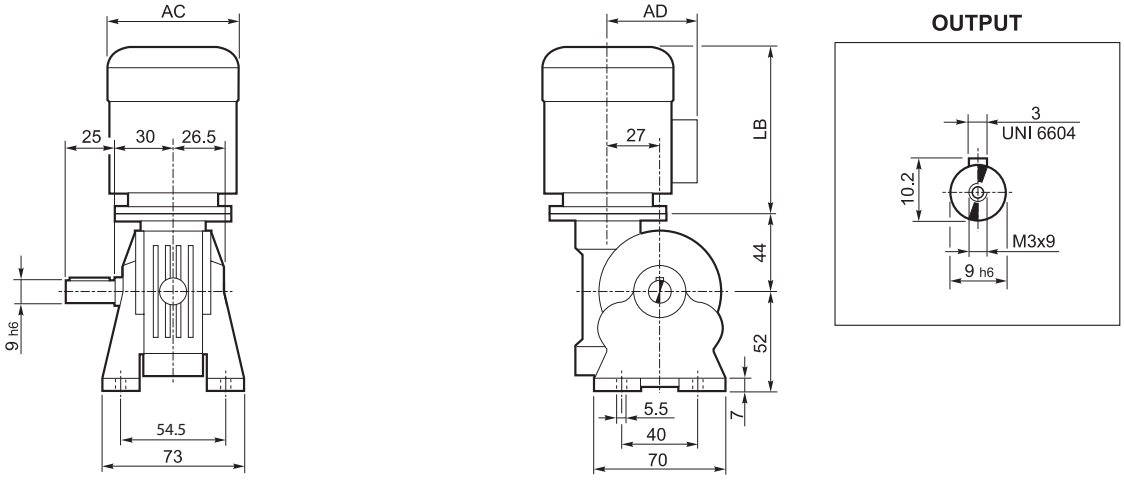

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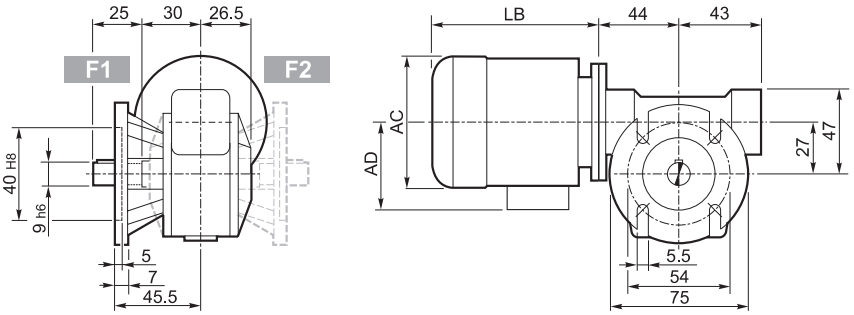
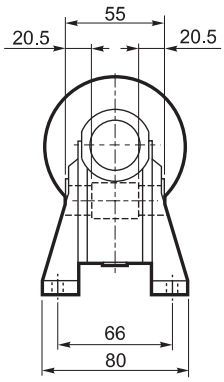
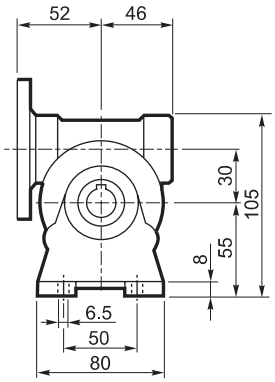


	P_n kW	n min^{-1}	M_n Nm	η %	COSφ	In A (400V)	Is / In	Ms / Mn	Ma / Mn	Jm (·10-4) kgm^2	Kg	LB	AC	AD
BN 27A4	0.04	1350	0.28	36	0.57	0.28	2.3	2.0	1.8	0.56	2.8	132	103	76
BN 27B4	0.06	1360	0.42	39	0.57	0.39	2.5	2.2	1.9	0.76	3.1	149	103	76
BN 27C4	0.09	1380	0.63	46	0.65	0.43	2.8	2.3	1.9	1.49	3.3	175	112	94

VF 30...P (IEC)

A





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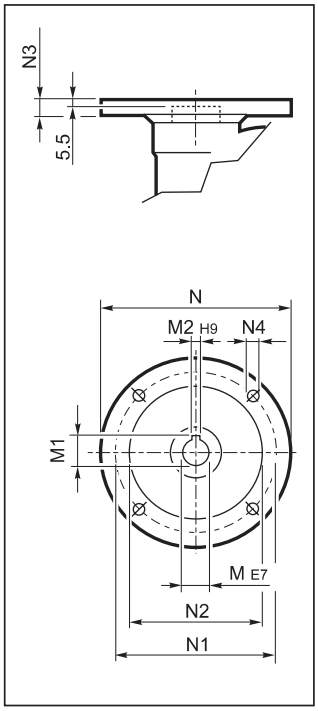

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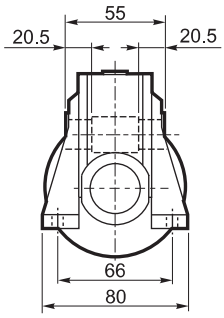

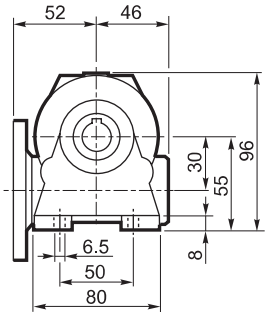

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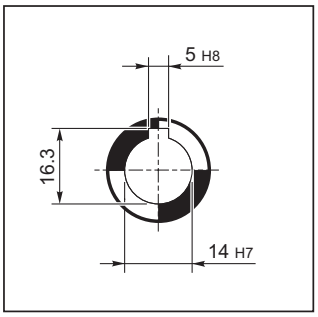

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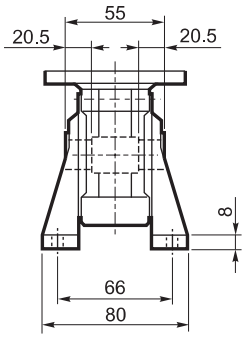

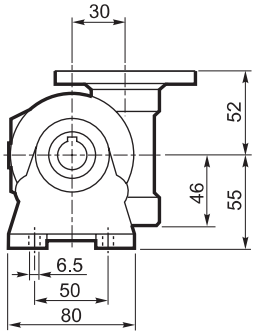

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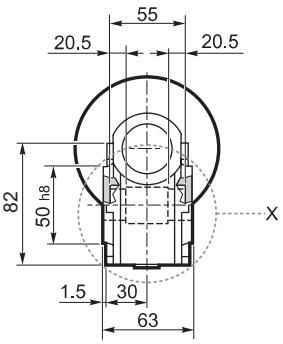
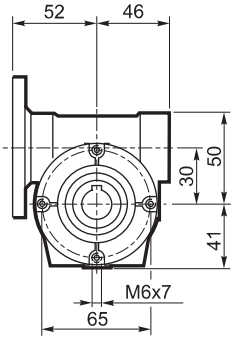
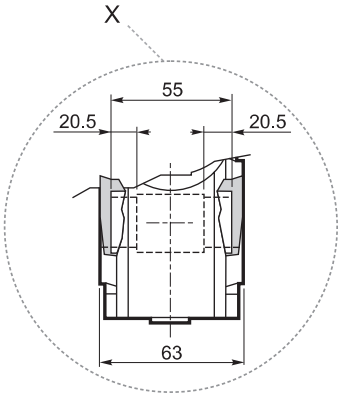
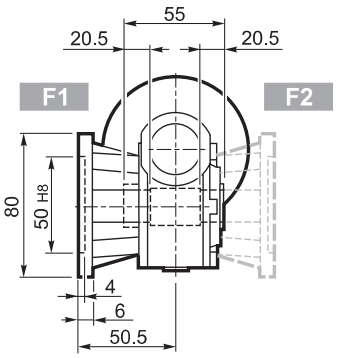


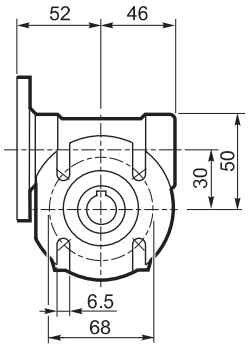




VF 30...P (IEC)

F_





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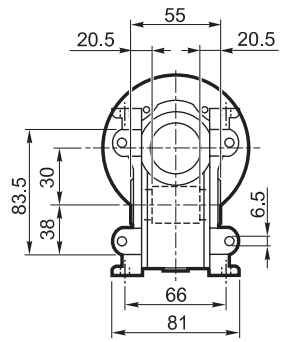

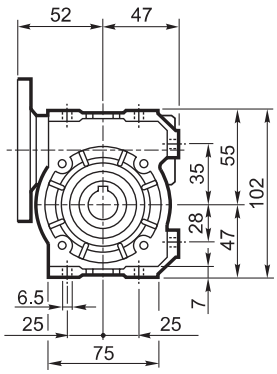

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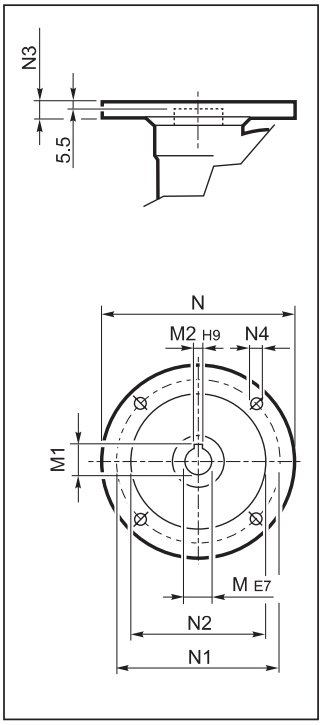

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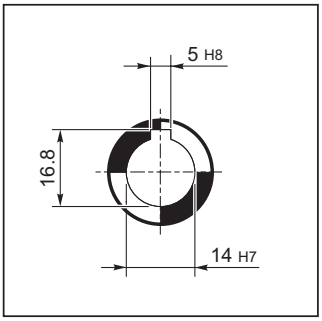
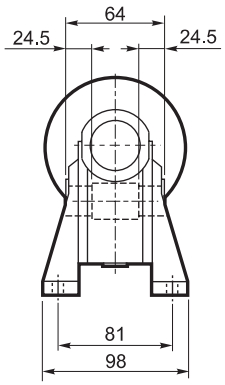
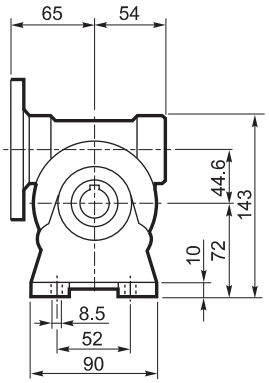


		M	M1	M2	N	N1	N2	N3	N4	Kg
VF 30	**P56 B5**	9	10.4	3	120	100	80	7	7	1.1
VF 30	**P56 B14**	9	10.4	3	80	65	50	7	5.5	
VF 30	**P63 B5**	11	12.8	4	140	115	95	8	9.5	
VF 30	**P63 B14**	11	12.8	4	90	75	60	6	5.5	

VF 44...P (IEC)

A





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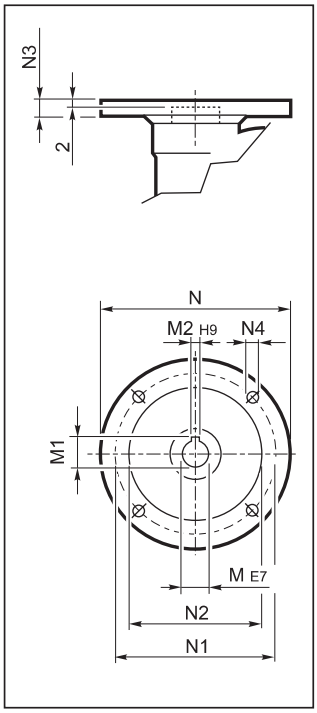

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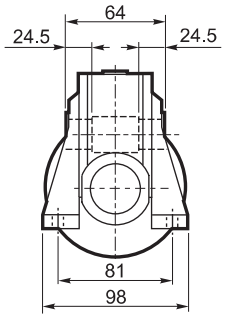

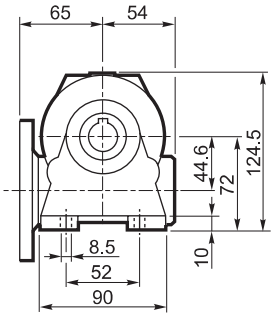

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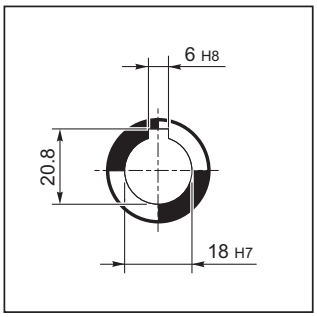

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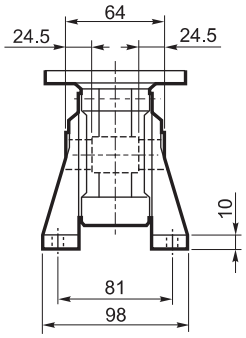

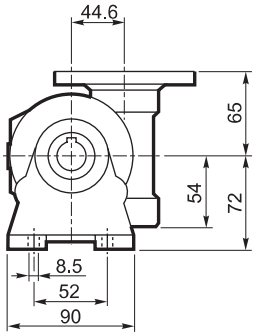

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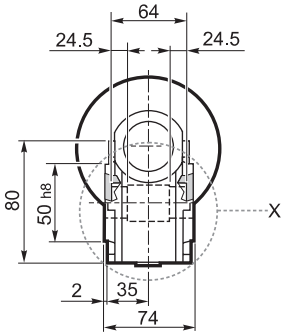

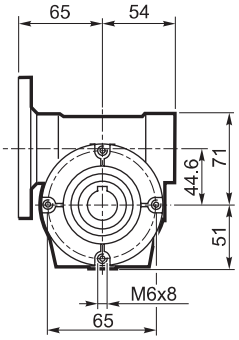

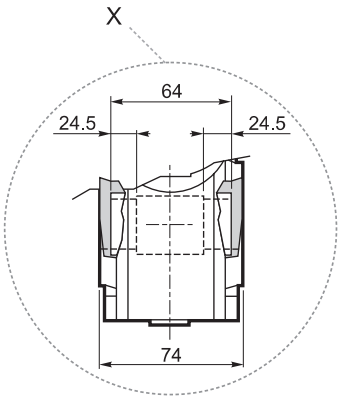

VF 44...P (IEC)

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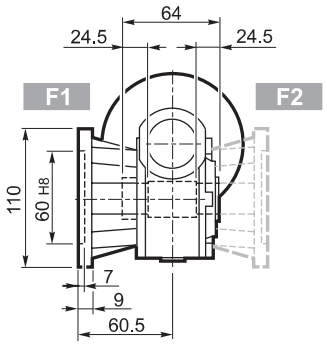

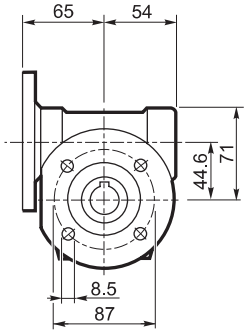

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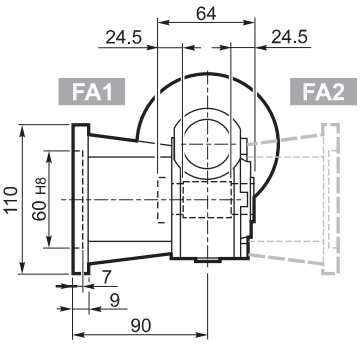

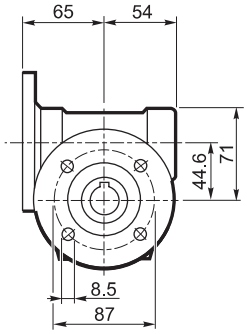

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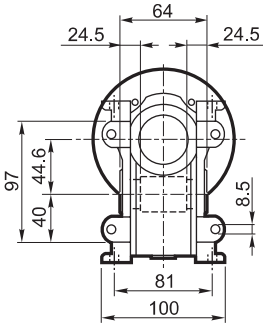

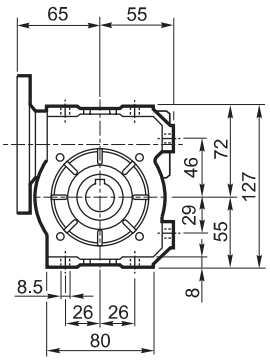

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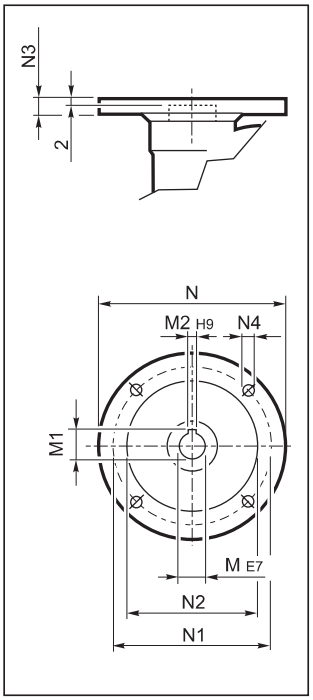

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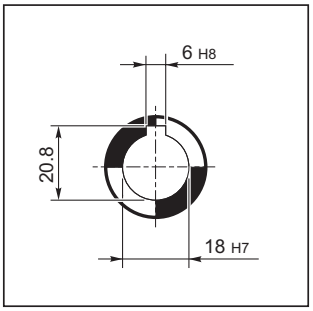

		M	M1	M2	N	N1	N2	N3	N4	Kg
VF 44	**P63 B5**	11	12.8	4	140	115	95	10	9.5	2.0
VF 44	**P71 B5**	14	16.3	5	160	130	110	10	9.5	
VF 44	**P63 B14**	11	12.8	4	90	75	60	8	5.5	
VF 44	**P71 B14**	14	16.3	5	105	85	70	10	7	

VFR 44...BN 44

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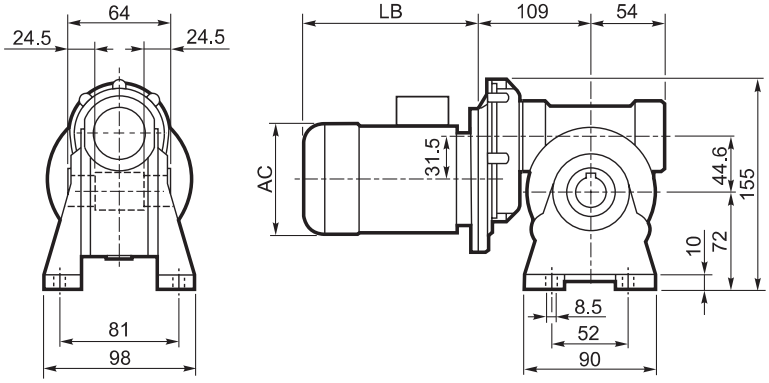

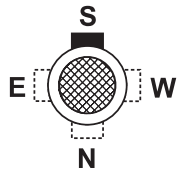

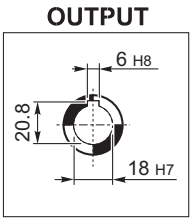

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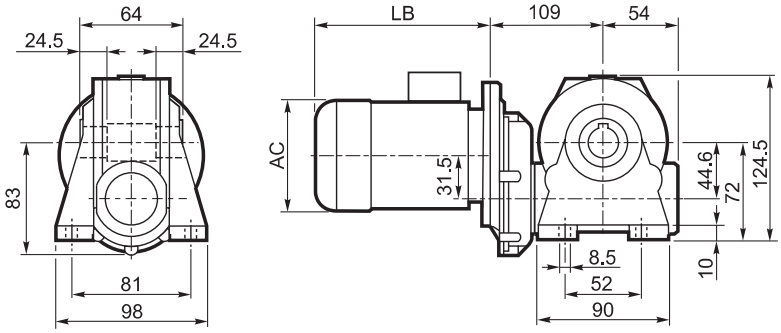

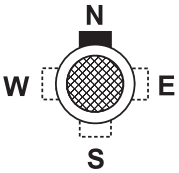

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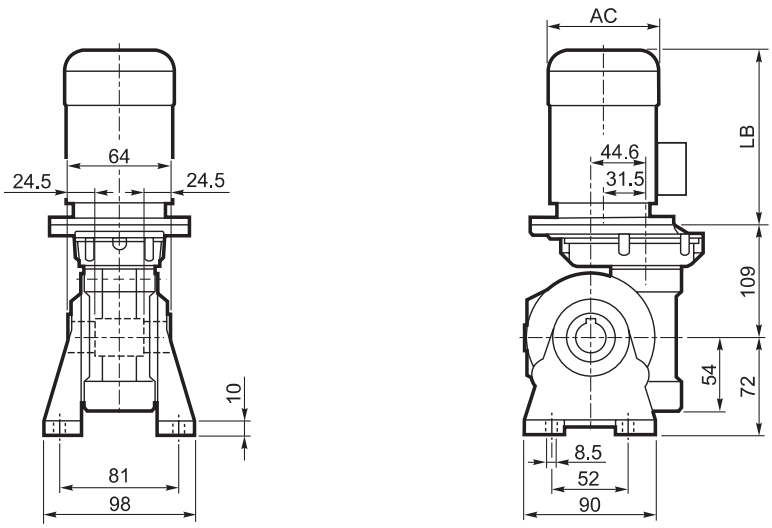

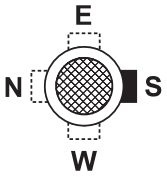

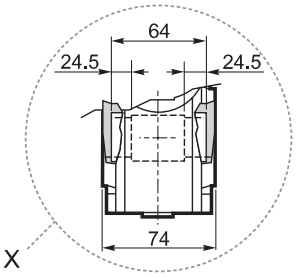

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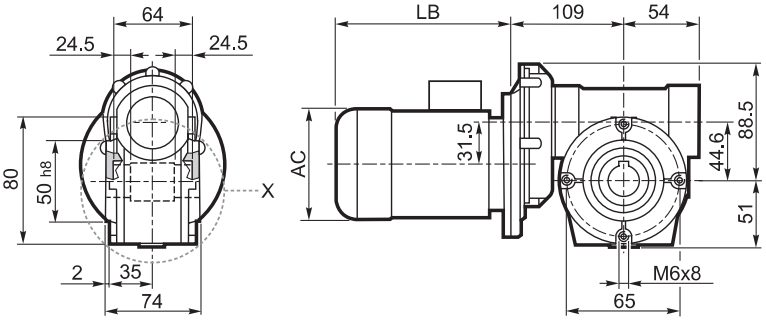
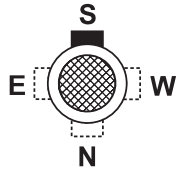
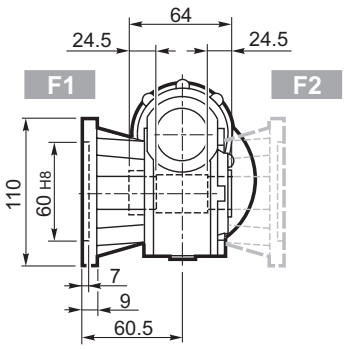
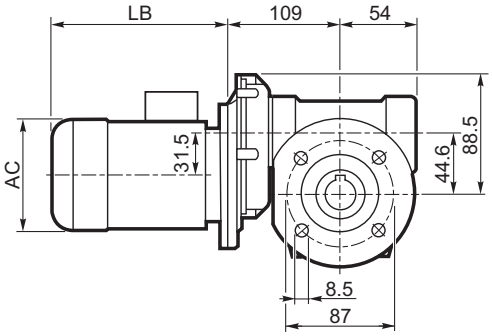


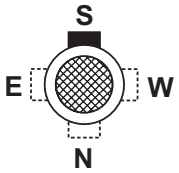


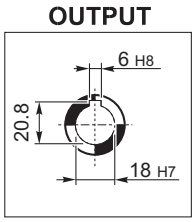
VFR 44...BN 44

F_









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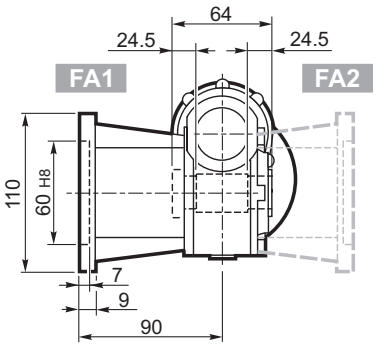

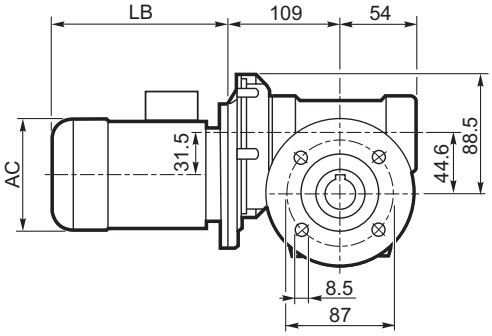

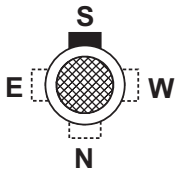

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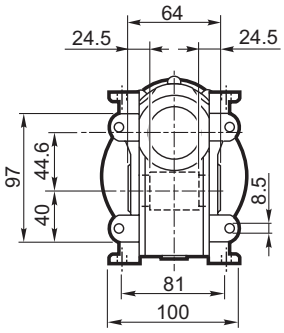
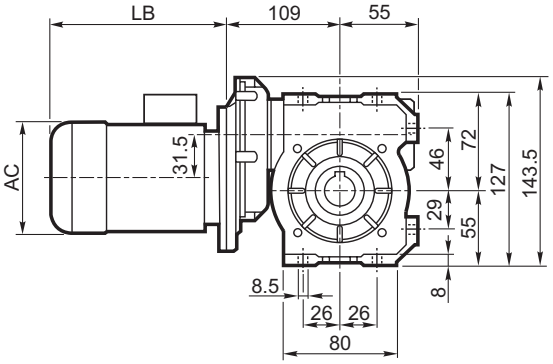
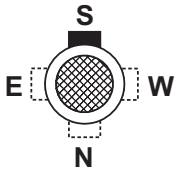


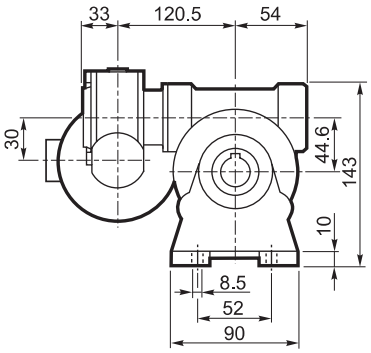


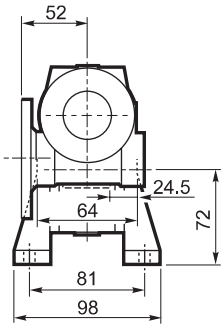


	P_n kW	n min^{-1}	M_n Nm	η %	COSφ	In A (400V)	Is/In	Ms/Mn	Ma/Mn	Jm ($\cdot 10^{-4}$) kgm^2	Kg	LB	AC	AD
BN 44B4	0.06	1380	0.42	40	0.58	0.38	2.4	2.3	1.9	1.22	4.7	168	112	94
BN 44C4	0.09	1380	0.63	46	0.65	0.43	2.8	2.3	2	1.49	4.6	168	112	94

VF/VF 30/44...P (IEC)

A





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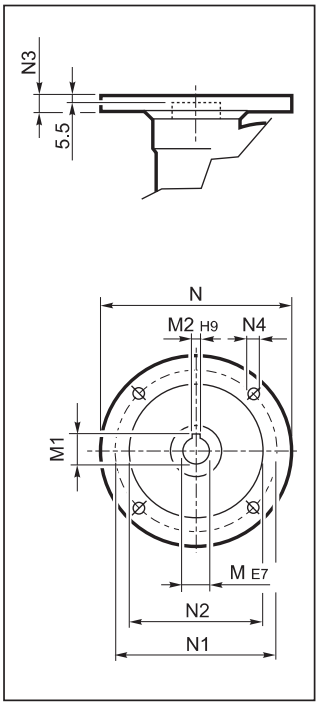

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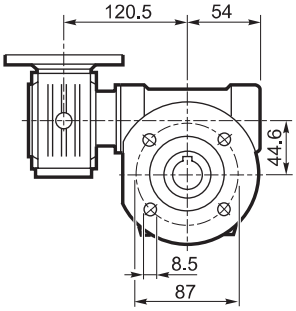

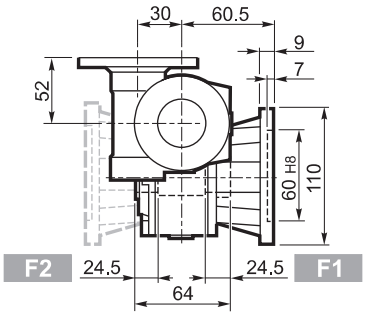

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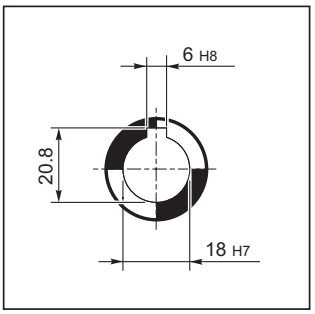

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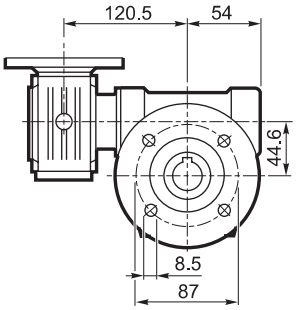

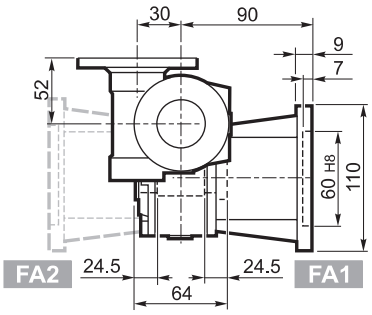

VF/VF 30/44...P (IEC)

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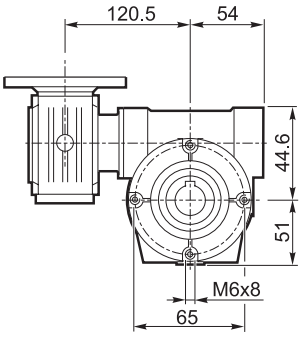

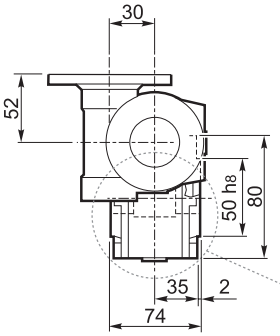

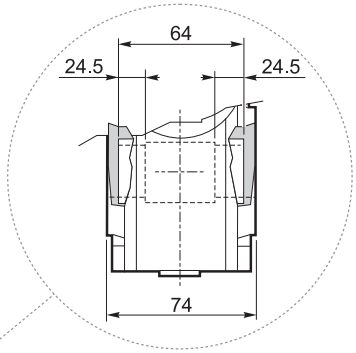

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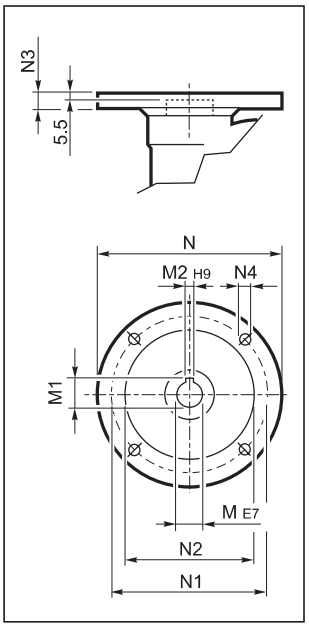

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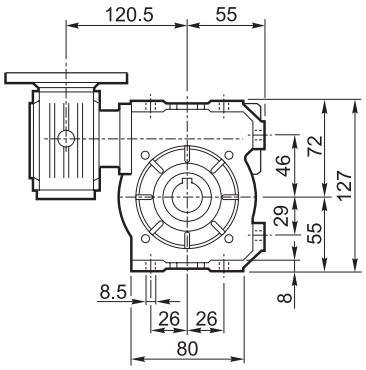

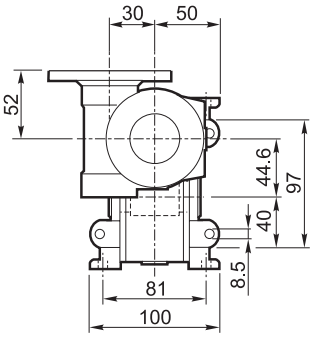

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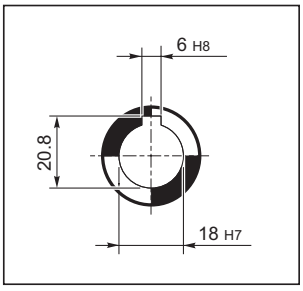
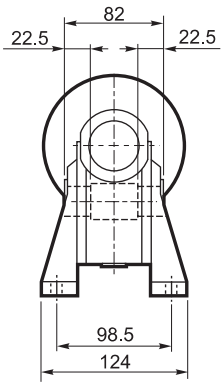
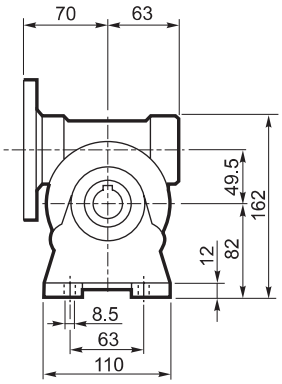


		M	M1	M2	N	N1	N2	N3	N4	Kg
VF/VF 30/44	**P56 B14**	9	10.4	3	80	65	50	7	5.5	3.5
VF/VF 30/44	**P63 B14**	11	12.8	4	90	75	60	6	5.5	

VF 49...P (IEC)

A





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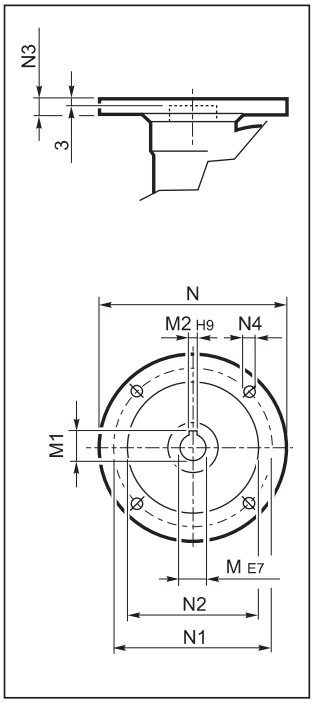

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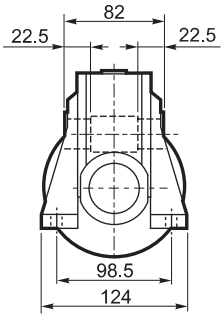

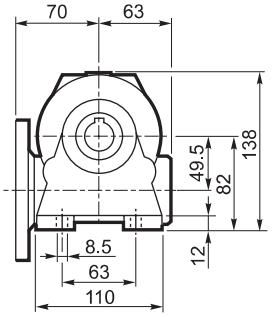

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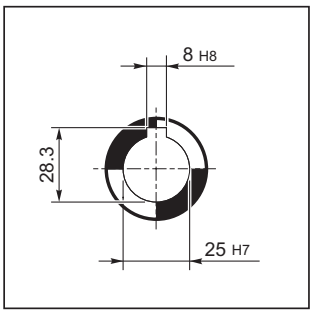

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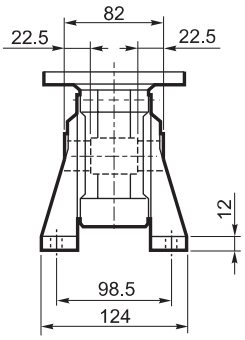

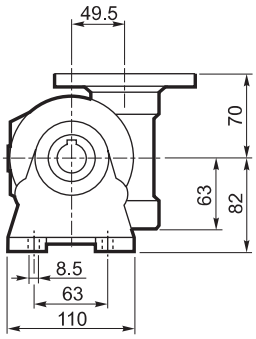

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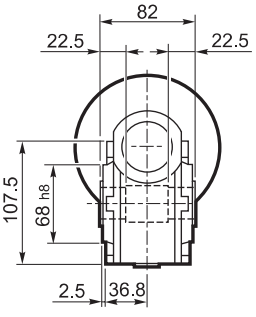
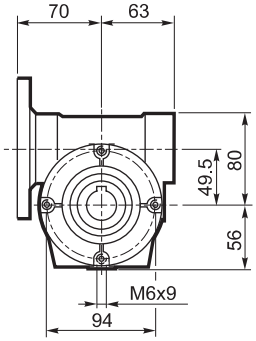
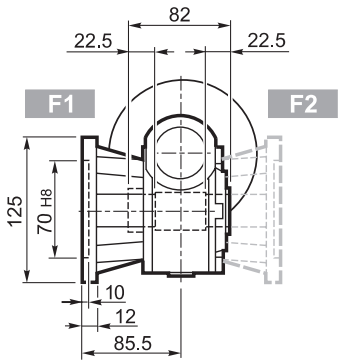
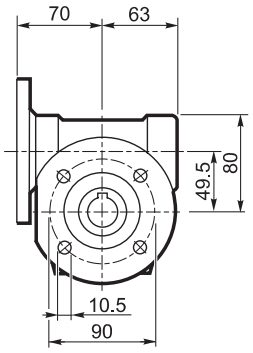




VF 49...P (IEC)

F_





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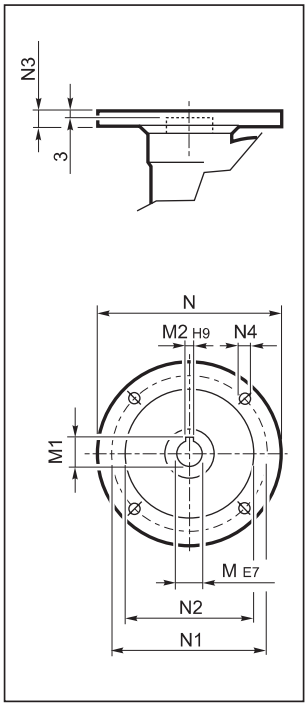

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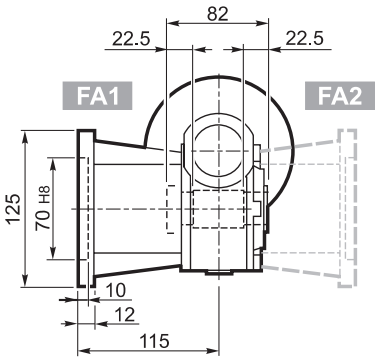

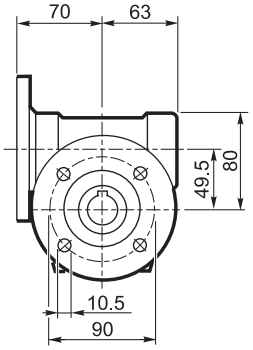

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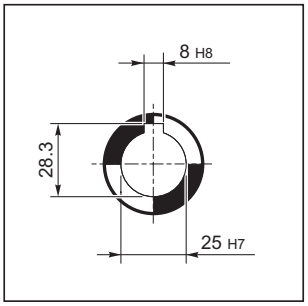

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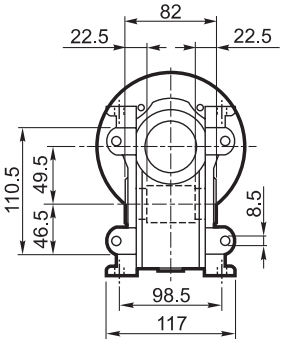
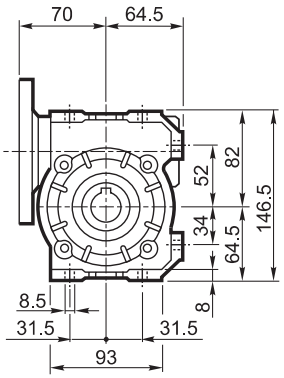
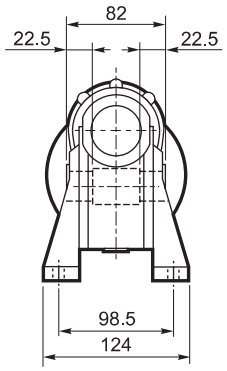


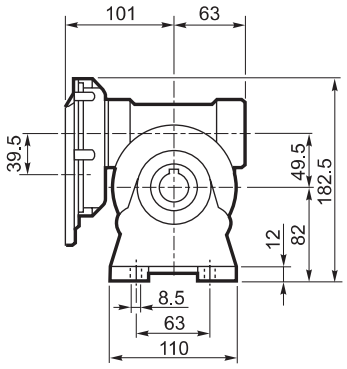


		M	M1	M2	N	N1	N2	N3	N4	Kg
VF 49	**P63 B5**	11	12.8	4	140	115	95	10.5	9.5	3.0
VF 49	**P71 B5**	14	16.3	5	160	130	110	10.5	9.5	
VF 49	**P80 B5**	19	21.8	6	200	165	130	10	11.5	
VF 49	**P63 B14**	11	12.8	4	90	75	60	7	6	
VF 49	**P71 B14**	14	16.3	5	105	85	70	10.5	6.5	
VF 49	**P80 B14**	19	21.8	6	120	100	80	10	7	

VFR 49...P (IEC)

A





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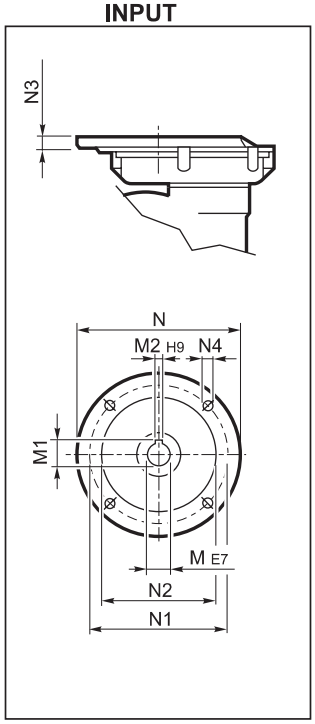

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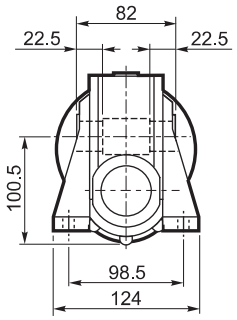

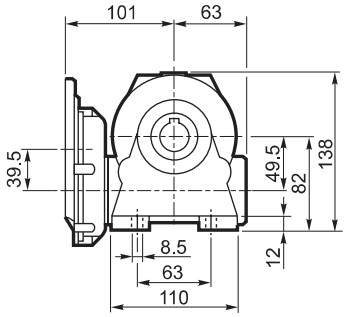

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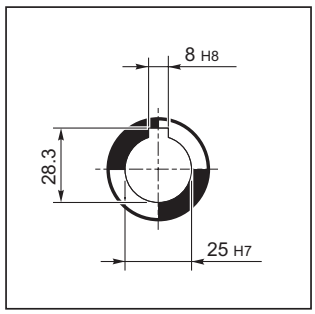

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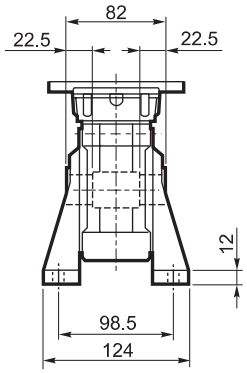

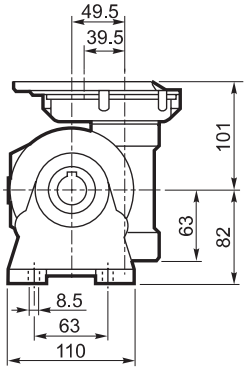

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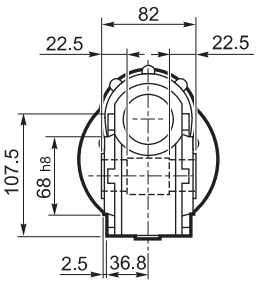
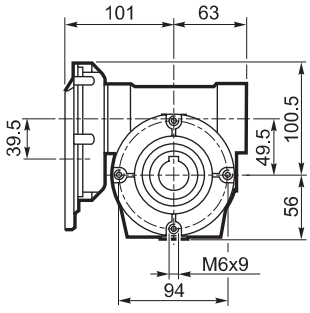
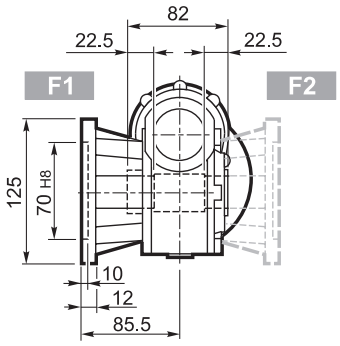
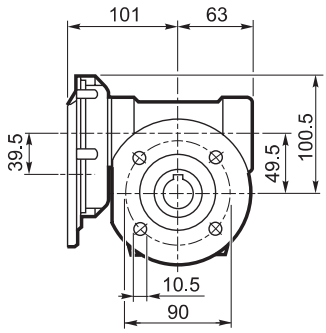




VFR 49...P (IEC)

F_





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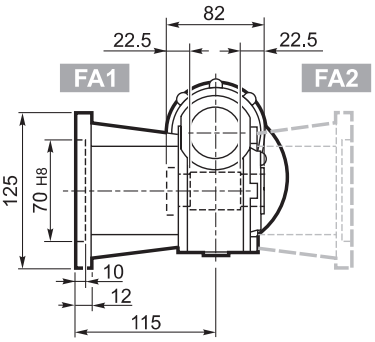

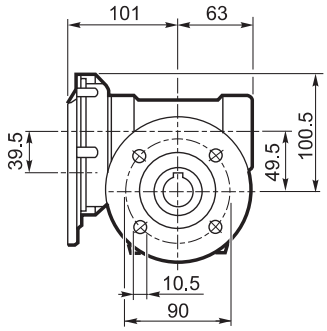

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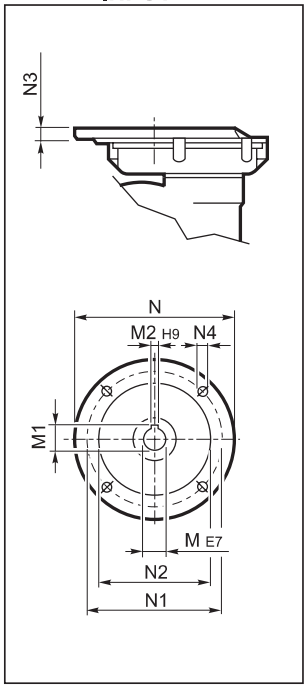

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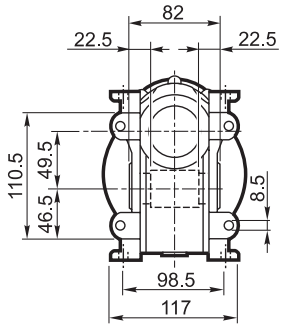

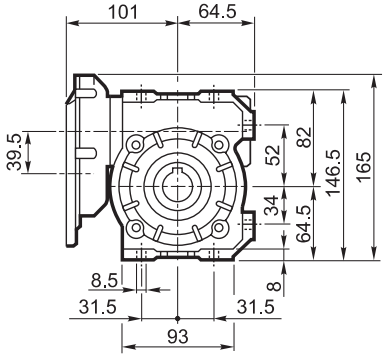

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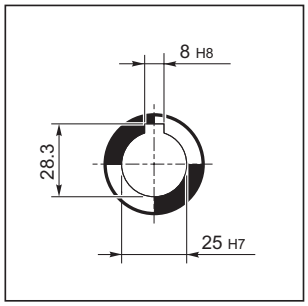
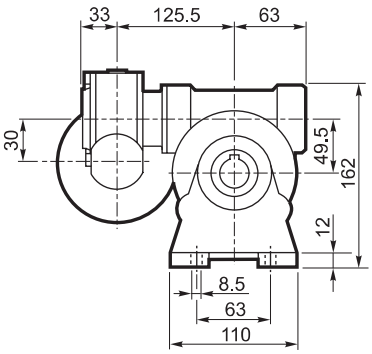
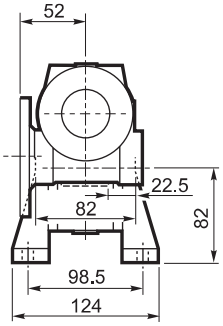


		M	M1	M2	N	N1	N2	N3	N4	Kg
VFR 49	**P63 B5**	11	12.8	4	140	115	95	11	M8 x 19	5.0

VF/VF 30/49...P (IEC)

A





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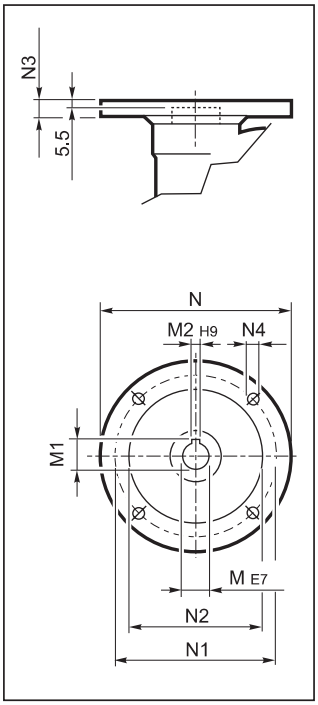

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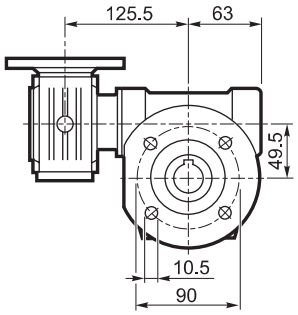

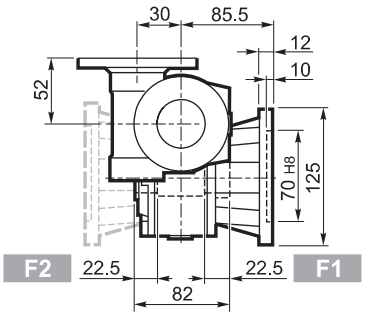

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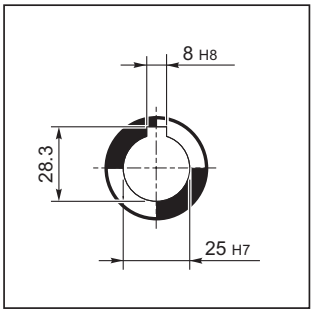

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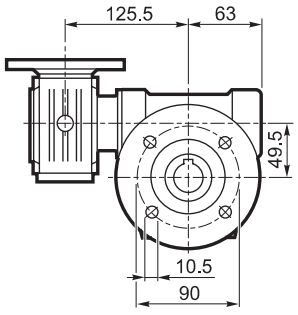
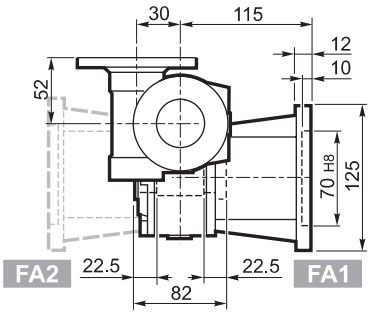
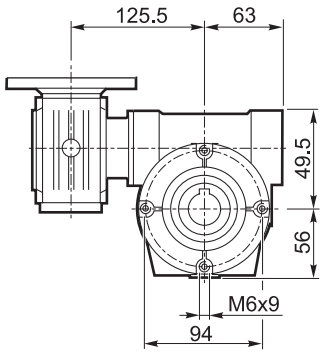
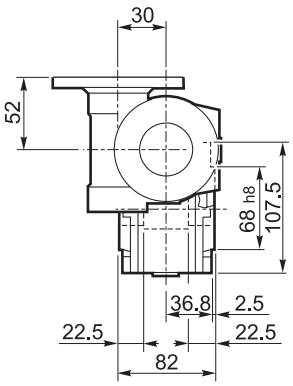




VF/VF 30/49...P (IEC)

P





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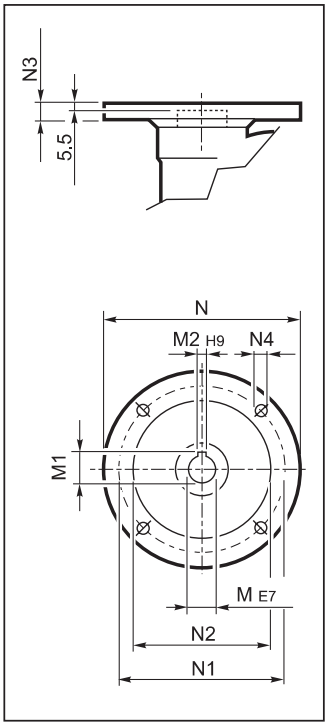

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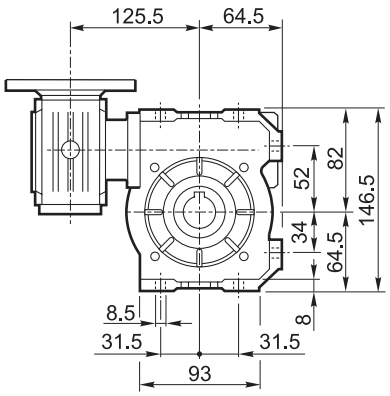

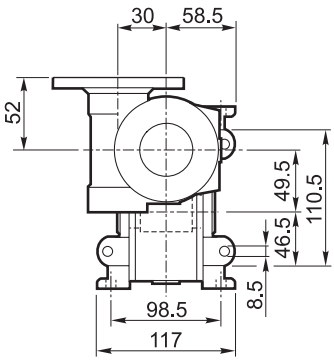

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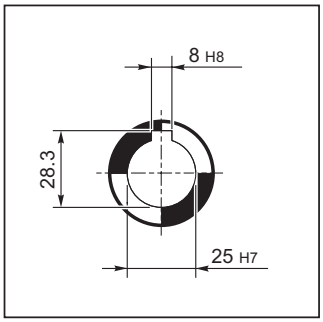
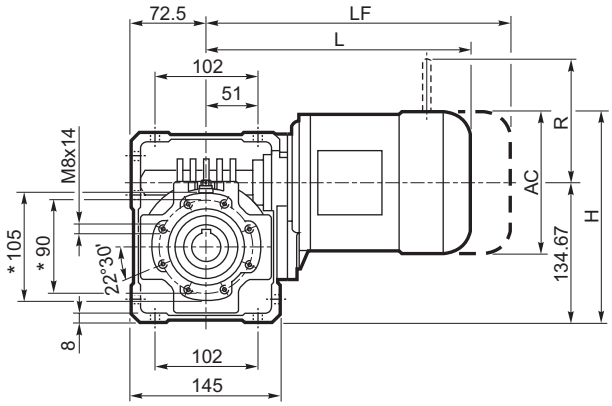
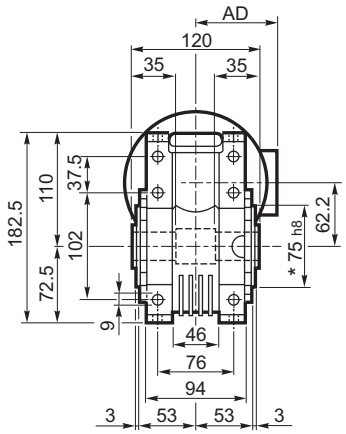


		M	M1	M2	N	N1	N2	N3	N4	Kg
VF/VF 30/49	**P56 B14**	9	10.4	3	80	65	50	7	5.5	4.5
VF/VF 30/49	**P63 B14**	11	12.8	4	90	75	60	6	5.5	

W 63...M/ME

U





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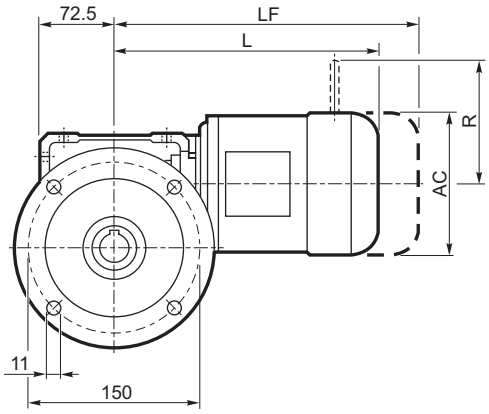
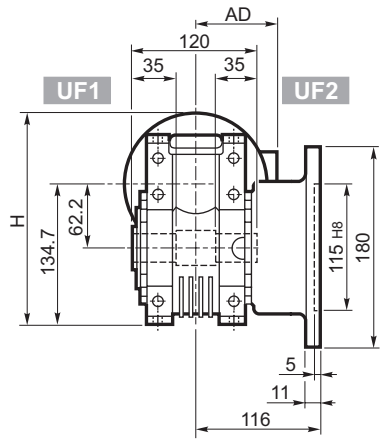
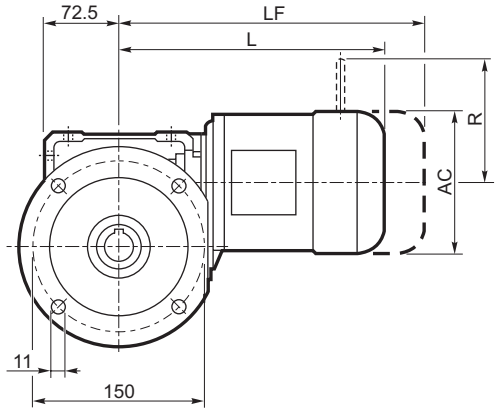
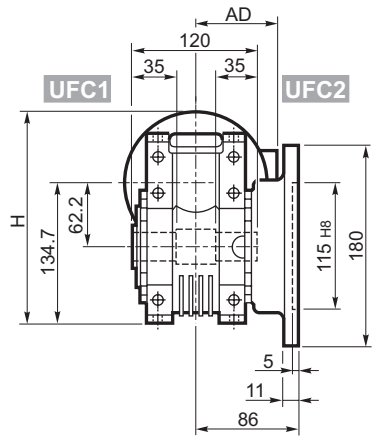




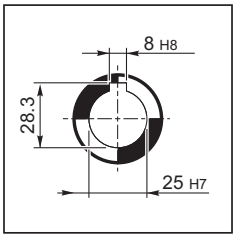
UFC_





			M/ME					M...FD M...FA		M...FD		M...FA	
			AC	H	L	AD	Kg	LF	Kg	R	AD	R	AD
W 63	**S1**	**M1**	138	204	289	108	13	350	15	103	135	124	108
W 63	**S2**	**M2S**	156	213	317	119	17	393	20	129	146	134	119
W 63	**S2**	**ME2S**	156	213	317	119	17	—	—	—	—	—	—

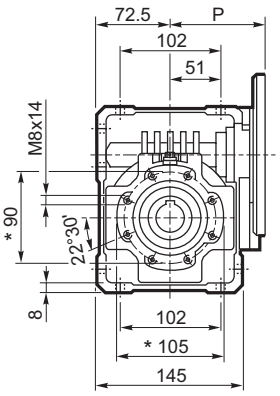
OUTPUT

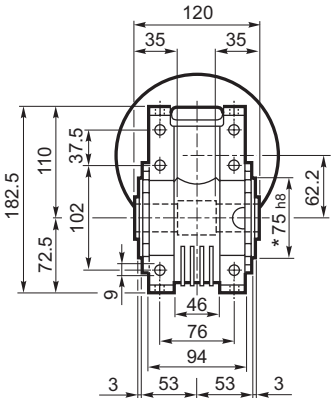


* On both sides

W 63...P (IEC)

U





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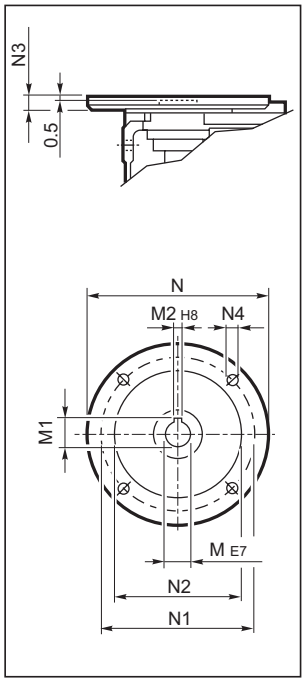

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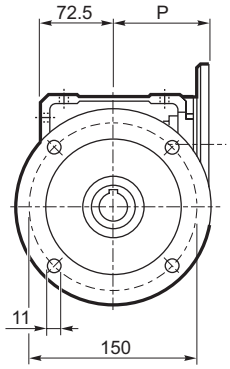

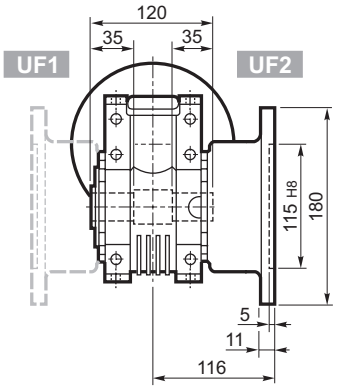

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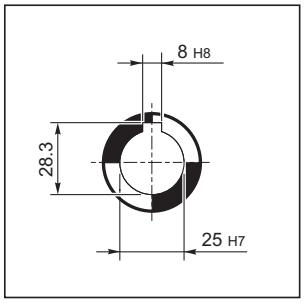
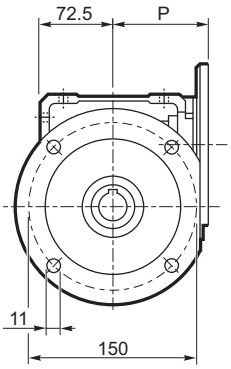
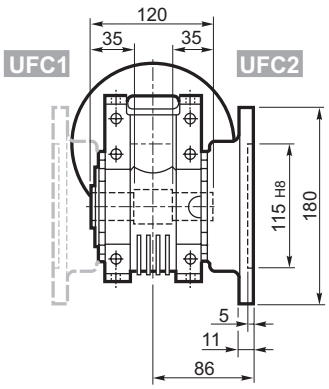


UFC_

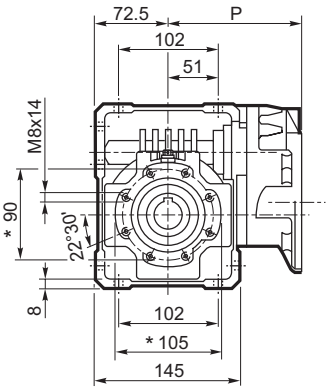


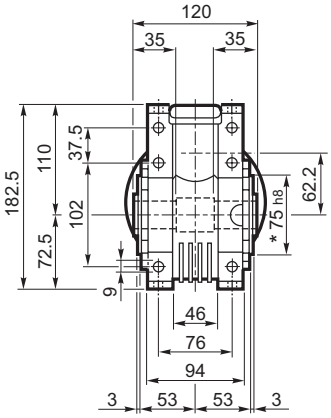


		M	M1	M2	N	N1	N2	N3	N4	P	Kg
W 63	**P71 B5**	14	16.3	5	160	130	110	11	9	95	6.3
W 63	**P80 B5**	19	21.8	6	200	165	130	12	11.5	102	6.5
W 63	**P90 B5**	24	27.3	8	200	165	130	12	11.5	102	6.4
W 63	**P71 B14**	14	16.3	5	105	85	70	11	6.5	95	6.1
W 63	**P80 B14**	19	21.8	6	120	100	80	11	6.5	102	6.3
W 63	**P90 B14**	24	27.3	8	140	115	95	11	8.5	102	6.3

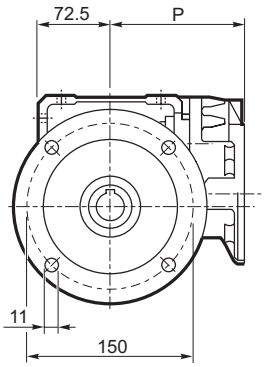
WR 63...P (IEC)

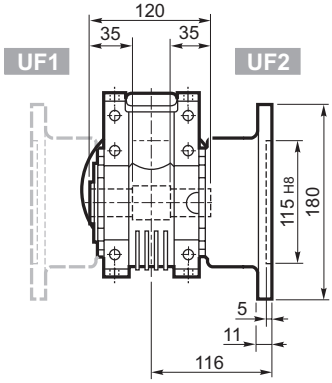
U





UF_





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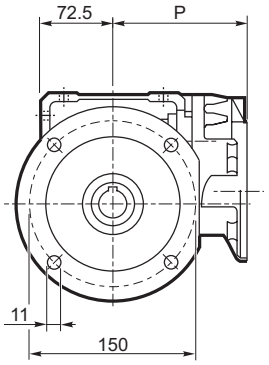
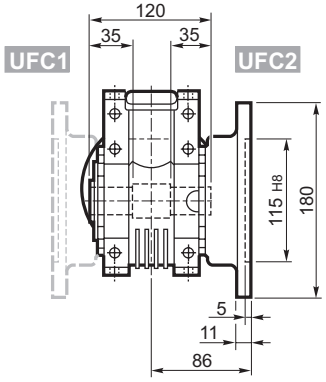
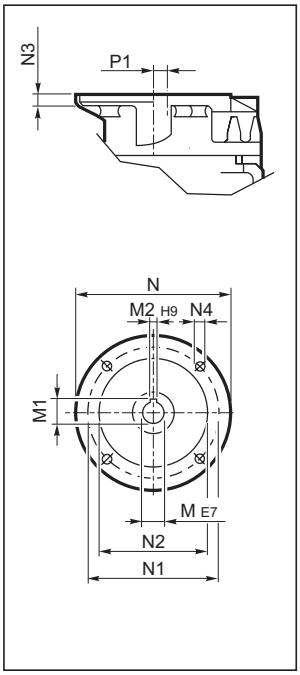
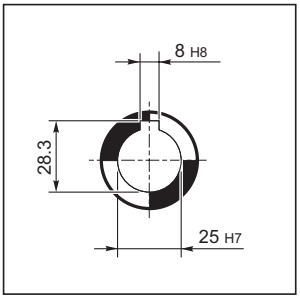




INPUT



OUTPUT

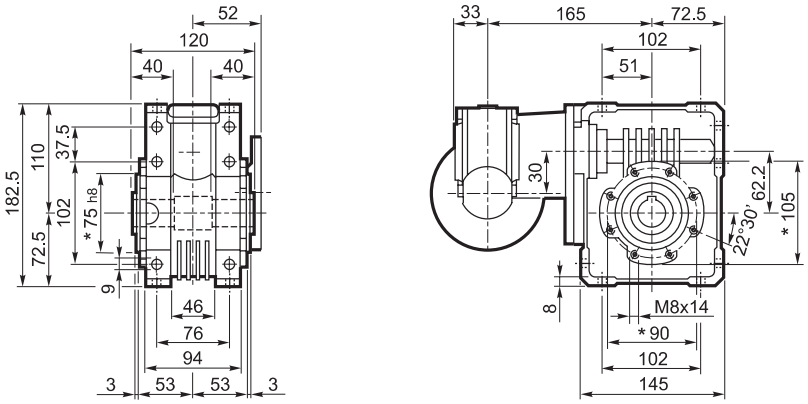


		M	M1	M2	N	N1	N2	N3	N4	P	P1	Kg
WR 63	**P63 B5**	11	12.8	4	140	115	95	10	M8x10	133.5	11.42	7.1
WR 63	**P71 B5**	14	16.3	5	160	130	110	10	M8x10	133.5	11.42	

* On both sides

VF/W 30/63...P (IEC)

U



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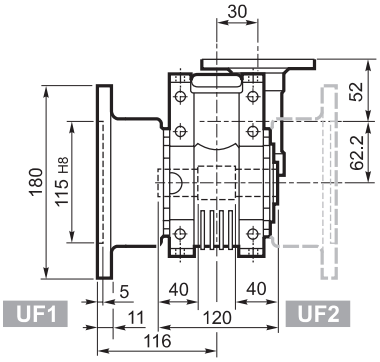

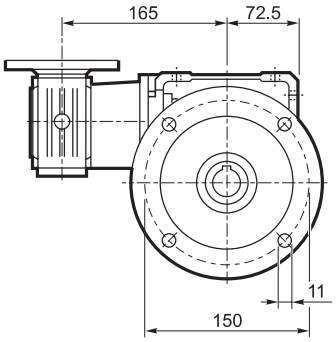

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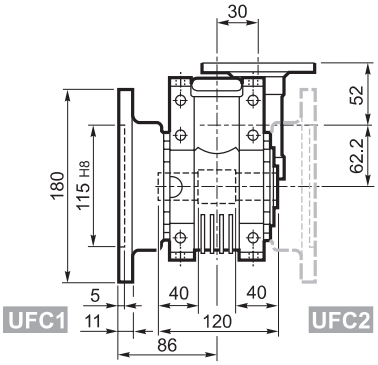

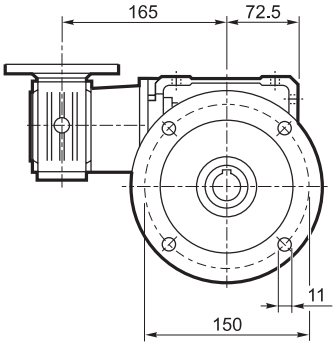

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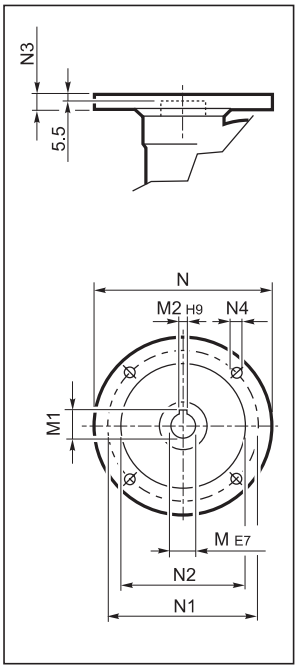

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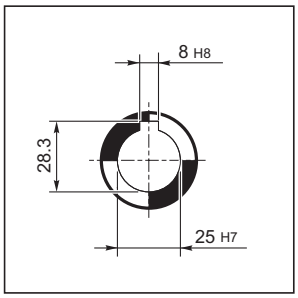
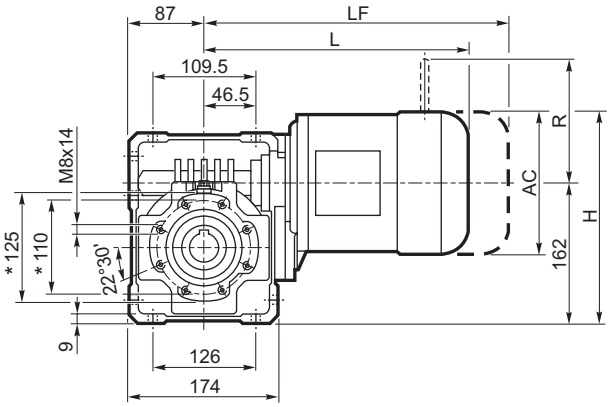


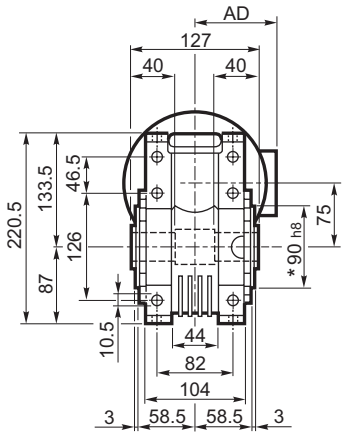
		M	M1	M2	N	N1	N2	N3	N4	Kg
VF/W 30/63	**P56 B5**	9	10.4	3	120	100	80	7	7	8.0
VF/W 30/63	**P63 B5**	11	12.8	4	140	115	95	8	9.5	
VF/W 30/63	**P63 B14**	9	10.4	3	80	65	50	7	5.5	
VF/W 30/63	**P63 B14**	11	12.8	4	90	75	60	6	5.5	

* On both sides

W 75...M/ME

U





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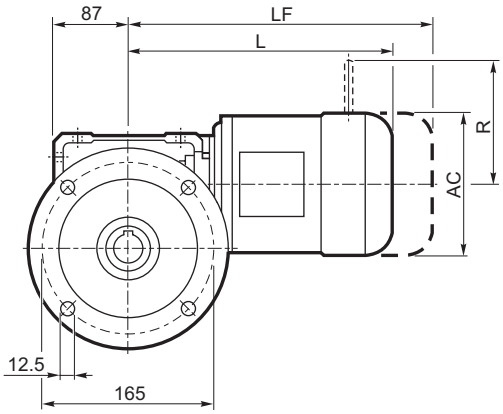
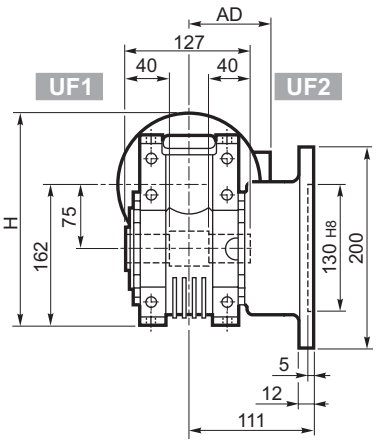
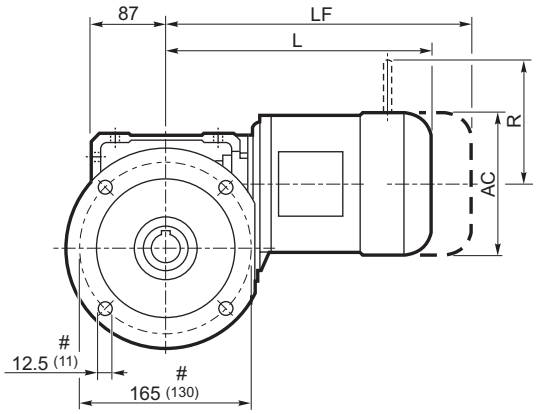
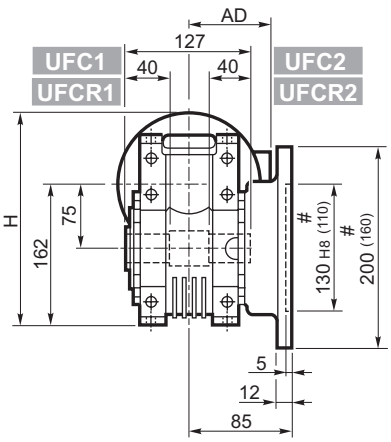




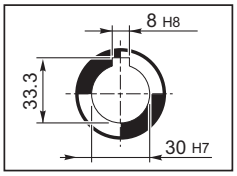
UFC_

UFCR_#

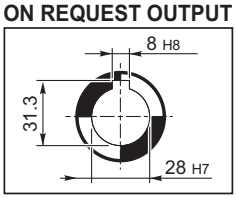




STANDARD OUTPUT



ON REQUEST OUTPUT



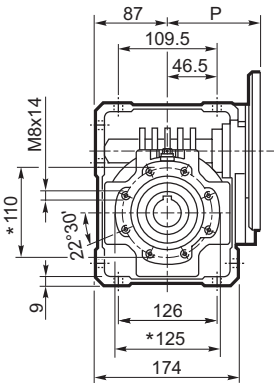
			M/ME					M...FD M...FA		M...FD		M...FA	
			AC	H	L	AD	Kg	LF	Kg	R	AD	R	AD
W 75	**S1**	**M1**	138	231	308	108	16.0	369	18.2	103	135	124	108
W 75	**S2**	**ME2S**	153	240	333	119	18.5	—	—	—	—	—	—
W 75	**S3**	**ME3S**	193	258.5	376	142	27.1	—	—	—	—	—	—
W 75	**S3**	**ME3L**	193	258.5	408	142	32.6	—	—	—	—	—	—

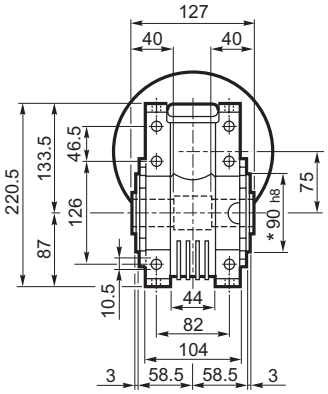
* On both sides

\# Reduced flange

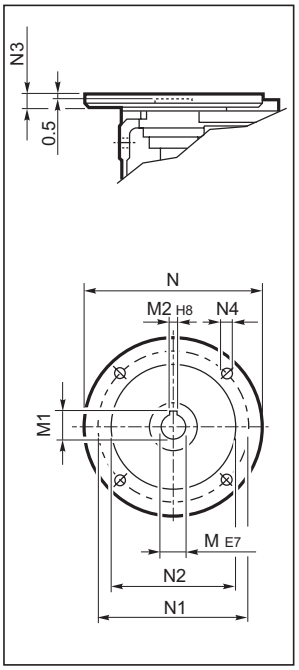
W 75...P (IEC)

U

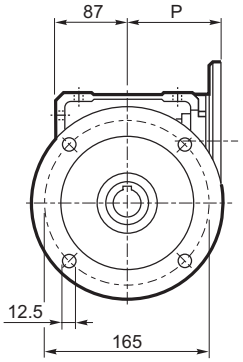


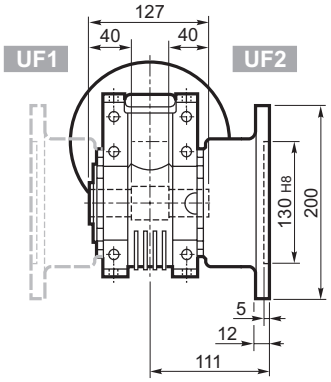


INPUT

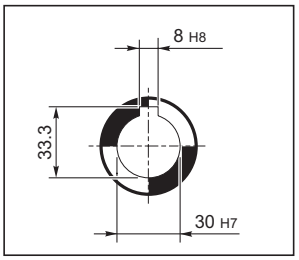


UF_

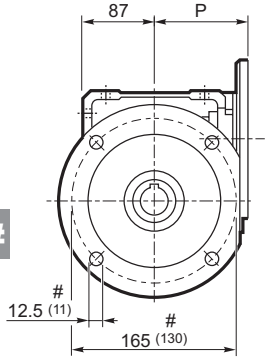


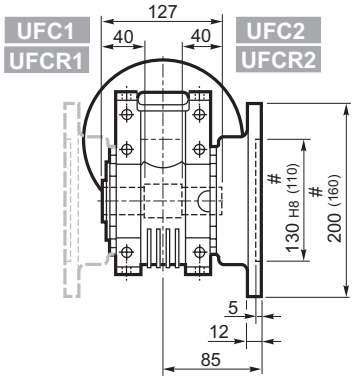


STANDARD OUTPUT

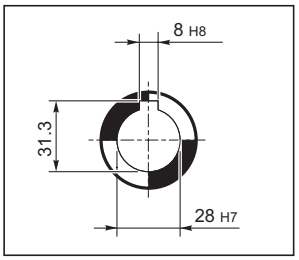


UFC_
UFCR_#





ON REQUEST OUTPUT



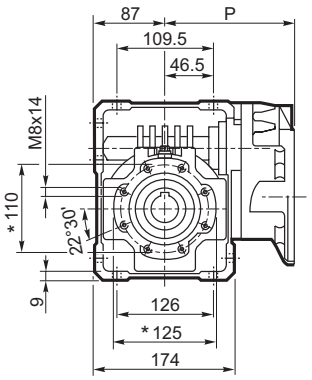
		M	M1	M2	N	N1	N2	N3	N4	P	Kg
W 75	**P71 B5**	14	16.3	5	160	130	110	11	9	112	9.5
W 75	**P80 B5**	19	21.8	6	200	165	130	12	11.5	112	9.7
W 75	**P90 B5**	24	27.3	8	200	165	130	12	11.5	112	9.6
W 75	**P100 B5**	28	31.3	8	250	215	180	13	12.5	120	9.7
W 75	**P112 B5**	28	31.3	8	250	215	180	13	12.5	120	9.7
W 75	**P80 B14**	19	21.8	6	120	100	80	7.5	6.5	112	9.4
W 75	**P90 B14**	24	27.3	8	140	115	95	7.5	8.5	112	9.4
W 75	**P100 B14**	28	31.3	8	160	130	110	10	8.5	120	9.5
W 75	**P112 B14**	28	31.3	8	160	130	110	10	8.5	120	9.5

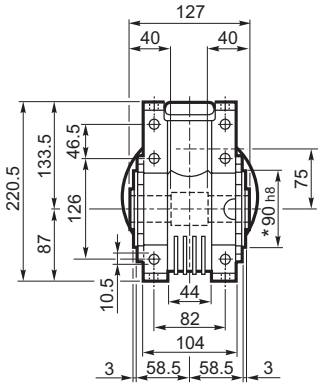
* On both sides

\# Reduced flange

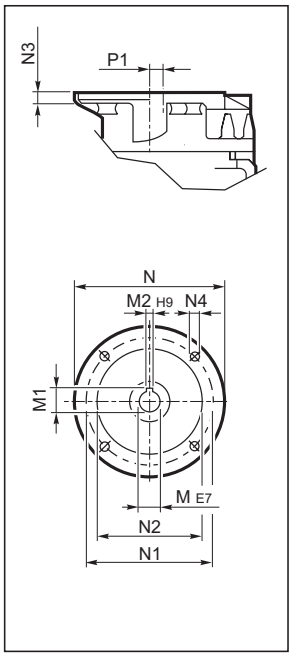
WR 75...P (IEC)

U





INPUT



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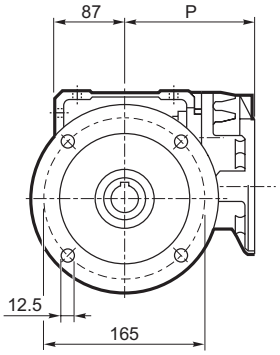
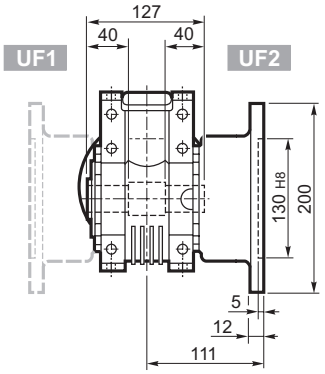
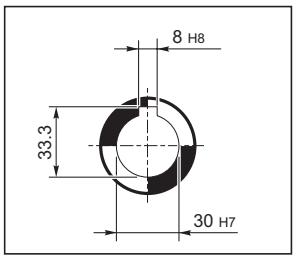




STANDARD OUTPUT



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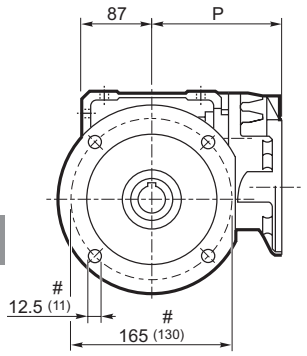
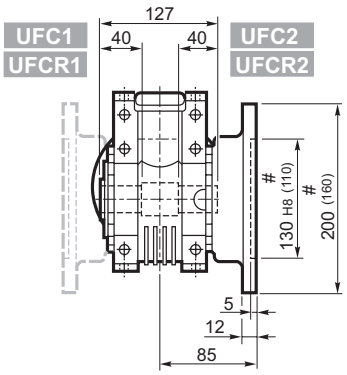
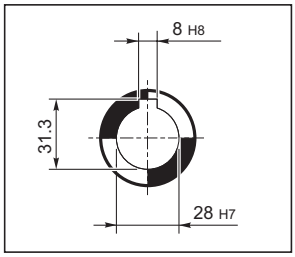
UFCR_#





ON REQUEST OUTPUT



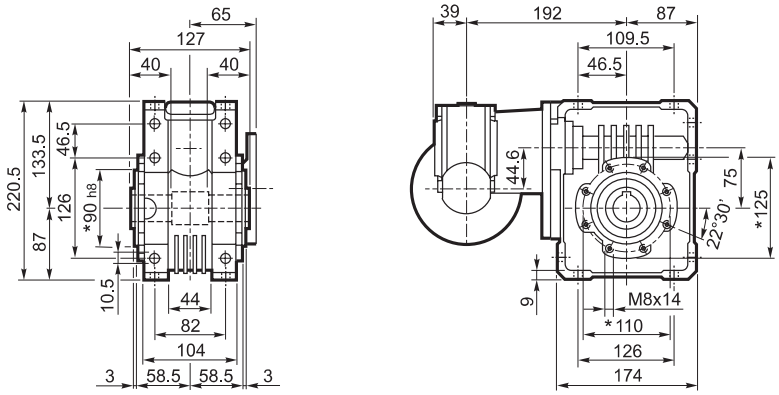
		M	M1	M2	N	N1	N2	N3	N4	P	P1	Kg
WR 75	**P63 B5**	11	12.8	4	140	115	95	10	M8x10	152	23.53	10.6
WR 75	**P71 B5**	14	16.3	5	160	130	110	10	M8x10	152	23.53	10.7
WR 75	**P80 B5**	19	21.8	6	200	165	130	12	M10x13	163.5	11	11.5
WR 75	**P90 B5**	24	27.3	8	200	165	130	12	M10x13	163.5	11	11.6

* On both sides

\# Reduced flange

VF/W 44/75...P (IEC)

U



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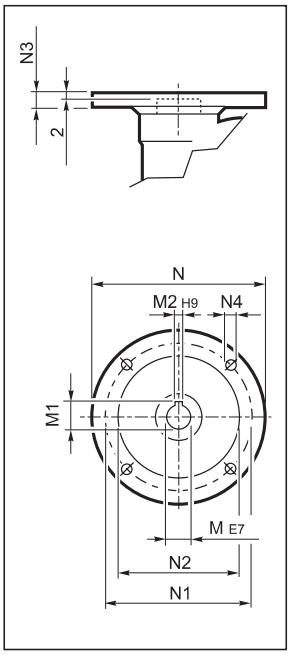
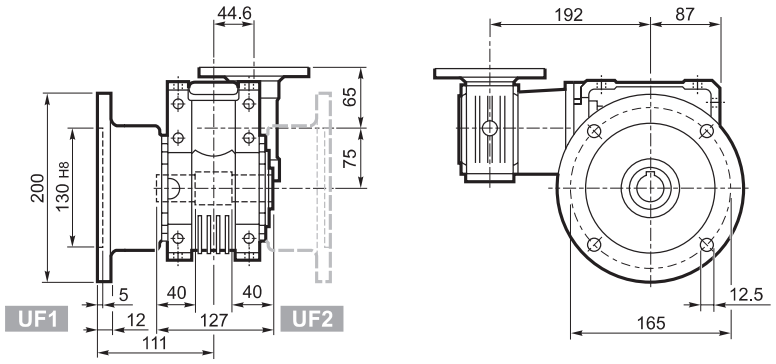
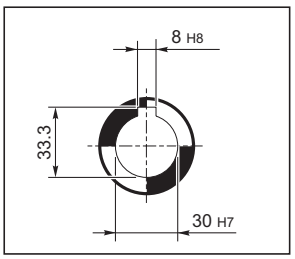


UF_



STANDARD OUTPUT



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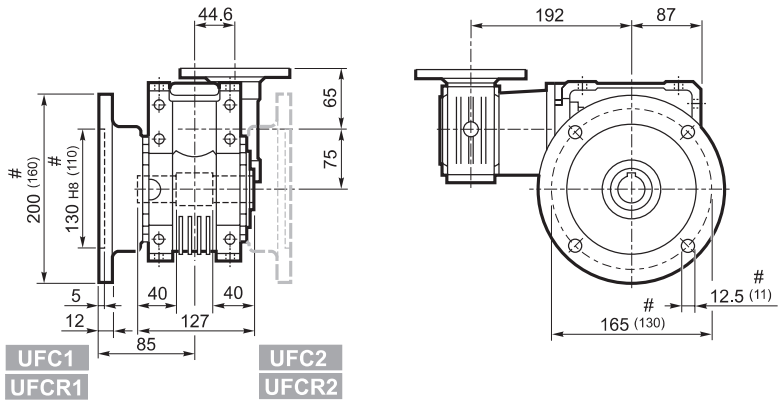
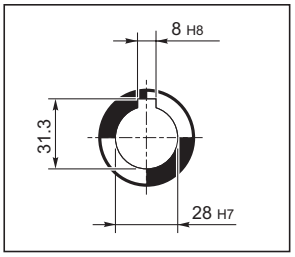
UFCR_#



ON REQUEST OUTPUT



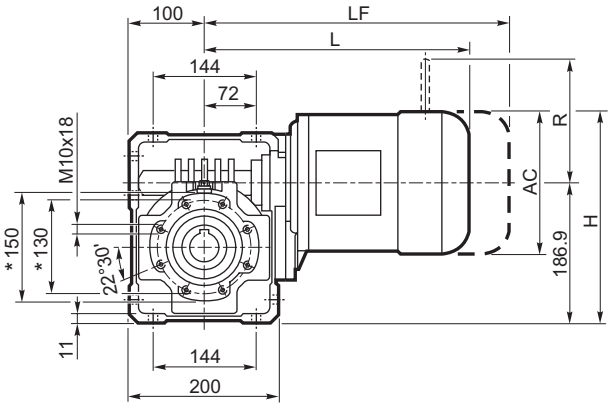
		M	M1	M2	N	N1	N2	N3	N4	Kg
VF/W 44/75	**P63 B5**	11	12.8	4	140	115	95	10	9.5	12.5
VF/W 44/75	**P71 B5**	14	16.3	5	160	130	110	10	9.5	
VF/W 44/75	**P63 B14**	11	12.8	4	90	75	60	8	5.5	
VF/W 44/75	**P71 B14**	14	16.3	5	105	85	70	10	7	

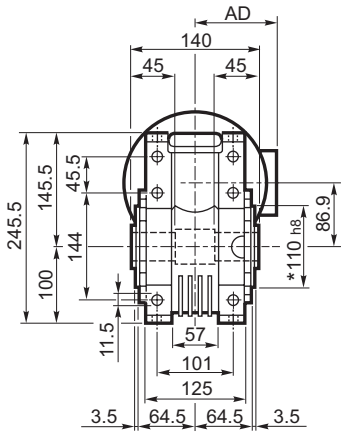
* On both sides

\# Reduced flange

W 86...M/ME

U





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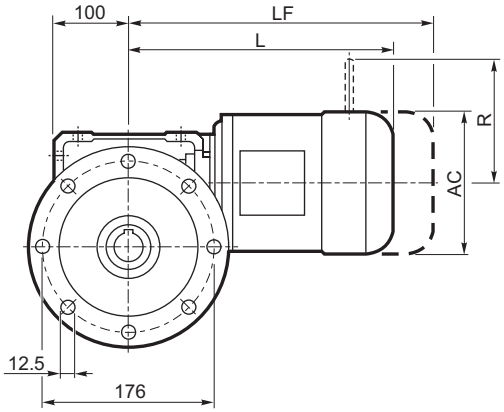

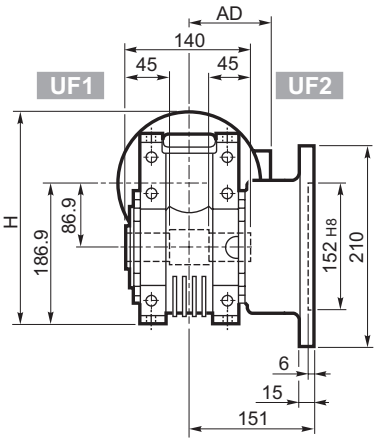

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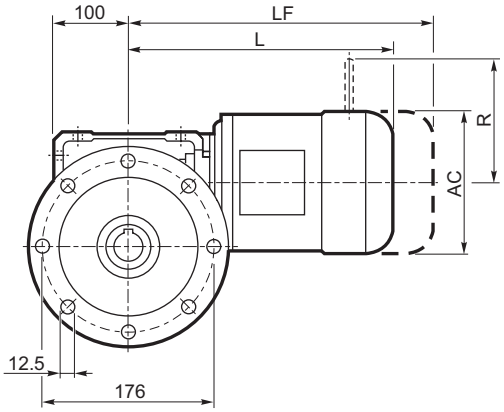
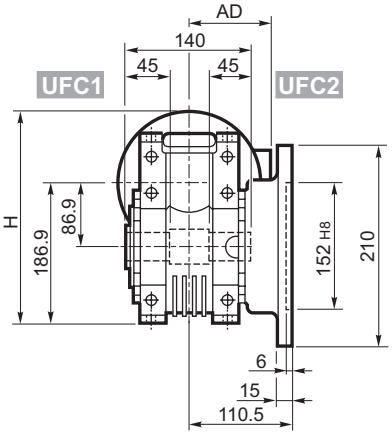
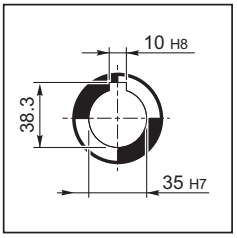




			M/ME					M...FD M...FA		M...FD		M...FA	
			AC	H	L	AD	Kg	LF	Kg	R	AD	R	AD
W 86	**S1**	**M1**	138	256	324	108	20.1	385	22.3	103	135	124	108
W 86	**S2**	**M2S**	156	265	349	119	22.6	425	25.7	129	146	134	119
W 86	**S2**	**ME2S**	156	265	349	119	22.6	—	—	—	—	—	—
W 86	**S3**	**ME3S**	193	283.5	392	142	31.2	—	—	—	—	—	—
W 86	**S3**	**ME3L**	193	283.5	424	142	36.7	—	—	—	—	—	—

OUTPUT

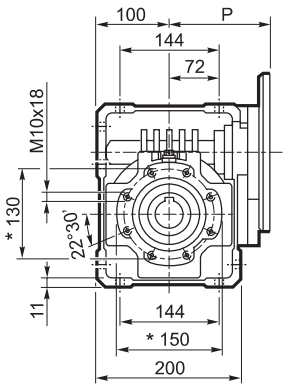


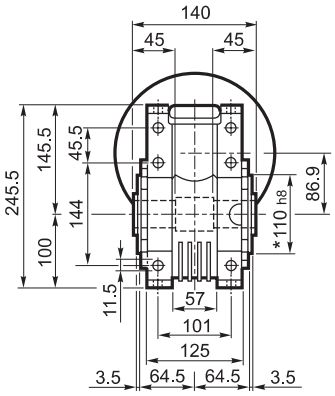
* On both sides

Bonfiglioli Riduttori

W 86...P (IEC)

U





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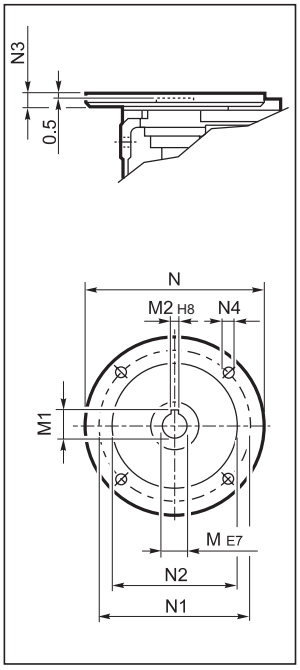

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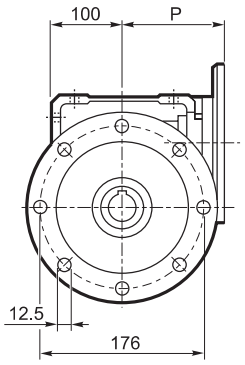

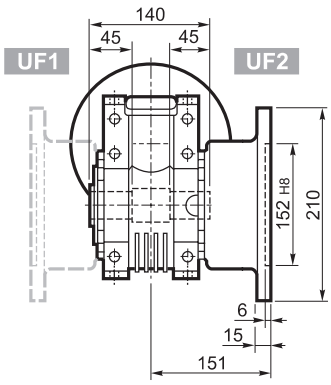

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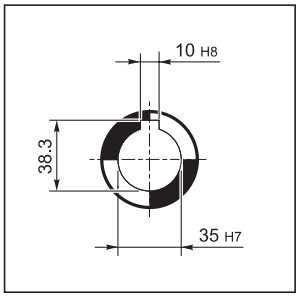

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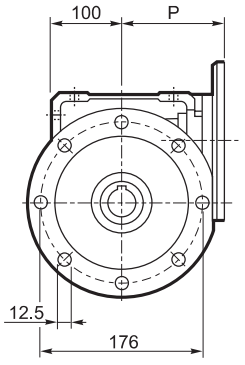
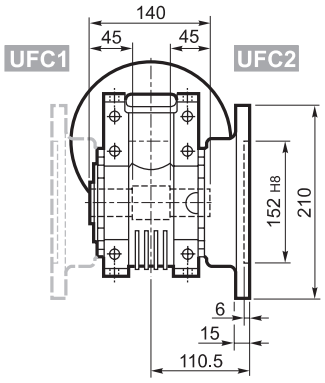


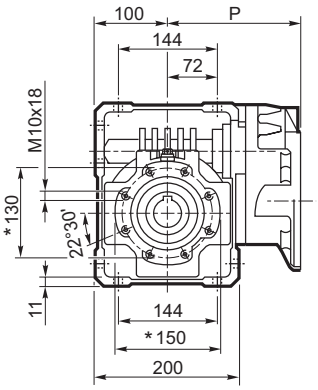


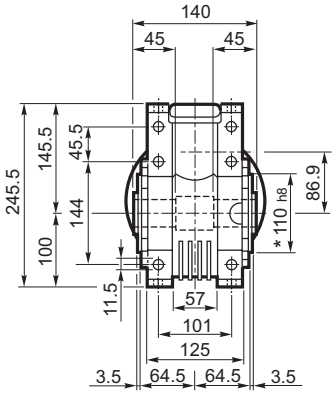
		M	M1	M2	N	N1	N2	N3	N4	P	Kg
W 86	**P71 B5**	14	16.3	5	160	130	110	11	9	128	13.6
W 86	**P80 B5**	19	21.8	6	200	165	130	12	11.5	128	13.8
W 86	**P90 B5**	24	27.3	8	200	165	130	12	11.5	128	13.7
W 86	**P100 B5**	28	31.3	8	250	215	180	13	12.5	136	13.8
W 86	**P112 B5**	28	31.3	8	250	215	180	13	12.5	136	13.8
W 86	**P80 B14**	19	21.8	6	120	100	80	7.5	6.5	128	13.5
W 86	**P90 B14**	24	27.3	8	140	115	95	7.5	8.5	128	13.5
W 86	**P100 B14**	28	31.3	8	160	130	110	10	8.5	136	13.6
W 86	**P112 B14**	28	31.3	8	160	130	110	10	8.5	136	13.6

* On both sides

WR 86...P (IEC)

U





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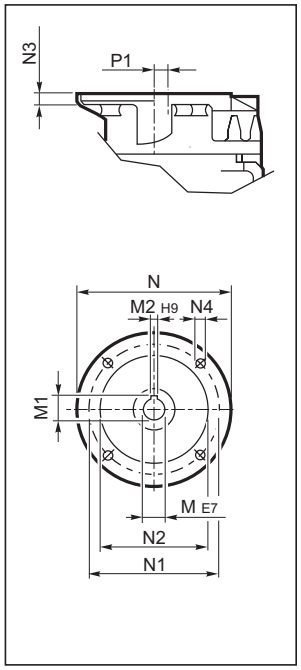

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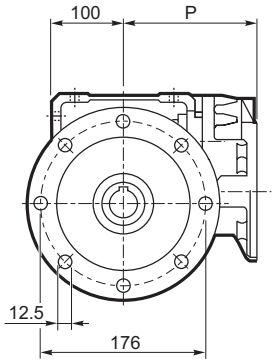

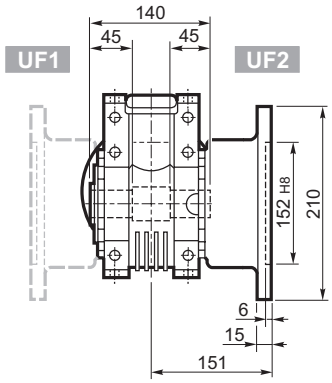

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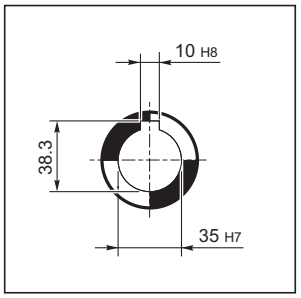

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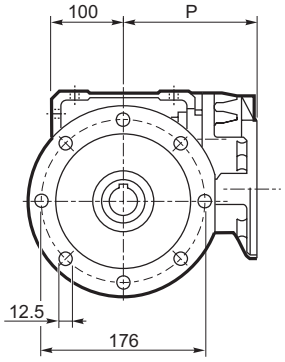
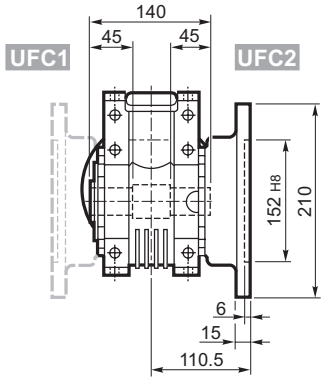


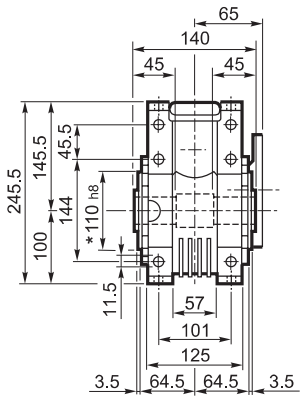


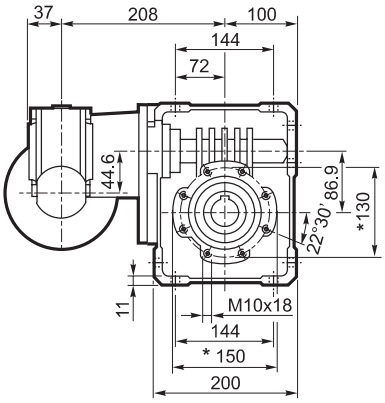
		M	M1	M2	N	N1	N2	N3	N4	P	P1	Kg
WR 86	**P63 B5**	11	12.8	4	140	115	95	10	M8x10	168	35.4	14.3
WR 86	**P71 B5**	14	16.3	5	160	130	110	10	M8x10	168	35.4	14.4
WR 86	**P80 B5**	19	21.8	6	200	165	130	12	M10x13	179.5	22.9	15.2
WR 86	**P90 B5**	24	27.3	8	200	165	130	12	M10x13	179.5	22.9	15.3

* On both sides

VF/W 44/86... P (IEC)

U





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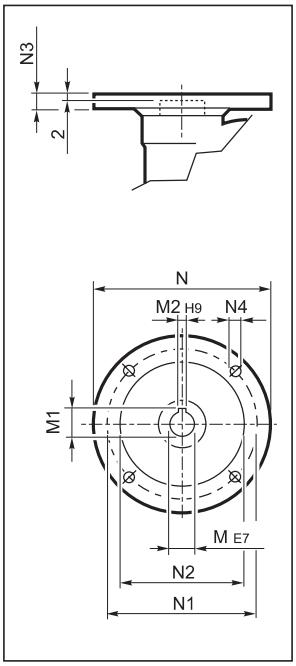

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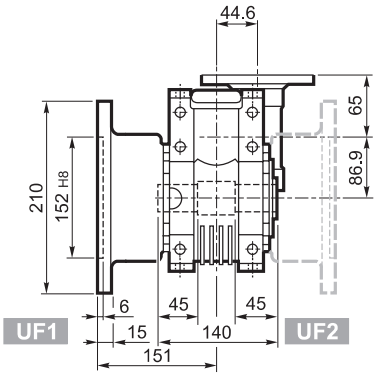

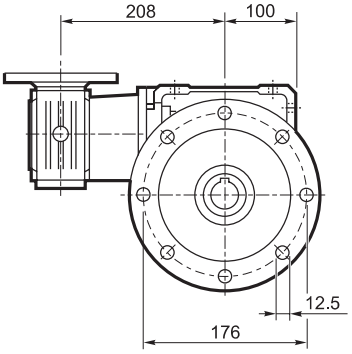

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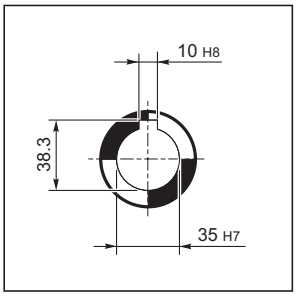

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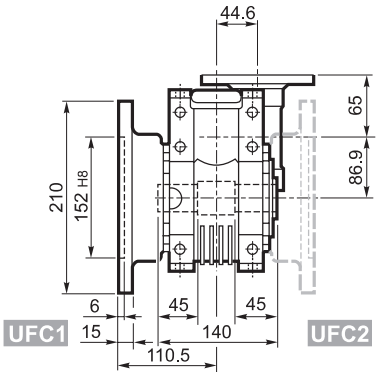
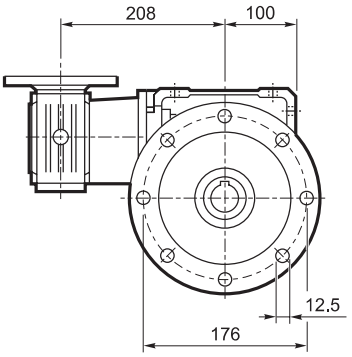


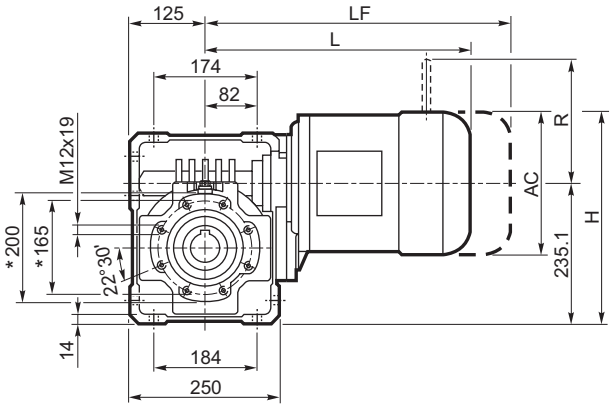


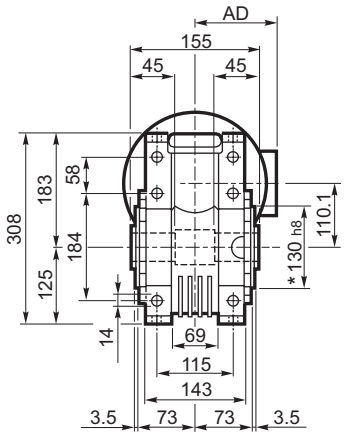
		M	M1	M2	N	N1	N2	N3	N4	Kg
VF/W 44/86	**P63 B5**	11	12.8	4	140	115	95	10	9.5	16.6
VF/W 44/86	**P71 B5**	14	16.3	5	160	130	110	10	9.5	
VF/W 44/86	**P63 B14**	11	12.8	4	90	75	60	8	5.5	
VF/W 44/86	**P71 B14**	14	16.3	5	105	85	70	10	7	

* On both sides

W 110...M/ME

U





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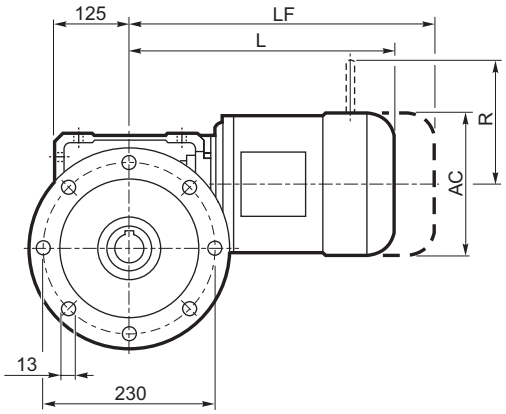

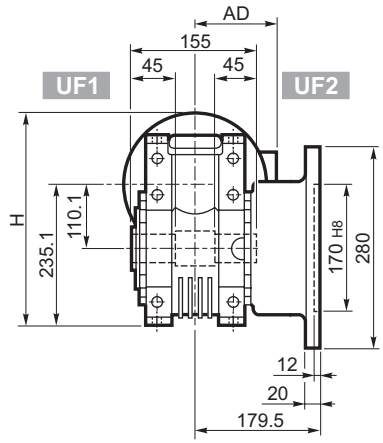

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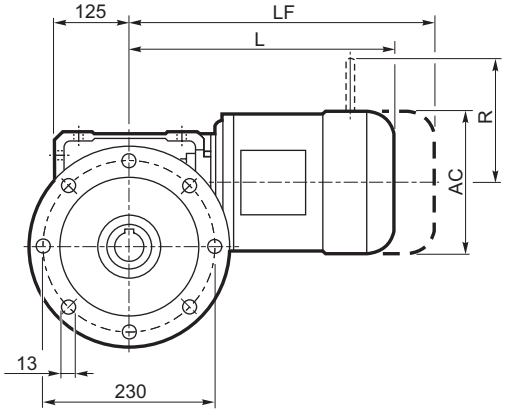
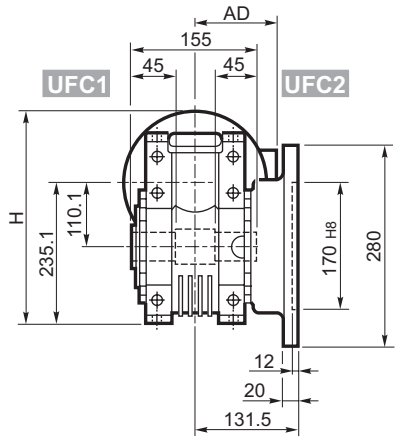
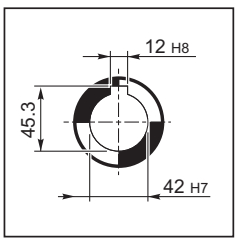




			M/ME					M...FD M...FA		M...FD		M...FA	
			AC	H	L	AD	Kg	LF	Kg	R	AD	R	AD
W 110	**S2**	**M2S**	156	313	364	119	38	440	41	129	146	134	119
W 110	**S2**	**ME2S**	156	313	364	119	38	—	—	—	—	—	—
W 110	**S3**	**ME3S**	193	332	407	142	47.5	—	—	—	—	—	—
W 110	**S3**	**ME3L**	193	332	439	142	53	—	—	—	—	—	—

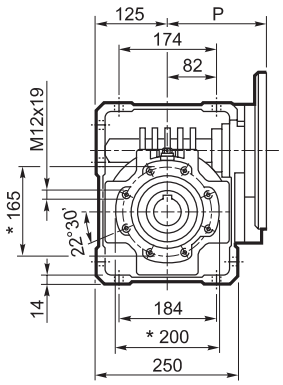
OUTPUT

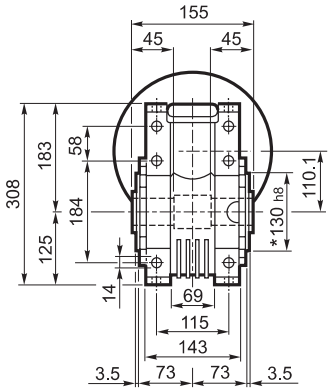


* On both sides

W 110...P (IEC)

U





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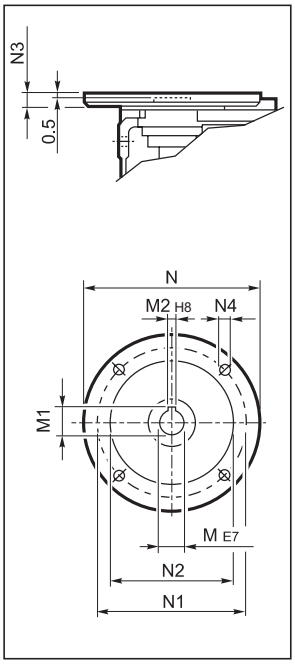

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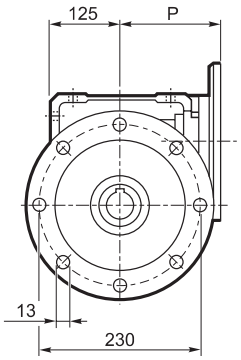

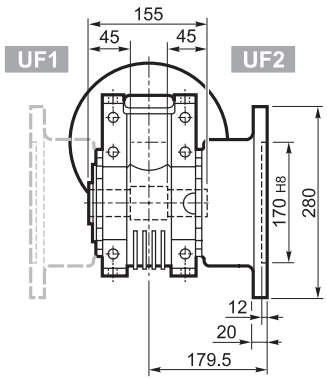

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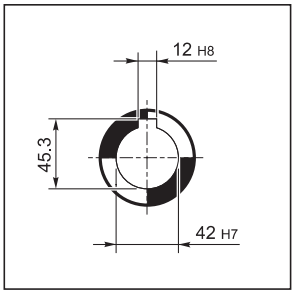

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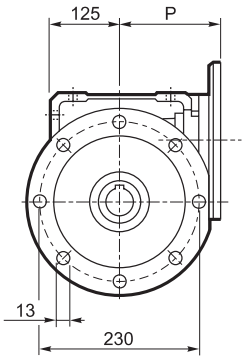
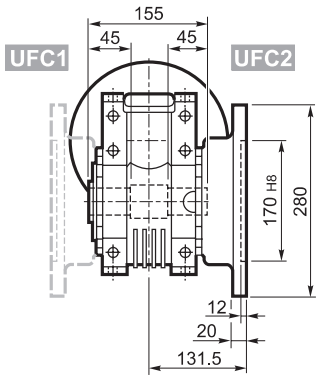


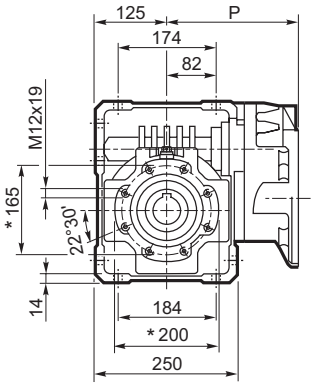


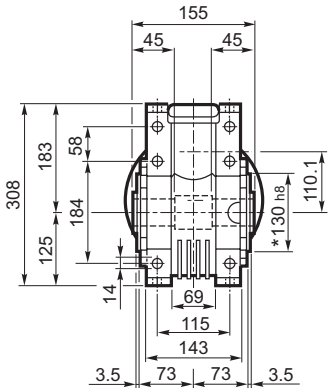
		M	M1	M2	N	N1	N2	N3	N4	P	Kg
W 110	**P80 B5**	19	21.8	6	200	165	130	—	M10x12	143	28
W 110	**P90 B5**	24	27.3	8	200	165	130	—	M10x12	143	28
W 110	**P100 B5**	28	31.3	8	250	215	180	13	13	151	29
W 110	**P112 B5**	28	31.3	8	250	215	180	13	13	151	29
W 110	**P132 B5**	38	41.3	10	300	265	230	16	14	226	31
W 110	**P80 B14**	19	21.8	6	120	100	80	7.5	7	143	27.5
W 110	**P90 B14**	24	27.3	8	140	115	95	6.5	9	143	27.5
W 110	**P100 B14**	28	31.3	8	160	130	110	13	9	151	27
W 110	**P112 B14**	28	31.3	8	160	130	110	13	9	151	27

* On both sides

WR 110...P (IEC)

U





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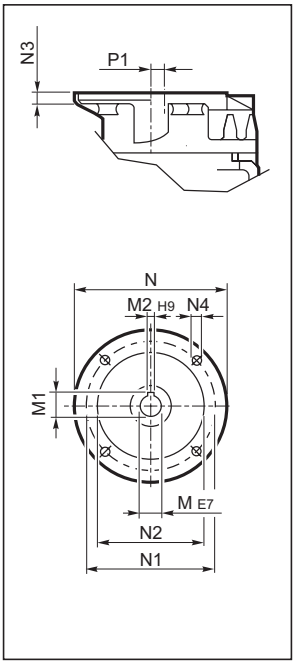
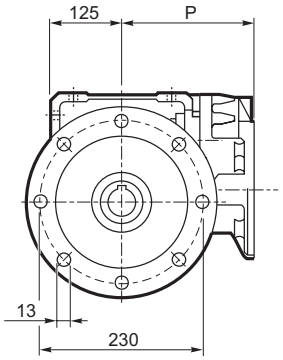
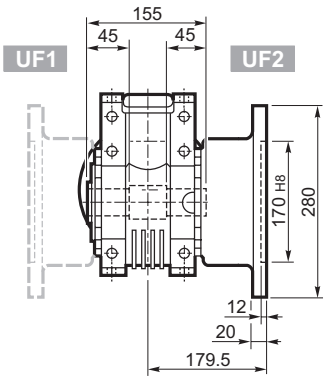
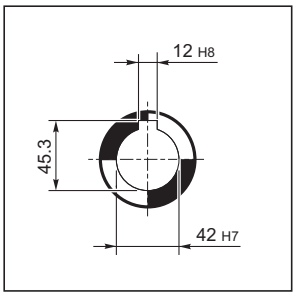


UF_

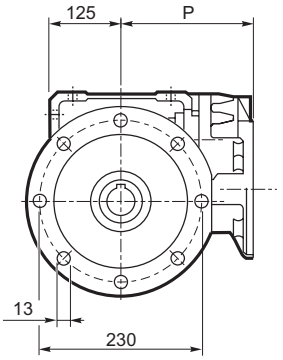


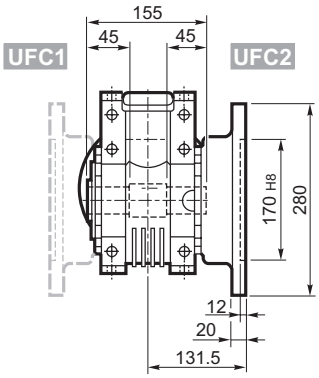


OUTPUT



UFC_



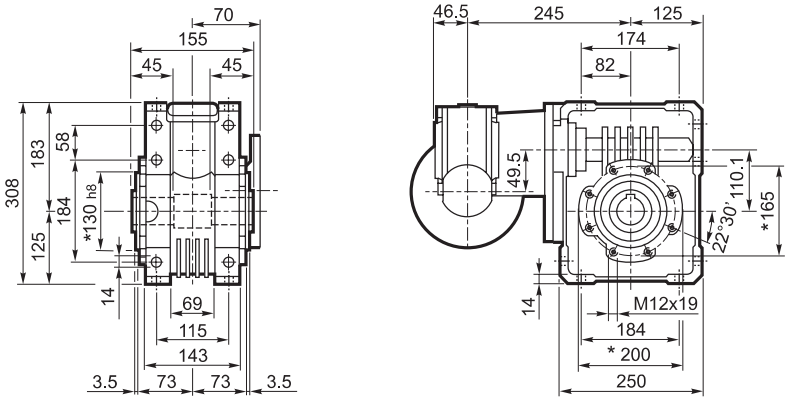


		M	M1	M2	N	N1	N2	N3	N4	P	P1	Kg
WR 110	**P71 B5**	14	16.3	5	160	130	110	10	M8x14	185	58.6	30.5
WR 110	**P80 B5**	19	21.8	6	200	165	130	14	M10x15	204	21.1	31
WR 110	**P90 B5**	24	27.3	8	200	165	130	14	M10x15	204	21.1	31
WR 110	**P100 B5**	28	31.3	8	250	215	180	14	M12x13	213	21.1	32
WR 110	**P112 B5**	28	31.3	8	250	215	180	14	M12x13	213	21.1	32

* On both sides

VF/W 49/110...P (IEC)

U



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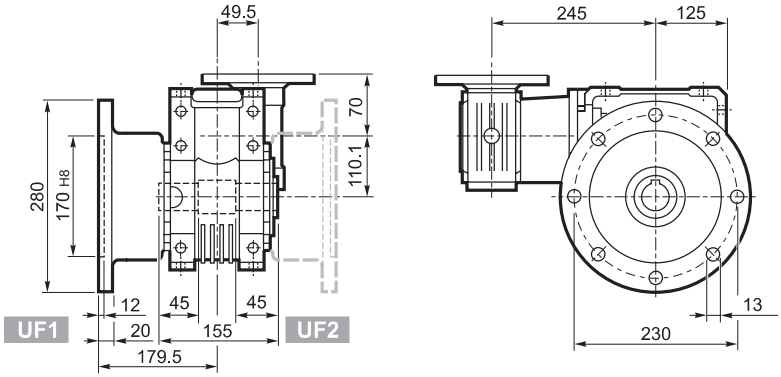

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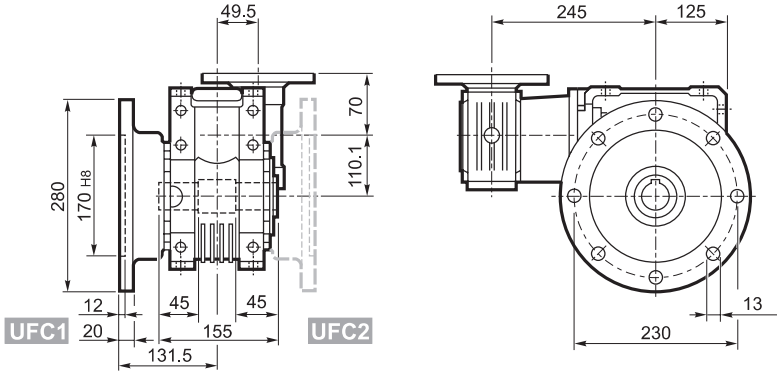

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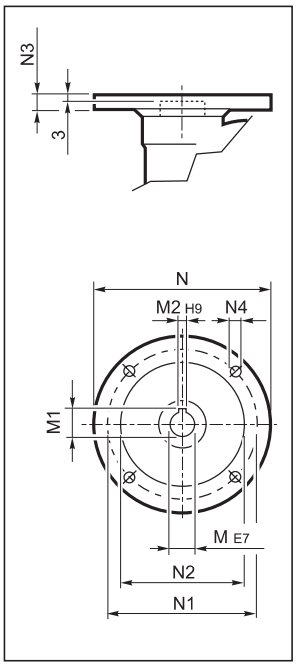
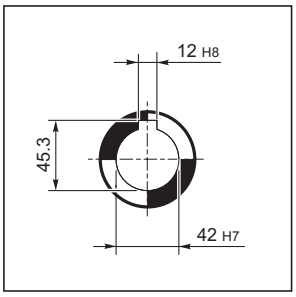


OUTPUT

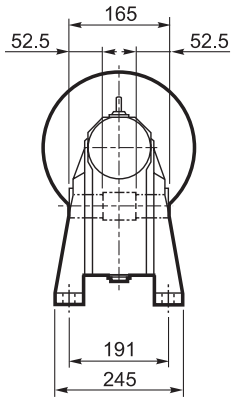


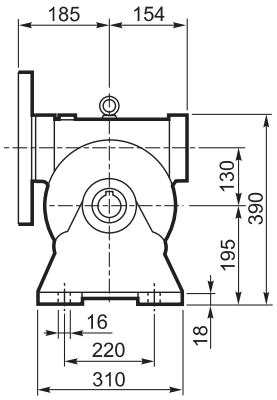
		M	M1	M2	N	N1	N2	N3	N4	Kg
VF/W 49/110	**P63 B5**	11	12.8	4	140	115	95	10.5	9.5	33
VF/W 49/110	**P71 B5**	14	16.3	5	160	130	110	10.5	9.5	
VF/W 49/110	**P80 B5**	19	21.8	6	200	165	130	10	11.5	
VF/W 49/110	**P63 B14**	11	12.8	4	90	75	60	7	6	
VF/W 49/110	**P71 B14**	14	16.3	5	105	85	70	10.5	6.5	
VF/W 49/110	**P80 B14**	19	21.8	6	120	100	80	10	7	

* On both sides

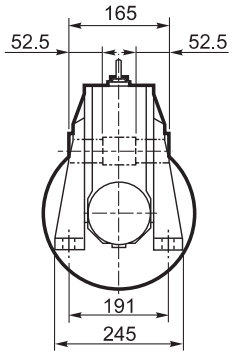
VF 130...P (IEC)

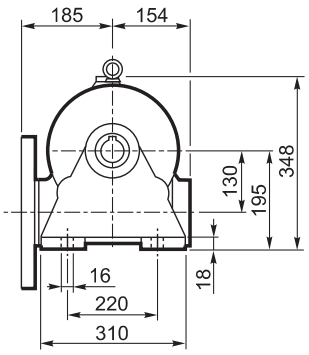
A



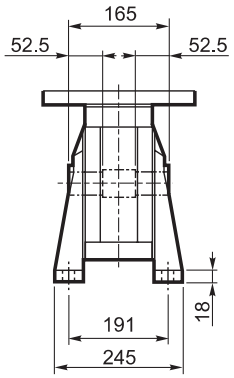


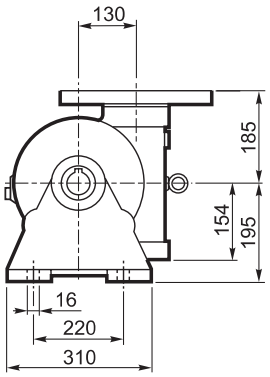
N



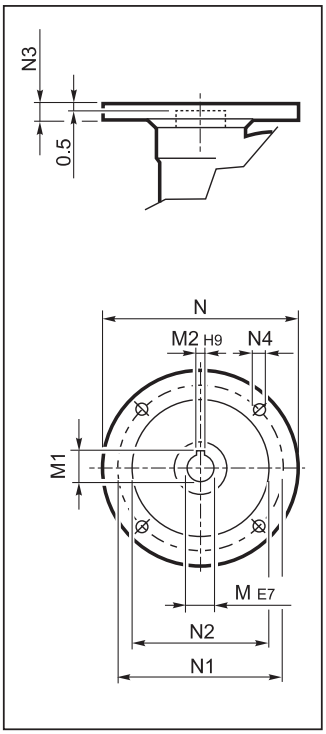


V

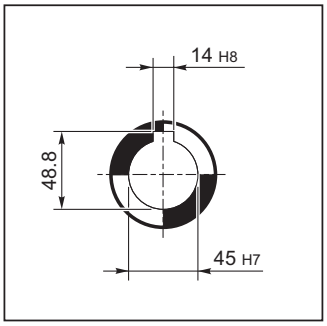




INPUT

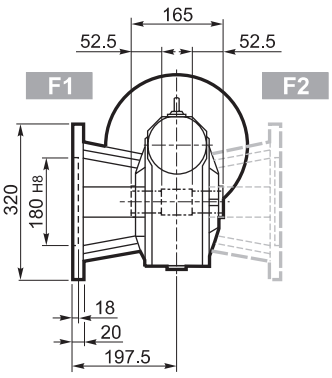


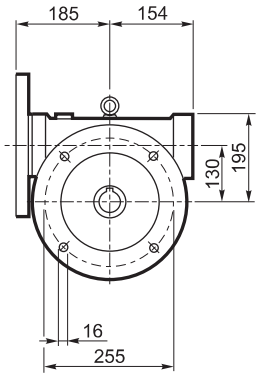
OUTPUT



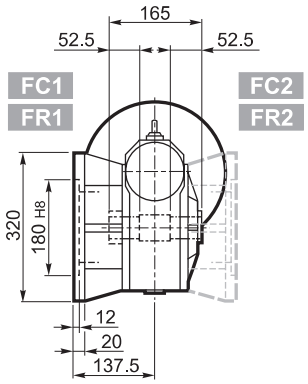
VF 130...P (IEC)

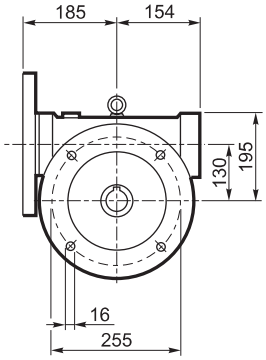
F_



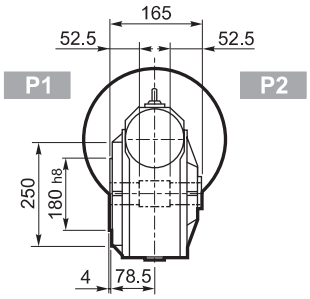


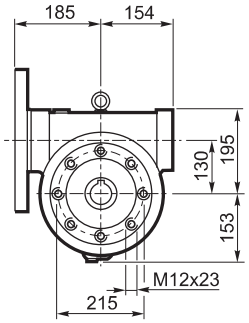
FC_
FR_





P_





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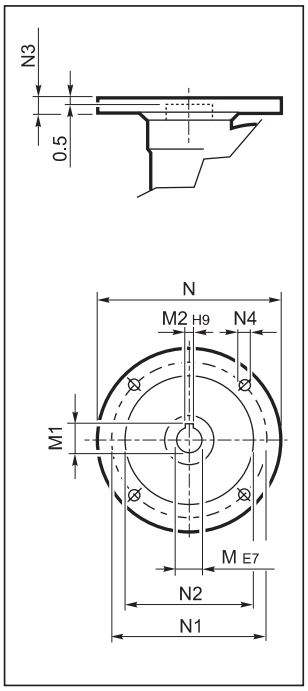

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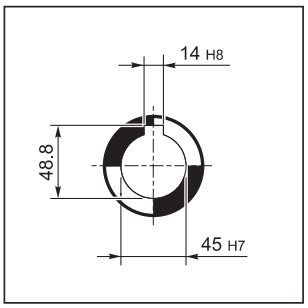
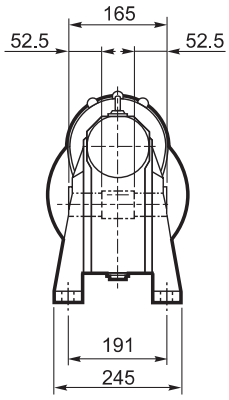


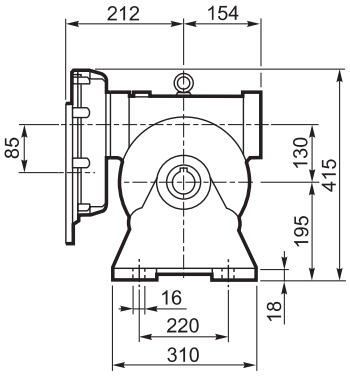
		M	M1	M2	N	N1	N2	N3	N4	Kg
VF130	**P90 B5**	24	27.3	8	200	165	130	17	11	49
VF130	**P100 B5**	28	31.3	8	250	215	180	17	13	
VF130	**P112 B5**	28	31.3	8	250	215	180	17	13	
VF130	**P132 B5**	38	40.1#	10	300	265	230	17	13	

Lowered key

VFR 130...P (IEC)

A





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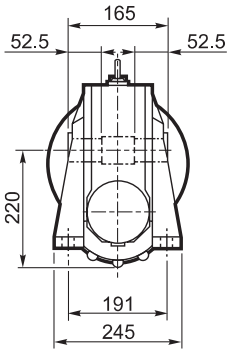
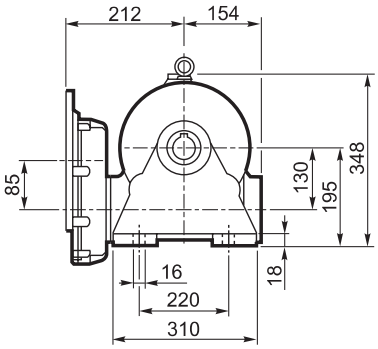
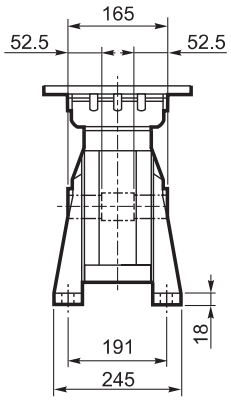
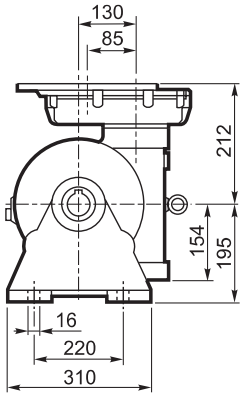




V





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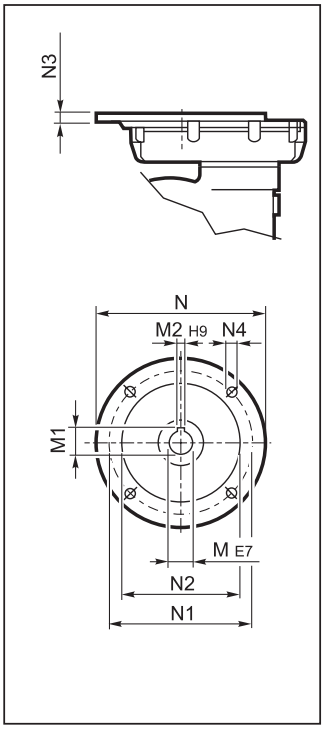

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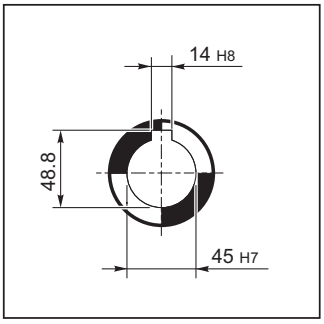
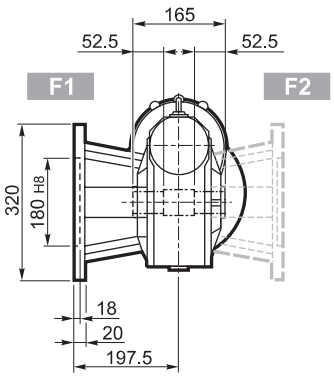
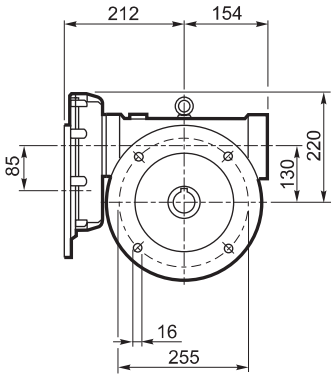


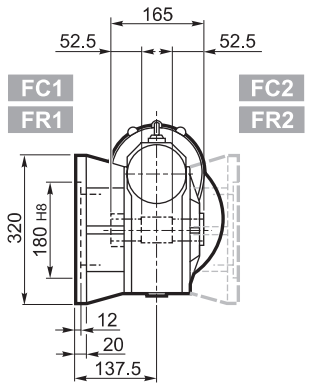
VFR 130...P (IEC)

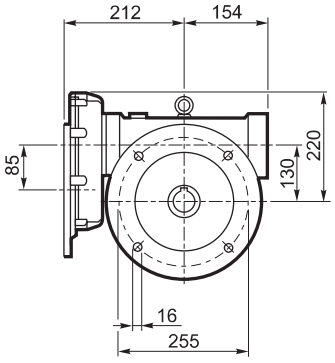
F_



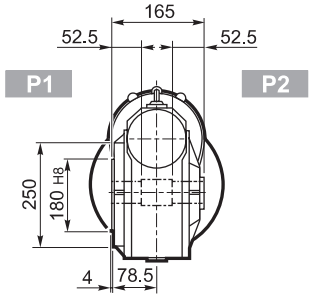


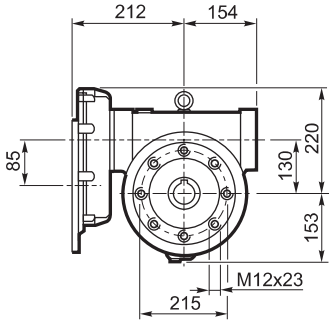
FC_
FR_



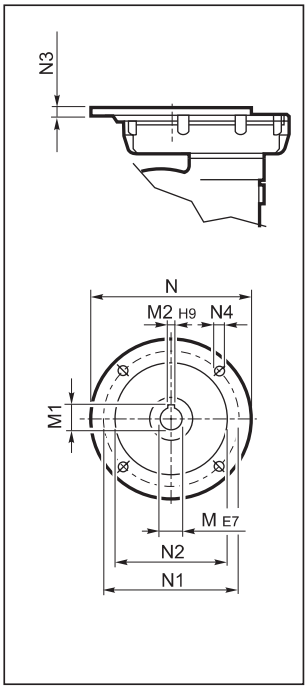


P_

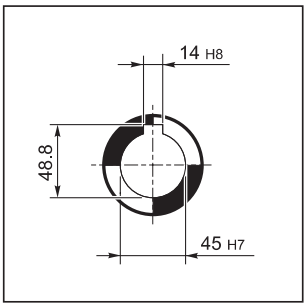




INPUT



OUTPUT

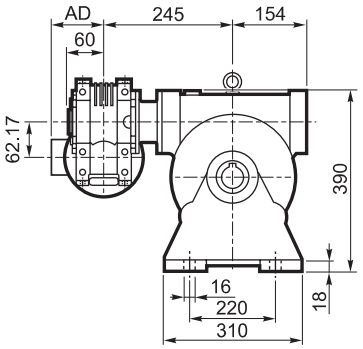


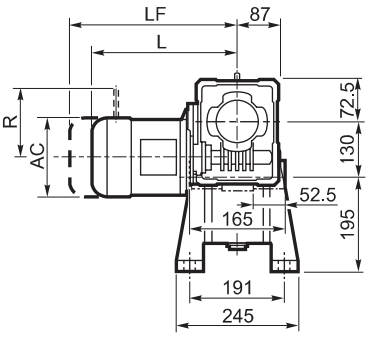
		M	M1	M2	N	N1	N2	N3	N4	Kg
VFR 130	**P80 B5**	19 K6	21.8	6	200	165	130	12	M10x25	57
VFR 130	**P90 B5**	24 K6	27.3	8	200	165	130	12	M10x25	
VRF 130	**P100 B5**	28 J6	29.1#	8	250	215	180	13	M12x35	
VRF 130	**P112 B5**	28 J6	29.1#	8	250	215	180	13	M12x35	

Lowered key

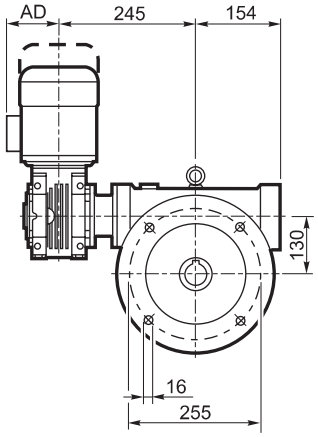
W/VF 63/130...M/ME

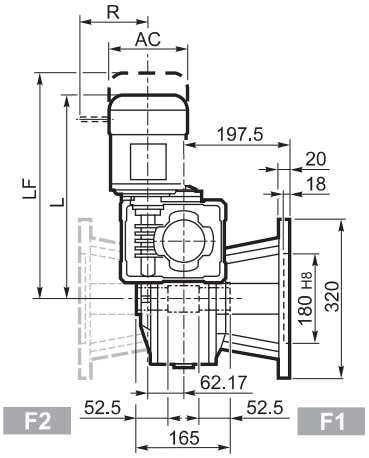
A

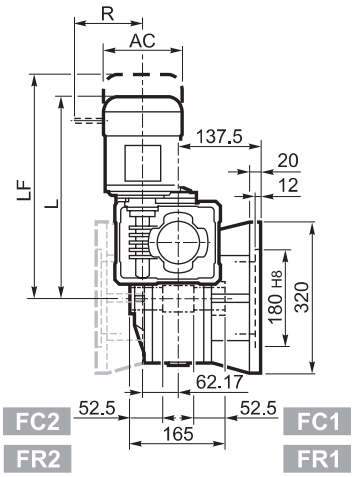




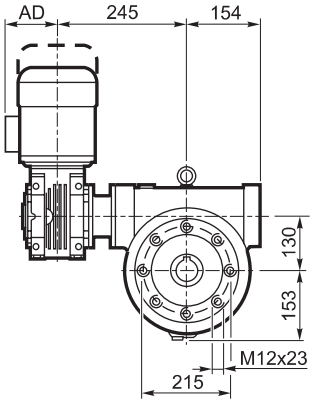
F_
FC_
FR_

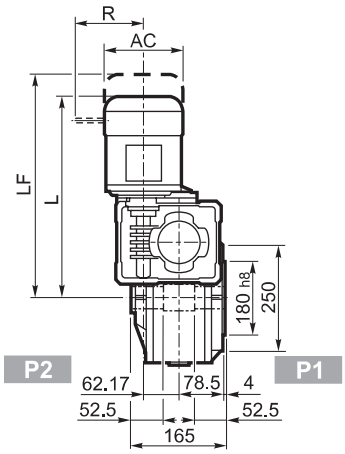


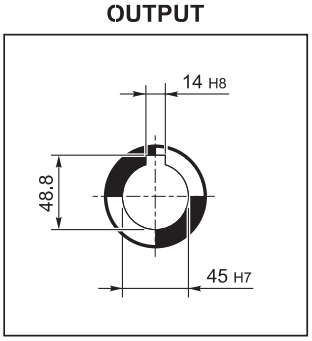




P_





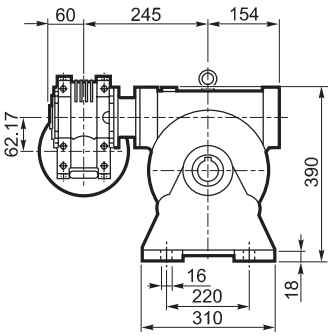


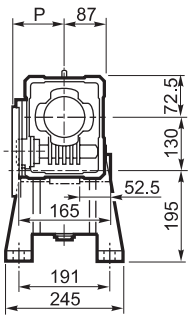
			M/ME				M...FD M...FA		M...FD		M...FA	
			AC	L	AD	Kg	LF	Kg	R	AD	R	AD
W/VF 63/130	**S1**	**M1**	138	419	108	63	480	65	103	135	124	108
W/VF 63/130	**S2**	**ME2S**	156	447	119	68	—	—	—	—	—	—

Bonfiglioli Riduttori

W/VF 63/130...P (IEC)

A





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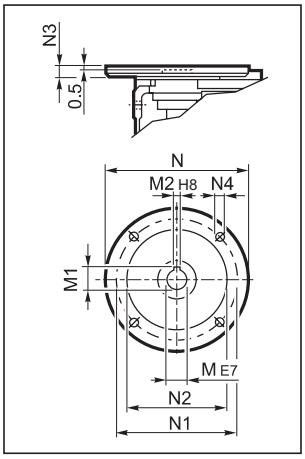
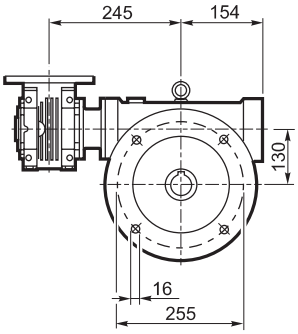
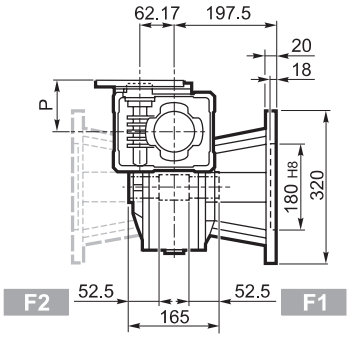
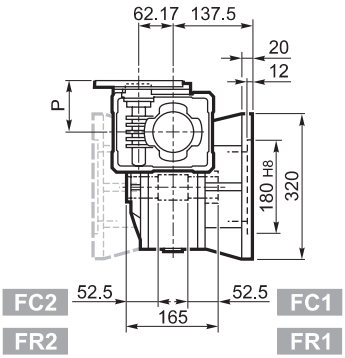


F_
FC_
FR_







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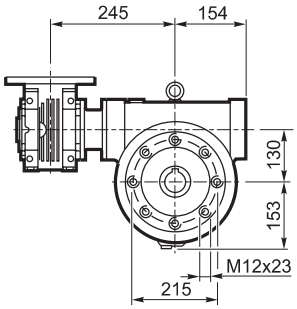

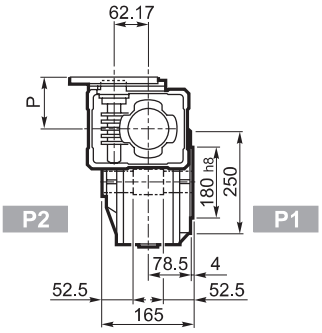

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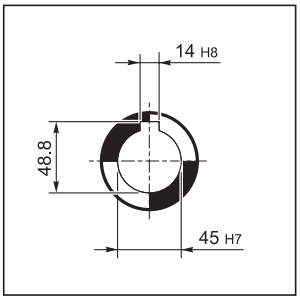
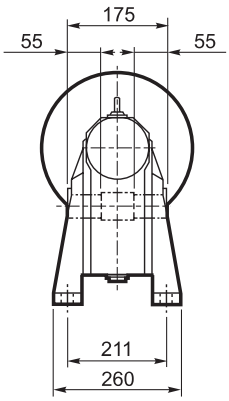
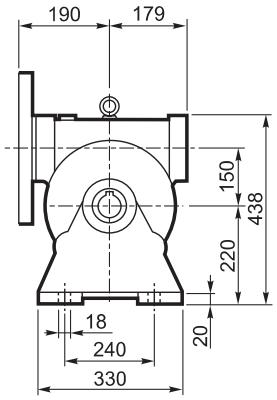


		M	M1	M2	N	N1	N2	N3	N4	P	kg
W/VF 63/130	**P71 B5**	14	16.3	5	160	130	110	11	9	95	57
W/VF 63/130	**P80 B5**	19	21.8	6	200	165	130	12	11.5	102	
W/VF 63/130	**P90 B5**	24	27.3	8	200	165	130	12	11.5	102	
W/VF 63/130	**P71 B14**	14	16.3	5	105	85	70	11	6.5	95	
W/VF 63/130	**P80 B14**	19	21.8	6	120	100	80	11	6.5	102	
W/VF 63/130	**P90 B14**	24	27.3	8	140	115	95	11	8.5	102	

VF 150...P (IEC)

A





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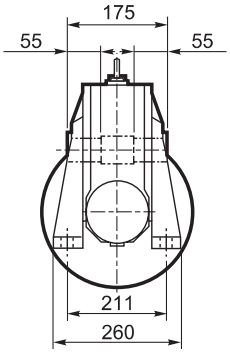

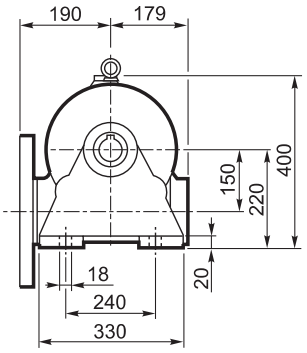

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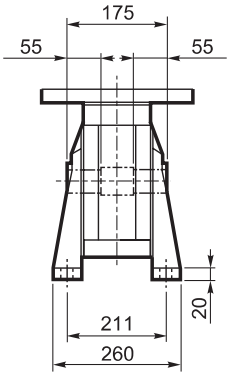

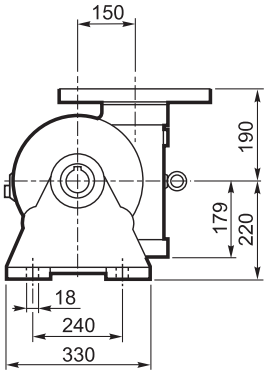

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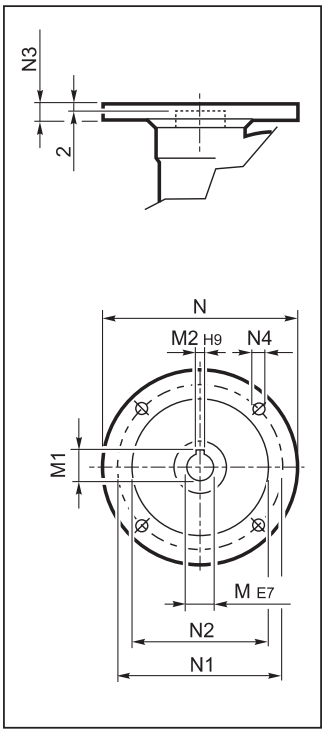

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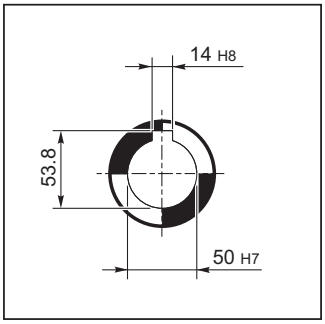
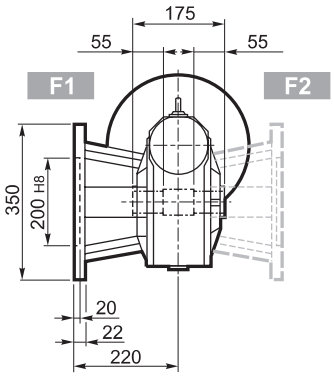
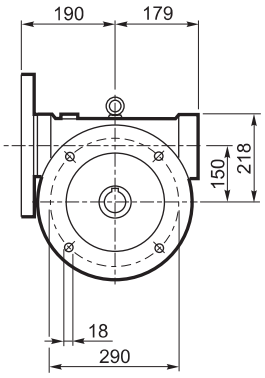


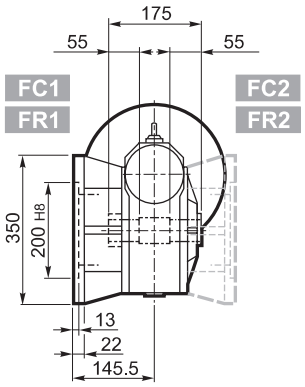
VF 150...P (IEC)

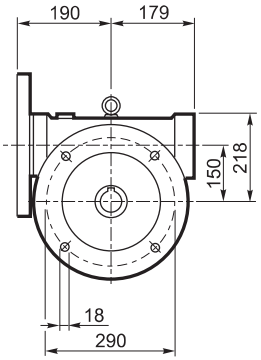
F_



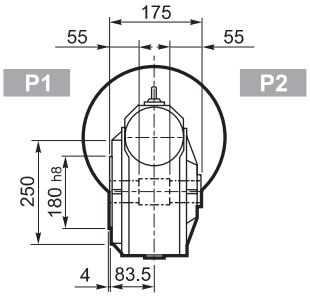


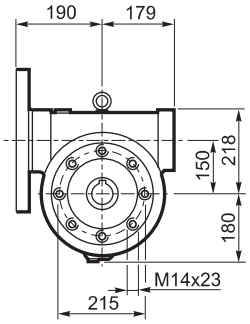
FC_
FR_





P_





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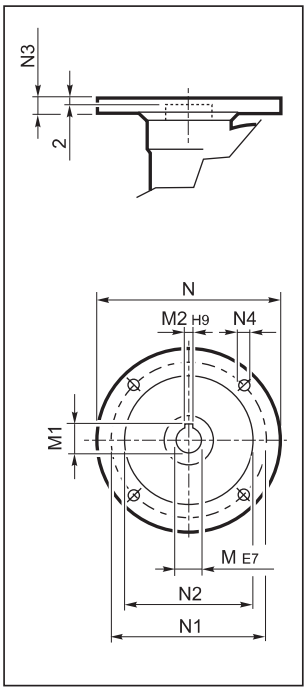

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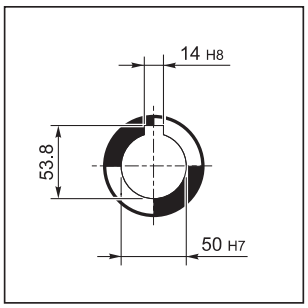
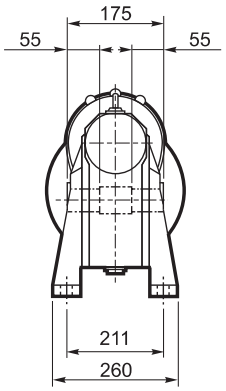


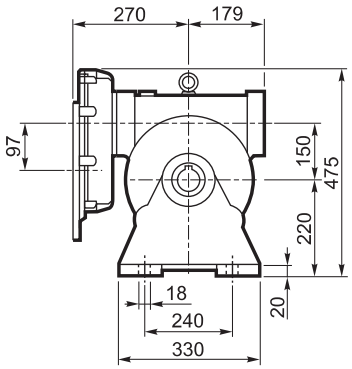
		M	M1	M2	N	N1	N2	N3	N4	Kg
VF 150	**P100 B5**	28	31.3	8	250	215	180	11	13	60
VF 150	**P112 B5**	28	31.3	8	250	215	180	11	13	
VF 150	**P132 B5**	38	41.3	10	300	265	230	16	13	
VF 150	**P160 B5**	42	44.6#	12	350	300	250	18	18	

Lowered key

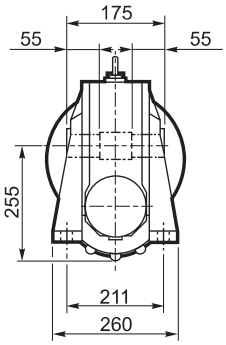
VFR 150...P (IEC)

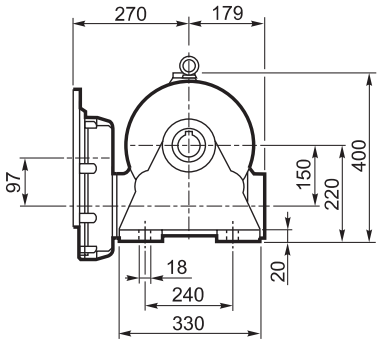
A



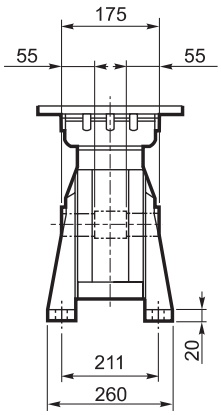


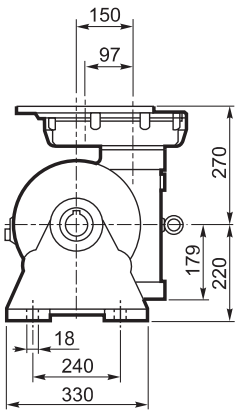
N





V





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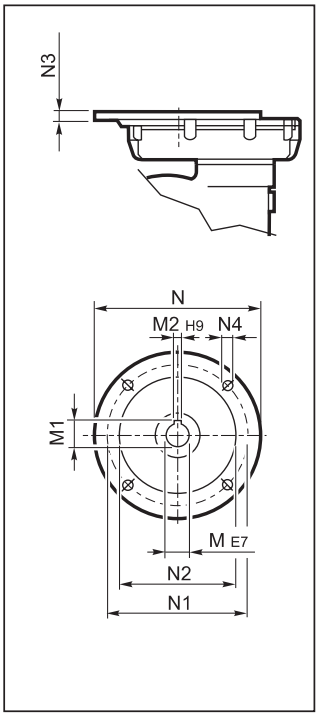

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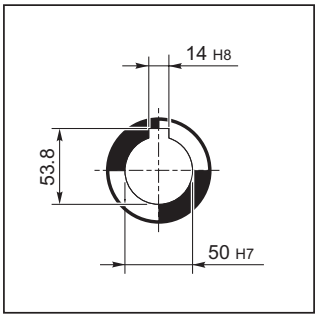
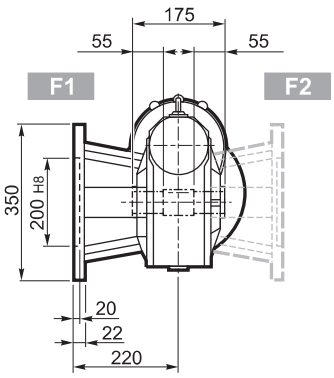
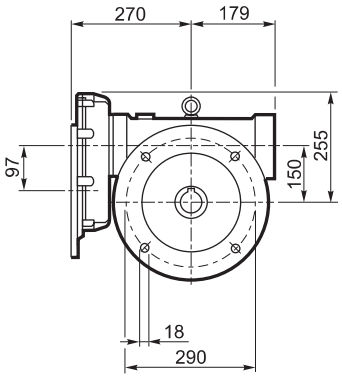


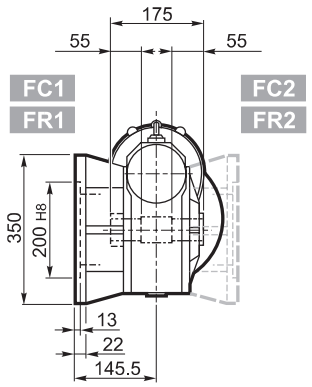
VFR 150...P (IEC)

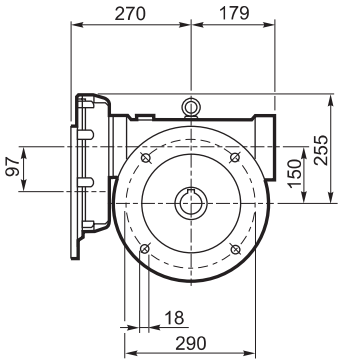
F_



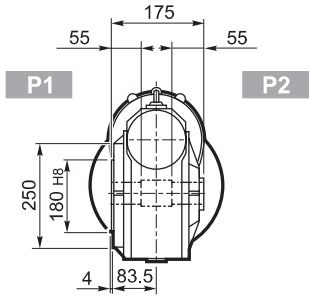


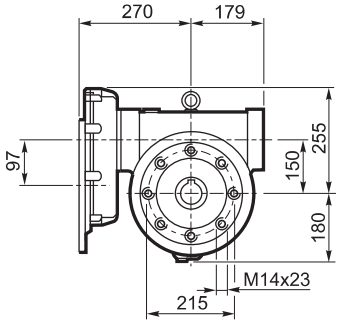
FC_
FR_





P_





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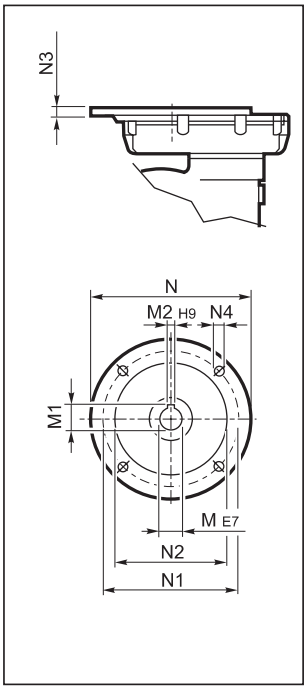
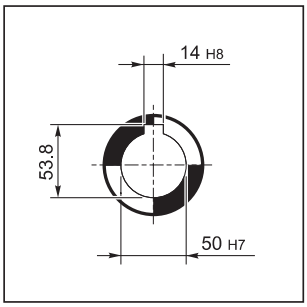


OUTPUT

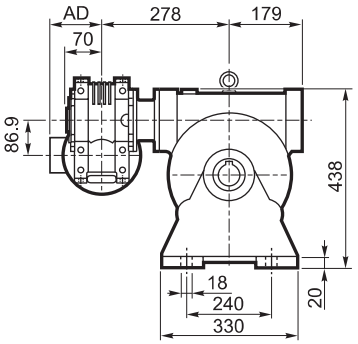


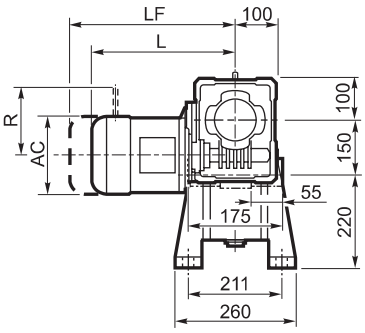
		M	M1	M2	N	N1	N2	N3	N4	Kg
VFR 150	**P90 B5**	24 K6	27.3	8	200	165	130	13	M10x25	71
VRF 150	**P100 B5**	28 K6	31.3	8	250	215	180	13	M12x35	
VRF 150	**P112 B5**	28 J6	31.3	8	250	215	180	13	M12x35	
VFR 150	**P132 B5**	38 J6	39.6#	10	300	265	230	13	M12x35	

Lowered key

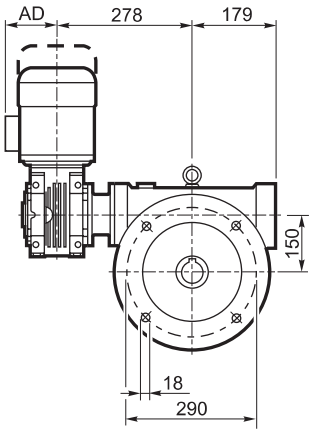
W/VF 86/150...M/ME

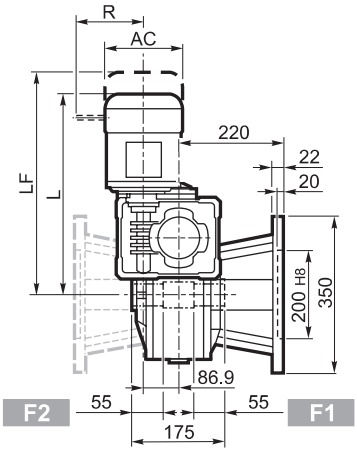
A

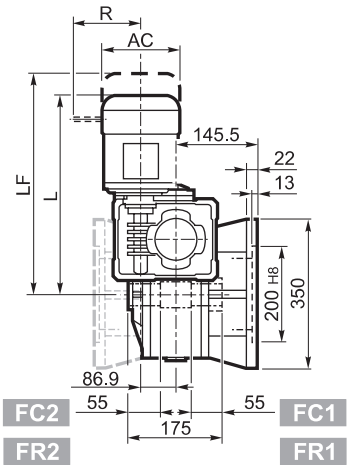




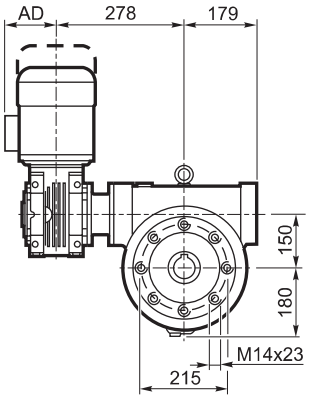
F_
FC_
FR_

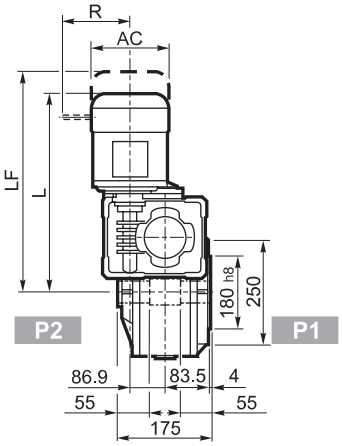


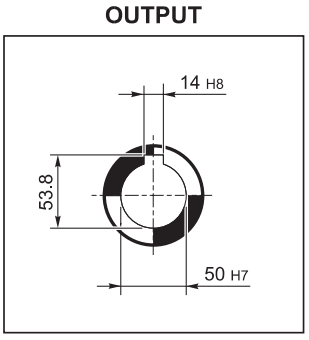




P_



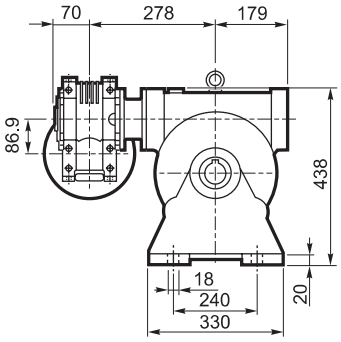


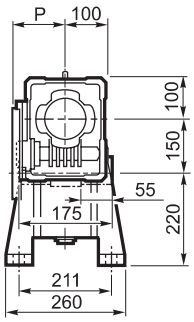


			M/ME				M...FD M...FA		M...FD		M...FA	
			AC	L	AD	Kg	LF	Kg	R	AD	R	AD
W/VF 86/150	**S1**	**M1**	138	474	108	82	385	84	103	135	124	108
W/VF 86/150	**S2**	**ME2S**	156	499	119	86	—	—	—	—	—	—
W/VF 86/150	**S3**	**ME3S**	193	542	142	92.5	—	—	—	—	—	—
W/VF 86/150	**S3**	**ME3L**	193	574	142	98	—	—	—	—	—	—

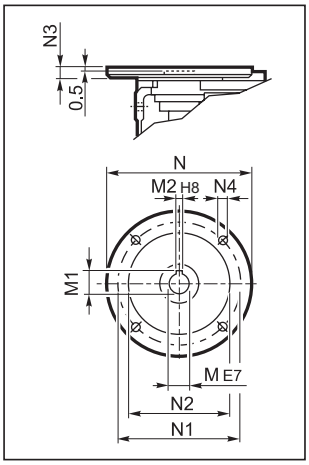
W/VF 86/150...P (IEC)

A

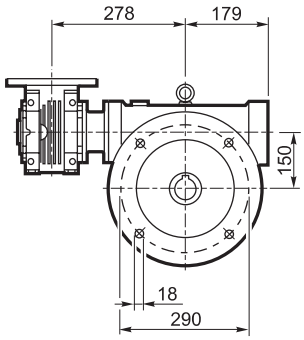


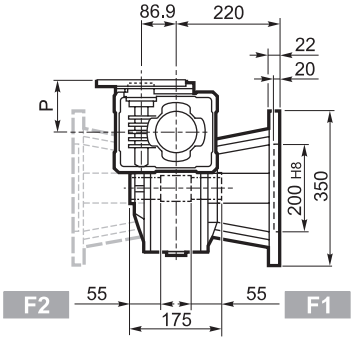


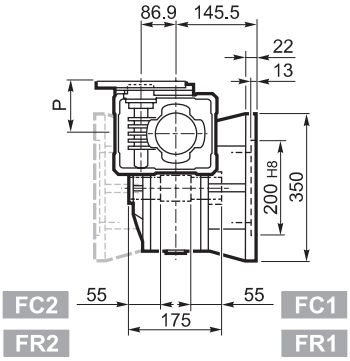
INPUT



F_
FC_
FR_







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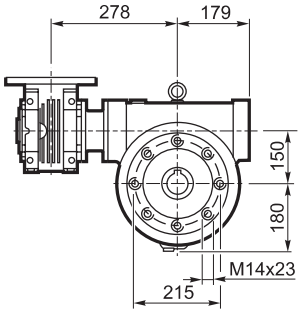

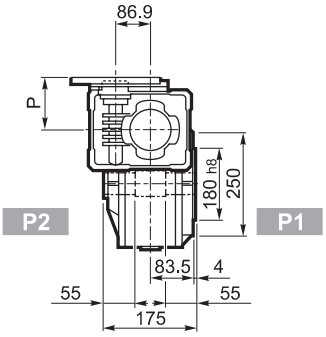

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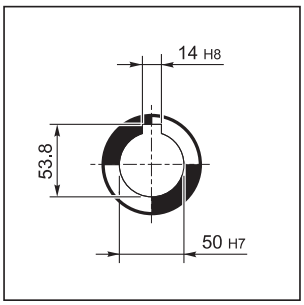
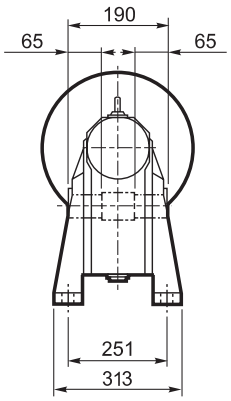
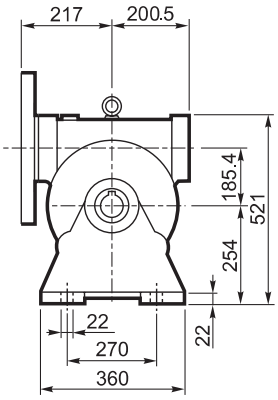


		M	M1	M2	N	N1	N2	N3	N4	P	Kg
W/VF 86/150	**P71 B5**	14	16.3	5	160	130	110	11	9	128	
W/VF 86/150	**P80 B5**	19	21.8	6	200	165	130	12	11.5	128	
W/VF 86/150	**P90 B5**	24	27.3	8	200	165	130	12	11.5	128	
W/VF 86/150	**P100 B5**	28	31.3	8	250	215	180	13	12.5	136	
W/VF 86/150	**P112 B5**	28	31.3	8	250	215	180	13	12.5	136	75
W/VF 86/150	**P80 B14**	19	21.8	6	120	100	80	7.5	6.5	128	
W/VF 86/150	**P90 B14**	24	27.3	8	140	115	95	7.5	8.5	128	
W/VF 86/150	**P100 B14**	28	31.3	8	160	130	110	10	8.5	136	
W/VF 86/150	**P112 B14**	28	31.3	8	160	130	110	10	8.5	136	

VF 185...P (IEC)

A





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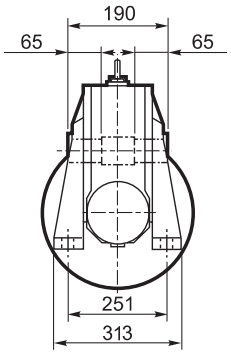
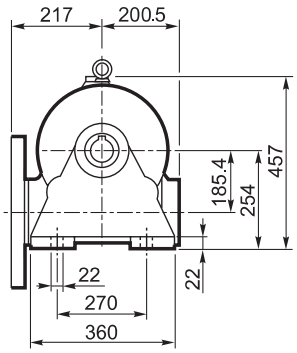
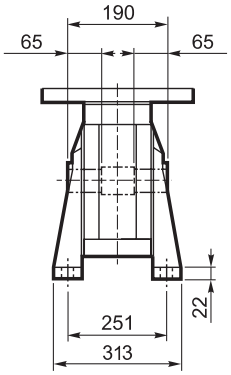
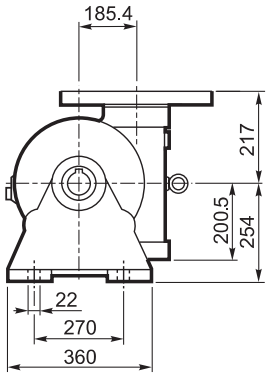




V





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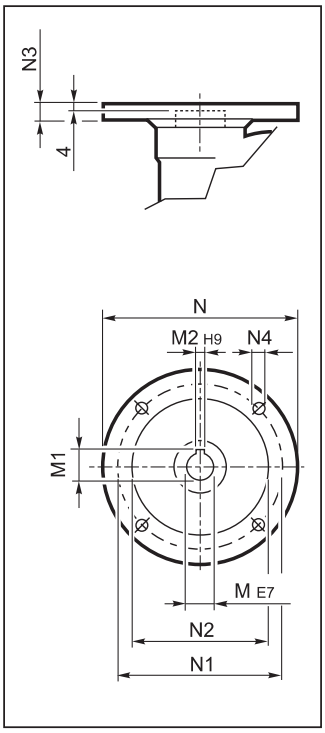

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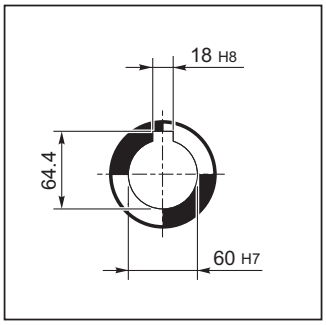
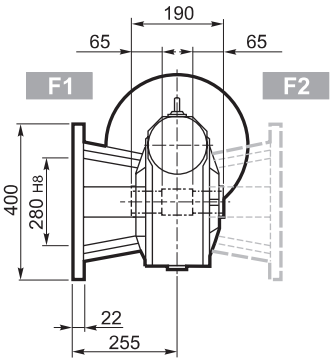
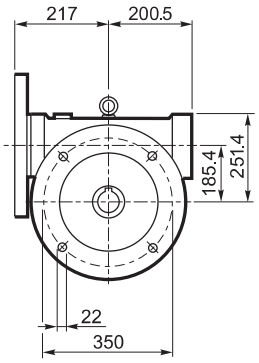


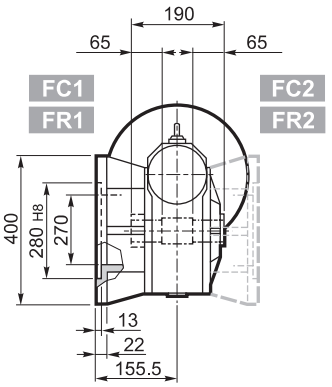
VF 185...P (IEC)

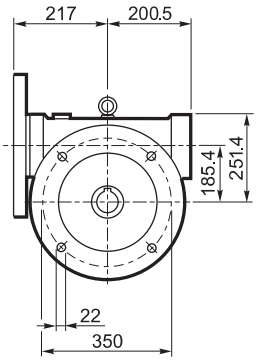
F_





FC_
FR_





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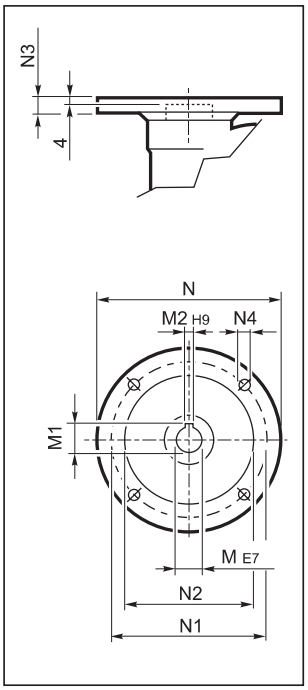
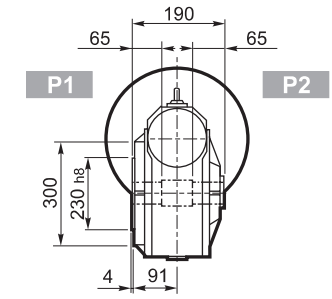
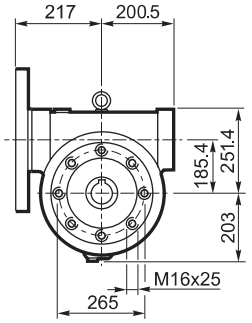
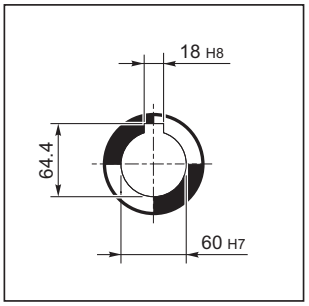


P_





OUTPUT

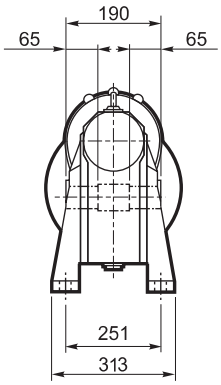


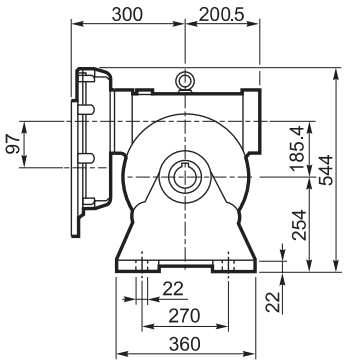
		M	M1	M2	N	N1	N2	N3	N4	Kg
VF 185	**P100 B5**	28	31.3	8	250	215	180	16	13	94
VF 185	**P112 B5**	28	31.3	8	250	215	180	16	13	
VF 185	**P132 B5**	38	41.3	10	300	265	230	16	13	
VF 185	**P160 B5**	42	45.3	12	350	300	250	18	18	
VF 185	**P180 B5**	48	51.2#	14	350	300	250	18	18	

Lowered key

VFR 185...P (IEC)

A





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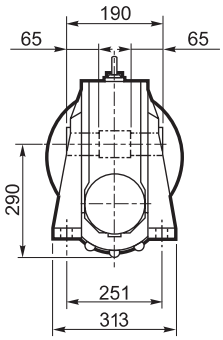
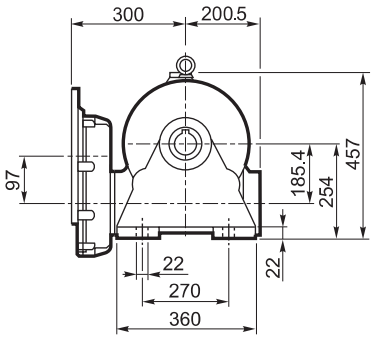
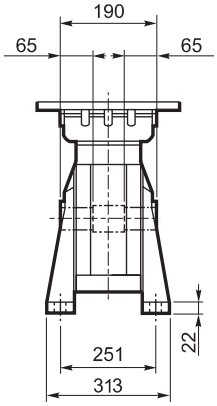
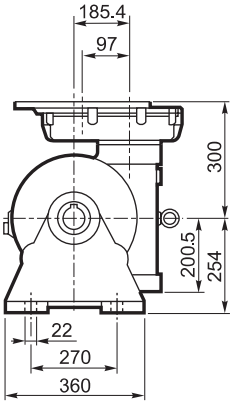




V





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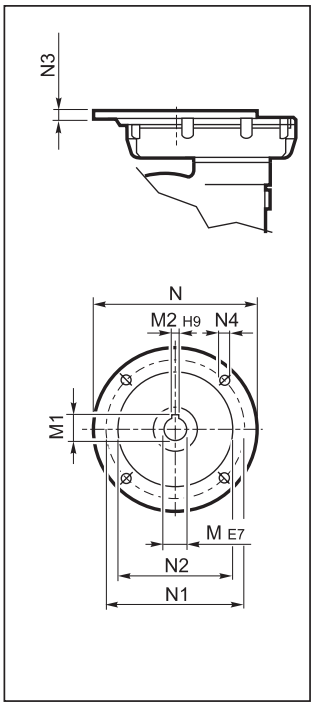

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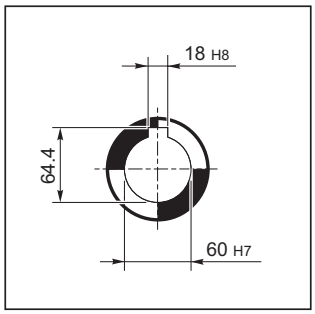
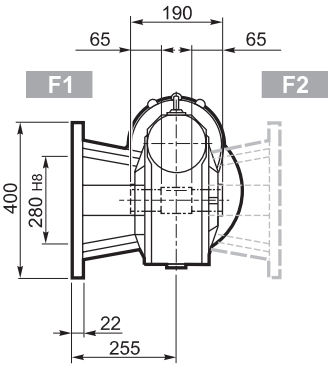
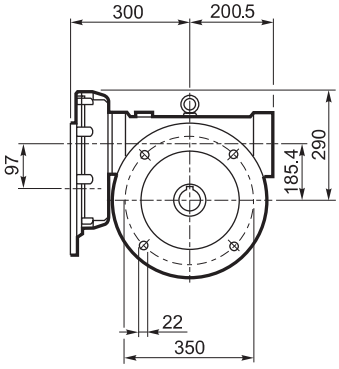


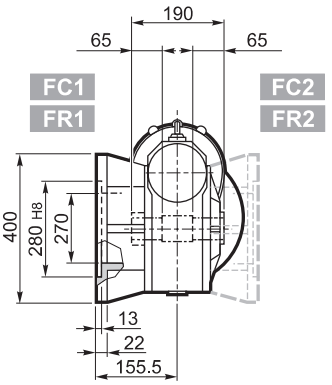
VFR 185...P (IEC)

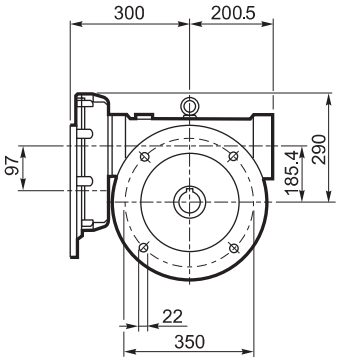
F_



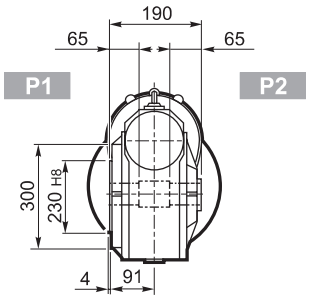


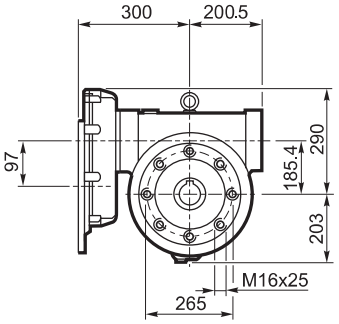
FC_
FR_



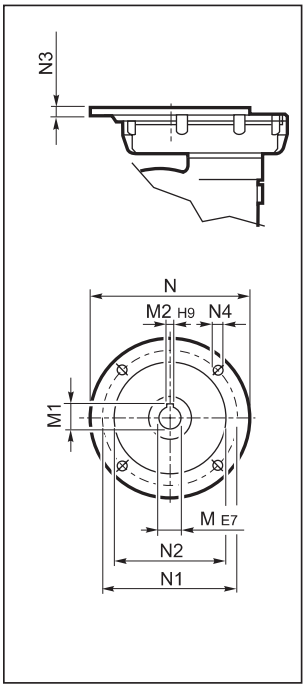


P_

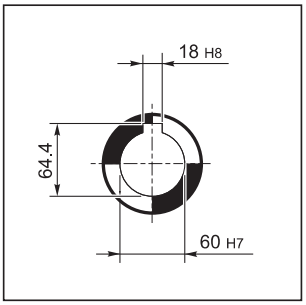




INPUT



OUTPUT

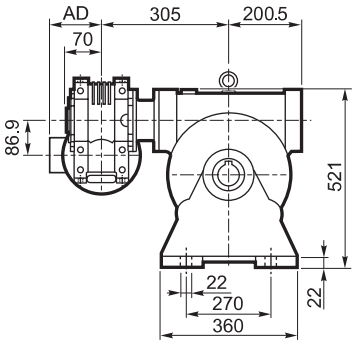


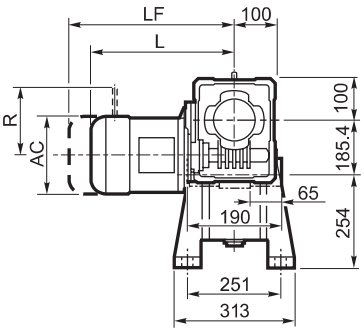
		M	M1	M2	N	N1	N2	N3	N4	Kg
VFR 185	**P90 B5**	24 K6	27.3	8	200	165	130	13	M10x25	110
VRF 185	**P100 B5**	28 K6	31.3	8	250	215	180	13	M12x35	
VRF 185	**P112 B5**	28 K6	31.3	8	250	215	180	13	M12x35	
VFR 185	**P132 B5**	38 J6	39.6#	10	300	265	230	13	M12x35	

Lowered key

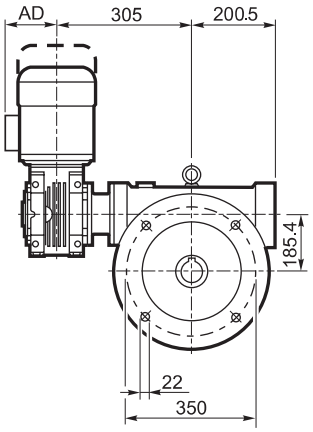
W/VF 86/185...M/ME

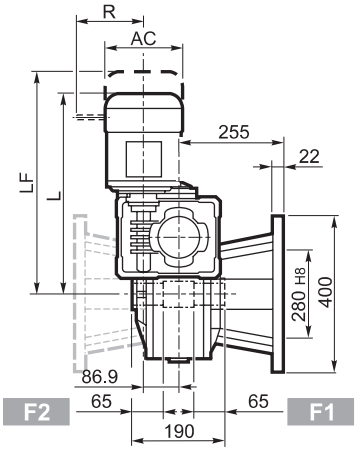
A

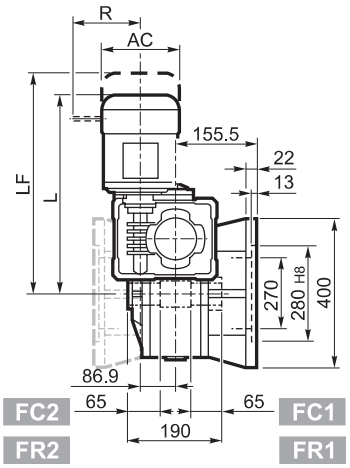




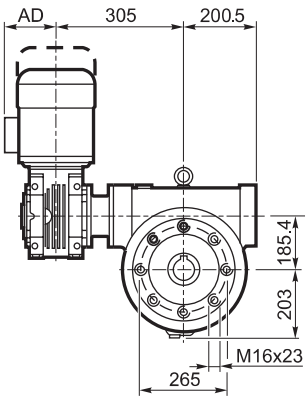
F_
FC_
FR_

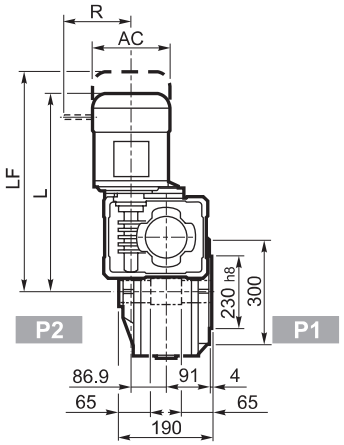


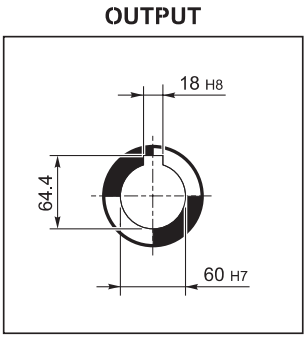




P_



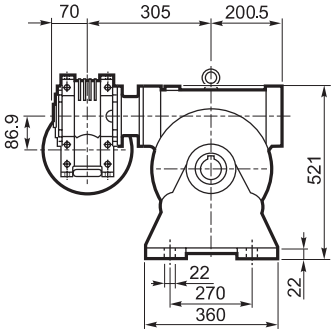


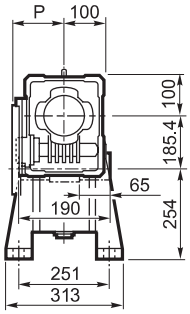


			M/ME				M...FD M...FA		M...FD		M...FA	
			AC	L	AD	Kg	LF	Kg	R	AD	R	AD
W/VF 86/185	**S1**	**M1**	138	509	108	116	570	118	103	135	124	108
W/VF 86/185	**S2**	**ME2S**	156	534	119	120	—	—	—	—	—	—
W/VF 86/185	**S3**	**ME3S**	193	577	142	126.5	—	—	—	—	—	—
W/VF 86/185	**S3**	**ME3L**	193	609	142	132	—	—	—	—	—	—

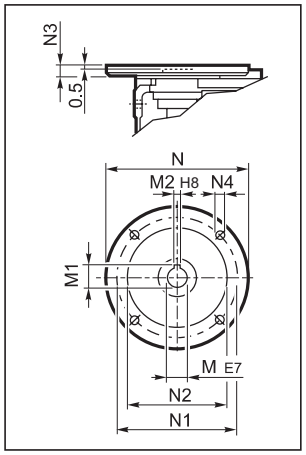
W/VF 86/185...P (IEC)

A

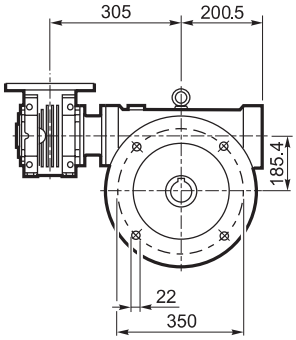


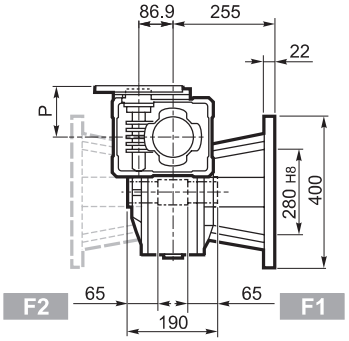


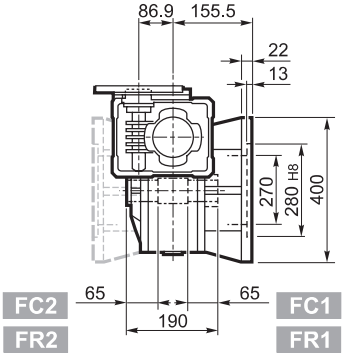
INPUT



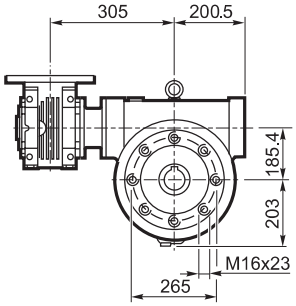
F_
FC_
FR_

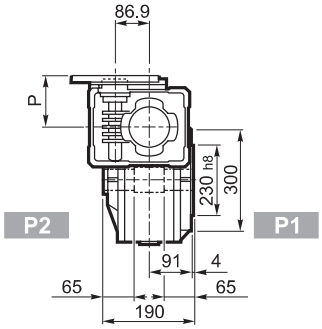




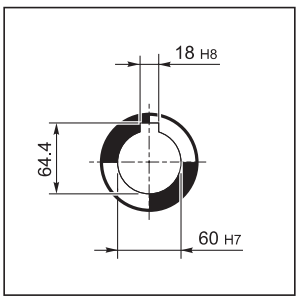


P_





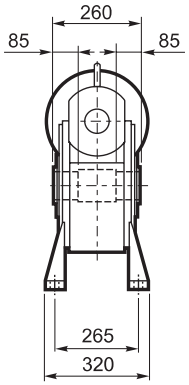
OUTPUT

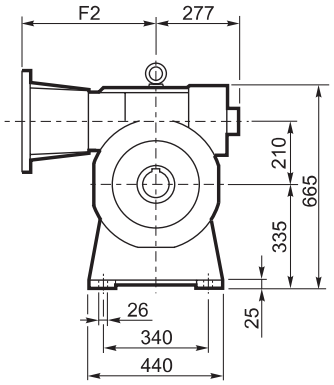


		M	M1	M2	N	N1	N2	N3	N4	P	Kg
W/VF 86/185	**P71 B5**	14	16.3	5	160	130	110	11	9	128	
W/VF 86/185	**P80 B5**	19	21.8	6	200	165	130	12	11.5	128	
W/VF 86/185	**P90 B5**	24	27.3	8	200	165	130	12	11.5	128	
W/VF 86/185	**P100 B5**	28	31.3	8	250	215	180	13	12.5	136	
W/VF 86/185	**P112 B5**	28	31.3	8	250	215	180	13	12.5	136	109
W/VF 86/185	**P80 B14**	19	21.8	6	120	100	80	7.5	6.5	128	
W/VF 86/185	**P90 B14**	24	27.3	8	140	115	95	7.5	8.5	128	
W/VF 86/185	**P100 B14**	28	31.3	8	160	130	110	10	8.5	136	
W/VF 86/185	**P112 B14**	28	31.3	8	160	130	110	10	8.5	136	

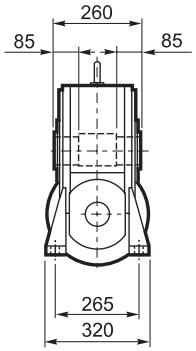
VF 210...P (IEC)

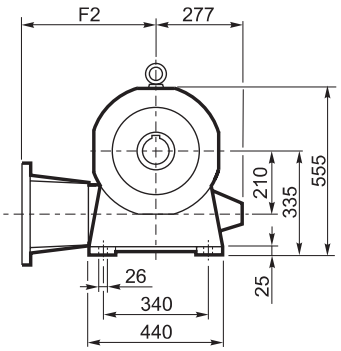
A





N





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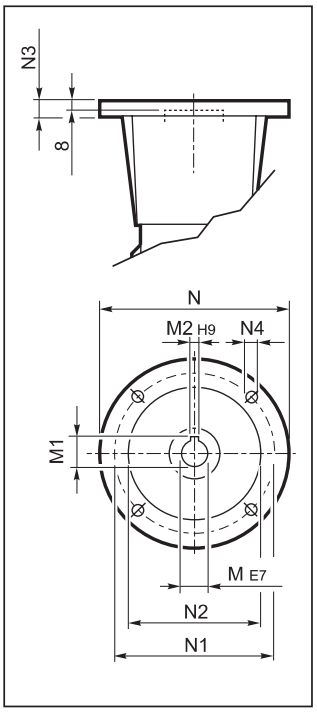

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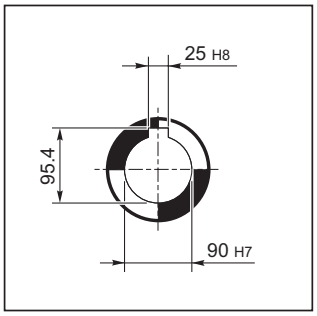
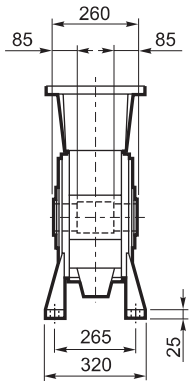
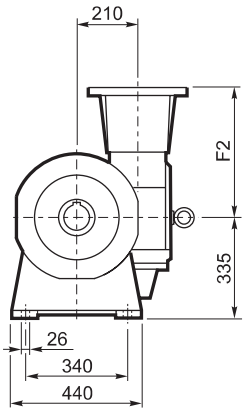


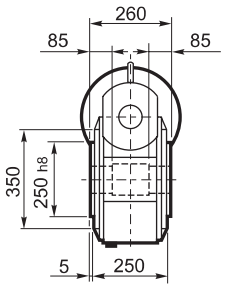
VF 210...P (IEC)

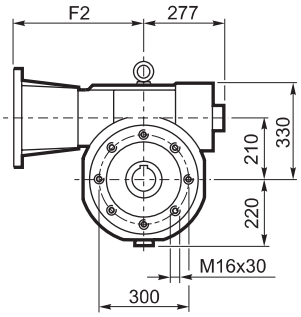
V





P





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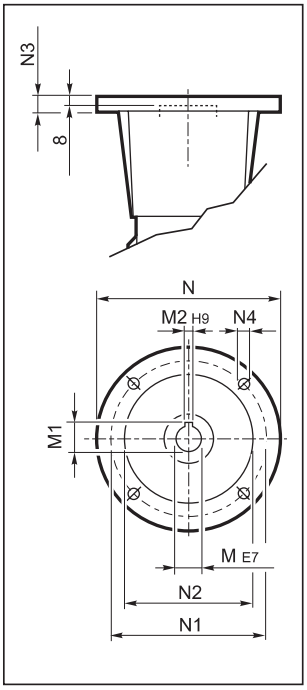

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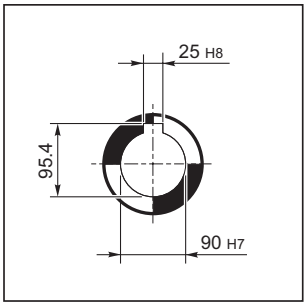


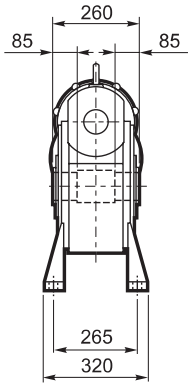
Fan cooling as standard on versions A and P.
P(IEC) arrangements come complete with gear coupling enclosed in the bell housing.

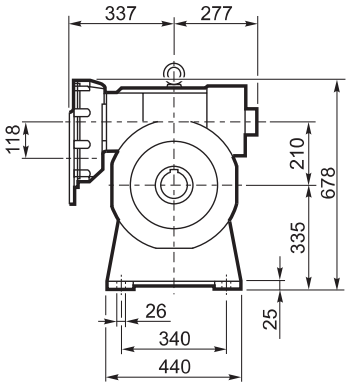
		F2	M	M1	M2	N	N1	N2	N3	N4	Kg
VF 210	**P132 B5**	485	38	41.3	10	300	265	230	25	M12	210
VF 210	**P160 B5**	460	42	45.3	12	350	300	250	22	18	
VF 210	**P180 B5**	460	48	51.8	14	350	300	250	22	18	
VF 210	**P200 B5**	485	55	59.3	16	400	350	300	25	M16	
VF 210	**P225 B5**	490	60	64.4	18	450	400	350	22	18 #	

N° 8 holes at 45°

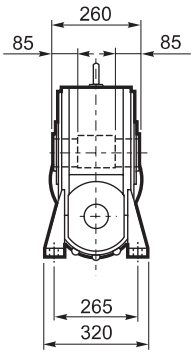
VFR 210...P (IEC)

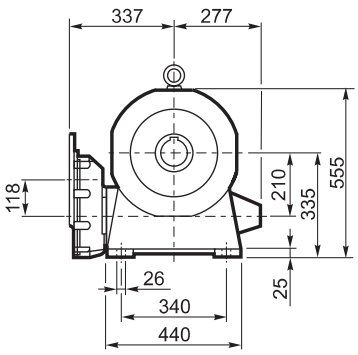
A



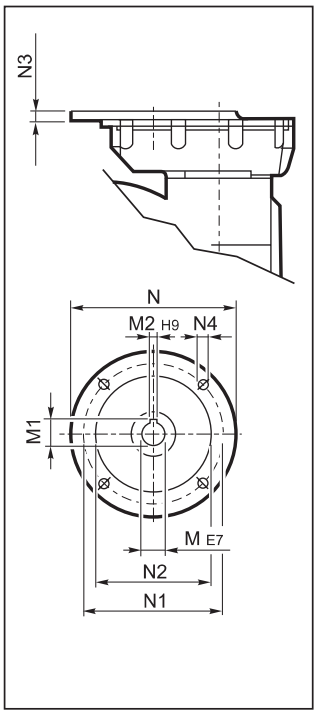


N





INPUT



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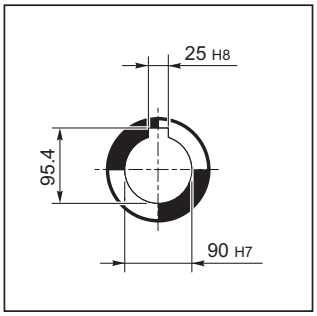
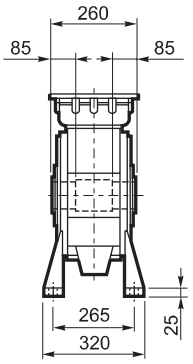
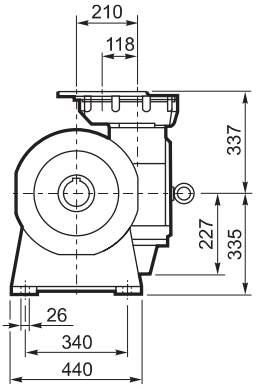


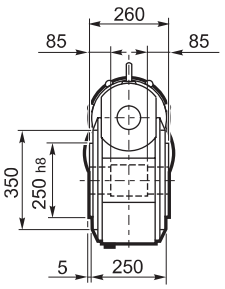
VFR 210...P (IEC)

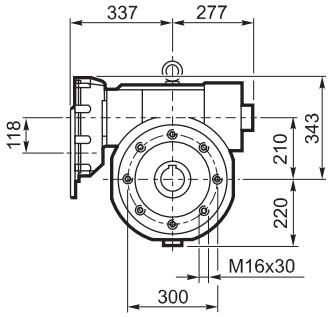
V





P





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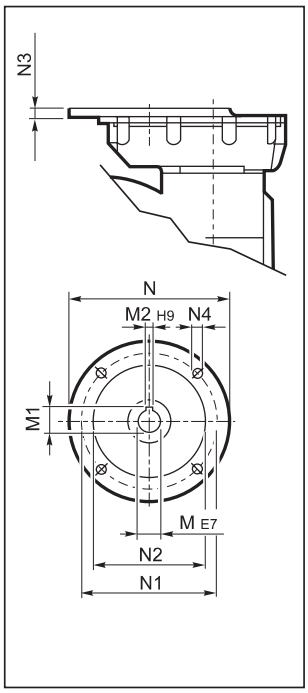

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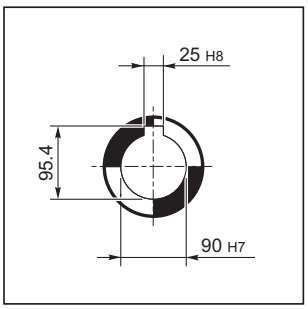


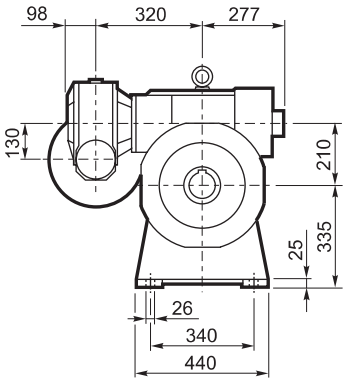
Fan cooling as standard on versions A and P.

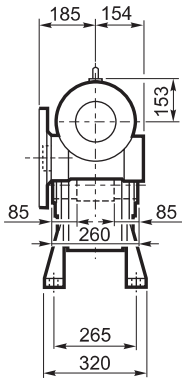
		M	M1	M2	N	N1	N2	N3	N4	Kg
VRF 210	**P100 B5**	28 K6	31.3	8	250	215	180	13	M12x35	185
VRF 210	**P112 B5**	28 K6	31.3	8	250	215	180	13	M12x35	
VFR 210	**P132 B5**	38 J6	41.3	10	300	265	230	13	M12x35	
VFR 210	**P160 B5**	42 J6	44.3#	12	350	300	250	18	M16x60	

Lowered key

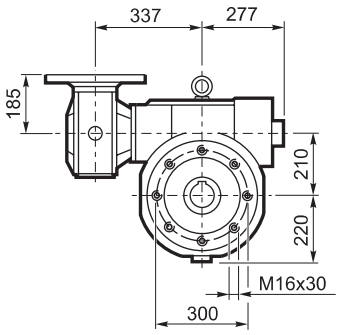
VF/VF 130/210...P (IEC)

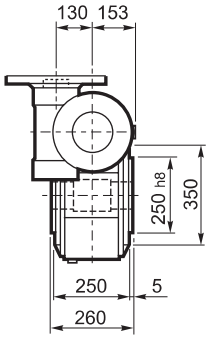
A



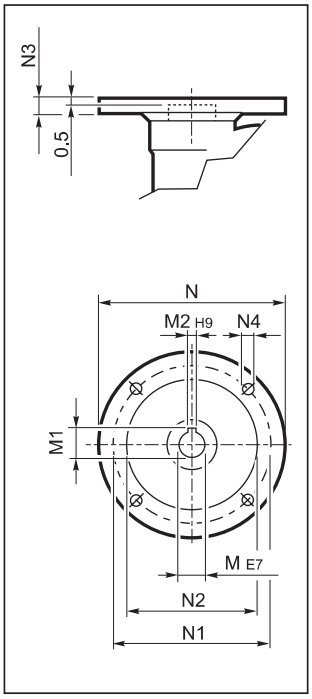


P

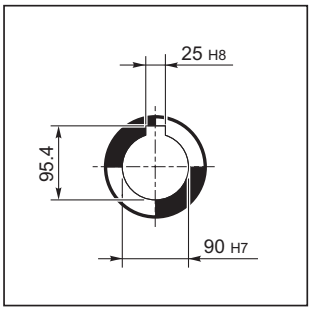




INPUT



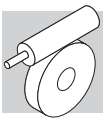
OUTPUT



Fan cooling as standard on versions A and P.

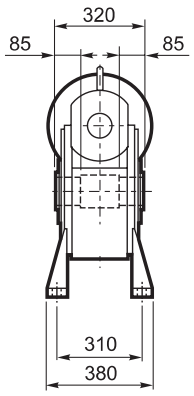
		M	M1	M2	N	N1	N2	N3	N4	kg
VF/VF 130/210	**P90 B5**	24	27.3	8	200	165	130	17	11	225
VF/VF 130/210	**P100 B5**	28	31.3	8	250	215	180	17	13	
VF/VF 130/210	**P112 B5**	28	31.3	8	250	215	180	17	13	
VF/VF 130/210	**P132 B5**	38	40.1#	10	300	265	230	17	13	

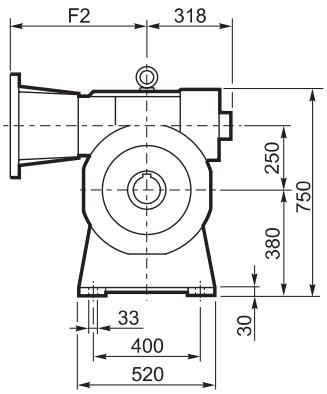
Lowered key



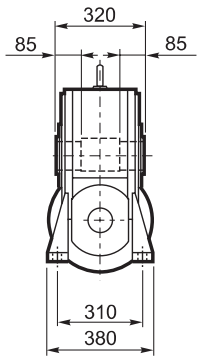
VF 250...P (IEC)

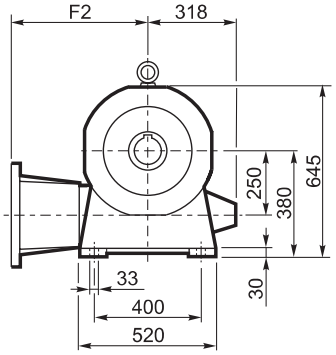
A





N





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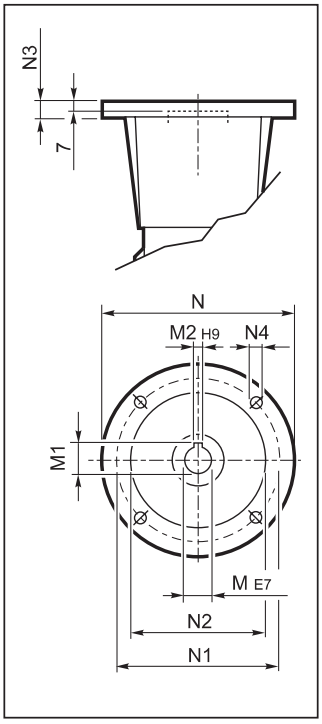

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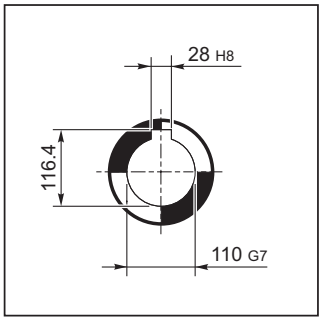
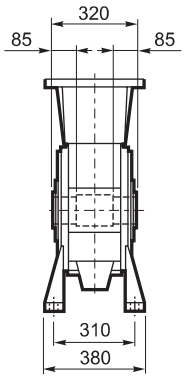
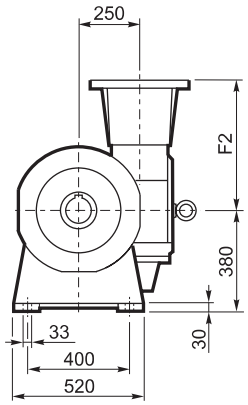


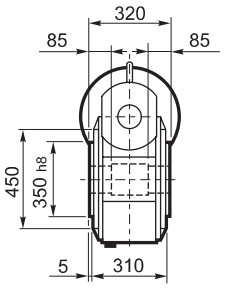
VF 250...P (IEC)

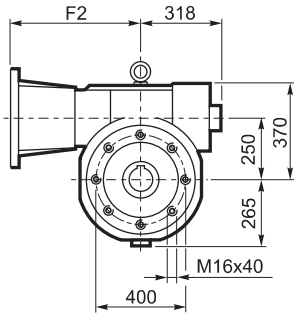
V





P





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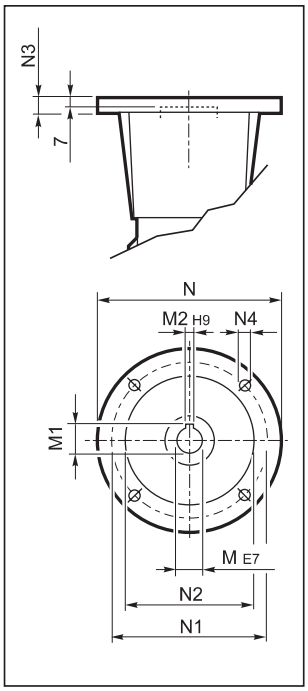
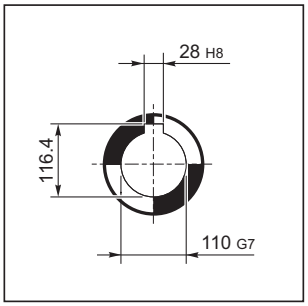


OUTPUT



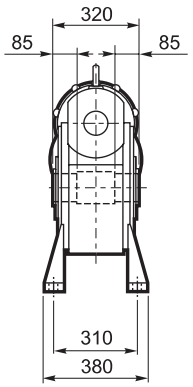
Fan cooling as standard on versions A and P.
P(IEC) arrangements come complete with gear coupling enclosed in the bell housing.

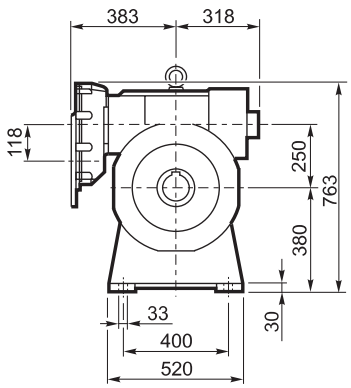
		F2	M	M1	M2	N	N1	N2	N3	N4	Kg
VF 250	**P132 B5**	531	38	41.3	10	300	265	230	25	M12	310
VF 250	**P160 B5**	506	42	45.3	12	350	300	250	22	18	
VF 250	**P180 B5**	506	48	51.8	14	350	300	250	22	18	
VF 250	**P200 B5**	531	55	59.3	16	400	350	300	25	M16	
VF 250	**P225 B5**	536	60	64.4	18	450	400	350	22	18#	

N° 8 holes at 45°

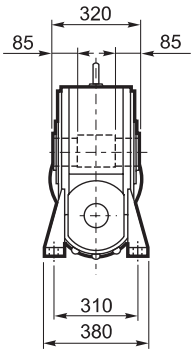
VFR 250...P (IEC)

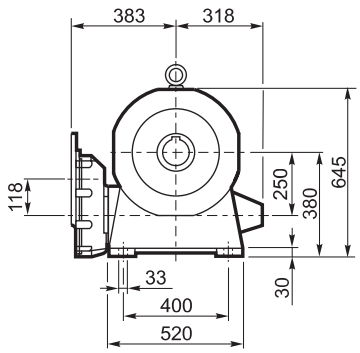
A



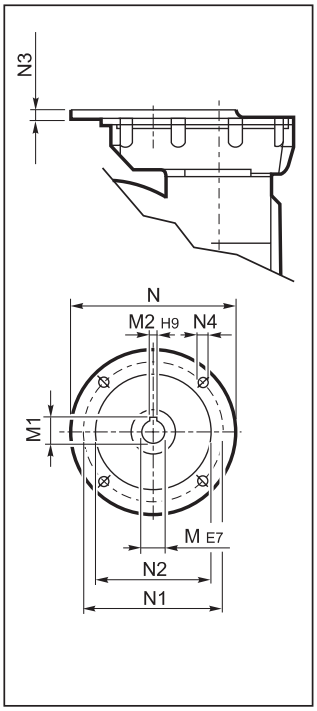


N

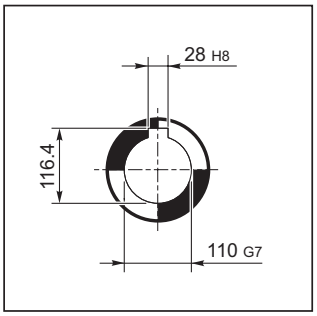




INPUT

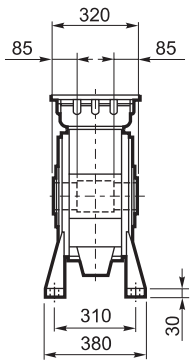


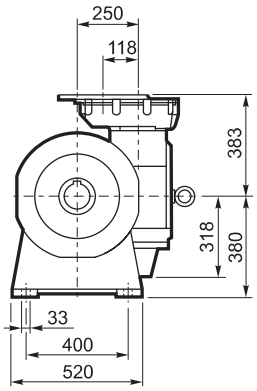
OUTPUT



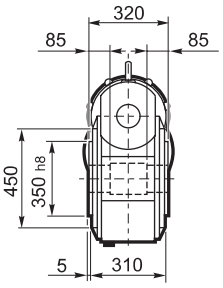
VFR 250...P (IEC)

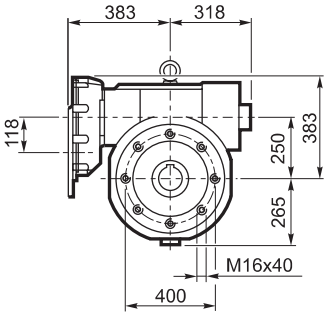
V



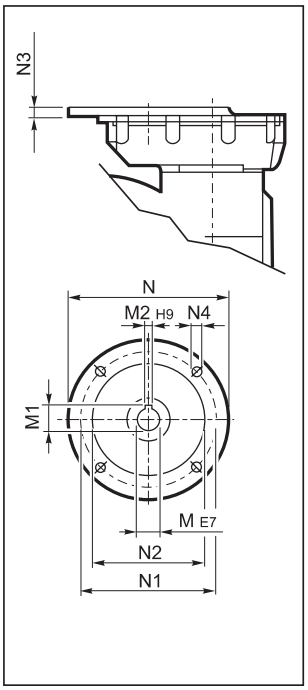


P

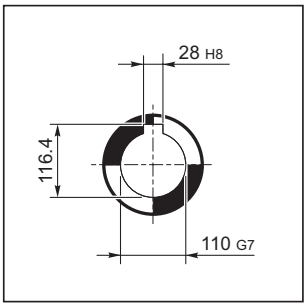




INPUT



OUTPUT



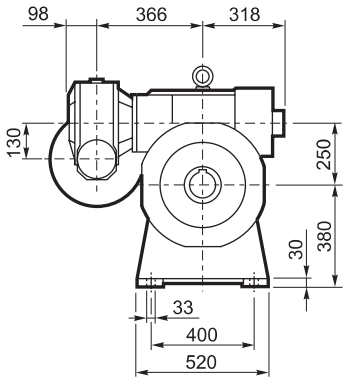
Fan cooling as standard on versions A and P.

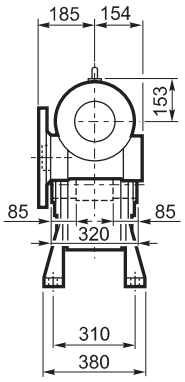
		M	M1	M2	N	N1	N2	N3	N4	Kg
VRF 250	**P100 B5**	28 K6	31.3	8	250	215	180	13	M12x35	295
VRF 250	**P112 B5**	28 K6	31.3	8	250	215	180	13	M12x35	
VFR 250	**P132 B5**	38 J6	41.3	10	300	265	230	13	M12x35	
VFR 250	**P160 B5**	42 J6	44.3#	12	350	300	250	18	M16x60	

Lowered key

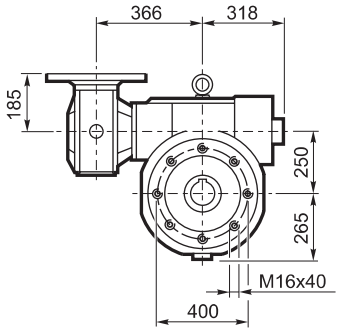
VF/VF 130/250...P (IEC)

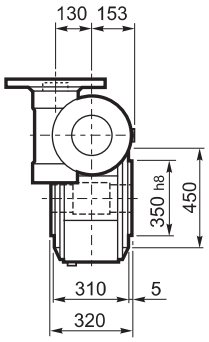
A



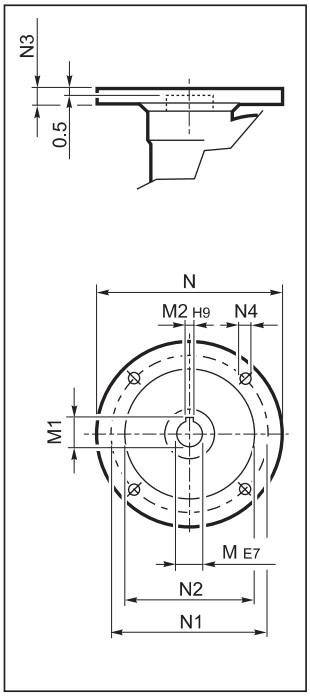


P

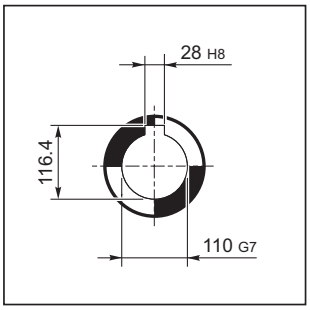




INPUT



OUTPUT



Fan cooling as standard on versions A and P.

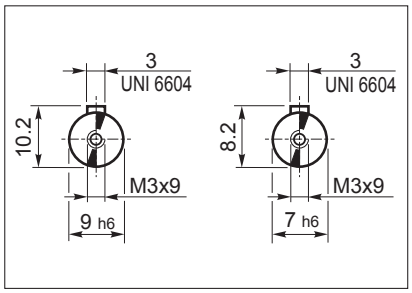
		M	M1	M2	N	N1	N2	N3	N4	Kg
VF/VF 130/250	**P 90 B5**	24	27.3	8	200	165	130	17	11	325
VF/VF 130/250	**P100 B5**	28	31.3	8	250	215	180	17	13	
VF/VF 130/250	**P112 B5**	28	31.3	8	250	215	180	17	13	
VF/VF 130/250	**P132 B5**	38	40.1#	10	300	265	230	17	13	

Lowered key

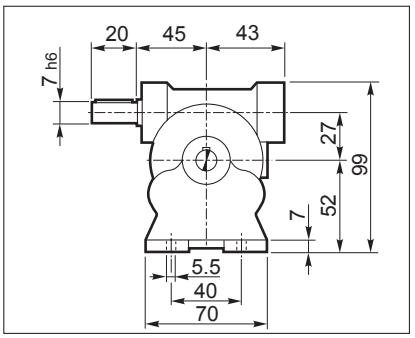
27 DIMENSIONS FOR GEAR UNITS WITH SOLID INPUT SHAFT

VF 27...HS

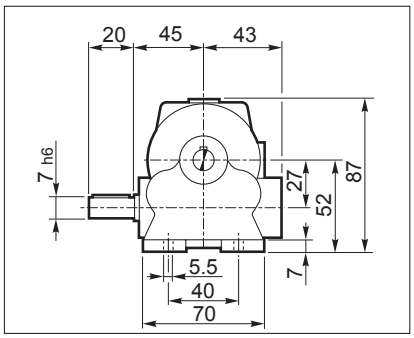
Output shaft Input shaft



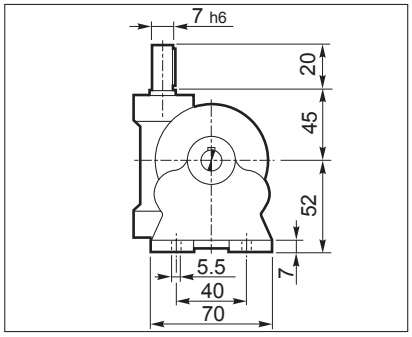
VF 27_A..HS



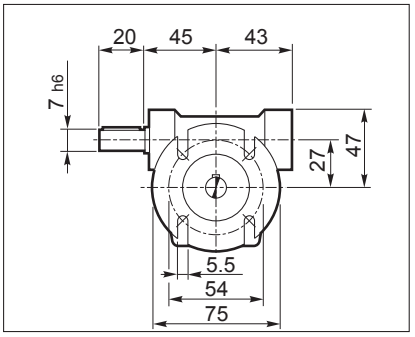
VF 27_N..HS



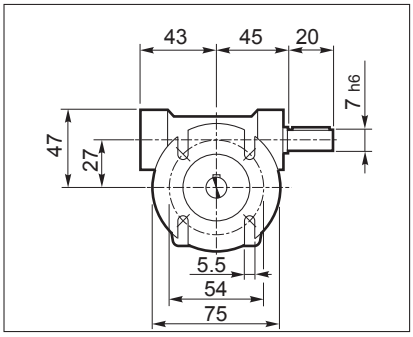
VF 27_V..HS



VF 27_F1..HS



VF 27_F2..HS

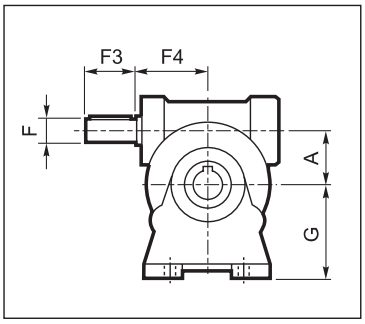


	Kg
VF 27_HS	0.73

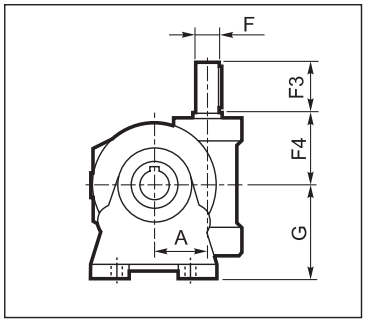
Dimensions common to the other configurations can be found at page 105.

VF...HS - W..HS

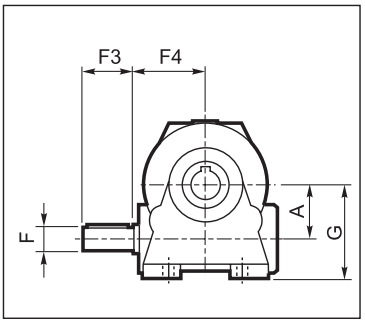
VF_A..HS



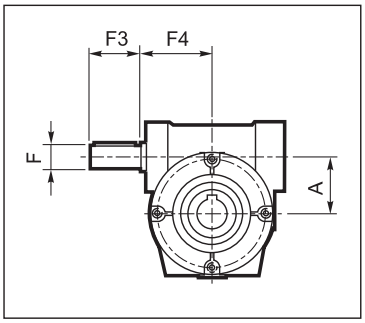
VF_V..HS



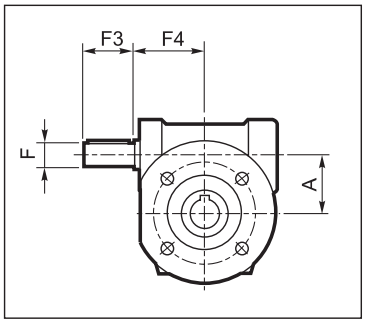
VF_N..HS



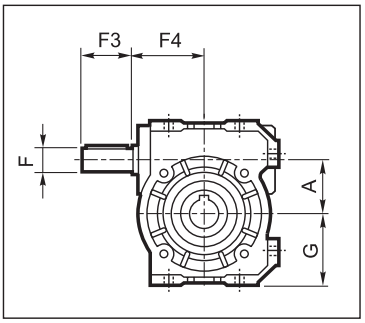
VF_P..HS



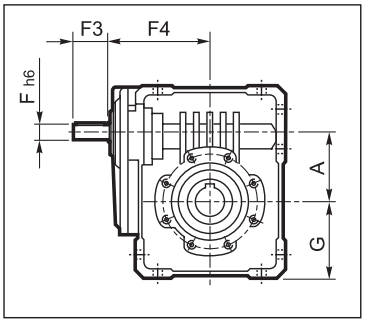
VF_FA/FC/FR/F..HS



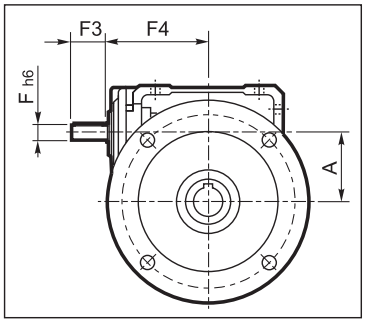
VF_U..HS



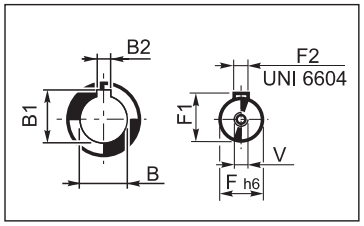
W_U..HS



W_UF/UFC/UFCR..HS



Output shaft Input shaft

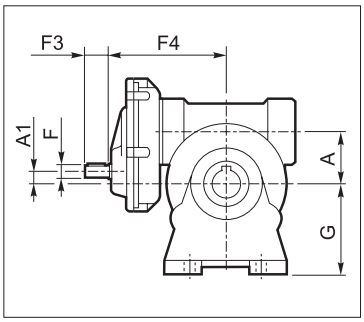


	A	B	B1	B2	F	F1	F2	F3	F4	G	V	Kg
VF 30_HS	30	14 H7	16.3	5	9	10.2	3	20	50	55	—	1.1
VF 30 U HS										47		
VF 44_HS	44.6	18 H7	20.8	6	11	12.5	4	30	54	72	—	2.0
VF 44 U HS										55		
VF 49_HS	49.5	25 H7	28.3	8	16	18	5	40	65	82	M6x16	3.0
VF 49 U HS										64.5		
W 63_HS	62.17	25 H7	28.3	8	18	20.5	6	40	110.5	72.5	M6x16	6.4
W 75_HS	75	30(28) H7	33.3(31.3)	8	19	21.5	6	40	128	87	M6x16	10.0
W 86_HS	86.9	35 H7	38.3	10	25	28	8	50	144	100	M8x19	14.1
W 110_HS	110.1	42 H7	45.3	12	25	28	8	60	168	125	M8x19	27
VF 130_HS	130	45 H7	48.8	14	30	33	8	60	160	195	M8x20	49
VF 150_HS	150	50 H7	53.8	14	35	38	10	65	185	220	M8x20	60
VF 185_HS	185.4	60 H7	64.4	18	40	43	12	70	214.5	254	M8x20	94
VF 210_HS	210	90 H7	95.4	25	48	51.5	14	110	230	335	M16x40	175
VF 250_HS	250	110 G7	116.4	28	55	59	16	110	274	380	M16x40	275

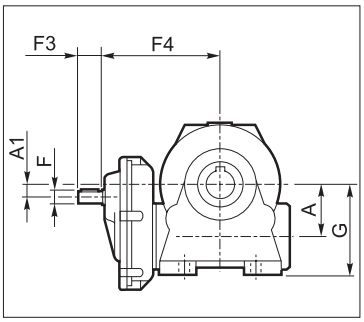
Dimensions common to the other configurations can be found from page 106 to 161.

VFR...HS - WR...HS

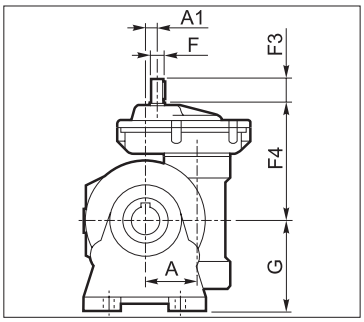
VFR_A..HS



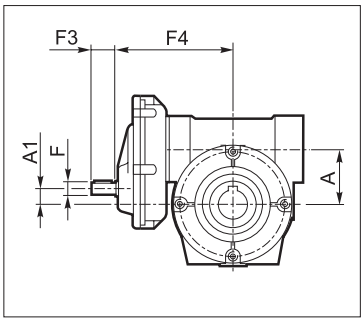
VFR_N..HS



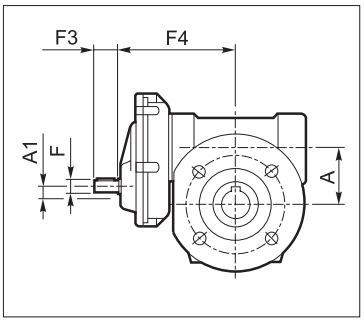
VFR_V..HS



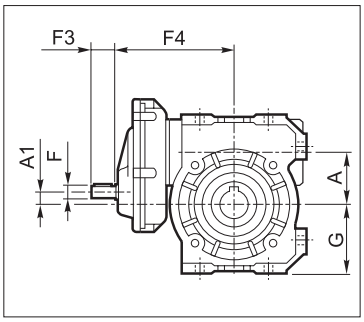
VFR_P..HS



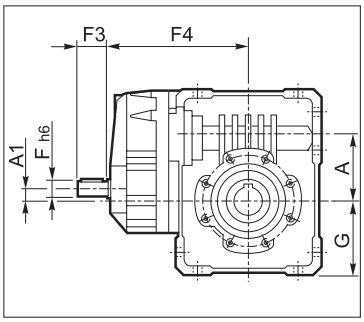
VFR_FA/FC/FR/F..HS



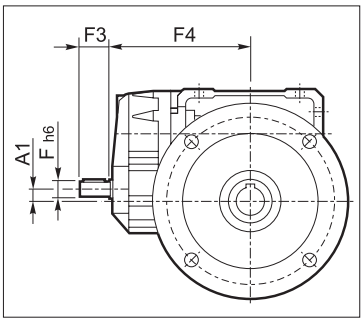
VFR_U..HS

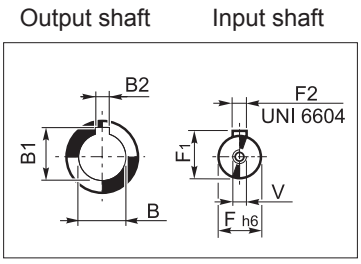


WR_U..HS



WR_UF/UFC/UFCR..HS



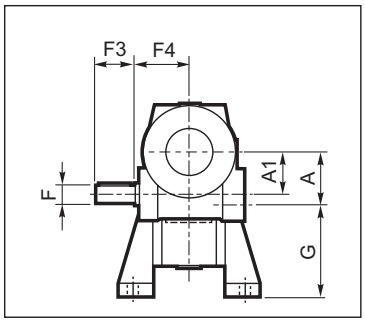


	A	A1	B	B1	B2	F	F1	F2	F3	F4	G	V	Kg
VFR 49_HS	49.5	10	25 H7	28.3	8	11	12.5	4	23	110	82	M4x10	5
VFR 49 U HS											64.5		
WR 63_HS	62.17	11.42	25 H7	28.3	8	14	16	5	30	138	72.5	M5x12.5	7.1
WR 75_HS	75	11	30(28) H7	33.3(31.3)	8	19	21.5	6	40	162	87	M6x16	11.1
WR 86_HS	86.9	22.9	35 H7	38.3	10	19	21.5	6	40	178	100	M6x16	14.7
WR 110_HS	110.1	21.1	42 H7	45.3	12	24	27	8	50	201	125	M8x19	34
VFR 130_HS	130	45	45 H7	48.8	14	24	27	8	50	228	195	M8x20	57
VFR 150_HS	150	53	50 H7	53.8	14	28	31	8	60	280	220	M8x20	71
VFR 185_HS	185.4	88.4	60 H7	64.4	18	28	31	8	60	310	254	M8x20	110
VFR 210_HS	210	92	90 H7	95.4	25	38	41	10	80	335	335	M10x25	185
VFR 250_HS	250	132	110 G7	116.4	28	38	41	10	80	383	380	M10x25	295

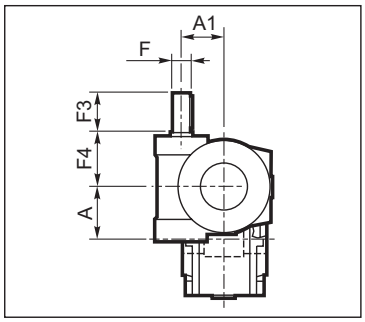
Dimensions common to the other configurations can be found from page 116 to 163.

VF/VF...HS - VF/W...HS - W/VF...HS

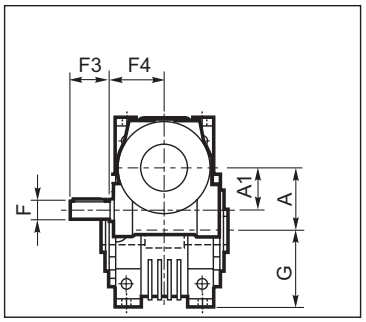
VF/VF_A..HS
W/VF_A..HS

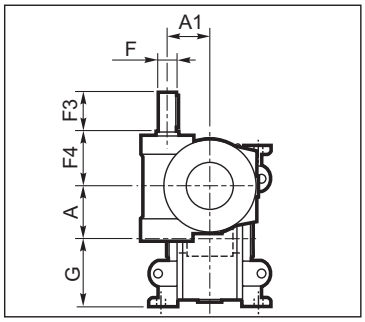


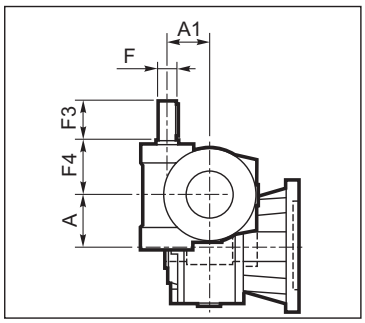
VF/VF_P..HS
W/VF_P..HS

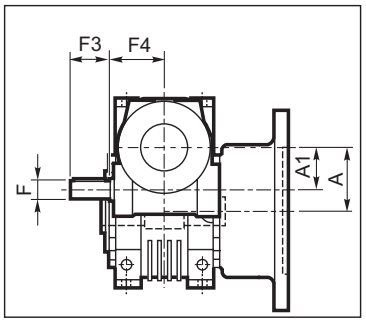


VF/VF_P..HS
W/VF_P..HS

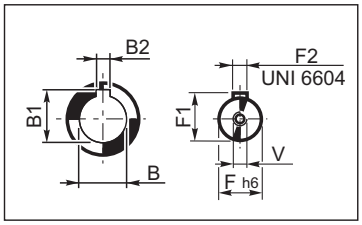








Output shaft Input shaft

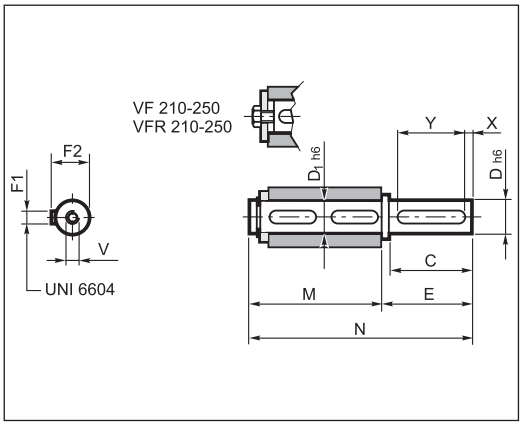


	A	A1	B	B1	B2	F	F1	F2	F3	F4	G	V	Kg
VF/VF 30/44_HS	44.6	30	18 H7	20.8	6	9	10.2	3	20	50	72	—	3.5
VF/VF 30/44 U HS											55		
VF/VF 30/49_HS	49.5	30	25 H7	28.3	8	9	10.2	3	20	50	82	—	4.5
VF/VF 30/49 U HS											64.5		
VF/W 30/63_HS	62.17	30	25 H7	28.3	8	9	10.2	3	20	50	100	—	7.5
VF/W 44/75_HS	75	44.6	30 (28) H7	33.3 (31.3)	8	11	12.5	4	30	54	115	—	16.1
VF/W 44/86_HS	86.9	44.6	35 H7	38.3	10	11	12.5	4	30	54	142	—	42
VF/W 49/110_HS	110.0	49.5	42 H7	45.3	12	16	18	5	40	65	170	M6x16	46
W/VF 63/130_HS	130	62.17	45 H7	48.8	14	18	20.5	6	40	110.5	72.5	M6x16	74
W/VF 86/150_HS	150	86.9	50 H7	53.8	14	25	28	8	50	144	100	M8x19	108
W/VF 86/185_HS	185.4	86.9	60 H7	64.4	18	25	28	8	50	144	100	M8x19	109
VF/VF 130/210_HS	210	130	90 H7	95.4	25	30	33	8	60	160	335	M8	225
VF/VF 130/250_HS	250	130	110 G7	116.4	28	30	33	8	60	160	380	M8	325

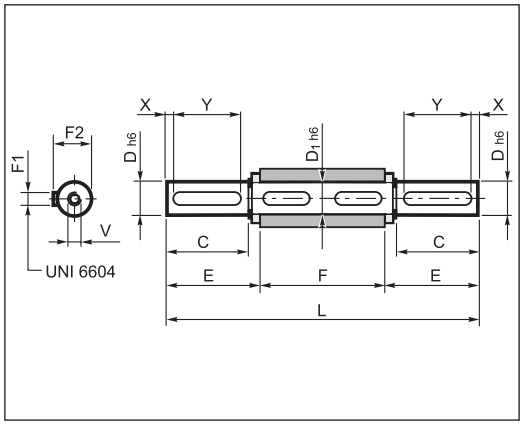
Dimensions common to the other configurations can be found from page 112 to 164.

28 ACCESSORIES

28.1 Plug-in output shaft



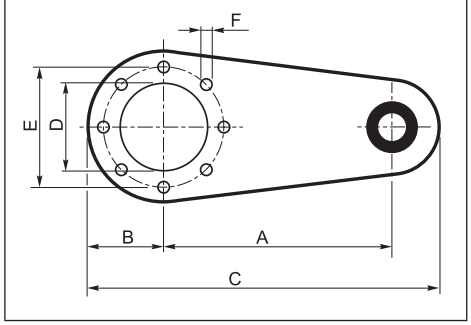
		C	D	D1	E	F1	F2	M	N	V	X	Y
VF	30	30	14	14	35	5	16	61	96	M5x13	5	20
VFR	44	40	18	18	45	6	20.5	70	115	M6x16	5	30
VF/VF	49	60	25	25	65	8	28	89	154	M8x19	5	50
	63	60	25	25	65	8	28	127	192	M8x19	5	50
W	75_D28	60	28	30	65	8	31	134	199	M8x20	5	50
WR	75_D30	60	30	30	65	8	33	134	199	M10x22	5	50
VF/W	86	60	35	35	65	10	38	149	214	M10x22	5	50
	110	75	42	42	80	12	45	164	244	M12x28	7.5	60
	130	80	45	45	85	14	48.5	176	261	M12x32	5	70
VF	150	85	50	50	93	14	53.5	185	278	M16x40	7.5	70
VFR	185	100	60	60	110	18	64	200	310	M16x40	10	80
W/VF	210	130	90	90	140	25	95	255	395	M20x50	5	120
	250	165	110	110	175	28	116	315	490	M24x64	15	140



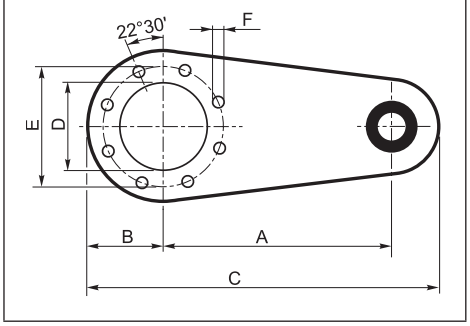
		C	D	D1	E	F	F1	F2	L	V	X	Y
VF	30	30	14	14	32.5	55	5	16	120	M5x13	5	20
VFR	44	40	18	18	42.7	64	6	20.5	149.4	M6x16	5	30
VF/VF	49	60	25	25	63.2	82	8	28	208.4	M8x19	5	50
	63	60	25	25	63.2	120	8	28	246.4	M8x19	5	50
W	75_D28	60	28	30	64	127	8	31	255	M8x20	5	50
WR	75_D30	60	30	30	64	127	8	33	255	M10x22	5	50
VF/W	86	60	35	35	64	140	10	38	268	M10x22	5	50
	110	75	42	42	79.3	155	12	45	313.5	M12x28	7.5	60
	130	80	45	45	84.7	165	14	48.5	334.5	M12x32	5	70
VF	150	85	50	50	90	175	14	53.5	355	M16x40	7.5	70
VFR	185	100	60	60	105	190	18	64	400	M16x40	10	80
W/VF	210	130	90	90	140	260	25	95	540	M20x50	5	120
	250	165	110	110	175	320	28	116	670	M24x64	15	140

28.2 Torque arm

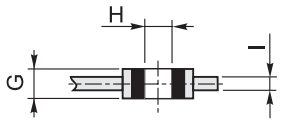
VF



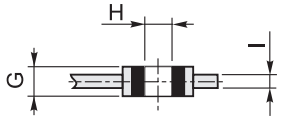
W



VF 30 - VF 44 - VF 49

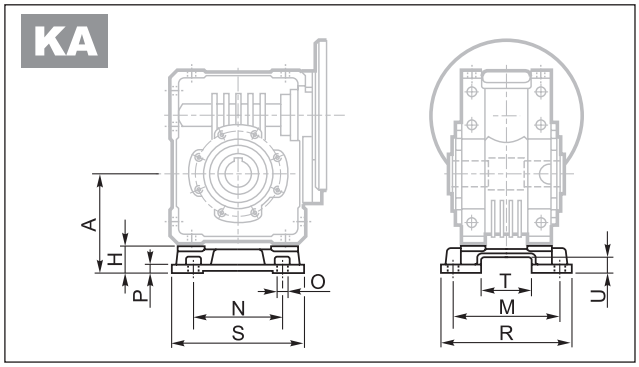


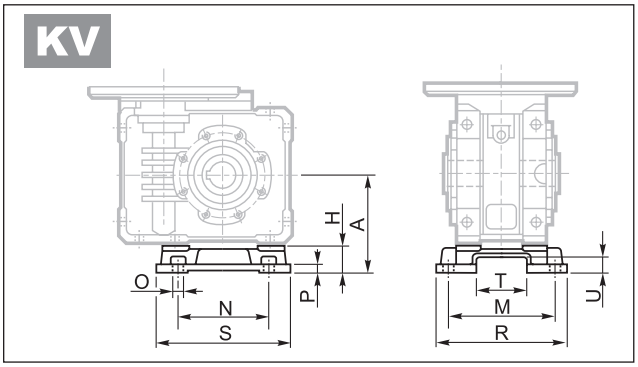
Without vibration-dampening bushing



		A	B	C	D	E	F	G	H	I
VF VFR VF/VF	30	100	40	157.5	50	65	7	14	8	4
	44	100	40	157.5	50	65	7	14	8	4
	49	100	55	172.5	68	94	7	14	8	4
W WR VF/W	63	150	55	233	75	90	9	20	10	6
	75	200	63	300	90	110	9	25	20	6
	86	200	80	318	110	130	11	25	20	6
	110	250	100	388	130	165	13	25	20	6
VF VFR W/VF	130	300	125	470	180	215	13	30	25	6
	150	300	125	470	180	215	15	30	25	6
	185	350	150	545	230	265	17	30	25	6
	210	350	175	625	250	300	19	60	50	8
	250	400	225	725	350	400	19	60	50	10

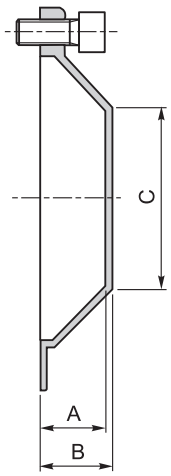
28.3 VF-interchangeable foot kits KA, KV





	A	H	M	N	O	P	R	S	T	U
W 63 - WR 63	100	27.5	111	95	11	8	135	145	56.5	15.5
W 75 - WR 75	115	28	115	120	11	9	139	174	56.5	15.5
W 86 - WR 86	142	42	146	140	11	11	170	200	69	20
W 110 - WR 110	170	45	181	200	13	14	210	250	69	20

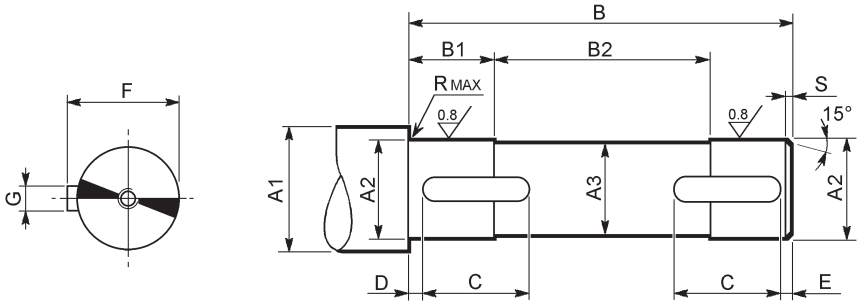
28.4 Safety cover

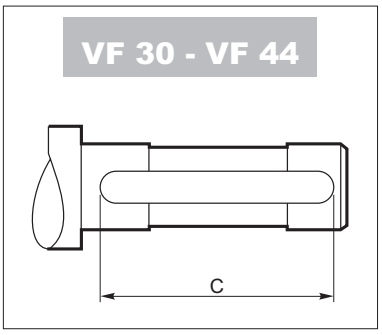


	A	B	C
W 63 - WR 63	26.5	29	Ø35
W 75 - WR 75	24.5	27	Ø54
W 86 - WR 86	26.5	29	Ø71
W 110 - WR110	27.5	30	Ø89

29 CUSTOMER'S SHAFT

Pivot of driven equipment should be made from high grade alloy steel.
Table below shows recommended dimensions for the Customer to consider when designing mating shaft.
A device such as that illustrated below should also be installed to secure the shaft axially. Take care to verify and dimension the various components to suit the needs of the application.





	A1	A2	A3	B	B1	B2	C	D	E	F	G	R	S	UNI 6604
VF 30	≥ 19	14 f7	13	53	18.5	16	40	6.5	6.5	16	5 h9	0.5	1.5	5x5x40 A
VF 44	≥ 23	18 f7	17	62	22.5	17	50	6	6	20.5	6 h9	0.5	1.5	6x6x50 A
VF 49	≥ 30	25 f7	24	80	20.5	39	20	2	2	28	8 h9	1	1.5	8x7x20 A
W 63	≥ 30	25 f7	24	118	38	42	35	2	2	28	8 h9	1	1.5	8x7x35 A
W 75	≥ 35	28 f7	27	125	38	49	40	2	2	31	8 h9	1	1.5	8x7x40 A
	≥ 35	30 f7	29	125	38	49	40	2	2	33	8 h9	1	1.5	8x7x40 A
W 86	≥ 42	35 f7	34	138	43	52	40	2	2	38	10 h9	1.5	1.5	10x8x40 A
W 110	≥ 48	42 f7	41	153	43	67	50	2	2	45	12 h9	1.5	2	12x8x50 A
VF 130	≥ 52	45 f7	44	163	50.5	62	60	2.5	2.5	49.5	14 h9	2.5	2	14x9x60 A
VF 150	≥ 57	50 f7	49	173	53	67	70	2.5	2.5	53.5	14 h9	2.5	2	14x9x70 A
VF 185	≥ 68	60 f7	59	188	63	62	80	2.5	2.5	64	18 h9	2.5	2	18x11x80 A
VF 210	≥ 99	90 f7	89	258	83	92	80	3	3	95	25 h9	2.5	2.5	25x14x80 A
VF 250	≥ 121	110 h7	109	318	83	152	80	3	3	116	28 h9	2.5	2.5	28x16x80 A

30 TORQUE LIMITER

30.1 Description

The friction-based torque limiter, available for wormgears type **VF44 - VF49** and **W63…W110**, is designed to protect the transmission from accidental overloads which could damage the drive elements. Against conventional external torque limiters, this versatile solution lends the following advantages:

• unchanged external dimensions against standard same model standard units
• maintenance-free, as the system is permanently lubed
• slip torque can be easily adjusted by means of a simple manual operation from the outside of the gearbox
• slipping, even if continuous, does not create any damage or wear to the mechanical parts, since slipping parts are constantly separated by an oil film.

We advise against installing this device to lifting equipment.

30.2 Operating principle

The torque limiter basically consists of a double tapered clutch with active surfaces machined on (bronze) worm wheel and hub of output shaft (nodular cast iron GS400/12). Bore of output shaft allows shaft mounting of gear unit onto driven machine.
Active surfaces of the torque limiter are pressed against each other by thrust generated by adequately proportioned spring washers. Transmissible torque is proportional to axial force applied by the springs and adjustment of torque setting is easily conducted manually through an external ring nut.

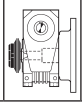
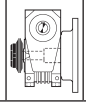
30.3 Protection of the machine from overloads

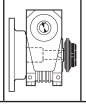
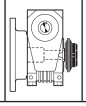
The torque limiter, properly adjusted in function of the torque necessary for the driven equipment, protects all mechanical components of the transmission avoiding any damage due to overloads.

30.4 Reversing of a self-locking unit

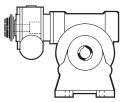
In some applications it may be desired to rotate the output shaft while machine is not operating. Such a situation is not always possible with high-ratio self-locking worm gears. Using the torque limiter it is possible to conduct such operation untightening the ring nut.

30.5 VF…L, W…L

L1							
	N	A	V	U	F1 FC1 FR1 FA1	F2 FC2 FR2 FA2**	P1 P2
VF VF/VF*						** ⛔ VF 49	
	U	UF1 UFC1	UF2 UFC2	UFCR1	UFCR2		
W VF/W*			⛔		⛔		

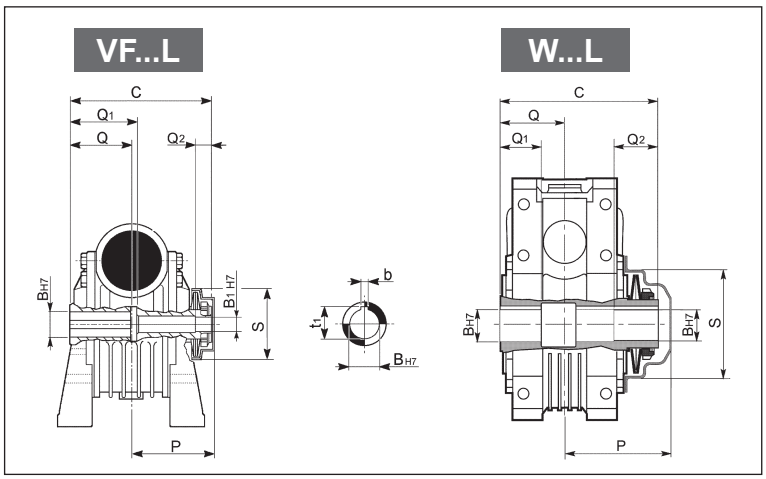
L2							
	N	A	V	U	F1 FC1 FR1 FA1**	F2 FC2 FR2 FA2	P1 P2
VF VF/VF*					** ⛔ VF 49		
	U	UF1 UFC1	UF2 UFC2	UFCR1	UFCR2		
W VF/W*		⛔		⛔			

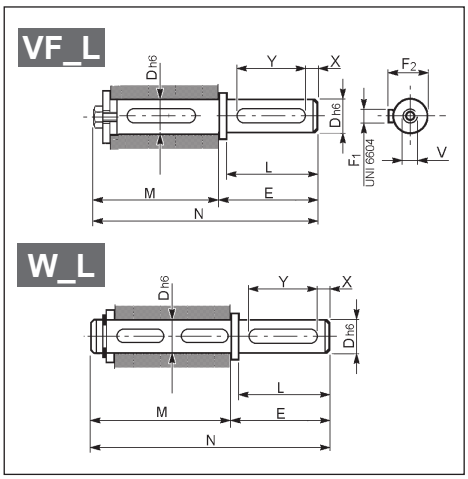
* On double worm gear units the torque limiter is fitted on 2nd reducer (larger size) for the L1 or L2 configurations. Same is fitted on 1st reducer (smaller) when the LF configuration is specified.

LF			
			
VF/W	44/75	44/86	49/110
W/VF	63/130	86/150	86/185

Unless otherwise specified VF…L gear units are supplied with ring nut on the left hand side (L1), viewing from the electric motor and gearbox in the B3 mounting position.

30.6 Dimensions





	Torque limiter										Single output shaft									
	C	Q	Q1	Q2	P	S	B H7	B1 H7	t1	b	L	D h6	E	F1	F2	M	N	V	X	Y
VF 44L	79	32	32	12	48	42.5	18	11	20.8	6	40	18	45	6	20.5	86	131	M6x16	5	30
VF 49L	105	41	51	15	63.5	66.5	25	14	28.3	8	60	25	65	8	28	114.5	179.5	M8x19	5	40
W 63L	145	60	40	40	100	77	25	-	28.3	8	60	25	65	8	28	152	217	M8x19	5	50
W 75L_D30	154.5	63.5	40	40	104	100	30	-	33.3	8	60	30	65	8	33	161.5	226.5	M10x22	5	50
W 86L	170	70	50	45	113	119	35	-	38.3	10	60	35	65	10	38	179	244	M10x22	5	50
W 110L	191	77.5	55	45	133	134	42	-	45.3	12	75	42	80	12	45	200	280	M12x28	7.5	60

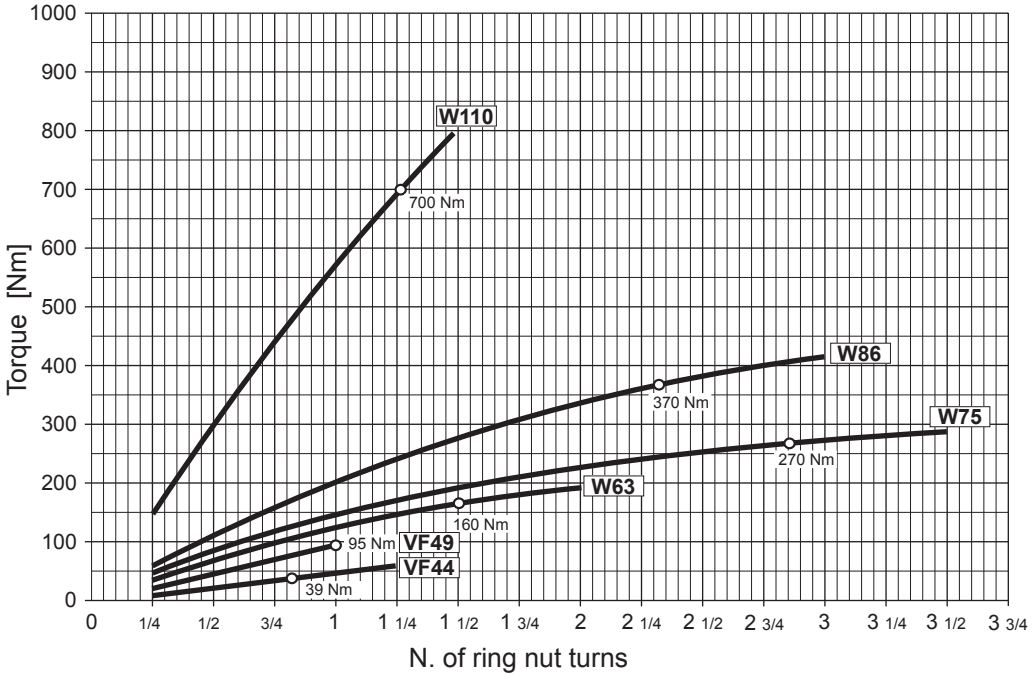
30.7 Slip torque setting

A preliminary slip torque setting is conducted at the factory. Reference is made to torque rating Mn_2 [n_1=1400] of the captioned VF or W gear unit.
Here below the operations performed at the factory for the initial adjustment are listed.
Same steps, with the exception of step (2), must be followed when a different torque setting is required.

1. Ring nut is tightened until spring washers are sufficiently loaded that manual rotation is hardly possible.

2. By means of an engraver marks are made, in identical (angular) position, on both the ring nut and the hollow shaft.
Setting will then be referred to as the zero-point for the consequent slip torque adjustment, through turning of the ring nut.

3. Ring nut is then turned of the number of turns, or fraction of, corresponding to nominal torque rating Mn_2 of the captioned gear unit. In this case the diagram shown here under refers as to the proportion between number of turns and transmissible torque. Same diagram comes handy for customised torque adjustments, should these be required with time.



RVS LIMIT-STOP DEVICE

31 GENERAL INFORMATION

The limit-stop device type RVS has been designed to fit Bonfiglioli Riduttori worm gearmotors to operate:

- Green house windows and shades
- Remote-controlled gates
- Hopper frame windows
- Dosing devices for the livestock farming industry
- Butterfly valves

Worm gearmotors equipped with the RVS limit switch device are suitable for linear and rotary intermittent duty applications requiring accurate and repetitive positioning.
For the applications listed above, typically light duty, worm gear-motors should only be selected from relevant selection charts, given at paragraph 34.
The drive selection will then comply with both the application duty and the max. peripheral speed constraints of the limit-switch device.
The configuration is complete when the limit-switch device RVS is flanged onto the gearmotor through the relevant assembly kit (see page 176).
Configuration kits are available for worm gears type VF 49, W 63, W 75, and W 86 only.
Please note that **RVS** devices will only fit F-flanged VF 49 and FC-flanged W worm gears.
RVS mounting side is opposite to flange.

31.1 Technical features

The working principle of the limit-stop device is based on the differential movement of two pairs of wheels – each equipped with a cam – and the relative operation of precision micro-switches that stop and reverse motion through relays (to be fitted by the installer).
Travel end positions, normally the open and closed positions of application frame, are easily set using a common Allen key after gearmotor installation.
Once adjusted, the unit will retain its settings over time for guaranteed motion repeatability.
In its basic version, the **RVS** limit-stop unit comes with a pair of approx. 1-m long cables. Internal wiring is made at the factory.
The RVS unit is available in the following variants:

RVS ME: the limit switch features a 6-stud terminal box for external wiring of cables wiring of cables to main relais.

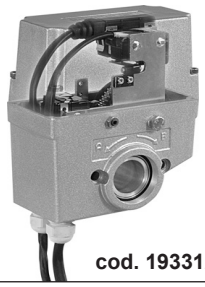
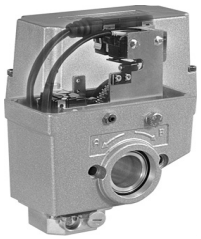
RVS DM: features a double set of micro-switches, connected in series, for absolute reliability where applicable regional standards or regulations call for a redundant design.

RVS ME DM: features the combination of the two options described above.

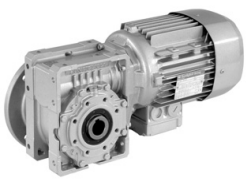
Regardless to the variant the RVS limit switch device offers the following features:
- Extremely quite operation
- Space efficiency
- Ease of installation and setting
- Overall protection IP55
- Adjustment range within a maximum of 43 revolutions of drive shaft.

32 ORDERING CODES

Determine which device or variant best suits the specific application and locate the part number in the table below:

RVS	RVS ME	RVS DM	RVS ME DM
cod. 193312025	cod. 193312026	 cod. 193312027	 cod. 193312028

Select also the part number of the specific configuration kit for the speed reducer the limit-stop device is to be installed to:

cod. 192860001	cod. 192860002	cod. 192860003	cod. 192860004
			
VF 49 F - VFR 49 F	W 63 UFC - WR 63 UFC	W 75 UFC - WR 75 UFC	W 86 UFC - WR 86 UFC

33 DESIGNATION

Ordering code for RVS acceptable **VF** and **W** gear units.

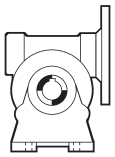
W R 75 UFC1 D30 240 P71 B5 B3 ....

OPTIONS

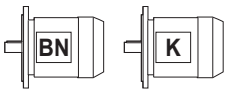
MOUNTING POSITION
B3 (default), **B6, B7, B8, V5, V6**

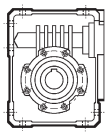
IEC MOTOR MOUNTING
B5
B14

INPUT TYPE
VF: **P** (IEC)
W: **S_, P** (IEC)

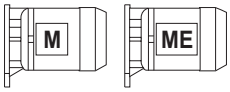


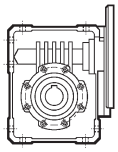
P63, P71



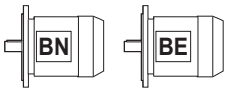


S1 ... S3





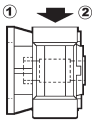
P63 ... P90



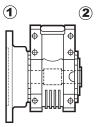
GEAR RATIO

SHAFT BORE
D30 (W75 alone)

VERSION
VF: **F**
W: **UFC**



F (1, 2)



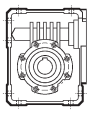
UFC (1, 2)

FRAME SIZE
VF: **49**
W: **63, 75, 86**

HELICAL REDUCTION
/
R

GEAR TYPE

VF



W

34 GEARMOTOR SELECTION

0.12 kW

n_2 min^{-1}	M_2 Nm	i			IEC				
4.7	98	300	**VFR 49_300**	**P63**	**BN63A4**				
5.8	89	240	**VFR 49_240**	**P63**	**BN63A4**				
6.7	83	210	**VFR 49_210**	**P63**	**BN63A4**				
7.8	76	180	**VFR 49_180**	**P63**	**BN63A4**				
10.4	64	135	**VFR 49_135**	**P63**	**BN63A4**				
14.0	41	100	**VF 49_100**	**P63**	**BN63A4**	**VF 49_100**	**P63**	**K63A4**	
17.5	37	80	**VF 49_80**	**P63**	**BN63A4**	**VF 49_80**	**P63**	**K63A4**	
20.0	34	70	**VF 49_70**	**P63**	**BN63A4**	**VF 49_70**	**P63**	**K63A4**	
23.3	31	60	**VF 49_60**	**P63**	**BN63A4**	**VF 49_60**	**P63**	**K63A4**	

0.18 kW

n_2 min^{-1}	M_2 Nm	i			IEC				
7.8	112	180	**VFR 49_180**	**P63**	**BN63B4**				
10.4	95	135	**VFR 49_135**	**P63**	**BN63B4**				
14.0	61	100	**VF 49_100**	**P63**	**BN63B4**				
17.5	54	80	**VF 49_80**	**P63**	**BN63B4**	**VF 49_80**	**P63**	**K63B4**	
20.0	49	70	**VF 49_70**	**P63**	**BN63B4**	**VF 49_70**	**P63**	**K63B4**	
23.3	45	60	**VF 49_60**	**P63**	**BN63B4**	**VF 49_60**	**P63**	**K63B4**	

0.25 kW

n_2 min^{-1}	M_2 Nm	i			IEC				
4.7	214	300	**WR 63_300**	**P71**	**BN71A4**				
5.8	192	240	**WR 63_240**	**P71**	**BN71A4**				
7.3	170	192	**WR 63_192**	**P71**	**BN71A4**				
10.4	136	135	**WR 63_135**	**P71**	**BN71A4**				
12.3	121	114	**WR 63_114**	**P71**	**BN71A4**				
14.0	82	100	**VF 49_100**	**P71**	**BN71A4**				
17.5	72	80	**VF 49_80**	**P71**	**BN71A4**				
20.0	66	70	**VF 49_70**	**P71**	**BN71A4**				
23.3	61	60	**VF 49_60**	**P71**	**BN71A4**	**VF 49_60**	**P71**	**K71A4**	

0.37 kW

n_2 min^{-1}	M_2 Nm	i		IEC				
4.7	382	300	**WR 86_300**	**P71**	**BN71B4**			
5.8	306	240	**WR 75_240**	**P71**	**BN71B4**			
7.3	290	192	**WR 86_192**	**P71**	**BN71B4**			
7.8	257	180	**WR 75_180**	**P71**	**BN71B4**			
9.3	226	150	**WR 75_150**	**P71**	**BN71B4**			
10.4	204	135	**WR 63_135**	**P71**	**BN71B4**			
12.3	181	114	**WR 63_114**	**P71**	**BN71B4**			
14.0	133	100	**W 63_100**	**P71**	**BN71B4**	**W 63_100**	**S1**	**M1SD4**
17.5	108	80	**VF 49_80**	**P71**	**BN71B4**			
20.0	98.3	70	**VF 49_70**	**P71**	**BN71B4**			
23.3	90.5	60	**VF 49_60**	**P71**	**BN71B4**			

0.55 kW

n_2 min^{-1}	M_2 Nm	i		IEC				
4.7	559	300	**WR 86_300**	**P80**	**BN80A4**			
5.8	483	240	**WR 86_240**	**P80**	**BN80A4**			
7.3	423	192	**WR 86_192**	**P80**	**BN80A4**			
7.8	376	180	**WR 75_180**	**P80**	**BN80A4**			
8.3	383	168	**WR 86_168**	**P80**	**BN80A4**			
9.3	331	150	**WR 75_150**	**P80**	**BN80A4**			
10.1	330	138	**WR 86_138**	**P80**	**BN80A4**			
11.7	287	120	**WR 75_120**	**P80**	**BN80A4**			
14.0	194	100	**W 63_100**	**P80**	**BN80A4**	**W 63_100**	**S1**	**M1LA4**
17.5	170	80	**W 63_80**	**P80**	**BN80A4**	**W 63_80**	**S1**	**M1LA4**
21.9	148	64	**W 63_64**	**P80**	**BN80A4**	**W 63_64**	**S1**	**M1LA4**
23.3	148	60	**W 75_60**	**P80**	**BN80A4**	**W 75_60**	**S1**	**M1LA4**

0.75 kW

n_2 min^{-1}	M_2 Nm	i		IEC				
7.4	557	192	**WR 86_192**	**P80**	**BE80B4**			
8.5	504	168	**WR 86_168**	**P80**	**BE80B4**			
9.5	435	150	**WR 75_150**	**P80**	**BE80B4**			
10.3	436	138	**WR 86_138**	**P80**	**BE80B4**			
11.9	378	120	**WR 75_120**	**P80**	**BE80B4**			
14.3	275	100	**W 75_100**	**P80**	**BE80B4**	**W 75_100**	**S2**	**ME2SB4**
17.9	236	80	**W 75_80**	**P80**	**BE80B4**	**W 75_80**	**S2**	**ME2SB4**
22.3	195	64	**W 63_64**	**P80**	**BE80B4**	**W 63_64**	**S2**	**ME2SB4**
23.8	196	60	**W 75_60**	**P80**	**BE80B4**	**W 75_60**	**S2**	**ME2SB4**

1.1 kW

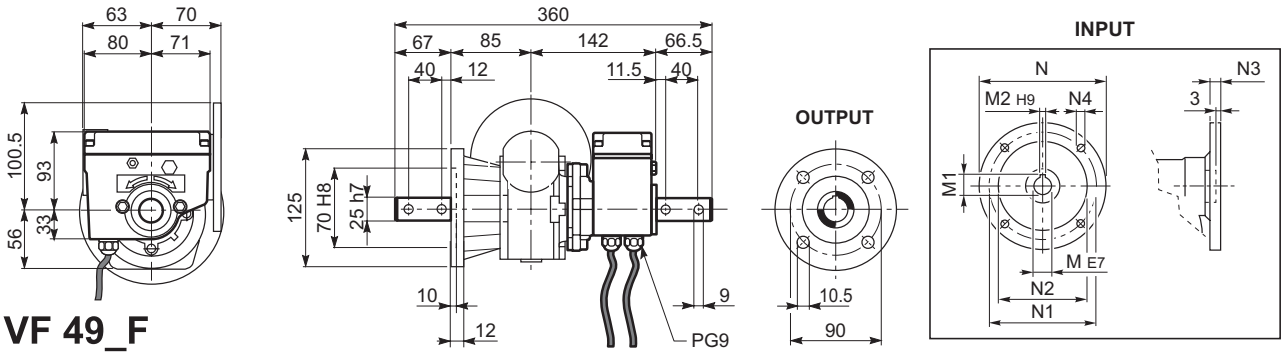
n_2 min^{-1}	M_2 Nm	i		IEC				
10.4	643	138	**WR 86_138**	**P90**	**BE90S4**			
11.9	586	120	**WR 86_120**	**P90**	**BE90S4**			
14.3	437	100	**W 86_100**	**P90**	**BE90S4**	**W 86_100**	**S3**	**ME2SA4**
17.9	379	80	**W 86_80**	**P90**	**BE90S4**	**W 86_80**	**S3**	**ME3SA4**
22.3	322	64	**W 86_64**	**P90**	**BE90S4**	**W 86_60**	**S3**	**ME3SA4**

1.5 kW

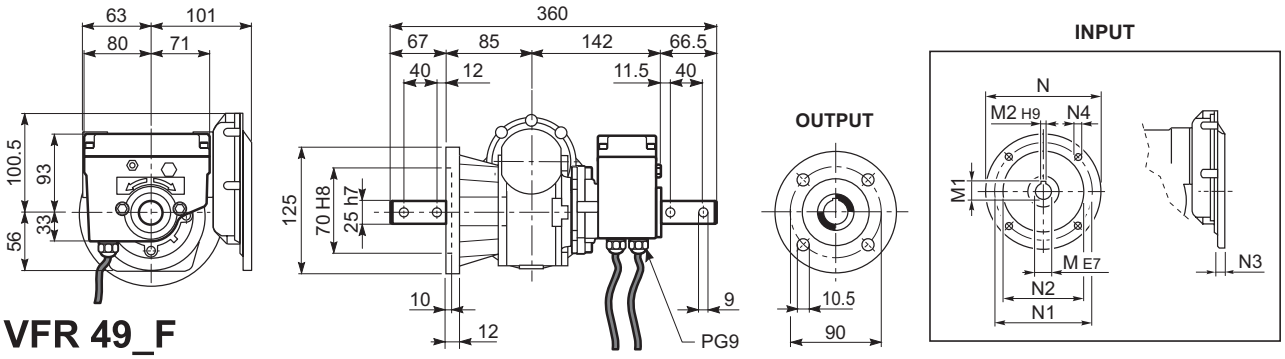
n_2 min^{-1}	M_2 Nm	i		IEC				
11.9	792	120	**WR 86_120**	**P90**	**BE90LA4**			
17.9	512	80	**W 86_80**	**P90**	**BE90LA4**	**W 86_80**	**S3**	**ME3SB4**
22.3	435	64	**W 86_64**	**P90**	**BE90LA4**	**W 86_60**	**S3**	**ME3SB4**

35 DIMENSIONS

VF 49_F - VFR 49_F



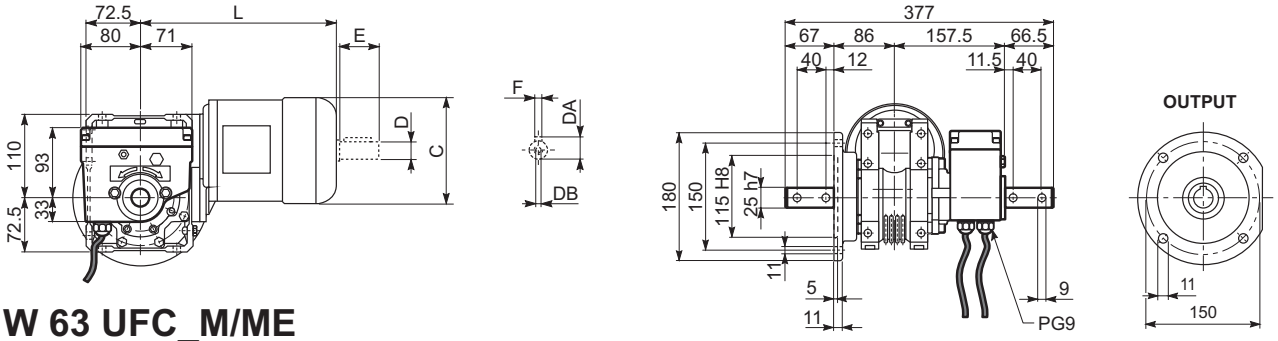
VF 49_F



VFR 49_F

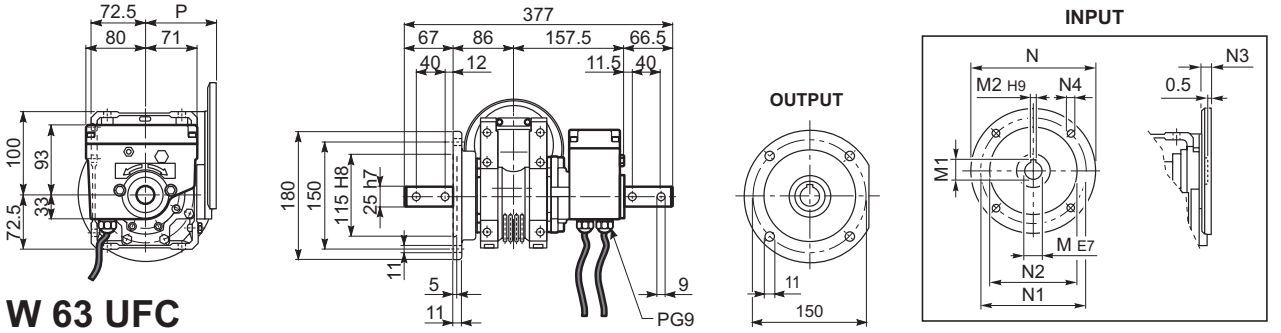
	M	M1	M2	N	N1	N2	N3	N4
VF 49_P 63	11	12.8	4	140	115	95	10.5	9.5
VF 49_P 71	14	16.3	5	160	130	110	10.5	9.5
VFR 49_P 63	11	12.8	4	140	115	95	11	M8x19

W 63 UFC_M/ME - W 63 UFC - WR 63 UFC

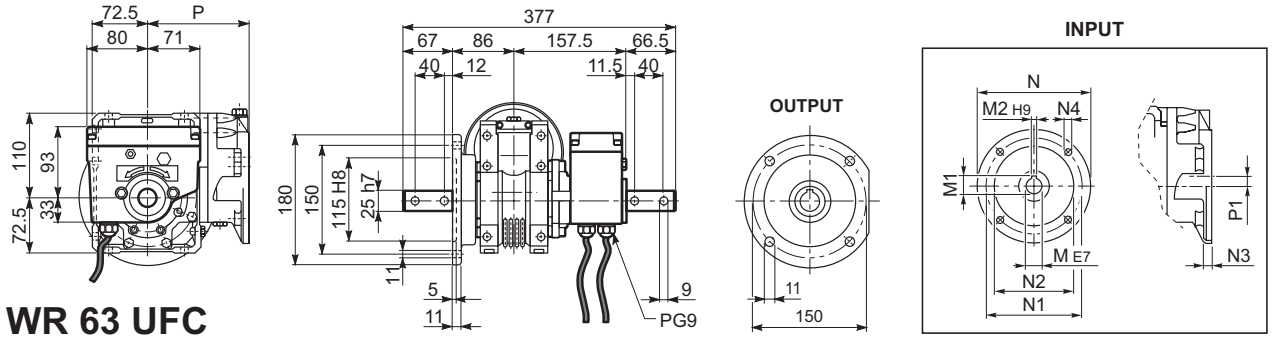


W 63 UFC_M/ME

	C	D	DA	DB	E	F	L
W 63_S1 M1L	138	14	16	M5	30	5	289
W 63_S2 ME2S	156	19	21.5	M6	40	6	317



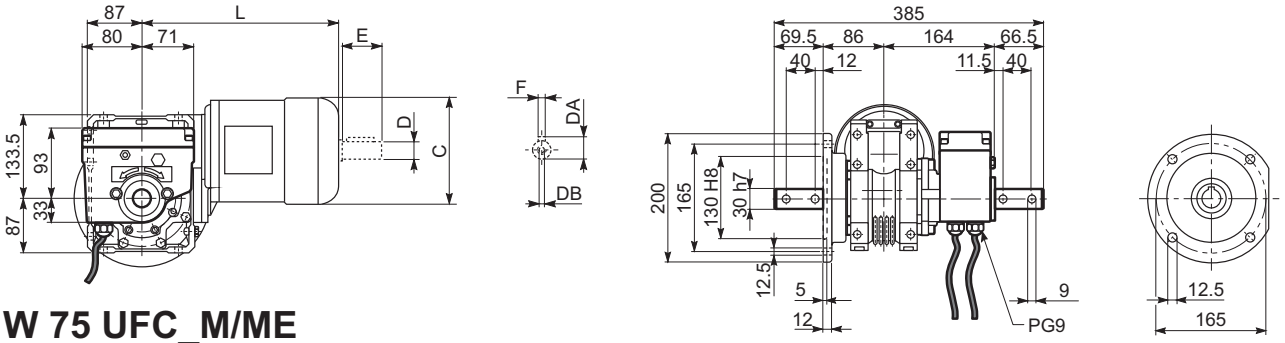
W 63 UFC



WR 63 UFC

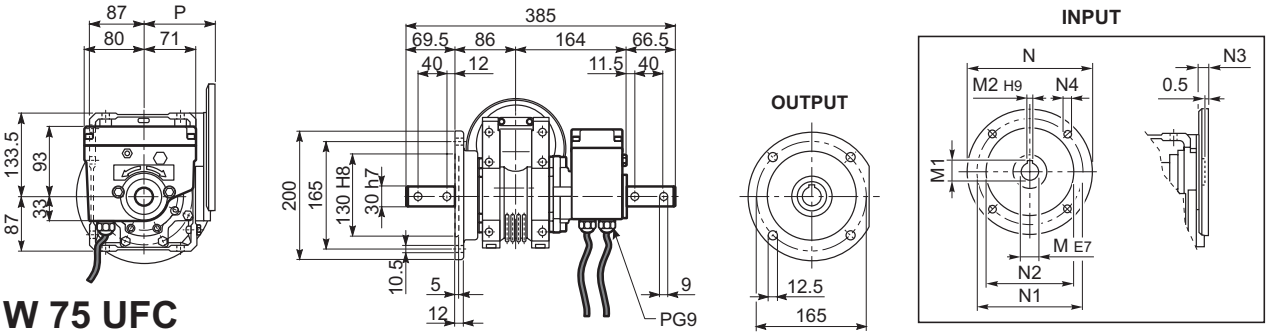
	M	M1	M2	N	N1	N2	N3	N4	P	P1
W 63_P 71	14	16.3	5	160	130	110	11	9	95	-
W 63_P 80	19	21.8	6	200	165	130	12	11.5	102	-
W 63_P 90	24	27.3	8	200	165	130	12	11.5	102	-
WR 63_P 63	11	12.8	4	140	115	95	10	M8x10	133.5	11.42
WR 63_P 71	14	16.3	5	160	130	110	10	M8x10	133.5	11.42

W 75 UFC_M/ME - W 75 UFC - WR 75 UFC

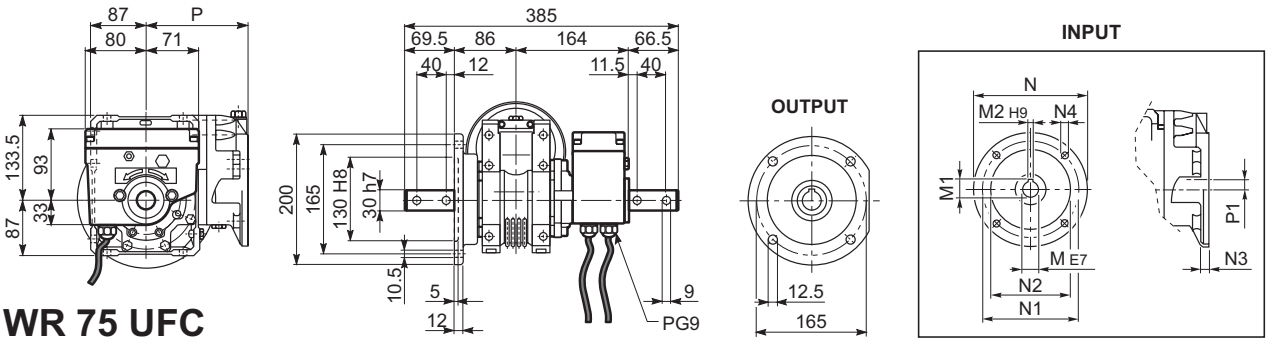


W 75 UFC_M/ME

	C	D	DA	DB	E	F	L
W 75_S1 M1L	138	14	16	M5	30	5	308
W 75_S2 ME2S	156	19	21.5	M6	40	6	333
W 75_S3 ME3S	193	28	31	M10	60	8	376
W 75_S3 ME3L	193	28	31	M10	60	8	408



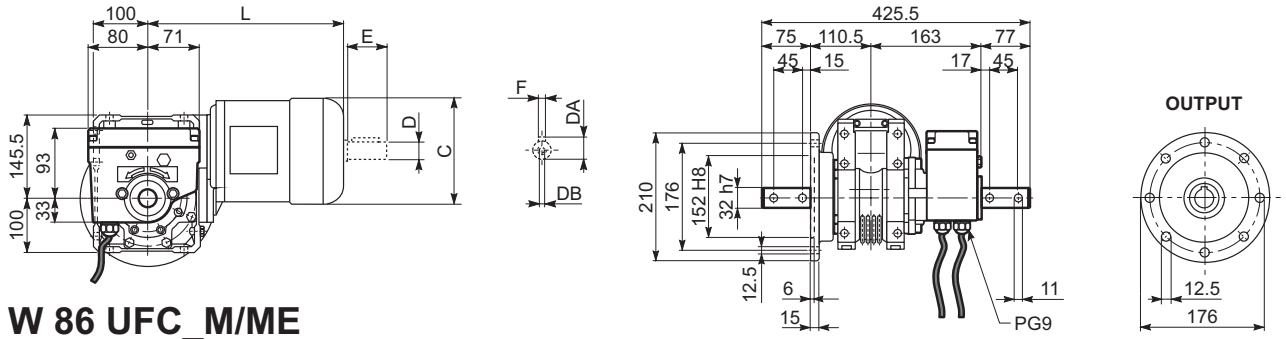
W 75 UFC



WR 75 UFC

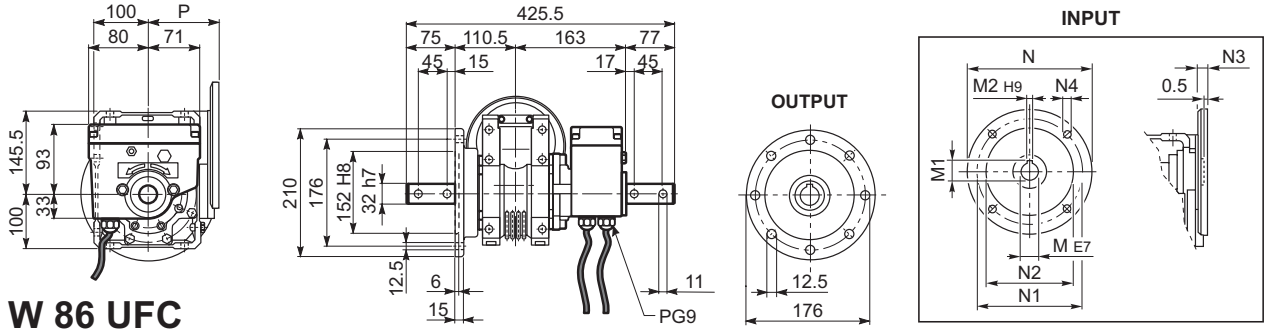
	M	M1	M2	N	N1	N2	N3	N4	P	P1
W 75_P 71	14	16.3	5	160	130	110	11	9	112	-
W 75_P 80	19	21.8	6	200	165	130	12	11.5	112	-
W 75_P 90	24	27.3	8	200	165	130	12	11.5	112	-
WR 75_P 63	11	12.8	4	140	115	95	10	M8x10	152	23.53
WR 75_P 71	14	16.3	5	160	130	110	10	M8x10	152	23.53
WR 75_P 80	19	21.8	6	200	165	130	12	M10x13	163.5	11
WR 75_P 90	24	27.3	8	200	165	130	12	M10x13	163.5	11

W 86 UFC_M/ME - W 86 UFC - WR 86 UFC

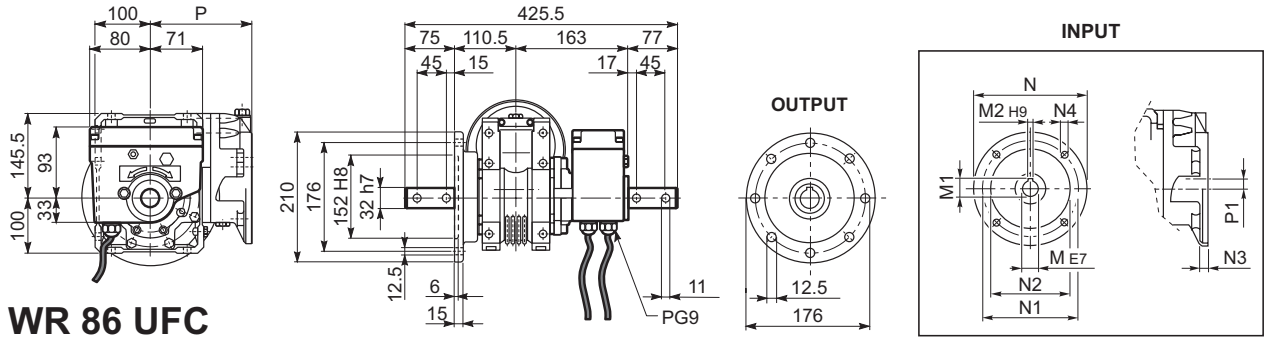


W 86 UFC_M/ME

	C	D	DA	DB	E	F	L
W 86_S1 M1L	138	14	16	M5	30	5	324
W 86_S2 ME2S	156	19	21.5	M6	40	6	349
W 86_S3 ME3S	193	28	31	M10	60	8	392
W 86_S3 ME3L	193	28	31	M10	60	8	424



W 86 UFC



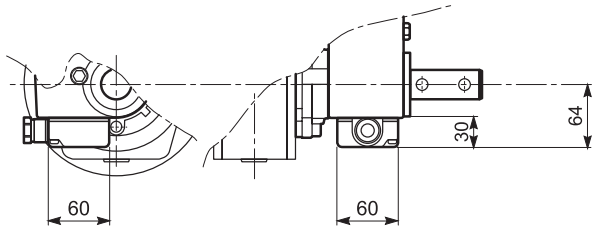
WR 86 UFC

	M	M1	M2	N	N1	N2	N3	N4	P	P1
W 86_P 71	14	16.3	5	160	130	110	11	9	128	-
W 86_P 80	19	21.8	6	200	165	130	12	11.5	128	-
W 86_P 90	24	27.3	8	200	165	130	12	11.5	128	-
WR 86_P 63	11	12.8	4	140	115	95	10	M8x10	168	35.4
WR 86_P 71	14	16.3	5	160	130	110	10	M8x10	168	35.4
WR 86_P 80	19	21.8	6	200	165	130	12	M10x13	179.5	22.9
WR 86_P 90	24	27.3	8	200	165	130	12	M10x13	179.5	22.9

36 OPTIONS

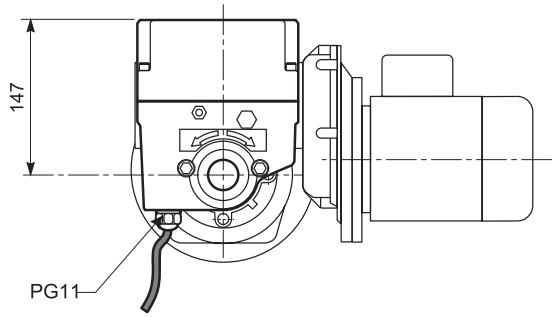
Limit switch modifications

ME

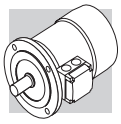


Version with terminal box

DM



Four microswitch version



SYMBOLS AND UNITS OF MEASUREMENT

Symbols	Units of Measure	Description
$\cos\varphi$	–	Power factor
η	–	Efficiency
f_m	–	Power adjusting factor
I	–	Cyclic duration factor
I_N	[A]	Rated current
I_S	[A]	Locked rotor current
J_C	[Kgm^2]	Load moment of inertia
J_M	[Kgm^2]	Moment of inertia
K_c	–	Torque factor
K_d	–	Load factor
K_J	–	Inertia factor
M_A	[Nm]	Mean breakaway torque
M_B	[Nm]	Brake torque
M_N	[Nm]	Rated torque
M_L	[Nm]	Counter-torque during acceleration
M_S	[Nm]	Starting torque

Symbols	Units of Measure	Description
n	[min^{-1}]	Rated speed
P_B	[W]	Power drawn by the brake at 20°C
P_n	[kW]	Motor rated power
P_r	[kW]	Required power
t_1	[ms]	Brake response time with one-way rectifier
t_{1s}	[ms]	Brake response time with electronic-controlled rectifier
t_2	[ms]	Brake reaction time with a.c. disconnect
t_{2c}	[ms]	Brake reaction time with a.c. and d.c. disconnect
t_a	[°C]	Ambient temperature
t_f	[min]	Work time at constant load
t_r	[min]	Rest time
W	[J]	Braking work between service interval
W_{max}	[J]	Maximum brake work for each braking
Z	[1/h]	Permissible starting frequency, loaded
Z_0	[1/h]	Max. permissible unloaded starting frequency (I = 50%)

M1 HIGH EFFICIENCY MOTORS

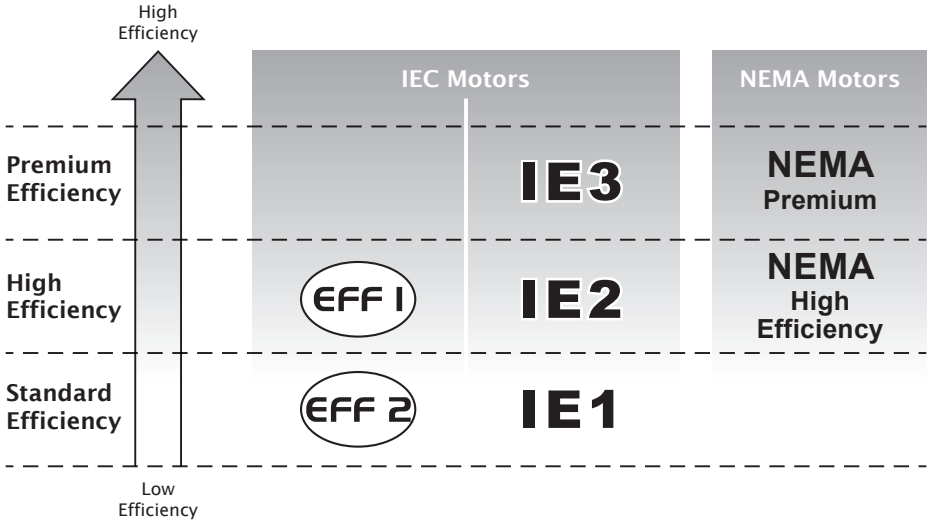
M1.1 INTRODUCTION

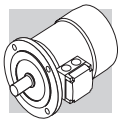
Efficiency classes and test methods

Efficiency classes characterise the efficiency with which an electric motor converts electrical energy into mechanical energy. In Europe, the energy efficiency of low voltage electric motors used to be classified using the voluntary Eff1/Eff2/Eff3 system. Outside Europe, other countries used to apply their own national systems, often very different to the European system. This uncertainty in standards led manufacturers to develop a harmonised international standard, and push for the issue of IEC (International Electrotechnical Commission) standard IEC 60034-30:2008 “Efficiency classes of single-speed, three-phase, cage-induction motors (IE code)”.

This new standard:
- defines new classes of efficiency
  IE1 (standard efficiency)
  IE2 (high efficiency)
  IE3 (premium efficiency)
- provides a common, international reference system for the classification of electric motors and for national legislation
- introduces a new efficiency measurement method in conformity with standard IEC 60034-1-2:2007

The following table shows the correspondence among the main classes.





European Commission regulation 640/2009

IEC standard 60034-30 establishes technical guidelines for efficiency classification but does not impose any legal requirements for the adoption of any particular efficiency class. These are laid down by European Directives and national laws.

The EC Regulation applying Directive 2005/32/EC was adopted on the 22nd July 2009. This establishes the legal requirements and eco-compatible design criteria for electric motors, and imposes minimum efficiency limits according to the following schedule:

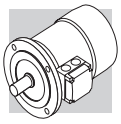
- **16/06/2011:** Electric motors must have a minimum efficiency level equivalent to class **IE2**
- **01/01/2015**: Electric motors with a rated power output between 7.5 kW and 375 kW must have a minimum efficiency level corresponding to **IE3**, or to **IE2** if controlled by an inverter.
- **01/01/2017:** Electric motors with a rated power output between 0.75 kW and 375 kW must have a minimum efficiency level corresponding to **IE3**, or to **IE2** if controlled by an inverter.

Scope and exclusions

EC Regulation 640/2009 applies to 2, 4, and 6 pole, single-speed, three-phase, 50 Hz or 60 Hz, cage-induction motors with rated outputs of 0.75 kW to 375 kW, and rated voltage up to 1000 V, designed for continuous duty (S1).

The regulation does not apply to:

- brakemotors
- motors designed to function immersed in liquid
- motors that are fully integrated in a product (like a gearbox, pump, fan), so that it is not possible to test the performance of the motor independently of that of the product.
- motors expressly designed to function:
- at altitudes above 1000 metres a.s.l.;
- in ambient temperatures above 40 °C;
- at maximum operating temperatures above 400 °C;
- in ambient temperatures below -15 °C (all motors) or below 0 °C (air-cooled motors);
- with incoming liquid coolants at temperatures below 5 °C or above 25 °C;
- in potentially explosive atmospheres as defined by Directive 94/9/EC.

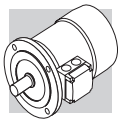


M1.2 BONFIGLIOLI SERIES BE - ME MOTORS

BONFIGLIOLI RIDUTTORI's new **BE** Series motors (BE 80B ... BE 180L) and **ME** (ME 2S ... ME 5L), are **IE2** class (high efficiency), three phase, asynchronous, enclosed, externally ventilated, cage-induction motors, available in rated power outputs from 0.75 to 22 kW.
Standard versions of **BE** and **ME** motors are 230/400V Δ/Y (400/690V Δ/Y in sizes BE 160 and BE 180), 50 Hz motors, with a tolerance of ±10%.
BE and **ME** Series motors conform to the requirements of Directive 2006/95/EC (Low Voltage Directive) and Directive 2004/108/EC (Electromagnetic Compatibility Directive).
BE and **ME** Series motors are constructed according to the standards specified in the following table.

(F 1)

Title	CEI	IEC
General requirements for rotating electrical machines	**CEI EN 60034-1**	**IEC 60034-1**
Terminal markings and direction of rotation of rotating machines	**CEI 2-8**	**IEC 60034-8**
Methods of cooling for electrical machines	**CEI EN 60034-6**	**IEC 60034-6**
Dimensions and output ratings for rotating electrical machines	**EN 50347**	**IEC 60072**
Classification of degree of protection provided by enclosures for rotating machines	**CEI EN 60034-5**	**IEC 60034-5**
Noise limits	**CEI EN 60034-9**	**IEC 60034-9**
Classification of type of construction and mounting arrangements	**CEI EN 60034-7**	**IEC 60034-7**
Rated voltage for low voltage mains power	**CEI 8-6**	**IEC 60038**
Vibration level of electric machines	**CEI EN 60034-14**	**IEC 60034-14**
Efficiency classes of single-speed, three-phase, cage-induction motors (IE code)	**CEI EN 60034-30**	**IEC 60034-30**
Standard method for determining losses and efficiency from tests	**CEI EN 60034-2-1**	**IEC 60034-2-1**



M1.3 MOTOR DESIGNATION

BE **90LA** **4** 230/400-50 IP55 CLF **B5** ... ...

OPTIONS

TERMINAL BOX POSITION
W (default), **N**, **E**, **S**

MOTOR MOUNTING
— (compact motor)
IM B5 - IM V1, IM V3
IM B14 - IM V18, IM V19

INSULATION CLASS
CL F, **CL H**

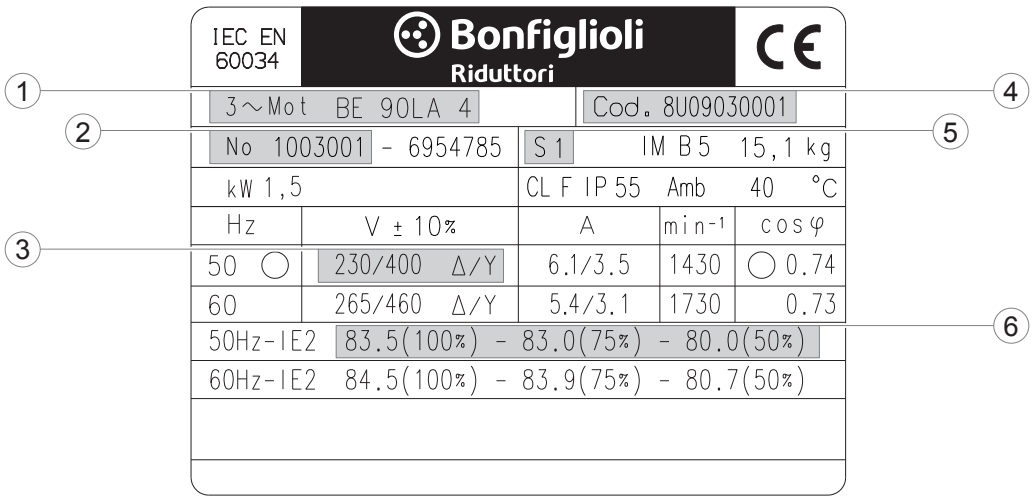
DEGREE OF PROTECTION
IP55

VOLTAGE - FREQUENCY
230/400 V Δ/Y - 50 Hz (BE 80 ... BE 132 / ME 2 ... ME 4)
460 V Y - 60 Hz (BE 80 ... BE 132 / ME 2 ... ME 4)
400/690 V Δ/Y - 50 Hz (BE 160 - BE 180 / ME 5)
460 V Δ - 60 Hz (BE 160 - BE 180 / ME 5)

POLE NUMBER
2, 4, 6

MOTOR SIZE
BE 80B ... BE 180L
ME 2S ... ME 5L

MOTOR TYPE
BE IEC 3-phase, class IE2
ME compact 3-phase, class IE2



① BONFIGLIOLI Motor type
② Serial number
③ Rated voltage
④ Motor code
⑤ Type of duty: S1 Continuous duty
⑥ IE Class, Efficiency at: 4/4 - 3/4 - 2/4 load

M1.4 TOLERANCES

Allowed tolerances for guaranteed parameters in accordance with standards CEI EN 60034-1 are indicated in the table below:

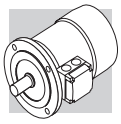
(F 2)

-0.15 (1 - η) P ≤ 50kW	Efficiency
-(1 - cosφ)/6 min 0.02 max 0.07	Power factor
±20% *	Slip
+20%	Locked rotor current
-15% +25%	Locked rotor torque
-10%	Max. torque

* ± 30% for motors with Pn < 1 kW

M1.4.1 GEOMETRIC TOLERANCES

Dimensions and tolerances of shaft end, key and flange are in accordance with EN 50347, IEC 60072-1, CEI-UNEL 13501.
Shaft ends feature an axial threaded hole in accordance with UNI 3221, DIN 332 and a key inserted in the suitable keyway.
The following table reports the tolerances for the different parts:



(F 3)

Component	Dimensions		Tolerance
Shaft end	**D - DA**	Ø 11 - 28	**j6**
		Ø 38 - 48	**k6**
		Ø ≥ 55	**m6**
Key	**F - FA**		**h9**
Flange	**N**	Ø < 250	**j6**
		Ø ≥ 250	**h6**

M1.4.2 NOISE LEVEL

Noise levels measured using the method specified by standard ISO 1680 are within the maximum limits required by standards CEI EN 60034-9

M1.5 DIRECTION OF ROTATION

Motors may operate in both directions of rotation. When the terminals U1, V1, W1 are connected to the line phases L1, L2, L3, the motor will run in a clockwise direction as viewed from the coupling end. Counter clockwise rotation is obtained by swapping two phases.

M1.6 BEARINGS

Axially pre-loaded radial ball bearings, lubricated for life with the grease.
Nominal fatigue life L_{10h} ~ 40,000 hours assuming no overhung load on the shaft, and mounting position horizontal.
The types of bearings in use are listed in the table below:

(F 4)

		DE	**NDE**
		All motors	
BE 80	**ME 2**	6204 2Z C3	6204 2Z C3
BE 90	**—**	6205 2Z C3	6205 2Z C3
BE 100	**ME 3**	6206 2Z C3	6206 2Z C3
BE 112	**—**	6306 2Z C3	6306 2Z C3
BE 132	**ME 4**	6308 2Z C3	6308 2Z C3
BE 160M/L	**ME 5**	6309 2Z C3	6309 2Z C3
BE 180M	**—**	6310 2Z C3	6310 2Z C3
BE 180L	**—**	6310 2Z C3	6310 2Z C3

DE = drive end
NDE = non drive end

M1.7 STANDARD OPERATION

M1.7.1 VOLTAGE

BE/ME motors in standard version are designed to operate from a rated voltage 230/400V Δ/Y (or 400/690V Δ/Y for frame sizes BE 160, BE 180 and ME 5) 50 Hz, with ± 10%. The full load efficiency is guaranteed only with reference to the voltage values stated on the motor nameplate.
Motors are suitable for operation with European power mains with voltage in accordance with publication IEC 60038.

(F 5)

		Vmot ± 10% 3 ~		Configuration
BE 80 ... BE 132	**ME 2 ... ME 4**	230/400 V Δ /Y 460 V Y	50 Hz 60 Hz (*)	Standard
BE 160, BE 180	**ME 5**	400/690 V Δ /Y 460 V Δ	50 Hz 60 Hz (*)	Standard
BE 80 ... BE 132	**ME 2 ... ME 4**	400/690 V Δ /Y 460 V Δ	50 Hz 60 Hz (*)	At request

(*) Only 4 poles motors

M1.7.2 FREQUENCY

BE/ME motors may operate under 50Hz supply.
4 poles BE/ME motors may also operate with 60Hz power mains.

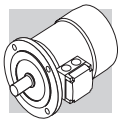
M1.7.3 AMBIENT TEMPERATURE

Catalog rating charts report operating characteristics at 50 Hz, under installation conditions as specified by standards CEI EN 60034-1 (temperature between -15 °C and + 40 °C and altitude above sea level ≤ 1000 m).

M1.8 60 Hz OPERATION

4 poles BE/ME motors may also operate with 60Hz power mains; on the motor nameplate are available the electrical data related to 50Hz and the electrical data related to 460V -60Hz, with the same rated power available with 50Hz supply.

Key parameter variations for 4 poles BE/ME motors with standard winding operating with 60 Hz power mains are reported below (variations expressed as percentages):



(F 6)

50 Hz	60 Hz			
V	V	P_n	M_n, M_a/M_n	n [min^{-1}]
230/400 Δ /Y	265/460 Δ/Y	1	0.83	1.2
400/690 Δ /Y	460 Δ			

M1.8.1 MOTORS FOR USA AND CANADA

CUS

BE and ME motors are available in NEMA Design C configuration (concerning electrical characteristics), in compliance with CSA (Canadian Standard) C22.2 No. 100 and UL (Underwriters Laboratory) UL 1004-1. By specifying the option CUS the name plate is marked with both symbols shown here below:

C US

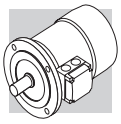
(voltage ≤ 600V)

US power mains voltages and the corresponding rated voltages to be specified for the motor are indicated in the following table:

(F 7)

Frequency	Mains voltage	Motor rated voltage
60 Hz	208 V	200 V
	240 V	230 V
	480 V	460 V
	600 V	575 V

Motors with YY/Y connection (e.g. 230/460-60; 220/440-60) feature, as standard, a 9-stud terminal board.
The option CUS does not apply to servo-ventilated motors.



M1.9 TERMINAL BOX

The main terminal box has 6 terminals for connection to lead-in wires (9-terminal version is supplied for “dual voltage” US voltage ratings)
The ground terminal for earth lead connection is housed in the terminal box.
Terminal sizes are listed in the following table.
In motor design IM B3, the terminal box is top mounted (side opposite to feet).
Please refer to the wiring diagrams reported inside the terminal box, for correct wiring.

(F 8)

		No. of terminals	Terminal threads	Wire max cross section area sq mm^2
BE 80, BE 90	**ME 2**	6	M4	2.5
BE 100 ... BE 132	**ME 3, ME 4**	6	M5	6
BE 160	**ME 5**	6	M6	16
BE 180	**—**	6	M8	25

M1.9.1 CABLE GLAND HOLES

Standard cable gland holes accommodate metric-size cable glands in accordance with standard CEI EN 50262. Dimensions and locations are as shown in the following tables.

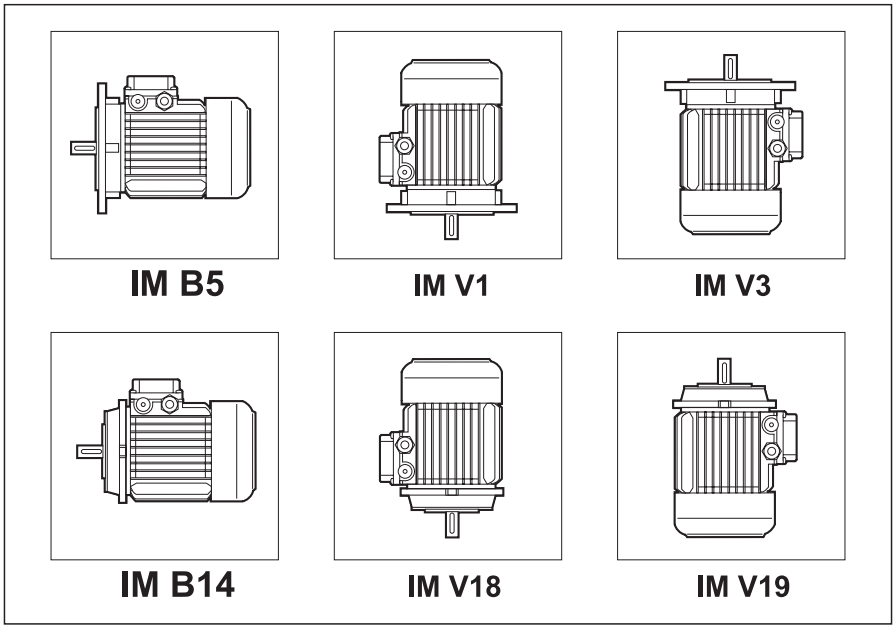
(F 9)

		No. & size of cable gland holes		Wire max Ø [mm]
BE 80, BE 90	**ME 2**	2 x M 25 x 1.5	1 Hole on each side	17
BE 100, BE 112	**ME 3**	2 x M 32 x 1.5 2 x M 25 x 1.5	2 Holes on each side	21 17
BE 132	**ME 4**	4 x M 32 x 1.5		21
BE 160, BE 180	**ME 5**	2 x M 40 x 1.5	Pivoting, 4 x 90°	28

M.1.10 DESIGN VERSIONS

Motors are available in the design versions IM B5, IM B14 and derived versions in accordance with standard CEI EN 60034-7, as outlined in the table below.

(F 10)



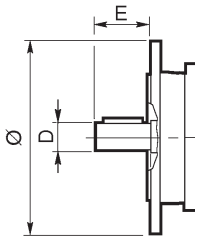
Motors in the derived design versions may also be installed as outlined in the table below. however, note that motor name plate will report the corresponding basic design version:

(F 11)

Basic design version	Derived design version	
IM B5	IM V1	IM V3
IM B14	IM V18	IM V19

If motor is to be installed with the shaft pointing downwards, the rain canopy option RC.
Flange output motors are also available with reduced coupling dimensions corresponding to design versions B5R or B14R. Dimensions are indicated in the table below:

(F 12)



	BE 80	BE 90	BE 100	BE 112	BE 132
	DxE - Ø				
B5R (1)	14x30 - 160	19x40 - 200	24x50 - 200	24x50 - 200	28x60 - 250
B14R (2)	14x30 - 105	19x40 - 120	24x50 - 140	—	—

(1) flange with through holes
(2) flange with threaded holes

M1.11 DEGREE OF PROTECTION

IP..

Standard BE/ME motors are manufactured in protection class IP55. A higher protection class IP56 is available at request.
Regardless of the protection class specified on order, motors to be installed outdoors require protection against direct sunlight and in addition – when they are to be installed with the shaft pointing downwards – a rain canopy to keep out water and solid bodies (option **RC**).

M1.12 INSULATION CLASS

CL F

Bonfiglioli motors use class **F** insulating materials as compare to the standard motor.

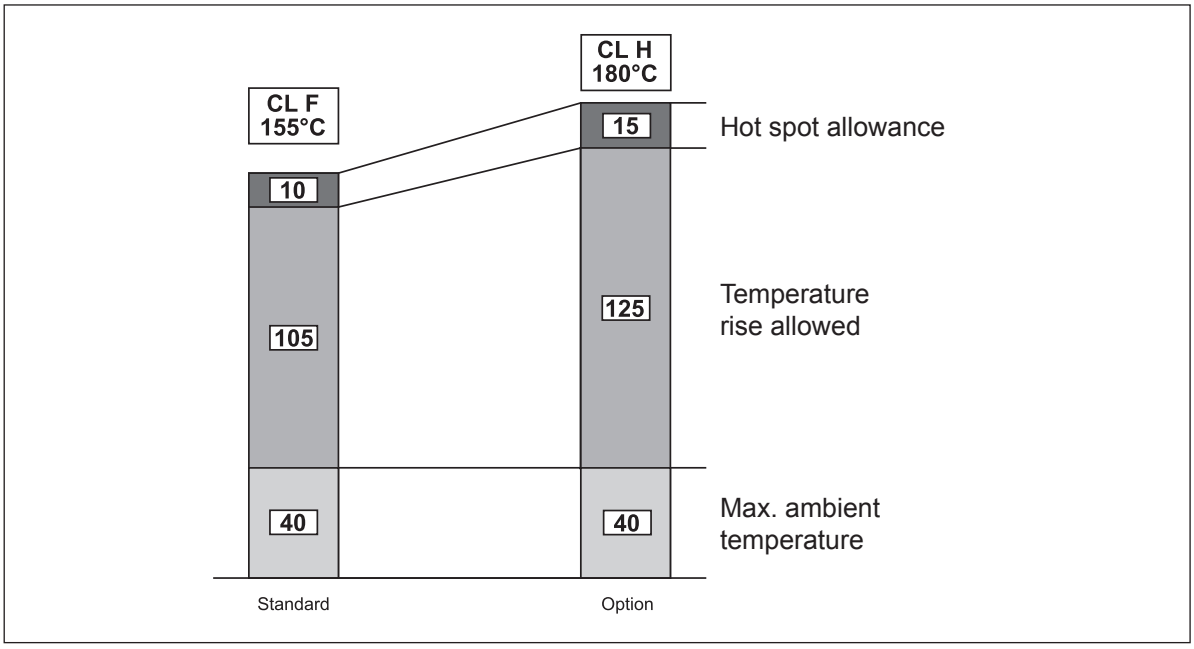
In standard motors, stator windings over temperature normally stays below the 80 K limit corresponding to class B over temperature.
A careful selection of insulating components makes the motors compatible with tropical climates and normal vibration.

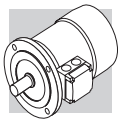
For applications involving the presence of aggressive chemicals or high humidity, contact Bonfiglioli Engineering for assistance with product selection.

CL H

Motors manufactured in insulation class **H** are available at request.
The option is not applicable to motors compliant with the CSA and UL norms (option CUS).

(F 13)





M1.13 OPTIONS

(F 14)

Description	Catalogue numbers					
Thermal protective devices	**D3**	**E3**	**K1**			
Feedback devices	**EN1**	**EN2**	**EN3**	**EN4**	**EN5**	**EN6**
Anti-condensate heaters	**H1**					
Tropicalized windings	**TP**					
Double-extended shaft	**PS**					
Rotor balancing grade B	**RV**					
External mechanical protections	**RC**	**TC**				
Forced ventilation	**U1**	**U2**				
Certification C US	**CUS**					
Plug connector	**CON**					

M1.13.1 Thermal protective devices

The standard thermal cut out fitted to motors may be supplemented by incorporating thermistors or thermostats to protect winding from overheating due to poor ventilation or intermittent duty.
Such additional protection is highly recommended for motors with separate ventilation. Available variants are as follows:

D3

3 Bi-metallic thermostats in the windings, 150 °C temperature
Bimetallic thermostats consist of a bimetallic disc mounted inside a casing. Upon reaching the preset operating temperature (150 °C), the disc operates the contacts causing them to disengage from the rest position.
As temperature decreases, disc and contacts return to the rest position.
Normally, three bimetallic thermostats connected in series with normally closed contacts and an auxiliary terminal board are used.

E3

3 PTC thermistors in the windings, 150 °C temperature
Thermistors are semiconductors that exhibit a rapid resistance change when approaching a preset switch temperature (150 °C). Normally, positive temperature coefficient (PTC) thermistors are used.
Thermistors cannot control relays directly and must be connected to a suitable disconnect device.
The terminals for three PTC thermistors connected in series are available in an auxiliary terminal board.

K1

1 x KTY 84-130 in the windings

The design characteristics of this sub-group of PTC thermistors allow them to be used as positive temperature coefficient sensors with variable resistance.
Functioning temperature range: 0°C ... +260°C.
Thermistors cannot control relays directly and must be connected to a suitable disconnect device.
Terminals (polarised) for 1 x KTY 84-130 are provided on an auxiliary terminal strip.

M1.13.2 Connectors

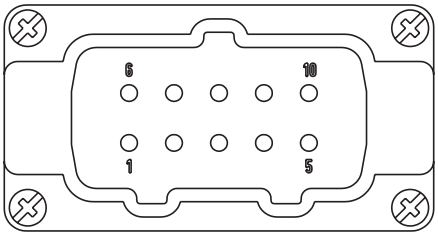
CON

Plug connector

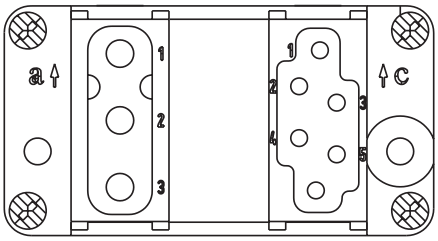
Three types of connectors (CON 1, CON 2, CON 3) are provided; they can be mounted in two different positions: right side of terminal box cover (C1D, C2D, C3D); left side of terminal box cover (C1S, C2S, C3S).
The option CON is available for BE motors sizes listed below.
The male connector (with pins) is mounted on the motor, the female connector is not provided.
With CON option, the winding connection is always Y.
With option U1 “forced ventilation”, the fan unit supply is available inside the separate terminal box fixed to fan cover.
With options EN1...EN6, the encoder connection is made by a cable not connected to the motor plug connector.
The CON option is not available when at least one of the next options are selected: the U2 and CUS.

Specifications

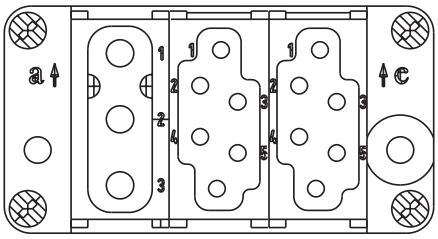
(F 15)

Option	**CON 1**
Motor size	**BE80…BE112 / ME2...ME3**
Connector view	
Type of connector	Harting Han 10ES
Housing	Han EMC 10B with 2 levers
Numbers of pins - nominal current	10 x 16A
Voltage	500 Vac
Contact connection	Screw terminals

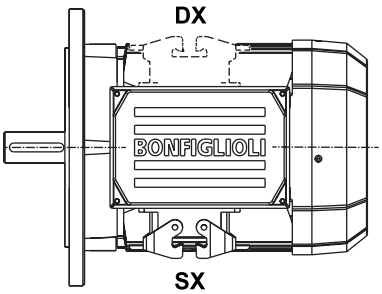
(F 16)

Option	**CON 2**
Motor size	**BE80…BE132M / ME2...ME4**
Connector view	
Type of connector	Harting Han Modular
Housing	Han EMC 10B with 2 levers
Module type	Module C + Empty module + Module E
Numbers of pins - nominal current	3 x 36A / 6 x 16A
Voltage	500 Vac
Contact connection	Crimping contacts

(F 17)

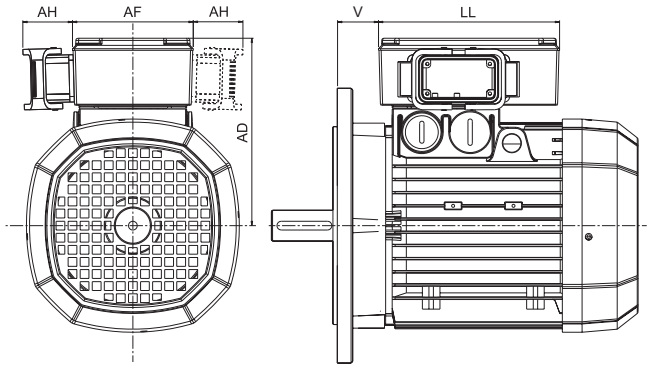
Option	**CON 3**
Motor size	**BE80…BE132M / ME2...ME4**
Connector view	
Type of connector	Harting Han Modular
Housing	Han EMC 10B with 2 levers
Module type	Module C + Module E + Module E
Numbers of pins - nominal current	3 x 36A / 6 + 6 x 16A
Voltage	500 Vac
Contact connection	Crimping contacts

(F 18)

Connector orientation


(F 19)

Motors without brake dimensions



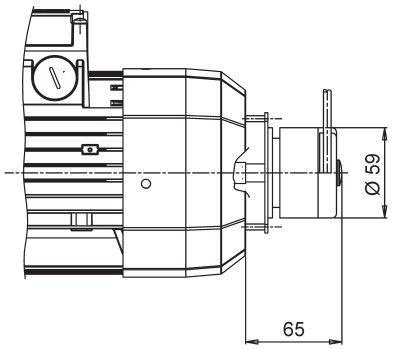
		AD (mm)	**AF** (mm)	**AH** (mm)	**LL** (mm)	**V**(*) (mm)
BE80	**ME2**	160	110	45	165	16.5
BE90	**—**	162	110	45	165	31.5
BE100	**ME3**	171	110	45	165	37.5
BE112	**—**	186	110	45	165	39
BE132	**ME4**	210	140	45	188	45.5

(*) Dimension valid only for motorsi BE.

M1.13.3 Feedback units

(F 20)

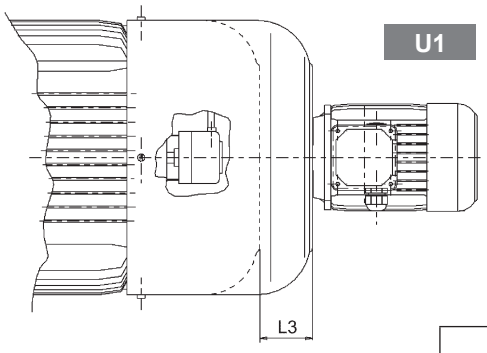
EN1, EN2, EN3, EN4, EN5, EN6



BE 80B ... BE 180L	ME 2S ... ME 5L

(F 21)

EN_ + U1



		L3
BE 160	**ME 5**	72
BE 180	**—**	82

If the encoder device (options EN_) is specified on motors BE80B...BE132MB / ME2...ME4, along with the independent fan cooling (options U1, U2), the extra length of motor is coincident with that of the correspondent U1 and U2 execution.

EN1

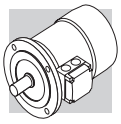
Incremental encoder, V_{IN} = 5 V, line-driver output RS 422.

EN2

Incremental encoder, V_{IN} = 10-30 V, line-driver output RS 422.

EN3

Incremental encoder, V_{IN} = 12-30 V, push-pull output 12-30 V.



EN4

Encoder sin/cos, V_{IN} = 4.5-5.5 V, output Sinus 0.5 V_{PP}.

EN5

Absolute encoder singleturn, HIPERFACE® interface, V_{IN} = 7-12 V.

EN6

Absolute encoder multiturn, HIPERFACE® interface, V_{IN} = 7-12 V.

(F 22)

		EN1	EN2	EN3	EN4	EN5	EN6
Interface		TTL/RS 422	TTL/RS 422	HTL/push-pull	Sinus 0.5 VPP	HIPERFACE®	HIPERFACE®
Power supply voltage	[V]	4...6	10...30	12...30	4.4...5.5	7...12	7...12
Output voltage	[V]	5	5	12...30	—	—	—
No-load operating current	[mA]	120	100	100	40	80	80
No. of pulses per revolution		1024					
Steps per revolution		—	—	—	—	15 bit	15 bit
Revolutions		—	—	—	—	—	12 bit
No. of signals		6 (A, B, Z + inverted signals)			6 (cos-, cos+, sin-, sin+, Z, $\overline{Z}$)	—	—
Max. output frequency	[kHz]	600			200		
Max. speed	[min^{-1}]	6000 (9000 min^{-1} for 10 s)					
Working temperature range	[°C]	-30 ... +100					
Protection class		IP 65					

M1.13.4 Anti-condensation heaters

H1

Where an application involves high humidity or extreme temperature fluctuation, motors may be equipped with an anti-condensate heater.
A single-phase power supply is available in the auxiliary terminal board inside the main terminal box.

(F 23)

		H1
		1~ 230V ± 10% **P [W]**
BE 80	**ME 2**	10
BE 90 ... BE 132MB	**ME 3, ME 4**	25
BE 160, BE 180	**ME 5**	50

Always remove power supply to the anti-condensate heater before operating the motor.

M1.13.5 Tropicalization

TP

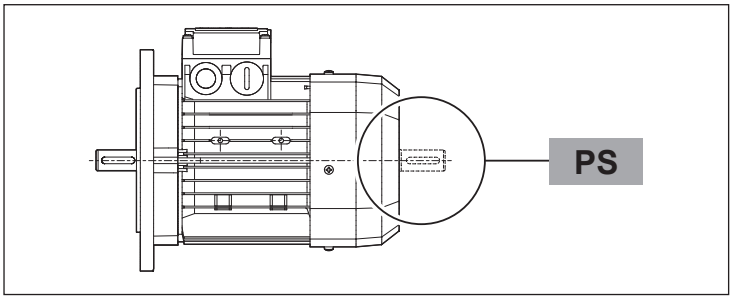
When option **TP** is specified, motor windings receive additional protection for operation in high humidity and temperature conditions.

M1.13.6 Rotor shaft configurations

PS

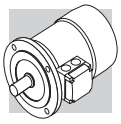
Second shaft extension
This option is not compatible with variants RC, TC, U1, U2, EN1, EN2, EN3, EN3, EN4, EN5, EN6.
For shaft dimensions please see motor dimensions tables.

(F 24)



M1.13.7 Rotor balancing

Motors are dynamically balanced with a half key and fall within vibration class **A** in accordance with standard CEI EN 60034-14.



RV

Where low noise is a priority requirement, the option **RV** ensures reduced vibration in accordance with vibration class **B**.
The table below reports effective velocity of vibration for normal (A) and B grade balancing.

(F 25)

Vibration class	Synchronous speed n [min^{-1}]	Limits of the vibration velocity (mm/s) **80 ≤ H ≤ 180L**
A	600 < n < 3600	1.6
B	600 < n < 3600	0.70

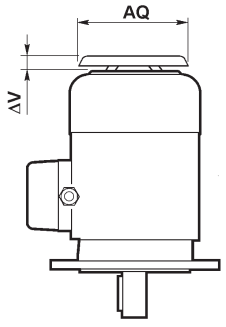
Values are obtained from measurements on freely suspended motor during no-load operation; tolerance ±10%.

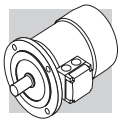
M1.13.8 External mechanical protections

RC

The rain canopy protects the motor from dripping and avoids the ingress of solid matter. It is recommended when motor is installed in a vertical position with the shaft pointing downwards.
Relevant dimensions are indicated in the table below.
The rain canopy is not compatible with variants PS, EN1, EN2, EN3, EN3, EN4, EN5, EN6.

(F 26)

		AQ	ΔV	
BE 80	**ME 2**	152	25	
BE 90	**—**	168	30	
BE 100	**ME 3**	190	28	
BE 112	**—**	211	32	
BE 132	**ME 4**	254	32	
BE 160	**ME 5**	302	36	
BE 180	**—**	340	36	



TC

Option TC is a rain canopy variant for textile industry environments, where lint may obstruct the fan grid and prevent a regular flow of cooling air.
This option is not compatible with variants EN1, EN2, EN3, EN3, EN4, EN5, EN6.
Overall dimensions are the same as rain canopy type RC.

M1.13.9 Ventilation

Motors are cooled by external ventilation systems (IC 411 in accordance with CEI EN 60034-6) and are equipped with a plastic radial fan running in both directions of rotation.
Installation must take into account a minimum distance of the fan cover from the nearest wall so as to ensure unobstructed air circulation. This also facilitates routine maintenance operations for motor.
At request motors may be equipped with forced ventilation with independent power supply.
Motor is cooled by an axial ventilator mounted on the fan cover using an independent power supply (cooling method IC 416).

This design is adopted on inverter-controlled motors in order to extend torque-control operating range to include low speeds, or when the motor is to perform a large number of starts per hour.
This option is not compatible with motors with double-extended shaft (option PS).

Variant is available in two alternative executions named **U1** and **U2**, featuring the same overall length.
The largest length of fan cover (ΔL) for each configuration is reported in the following table.
For overall dimensions, please see the dimension tables of motors.

Extra length for motors with independent cooling

(F 27)

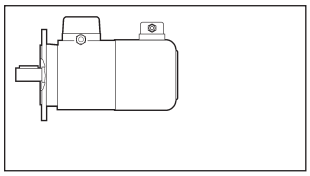
		ΔL_1 [mm]
BE 80	**ME 2**	127
BE 90	**—**	131
BE 100	**ME 3**	119
BE 112	**—**	130
BE 132	**ME 4**	161
BE 160, BE 180	**ME 5**	184

ΔL_1 = dimension variation compared to length LB of the corresponding standard motor.

U1

Terminals of the independent fan motor are housed in a separate terminal box.
The option is not applicable to motors compliant with the CSA and UL norms (option CUS).

(F 28)

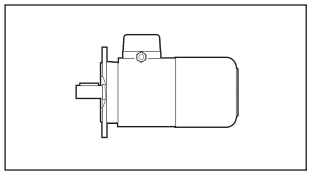


		V a.c. ±10%	Hz	P [W]	I [A]
BE 80	**ME 2**	1 ~ 230	50 / 60	22	0.12
BE 90	**—**			40	0.30
BE 100	**ME 3**			50	0.25
BE 112	**—**	3 ~ 230Δ / 400Y		50	0.26 / 0.15
BE 132	**ME 4**			110	0.38 / 0.22
BE 160	**ME 5**		50	180	1.25 / 0.72
BE 180	**—**			250	1.51 / 0.87

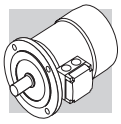
U2

Terminals of the fan motor are located in the main terminal box.
The option is not applicable to motors compliant with the CSA and UL norms (option CUS).

(F 29)



		V a.c. ±10%	Hz	P [W]	I [A]
BE 80	**ME 2**	1 ~ 230	50 / 60	22	0.12
BE 90	**—**			40	0.30
BE 100	**ME 3**	3 ~ 230Δ / 400Y		40	0.12 / 0.09
BE 112	**—**			50	0.26 / 0.15
BE 132	**ME 4**			110	0.38 / 0.22



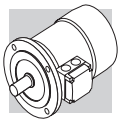
M1.14 MOTOR RATING CHARTS

2 P	3000 min^{-1} - S1	50 Hz - IE2

P_n kW		n min^{-1}	M_n Nm	In 400V A	η% 100%	η% 75%	η% 50%	cos φ	I_s/I_n	M_s/M_n	M_a/M_n	J_m x 10^{-4} kgm^2	IM B5 Kg
0.75	**BE 80A 2**	2860	2.5	1.65	80.0	79.6	76.4	0.83	6.8	3.8	3.5	9.0	9.5
1.1	**BE 80B 2**	2845	3.7	2.35	81.5	82.2	79.9	0.83	6.9	3.8	3.1	11.4	11.3
1.5	**BE 90SA 2**	2865	5.0	3.2	81.3	80.7	78.1	0.82	6.8	3.6	2.8	12.5	12.3
2.2	**BE 90L 2**	2870	7.3	4.7	83.2	83.1	80.8	0.82	6.9	3.1	2.9	16.7	14
3	**BE 100L 2**	2880	9.9	6.2	84.6	84.6	83.7	0.83	7.3	3.5	3.1	39	23
4	**BE 112M 2**	2920	13.1	8.2	85.8	85.5	84.3	0.82	7.9	3.5	3.1	57	28
5.5	**BE 132SA 2**	2925	18.0	10.6	87.0	85.0	81.7	0.86	8.5	3.6	3.3	145	42
7.5	**BE 132SB 2**	2935	24	14.3	88.1	87.4	84.7	0.86	8.8	3.9	3.6	178	53
9.2	**BE 132MB 2**	2920	30	16.4	88.8	86.5	84.2	0.91	8.4	3.7	3.3	210	65
11	**BE 160MA 2**	2940	36	20.0	89.4	89.5	88.0	0.89	8.1	3.0	2.9	340	84
15	**BE 160MB 2**	2950	49	27.2	90.5	90.5	89.5	0.88	8.5	3.0	2.8	420	97
18.5	**BE 160L 2**	2945	60	32	90.9	90.5	89.8	0.91	7.7	2.9	2.7	490	109

4 P	1500 min^{-1} - S1	50 Hz - IE2

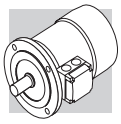
P_n kW		n min^{-1}	M_n Nm	In 400V A	η% 100%	η% 75%	η% 50%	cos φ	I_s/I_n	M_s/M_n	M_a/M_n	J_m x 10^{-4} kgm^2	IM B5 Kg
0.75	**BE 80B 4**	1430	5.0	1.65	81.0	80.5	78.0	0.81	6.1	3.2	3.0	28	12.2
1.1	**BE 90S 4**	1430	7.4	2.53	82.5	82.0	79.5	0.76	6.3	2.9	2.8	28	13.6
1.5	**BE 90LA 4**	1430	10.0	3.5	83.5	83.0	80.0	0.74	5.9	3.1	3.0	34	15.1
2.2	**BE 100LA 4**	1430	14.7	4.9	85.4	85.0	84.0	0.76	5.8	3.0	2.8	54	22
3	**BE 100LB 4**	1420	20	6.6	85.5	86.0	85.5	0.77	5.9	2.8	2.6	61	24
4	**BE 112M 4**	1440	27	8.3	87.0	87.0	86.0	0.80	6.5	2.8	2.8	105	32
5.5	**BE 132S 4**	1460	36	11.1	88.5	88.5	87.5	0.81	7.3	2.9	2.9	270	53
7.5	**BE 132MA 4**	1460	49	14.8	89.0	89.0	88.5	0.82	6.9	2.9	2.8	319	59
9.2	**BE 132MB 4**	1460	60	18.1	89.5	89.5	88.5	0.82	6.9	2.9	3.0	360	70
11	**BE 160M 4**	1465	72	21.5	91.0	91.3	90.5	0.81	6.5	2.8	2.6	650	99
15	**BE 160L 4**	1465	98	28.7	90.8	91.0	90.5	0.83	6.5	2.6	2.3	790	115
18.5	**BE 180M 4**	1465	121	35	91.6	92.0	91.3	0.83	6.5	2.6	2.5	1250	135
22	**BE 180L 4**	1465	143	41	91.6	91.8	91.4	0.84	6.8	2.7	2.6	1650	157



6 P	1000 min^{-1} - S1	50 Hz - IE2

P_n kW		n min^{-1}	M_n Nm	In 400V A	η% 100%	η% 75%	η% 50%	cos φ	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	J_m x 10^{-4} kgm^2	IM B5 Kg
0.75	**BE 90S 6**	935	7.7	2.06	75.9	75.9	73.0	0.69	5.1	3.1	2.9	33	15
1.1	**BE 100M 6** (*)	945	11.1	2.75	78.1	76.2	73.0	0.74	4.9	2.2	1.9	82	22
1.5	**BE 100LA 6**	945	15.2	3.9	79.8	77.5	74.0	0.72	5.6	2.5	2.3	95	24
2.2	**BE 112M 6**	950	22	5.2	81.8	81.8	79.3	0.74	5.2	2.6	2.3	168	32
3	**BE 132S 6**	955	30	6.6	83.3	83.3	82.4	0.79	6.1	2.1	1.9	295	44
4	**BE 132MA 6**	965	40	8.7	84.6	85.0	83.1	0.79	6.9	2.2	2.0	383	56
5.5	**BE 160MA 6** (*)	965	54	11.6	87.0	87.0	86.4	0.79	6.6	2.5	2.3	740	83
7.5	**BE 160MB 6** (*)	965	74	15.0	88.0	88.0	87.2	0.82	6.6	2.3	2.1	970	103

(*) Power / size relation not standardized

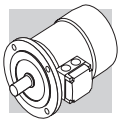


2 P	3000 min^{-1} - S1	50 Hz - IE2

P_n kW			n min^{-1}	M_n Nm	In 400V A	η% 100%	η% 75%	η% 50%	cos φ	I_s/I_n	M_s/M_n	M_a/M_n	J_m x 10^{-4} kgm^2	IM B9 Kg
0.75	**ME 2SA**	**2**	2860	2.5	1.63	80.0	79.6	76.4	0.83	6.8	3.8	3.5	9.0	8.8
1.1	**ME 2SB**	**2**	2845	3.7	2.35	81.5	82.2	79.9	0.83	6.9	3.8	3.1	11.4	10.6
1.5	**ME 3SA**	**2**	2845	5.0	3.2	81.3	79.0	76.0	0.84	6.1	2.9	2.7	24	15.5
2.2	**ME 3LA**	**2**	2895	7.3	4.8	83.2	83.2	81.5	0.80	6.3	2.7	2.5	31	18.7
3	**ME 3LB**	**2**	2880	9.9	6.2	84.6	84.6	83.7	0.83	7.3	3.5	3.1	39	22
4	**ME 4SA**	**2**	2900	13.2	7.8	85.8	84.5	82.2	0.87	7.0	2.9	2.8	101	33
5.5	**ME 4SB**	**2**	2925	18.0	10.6	87.0	85.0	81.7	0.86	8.5	3.6	3.3	145	40
7.5	**ME 4LA**	**2**	2935	24	14.3	88.1	87.4	84.7	0.86	8.8	3.9	3.6	178	51
9.2	**ME 4LB**	**2**	2920	30	16.4	88.8	86.5	84.2	0.91	8.4	3.7	3.3	210	60
11	**ME 5SA**	**2**	2940	36	20.0	89.4	89.5	88.0	0.89	8.1	3.0	2.9	340	70
15	**ME 5SB**	**2**	2950	49	27.2	90.5	90.5	89.5	0.88	8.5	3	2.8	420	83
18.5	**ME 5LA**	**2**	2945	60	32	90.9	90.5	89.8	0.91	7.7	2.9	2.7	490	95

4 P	1500 min^{-1} - S1	50 Hz - IE2

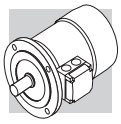
P_n kW			n min^{-1}	M_n Nm	In 400V A	η% 100%	η% 75%	η% 50%	cos φ	I_s/I_n	M_s/M_n	M_a/M_n	J_m x 10^{-4} kgm^2	IM B9 Kg
0.75	**ME 2SB**	**4**	1430	5.0	1.65	81.0	80.5	78.0	0.81	6.1	3.2	3	28	10.9
1.1	**ME 3SA**	**4**	1430	7.4	2.60	82.5	82.0	79.0	0.74	5.5	2.5	2.8	34	15.5
1.5	**ME 3SB**	**4**	1420	10.1	3.48	84.0	84.0	83.0	0.74	6.2	2.9	2.9	40	17
2.2	**ME 3LA**	**4**	1430	14.7	4.89	85.4	85.0	84.0	0.76	5.8	3	2.8	54	21
3	**ME 3LB**	**4**	1420	20	6.58	85.5	86.0	85.5	0.77	5.9	2.8	2.6	61	23
4	**ME 4SA**	**4**	1440	27	8.25	87.5	86.8	84.0	0.80	7.1	3.0	3.1	213	42
5.5	**ME 4SB**	**4**	1460	36	11.07	88.5	88.5	87.5	0.81	7.3	2.9	2.9	270	51
7.5	**ME 4LA**	**4**	1460	49	14.83	89.0	89.0	88.5	0.82	6.9	2.9	2.8	319	57
9.2	**ME 4LB**	**4**	1460	60	18.09	89.5	89.5	88.5	0.82	6.9	2.9	3	360	65
11	**ME 5SA**	**4**	1465	72	21.54	91.0	91.3	90.5	0.81	6.5	2.8	2.6	650	85
15	**ME 5LA**	**4**	1465	98	28.73	90.8	91.0	90.5	0.83	6.5	2.6	2.3	790	101



6 P	1000 min^{-1} - S1	50 Hz - IE2

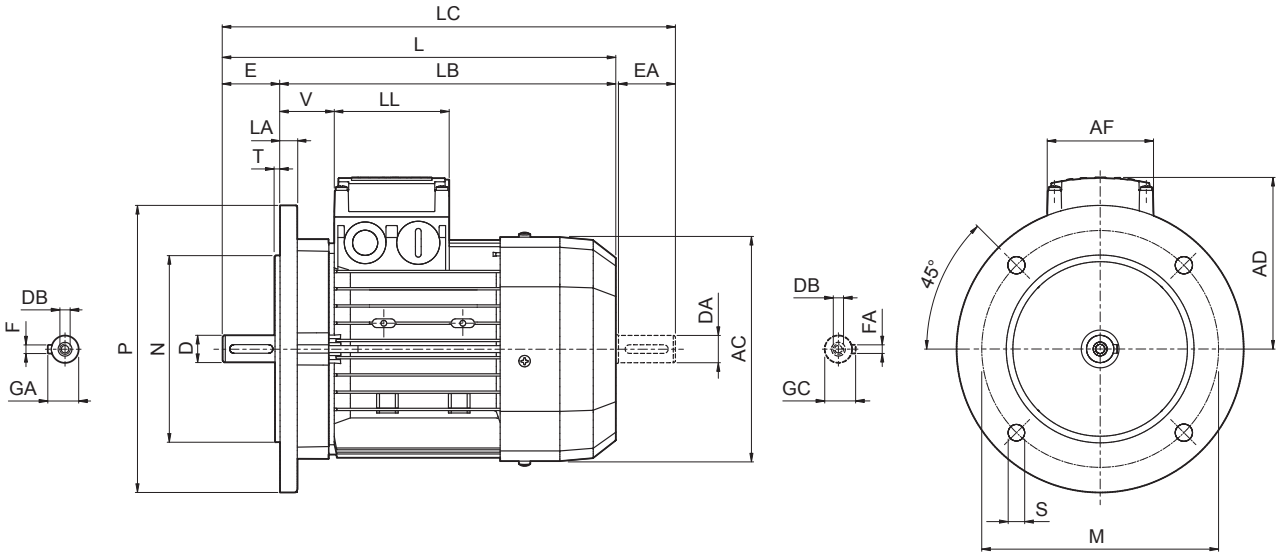
P_n kW		n min^{-1}	M_n Nm	In 400V A	η% 100%	η% 75%	η% 50%	cos φ	I_s/I_n	M_s/M_n	M_a/M_n	J_m x 10^{-4} kgm^2	IM B9 Kg
0.75	**ME 3SA 6**	940	7.6	1.98	75.9	75.0	70.7	0.72	4.7	2.2	2.0	33	17
1.1	**ME 3LA 6** (*)	945	11.1	2.75	78.1	76.2	73.0	0.74	4.9	2.2	1.9	82	21
1.5	**ME 3LB 6**	945	15.2	3.8	79.8	77.5	74.0	0.72	5.6	2.5	2.3	95	23
2.2	**ME 4SA 6**	955	22	4.9	81.8	81.8	80.0	0.80	5.7	1.9	1.7	216	34
3	**ME 4SB 6**	955	30	6.6	83.3	83.3	82.4	0.79	6.1	2.1	1.9	295	43
4	**ME 4LA 6**	965	40	8.6	84.6	85	83.1	0.79	6.9	2.2	2	383	54
5.5	**ME 5SA 6** (*)	965	54	11.6	87.0	87.0	86.4	0.79	6.6	2.5	2.3	740	69
7.5	**ME 5SB 6** (*)	965	74	15.0	88.0	88.0	87.2	0.82	6.6	2.3	2.1	970	89

(*) Power / size relation not standardized



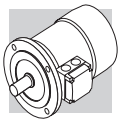
M1.15 DIMENSIONS

BE - IM B5

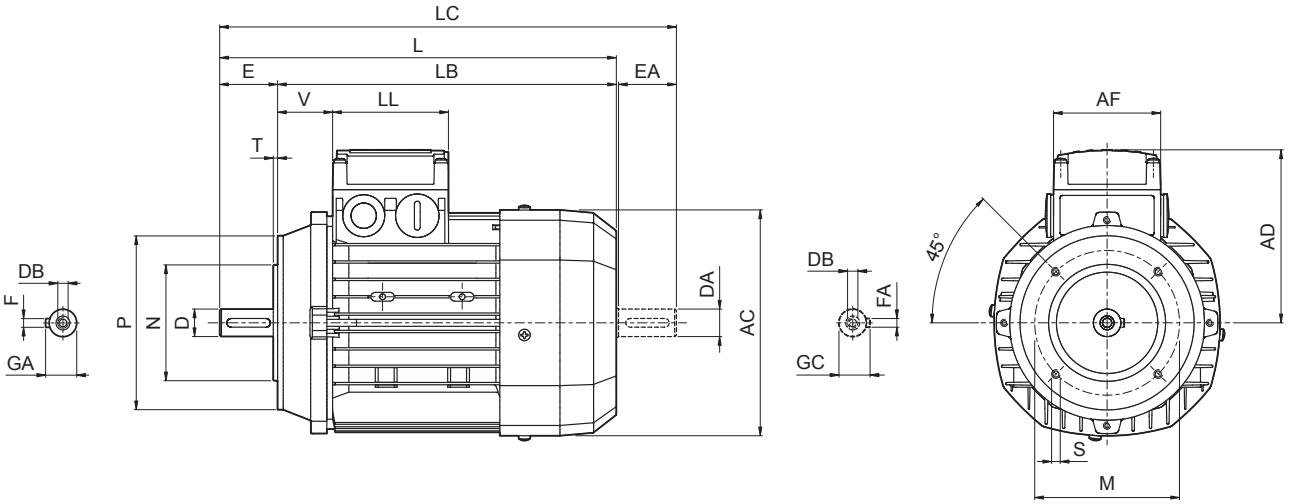


	Shaft					Flange						Motor							
	D DA	**E EA**	**DB**	**GA GC**	**F FA**	**M**	**N**	**P**	**S**	**T**	**LA**	**AC**	**L**	**LB**	**LC**	**AD**	**AF**	**LL**	**V**
BE 80	19	40	M6	21.5	6	165	130	200	11.5	3.5	11.5	156	274	234	315	119	74	80	38
BE 90 S	24	50	M8	27	8	165	130	200	11.5	3.5	11.5	176	326	276	378	133	98	98	44
BE 90 L	24	50	M8	27	8	165	130	200	11.5	3.5	11.5	176	326	276	378	133	98	98	44
BE 100	28	60	M10	31	8	215	180	250	14	4	14	195	367	307	429	142	98	98	50
BE 112	28	60	M10	31	8	215	180	250	14	4	15	219	385	325	448	157	98	98	52
BE 132 S	38	80	M12	41	10	265	230	300	14	4	16	258	493	413	576	193	118	118	58
BE 132 MA	38	80	M12	41	10	265	230	300	14	4	16	258	493	413	576	193	118	118	58
BE 132 MB	38	80	M12	41	10	265	230	300	14	4	16	258	528	448	611	193	118	118	58
BE 160 M	42 38(1)	110 80(1)	M16 M12(1)	45 41(1)	12 10(1)	300	250	350	18.5	5	15	310	596	486	680	245	187	187	51
BE 160 L	42 38(1)	110 80(1)	M16 M12(1)	45 41(1)	12 10(1)	300	250	350	18.5	5	15	310	640	530	724	245	187	187	51
BE 180 M	48 42(1)	110 110(1)	M16 M16(1)	51.5 45(1)	14 12(1)	300	250	350	18.5	5	18	348	708	598	823	261	187	187	52
BE 180 L	48 42(1)	110 110(1)	M16 M16(1)	51.5 45(1)	14 12(1)	300	250	350	18.5	5	18	348	708	598	823	261	187	187	52

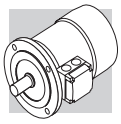
NOTE:
1) These values refer to the rear shaft end.



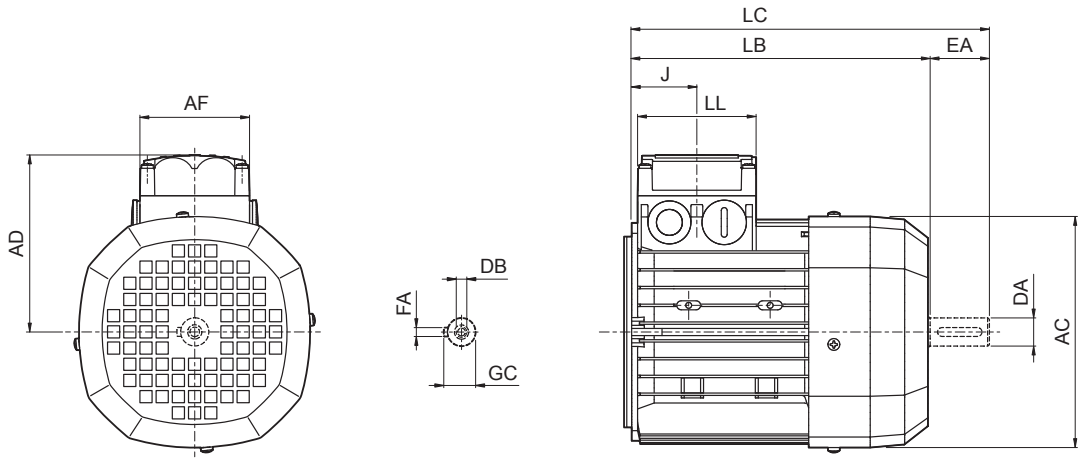
BE - IM B14



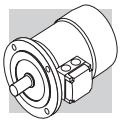
	Shaft					Flange					Motor							
	D DA	**E EA**	**DB**	**GA GC**	**F FA**	**M**	**N**	**P**	**S**	**T**	**AC**	**L**	**LB**	**LC**	**AD**	**AF**	**LL**	**V**
BE 80	19	40	M6	21.5	6	100	80	120	M6	3	156	274	234	315	119	74	80	38
BE 90 S	24	50	M8	27	8	115	95	140	M8	3	176	326	276	378	133	98	98	44
BE 90 L	24	50	M8	27	8	115	95	140	M8	3	176	326	276	378	133	98	98	44
BE 100	28	60	M10	31	8	130	110	160	M8	3.5	195	367	307	429	142	98	98	50
BE 112	28	60	M10	31	8	130	110	160	M8	3.5	219	385	325	448	157	98	98	52
BE 132 S	38	80	M12	41	10	165	130	200	M10	4	258	493	413	576	193	118	118	58
BE 132 MA	38	80	M12	41	10	165	130	200	M10	4	258	493	413	576	193	118	118	58
BE 132 MB	38	80	M12	41	10	165	130	200	M10	4	258	528	448	611	193	118	118	58



ME



	Rear shaft end					Motor						
	DA	**EA**	**DB**	**FA**	**GC**	**AC**	**LB**	**LC**	**AF**	**LL**	**J**	**AD**
ME 2S	19	40	M6	6	21.5	156	202	245	74	80	44	119
ME 3S	28	60	M10	8	31	195	230	293	98	98	53.5	142
ME 3L	28	60	M10	8	31	195	262	325	98	98	53.5	142
ME 4S	38	80	M12	10	41	258	361	444	118	118	64.5	193
ME 4L	38	80	M12	10	41	258	361	444	118	118	64.5	193
ME 4LB	38	80	M12	10	41	258	396	479	118	118	64.5	193
ME 5S	38	80	M12	10	41	310	418	502	187	187	77	245
ME 5L	38	80	M12	10	41	310	462	546	187	187	77	245



M2 STANDARD ELECTRIC MOTORS

M2.1 GENERAL CHARACTERISTICS

M2.1.1 Production range

The asynchronous three-phase electric motors of BONFIGLIOLI RIDUTTORI's production, are available in basic designs IMB5 and IMB14 and derived versions, with the following polarities: 2, 4, 6, 2/4, 2/6, 2/8, 2/12.
The technical characteristics of compact motors, M type, are also supplied in this manual.

M2.1.2 Standards

The motors described in this catalogue are manufactured to the applicable standards shown in the following table.

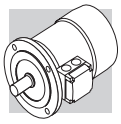
(G 1)

Title	CEI	IEC
General requirements for rotating electrical machines	**CEI EN 60034-1**	**IEC 60034-1**
Terminal markings and direction of rotation of rotating machines	**CEI 2-8**	**IEC 60034-8**
Methods of cooling for electrical machines	**CEI EN 60034-6**	**IEC 60034-6**
Dimensions and output ratings for rotating electrical machines	**EN 50347**	**IEC 60072**
Classification of degree of protection provided by enclosures for rotating machines	**CEI EN 60034-5**	**IEC 60034-5**
Noise limits	**CEI EN 60034-9**	**IEC 60034-9**
Classification of type of construction and mounting arrangements	**CEI EN 60034-7**	**IEC 60034-7**
Rated voltage for low voltage mains power	**CEI 8-6**	**IEC 60038**
Vibration level of electric machines	**CEI EN 60034-14**	**IEC 60034-14**

The motors also comply with foreign standards adapted to IEC 60034-1 as shown here below.

(G 2)

DIN VDE 0530	Germany
BS5000 / BS4999	Great Britain
AS 1359	Australia
NBNC 51 - 101	Belgium
NEK - IEC 34	Norway
NF C 51	France
OEVE M 10	Austria
SEV 3009	Switzerland
NEN 3173	Netherlands
SS 426 01 01	Sweden



M2.1.3 Motors for USA and Canada

CUS

BN and M motors are available in NEMA Design C configuration (concerning electrical characteristics), in compliance with CSA (Canadian standard) C22.2 No. 100 and UL (Underwriters Laboratory) UL 1004-1. By specifying the option CUS the name plate is marked with both symbols shown here below.

US power mains voltages and the corresponding rated voltages to be specified for the motor are indicated in the following table:

(G 3)

Frequency	Mains voltage	V_{mot}
60 Hz	208 V	**200 V**
	240 V	**230 V**
	480 V	**460 V**
	600 V	**575 V**

Motors with YY/Y connection (e.g. 230/460-60; 220/440-60) feature, as standard, a 9-stud terminal board. For same executions, as well as for 575V-60H tions, as well as for 575V-60Hz supply, the nominal rating is coincident with the correspondent 50Hz rating.
For DC brake motors type BN/M_FD and BN/M_AFD, the rectifier is connected to a single-phase 230 VAC supply voltage in the motor terminal box.
Brake power supply for brake motors is as follows:

(G 4)

BN_FD ; BN_AFD M_FD ; M_AFD
Wired to terminal box 1~230V a.c.

BN_FA ; BN_BA M_FA	Specify
Separate power supply 230V Δ - 60Hz	230SA
Separate power supply 460V Y - 60Hz	460SA

The CUS option does not apply to servo-ventilated motors or motors with the AFD brake.

M2.1.4 China Compulsory Certification

CCC

Electric motors destined for sale in the People's Republic of China have to be certified under the CCC (China Compulsory Certification) system. BN motors of up to 7 Nm in rated torque are available with CCC certification and a special nameplate bearing the mark shown below:

The CCC option does not apply to motors with the AFD brake.

M2.1.5 Directives 2006/95/EC (LVD) and 2004/108/EC (EMC)

BN and M motors meet the requirements of Directives 2006/95/EC (Low Voltage Directive) and 2004/108/EC (Electromagnetic Compatibility Directive) and their name plates bear the CE mark.
As for the EMC Directive, construction is in accordance with standards CEI EN 60034-1, EN 61000-6-2, EN 61000-6-4.
Motors with FD and AFD brakes, when fitted with the suitable capacitive filter at rectifier input (option **CF**), meet the emission limits required by Standard EN 61000-6-3:2007 "Electromagnetic compatibility - Generic Emission Standard - Part 6-3 Residential, commercial and light industrial environment".
Motors also meet the requirements of standard CEI EN 60204-1 "Electrical equipment of machines".
The responsibility for final product safety and compliance with applicable directives rests with the manufacturer or the assembler who incorporate the motors as component parts.

M2.1.6 Tolerances

As per the Norms applicable the tolerances here below apply to the following quantities.

(G 5)

-0.15 (1 - η) P ≤ 50kW	Efficiency
-(1 - cosφ)/6 min 0.02 max 0.07	Power factor
±20% *	Slip
+20%	Locked rotor current
-15% +25%	Locked rotor torque
-10%	Max. torque

* ± 30% for motors with Pn < 1 kW

M2.2 MECHANICAL FEATURES

M2.2.1 Versions

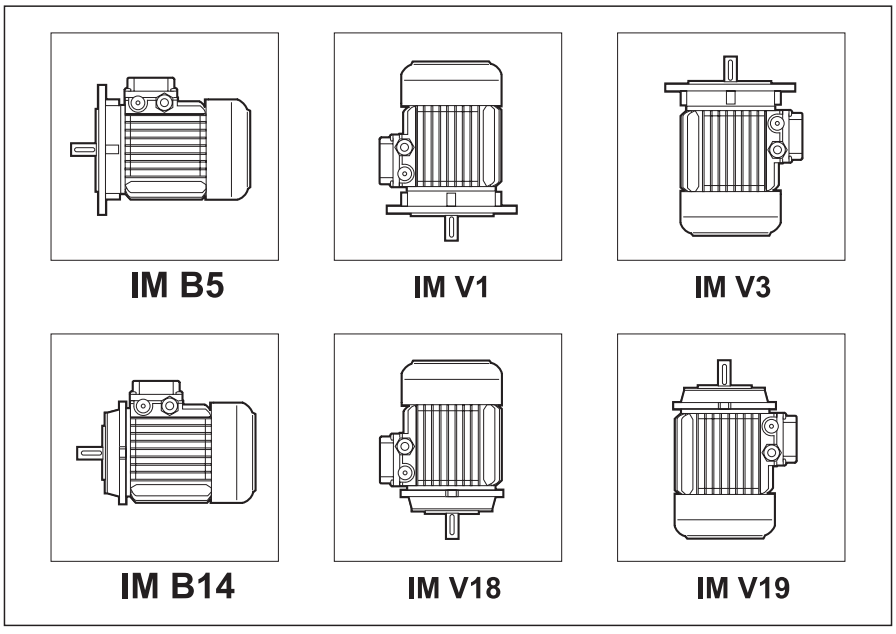
EC-normalised BN motors are available in the design versions indicated in table (G6) as per Standards CEI EN 60034-14.

Mounting versions are:

IM B5 (basic)
IM V1, IM V3 (derived)
IM B14 (basic)
IM V18, IM V19 (derived)

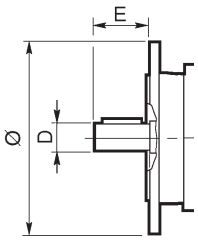
IM B5 design motors can be installed in positions IM V1 and IM V3; IM B14 design motors can be installed in positions IM V18 and IM V19.
In such cases, the basic design IM B5 or IM B14 is indicated on the motor name plate.
In design versions with a vertically located motor and shaft downwards, it is recommended to request the drip cover (always necessary for brake motors). This facility, included in the option list should be specified when ordering as it does not come as a standard device

(G 6)



Flanged motors can be supplied with a reduced mounting interface, as shown in chart (G7) below.

(G 7)

						
	BN 71	**BN 80**	**BN 90**	**BN 100**	**BN 112**	**BN 132**
	DxE - Ø					
B5R (1)	11x23 - 140	14x30 - 160	19x40 - 200	24x50 - 200	24x50 - 200	28x60 - 250
B14R (2)	11x23 - 90	14x30 - 105	19x40 - 120	24x50 - 140	—	—

(1) flange with through holes
(2) flange with threaded holes

M2.2.2 Degree of protection

IP..

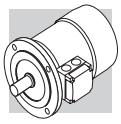
The following chart provides an overview of the degrees of protection available.
In addition to the degree of protection specified when ordering, motors to be installed outdoors require protection against direct sunlight and also – when they are to be installed vertically down – a drip cover to prevent the ingress of water and soli
the ingress of water and solid particles (option **RC**).

(G 8)

		IP 54	**IP 55**	**IP 56**
BN	**M**	⛔	standard	
BN_FD **BN_AFD** **BN_FA**	**M_FD** **M_AFD** **M_FA**	standard		⛔
BN_BA	**–**	⛔	standard	⛔

M2.2.3 Cooling

The motors are externally ventilated (IC 411 to CEI EN 60034-6) and are equipped with a plastic fan working in both directions.
The motors must be installed allowing sufficient space between fan cowl and the nearest wall to ensure free air intake and allow access for maintenance purposes on motor and brake, if supplied.
Independent, forced air ventilation (IC 416) can be supplied on request (option U1).
This solution enables to increase
the motor duty factor when driven by an inverter and operating at reduced speed.



M2.2.4 Direction of rotation

Rotation is possible in both directions. If terminals U1, V1, and W1 are connected to line phases L1,L2 and L3, clockwise rotation (looking from drive end) is obtained. For counterclockwise rotation, switch two phases.

M2.2.5 Noise

Noise levels, measured using the method prescribed by ISO 1680 Standards, are within the maximum levels specified by Standards CEI EN 60034-9.

M2.2.6 Vibrations and balancing

Rotor shafts are balanced with half key fitted and fall within the vibration class N, as per Standard CEI EN 60034-14.
If a further reduced noise level is required improved balancing carequired improved balancing can be optionally requested (class B).
Table below shows the value for the vibration velocity for standard (A) and improved (B) balancing.

(G 9)

Vibration class	Angular velocity n [min^{-1}]	Limits of the vibration velocity [mm/s] **BN 56 ≤ H ≤ BN 200** **M05 ≤ H ≤ M5**
A	600 < n < 3600	1.6
B	600 < n < 3600	0.70

Values refer to measures with freely suspended motor in unloaded conditions.

M2.2.7 Terminal box

Terminal board features 6 studs for eyelet terminal connection.
A ground terminal is also supplied for earthing of the equipment.
Terminals number and type are shown in the following table.
For brake power supply, please read par. M6, M7 (brake FD and AFD), M8, M9 (brake FA and BA).
Brakemotors house the a.c./d.c. rectifier (factory pre-wired) inside the terminal box.
Wiring instructions are provided either in the box or in the user manual.

(G 10)

		No. of terminals	Terminal threads	Wire max cross section area mm^2
BN 56...BN 71	**M05, M1**	6	M4	2.5
BN 80, BN 90	**M2**	6	M4	2.5
BN 100...BN 112	**M3**	6	M5	6
BN 132...BN 160MR	**M4**	6	M5	6
BN 160M...BN 180M	**M5**	6	M6	16
BN 180L...BN 200L	**–**	6	M8	25

M2.2.8 Cable entry

The holes used to bring cables to terminal boxes use metric threads in accordance with standard EN 50262 as indicated in the table here after.

(G 11)

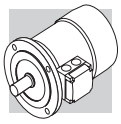
		Cable entry	Max. cable diameter allowed [mm]
BN 63	**M05**	2 x M20 x 1.5	13
BN 71	**M1**	2 x M25 x 1.5	17
BN 80 - BN 90	**M2**	2 x M25 x 1.5	17
BN 100	**M3**	2 x M32 x 1.5	21
		2 x M25 x 1.5	17
BN 112	**—**	2 x M32 x 1.5	17
		4 x M25 x 1.5	
BN 132...BN 160MR	**M4**	4 x M32 x 1.5	21
BN 160M...BN 200L	**M5**	2 x M40 x 1.5	29

M2.2.9 Bearings

Life lubricated preloaded radial ball bearings are used, types are shown in the chart here under.
Calculated endurance lifetime L_{10h}, as per ISO 281, in unloaded condition, exceeds 40000 hrs.
DE = drive end
NDE = non drive end

(G 12)

	DE	**NDE**	
	M, M_FD, M_AFD, M_FA	**M**	**M_FD, M_AFD, M_FA**
M05	6004 2Z C3	6201 2Z C3	6201 2RS C3
M1	6004 2Z C3	6202 2Z C3	6202 2RS C3
M2	6007 2Z C3	6204 2Z C3	6204 2RS C3
M3	6207 2Z C3	6206 2Z C3	6206 2RS C3
M4	6309 2Z C3	6308 2Z C3	6308 2RS C3
M5	6309 2Z C3	6309 2Z C3	6309 2RS C3



(G 13)

	DE	NDE	
	BN, BN_FD, BN_AFD, BN_FA, BN_BA	BN, BN_BA	BN_FD, BN_AFD, BN_FA
BN 56		6201 2Z C3	–
BN 63	6201 2Z C3	6201 2Z C3	6201 2RS C3
BN 71	6202 2Z C3	6202 2Z C3	6202 2RS C3
BN 80	6204 2Z C3	6204 2Z C3	6204 2RS C3
BN 90	6205 2Z C3	6205 2Z C3	6305 2RS C3
BN 100	6206 2Z C3	6206 2Z C3	6206 2RS C3
BN 112	6306 2Z C3	6306 2Z C3	6306 2RS C3
BN 132	6308 2Z C3	6308 2Z C3	6308 2RS C3
BN 160MR	6309 2Z C3	6308 2Z C3	6308 2RS C3
BN 160M/L	6309 2Z C3	6309 2Z C3	6309 2RS C3
BN 180M	6310 2Z C3	6309 2Z C3	6309 2RS C3
BN 180L	6310 2Z C3	6310 2Z C3	6310 2RS C3
BN 200L	6312 2Z C3	6310 2Z C3	6310 2RS C3

M2.3 ELECTRICAL CHARACTERISTICS

M2.3.1 Voltage

Single speed motors are rated for 230/400 V - 50 Hz.
A tolerance of ±10% applies to nominal voltage, with the exception of motors type M3LC4 and M3LC6.
In addition to nominal voltage-frequency values the name plate also shows voltage ranges the motor can operate under, e.g.:
220-240V Δ - 50 Hz
380-415V Y - 50 Hz
As per Norms CEI EN 60034-1 on above voltage values the ±5% tolerance applies.
When operating close to the tolerance limit values the winding temperature can exceed by 10 K the rated temperature for the given insulation class.
With the exception of BN/M_FD and BN/M_AFD brakemotors, the rated voltage values for operation under 60 Hz mains are also shown on the nameplate, e.g. 460Y-60 Hz along with related tolerance field, e.g. 440-480V Y-60 Hz.
For brakemotors, FD and AFD type, rated voltage is:
220-240V Δ - 50 Hz
380-415V Y - 50 Hz
Brake supply is a.c. 230V ±10% single phase.
Chart below shows standard and optional wiring of motors.

(G 14)

		BN M	BN_FD ; BN_AFD M_FD ; M_AFD		BN_FA ; BN_BA M_FA		Configuation
		V_{mot} ± 10 % 3 ~	V_{mot} ± 10 % 3 ~	V_B ± 10 % 1 ~	V_{mot} ± 10 % 3 ~	V_B ± 10 % 3 ~	
BN 56 - BN 132	**M05…M4**	230/400 - 50 Hz 460 - 60 Hz	230/400V Δ/Y- 50 Hz	230V	230/400V Δ/Y- 50 Hz 460V Y - 60Hz	230/400V Δ/Y- 50 Hz 460V Y - 60Hz	Standard
BN 100 - BN 132	**M3 - M4**	400/690 - 50 Hz 460 - 60Hz	400/690V Δ/Y- 50 Hz	400V	400/690V Δ/Y- 50 Hz 460V Y - 60Hz	400/690V Δ/Y- 50 Hz 460V Y - 60Hz	On request at no extra charge

The only rated voltage for motors type 400V/50Hz and all double speed motors is 400V.
Applicable tolerances as per CEI EN 60034-1.

The table below shows the wiring options available.

(G 15)

		Pole	Wiring options
BN 56…BN 200	**M05…M5**	2, 4, 6	Δ / Y
		2/4	Δ / YY (Dahlander)
		2/6, 2/8, 2/12	Y / Y (Two windings)

M2.3.2 Frequency

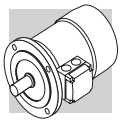
With the exception of brakemotors FD and AFD, name plate of standard single speed motors shows, besides the 50 Hz voltage ratings, also the rated power output for 60 Hz operation in the 440-480 V range.
Power output is increased by approx 20%.
Rated output power for 60 Hz operation is shown in the following diagram.

(G 16)

		2P	4P	6P
		P_n [kW]		
BN 56A	**–**	–	0.06	–
BN 56B	**M0B**	–	0.10	–
BN 63A	**M05A**	0.21	0.14	0.10
BN 63B	**M05B**	0.30	0.21	0.14
BN 71A	**M05C**	0.45	0.30	0.21
BN 71B	**M1SD**	0.65	0.45	0.30
BN 80A	**M1LA**	0.90	0.65	0.45
BN 80B	**M2SA**	1.30	0.90	0.65
BN 90S	**M2SB**	–	1.30	0.90
BN 90SA	**M2SB**	1.8	–	–
BN 90L	**M3SA**	2.5	–	1.3
BN 90LA	**M3SA**	–	1.8	–
BN 100L	**M3LA**	3.5	–	–
BN 100LA	**M3LA**	–	2.5	1.8
BN 100LB	**M3LB**	4.7	3.5	2.2

		2P	4P	6P
		P_n [kW]		
BN 112M	**M3LB**	4.7	4.7	2.5
	M3LC	–	4.7	2.5
BN 132S	**M4SA**	–	6.5	3.5
BN 132SA	**M4SA**	6.3	–	–
BN 132SB	**M4SB**	8.7	–	–
BN 132M	**M4LA**	11	–	–
BN 132MA	**M4LA**	–	8.7	4.6
BN 132MB	**M4LB**	–	11	6.5
BN 160MR	**M4LC**	12.5	12.5	–
BN 160MB	**M5SB**	17.5	–	–
BN 160M	**M5SA**	–	–	8.6
BN 160L	**M5S**	21.5	17.5	12.6
BN 180M	**M5LA**	24.5	21.5	–
BN 180L	**–**	–	25.3	17.5
BN 200L	**–**	34	34	22

For two-speed motors operated under 60 Hz supply the rated power output is increased by 15% as compared to same motor with 50 Hz supply.
If same IEC-normalised 50 Hz power rating value is desired on name plate of a 60 Hz operated motor specify option PN in the ordering code.
Standard motors wound for 5 Hz supply can be operated under 60 Hz with main data corrected as per chart below:
Brakes, if fitted, must be supplied with the voltage value V_b that is stated on the nameplate.



(G 17)

50 Hz	**60 Hz**			
V - 50 Hz	**V** - 60 Hz	**Pn** - 60 Hz	$\mathbf{M_n}$, $\mathbf{M_a/M_n}$ - 60 Hz	**n** [min^{-1}] - 60 Hz
230/400 Δ/Y	220 - 240 Δ	1	0.83	1.2
	380 - 415 Y			
400/690 Δ/Y	380 - 415 Δ			
230/400 Δ/Y	265 - 280 Δ	1.15	1	1.2
	440 - 480 Y			
400/690 Δ/Y	440 - 480 Δ			

M2.3.3 Rated power

Catalogue rating values are calculated for 50 Hz operation and for standard ambient conditions (temperature 40 °C; elevation <1000 m a.s.l.) as per the CEI EN 60034-1 Standards.
The motors can be used within the 40 - 60 °C temperature range with rated power output adjusted by factors given in the following charts.

(G 18)

Ambient temperature (°C)	40°	45°	50°	55°	60°
Permitted power as a % of rated power	100%	95%	90%	85%	80%

Should a derating factor higher than 15% apply please consult factory.

M2.3.4 Insulation class

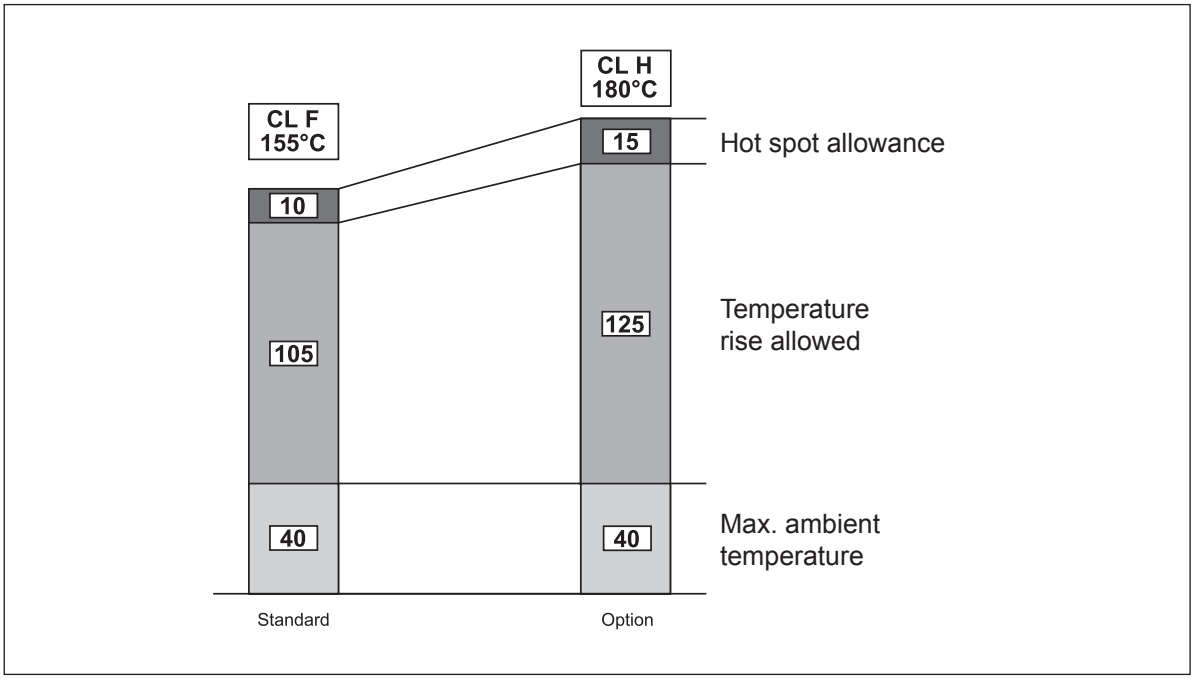
CL F

Bonfiglioli motors use class **F** insulating materials (enamelled wire, insulators, impregnation resins) as compare to the standard motor.

CL H

Motors manufactured in insulation class **H** are available at request.
In standard motors, stator windings over temperature normally stays below the 80 K limit corresponding to class B over temperature.
A careful selection of insulating components makes the motors compatible with tropical climates and normal vibration.
For applications involving the presence of aggressive chemicals or high humidity, contact Bonfiglioli Engineering for assistance with product selection.
Not available for motors in compliance with CSA e UL standards (CUS option).

(G 19)



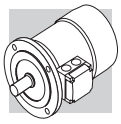
M2.3.5 Type of duty

Unless otherwise specified, catalogue motor power refers to continuous duty S1.
Any operating conditions other than S1 duty must be identified in accordance with duty cycle definitions laid down in standards CEI EN 60034-1.
For duty cycles S2 and S3, the power increase co-efficient reported in the following table may be used. Please note that the table provided below applies to single-speed motors.
As an alternative to S1 continuous duty, one of the following values can be specified at the product configuration stage: S2, S3 or S9. The motor nameplate will be marked with an increased power rating to suit the type of duty, and with specific electrical data and a duty type of S2-30 min, S3-70% or S9 respectively.
For further details, contact Bonfiglioli's Technical Service.
Please contact Bonfiglioli Engineering for the power increase coefficients applicable to switch-pole motors.

(G 20)

	Duty						
	S2			**S3 ***			**S4 - S9**
	Cycle duration (min)			Cyclic duration factor (I)			
	10	**20**	**60**	**25%**	**40%**	**60%**	Consult factory
f_m	1.35	1.15	1.05	1.25	1.15	1.1	

* Cycle duration must, in any event, be equal to or less than 10 minutes; if this time is exceeded, please contact our Technical Service.



M2.3.5.1 Cyclic duration factor:

$$I = \frac{t_f}{t_f + t_r} \cdot 100 \qquad (23)$$

tf = work time under constant load
tr = rest time

M2.3.5.2 Limited duration duty S2

This type of duty is characterized by operation at constant load for a limited time, which is shorter than the time required to reach thermal equilibrium, followed by a rest period of sufficient duration to restore ambient temperature in the motor.

M2.3.5.3 Periodical intermittent duty S3:

This type of duty is characterized by a sequence of identical operation cycles, each including a constant load operation period and a rest period.
For this type of duty, the starting current does not significantly influence overtemperature.

M2.3.6 Inverter-controlled motors

The electric motors of series BN and M may be used in combination with PWM inverters with rated voltage at transformer input up to 500 V.Standard motors use a phase insulating system with separators, class 2 enamelled wire and class H impregnation resins (1600V peak-to-peak voltage pulse capacity and rise edge t_s > 0.1µs at motor terminals). Table (G30) shows the typical torque/speed curves referred to S1 duty for motors with base frequency f_b = 50 Hz.
Because ventilation is somewhat impaired in operation at lower frequencies (about 30 Hz), standard motors with incorporated fan (IC411) require adequate torque derating or - alternately - the addition of a separate supply fan cooling.
Above base frequency, upon reaching the maximum output voltage of the inverter, the motor enters a steady-power field of operation, and shaft torque drops with ratio (f/f_b).
As motor maximum torque decreases with $(f/f_b)^2$, the allowed overloading must be reduced progressively.

(G 21)

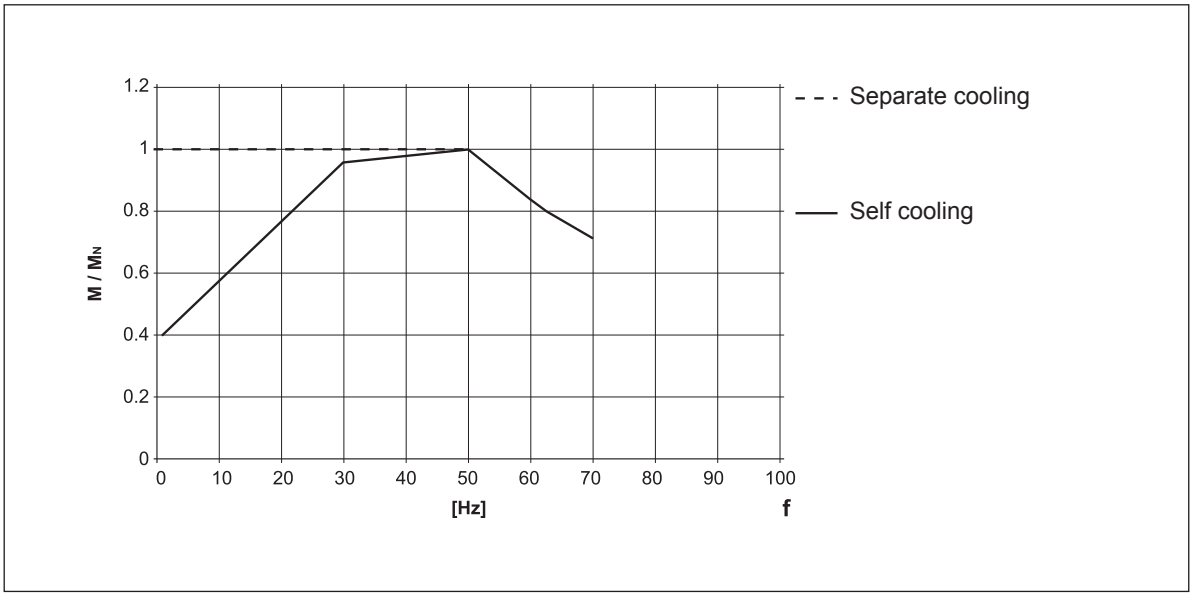


Table (G22) reports the mechanical limit speed for motor operation above rated frequency:

(G 22)

		n [min^{-1}]		
		2p	**4p**	**6p**
≤ BN 112	**M05…M3**	5200	4000	3000
BN 132...BN 200L	**M4, M5**	4500	4000	3000

Above rated speed, motors generate increased mechanical vibration and fan noise. Class B rotor balancing is highly recommended in these applications. Installing a separate supply fan cooling may also be advisable.

Remote-controlled fan and brake (if fitted) must always be connected direct to mains power supply.

M2.3.7 Permissible starts per hour, Z

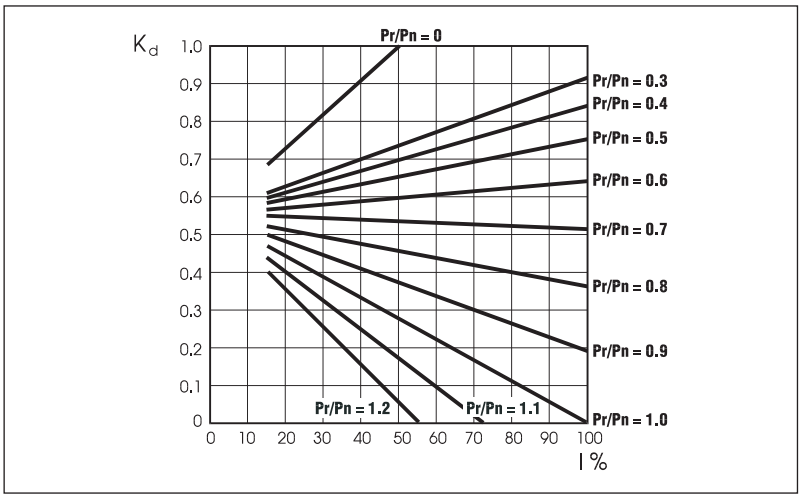
The rating charts of brakemotors lend the permitted number of starts Z_0, based on 50% intermittence and for unloaded operation.
The catalogue value represents the maximum number of starts per hour for the motor without exceeding the rated temperature for the insulation class F.
To give a practical example for an application characterized by inertia J_c, drawing power P_r and requiring mean torque at start-up M_L the actual number of starts per hour for the motor can be calculated approximately through the following equation:

$$Z = \frac{Z_0 \cdot K_c \cdot K_d}{K_J} \qquad (24)$$

where:

$K_J = \frac{J_m + J_c}{J_m}$	inertia factor
$K_c = \frac{M_a - M_L}{M_a}$	torque factor
$K_d =$	load factor see table (F23)

(G 23)



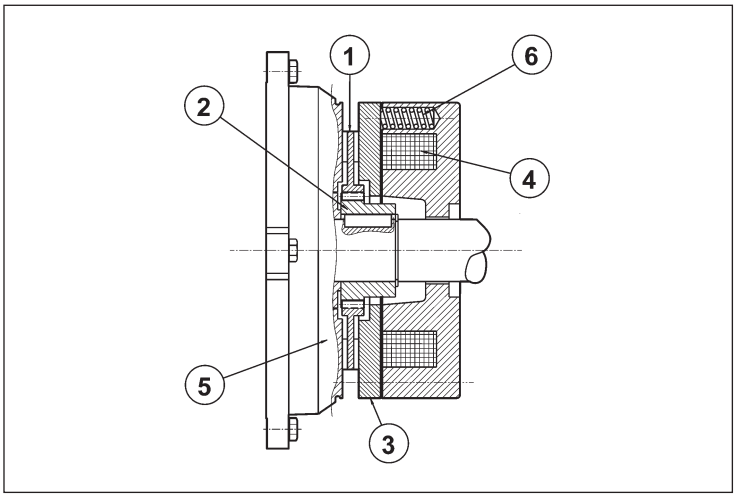
If actual starts per hour is within permitted value (Z) it may be worth checking that braking work is compatible with brake (thermal) capacity W_{max} also given in table (G30) and dependent on the number of switches (c/h).

M2.4 ASYNCHRONOUS BRAKE MOTORS

M2.4.1 Operation

Versions with incorporated brake use spring-applied DC (FD, AFD option) or AC (FA, BA options) brakes.
All brakes are designed to provide fail-safe operation, meaning that they are applied by spring-action in the event of power failure.

(G 24)



Key:
① brake disc
② disc carrier
③ pressure plate
④ brake coil
⑤ motor rear shield
⑥ brake springs

When voltage is interrupted, pressure springs push the armature plate against the brake disc. The disc becomes trapped between the armature plate and motor shield and stops the shaft from rotation.
When the coil is energized, a magnetic field strong enough to overcome spring action attracts the armature plate, so that the brake disc – which is integral with the motor shaft – is released.

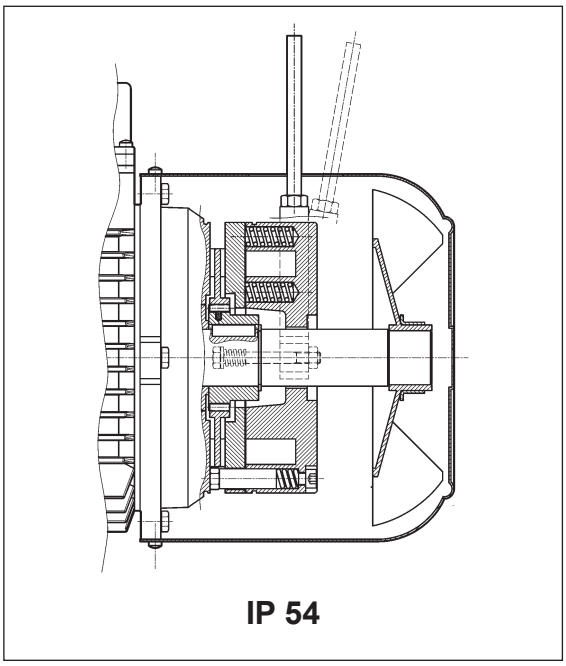
M2.4.2 Most significant features

- High braking torques (normally $M_b \approx 2$ Mn), braking torque adjustment.
- Steel brake disc with double friction lining (low-wear, asbestos-free lining).
- Hexagonal seat on motor shaft fan end (N.D.E.) for manual rotation (not compatible with options PS, RC, TC, U1, U2, EN1, EN2, EN3, EN4, EN5, EN6).
- Manual release lever (options **R** and **RM** for BN/M_FD; option **R** for BN/M_FA).
- Manual mechanical release (option **R** for BN/M_AFD).
- Corrosion-proof treatment on all brake surfaces.
- Insulation class F.

M2.5 DC BRAKE MOTORS TYPE BN_FD and M_FD

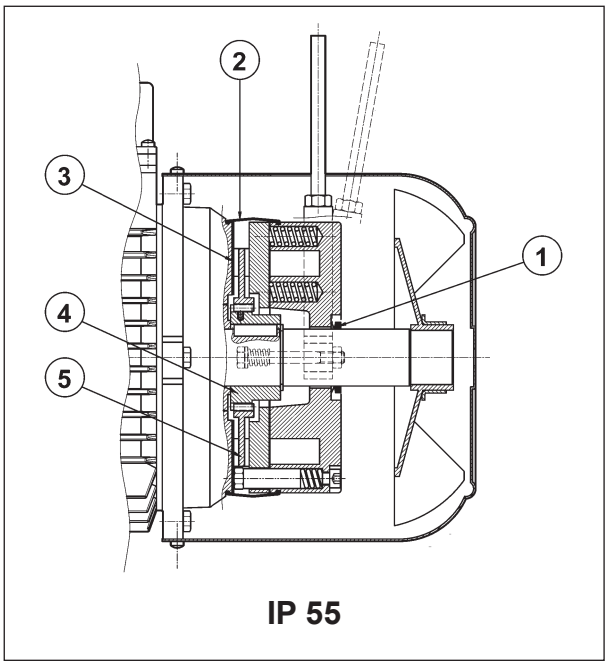
Frame sizes: BN 63 … BN 200L / M05 ... M5

(G 25)



IP 54

(G 26)



IP 55

Direct current toroidal-coil electromagnetic brake bolted onto motor shield. Preloading springs provide axial positioning of magnet body.
Brake disc slides axially on steel hub shrunk onto motor shaft with anti-vibration device.
Brake torque factory setting is indicated in the corresponding motor rating charts. Braking torque may be modified by changing the type and/or number of springs.
At request, motors may be equipped with manual release lever with automatic return (**R**) or system for holding brake in the released position (**RM**).
See variant at paragraph “BRAKE RELEASE SYSTEMS” for available release lever locations.
FD brakes ensure excellent dynamic performance with low noise. DC brake operating characteristics may be optimized to meet application requirements by choosing from the various rectifier/power supply and wiring connection options available.
For applications involving lifting and/or high hourly energy dissipation, contact Bonfiglioli’s Technical Service.

M2.5.1 Degree of protection

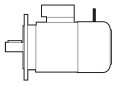
Standard protection class is IP54.
Brake motor FD is also available in protection class **IP55**, which mandates the following variants:

① V-ring at N.D.E. of motor shaft
② dust and water-proof rubber boot
③ stainless steel ring placed between motor shieldand brake disc
④ stainless steel hub
⑤ stainless steel brake disc

M2.5.2 FD brake power supply

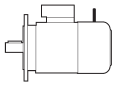
A rectifier accommodated inside the terminal box feeds the DC brake coil. Wiring connection across rectifier and brake coil is performed at the factory.
On all single-pole motors, rectifier is connected to the motor terminal board.
Rectifier standard power supply voltage VB is as indicated in the following table, regardless of mains frequency:

(G 27)

2, 4, 6 P					**1 speed**
		**BN_FD / M_FD** V_{mot} ± 10% 3 ~	V_B ± 10% 1 ~	brake connected to terminal board power supply	separate power supply
BN 63…BN 132	**M05...M4LB**	230/400 V – 50 Hz	230 V	standard	specify **V_B SA** o **V_B SD**
BN 160…BN 200	**M4LC...M5**	400/690 V – 50 Hz	400 V	standard	specify **V_B SA** o **V_B SD**

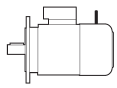
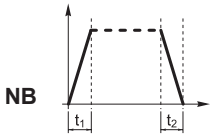
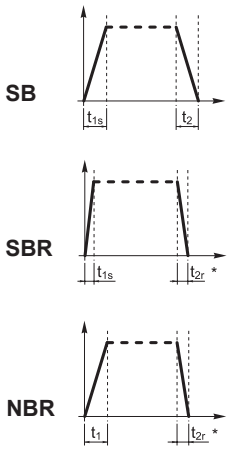
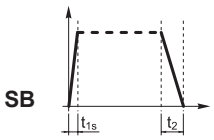
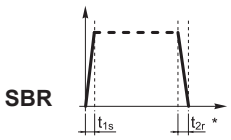
Switch-pole motors feature a separate power supply line for the brake with rectifier input voltage V_B as indicated in the table below:

(G 28)

2/4, 2/6, 2/8, 2/12, 4/6, 4/8 P					**2 speed**
		**BN_FD / M_FD** V_{mot} ± 10% 3 ~	V_B ± 10% 1 ~	brake connected to terminal board power supply	separate power supply
BN 63…BN 132	**M05...M4LB**	400 V – 50 Hz	230 V	⛔	specify **V_B SA** o **V_B SD**

The diode half-wave rectifier (VDC ≈ 0,45 x VAC) is available in versions **NB, SB, NBR** e **SBR**, as detailed in the table below:

(G 29)

		brake	standard	at request
BN 63	**M05**	**FD 02**		
BN 71	**M1**	**FD 03**		
		FD 53		
BN 80	**M2**	**FD 04**		
BN 90S	**—**	**FD 14**		
BN 90L	**—**	**FD 05**		
BN 100	**M3**	**FD 15**		
—		**FD 55**		
BN 112	**—**	**FD 06S**		
BN 132...160MR	**M4**	**FD 56**		
BN 160L - BN 180M	**M5**	**FD 06**		
BN 180L - NM 200L	**—**	**FD 07**		

(*) $t_{2c} < t_{2r} < t_2$

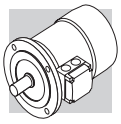
Rectifier **SB** with electronic energizing control over-energizes the electromagnet upon power-up to cut brake release response time and then switches to normal half-wave operation once the brake has been released.

Use of the **SB** rectifier is mandatory in the event of:
- high number of operations per hour
- reduced brake release response time
- brake is exposed to extreme thermal stress

Rectifiers **NBR** or **SBR** are available for applications requiring quick brake release response.
These rectifiers complement the **NB** and **SB** types as their electronic circuit incorporates a static switch that de-energizes the brake quickly in the event voltage is missing.
This arrangement ensures short brake release response time with no need for additional external wiring and contacts.
Optimum performance of rectifiers **NBR** and **SBR** is achieved with separate brake power supply.
Available voltages: 230V ± 10%, 400V ± 10%, 50/60 Hz.

M2.5.3 FD brake technical specifications

The table below reports the technical specifications of DC brakes FD.



(G 30)

Brake	Brake torque M_b [Nm] springs			Release		Braking		W_{max} per brake operation [J]			W	P
				t_1	$t_{1\,s}$	t_2	t_{2c}					
	6	4	2	[ms]	[ms]	[ms]	[ms]	10 s/h	100 s/h	1000 s/h	[MJ]	[W]
FD02	–	3.5	1.75	30	15	80	9	4500	1400	180	15	17
FD03	5	3.5	1.75	50	20	100	12	7000	1900	230	25	24
FD53	7.5	5	2.5	60	30	100	12					
FD04	15	10	5	80	35	140	15	10000	3100	350	30	33
FD14												
FD05	40	26	13	130	65	170	20	18000	4500	500	50	45
FD15	40	26	13	130	65	170	20					
FD55	55	37	18	–	65	170	20					
FD06S	60	40	20	–	80	220	25	20000	4800	550	70	55
FD56	–	75	37	–	90	250	20	29000	7400	800	80	65
FD06		100	50		100	250	20					
FD07	150	100	50	–	120	200	25	40000	9300	1000	130	65
FD08*	250	200	170	–	140	350	30	60000	14000	1500	230	100
FD09**	400	300	200	–	200	450	40	70000	15000	1700	230	120

* brake torque values obtained with 9, 7 and 6 springs, respectively

** brake torque values obtained with 12, 9 and 6 springs, respectively

t_1 = brake release time with half-wave rectifier
t_{1s} = brake release time with over-energizing rectifier
t_2 = brake engagement time with AC line interruption and separate power supply
t_{2c} = brake engagement time with AC and DC line interruption – Values for t1, t1s, t2, t2c indicated in the tab. (F30) are referred to brake set at maximum torque, medium air gap and rated voltage
W_{max} = max energy per brake operation
W = braking energy between two successive air gap adjustments
P_b = brake power absorption at 20 °C
M_b = static braking torque (±15%)
s/h = starts per hour

The brake pad wear depends on the operating/ambient conditions (temperature, humidity, angular speed, specifica pressure); Therefore the declared wear rate must be considered as indicative.

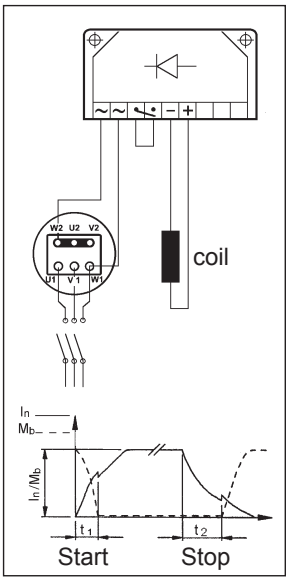
M2.5.4 FD brake connections

On standard single-pole motors, the rectifier is connected to the motor terminal board at the factory. For switch-pole motors and where a separate brake power supply is required, connection to rectifier must comply with brake voltage VB stated in motor name plate.
Because the load is of the inductive type, brake control and DC line interruption must use contacts from the usage class AC-3 to IEC 60947-4-1.

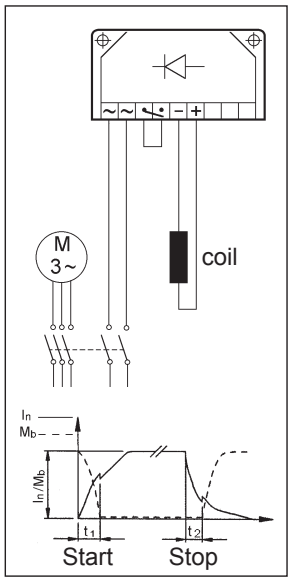
Table (G31) – Brake power supply from motor terminals and AC line interruption
Delayed stop time t_2 and function of motor time constants.
Mandatory when soft-start/stops are required.
Table (G32) – Brake coil with separate power supply and AC line interruption
Normal stop time independent of motor.
Achieved stop times t_2 are indicated in the table (G30).
Table (G33) – Brake coil power supply from motor terminals and AC/DC line interruption.
Quick stop with operation times t_{2c} as per table (G30).
Table (G34) – Brake coil with separate power supply and AC/DC line interruption.
Stop time decreases by values t_{2c} indicated in the table (G30).

Tables (G31) through (G34) show the typical connection diagrams for 400 V power supply, star-connected 230/400V motors and 230 V brake.

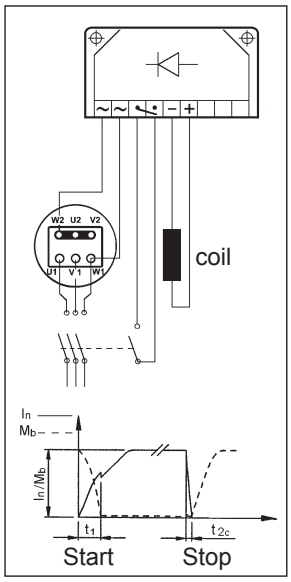
(G 31)



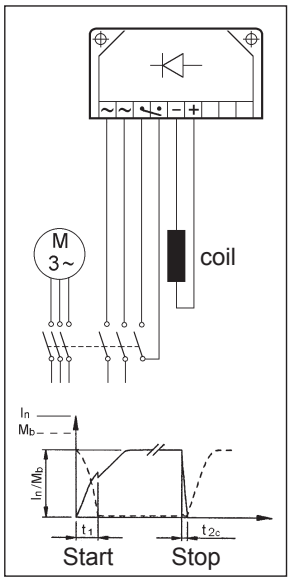
(G 32)



(G 33)



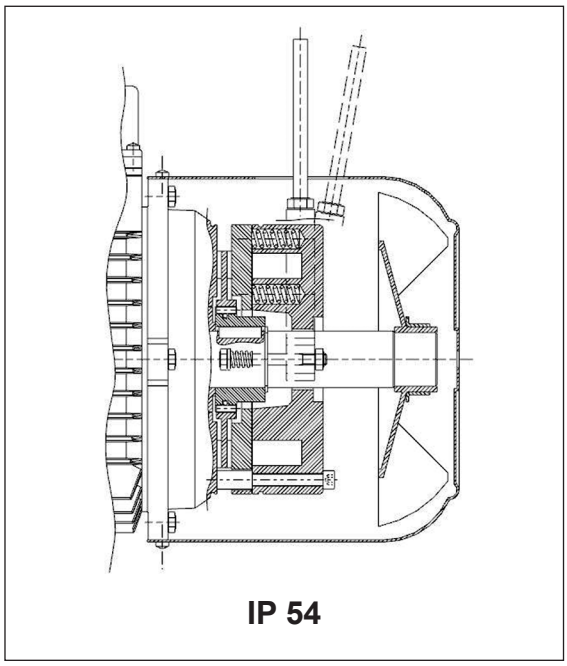
(G 34)



M2.6 DC BRAKE MOTORS TYPE BN_AFD and M_AFD

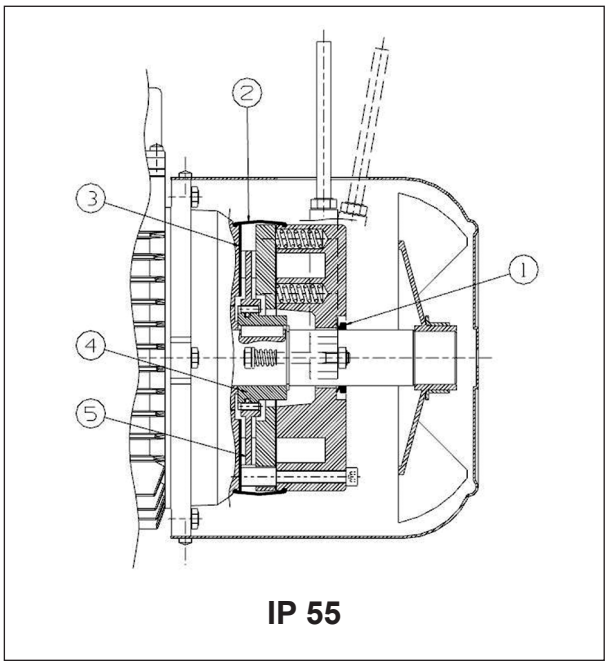
Frame sizes: BN 63 … BN 200L / M05 ... M5

(G 35)



IP 54

(G 36)



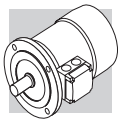
IP 55

Maintenance free up to the maximum permissible wear of brake disc. The air gap of AFD brakes is preset and it does not have to be set

Direct current toroidal-coil electromagnetic brake bolted onto motor shield.
Brake disc slides axially on steel hub shrunk onto motor shaft with anti-vibration device.
Brake torque factory setting is indicated in the corresponding motor rating charts. Braking torque may be modified by changing the type and/or number of springs.
At request, motors may be equipped with manual release lever with automatic return (**R**) see variant at paragraph “BRAKE RELEASE SYSTEMS” for available release lever locations.
AFD brakes ensure excellent dynamic performance with low noise. DC brake operating characteristics may be optimized to meet application requirements by choosing from the various rectifier/power supply and wiring connection options available.
The AFD brake is recommended for applications in which it is used as a holding brake.
For applications involving lifting and/or high hourly energy dissipation, contact Bonfiglioli’s Technical Service.

M2.6.1 Degree of protection

Standard protection class is IP54.
Brake motor AFD is also available in protection class **IP55**, which mandates the following variants:

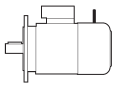


① V-ring at N.D.E. of motor shaft
② dust and water-proof rubber boot
③ stainless steel ring placed between motor shieldand brake disc
④ stainless steel hub
⑤ stainless steel brake disc

M2.6.2 AFD brake power supply

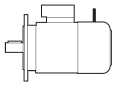
A rectifier accommodated inside the terminal box feeds the DC brake coil. Wiring connection across rectifier and brake coil is performed at the factory.
On all single-pole motors, rectifier is connected to the motor terminal board.
Rectifier standard power supply voltage VB is as indicated in the following table, regardless of mains frequency:

(G 37)

2, 4, 6 P					**1 speed**
		**BN_AFD / M_AFD** V_{mot} ± 10% 3 ~	**BN_AFD / M_AFD** V_B ± 10% 1 ~	brake connected to terminal board power supply	separate power supply
BN 63…BN 132	**M05...M4LB**	230/400 V – 50 Hz	230 V	standard	specify **V_B SA** o **V_B SD**
BN 160MR	**M4LC**	400/690 V – 50 Hz	400 V	standard	specify **V_B SA** o **V_B SD**

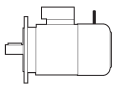
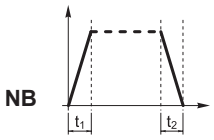
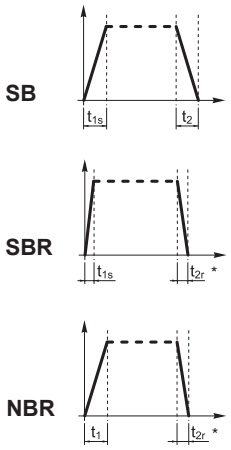
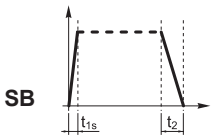
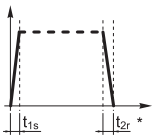
Switch-pole motors feature a separate power supply line for the brake with rectifier input voltage V_B as indicated in the table below:

(G 38)

2/4, 2/6, 2/8, 2/12, 4/6, 4/8 P					**2 speed**
		**BN_AFD / M_AFD** V_{mot} ± 10% 3 ~	**BN_AFD / M_AFD** V_B ± 10% 1 ~	brake connected to terminal board power supply	separate power supply
BN 63…BN 132	**M05...M4LB**	400 V – 50 Hz	230 V	⛔	specify **V_B SA** o **V_B SD**

The diode half-wave rectifier (VDC ≈ 0,45 x VAC) is available in versions **NB, SB, NBR** e **SBR**, as detailed in the table below:

(G 39)

		brake	standard	at request
BN 63	**M05**	**AFD 02**		
BN 71	**M1**	**AFD 03**		
BN 80	**M2**	**AFD 04**		
BN 90S	**—**	**AFD 14**		
BN 90L	**—**	**AFD 05**		
BN 100	**M3**	**AFD 15**		
BN 112	**—**	**AFD 06S**		
BN 132...160MR	**M4**	**AFD 06**		
		AFD 07		

(*) $t_{2c} < t_{2r} < t_2$

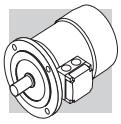
Rectifier **SB** with electronic energizing control over-energizes the electromagnet upon power-up to cut brake release response time and then switches to normal half-wave operation once the brake has been released.

Use of the **SB** rectifier is mandatory in the event of:
- high number of operations per hour
- reduced brake release response time
- brake is exposed to extreme thermal stress

Rectifiers **NBR** or **SBR** are available for applications requiring quick brake release response. These rectifiers complement the **NB** and **SB** types as their electronic circuit incorporates a static switch that de-energizes the brake quickly in the event voltage is missing.
This arrangement ensures short brake release response time with no need for additional external wiring and contacts.
Optimum performance of rectifiers **NBR** and **SBR** is achieved with separate brake power supply.
Versions available: 230 V ac ±10%, 400 V ac ± 10%, 50/60 Hz (with power supply); 100 V dc ±10%, 180 V dc ± 10% (with SD option).

M2.6.3 AFD brake technical specifications

The table below reports the technical specifications of DC brakes AFD.



(G 40)

Brake	Brake torque M_b [Nm] springs			Release		Braking		W_{max} per brake operation [J]			W	P
				t_1	$t_{1\,s}$	t_2	t_{2c}					
	6	4	2	[ms]	[ms]	[ms]	[ms]	10 s/h	100 s/h	1000 s/h	[MJ]	[W]
AFD 02	—	3.5	1.75	40	20	110	112	4500	1400	180	40	13
AFD 03	7.5	5	2.5	80	35	140	15	7000	1900	230	60	17
AFD 04	15	10	5	120	55	180	20	10000	3100	350	75	23
AFD 14												
AFD 05	40	26	13	200	85	250	30	18000	4500	500	125	32
AFD 15												
AFD 06S	60	40	20	—	110	280	35	20000	4800	550	175	40
AFD 06	100	75(*) / 62(*)	37	—	130	330	45	29000	7400	800	200	45
AFD 07	150	100	50	—	170	400	50	40000	9300	1000	320	50

(*) depending on the type of springs

t_1 = brake release time with half-wave rectifier
t_{1s} = brake release time with over-energizing rectifier
t_2 = brake engagement time with AC line interruption and separate power supply
t_{2c} = brake engagement time with AC and DC line interruption – Values for t1, t1s, t2, t2c indicated in the tab. (F30) are referred to brake set at maximum torque, medium air gap and rated voltage
W_{max} = max energy per brake operation
W = dissipatable braking energy before replacement of brake disc
P_b = brake power absorption at 20 °C
M_b = static braking torque (±15%)
s/h = starts per hour

The brake pad wear depends on the operating/ambient conditions (temperature, humidity, angular speed, specifica pressure); Therefore the declared wear rate must be considered as indicative.

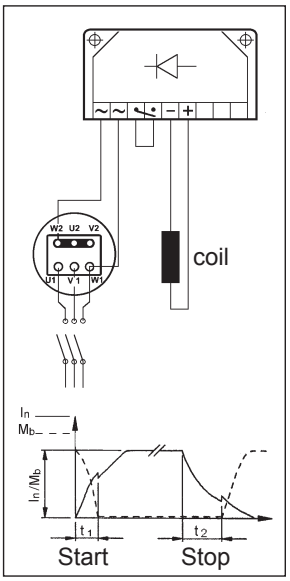
M2.6.4 AFD brake connections

On standard single-pole motors, the rectifier is connected to the motor terminal board at the factory. For switch-pole motors and where a separate brake power supply is required, connection to rectifier must comply with brake voltage VB stated in motor name plate.
Because the load is of the inductive type, brake control and DC line interruption must use contacts from the usage class AC-3 to IEC 60947-4-1.

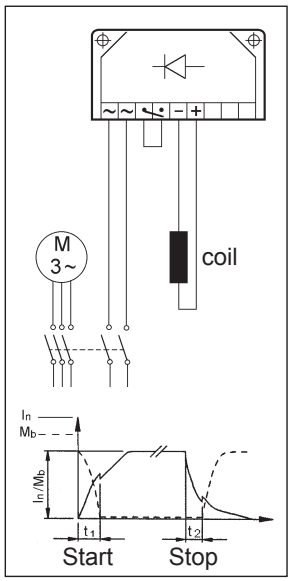
Table (G41) – Brake power supply from motor terminals and AC line interruption
Delayed stop time t_2 and function of motor time constants.
Mandatory when soft-start/stops are required.
Table (G42) – Brake coil with separate power supply and AC line interruption
Normal stop time independent of motor.
Achieved stop times t_2 are indicated in the table (G40).
Table (G43) – Brake coil power supply from motor terminals and AC/DC line interruption.
Quick stop with operation times t_{2c} as per table (G40).
Table (G44) – Brake coil with separate power supply and AC/DC line interruption.
Stop time decreases by values t_{2c} indicated in the table (G40).

Tables (G41) through (G44) show the typical connection diagrams for 400 V power supply, star-connected 230/400V motors and 230 V brake.

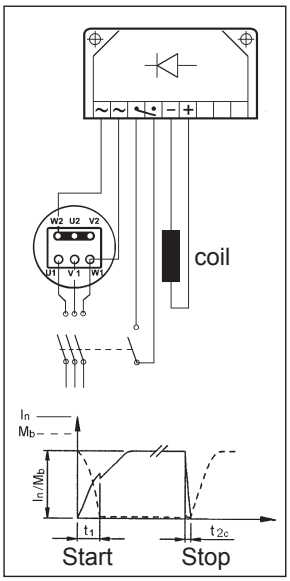
(G 41)



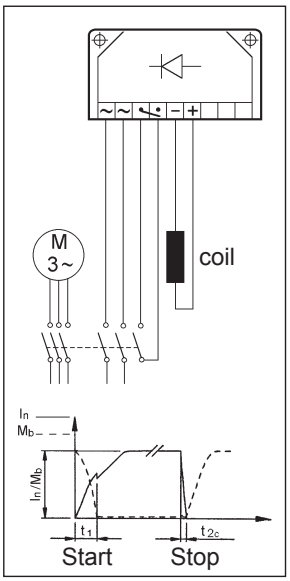
(G 42)



(G 43)



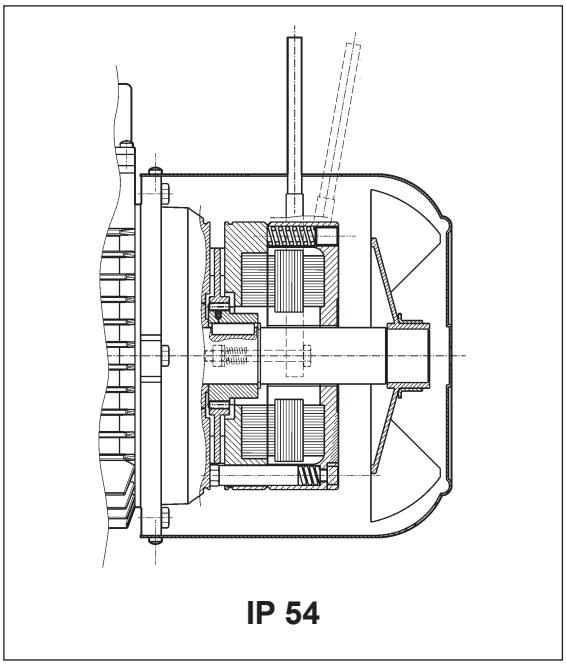
(G 44)



M2.7 AC BRAKE MOTORS TYPE BN_FA and M_FA

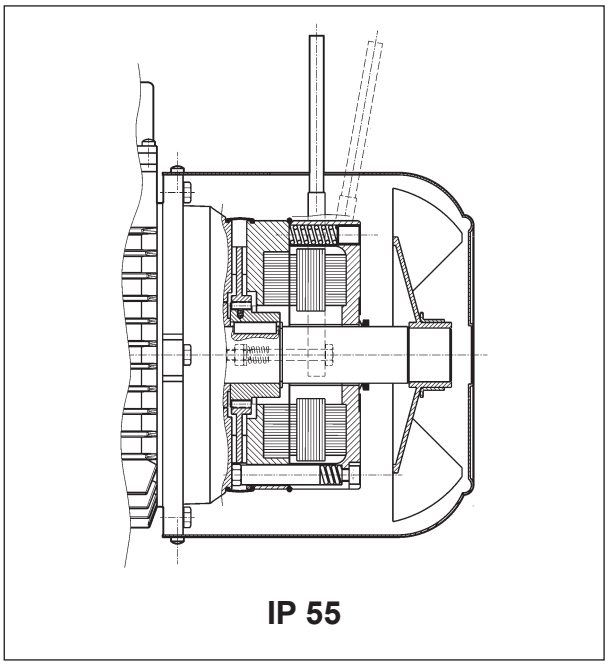
Frame sizes: BN 63 … BN 180M / M05 ... M5

(G 45)



IP 54

(G 46)



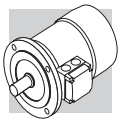
IP 55

Electromagnetic brake operates from three-phase **alternated current** power supply and is bolted onto conveyor shield. Preloading springs provide axial positioning of magnet body.
Steel brake disc slides axially on steel hub shrunk onto motor shaft with anti-vibration device.
Brake torque factory setting is indicated in the corresponding motor rating charts.
Spring preloading screws provide stepless braking torque adjustment.
Torque adjustment range is 30% $M_{bMAX} < M_b < M_{bMAX}$ (where M_{bMAX} is maximum braking torque as shown in tab. (G48).
Thanks to their high dynamic characteristics, FA brakes are ideal for heavy-duty applications as well as applications requiring frequent stop/starts and very fast response time.
Motors may be equipped with manual release lever with automatic return (**R**) at request. See variant at paragraph “BRAKE RELEASE SYSTEMS” for available release lever locations.
For applications involving lifting and/or high hourly energy dissipation, contact Bonfiglioli’s Technical Service.

M2.7.1 Degree of protection

Standard protection class is IP54.
Brake motor BN_FA is also available in protection class **IP55**, which mandates the following variants:

- V-ring at N.D.E. of motor shaft
- rubber protection sleeve
- O-ring



M2.7.2 FA brake power supply

In single speed motors, power supply is brought to the brake coil direct from the motor terminal box. As a result, brake voltage and motor voltage are the same. In this case, brake voltage indication may be omitted in the designation.
Switch-pole motors and motors with separate brake power supply feature an auxiliary terminal board with 6 terminals for connection to brake line. In both cases, brake voltage indication in the designation is mandatory.
The following table reports standard AC brake power supply ratings for single- and switch-pole motors:

(G 47)

	BN 63…BN 132	BN 160…BN 180
single-pole motor	**M05...M4LB**	**M4LC...M5**
	230Δ / 400Y V ±10% – 50 Hz	400Δ/ 690Y V ±10% – 50 Hz
	265Δ / 460Y ±10% - 60 Hz	460Y – 60 Hz

	BN 63…BN 132
switch-pole motors (separate power supply line)	**M05...M4**
	230Δ / 400Y V ±10% – 50 Hz
	460Y - 60 Hz

Unless otherwise specified, standard brake power supply is 230Δ /400Y V - 50 Hz.

Special voltages in the 24…690 V, 50-60 Hz range are available at request.

M2.7.3 Technical specifications of FA brakes

(G 48)

Brake	Brake torque M_b [Nm]	Release t_1 [ms]	Braking t_2 [ms]	W_{max} [J]			W [MJ]	P [VA]
				10 s/h	**100 s/h**	**1000 s/h**		
FA 02	3.5	4	20	4500	1400	180	15	60
FA 03	7.5	4	40	7000	1900	230	25	80
FA 04	15	6	60	10000	3100	350	30	110
FA 14								
FA 05	40	8	90	18000	4500	500	50	250
FA 15								
FA 06S	60	16	120	20000	4800	550	70	470
FA 06	75	16	140	29000	7400	800	80	550
FA 07	150	16	180	40000	9300	1000	130	600
FA 08	250	20	200	60000	14000	1500	230	1200

M_b = max static braking torque (±15%)
t_1 = brake release time
t_2 = brake engagement time
W_{max} = max energy per brake operation (brake thermal capacity)
W = braking energy between two successive air gap adjustments
P_b = power drawn by brake at 20° (50 Hz)
s/h = starts per hour

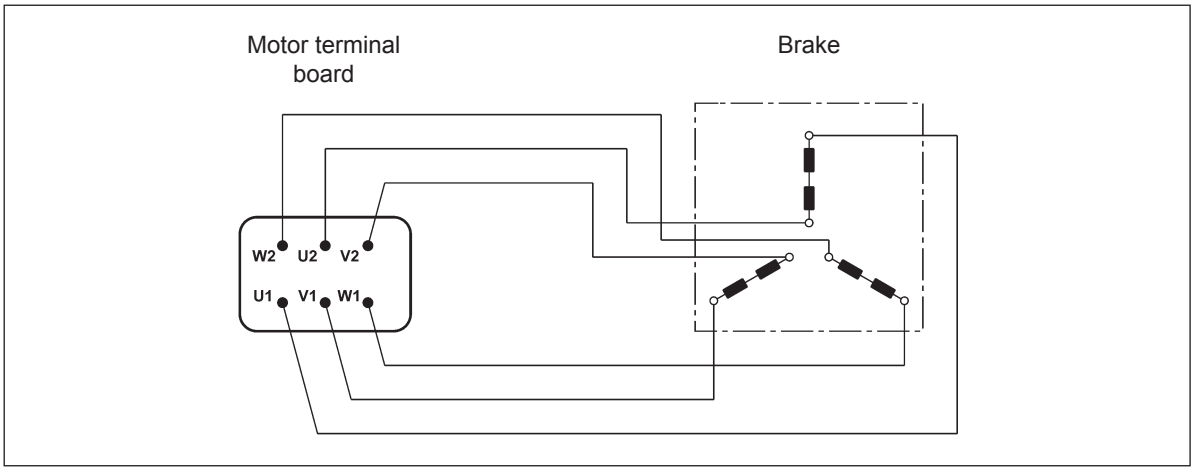
NOTE
Values t_1 and t_2 in the table refer to a brake set at rated torque, medium air gap and rated voltage.

The brake pad wear depends on the operating/ambient conditions (temperature, humidity, angular speed, specifica pressure); Therefore the declared wear rate must be considered as indicative.

M2.7.4 FA brake connections

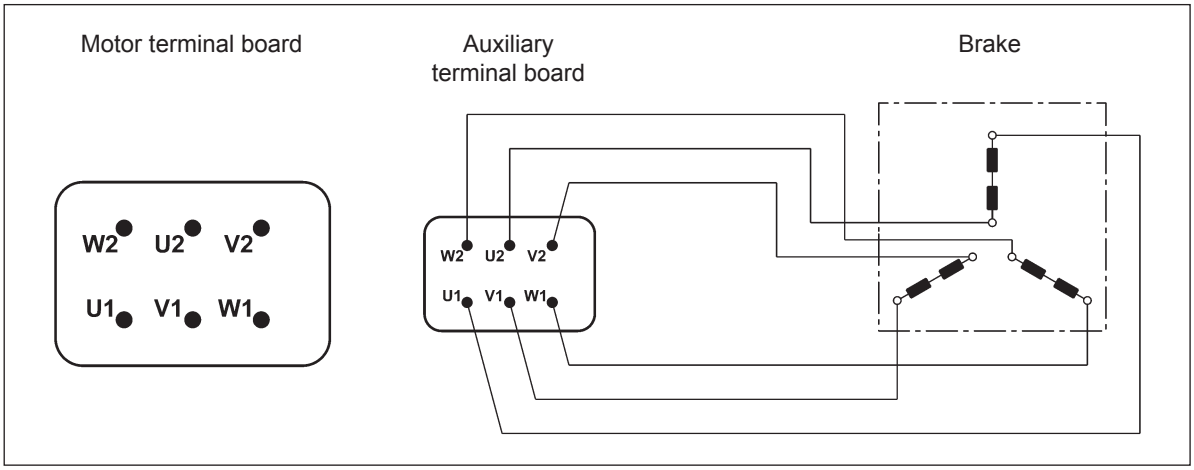
The diagram (G49) shows the wiring when brake is connected directly to same power supply of the motor:

(G 49)



Switch-pole motors and, at request, single-pole motors with separate power supply are equipped with an auxiliary terminal board with 6 terminals for brake connection.
In this version, motors feature a larger terminal box. See diagram (G50):

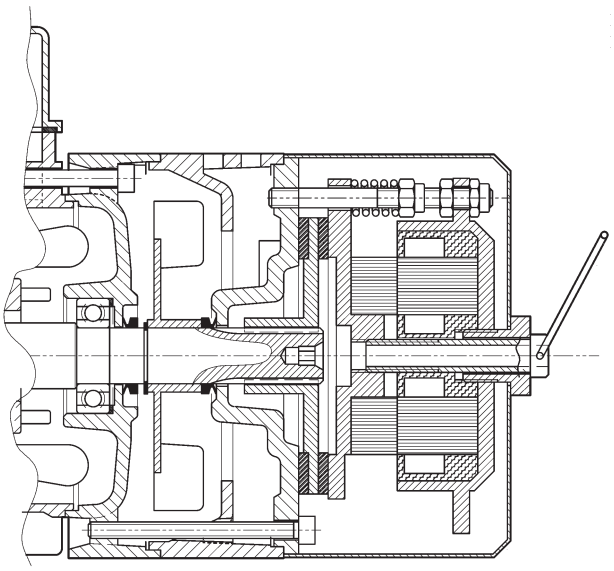
(G 50)



M2.8 AC BRAKE MOTORS TYPE BN_BA

Frame sizes: BN 63 … BN 132M

(G 51)

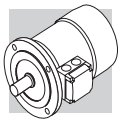


IP 55

Electromagnetic brake operates from three-phase **alternated current** power supply and is bolted onto conveyor shield.
Steel brake disc slides axially on splined motor shaft (steel drive hub is shrunk onto shaft on frame size 244).
Factory setting is maximum brake torque.
Step less braking torque adjustment by screws which compress the brake springs. Allowed adjustment range is 30% $M_{bMAX} < M_b < M_{bMAX}$ (where M_{bMAX} is maximum braking torque as shown in tab. (G53).
Motors are supplied complete with manual brake release screw as standard. Screw may be locked in the release position to allow for motor shaft rotation.
The brake release screw must be removed after use to ensure proper brake operation and avoid potentially dangerous conditions.
In addition to the high dynamic characteristics typical of AC brakes, a sturdy design and increased braking energy make the BA brake ideal for heavy-duty applications as well as applications requiring frequent stop/starts and very fast response time.
For applications involving lifting and/or high hourly energy dissipation, contact Bonfiglioli's Technical Service.

M2.8.1 Protection class

Only available in protection class IP55.



M2.8.2 A brake power supply

In single speed motors, power supply is brought to the brake coil direct from the motor terminal box. As a result, brake voltage and motor voltage are the same. In this case, brake voltage indication may be omitted in the designation.
Switch-pole motors and motors with separate brake power supply feature an auxiliary terminal board with 6 terminals for connection to brake line. In both cases, brake voltage indication in the designation is mandatory.
The following table reports standard AC brake power supply ratings for single- and switch-pole motors:

(G 52)

	BN 63 … BN 132
single-pole motor	230Δ / 400Y V ±10% – 50 Hz
	265Δ / 460Y ±10% - 60 Hz

	BN 63 … BN 132
switch-pole motors (separate power supply line)	230Δ / 400Y V ±10% – 50 Hz
	460Y - 60 Hz

Unless otherwise specified, standard brake power supply is 230Δ /400Y V - 50 Hz.

Special voltages in the 24…690 V, 50-60 Hz range are available at request.

M2.8.3 BA brake technical specifications

The table below reports the technical specifications for AC brakes type BA.

(G 53)

Brake	Brake torque M_b [Nm]	Release t_1 [ms]	Braking t_2 [ms]	W_{max} [J] 10 s/h	W_{max} [J] 100 s/h	W_{max} [J] 1000 s/h	W [MJ]	P_B [VA]
BA 60	5	5	20	4000	1500	180	30	60
BA 70	8	6	25	7000	2700	300	60	75
BA 80	18	6	25	10000	3100	350	80	110
BA 90	35	8	35	13000	3600	400	88	185
BA 100	50	8	35	18000	4500	500	112	225
BA 110	75	8	35	28000	6800	750	132	270
BA 140	150	15	60	60000	14000	1500	240	530

M_b = max static braking torque (±15%)
t_1 = brake release time
t_2 = brake engagement time
W_{max} = max energy per brake operation (brake thermal capacity)
W = braking energy between two successive air gap adjustments
Pb = power drawn by brake at 20° (50 Hz)
s/h = starts per hour

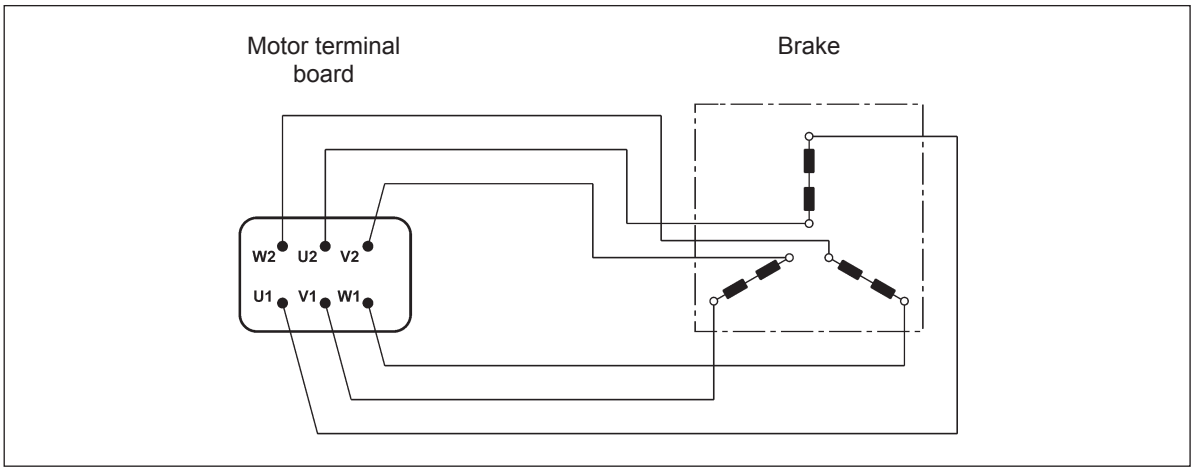
NOTE
Values t_1 and t_2 in the table refer to a brake set at rated torque, medium air gap and rated voltage.

The brake pad wear depends on the operating/ambient conditions (temperature, humidity, angular speed, specifica pressure); Therefore the declared wear rate must be considered as indicative.

M2.8.4 BA brake connections

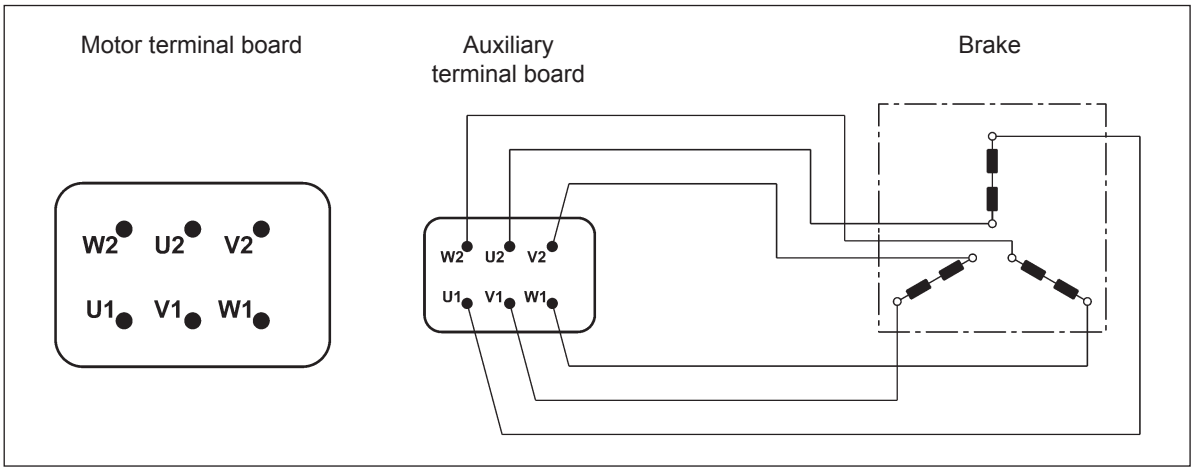
The diagram (G54) shows the required connections to terminal box when brake is to be connected directly to motor power supply:

(G 54)



Switch-pole motors and, at request, single-pole motors with separate power supply line are equipped with an auxiliary terminal board with 6 terminals for brake connection. In this version, motors feature a larger terminal box. See diagram (G55):

(G 55)

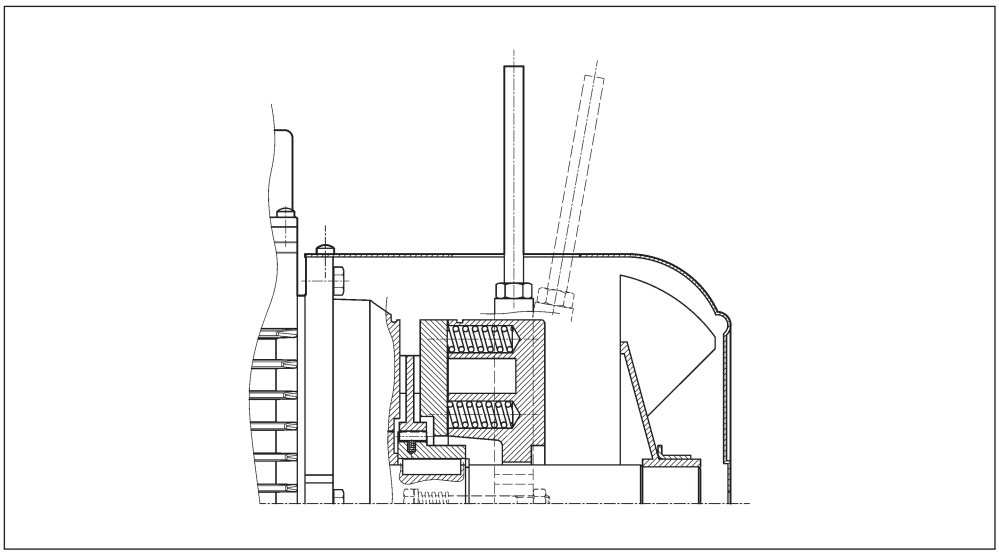


M2.9 BRAKE RELEASE SYSTEMS

Spring-applied brakes type FD, AFD and FA may be equipped with optional manual release devices. These are typically used for manually releasing the brake before servicing any machine or plant parts operated by the motor.

(G 56)

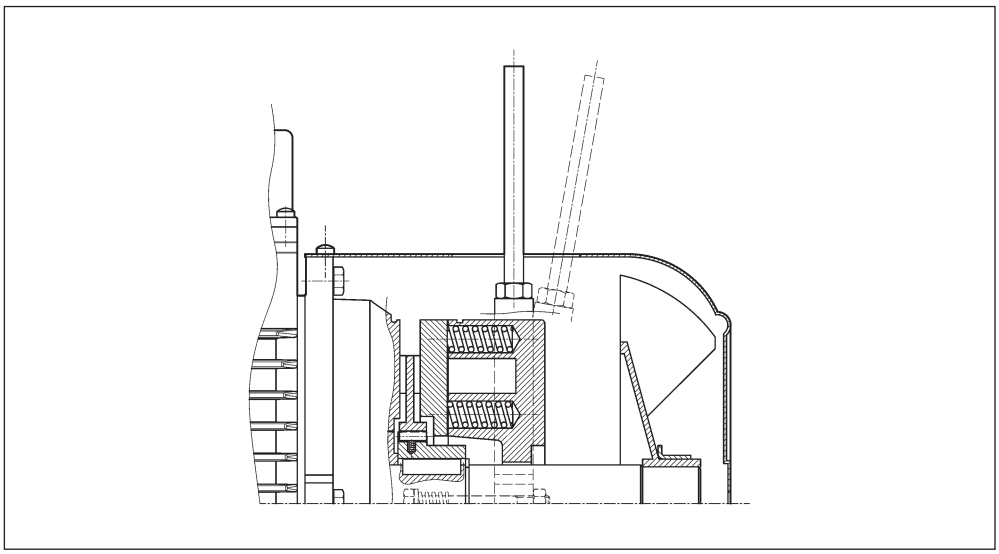
R



A return spring brings the release lever back in the original position.

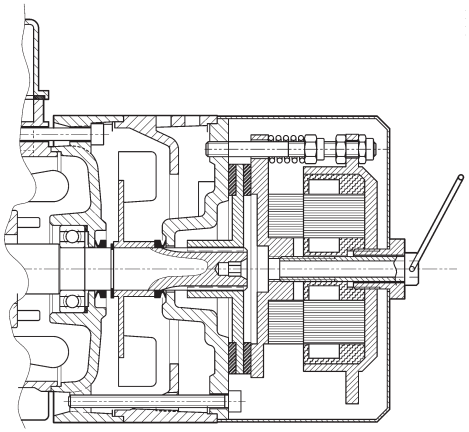
(G 57)

RM



On motors type BN_FD, if the option RM is specified, the release device may be locked in the ”release” position by tightening the lever until its end becomes engaged with a brake housing projection. The availability for the various disengagement devices is charted here below:

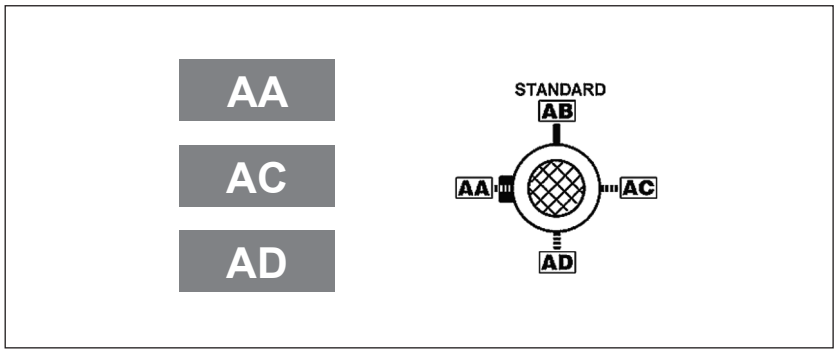
(G 58)

	R	RM
BN_FD	BN 63...BN 200	2p 63A2 ≤ H ≤ 132M2 4p 63A4 ≤ H ≤ 132MA4 6p 63A6 ≤ H ≤ 132MA6
BN_AFD	BN 63...BN 160MR	⛔
M_FD	M 05...M 5	M 05...M 4LA
M_AFD	M 05...M 4LC	⛔
BN_FA	BN 63...BN 180M	⛔
M_FA	M 05...M 5	
BN_BA		Standard Supply

M2.9.1 Release lever orientation

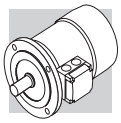
Unless otherwise specified, the release lever is located 90° away from the terminal box – identified by letters [**AB**] in the diagram below – in a clockwise direction on both options **R** and **RM**.
Alternative lever positions [**AA**], [**AC**] and [**AD**] are also possible when the corresponding option is specified:

(G 59)



M2.9.2 Fly-wheel data (F1)

The table below shows values of weight and inertia of flywheel (option F1). Overall dimensions of motors remain unchanged.



(G 60)

Main data for flywheel of motore type: BN_FD, BN_AFD, M_FD, M_AFD			
		Fly-wheel weight [Kg]	**Fly-wheel inertia** [Kgm²]
BN 63	**M05**	0.69	0.00063
BN 71	**M1**	1.13	0.00135
BN 80	**M2**	1.67	0.00270
BN 90 S - BN 90 L	**–**	2.51	0.00530
BN 100	**M3**	3.48	0.00840
BN 112	**–**	4.82	0.01483
BN 132 S - BN 132 M	**M4**	6.19	0.02580

M2.10 OPTIONS

M2.10.1 Thermal protective devices

n addition to the standard protection provided by the magneto-thermal device, motors can be supplied with built-in thermal probes to protect the winding against overheating caused, by insufficient ventilation or by an intermittent duty.
This additional protection should always be specified for servoven- tilated motors (IC416).

M2.10.2 Thermistors

E3

These are semi-conductors having rapid resistance variation when they are close to the rated switch off temperature (150 °C).
Variations of the R = f(T) characteristic are specified under DIN 44081, IEC 34-11 Standards.
Positive temperature coefficient thermistors are normally used (also known as PTC “cold conductor resistors”).
Thermistors cannot control relays directly and must be connected to a suitable disconnect device.
Thus protected, three PTCs connected in series are installed in the winding, the terminals of which are located on the auxiliary terminal-board.

K1

The design characteristics of this sub-group of PTC thermistors allow them to be used as positive temperature coefficient sensors with variable resistance.
Functioning temperature range: 0°C ... +260°C.
Thermistors cannot control relays directly and must be connected to a suitable disconnect device.
Terminals (polarised) for 1 x KTY 84-130 are provided on an auxiliary terminal strip.

M2.10.3 Bimetallic thermostates

D3

These types of protective devices house a bimetal disk. When the rated switch off temperature (150 °C) is reached, the disk switches the contacts from their initial rest position.
As temperature falls, the disk and the contacts automatically return to rest position.
Three bimetallic thermostates connected in series are usually employed, with normally closed contacts. The terminals are located on an auxiliary terminal-board.

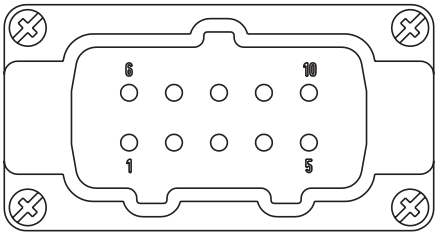
M2.10.4 Plug connector

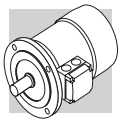
CON

Three types of connectors (CON 1, CON 2, CON 3) are provided; they can be mounted in two different positions: right side of terminal box cover (C1D, C2D, C3D); left side of terminal box cover (C1S, C2S, C3S).
The option CON is applicable to single speed BN and M motors (2, 4, 6, 8 poles), and it is not applicable to switch-pole motors. More details about the motor sizes are available in the next table.
The connectors CON 1 / CON 2 are available for BN and M motors without brake and for BN and M brakemotors equipped with DC brake type FD or AFD, for the motor sizes listed below.
The male connector (with pins) is mounted on the motor, the female connector is not provided.
With CON option, the winding connection is always Y.
With option U1 “forced ventilation”, the fan unit supply is available inside the separate terminal box fixed to fan cover.
With options EN1...EN6, the encoder connection is made by a cable not connected to the motor plug connector.
The CON option is not applicable to brakemotors equipped with AC brake type FA or BA.
The CON option is not available when at least one of the next options are selected: the U2, CUS, IC.

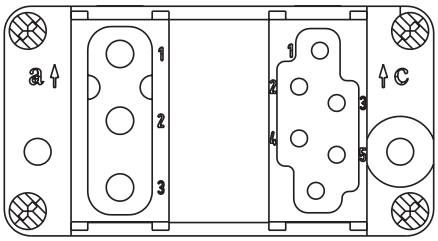
Specifications

(G 61)

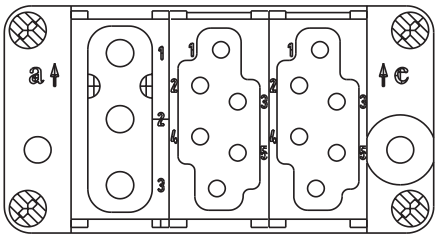
Option	**CON 1**
Motor size	**BN63…BN112 / M05...M3**
Connector view	
Type of connector	Harting Han 10ES
Housing	Han EMC 10B with 2 levers
Numbers of pins - nominal current	10 x 16A
Voltage	500 Vac
Contact connection	Screw terminals



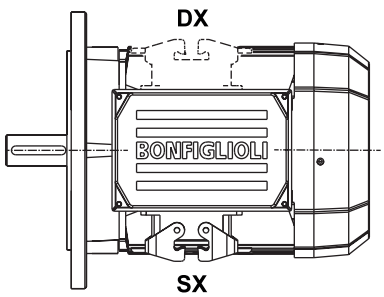
(G 62)

Option	CON 2
Motor size	**BN63…BN160MR / M05...M4LC**
Connector view	
Type of connector	Harting Han Modular
Housing	Han EMC 10B with 2 levers
Module type	Module C + Empty module + Module E
Numbers of pins - nominal current	3 x 36A / 6 x 16A
Voltage	500 Vac
Contact connection	Crimping contacts

(G 63)

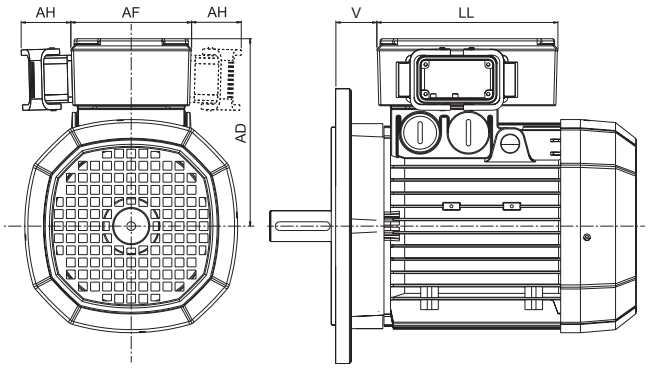
Option	CON 3
Motor size	**BN63…BN160MR / M05...M4LC**
Connector view	
Type of connector	Harting Han Modular
Housing	Han EMC 10B with 2 levers
Module type	Module C + Module E + Module E
Numbers of pins - nominal current	3 x 36A / 6 + 6 x 16A
Voltage	500 Vac
Contact connection	Crimping contacts

(G 64)

Connector orientation


(G 65)

Motors without brake dimensions

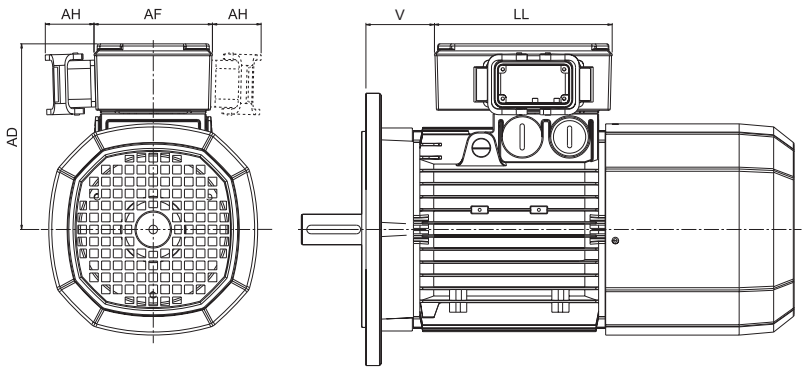


		AD (mm)	**AF** (mm)	**AH** (mm)	**LL** (mm)	**V**(*) (mm)
BN63	**M05**	136	110	45	165	4.5
BN71	**M1**	149	110	45	165	15.5
BN80	**M2**	160	110	45	165	16.5
BN90	**—**	162	110	45	165	31.5
BN100	**M3**	171	110	45	165	37.5
BN112	**—**	186	110	45	165	39
BN132	**M4**	210	140	45	188	45.5
BN160MR	**—**	210	140	45	188	161

(*) Dimension valid only for motors BN.

(G 66)

Motors with FD brake dimensions



		AD (mm)	**AF** (mm)	**AH** (mm)	**LL** (mm)	**V**(*) (mm)
BN63	**M05**	136	110	45	165	4.5
BN71	**M1**	149	110	45	165	1.5
BN80	**M2**	160	110	45	165	18.5
BN90	**—**	162	110	45	165	39.5
BN100	**M3**	171	110	45	165	63.5
BN112	**—**	186	110	45	165	75
BN132	**M4**	210	140	45	188	122
BN160MR	**—**	210	140	45	188	161

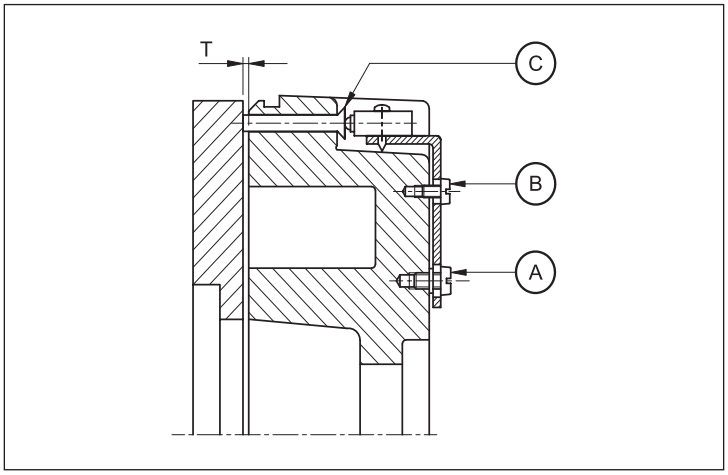
(*) Dimension valid only for motors BN.

M2.10.5 Control of brake operation

MSW

The microswitch can be set in order to obtain from it a signal related to the attraction/release of anchor plate, or it can be set in order to give feedback when the air gap reaches the maximum value.
MSW option is available for brakes FD03...FD09 and AFD03...AFD07.
The microswitch is provided with three lead wires (NC, NO, COM). The next figure shown the main components of the brake equipped with microswitch.

(G 67)



A: Plate fixing screws
B: Setting screws
C: Actuator control pin

M2.10.6 Additional cable entry for brakemotors

IC

The terminal box cover of brakemotors BN63...BN160MR / M05...M4 is provided with two additional cable entry M16 x 1.5 (one cable entry per side).
The terminal box cover of brakemotors BN160...BN200 / M5 is provided with an additional cable entry M16 x 1.5 next to the cable entry used for the brake.

M2.10.7 Anti-condensation heaters

H1

Where an application involves high humidity or extreme temperature fluctuation, motors may be equipped with an anti-condensate heater.
A single-phase power supply is available in the auxiliary terminal board inside the main terminal box.
Values for the absorbed power are listed here below:

(G 68)

		H1 1~ 230V ± 10% P [W]
BN 56...BN 80	**M0...M2**	10
BN 90...BN 160MR	**M3 - M4**	25
BN 160M...BN 180M	**M5**	50
BN 180L...BN 200L	**—**	50

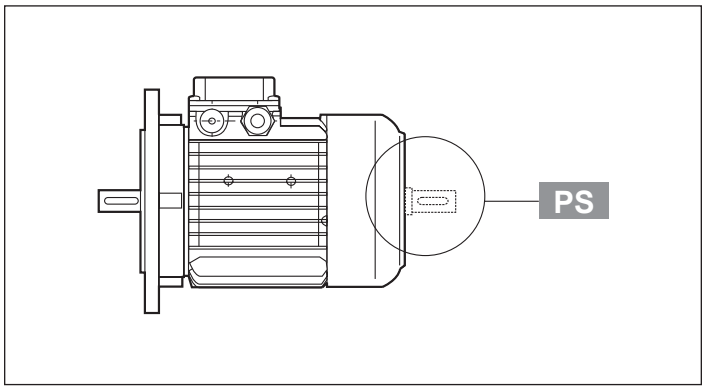
Warning!
Always remove power supply to the anti-condensante hea- ter before operating the motor.

M2.10.8 Second shaft extension

PS

This option is not compatible with variants RC, TC, U1, U2, EN1, EN2, EN3, EN4, EN5, EN6 – and is not feasible on motors equipped with BA brake.
For shaft dimensions please see motor dimensions tables.

(G 69)



M2.10.9 Backstop device

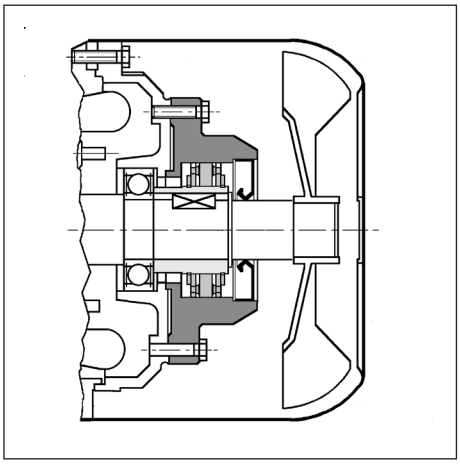
AL **AR**

For applications where backdriving must be avoided, motors equipped with an anti run-back device can be used (available for the M series only).
While allowing rotation in the direction required, this device operates instantaneously in case of a power failure, preventing the shaft from running back.
The anti run-back device is life lubricated with special grease for this specific application.
When ordering, customers should indicate the required rotation direction, AL or AR.
Never use the anti run-back device to prevent reverse rotation caused by faulty electrical connection.
Table (G70) shows rated and maximum locking torques for the anti run-back devices.
A diagram of the device can be seen in Table (G71). Overall dimensis are same as the corresponding brake motor.
The direction of free rotation is described in the “MOTOR OPTIONS” section of specifically dedicated sections to gear units.

(G 70)

	Rated locking torque [Nm]	Max. locking torque [Nm]	Release speed [min^{-1}]
M1	6	10	750
M2	16	27	650
M3	54	92	520
M4	110	205	430

(G 71)



M2.10.10 Ventilation

Motors are cooled through outer air blow (IC 411 according to CEI EN 60034-6) and are equipped with a plastic radial fan, which operates in both directions.
Ensure that fan cover is installed at a suitable distance from the closest wall so to allow air circulation and servicing of motor and brake, if fitted.
On request, motors can be supplied with independently power-supplied forced ventilation system starting from BN 71 or M1 size.
Motor is cooled by an axial fan with independent power supply and fitted on the fan cover (IC 416 cooling system).
This version is used in case of motor driven by inverter so that steady torque operation is possible even at low speed or when high starting frequencies are needed.
Brake motors of BN_BA type and all motors with rear shaft projection (PS option) are excluded.

(G 72)

Power supply					
		V a.c. ± 10%	**Hz**	**P** [W]	**I** [A]
BN 71	**M1**	1~ 230	50 / 60	22	0.12
BN 80	**M2**			22	0.12
BN 90	**—**			40	0.30
BN 100 (*)	**M3**			50	0.25
BN 112	**—**	3~ 230 Δ / 400Y		50	0.26 / 0.15
BN 132S	**M4S**			110	0.38 / 0.22
BN 132M...BN 160MR	**M4L**				
BN 160...BN 180M	**M5**		50	180	1.25 / 0.72

This variant has two different models, called **U1** and **U2**, having the same longitudinal size. Longer side of fan cover (**DL**) is specified for both models in the table below. Overall dimension can be reckoned from motor size table.

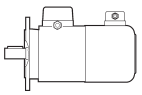
(G 73)

Extra length for servoventilated motors			
		Δ L_1	**Δ L_2**
BN 71	**M1**	93	32
BN 80	**M2**	127	55
BN 90	**—**	131	48
BN 100	**M3**	119	28
BN 112	**—**	130	31
BN 132S	**M4S**	161	51
BN 132M	**M4L**	161	51

ΔL_1 = extra length to LB value of corresponding standard motor

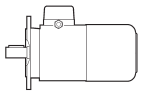
ΔL_2 = extra length to LB value of corresponding brake motor

U1



Fan wiring terminals are housed in a separate terminal box.
In brake motors of size BN 71...BN 160MR, with **U1** model, the release lever cannot be positioned to AA.
The option is not applicable to motors compliant with the CSA and UL norms (option CUS).

U2



Fan terminals are wired in the motor terminal box.
The **U2** option does not apply to motors BN 160 through BN 200L, with the only exception of motor BN 160MR for which the option is available instead and to motors with option CUS (compliant to norms CSA and UL).

(G 74)

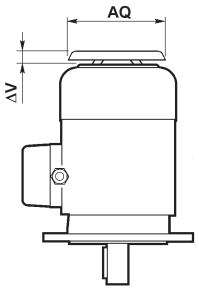
(*)			**V a.c. ± 10%**	**Hz**	**P** [W]	**I** [A]
	BN 100_U2	**M3**	3~ 230 Δ / 400Y	50 / 60	40	0.12 / 0.09

M2.10.11 Rain canopy

RC

The rain canopy protects the motor from dripping and avoids the ingress of solid bodies. It is recommended when motor is installed in a vertical position with the shaft downwards.
Relevant dimensions are indicated in the table below.
The drip cover is not compatible with variants PS, EN1, EN2, EN3, EN4, EN5, EN6 and will not fit motors equipped with a BA brake.

(G 75)

		AQ	ΔV	
BN 63	**M05**	118	24	
BN 71	**M1**	134	27	
BN 80	**M2**	152	25	
BN 90	**—**	168	30	
BN 100	**M3**	190	28	
BN 112	**—**	211	32	
BN 132...BN 160MR	**M4**	254	32	
BN 160M...BN 180M	**M5**	302	36	
BN 180L...BN 200L	**—**	340	36	

M2.10.12 Textile canopy

TC

Option TC is a cover variant for textile industry environments, where lint may obstruct the fan grid and prevent a regular flow of cooling air.
This option is not compatible with variants EN1, EN2, EN3, EN4, EN5, EN6 and will not fit motors equipped with a BA brake.
Overall dimensions are the same as drip cover type RC.

M2.10.13 Feedback units

Motors may be combined with three different types of encoders to achieve feedback circuits.
Configurations with double-extended shaft (PS) and rain canopy (RC, TC) are not compatible with encoder installation.
Also not compatible are motors equipped with a.c. brakes, type BA.

EN1

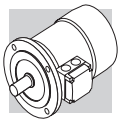
Incremental encoder, V_{IN} = 5 V, line-driver output RS 422.

EN2

Incremental encoder, V_{IN} = 10-30 V, line-driver output RS 422.

EN3

Incremental encoder, V_{IN} = 12-30 V, push-pull output 12-30 V



EN4

Encoder sin/cos, V_{IN} = 4.5-5.5 V, output Sinus 0.5V_{PP}.

EN5

Absolute encoder singleturn, HIPERFACE® interface, V_{IN} = 7-12 V.

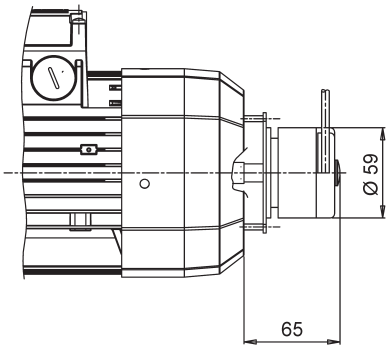
EN6

Absolute encoder multiturn, HIPERFACE® interface, V_{IN} = 7-12 V.

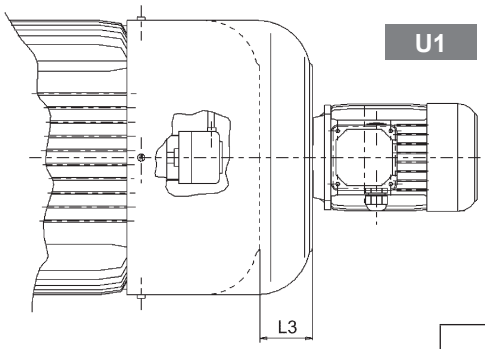
(G 76)

		EN1	EN2	EN3	EN4	EN5	EN6
Interface		TTL/RS 422	TTL/RS 422	HTL/push-pull	Sinus 0.5 VPP	HIPERFACE®	HIPERFACE®
Power supply voltage	[V]	4...6	10...30	12...30	4.4...5.5	7...12	7...12
Output voltage	[V]	5	5	12...30	—	—	—
No-load operating current	[mA]	120	100	100	40	80	80
No. of pulses per revolution		1024					
Steps per revolution		—	—	—	—	15 bit	15 bit
Revolutions		—	—	—	—	—	12 bit
No. of signals		6 (A, B, Z + inverted signals)			6 (cos-, cos+, sin-, sin+, Z, $\overline{Z}$)	—	—
Max. output frequency	[kHz]	600			200		
Max. speed	[min^{-1}]	6000 (9000 min^{-1} for 10 s)					
Working temperature range	[°C]	-30 ... +100					
Protection class		IP 65					

(G 77)

EN1, EN2, EN3, EN4, EN5, EN6	
	
BN 63...BN 200L	**M05...M5**
BN 63_FD...BN 200L_FD	**M05_FD...M5_FD**
BN 63_AFD...BN 160MR_AFD	**M05_AFD...M4LC_AFD**
BN 63_FA...BN 200L_FA	**M05_FA...M5_FA**

(G 78)

EN_ + U1		
		
		L3
BN 160M...BN 180M	**M5**	72
BN 180L...BN 200L	**-**	82
BN 160M_FD...BN 180M_FD	**M5_FD**	35
BN 180L_FD...BN 200L_FD	**-**	41

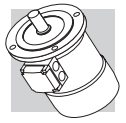
If the encoder device (option EN_) is specified on motors BN71...BN160MR / M1...M4, along with the independent fan cooling (options U1, U2), the extra length of motor is coincident with that of the correspondent U1 and U2 execution.

2P — 3000 min^{-1} - S1 — 50 Hz

															d.c. brake						d.c. brake with fixed air gap						a.c. brake									
															FD						AFD						FA						BA				
P_n		n	M_n	IE1	η	η	η	cosφ	In	Is	Ms	Ma	J_m	IM B5	Mod	Mb	Z_o		J_m	IM B5	Mod	Mb	Z_o		J_m	IM B5	Mod	Mb	Z_o	J_m	IM B5	Mod	Mb	Z_o	J_m	IM B5
					(100%)	(75%)	(50%)		400V				x 10^{-4}				1/h		x 10^{-4}				1/h		x 10^{-4}				1/h	x 10^{-4}				1/h	x 10^{-4}	
kW		min^{-1}	Nm		%	%	%		A	In	Mn	Mn	kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm		kgm^2	Kg		Nm		kgm^2	Kg
0.18	**BN 63A 2**	2730	0.63	○	59.9	56.9	51.9	0.77	0.56	3.0	2.1	2.0	2.0	3.5	**FD 02**	1.75	3900	4800	2.6	5.2	**AFD 02**	1.75	3900	4800	2.6	5.0	**FA 02**	1.75	4800	2.6	5.0	**BA 60**	5	3500	4.0	5.8
0.25	**BN 63B 2**	2740	0.87	○	66.0	64.8	64.8	0.76	0.72	3.3	2.3	2.3	2.3	3.9	**FD 02**	1.75	3900	4800	3.0	5.6	**AFD 02**	1.75	3900	4800	3.0	5.4	**FA 02**	1.75	4800	3.0	5.4	**BA 60**	5	3600	4.3	6.2
0.37	**BN 63C 2**	2800	1.26	○	69.1	66.8	66.8	0.78	0.99	3.9	2.6	2.6	3.3	5.1	**FD 02**	3.5	3600	4500	3.9	6.8	**AFD 02**	3.5	3600	4500	3.9	6.6	**FA 02**	3.5	4500	3.9	6.6	**BA 60**	5	3500	5.3	7.4
0.37	**BN 71A 2**	2820	1.25	○	73.8	73.0	70.6	0.76	0.95	4.8	2.8	2.6	3.5	5.4	**FD 03**	3.5	3000	4100	4.6	8.1	**AFD 03**	5	3000	4100	4.6	7.8	**FA 03**	3.5	4200	4.6	7.8	**BA 70**	8	3500	5.5	9.3
0.55	**BN 71B 2**	2820	1.86	○	76.0	75.8	74.8	0.76	1.37	5.0	2.9	2.8	4.1	6.2	**FD 03**	5	2900	4200	5.3	8.9	**AFD 03**	5	2900	4200	5.3	8.6	**FA 03**	5	4200	5.3	8.6	**BA 70**	8	3600	6.1	10.1
0.75	**BN 71C 2**	2810	2.6	○	76.6	76.2	76.2	0.76	1.86	5.1	3.1	2.8	5.0	7.3	**FD 03**	5	1900	3300	6.1	10.0	**AFD 03**	7.5	1900	3300	6.1	9.7	**FA 03**	5	3600	6.1	9.7	**BA 70**	8	3200	7.0	11.2
0.75	**BN 80A 2**	2810	2.6	•	76.2	75.5	68.3	0.81	1.75	4.8	2.6	2.2	7.8	8.6	**FD 04**	5	1700	3200	9.4	12.5	**AFD 04**	5	1700	3200	9.4	12.1	**FA 04**	5	3200	9.4	12.4	**BA 80**	18	2800	10.8	13.9
1.1	**BN 80B 2**	2800	3.8	•	76.4	76.2	75.0	0.81	2.57	4.8	2.8	2.4	9.0	9.5	**FD 04**	10	1500	3000	10.6	13.4	**AFD 04**	10	1500	3000	10.6	13.0	**FA 04**	10	3000	10.6	13.3	**BA 80**	18	2700	12.0	14.8
1.5	**BN 80C 2**	2800	5.1	•	79.1	79.5	77.2	0.81	3.4	4.9	2.7	2.4	11.4	11.3	**FD 04**	15	1300	2600	13.0	15.2	**AFD 04**	15	1300	2600	13.0	14.8	**FA 04**	15	2600	13.0	15.1	**BA 80**	18	2400	14.4	16.6
1.5	**BN 90SA 2**	2870	5.0	•	82.0	81.5	78.1	0.80	3.4	5.9	2.7	2.6	12.5	12.3	**FD 14**	15	900	2200	14.1	16.5	**AFD 14**	15	900	2200	14.1	16.1	**FA 14**	15	2200	14.1	16.4	**BA 90**	35	1600	19.5	19.6
1.85	**BN 90SB 2**	2880	6.1	•	82.5	82.0	75.4	0.80	4.0	6.2	2.9	2.6	16.7	14	**FD 14**	15	900	2200	18.3	18.2	**AFD 14**	15	900	2200	18.3	17.8	**FA 14**	15	2200	18.3	18.1	**BA 90**	35	1700	23.7	21.3
2.2	**BN 90L 2**	2880	7.3	•	82.7	82.1	80.8	0.80	4.8	6.3	2.9	2.7	16.7	14	**FD 05**	26	900	2200	21	20	**AFD 05**	26	900	2200	21	19.4	**FA 05**	26	2200	21	20.7	**BA 90**	35	1700	24	21.3
3	**BN 100L 2**	2860	10.0	•	81.5	81.3	77.4	0.79	6.7	5.6	2.6	2.2	31	20	**FD 15**	26	700	1600	35	26	**AFD 15**	26	700	1600	35	25	**FA 15**	26	1600	35	27	**BA 100**	50	1300	43	30
4	**BN 100LB 2**	2870	13.3	•	83.1	83.0	77.8	0.80	8.7	5.8	2.7	2.5	39	23	**FD 15**	40	450	900	43	29	**AFD 15**	40	450	900	43	28	**FA 15**	40	1000	43	30	**BA 100**	50	850	51	33
4	**BN 112M 2**	2900	13.2	•	85.5	84.5	83.0	0.82	8.2	6.9	3.0	2.9	57	28	**FD 06S**	40	—	950	66	39	**AFD 06S**	40	—	950	66	38	**FA 06S**	40	950	66	40	**BA 110**	75	850	73	41
5.5	**BN 132SA 2**	2890	18.2	•	84.7	84.5	81.2	0.84	11.2	5.9	2.6	2.2	101	35	**FD 06**	50	—	600	112	48	**AFD 06**	62	—	600	112	47	**FA 06**	50	600	112	49	**BA 140**	150	500	151	67
7.5	**BN 132SB 2**	2900	25	•	86.5	86.3	84.4	0.85	14.7	6.4	2.6	2.2	145	42	**FD 06**	50	—	550	154	55	**AFD 06**	62	—	550	154	54	**FA 06**	50	550	154	56	**BA 140**	150	450	195	74
9.2	**BN 132M 2**	2930	30	•	87.0	86.5	83.6	0.86	17.7	6.7	2.8	2.3	178	53	**FD 56**	75	—	430	189	66	**AFD 06**	75	—	430	189	65	**FA 06**	75	430	189	67	**BA 140**	150	400	228	85
11	**BN 160MR 2**	2920	36	•	87.6	87.0	86.0	0.88	20.6	6.9	2.9	2.5	210	65																						
15	**BN 160MB 2**	2930	49	•	89.6	89.4	88.0	0.86	28.1	7.1	2.6	2.3	340	84																						
18.5	**BN 160L 2**	2930	60	•	90.4	90.1	89.0	0.86	34	7.6	2.7	2.3	420	97																						
22	**BN 180M 2**	2930	72	•	89.9	89.7	89.5	0.88	40	7.8	2.6	2.4	490	109																						
30	**BN 200LA 2**	2930	98	•	90.7	90.1	87.6	0.89	54	7.8	2.7	2.9	770	140																						

○ = n.a. • = IE1

4P — 1500 min^{-1} - S1 — 50 Hz



															d.c. brake						d.c. brake with fixed air gap						a.c. brake										
															FD						AFD						FA						BA				
P_n		n	M_n	IE1	η (100%)	η (75%)	η (50%)	cosφ	In	Is/In	Ms/Mn	Ma/Mn	J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h		J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h		J_m x 10^{-4}	IM B5	Mod	Mb	Z_o	J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h	J_m x 10^{-4}	IM B5
kW		min^{-1}	Nm		%	%	%		400V A				kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm	1/h	kgm^2	Kg		Nm	1/h	kgm^2	Kg
0.06	**BN 56A 4**	1340	0.43	○	46.8	44.2	41.3	0.65	0.28	2.6	2.3	2.0	1.5	3.1																						
0.09	**BN 56B 4**	1350	0.64	○	51.7	47.6	42.9	0.60	0.42	2.6	2.5	2.4	1.5	3.1																						
0.12	**BN 63A 4**	1350	0.85	○	59.8	56.2	47.0	0.62	0.47	2.6	1.9	1.8	2.0	3.5	**FD 02**	1.75	10000	13000	2.6	5.2	**AFD 02**	1.75	10000	13000	2.6	5.0	**FA 02**	1.75	13000	2.6	5.0	**BA 60**	5.0	9000	4.0	5.8
0.18	**BN 63B 4**	1320	1.30	○	54.8	52.9	52.5	0.67	0.71	2.6	2.2	2.0	2.3	3.9	**FD 02**	3.5	10000	13000	3.0	5.6	**AFD 02**	3.5	10000	13000	3.0	5.4	**FA 02**	3.5	13000	3.0	5.4	**BA 60**	5.0	9000	4.3	6.2
0.25	**BN 63C 4**	1340	1.78	○	65.3	65.0	57.9	0.69	0.80	2.7	2.1	1.9	3.3	5.1	**FD 02**	3.5	7800	10000	3.9	6.8	**AFD 02**	3.5	7800	10000	3.9	6.6	**FA 02**	3.5	10000	3.9	6.6	**BA 60**	5.0	8500	5.3	7.4
0.25	**BN 71A 4**	1380	1.73	○	63.7	62.2	59.1	0.73	0.78	3.3	1.9	1.7	5.8	5.1	**FD 03**	3.5	7700	11000	6.9	7.8	**AFD 03**	5	7700	11000	6.9	7.5	**FA 03**	3.5	11000	6.9	7.5	**BA 70**	8.0	9700	7.8	9.0
0.37	**BN 71B 4**	1370	2.6	○	66.8	66.7	63.0	0.76	1.05	3.7	2.0	1.9	6.9	5.9	**FD 03**	5	6000	9400	8.0	8.6	**AFD 03**	5	6000	9400	8.0	8.3	**FA 03**	5.0	9400	8.0	8.3	**BA 70**	8.0	8500	8.9	9.8
0.55	**BN 71C 4**	1380	3.8	○	69.0	68.9	68.8	0.74	1.55	4.1	2.3	2.3	9.1	7.3	**FD 53**	7.5	4300	8700	10.2	10.0	**AFD 03**	7.5	4300	8700	10.2	9.7	**FA 03**	7.5	8700	10.2	9.7	**BA 70**	8.0	8000	11.1	11.2
0.55	**BN 80A 4**	1390	3.8	○	72.0	71.3	69.7	0.77	1.43	4.1	2.3	2.0	15	8.2	**FD 04**	10	4100	8000	16.6	12.1	**AFD 04**	10	4100	8000	16.6	11.7	**FA 04**	10	8000	16.6	12.0	**BA 80**	18	7400	18	13.5
0.75	**BN 80B 4**	1400	5.1	•	75.0	74.5	69.3	0.78	1.85	4.9	2.7	2.5	20	9.9	**FD 04**	15	4100	7800	22	13.8	**AFD 04**	15	4100	7800	22	13.4	**FA 04**	15	7800	22	13.7	**BA 80**	18	7400	23	15.2
1.1	**BN 80C 4**	1400	7.5	•	75.5	76.2	70.4	0.78	2.7	5.1	2.8	2.5	25	11.3	**FD 04**	15	2600	5300	27	15.2	**AFD 04**	15	2600	5300	27	14.8	**FA 04**	15	5300	27	15.1	**BA 80**	18	5100	28	16.6
1.1	**BN 90S 4**	1390	7.6	•	76.5	76.2	72.2	0.77	2.70	4.6	2.6	2.2	21	12.2	**FD 14**	15	4800	8000	23	16.4	**AFD 14**	15	4800	8000	23	16	**FA 14**	15	8000	23	16.3	**BA 90**	35	6500	28	19.5
1.5	**BN 90LA 4**	1410	10.2	•	78.7	78.5	74.9	0.77	3.6	5.3	2.8	2.4	28	13.6	**FD 05**	26	3400	6000	32	19.6	**AFD 05**	26	3400	6000	32	19	**FA 05**	26	6000	32	20.3	**BA 90**	35	5400	35	21.0
1.85	**BN 90LB 4**	1390	12.7	•	78.6	78.9	77.2	0.79	4.3	5.1	2.8	2.6	30	15.1	**FD 05**	26	3200	5900	34	21.1	**AFD 05**	26	3200	5900	34	20.5	**FA 05**	26	5900	34	21.8	**BA 90**	35	5400	37	22.5
2.2	**BN 100LA 4**	1410	14.9	•	81.1	81.4	79.9	0.75	5.2	4.5	2.2	2.0	40	18	**FD 15**	40	2600	4700	44	25	**AFD 15**	40	2600	4700	44	24.4	**FA 15**	40	4700	44	25	**BA 100**	50	4000	52	29
3	**BN 100LB 4**	1410	20	•	82.6	83.8	83.7	0.77	6.8	5.0	2.3	2.2	54	22	**FD 15**	40	2400	4400	58	28	**AFD 15**	40	2400	4400	58	27	**FA 15**	40	4400	58	29	**BA 100**	50	3800	66	32
4	**BN 112M 4**	1430	27	•	84.4	84.2	81.6	0.81	8.4	5.6	2.7	2.5	98	30	**FD 06S**	60	—	1400	107	40	**AFD 06S**	60	—	1400	107	39	**FA 06S**	60	2100	107	42	**BA 110**	75	2000	114	43
5.5	**BN 132S 4**	1440	36	•	84.7	84.8	82.5	0.81	11.6	5.5	2.3	2.2	213	44	**FD 56**	75	—	1050	223	57	**AFD 06**	75	—	1050	223	56	**FA 06**	75	1200	223	58	**BA 140**	150	1200	263	76
7.5	**BN 132MA 4**	1440	50	•	86.0	86.3	85.3	0.81	15.5	5.7	2.5	2.4	270	53	**FD 06**	100	—	950	280	66	**AFD 06**	100	—	950	280	65	**FA 07**	100	1000	280	71	**BA 140**	150	1000	320	85
9.2	**BN 132MB 4**	1440	61	•	88.4	88.6	87.5	0.81	18.8	5.9	2.7	2.5	319	59	**FD 07**	150	—	900	342	75	**AFD 07**	150	—	900	342	73	**FA 07**	150	900	342	77	**BA 140**	150	900	369	91
11	**BN 160MR 4**	1440	73	•	87.6	87.8	86.0	0.81	22.4	6.0	2.7	2.5	360	70	**FD 07**	150	—	850	382	86	**AFD 07**	150	—	850	382	84	**FA 07**	150	850	382	88					
15	**BN 160L 4**	1460	98	•	88.7	88.5	88.4	0.81	30	6.0	2.3	2.1	650	99	**FD 08**	200	—	750	725	129							**FA 08**	200	750	710	128					
18.5	**BN 180M 4**	1460	121	•	89.3	89.5	89.2	0.81	37	6.2	2.6	2.5	790	115	**FD 08**	250	—	700	865	145							**FA 08**	250	700	850	144					
22	**BN 180L 4**	1460	144	•	89.9	90.0	90.0	0.80	44	6.4	2.5	2.5	1250	135	**FD 09**	300	—	400	1450	175																
30	**BN 200L 4**	1460	196	•	91.4	91.7	91.0	0.80	59	7.1	2.7	2.8	1650	157	**FD 09**	400	—	300	1850	197																

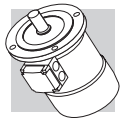
○ = n.a. • = IE1

6P — 1000 min^{-1} - S1 — 50 Hz

																d.c. brake						d.c. brake with fixed air gap						a.c. brake									
																FD						AFD						FA						BA			
P_n		n	M_n	IE1	η	η	η	cosφ	In	Is	Ms	Ma	J_m	IM B5		Mod	Mb	Z_o		J_m	IM B5	Mod	Mb	Z_o		J_m	IM B5	Mod	Mb	Z_o	J_m	IM B5	Mod	Mb	Z_o	J_m	IM B5
					(100%)	(75%)	(50%)			In	Mn	Mn	x 10^{-4}					1/h		x 10^{-4}				1/h		x 10^{-4}				1/h	x 10^{-4}				1/h	x 10^{-4}	
kW		min^{-1}	Nm		%	%	%		400V A				kgm^2	Kg			Nm	NB	SB	kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm		kgm^2	Kg		Nm		kgm^2	Kg
0.09	**BN 63A 6**	880	0.98	○	41.0	41.0	32.9	0.53	0.60	2.1	2.1	1.8	3.4	4.6		**FD 02**	3.5	9000	14000	4.0	6.3	**AFD 02**	3.5	9000	14000	4.0	6.1	**FA 02**	3.5	14000	4.0	6.1	**BA 60**	5.0	12000	5.4	6.9
0.12	**BN 63B 6**	870	1.32	○	45.0	44.0	41.8	0.60	0.64	2.1	1.9	1.7	3.7	4.9		**FD 02**	3.5	9000	14000	4.3	6.6	**AFD 02**	3.5	9000	14000	4.3	6.4	**FA 02**	3.5	14000	4.3	6.4	**BA 60**	5.0	12000	5.7	7.2
0.18	**BN 71A 6**	900	1.91	○	55.0	55.5	51.0	0.69	0.68	2.6	1.9	1.7	8.4	5.5		**FD 03**	5	8100	13500	9.5	8.2	**AFD 03**	5	8100	13500	9.5	7.9	**FA 03**	5.0	13500	9.5	7.9	**BA 70**	8.0	12300	10.4	9.4
0.25	**BN 71B 6**	900	2.70	○	62.0	58.5	51.4	0.71	0.82	2.6	1.9	1.7	10.9	6.7		**FD 03**	5	7800	13000	12	9.4	**AFD 03**	5	7800	13000	12	9.1	**FA 03**	5.0	13000	12	9.1	**BA 70**	8.0	12000	12.9	10.6
0.37	**BN 71C 6**	910	3.9	○	66.0	60.0	53.3	0.69	1.17	3.0	2.4	2.0	12.9	7.7		**FD 53**	7.5	5100	9500	14	10.4	**AFD 03**	7.5	5100	9500	14	10.1	**FA 03**	7.5	9500	14	10.1	**BA 70**	8.0	8900	14.9	11.6
0.37	**BN 80A 6**	910	3.9	○	68.0	67.4	63.3	0.68	1.15	3.2	2.2	2.0	21	9.9		**FD 04**	10	5200	8500	23	13.8	**AFD 04**	10	5200	8500	23	13.4	**FA 04**	10	8500	23	13.7	**BA 80**	18	8000	24	15.2
0.55	**BN 80B 6**	920	5.7	○	70.0	69.8	64.3	0.68	1.67	3.9	2.6	2.2	25	11.3		**FD 04**	15	4800	7200	27	15.2	**AFD 04**	15	4800	7200	27	14.8	**FA 04**	15	7200	27	15.1	**BA 80**	18	6800	28	16.6
0.75	**BN 80C 6**	920	7.8	•	70.0	70.0	64.4	0.65	2.38	3.8	2.5	2.2	28	12.2		**FD 04**	15	3400	6400	30	16.1	**AFD 04**	15	3400	6400	30	15.7	**FA 04**	15	6400	30	16.0	**BA 80**	18	6100	31	17.5
0.75	**BN 90S 6**	920	7.8	•	70.0	69.0	64.2	0.68	2.27	3.8	2.4	2.2	26	12.6		**FD 14**	15	3400	6500	28	16.8	**AFD 14**	15	3400	6500	28	16.4	**FA 14**	15	6500	28	16.7	**BA 90**	35	5500	33	19.9
1.1	**BN 90L 6**	920	11.4	•	72.9	72.6	69.1	0.69	3.2	3.9	2.3	2.0	33	15		**FD 05**	26	2700	5000	37	21	**AFD 05**	26	2700	5000	37	20	**FA 05**	26	5000	37	22	**BA 90**	35	4600	40	22
1.5	**BN 100LA 6**	940	15.2	•	75.2	74.2	70.3	0.72	4.0	4.1	2.1	2.0	82	22		**FD 15**	40	1900	4100	86	28	**AFD 15**	40	1900	4100	86	27	**FA 15**	40	4100	86	29	**BA 100**	50	3800	94	32
1.85	**BN 100LB 6**	930	19.0	•	76.6	72.8	62.6	0.73	4.8	4.6	2.1	2.0	95	24		**FD 15**	40	1700	3600	99	30	**AFD 15**	40	1700	3600	99	29	**FA 15**	40	3600	99	31	**BA 100**	50	3400	107	34
2.2	**BN 112M 6**	940	22	•	78.5	79.0	76.5	0.73	5.5	4.8	2.2	2.0	168	32		**FD 06S**	60	—	2100	177	42	**AFD 06S**	60	—	2100	177	41	**FA 06S**	60	2100	177	44	**BA 110**	75	2000	184	45
3	**BN 132S 6**	940	30	•	79.7	77.0	75.1	0.76	7.1	5.1	1.9	1.8	216	36		**FD 56**	75	—	1400	226	49	**AFD 06**	75	—	1400	226	48	**FA 06**	75	1400	226	50	**BA 140**	150	1200	266	68
4	**BN 132MA 6**	950	40	•	81.4	81.5	79.5	0.77	9.2	5.5	2.0	1.8	295	45		**FD 06**	100	—	1200	305	58	**AFD 06**	100	—	1200	305	57	**FA 07**	100	1200	318	63	**BA 140**	150	1050	345	77
5.5	**BN 132MB 6**	945	56	•	83.1	80.9	79.1	0.78	12.2	6.1	2.1	1.9	383	56		**FD 07**	150	—	1050	406	72	**AFD 07**	150	—	1050	406	70	**FA 07**	150	1050	406	74	**BA 140**	150	1000	433	88
7.5	**BN 160M 6**	955	75	•	85.0	85.0	84.8	0.81	15.7	5.9	2.2	2.0	740	83		**FD 08**	170	—	900	815	112							**FA 08**	170	900	815	113					
11	**BN 160L 6**	960	109	•	86.4	86.5	85.9	0.81	22.7	6.6	2.5	2.3	970	103		**FD 08**	200	—	800	1045	133							**FA 08**	200	800	1045	133					
15	**BN 180L 6**	970	148	•	87.7	88.0	87.3	0.82	30	6.2	2.0	2.4	1550	130		**FD 09**	300	—	600	1750	170																
18.5	**BN 200LA 6**	960	184	•	88.6	88.0	87.3	0.81	37	5.9	2.0	2.3	1700	145		**FD 09**	400	—	450	1900	185																

○ = n.a. • = IE1

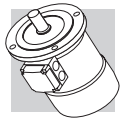
2/4P — 3000/1500 min^{-1} - S1 — 50 Hz



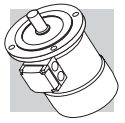
												d.c. brake						d.c. brake with fixed air gap						a.c. brake									
												FD						FD						FA					BA				
P_n		n	M_n	η	cosφ	In	Is/In	Ms/Mn	Ma/Mn	J_m	IM B5	Mod	Mb	Z_o		J_m	IM B5	Mod	Mb	Z_o		J_m	IM B5	Mod	Mb	Z_o	J_m	IM B5	Mod	Mb	Z_o	J_m	IM B5
						400V				x 10^{-4}				1/h		x 10^{-4}				1/h		x 10^{-4}					x 10^{-4}						x 10^{-4}	
kW		min^{-1}	Nm	%		A				kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm		kgm^2	Kg		max. Nm	1/h	kgm^2	Kg
0.20	**BN 63B 2**	2700	0.71	55	0.82	0.64	3.5	2.1	1.9	2.9	4.4	**FD 02**	3.5	2200	2600	3.5	6.1	**AFD 02**	3.5	2200	2600	3.5	5.9	**FA 02**	3.5	2600	3.5	5.9	**BA 60**	5.0	2000	4.9	6.7
0.15	**4**	1350	1.06	49	0.67	0.66	2.6	1.8	1.7					4000	5100					4000	5100					5100					4000		
0.28	**BN 71A 2**	2700	0.99	56	0.82	0.88	2.9	1.9	1.7	4.7	4.4	**FD 03**	3.5	2100	2400	5.8	7.1	**AFD 03**	5	2100	2400	5.8	6.8	**FA 03**	3.5	2400	5.8	6.8	**BA 70**	8.0	2100	5.6	8.3
0.20	**4**	1370	1.39	59	0.72	0.68	3.1	1.8	1.7					3800	4800					3800	4800					4800					4200		
0.37	**BN 71B 2**	2740	1.29	56	0.82	1.16	3.5	1.8	1.8	5.8	5.1	**FD 03**	5.0	1400	2100	6.9	7.8	**AFD 03**	5	1400	2100	6.9	7.5	**FA 03**	5.0	2100	6.9	7.5	**BA 70**	8.0	1800	7.8	9.0
0.25	**4**	1390	1.72	60	0.73	0.82	3.3	2.0	1.9					2900	4200					2900	4200					4200					3600		
0.45	**BN 71C 2**	2780	1.55	63	0.85	1.21	3.8	1.8	1.8	6.9	5.9	**FD 03**	5.0	1400	2100	8.0	8.6	**AFD 03**	5	1400	2100	8.0	8.3	**FA 03**	5.0	2100	8.0	8.3	**BA 70**	8.0	1800	8.9	9.8
0.30	**4**	1400	2.0	63	0.73	0.94	3.6	2.0	1.9					2900	4200					2900	4200					4200					3600		
0.55	**BN 80A 2**	2800	1.9	63	0.85	1.48	3.9	1.7	1.7	15	8.2	**FD 04**	5.0	1600	2300	17	12.1	**AFD 04**	5	1600	2300	17	11.7	**FA 04**	5.0	2300	16.6	12.0	**BA 80**	18	2100	18	13.5
0.37	**4**	1400	2.5	67	0.79	1.01	4.1	1.8	1.9					3000	4000					3000	4000					4000					3700		
0.75	**BN 80B 2**	2780	2.6	65	0.85	1.96	3.8	1.9	1.8	20	9.9	**FD 04**	10	1400	1600	22	13.8	**AFD 04**	10	1400	1600	22	13.4	**FA 04**	10	1600	22	13.7	**BA 80**	18	1500	22	15.2
0.55	**4**	1400	3.8	68	0.81	1.44	3.9	1.7	1.7					2700	3600					2700	3600					3600					3300		
1.1	**BN 90S 2**	2790	3.8	71	0.82	2.73	4.7	2.3	2.0	21	12.2	**FD 14**	10	1500	1600	23	16.4	**AFD 14**	10	1500	1600	23	16	**FA 14**	10	1600	23	16.3	**BA 90**	35	1300	28	19.5
0.75	**4**	1390	5.2	66	0.79	2.08	4.6	2.4	2.2					2300	2800					2300	2800					2800					2300		
1.5	**BN 90L 2**	2780	5.2	70	0.85	3.64	4.5	2.4	2.1	28	14.0	**FD 05**	26	1050	1200	32	20	**AFD 05**	26	1050	1200	32	19.4	**FA 05**	26	1200	32	21	**BA 90**	35	1100	35	21
1.1	**4**	1390	7.6	73	0.81	2.69	4.7	2.5	2.2					1600	2000					1600	2000					2000					1800		
2.2	**BN 100LA 2**	2800	7.5	72	0.85	5.2	4.5	2.0	1.9	40	18.3	**FD 15**	26	600	900	44	25	**AFD 15**	26	600	900	44	24.4	**FA 15**	26	900	44	25	**BA 100**	50	750	51	29
1.5	**4**	1410	10.2	73	0.79	3.8	4.7	2.0	2.0					1300	2300					1300	2300					2300					1900		
3.5	**BN 100LB 2**	2850	11.7	80	0.84	7.5	5.4	2.2	2.1	61	25	**FD 15**	40	500	900	65	31	**AFD 15**	40	500	900	65	30	**FA 15**	40	900	65	32	**BA 100**	50	750	72	35
2.5	**4**	1420	16.8	82	0.80	5.5	5.2	2.2	2.2					1000	2100					1000	2100					2100					1800		
4	**BN 112M 2**	2880	13.3	79	0.83	8.8	6.1	2.4	2.0	98	30	**FD 06S**	60	—	700	107	40	**AFD 06S**	60	—	700	107	39	**FA 06S**	60	700	107	42	**BA 110**	75	600	114	43
3.3	**4**	1420	22.2	80	0.80	7.4	5.1	2.1	2.0					—	1200					—	1200					1200					1100		
5.5	**BN 132S 2**	2890	18.2	80	0.87	11.4	5.9	2.4	2.0	213	44	**FD 56**	75	—	350	223	57	**AFD 06**	75	—	350	223	56	**FA 06**	75	350	223	58	**BA 140**	150	300	263	76
4.4	**4**	1440	29	82	0.84	9.2	5.3	2.2	2.0					—	900					—	900					900					750		
7.5	**BN 132MA 2**	2900	25	82	0.87	15.2	6.5	2.4	2.0	270	53	**FD 06**	100	—	350	280	66	**AFD 06**	100	—	350	280	65	**FA 07**	100	350	293	71	**BA 140**	150	300	320	85
6	**4**	1430	40	84	0.85	12.1	5.8	2.3	2.1					—	900					—	900					900					800		
9.2	**BN 132MB 2**	2920	30	83	0.86	18.6	6.0	2.6	2.2	319	59	**FD 07**	150	—	300	342	75	**AFD 07**	150	—	300	342	73	**FA 07**	150	300	342	77	**BA 140**	150	300	369	91
7.3	**4**	1440	48	85	0.85	14.6	5.5	2.3	2.1					—	800					—	800					800					750		

2/6P — 3000/1000 min^{-1} - S3 60/40% — 50 Hz

												d.c. brake						d.c. brake with fixed air gap						a.c. brake									
												FD						FD						FA					BA				
P_n		n	M_n	η	cosφ	In	Is/In	Ms/Mn	Ma/Mn	J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h		J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h		J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h	J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h	J_m x 10^{-4}	IM B5
kW		min^{-1}	Nm	%		A				kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm		kgm^2	Kg		max. Nm		kgm^2	Kg
0.25	BN 71A 2	2850	0.84	60	0.82	0.73	4.3	1.9	1.8	6.9	5.9	FD 03	1.75	1500	1700	8.0	8.6	AFD 03	2.5	1500	1700	8.0	8.3	FA 03	2.5	1700	8.0	8.3	BA 70	8.0	1500	8.9	9.8
0.08	6	910	0.84	43	0.70	0.38	2.1	1.4	1.5					10000	13000					10000	13000					13000					11000		
0.37	BN 71B 2	2880	1.23	62	0.80	1.08	4.4	1.9	1.8	9.1	7.3	FD 03	3.5	1000	1300	10.2	10.0	AFD 03	5	1000	1300	10.2	9.7	FA 03	3.5	1300	10.2	9.7	BA 70	8.0	1200	11.1	11.2
0.12	6	900	1.27	44	0.73	0.54	2.4	1.4	1.5					9000	11000					9000	11000					11000					10000		
0.55	BN 80A 2	2800	1.88	63	0.86	1.47	4.5	1.9	1.7	20	9.9	FD 04	5.0	1500	1800	22	13.8	AFD 04	5	1500	1800	22	13.4	FA 04	5.0	1800	22	13.7	BA 80	18	1700	23	15.2
0.18	6	930	1.85	52	0.65	0.77	3.3	2.0	1.9					4100	6300					4100	6300					6300					6000		
0.75	BN 80B 2	2800	2.6	66	0.87	1.89	4.3	1.8	1.6	25	11.3	FD 04	5.0	1700	1900	27	15.2	AFD 04	5	1700	1900	27	14.8	FA 04	5.0	1900	27	15.1	BA 80	18	1800	28	16.6
0.25	6	930	2.6	54	0.67	1.00	3.2	1.7	1.8					3800	6000					3800	6000					6000					5600		
1.10	BN 90L 2	2860	3.7	67	0.84	2.82	4.7	2.1	1.9	28	14.0	FD 05	13	1400	1600	32	20	AFD 05	13	1400	1600	32	19.4	FA 05	13	1600	32	21	BA 90	35	1500	35	21
0.37	6	920	3.8	59	0.71	1.27	3.3	1.6	1.6					3400	5200					3400	5200					5200					4700		
1.5	BN 100LA 2	2880	5	73	0.84	3.53	5.1	1.9	2.0	40	18.3	FD 15	13	1000	1200	44	24	AFD 15	13	1000	1200	44	23.4	FA 15	13	1200	44	25	BA 100	50	1050	51	29
0.55	6	940	5.6	64	0.67	1.85	3.5	1.7	1.8					2900	4000					2900	4000					4000					3500		
2.2	BN 100LB 2	2900	7.2	77	0.85	4.9	5.9	2.0	2.0	61	25	FD 15	26	700	900	65	31	AFD 15	26	700	900	65	30	FA 15	26	900	65	32	BA 100	50	800	72	36
0.75	6	950	7.5	67	0.64	2.5	3.3	1.9	1.8					2100	3000					2100	3000					3000					2700		
3	BN 112M 2	2900	9.9	78	0.87	6.4	6.3	2.0	2.1	98	30	FD 06S	40	—	1000	107	40	AFD 06S	40	—	1000	107	39	FA 06S	40	1000	107	32	BA 110	75	930	114	43
1.1	6	950	11.1	72	0.64	3.4	3.9	1.8	1.8					—	2600					—	2600					2600					2400		
4.5	BN 132S 2	2910	14.8	78	0.84	9.9	5.8	1.9	1.8	213	44	FD 56	37	—	500	223	57	AFD 06	37	—	500	223	56	FA 06	37	500	223	58	BA 140	150	400	263	76
1.5	6	960	14.9	74	0.67	4.4	4.2	1.9	2.0					—	2100					—	2100					2100					1700		
5.5	BN 132M 2	2920	18.0	78	0.87	11.7	6.2	2.1	1.9	270	53	FD 56	50	—	400	280	66	AFD 06	62	—	400	280	65	FA 06	50	400	280	67	BA 140	150	350	320	85
2.2	6	960	22	77	0.71	5.8	4.3	2.1	2.0					—	1900					—	1900					1900					1600		



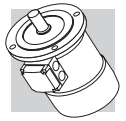
2/8P — 3000/750 min^{-1} - S3 60/40% — 50 Hz



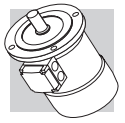
												d.c. brake						d.c. brake with fixed air gap						a.c. brake									
												FD						FD						FA					BA				
P_n		n	M_n	η	cosφ	In	Is/In	Ms/Mn	Ma/Mn	J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h		J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h		J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h	J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h	J_m x 10^{-4}	IM B5
kW		min^{-1}	Nm	%		400V A				kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm		kgm^2	Kg		max. Nm		kgm^2	Kg
0.25	**BN 71A** 2	2790	0.86	61	0.87	0.68	3.9	1.8	1.9	10.9	6.7	**FD 03**	1.75	1300	1400	12	9.4	**AFD 03**	2.5	1300	1400	12	9.1	**FA 03**	2.5	1400	12	9.1	**BA 70**	8.0	1300	12.9	10.6
0.06	8	680	0.84	31	0.61	0.46	2.0	1.8	1.9					10000	13000					10000	13000					13000					12000		
0.37	**BN 71B** 2	2800	1.26	63	0.86	0.99	3.9	1.8	1.9	12.9	7.7	**FD 03**	3.5	1200	1300	14	10.4	**AFD 03**	5	1200	1300	14	10.1	**FA 03**	3.5	1300	14	10.1	**BA 70**	8.0	1200	14.9	11.6
0.09	8	670	1.28	34	0.75	0.51	1.8	1.4	1.5					9500	13000					9500	13000					13000					12000		
0.55	**BN 80A** 2	2830	1.86	66	0.86	1.40	4.4	2.1	2.0	20	9.9	**FD 04**	5.0	1500	1800	22	13.8	**AFD 04**	5	1500	1800	22	13.4	**FA 04**	5.0	1800	22	13.7	**BA 80**	18	1700	23	15.2
0.13	8	690	1.80	41	0.64	0.72	2.3	1.6	1.7					5600	8000					5600	8000					8000					7500		
0.75	**BN 80B** 2	2800	2.6	68	0.88	1.81	4.6	2.1	2.0	25	11.3	**FD 04**	10	1700	1900	27	15.2	**AFD 04**	10	1700	1900	27	14.8	**FA 04**	10	1900	27	15.1	**BA 80**	18	1800	28	16.6
0.18	8	690	2.5	43	0.66	0.92	2.3	1.6	1.7					4800	7300					4800	7300					7300					7000		
1.10	**BN 90L** 2	2830	3.7	63	0.84	3.00	4.5	2.1	1.9	28	14.0	**FD 05**	13	1400	1600	32	20	**AFD 05**	13	1400	1600	32	19.4	**FA 05**	13	1600	32	21	**BA 90**	35	1400	35	21
0.28	8	690	3.9	48	0.63	1.34	2.4	1.8	1.9					3400	5100					3400	5100					5100					4500		
1.5	**BN 100LA** 2	2880	5.0	69	0.85	3.69	4.7	1.9	1.8	40	18.3	**FD 15**	13	1000	1200	44	25	**AFD 15**	13	1000	1200	44	14.4	**FA 15**	13	1200	44	25	**BA 100**	50	1000	52	29
0.37	8	690	5.1	46	0.63	1.84	2.1	1.6	1.6					3300	5000					3300	5000					5000					4200		
2.4	**BN 100LB** 2	2900	7.9	75	0.82	5.6	5.4	2.1	2.0	61	25	**FD 15**	26	550	700	65	31	**AFD 15**	26	550	700	65	30	**FA 15**	26	700	65	32	**BA 100**	50	600	72	36
0.55	8	700	7.5	54	0.58	2.5	2.6	1.8	1.8					2000	3500					2000	3500					3500					3100		
3	**BN 112M** 2	2900	9.9	76	0.87	6.5	6.3	2.1	1.9	98	30	**FD 06S**	40	—	900	107	40	**AFD 06S**	40	—	900	107	39	**FA 06S**	40	900	107	42	**BA 110**	75	800	114	43
0.75	8	690	10.4	60	0.65	2.8	2.5	1.6	1.6					—	2900					—	2900					2900					2700		
4	**BN 132S** 2	2870	13.3	73	0.84	9.4	5.6	2.3	2.4	213	44	**FD 56**	37	—	500	223	57	**AFD 06**	37	—	500	223	56	**FA 06**	37	500	223	58	**BA 140**	150	400	263	76
1	8	690	13.8	66	0.62	3.5	2.9	1.9	1.8					—	3500					—	3500					3500					3000		
5.5	**BN 132M** 2	2870	18.3	75	0.84	12.6	6.1	2.4	2.5	270	53	**FD 06**	50	—	400	280	66	**AFD 06**	62	—	400	280	65	**FA 06**	50	400	280	67	**BA 140**	150	350	320	85
1.5	8	690	21	68	0.63	5.1	2.9	1.9	1.9					—	2400					—	2400					2400					2100		

2/12P — 3000/500 min^{-1} - S3 60/40% — 50 Hz

												d.c. brake						d.c. brake with fixed air gap						a.c. brake									
												FD						FD						FA					BA				
P_n kW		n min^{-1}	M_n Nm	η %	cosφ	In 400V A	Is / In	Ms / Mn	Ma / Mn	J_m x 10^{-4} kgm^2	IM B5 Kg	Mod	Mb Nm	Z_o 1/h NB	Z_o 1/h SB	J_m x 10^{-4} kgm^2	IM B5 Kg	Mod	Mb Nm	Z_o 1/h NB	Z_o 1/h SB	J_m x 10^{-4} kgm^2	IM B5 Kg	Mod	Mb Nm	Z_o 1/h	J_m x 10^{-4} kgm^2	IM B5 Kg	Mod	Mb max. Nm	Z_o 1/h	J_m x 10^{-4} kgm^2	IM B5 Kg
0.55	**BN 80B 2**	2820	1.86	64	0.89	1.39	4.2	1.6	1.7	25	11.3	**FD 04**	5.0	1000	1300	27	15.2	**AFD 04**	5	1000	1300	27	14.8	**FA 04**	5.0	1300	27	15.1	**BA 80**	18	1200	28	16.6
0.09	**12**	430	2.0	30	0.63	0.69	1.8	1.9	1.8					8000	12000					8000	12000					12000					11000		
0.75	**BN 90L 2**	2790	2.6	56	0.89	2.17	4.2	1.8	1.7	26	12.6	**FD 05**	13	1000	1150	30	18.6	**AFD 05**	13	1000	1150	30	18.0	**FA 05**	13	1150	30	19.3	**BA 90**	35	1050	33	19.9
0.12	**12**	430	2.7	26	0.63	1.06	1.7	1.4	1.6					4600	6300					4600	6300					6300					5700		
1.10	**BN 100LA 2**	2850	3.7	65	0.85	2.87	4.5	1.6	1.8	40	18.3	**FD 15**	13	700	900	44	25	**AFD 15**	13	700	900	44	24.4	**FA 15**	13	900	44	25	**BA 100**	50	750	52	29
0.18	**12**	430	4.0	26	0.54	1.85	1.5	1.3	1.5					4000	6000					4000	6000					6000					5000		
1.5	**BN 100LB 2**	2900	4.9	67	0.86	3.76	5.6	1.9	1.9	54	22	**FD 15**	13	700	900	58	28	**AFD 15**	13	700	900	58	27	**FA 15**	13	900	58	29	**BA 100**	50	800	66	32
0.25	**12**	440	5.4	36	0.46	2.18	1.8	1.7	1.8					3800	5000					3800	5000					5000					4300		
2	**BN 112M 2**	2900	6.6	74	0.88	4.43	6.5	2.1	2.0	98	30	**FD 06S**	20	—	800	107	40	**AFD 06S**	20	—	800	107	39	**FA 06S**	20	800	107	42	**BA 110**	75	750	114	43
0.3	**12**	460	6.2	46	0.43	2.19	2.0	2.1	2.0					—	3400					—	3400					3400					3200		
3	**BN 132S 2**	2920	9.8	74	0.87	6.7	6.8	2.3	1.9	213	44	**FD 56**	37	—	450	223	57	**AFD 06**	37	—	450	223	56	**FA 06**	37	450	223	58	**BA 140**	150	380	263	76
0.5	**12**	470	10.2	51	0.43	3.3	2.0	1.7	1.6					—	3000					—	3000					3000					2500		
4	**BN 132M 2**	2920	13.1	75	0.89	8.6	5.9	2.4	2.3	270	53	**FD 56**	37	—	400	280	66	**AFD 06**	37	—	400	280	65	**FA 06**	37	400	280	67	**BA 140**	150	350	320	85
0.7	**12**	460	14.5	53	0.44	4.3	1.9	1.7	1.6					—	2800					—	2800					2800					2500		



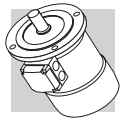
4/6P — 1500/1000 min^{-1} - S1 — 50 Hz



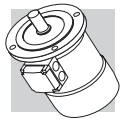
												d.c. brake						d.c. brake with fixed air gap						a.c. brake									
												FD						FD						FA					BA				
P_n		n	M_n	η	cosφ	In	Is/In	Ms/Mn	Ma/Mn	J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h		J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h		J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h	J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h	J_m x 10^{-4}	IM B5
kW		min^{-1}	Nm	%		400V A				kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm		kgm^2	Kg		max. Nm		kgm^2	Kg
0.22	**BN 71B 4**	1410	1.5	64	0.74	0.67	3.9	1.8	1.9	9.1	7.3	**FD 03**	3.5	2500	3500	10.2	10.0	**AFD 03**	5	2500	3500	10.2	9.7	**FA 03**	3.5	3500	10.2	9.7	**BA 70**	8.0	3200	11.1	11.2
0.13	**6**	920	1.4	43	0.67	0.65	2.3	1.6	1.7					5000	9000					5000	9000					9000					8200		
0.30	**BN 80A 4**	1410	2.0	61	0.82	0.87	3.5	1.3	1.5	15	8.2	**FD 04**	5.0	2500	3100	16.6	12.1	**AFD 04**	5	2500	3100	16.6	11.7	**FA 04**	5.0	3100	16.6	12.0	**BA 80**	18	2800	18	13.5
0.20	**6**	930	2.1	54	0.66	0.81	3.2	1.9	2.0					4000	6000					4000	6000					6000					5500		
0.40	**BN 80B 4**	1430	2.7	63	0.75	1.22	3.9	1.8	1.8	20	9.9	**FD 04**	10	1800	2300	22	13.8	**AFD 04**	10	1800	2300	22	13.4	**FA 04**	10	2300	22	13.7	**BA 80**	18	2200	23	15.2
0.26	**6**	930	2.7	55	0.70	0.97	2.7	1.5	1.6					3600	5500					3600	5500					5500					5200		
0.55	**BN 90S 4**	1420	3.7	70	0.78	1.45	4.5	2.0	1.9	21	12.2	**FD 14**	10	1500	2100	23	16.1	**AFD 14**	10	1500	2100	23	15.7	**FA 14**	10	2100	23	16.3	**BA 90**	35	1700	28	19.5
0.33	**6**	930	3.4	62	0.70	1.10	3.7	2.3	2.0					2500	4100					2500	4100					4100					3300		
0.75	**BN 90L 4**	1420	5.0	74	0.78	1.88	4.3	1.9	1.8	28	14	**FD 05**	13	1400	2000	32	20	**AFD 05**	13	1400	2000	32	19.4	**FA 05**	13	2000	32	21	**BA 90**	35	1800	35	21
0.45	**6**	920	4.7	66	0.71	1.39	3.3	2.0	1.9					2300	3600					2300	3600					3600					3300		
1.1	**BN 100LA 4**	1450	7.2	74	0.79	2.72	5.0	1.7	1.9	82	22	**FD 15**	26	1400	2000	86	28	**AFD 15**	26	1400	2000	86	27	**FA 15**	26	2000	86	29	**BA 100**	50	1800	94	32
0.8	**6**	950	8.0	65	0.69	2.57	4.1	1.9	2.1					2100	3300					2100	3300					3300					3000		
1.5	**BN 100LB 4**	1450	9.9	75	0.79	3.65	5.1	1.7	1.9	95	25	**FD 15**	26	1300	1800	99	31	**AFD 15**	26	1300	1800	99	30	**FA 15**	26	1800	99	32	**BA 100**	50	1600	107	34
1.1	**6**	950	11.1	72	0.68	3.24	4.3	2.0	2.1					2000	3000					2000	3000					3000					2800		
2.3	**BN 112M 4**	1450	15.2	75	0.78	5.7	5.2	1.8	1.9	168	32	**FD 06S**	40	—	1600	177	42	**AFD 06S**	40	—	1600	177	41	**FA 06S**	40	1600	177	44	**BA 110**	75	1500	184	45
1.5	**6**	960	14.9	73	0.72	4.1	4.9	2.0	2.0					—	2400					—	2400					2400					2300		
3.1	**BN 132S 4**	1460	20	83	0.83	6.5	5.9	2.1	2.0	213	44	**FD 56**	37	—	1200	223	57	**AFD 06**	62	—	1200	223	56	**FA 06**	37	1200	223	58	**BA 140**	150	1000	263	76
2	**6**	960	20	77	0.75	4.9	4.5	2.1	2.1					—	1900					—	1900					1900					1600		
4.2	**BN 132MA 4**	1460	27	84	0.82	8.8	5.9	2.1	2.2	270	53	**FD 06**	50	—	900	280	66	**AFD 06**	62	—	900	280	65	**FA 06**	50	900	280	67	**BA 140**	150	800	320	85
2.6	**6**	960	26	79	0.72	6.6	4.3	2.0	2.0					—	1500					—	1500					1500					1300		

4/8P — 1500/750 min^{-1} - S1 — 50 Hz

													d.c. brake						d.c. brake with fixed air gap						a.c. brake									
													FD						FD						FA					BA				
P_n		n	M_n	η	cosφ	In	Is/In	Ms/Mn	Ma/Mn	J_m	IM B5		Mod	Mb	Z_o 1/h		J_m	IM B5	Mod	Mb	Z_o 1/h		J_m	IM B5	Mod	Mb	Z_o	J_m	IM B5	Mod	Mb	Z_o	J_m	IM B5
kW		min^{-1}	Nm	%		400V A				x 10^{-4} kgm^2	Kg			Nm	NB	SB	x 10^{-4} kgm^2	Kg		Nm	NB	SB	x 10^{-4} kgm^2	Kg		Nm	1/h	x 10^{-4} kgm^2	Kg		max. Nm	1/h	x 10^{-4} kgm^2	Kg
0.37	**BN 80A** 4	1400	2.5	63	0.82	1.03	3.3	1.4	1.4	15	8.2		**FD 04**	10	2300	3500	16.6	12.1	**AFD 04**	10	2300	3500	16.6	11.7	**FA 04**	10	3500	16.6	12.0	**BA 80**	18	3200	18	13.5
0.18	8	690	2.5	44	0.60	0.98	2.2	1.5	1.6						4500	7000					4500	7000					7000					6500		
0.55	**BN 80B** 4	1390	3.8	65	0.86	1.42	3.8	1.7	1.6	20	9.9		**FD 04**	10	2200	2900	22	13.8	**AFD 04**	10	2200	2900	22	13.4	**FA 04**	10	2900	22	13.7	**BA 80**	18	2500	23	15.2
0.30	8	670	4.3	49	0.65	1.36	2.3	1.7	1.8						4200	6500					4200	6500					6500					5600		
0.65	**BN 90S** 4	1390	4.5	73	0.85	1.51	4.0	1.9	1.9	28	13.6		**FD 14**	15	2300	2800	30	17.8	**AFD 14**	15	2300	2800	30	17.4	**FA 14**	15	2800	30	17.7	**BA 90**	35	2400	35	21
0.35	8	690	4.8	49	0.57	1.81	2.5	2.1	2.2						3500	6000					3500	6000					6000					5100		
0.9	**BN 90L** 4	1370	6.3	73	0.87	2.05	3.8	1.8	1.8	30	15.1		**FD 05**	26	1700	2100	34	21	**AFD 05**	26	1700	2100	34	20.4	**FA 05**	26	2100	34	22	**BA 90**	35	1900	37	22
0.5	8	670	7.1	57	0.62	2.04	2.4	2.1	2.0						2500	4200					2500	4200					4200					3800		
1.30	**BN 100LA** 4	1420	8.7	72	0.83	3.14	4.3	1.7	1.8	82	22		**FD 15**	40	1300	1700	86	28	**AFD 15**	40	1300	1700	86	27	**FA 15**	40	1700	86	29	**BA 100**	50	1500	94	32
0.70	8	700	9.6	58	0.64	2.72	2.8	1.8	1.8						2000	3400					2000	3400					3400					3100		
1.8	**BN 100LB** 4	1420	12.1	69	0.87	4.3	4.2	1.6	1.7	95	25		**FD 15**	40	1200	1700	99	31	**AFD 15**	40	1200	1700	99	30	**FA 15**	40	1700	99	32	**BA 100**	50	1500	107	34
0.9	8	700	12.3	62	0.63	3.3	3.2	1.7	1.8						1600	2600					1600	2600					2600					2400		
2.2	**BN 112M** 4	1440	14.6	77	0.85	4.9	5.3	1.8	1.8	168	32		**FD 06S**	60	—	1200	177	42	**AFD 06S**	60	—	1200	177	41	**FA 06S**	60	1200	177	43	**BA 110**	75	1100	184	45
1.2	8	710	16.1	70	0.63	3.9	3.3	1.9	1.8						—	2000					—	2000					2000					1900		
3.6	**BN 132S** 4	1440	24	80	0.82	7.9	6.5	2.1	1.9	295	45		**FD 56**	75	—	1000	305	58	**AFD 06**	75	—	1000	305	57	**FA 06**	75	1000	305	59	**BA 140**	150	900	345	77
1.8	8	720	24	72	0.55	6.6	4.6	1.9	2.0						—	1400					—	1400					1400					1200		
4.6	**BN 132M** 4	1450	30	81	0.83	9.9	6.5	2.2	1.9	383	56		**FD 06**	100	—	1000	393	69	**AFD 06**	100	—	1000	393	68	**FA 07**	100	1000	406	74	**BA 140**	150	900	433	88
2.3	8	720	31	73	0.54	8.4	4.4	2.3	2.0						—	1300					—	1300					1300					1200		



2P — 3000 min^{-1} - S1 — 50 Hz



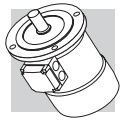
															d.c. brake						d.c. brake with fixed air gap						a.c. brake				
															FD						AFD						FA				
P_n		n	M_n	IE1	η (100%)	η (75%)	η (50%)	cosφ	In 400V	Is / In	Ms / Mn	Ma / Mn	J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h		J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h		J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h	J_m x 10^{-4}	IM B5
kW		min^{-1}	Nm		%	%	%		A				kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm		kgm^2	Kg
0.18	**M 05A 2**	2730	0.63	○	59.9	56.9	51.9	0.77	0.56	3.0	2.1	2.0	2.0	3.2	**FD 02**	1.75	3900	4800	2.6	4.9	**AFD 02**	1.75	3900	4800	2.6	4.7	**FA 02**	1.75	4800	2.6	4.7
0.25	**M 05B 2**	2740	0.87	○	66.0	64.8	64.8	0.76	0.72	3.3	2.3	2.3	2.3	3.6	**FD 02**	1.75	3900	4800	3.0	5.3	**AFD 02**	1.75	3900	4800	3.0	5.1	**FA 02**	1.75	4800	3.0	5.1
0.37	**M 05C 2**	2800	1.26	○	69.1	66.8	66.8	0.78	0.99	3.9	2.6	2.6	3.3	4.8	**FD 02**	3.5	3600	4500	3.9	6.5	**AFD 02**	3.5	3600	4500	3.9	6.3	**FA 02**	3.5	4500	3.9	6.3
0.55	**M 1SD 2**	2820	1.86	○	76.0	75.8	74.8	0.76	1.37	5.0	2.9	2.8	4.1	5.8	**FD 03**	5	2900	4200	5.3	8.5	**AFD 03**	5	2900	4200	5.3	8.2	**FA 03**	5	4200	5.3	8.2
0.75	**M 1LA 2**	2810	2.6	○	76.6	76.2	76.2	0.76	1.86	5.1	3.1	2.8	5.0	6.9	**FD 03**	5	1900	3300	6.1	9.6	**AFD 03**	7.5	1900	3300	6.1	9.3	**FA 03**	5	3300	6.1	9.3
1.1	**M 2SA 2**	2800	3.8	•	76.4	76.2	75.0	0.81	2.57	4.8	2.8	2.4	9.0	8.8	**FD 04**	10	1500	3000	10.6	11.9	**AFD 04**	10	1500	3000	10.6	11.5	**FA 04**	10	3000	10.6	12.6
1.5	**M 2SB 2**	2800	5.1	•	79.1	79.5	77.2	0.81	3.4	4.9	2.7	2.4	11.4	10.6	**FD 04**	15	1300	2600	13.0	9.9	**AFD 04**	15	1300	2600	13.0	9.5	**FA 04**	15	2600	13.0	14.4
2.2	**M 3SA 2**	2880	7.3	•	82.7	82.1	81.0	0.80	4.8	6.3	2.9	2.7	24	15.5	**FD 15**	26	1100	2400	28	22	**AFD 15**	26	1100	2400	28	21.4	**FA 15**	26	2400	28	23
3	**M 3LA 2**	2860	10.0	•	81.5	81.3	77.4	0.79	6.7	5.6	2.6	2.2	31	18.7	**FD 15**	26	700	1600	35	25	**AFD 15**	26	700	1600	35	24.4	**FA 15**	26	1600	35	26
4	**M 3LB 2**	2870	13.3	•	83.1	83.0	77.8	0.80	8.7	5.8	2.7	2.5	39	22	**FD 15**	40	450	900	43	28	**AFD 15**	40	450	900	43	27	**FA 15**	40	900	43	29
5.5	**M 4SA 2**	2890	18.2	•	84.7	84.5	81.2	0.84	11.2	5.9	2.6	2.2	101	33	**FD 06**	50	—	600	112	46	**AFD 06**	62	—	600	112	45	**FA 06**	50	600	112	47
7.5	**M 4SB 2**	2900	25	•	86.5	86.3	84.4	0.85	14.7	6.4	2.6	2.2	145	40	**FD 06**	50	—	550	154	53	**AFD 06**	62	—	550	154	52	**FA 06**	50	550	154	54
9.2	**M 4LA 2**	2930	30	•	87.0	86.5	83.6	0.86	17.7	6.7	2.8	2.3	178	51	**FD 56**	75	—	430	189	64	**AFD 06**	75	—	430	189	63	**FA 06**	75	430	189	65
11	**M 4LC 2**	2920	36	•	87.6	87.0	86.0	0.88	20.6	6.9	2.9	2.5	210	60																	
15	**M 5SB 2**	2930	49	•	89.6	89.4	88.0	0.86	28.1	7.1	2.6	2.3	340	70																	
18.5	**M 5SC 2**	2930	60	•	90.4	90.1	89.0	0.86	34	7.6	2.7	2.3	420	83																	
22	**M 5LA 2**	2930	72	•	89.9	89.7	89.5	0.88	40	7.8	2.6	2.4	490	95																	

○ = n.a. • = IE1

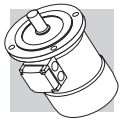
4P — 1500 min^{-1} - S1 — 50 Hz

															d.c. brake FD						d.c. brake with fixed air gap AFD						a.c. brake FA				
P_n kW		n min^{-1}	M_n Nm	IE1	η (100%) %	η (75%) %	η (50%) %	cosφ	In 400V A	Is/In	Ms/Mn	Ma/Mn	J_m x 10^{-4} kgm^2	IM B5 Kg	Mod	Mb Nm	Z_o 1/h NB	Z_o 1/h SB	J_m x 10^{-4} kgm^2	IM B5 Kg	Mod	Mb Nm	Z_o 1/h NB	Z_o 1/h SB	J_m x 10^{-4} kgm^2	IM B5 Kg	Mod	Mb Nm	Z_o 1/h	J_m x 10^{-4} kgm^2	IM B5 Kg
0.09	**M 0B 4**	1350	0.64	○	51.7	47.6	42.9	0.60	0.42	2.6	2.5	2.4	1.5	2.9																	
0.12	**M 05A 4**	1350	0.85	○	59.8	56.2	47.0	0.62	0.47	2.6	1.9	1.8	2.0	3.2	**FD 02**	1.75	10000	13000	2.6	4.9	**AFD 02**	1.75	10000	13000	2.6	4.7	**FA 02**	1.75	13000	2.6	4.7
0.18	**M 05B 4**	1320	1.30	○	54.8	52.9	52.5	0.67	0.71	2.6	2.2	2.0	2.3	3.6	**FD 02**	3.5	10000	13000	3.0	5.3	**AFD 02**	3.5	10000	13000	3.0	5.1	**FA 02**	3.5	13000	3.0	5.1
0.25	**M 05C 4**	1340	1.78	○	65.3	65.0	57.9	0.69	0.80	2.7	2.1	1.9	3.3	4.8	**FD 02**	3.5	7800	10000	3.9	6.5	**AFD 02**	3.5	7800	10000	3.9	6.3	**FA 02**	3.5	10000	3.9	6.3
0.37	**M 1SD 4**	1370	2.6	○	66.8	66.7	63.0	0.76	1.05	3.7	2.0	1.9	6.9	5.5	**FD 03**	5	6000	9400	8.0	8.2	**AFD 03**	7.5	6000	9400	8.0	7.9	**FA 03**	5	9400	8.0	7.9
0.55	**M 1LA 4**	1380	3.8	○	69.0	68.9	68.8	0.74	1.55	4.1	2.3	2.3	9.1	6.9	**FD 53**	7.5	4300	8700	10.2	9.6	**AFD 03**	7.5	4300	8700	10.2	9.3	**FA 03**	7.5	8700	10.2	9.3
0.75	**M 2SA 4**	1400	5.1	•	75.0	74.5	69.3	0.78	1.85	4.9	2.7	2.5	20	9.2	**FD 04**	15	4100	7800	22	13.1	**AFD 04**	15	4100	7800	22	12.7	**FA 04**	15	7800	22	13.0
1.1	**M 2SB 4**	1400	7.5	•	76.4	76.2	70.4	0.78	2.66	5.1	2.8	2.5	25	10.6	**FD 04**	15	2600	5300	27	14.5	**AFD 04**	15	2600	5300	27	14.1	**FA 04**	15	5300	27	14.4
1.5	**M 3SA 4**	1410	10.2	•	79.6	80.5	79.3	0.77	3.5	4.6	2.1	2.1	34	15.5	**FD 15**	26	2800	4900	38	22	**AFD 15**	26	2800	4900	38	21.4	**FA 15**	26	4900	38	23
2.2	**M 3LA 4**	1410	14.9	•	81.1	81.4	79.9	0.75	5.2	4.5	2.2	2.0	40	17	**FD 15**	40	2600	4700	44	24	**AFD 15**	40	2600	4700	44	23.4	**FA 15**	40	4700	44	24
3	**M 3LB 4**	1410	20	•	82.6	83.8	83.7	0.77	6.8	5.0	2.3	2.2	54	21	**FD 15**	40	2400	4400	58	27	**AFD 15**	40	2400	4400	58	26	**FA 15**	40	4400	58	28
4	**M 3LC 4**	1400	27	○	82.7	83.1	80.5	0.78	9.0	4.7	2.3	2.2	61	23	**FD 55**	55	—	1300	65	29	**—**	—	—	—	—	—	**FA 15**	40	1300	65	30
5.5	**M 4SA 4**	1440	36	•	84.7	84.8	82.5	0.81	11.6	5.5	2.3	2.2	213	42	**FD 56**	75	—	1050	223	55	**AFD 06**	75	—	1050	223	54	**FA 06**	75	1050	223	56
7.5	**M 4LA 4**	1440	50	•	86.0	86.3	85.3	0.81	15.5	5.7	2.5	2.4	270	51	**FD 06**	100	—	950	280	64	**AFD 06**	100	—	950	280	63	**FA 07**	100	950	280	65
9.2	**M 4LB 4**	1440	61	•	88.4	88.6	87.5	0.81	18.8	5.9	2.7	2.5	319	57	**FD 07**	150	—	900	342	73	**AFD 07**	150	—	900	342	71	**FA 07**	150	900	342	75
11	**M 4LC 4**	1440	73	•	87.6	87.8	86.0	0.81	22.4	6.0	2.7	2.5	360	65	**FD 07**	150	—	850	382	81	**AFD 07**	150	—	850	382	79	**FA 07**	150	850	382	83
15	**M 5SB 4**	1460	98	•	88.7	88.5	88.4	0.81	30.1	6.0	2.3	2.1	650	85	**FD 08**	200	—	750	725	115							**FA 08**	200	750	710	114
18.5	**M 5LA 4**	1460	121	•	89.3	89.5	89.2	0.81	37	6.2	2.6	2.5	790	101	**FD 08**	250	—	700	865	131							**FA 08**	250	700	850	130

○ = n.a. • = IE1



6P — 1000 min^{-1} - S1 — 50 Hz

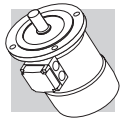


															d.c. brake						d.c. brake with fixed air gap						a.c. brake				
															FD						AFD						FA				
P_n		n	M_n	IE1	η (100%)	η (75%)	η (50%)	cosφ	In 400V	Is / In	Ms / Mn	Ma / Mn	J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h		J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h		J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h	J_m x 10^{-4}	IM B5
kW		min^{-1}	Nm		%	%	%		A				kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm		kgm^2	Kg
0.09	**M 05A 6**	880	0.98	○	41.0	41.0	32.9	0.53	0.60	2.1	2.1	1.8	3.4	4.3	**FD 02**	3.5	9000	14000	4.0	6.0	**AFD 02**	3.5	9000	14000	4.0	5.8	**FA 02**	3.5	14000	4.0	5.8
0.12	**M 05B 6**	870	1.32	○	45.0	44.0	41.8	0.60	0.64	2.1	1.9	1.7	3.7	4.6	**FD 02**	3.5	9000	14000	4.3	6.3	**AFD 02**	3.5	9000	14000	4.3	6.1	**FA 02**	3.5	14000	4.3	6.1
0.18	**M 1SC 6**	900	1.91	○	55.0	55.5	51.0	0.69	0.68	2.6	1.9	1.7	8.4	5.1	**FD 03**	5	8100	13500	9.5	7.8	**AFD 03**	5	8100	13500	9.5	7.5	**FA 03**	5	13500	9.5	7.5
0.25	**M 1SD 6**	900	2.7	○	62.0	58.5	51.4	0.71	0.82	2.6	1.9	1.7	10.9	6.3	**FD 03**	5	7800	13000	12	9.0	**AFD 03**	7.5	7800	13000	12	8.7	**FA 03**	5	13000	12	8.7
0.37	**M 1LA 6**	910	3.9	○	66.0	60.0	53.3	0.69	1.17	3.0	2.4	2.0	12.9	7.3	**FD 53**	7.5	5100	9500	14	10.0	**AFD 03**	7.5	5100	9500	14	9.7	**FA 03**	7.5	9500	14	9.7
0.55	**M 2SA 6**	920	5.7	○	70.0	69.8	64.3	0.68	1.67	3.9	2.6	2.2	25	10.6	**FD 04**	15	4800	7200	27	14.5	**AFD 04**	15	4800	7200	27	14.1	**FA 04**	15	7200	27	14.4
0.75	**M 2SB 6**	920	7.8	•	70.0	70.0	64.4	0.65	2.38	3.8	2.5	2.2	28	11.5	**FD 04**	15	3400	6400	30	15.4	**AFD 04**	15	3400	6400	30	15	**FA 04**	15	6400	30	15.3
1.1	**M 3SA 6**	920	11.4	•	75.0	74.0	72.0	0.72	2.9	4.3	2.0	1.8	33	17	**FD 15**	26	2700	5000	37	23	**AFD 15**	26	2700	5000	37	22.4	**FA 15**	26	5000	37	24
1.5	**M 3LA 6**	940	15.2	•	75.2	74.2	70.3	0.72	4.0	4.1	2.1	2.0	82	21	**FD 15**	40	1900	4100	86	27	**AFD 15**	40	1900	4100	86	26	**FA 15**	40	4100	86	28
1.85	**M 3LB 6**	930	19.0	•	76.6	72.8	62.6	0.73	4.8	4.6	2.1	2.0	95	23	**FD 15**	40	1700	3600	99	29	**AFD 15**	40	1700	3600	99	28	**FA 15**	40	3600	99	30
2.2	**M 3LC 6**	930	23	•	77.7	76.8	72.4	0.71	5.8	4.7	2.3	2.1	95	23	**FD 55**	55	—	1900	99	29	**—**	—	—	—	—	—	**FA 15**	55	1900	99	30
3	**M 4SA 6**	940	30	•	79.7	77.0	75.1	0.76	7.1	5.1	1.9	1.8	216	34	**FD 56**	75	—	1400	226	47	**AFD 06**	75	—	1400	226	46	**FA 06**	75	1400	226	48
4	**M 4LA 6**	950	40	•	81.4	81.5	79.5	0.77	9.2	5.5	2.0	1.8	295	43	**FD 06**	100	—	1200	305	56	**AFD 06**	100	—	1200	305	55	**FA 07**	100	1200	305	57
5.5	**M 4LB 6**	945	56	•	83.1	80.9	79.1	0.78	12.2	6.1	2.1	1.9	383	54	**FD 07**	150	—	1050	406	70	**AFD 07**	150	—	1050	406	68	**FA 07**	150	1050	406	72
7.5	**M 5SA 6**	955	75	•	85.0	85.0	84.8	0.81	15.7	5.9	2.2	2.0	740	69	**FD 08**	170	—	900	815	98							**FA 08**	170	900	800	98
11	**M 5SB 6**	960	109	•	86.4	86.5	85.9	0.81	22.7	6.6	2.5	2.3	970	89	**FD 08**	200	—	800	1045	119							**FA 08**	200	800	1030	118

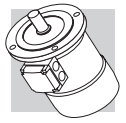
○ = n.a. • = IE1

2/4P — 3000/1500 min^{-1} - S1 — 50 Hz

												d.c. brake						d.c. brake with fixed air gap						a.c. brake				
												FD						AFD						FA				
P_n		n	M_n	η	cosφ	In 400V	Is / In	Ms / Mn	Ma / Mn	J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h		J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h		J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h	J_m x 10^{-4}	IM B5
kW		min^{-1}	Nm	%		A				kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm		kgm^2	Kg
0.20	**M 05A 2**	2700	0.71	55	0.82	0.64	3.5	2.1	1.9	2.9	4.1	**FD 02**	3.5	2200	2600	3.5	5.8	**AFD 02**	3.5	2200	2600	3.5	5.6	**FA 02**	3.5	2600	3.5	5.6
0.15	**4**	1350	1.06	49	0.67	0.66	2.6	1.8	1.7					4000	5100					4000	5100					5100		
0.28	**M 1SB 2**	2700	0.99	56	0.82	0.88	2.9	1.9	1.7	4.7	4.0	**FD 03**	3.5	2100	2400	5.8	6.7	**AFD 03**	5	2100	2400	5.8	6.4	**FA 03**	3.5	2400	5.8	6.4
0.20	**4**	1370	1.39	59	0.68	1.02	3.1	1.8	1.7					3800	4800					3800	4800					4800		
0.37	**M 1SC 2**	2740	1.29	56	0.82	1.16	3.5	1.8	1.8	5.8	4.7	**FD 03**	5	1400	2100	6.9	7.4	**AFD 03**	5	1400	2100	6.9	7.1	**FA 03**	5	2100	6.9	7.1
0.25	**4**	1390	1.72	60	0.73	0.82	3.3	2.0	1.9					2900	4200					2900	4200					4200		
0.45	**M 1SD 2**	2780	1.55	63	0.85	1.21	3.8	1.8	1.8	6.9	5.5	**FD 03**	5	1400	2100	8.0	8.2	**AFD 03**	5	1400	2100	8.0	7.9	**FA 03**	5	2100	8.0	7.9
0.30	**4**	1400	2.0	63	0.74	0.93	3.8	2.1	1.9					2900	4200					2900	4200					4200		
0.55	**M 1LA 2**	2800	1.9	73	0.79	1.38	4.2	2.0	1.8	9.1	6.9	**FD 03**	5	1600	2200	10.2	9.6	**AFD 03**	5	1600	2200	10.2	9.3	**FA 03**	5	2200	10.2	9.3
0.37	**4**	1400	2.5	68	0.72	1.09	3.9	2.2	2.0					3300	4600					3300	4600					4600		
0.75	**M 2SA 2**	2780	2.6	65	0.85	1.96	3.8	1.9	1.8	20	9.2	**FD 04**	10	1400	1600	22	13.1	**AFD 04**	10	1400	1600	22	12.7	**FA 04**	10	1600	22	13.0
0.55	**4**	1400	3.8	68	0.81	1.44	3.9	1.7	1.7					2700	3600					2700	3600					3600		
1.1	**M 2SB 2**	2730	3.9	65	0.86	2.84	3.9	2.0	1.9	25	10.7	**FD 04**	10	1200	1500	27	14.5	**AFD 04**	10	1200	1500	27	14.1	**FA 04**	10	1500	27	14.5
0.75	**4**	1410	5.1	75	0.81	1.78	4.5	2.1	2.0					2300	3100					2300	3100					3100		
1.5	**M 3SA 2**	2830	5.1	74	0.83	3.5	4.7	2.1	2.0	34	15.5	**FD 15**	26	700	1000	38	22	**AFD 15**	26	700	1000	38	21.4	**FA 15**	26	1000	38	23
1.1	**4**	1420	7.4	77	0.78	2.6	4.3	2.1	2.0					1600	2600					1600	2600					2600		
2.2	**M 3LA 2**	2800	7.5	72	0.85	5.2	4.5	2.0	1.9	40	17	**FD 15**	26	600	900	44	24	**AFD 15**	26	600	900	44	23.4	**FA 15**	26	900	44	24
1.5	**4**	1410	10.2	73	0.79	3.8	4.7	2.0	2.0					1300	2300					1300	2300					2300		
3.5	**M 3LB 2**	2850	11.7	80	0.84	7.5	5.4	2.2	2.1	61	23	**FD 15**	40	500	900	65	29	**AFD 15**	40	500	900	65	28	**FA 15**	40	900	65	30
2.5	**4**	1420	16.8	82	0.80	5.5	5.2	2.2	2.2					1000	2100					1000	2100					2100		
4.8	**M 4 SA 2**	2900	15.8	81	0.88	9.7	6.0	2.0	1.9	213	42	**FD 06**	50	—	400	233	55	**AFD 06**	62	—	400	233	54	**FA 06**	50	400	233	56
3.8	**4**	1430	25.4	81	0.84	8.1	5.2	2.1	2.1					—	950					—	950					950		
5.5	**M 4SB 2**	2890	18.2	80	0.87	11.4	5.9	2.4	2.0	213	42	**FD 56**	75	—	350	223	55	**AFD 06**	75	—	350	223	54	**FA 06**	75	350	223	56
4.4	**4**	1440	29	82	0.84	9.2	5.3	2.2	2.0					—	900					—	900					900		
7.5	**M 4LA 2**	2900	25	82	0.87	15.2	6.5	2.4	2.0	270	51	**FD 06**	100	—	350	280	64	**AFD 06**	100	—	350	280	63	**FA 07**	100	350	280	65
6	**4**	1430	40	84	0.85	12.1	5.8	2.3	2.1					—	950					—	950					950		
9.2	**M 4LB 2**	2920	30	83	0.86	18.6	6.0	2.6	2.2	319	57	**FD 07**	150	—	300	342	73	**AFD 07**	150	—	300	342	71	**FA 07**	150	300	342	75
7.3	**4**	1440	48	85	0.85	14.6	5.5	2.3	2.1					—	800					—	800					800		



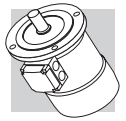
2/6P — 3000/1000 min^{-1} - S3 60/40% — 50 Hz



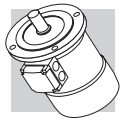
												d.c. brake						d.c. brake with fixed air gap						a.c. brake				
												FD						AFD						FA				
P_n		n	M_n	η	cosφ	In 400V	Is/In	Ms/Mn	Ma/Mn	J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h		J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h		J_m x 10^{-4}	IM B5	Mod	Mb	Z_o 1/h	J_m x 10^{-4}	IM B5
kW		min^{-1}	Nm	%		A				kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm	NB	SB	kgm^2	Kg		Nm		kgm^2	Kg
0.25	M 1SA 2	2850	0.84	60	0.82	0.73	4.3	1.9	1.8	6.9	5.5	FD 03	1.75	1500	1700	8.0	8.2	AFD 03	2.5	1500	1700	8.0	7.9	FA 03	1.75	1700	8.0	7.9
0.08	6	910	0.84	43	0.70	0.38	2.1	1.4	1.5					10000	13000					10000	13000					13000		
0.37	M 1LA 2	2880	1.23	62	0.80	1.08	4.4	1.9	1.8	9.1	6.9	FD 03	3.5	1000	1300	10.2	9.6	AFD 03	5	1000	1300	10.2	9.3	FA 03	3.5	1300	10.2	9.3
0.12	6	900	1.27	44	0.73	0.54	2.4	1.4	1.5					9000	11000					9000	11000					11000		
0.55	M 2SA 2	2800	1.88	63	0.86	1.47	4.5	1.9	1.7	20	9.2	FD 04	5	1500	1800	22	13.1	AFD 04	5	1500	1800	22	12.7	FA 04	5	1800	22	13.0
0.18	6	930	1.85	52	0.65	0.77	3.3	2.0	1.9					4100	6300					4100	6300					6300		
0.75	M 2SB 2	2800	2.6	66	0.87	1.89	4.3	1.8	1.6	25	10.6	FD 04	5	1700	1900	27	14.5	AFD 04	5	1700	1900	27	14.1	FA 04	5	1900	27	14.4
0.25	6	930	2.6	54	0.67	1.00	3.2	1.7	1.8					3800	6000					3800	6000					6000		
1.1	M 3SA 2	2870	3.7	71	0.82	2.73	4.9	1.8	1.9	34	15.5	FD 15	13	1000	1300	38	22	AFD 15	13	1000	1300	38	21.4	FA 15	13	1300	38	23
0.37	6	930	3.8	63	0.70	1.21	3.1	1.5	1.8					3500	5000					3500	5000					5000		
1.5	M 3LA 2	2880	5.0	73	0.84	3.53	5.1	1.9	2.0	40	17	FD 15	13	1000	1200	44	24	AFD 15	13	1000	1200	44	23.4	FA 15	13	1200	44	24
0.55	6	940	5.6	64	0.67	1.85	3.5	1.7	1.8					2900	4000					2900	4000					4000		
2.2	M 3LB 2	2900	7.2	77	0.85	4.9	5.9	2.0	2.0	61	23	FD 15	26	700	900	65	29	AFD 15	26	700	900	65	28	FA 15	26	900	65	30
0.75	6	950	7.5	67	0.64	2.5	3.3	1.9	1.8					2100	3000					2100	3000					3000		
3	M 4SA 2	2910	9.9	74	0.88	6.6	5.6	2.0	2.1	170	36	FD 56	37	—	600	182	48	AFD 06	37	—	600	182	47	FA 06	37	600	182	50
1.1	6	960	10.9	73	0.68	3.2	4.5	2.2	2.0					—	2200					—	2200					2200		
4.5	M 4SB 2	2910	14.8	78	0.84	9.9	5.8	1.9	1.8	213	42	FD 56	37	—	500	223	55	AFD 06	37	—	500	223	54	FA 06	37	500	223	56
1.5	6	960	14.9	74	0.67	4.4	4.2	1.9	2.0					—	2100					—	2100					2100		
5.5	M 4LA 2	2920	18.0	78	0.87	11.7	6.2	2.1	1.9	270	51	FD 06	50	—	400	280	64	AFD 06	62	—	400	280	63	FA 06	50	400	280	65
2.2	6	960	22	77	0.71	5.8	4.3	2.1	2.0					—	1900					—	1900					1900		

2/8P — 3000/750 min^{-1} - S3 60/40% — 50 Hz

												d.c. brake						d.c. brake with fixed air gap						a.c. brake				
												FD						AFD						FA				
P_n kW		n min^{-1}	M_n Nm	η %	cosφ	In 400V A	Is/In	Ms/Mn	Ma/Mn	J_m x 10^{-4} kgm^2	IM B5 Kg	Mod	Mb Nm	Z_o 1/h NB	Z_o 1/h SB	J_m x 10^{-4} kgm^2	IM B5 Kg	Mod	Mb Nm	Z_o 1/h NB	Z_o 1/h SB	J_m x 10^{-4} kgm^2	IM B5 Kg	Mod	Mb Nm	Z_o 1/h	J_m x 10^{-4} kgm^2	IM B5 Kg
0.37	M 1LA 2	2800	1.26	63	0.86	0.99	3.9	1.8	1.9	12.9	7.3	FD 03	3.5	1200	1300	14	10.0	AFD 03	5	1200	1300	14	9.7	FA 03	3.5	1300	14	9.7
0.09	8	670	1.28	34	0.75	0.51	1.8	1.4	1.5					9500	13000					9500	13000					13000		
0.55	M 2SA 2	2830	1.86	66	0.86	1.40	4.4	2.1	2.0	20	9.2	FD 04	5	1500	1800	22	13.1	AFD 04	5	1500	1800	22	12.7	FA 04	5	1800	22	13.0
0.13	8	690	1.80	41	0.64	0.72	2.3	1.6	1.7					5600	8000					5600	8000					8000		
0.75	M 2SB 2	2800	2.6	68	0.88	1.81	4.6	2.1	2.0	25	10.6	FD 04	10	1700	1900	27	14.5	AFD 04	10	1700	1900	27	14.1	FA 04	10	1900	27	14.4
0.18	8	690	2.5	43	0.66	0.92	2.3	1.6	1.7					4800	7300					4800	7300					7300		
1.1	M 3SA 2	2870	3.7	69	0.84	2.74	4.6	1.8	1.7	34	15.5	FD 15	13	1000	1300	38	22	AFD 15	13	1000	1300	38	21.4	FA 15	13	1300	38	23
0.28	8	690	3.9	44	0.56	1.64	2.3	1.4	1.7					3400	5000					3400	5000					5000		
1.5	M 3LA 2	2880	5.0	69	0.85	3.69	4.7	1.9	1.8	40	17	FD 15	13	1000	1200	44	24	AFD 15	13	1000	1200	44	23.4	FA 15	13	1200	44	24
0.37	8	690	5.1	46	0.63	1.84	2.1	1.6	1.6					3300	5000					3300	5000					5000		
2.4	M 3LB 2	2900	7.9	75	0.82	5.6	5.4	2.1	2.0	61	23	FD 15	26	550	700	65	29	AFD 15	26	550	700	65	28	FA 15	26	700	65	30
0.55	8	700	7.5	54	0.58	2.5	2.6	1.8	1.8					2000	3500					2000	3500					3500		
3	M 4SA 2	2920	9.8	72	0.85	7.1	5.6	2.0	1.8	162	36	FD 56	37	—	600	182	48	AFD 06	37	—	600	182	47	FA 06	37	600	182	50
0.75	8	710	10.1	61	0.64	2.8	3.0	1.7	1.8					—	3400					—	3400					3400		
4	M 4SB 2	2870	13.3	73	0.84	9.4	5.6	2.3	2.4	213	42	FD 56	37	—	500	223	55	AFD 06	37	—	500	223	54	FA 06	37	500	223	56
1	8	690	13.8	66	0.62	3.5	2.9	1.9	1.8					—	3500					—	3500					3500		
5.5	M 4LA 2	2870	18.3	75	0.84	12.6	6.1	2.4	2.5	270	51	FD 06	50	—	400	280	64	AFD 06	62	—	400	280	63	FA 06	50	400	280	65
1.5	8	690	21	68	0.63	5.1	2.9	1.9	1.9					—	2400					—	2400					2400		

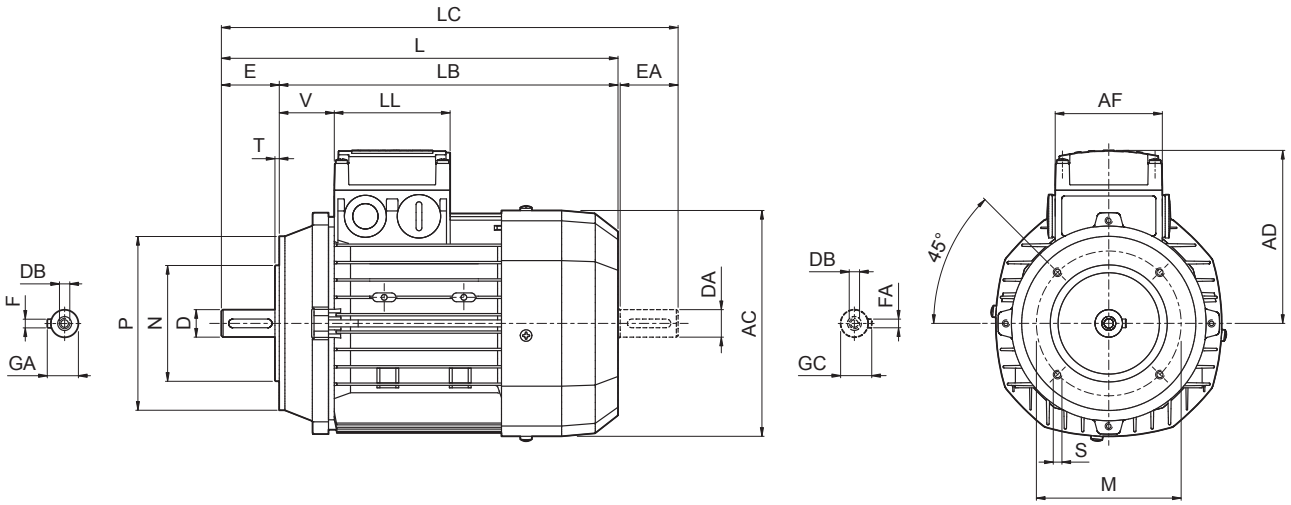


2/12P — 3000/500 min^{-1} - S3 60/40% — 50 Hz

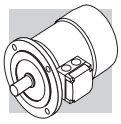


												d.c. brake						d.c. brake with fixed air gap						a.c. brake				
												FD						AFD						FA				
P_n kW		n min^{-1}	M_n Nm	η %	cosφ	In 400V A	Is / In	Ms / Mn	Ma / Mn	J_m x 10^{-4} kgm^2	IM B5 Kg	Mod	Mb Nm	Z_o 1/h NB	Z_o 1/h SB	J_m x 10^{-4} kgm^2	IM B5 Kg	Mod	Mb Nm	Z_o 1/h NB	Z_o 1/h SB	J_m x 10^{-4} kgm^2	IM B5 Kg	Mod	Mb Nm	Z_o 1/h	J_m x 10^{-4} kgm^2	IM B5 Kg
0.55	**M 2SA 2**	2820	1.86	64	0.89	1.39	4.2	1.6	1.7	25	10.6	**FD 04**	5	1000	1300	27	14.5	**AFD 04**	5	1000	1300	27	14.1	**FA 04**	5	1300	27	14.4
0.09	**12**	430	2.0	30	0.63	0.69	1.8	1.9	1.8					8000	12000					8000	12000					12000		
0.75	**M 3SA 2**	2900	2.5	65	0.81	2.06	5.2	1.9	2.1	34	15.5	**FD 15**	13	700	900	38	22	**AFD 15**	13	700	900	38	21.4	**FA 15**	13	900	38	23
0.12	**12**	460	2.5	33	0.43	1.22	1.9	1.3	1.6					5000	7000					5000	7000					7000		
1.1	**M 3LA 2**	2850	3.7	65	0.85	2.87	4.5	1.6	1.8	40	17	**FD 15**	13	700	900	44	24	**AFD 15**	13	700	900	44	23.4	**FA 15**	13	900	44	24
0.18	**12**	430	4.0	26	0.54	1.85	1.5	1.3	1.5					4000	6000					4000	6000					6000		
1.5	**M 3LB 2**	2900	4.9	67	0.86	3.76	5.6	1.9	1.9	54	21	**FD 15**	13	700	900	58	27	**AFD 15**	13	700	900	58	26	**FA 15**	13	900	58	28
0.25	**12**	440	5.4	36	0.46	2.18	1.8	1.7	1.8					3800	5000					3800	5000					5000		
2	**M 3LC 2**	2850	6.7	70	0.84	4.9	4.9	1.8	1.7	61	23	**FD 55**	18	—	700	65	29	**AFD 15**	26	—	700	65	28	**FA 15**	18	700	65	30
0.3	**12**	450	6.4	38	0.47	2.4	1.7	1.6	1.7					—	3500					—	3500					3500		
3	**M 4SA 2**	2920	9.8	74	0.87	6.7	6.8	2.3	1.9	213	42	**FD 56**	37	—	450	223	55	**AFD 06**	37	—	450	223	54	**FA 06**	37	450	223	56
0.5	**12**	470	10.2	51	0.43	3.3	2.0	1.7	1.6					—	3000					—	3000					3000		
4	**M 4LA 2**	2920	13.1	75	0.89	8.6	5.9	2.4	2.3	270	51	**FD 56**	37	—	400	280	64	**AFD 06**	37	—	400	280	63	**FA 06**	37	400	280	65
0.7	**12**	460	14.5	53	0.44	4.3	1.9	1.7	1.6					—	2800					—	2800					2800		

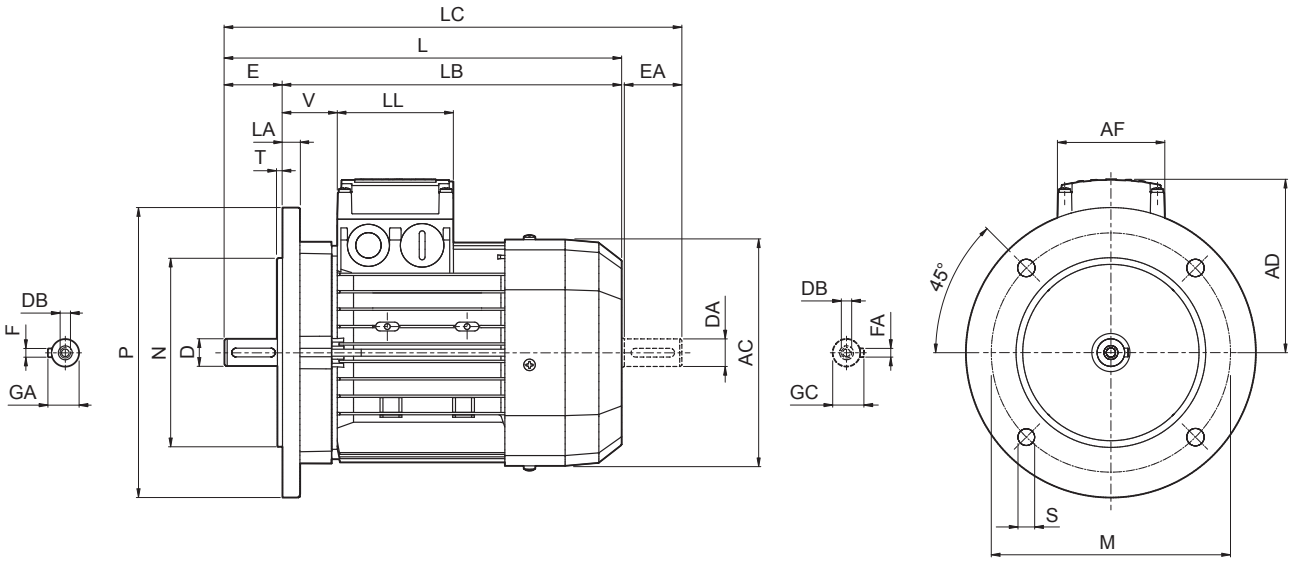
BN - IM B14



	Shaft					Flange					Motor							
	D DA	**E EA**	**DB**	**GA GC**	**F FA**	**M**	**N**	**P**	**S**	**T**	**AC**	**L**	**LB**	**LC**	**AD**	**AF**	**LL**	**V**
BN 56	9	20	M3	10.2	3	65	50	80	M5	2.5	110	185	165	207	91	74	80	34
BN 63	11	23	M4	12.5	4	75	60	90	M5	2.5	121	207	184	232	95	74	80	26
BN 71	14	30	M5	16	5	85	70	105	M6	2.5	138	249	219	281	108	74	80	37
BN 80	19	40	M6	21.5	6	100	80	120	M6	3	156	274	234	315	119	74	80	38
BN 90	24	50	M8	27	8	115	95	140	M8	3	176	326	276	378	133	98	98	44
BN 100	28	60	M10	31	8	130	110	160	M8	3.5	195	367	307	429	142	98	98	50
BN 112	28	60	M10	31	8	130	110	160	M8	3.5	219	385	325	448	157	98	98	52
BN 132	38	80	M12	41	10	165	130	200	M10	4	258	493	413	576	193	118	118	58



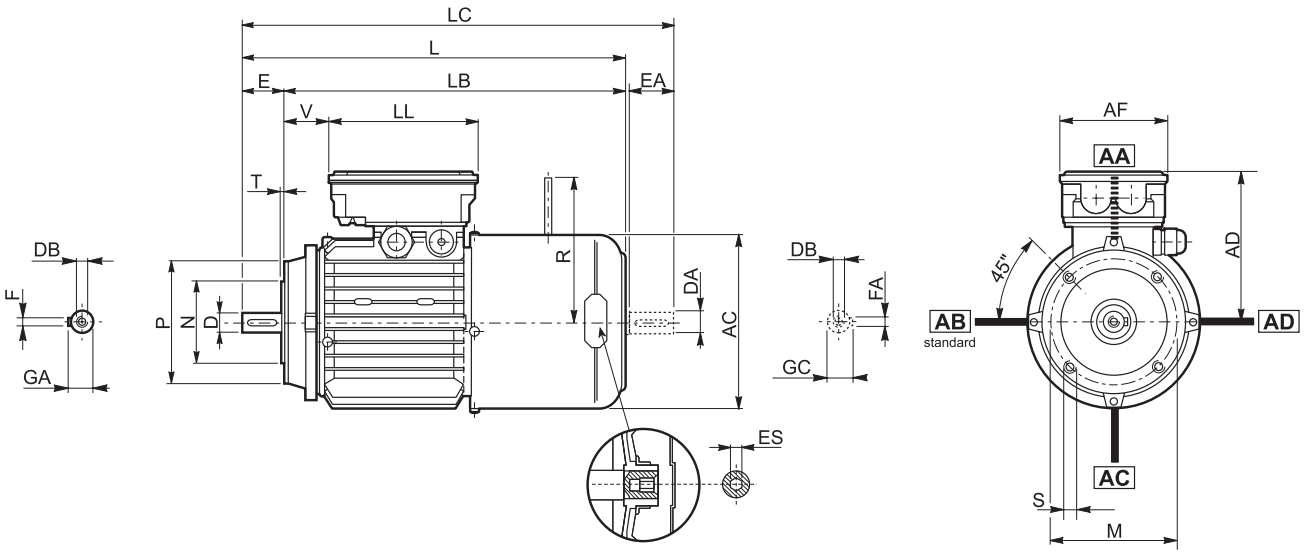
BN - IM B5



	Shaft					Flange						Motor							
	D DA	**E EA**	**DB**	**GA GC**	**F FA**	**M**	**N**	**P**	**S**	**T**	**LA**	**AC**	**L**	**LB**	**LC**	**AD**	**AF**	**LL**	**V**
BN 56	9	20	M3	10.2	3	100	80	120	7	3	8	110	185	165	207	91	74	80	34
BN 63	11	23	M4	12.5	4	115	95	140	9.5	3	10	121	207	184	232	95	74	80	26
BN 71	14	30	M5	16	5	130	110	160	9.5	3	10	138	249	219	281	108	74	80	37
BN 80	19	40	M6	21.5	6	165	130	200	11.5	3.5	11.5	156	274	234	315	119	74	80	38
BN 90	24	50	M8	27	8	165	130	200	11.5	3.5	11.5	176	326	276	378	133	98	98	44
BN 100	28	60	M10	31	8	215	180	250	14	4	14	195	367	307	429	142	98	98	50
BN 112	28	60	M10	31	8	215	180	250	14	4	15	219	385	325	448	157	98	98	52
BN 132	38	80	M12	41	10	265	230	300	14	4	20	258	493	413	576	193	118	118	58
BN 160 MR	42 38 (1)	110 80 (1)	M16 M12 (1)	45 41 (1)	12 10 (1)	300	250	350	18.5	5	15	258	562	452	645	193	118	118	218
BN 160 M	42 38 (1)	110 80 (1)	M16 M12 (1)	45 41 (1)	12 10 (1)	300	250	350	18.5	5	15	310	596	486	680	245	187	187	51
BN 160 L	42 38 (1)	110 80 (1)	M16 M12 (1)	45 41 (1)	12 10 (1)	300	250	350	18.5	5	15	310	596	486	680	245	187	187	51
BN 180 M	48 38 (1)	110 110 (1)	M16 M12 (1)	51.5 41 (1)	14 10 (1)	300	250	350	18.5	5	15	310	640	530	724	245	187	187	51
BN 180 L	48 42 (1)	110 110 (1)	M16 M16 (1)	51.5 45 (1)	14 12 (1)	300	250	350	18.5	5	18	348	708	598	823	261	187	187	52
BN 200 L	55 42 (1)	110 110 (1)	M20 M16 (1)	59 45 (1)	16 12 (1)	350	300	400	18.5	5	18	348	722	612	837	261	187	187	66

NOTE:
1) These values refer to the rear shaft end.

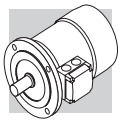
BN_FD ; BN_AFD - IM B14



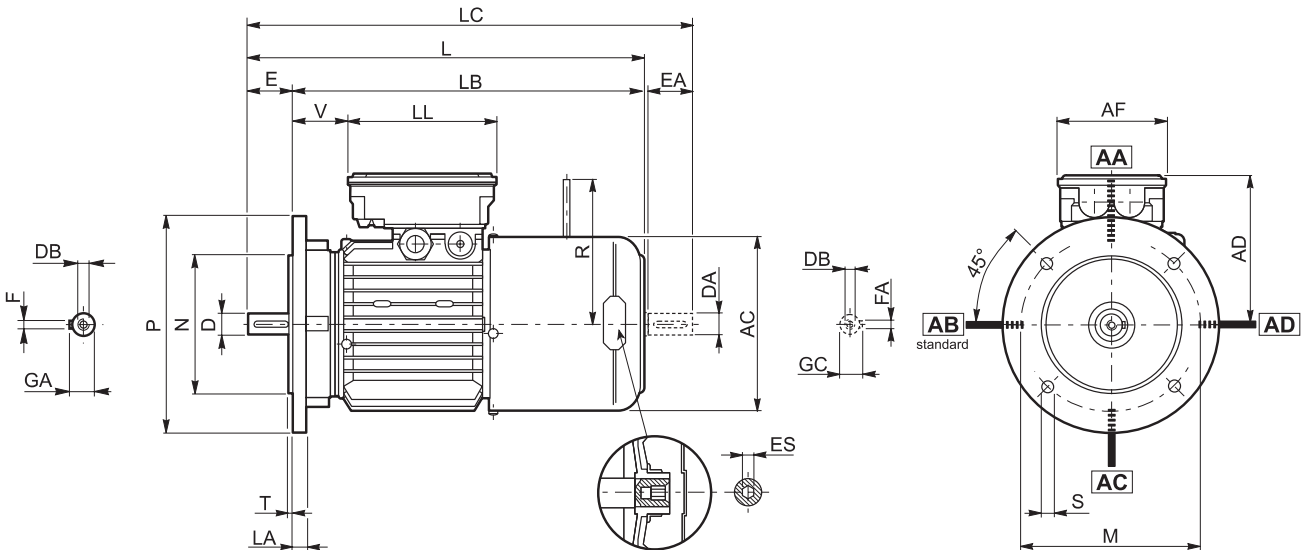
	Shaft					Flange					Motor									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V	R	ES
BN 63	11	23	M4	12.5	4	75	60	90	M5	2.5	121	272	249	297	122	98	133	14	96	5
BN 71	14	30	M5	16	5	85	70	105	M6	2.5	138	310	280	342	135	98	133	25	103	5
BN 80	19	40	M6	21.5	6	100	80	120	M6	3	156	346	306	388	146	98	133	41	129	5
BN 90 S	24	50	M8	27	8	115	95	140	M8	3	176	409	359	461	149	110	165	39	129	6
BN 90 L	24	50	M8	27	8	115	95	140	M8	3	176	409	359	461	146	110	165	39	160	6
BN 100	28	60	M10	31	8	130	110	160	M8	3.5	195	458	398	521	158	110	165	62	160	6
BN 112	28	60	M10	31	8	130	110	160	M8	3.5	219	484	424	547	173	110	165	73	199	6
BN 132	38	80	M12	41	10	165	130	200	M10	4	258	603	523	686	210	140	188	122	204 (1)	6

NOTE:
1) For FD07 and AFD07 brake value R=226.

ES hexagon is not supplied with PS option.



BN_FD ; BN_AFD - IM B5

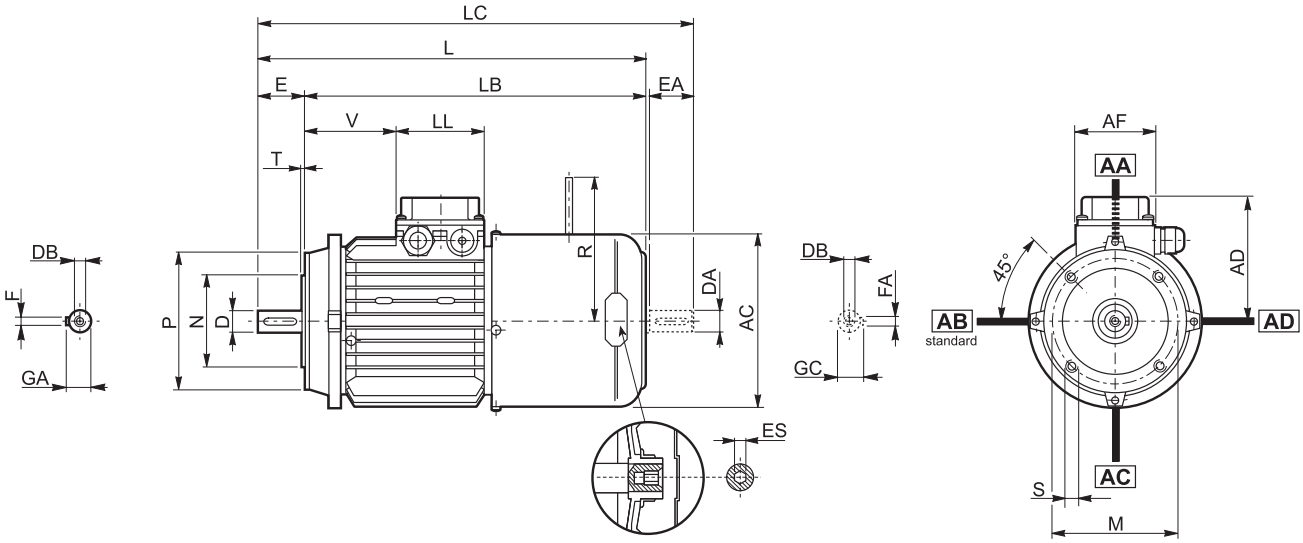


	Shaft					Flange						Motor									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	R	ES
BN 63	11	23	M4	12.5	4	115	95	140	9.5	3	10	121	272	249	297	122	98	133	14	96	5
BN 71	14	30	M5	16	5	130	110	160	9.5	3.5	10	138	310	280	342	135	98	133	25	103	5
BN 80	19	40	M6	21.5	6	165	130	200	11.5	3.5	11.5	156	346	306	388	146	98	133	41	129	5
BN 90 S	24	50	M8	27	8	165	130	200	11.5	3.5	11.5	176	409	359	461	149	110	165	39	129	6
BN 90 L	24	50	M8	27	8	165	130	200	11.5	3.5	11.5	176	409	359	461	146	110	165	39	160	6
BN 100	28	60	M10	31	8	215	180	250	14	4	14	195	458	398	521	158	110	165	62	160	6
BN 112	28	60	M10	31	8	215	180	250	14	4	15	219	484	424	547	173	110	165	73	199	6
BN 132	38	80	M12	41	10	265	230	300	14	4	20	258	603	523	686	210	140	188	122	204 (2)	6
BN 160 MR	42 38 (1)	110 80 (1)	M16 M12 (1)	45 41 (1)	12 10 (1)	300	250	350	18.5	5	15	258	672	562	755	210	140	188	161	226	6
BN 160 M	42 38 (1)	110 80 (1)	M16 M12 (1)	45 41 (1)	12 10 (1)	300	250	350	18.5	5	15	310	736	626	820	245	187	187	51	266	—
BN 160 L	42 38 (1)	110 80 (1)	M16 M12 (1)	45 41 (1)	12 10 (1)	300	250	350	18.5	5	15	310	736	626	820	245	187	187	51	266	—
BN 180 M	48 38 (1)	110 80 (1)	M16 M12 (1)	51.5 41 (1)	14 10 (1)	300	250	350	18.5	5	15	310	780	670	864	245	187	187	51	266	—
BN 180 L	48 42 (1)	110 110 (1)	M16 M16 (1)	51.5 45 (1)	14 12 (1)	300	250	350	18.5	5	18	348	866	756	981	261	187	187	52	305	—
BN 200 L	55 42 (1)	110 110 (1)	M20 M16 (1)	59 45 (1)	16 12 (1)	350	300	400	18.5	5	18	348	878	768	993	261	187	187	64	305	—

NOTE:
1) These values refer to the rear shaft end.
2) For FD07 and AFD07 brake value R=226.

ES hexagon is not supplied with PS option.

BN_FA - IM B14

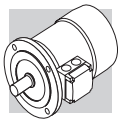


	Shaft					Flange					Motor									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V	R	ES
BN 63	11	23	M4	12.5	4	75	60	90	M5	2.5	121	272	249	119	95	74	80	26	116	5
BN 71	14	30	M5	16	5	85	70	105	M6	2.5	138	310	280	342	108	74	80	68	124	5
BN 80	19	40	M6	21.5	6	100	80	120	M6	3	156	346	306	388	119	74	80	83	134	5
BN 90	24	50	M8	27	8	115	95	140	M8	3	176	409	359	461	133	98	98	95	160	6
BN 100	28	60	M10	31	8	130	110	160	M8	3.5	195	458	398	521	142	98	98	119	160	6
BN 112	28	60	M10	31	8	130	110	160	M8	3.5	219	484	424	547	157	98	98	128	198	6
BN 132	38	80	M12	41	10	165	130	200	M10	4	258	603	523	686	193	118	118	180	200 (1)	6

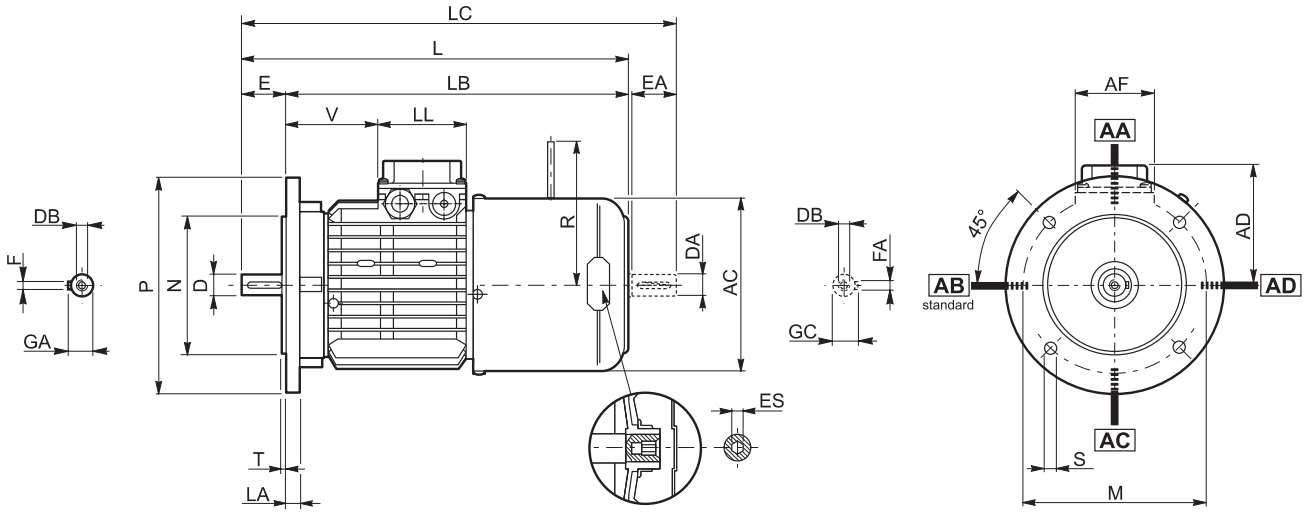
NOTE:
1) For FA07 brake value R=217.

Dimensions AD, AF, LL and V, relevant to terminal box of motors BN…FA featuring the separate brake supply (option SA), are coincident with corresponding dimensions of same-size BN…FD and AFD motors.

ES hexagon is not supplied with PS option.



BN_FA - IM B5



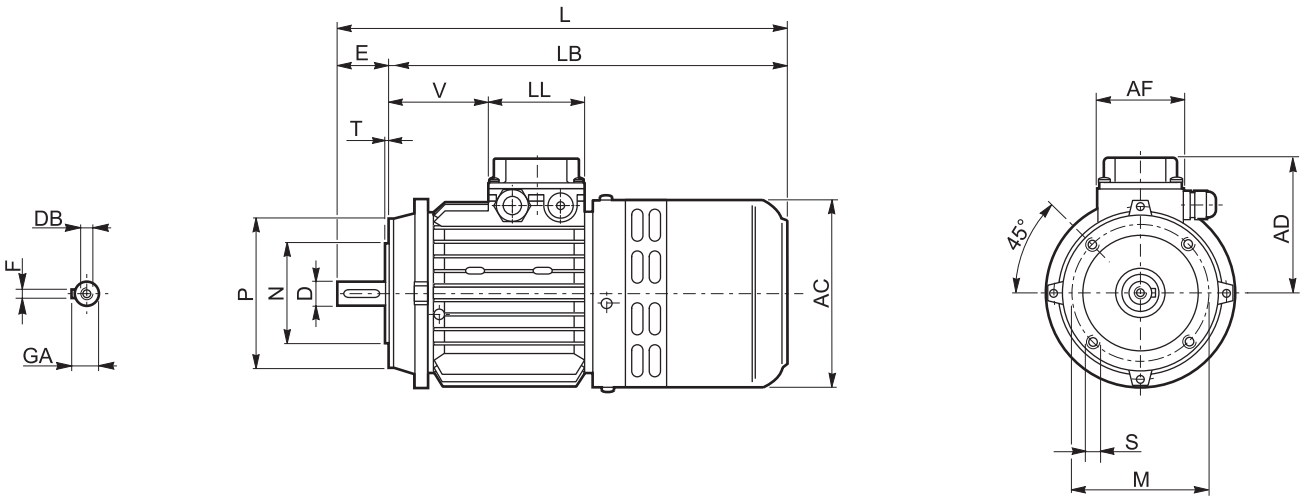
	Shaft					Flange						Motor									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	R	ES
BN 63	11	23	M4	12.5	4	115	95	140	9.5	3	10	121	272	249	297	95	74	80	26	116	5
BN 71	14	30	M5	16	5	130	110	160	9.5	3.5	10	138	310	280	342	108	74	80	68	124	5
BN 80	19	40	M6	21.5	6	165	130	200	11.5	3.5	11.5	156	346	306	388	119	74	80	83	134	5
BN 90	24	50	M8	27	8	165	130	200	11.5	3.5	11.5	176	409	359	461	133	98	98	95	160	6
BN 100	28	60	M10	31	8	215	180	250	14	4	14	195	458	398	521	142	98	98	119	160	6
BN 112	28	60	M10	31	8	215	180	250	14	4	15	219	484	424	547	157	98	98	128	198	6
BN 132	38	80	M12	41	10	265	230	300	14	4	20	258	603	523	686	193	118	118	180	200 (2)	6
BN 160 MR	42 38 (1)	110 80 (1)	M16 M12 (1)	45 41 (1)	12 10 (1)	300	250	350	18.5	5	15	258	672	562	755	193	118	118	218	217	6
BN 160 M	42 38 (1)	110-80 (1)	M16 M12 (1)	45 41 (1)	12 10 (1)	300	250	350	18.5	5	15	310	736	626	820	245	187	187	51	247	—
BN 160 L	42 38 (1)	110 80 (1)	M16 M12 (1)	45 41 (1)	12 10 (1)	300	250	350	18.5	5	15	310	736	626	820	245	187	187	51	247	—
BN 180 M	48 38 (1)	110 80 (1)	M16 M12 (1)	51.5 41 (1)	14 10 (1)	300	250	350	18.5	5	15	310	780	670	864	245	187	187	51	247	—

NOTE:
1) These values refer to the rear shaft end.
2) For FA07 brake value R=217.

Dimensions AD, AF, LL and V, relevant to terminal box of motors BN…FA featuring the separate brake supply (option SA), are coincident with corresponding dimensions of same-size BN…FD and AFD motors.

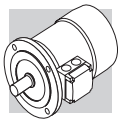
ES hexagon is not supplied with PS option.

BN_BA - IM B14

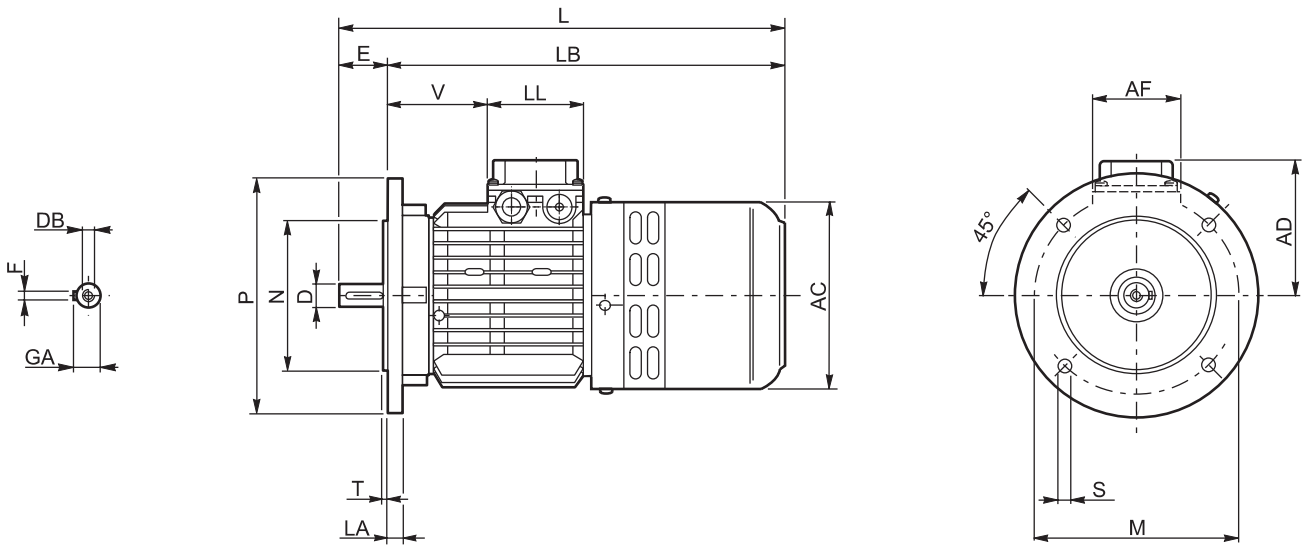


	Shaft					Flange					Motor							
	D	**E**	**DB**	**GA**	**F**	**M**	**N**	**P**	**S**	**T**	**AC**	**L**	**LB**	**LC**	**AD**	**AF**	**LL**	**V**
BN 63	11	23	M4	12.5	4	75	60	90	M5	2.5	124	298	275	95	74	80	28	34
BN 71	14	30	M5	16	5	85	70	105	M6	2.5	138	327	297	108	74	80	68	26
BN 80	19	40	M6	21.5	6	100	80	120	M6	3	156	372	332	119	74	80	83	37
BN 90	24	50	M8	27	8	115	95	140	M8	3	176	425	375	133	98	98	95	38
BN 100	28	60	M10	31	8	130	110	160	M8	3.5	195	477	417	142	98	98	119	44
BN 112	28	60	M10	31	8	130	110	160	M8	3.5	219	500	440	157	98	98	128	50
BN 132	38	80	M12	41	10	165	130	200	M10	4	258	638	558	193	118	118	180	52

NOTE:
Dimensions AD, AF, LL and V, relevant to terminal box of motors BN…BA featuring the separate brake supply (option SA), are coincident with corresponding dimensions of same-size BN…FD and AFD motors.



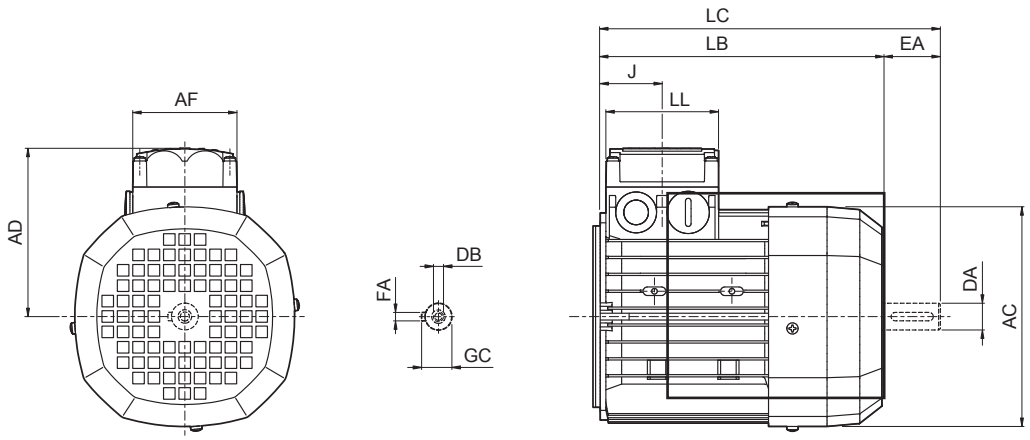
BN_BA - IM B5



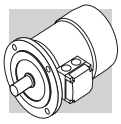
	Shaft					Flange						Motor							
	D	**E**	**DB**	**GA**	**F**	**M**	**N**	**P**	**S**	**T**	**LA**	**AC**	**L**	**LB**	**LC**	**AD**	**AF**	**LL**	**V**
BN 63	11	23	M4	12.5	4	115	95	140	9.5	3	10	124	298	275	95	74	80	28	34
BN 71	14	30	M5	16	5	130	110	160	9.5	3.5	10	138	327	297	108	74	80	68	26
BN 80	19	40	M6	21.5	6	165	130	200	11.5	3.5	11.5	156	372	332	119	74	80	83	37
BN 90	24	50	M8	27	8	165	130	200	11.5	3.5	11.5	176	425	375	133	98	98	95	38
BN 100	28	60	M10	31	8	215	180	250	14	4	14	195	477	417	142	98	98	119	44
BN 112	28	60	M10	31	8	215	180	250	14	4	15	219	500	440	157	98	98	128	50
BN 132	38	80	M12	41	10	265	230	300	14	4	20	258	638	558	193	118	118	180	52

NOTE:
Dimensions AD, AF, LL and V, relevant to terminal box of motors BN…BA featuring the separate brake supply (option SA), are coincident with corresponding dimensions of same-size BN…FD and AFD motors.

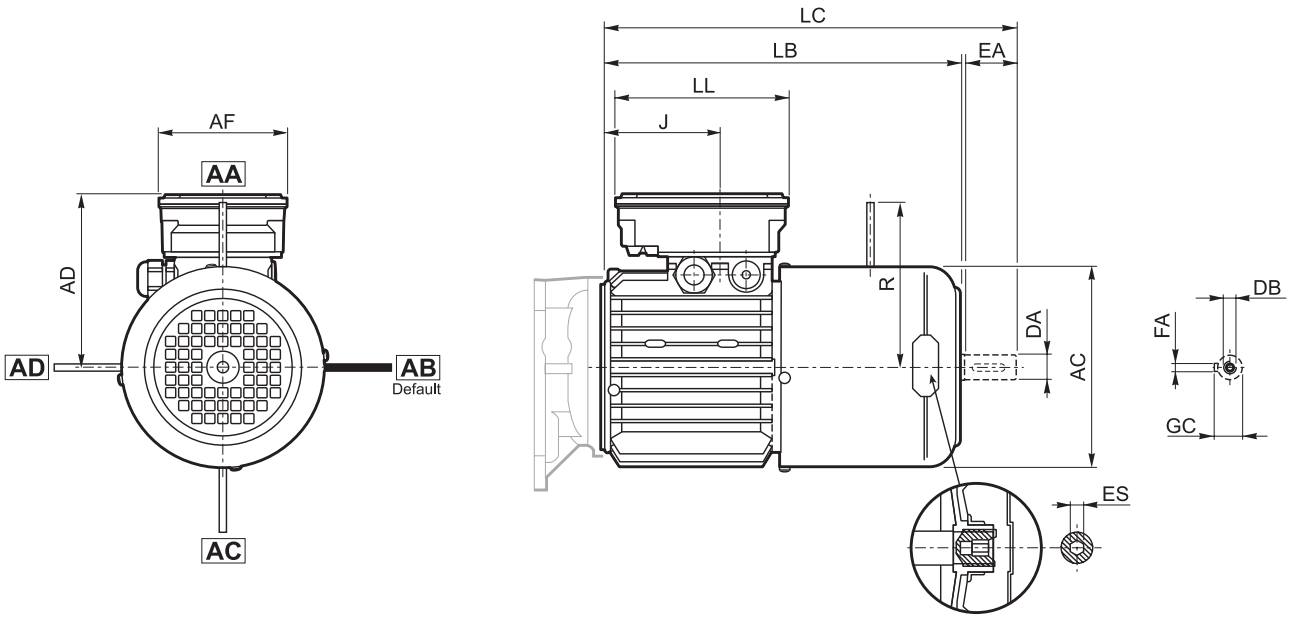
M



	Rear shaft end					Motor						
	DA	**EA**	**DB**	**FA**	**GC**	**AC**	**LB**	**LC**	**AF**	**LL**	**J**	**AD**
M 0	9	20	M3	3	10.2	110	133	155	74	80	42	91
M 05	11	23	M4	4	12.5	121	165	191	74	80	48	95
M 1	14	30	M5	5	16	138	187	219	74	80	45	108
M 2 S	19	40	M6	6	21.5	156	202	245	74	80	44	119
M 3 S	28	60	M10	8	31	195	230	293	98	98	53.5	142
M 3 L	28	60	M10	8	31	195	262	325	98	98	53.5	142
M 4	38	80	M12	10	41	258	361	444	118	118	64.5	193
M 4 LC	38	80	M12	10	41	258	396	479	118	118	64.5	193
M 5 S	38	80	M12	10	41	310	418	502	187	187	77	245
M 5 L	38	80	M12	10	41	310	462	546	187	187	77	245



M_FD ; M_AFD

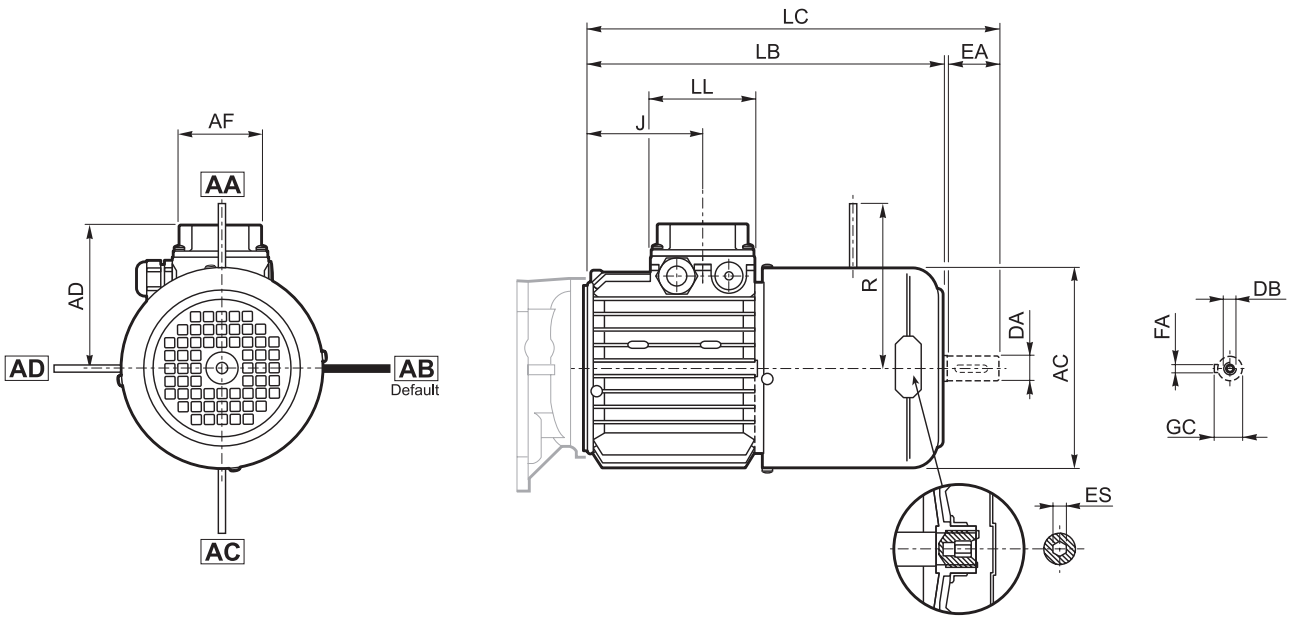


	Rear shaft end					Motor								
	DA	**EA**	**DB**	**FA**	**GC**	**AC**	**LB**	**LC**	**AF**	**LL**	**J**	**AD**	**R**	**ES**
M 05	11	23	M4	4	12.5	121	231	256	98	133	48	122	96	5
M 1	14	30	M5	5	16	138	248	280	98	133	73	135	103	5
M 2 S	19	40	M6	6	21.5	156	272	314	98	133	88	146	129	5
M 3 S	28	60	M10	8	31	195	326	389	110	165	124.5	158	160	6
M 3 L	28	60	M10	8	31	195	353	416	110	165	124.5	158	160	6
M 4	38	80	M12	10	41	258	470	553	140	188	185.5	210	204 (1)	6
M 4 LC	38	80	M12	10	41	258	495	578	140	188	64.5	210	226	6
M 5 S	38	80	M12	10	41	310	558	642	187	187	77	245	266	—
M 5 L	38	80	M12	10	41	310	602	686	187	187	77	245	266	—

NOTE:
1) For FD07 and AFD07 brake value R=226.

ES hexagon is not supplied with PS option.

M_FA

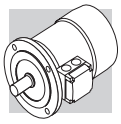


	Rear shaft end					Motor								
	DA	**EA**	**DB**	**FA**	**GC**	**AC**	**LB**	**LC**	**AF**	**LL**	**J**	**AD**	**R**	**ES**
M 05	11	23	M4	4	12.5	121	231	256	74	80	48	95	116	5
M 1	14	30	M5	5	16	138	248	280	74	80	73	108	124	5
M 2 S	19	40	M6	6	21.5	156	272	314	74	80	88	119	134	5
M 3 S	28	60	M10	8	31	195	326	389	98	98	124.5	142	160	6
M 3 L	28	60	M10	8	31	195	353	416	98	98	124.5	142	160	6
M 4	38	80	M14	10	41	258	470	553	118	118	185.5	193	200 (1)	6
M 4 LC	38	80	M14	10	41	258	495	578	118	118	64.5	193	217	6
M 5 S	38	80	M12	10	41	310	558	642	187	187	77	245	247	—
M 5 L	38	80	M12	10	41	310	602	686	187	187	77	245	247	—

NOTE:
1) For FA07 brake value R=217.

Dimensions AD, AF, LL and V, relevant to terminal box of motors M…FA featuring the separate brake supply (option SA), are coincident with corresponding dimensions of same-size M…FD and AFD motors.

ES hexagon is not supplied with PS option.



M3 ELECTRIC MOTORS SERIES K

M3.1 CHARACTERISTICS

The asynchronous three-phase electric motors of series K are designed for use in industrial applications, powered by factory mains or inverter.
In the compact version, they are compatible with gearbox types VF 30, VF 44 and VF 49 only.

M3.2 NOTES ON MOTORS

M3.2.1 Voltage - Frequency

Please always specify voltage and frequency on order.

M3.2.2 Protection class

Standard motors: IP 55
Brake motors: IP 54.

M3.2.3 Insulation class

Standard insulation class: F (Class H available on request).

M3.2.4 Brake type

DC brake type FC for light and medium duty.
Please contact Bonfiglioli Riduttori Customer Service if you wish another type of brake.

M3.2.5 Rectifier (for brake motors only)

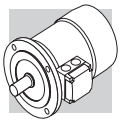
Included in supply scope, normally pre-wired to brake coil at the factory.

M3.2.6 Brake supply

Standard power supply is 230 VAC (via rectifier).
For separate power supply, please state:

a) the voltage followed by SA (e.g. 110SA);

b) in case of direct power supply of D.C. brake, state voltage followed by SD (e.g. 24SD); in this case the rectifier will be not supplied.



M3.8 MECHANICAL CHARACTERISTICS

M3.3.1 Ventilation

The motors are cooled by external ventilation and are equipped with a radial fan in plastic working in both directions.
The motors must be installed allowing sufficient space between fan cover and nearest wall to ensure unimpeded air intake and allow access for routine inspections and maintenance. Independent, forced air ventilation (IC 416) available on request for motor type K71 to ensure proper cooling when operating continuously at low speed.

M3.3.2 Terminal box

The main terminal board has six studs for connection to the lead-in wire.
A terminal for the ground conductor is provided inside the box.
All connections must be carried out according to the diagrams inside the terminal box or in the instruction manuals.

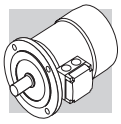
M3.3.3 Cable entry

Cable entry will accommodate metric-size cable glands as per standard EN 60262, according to the dimensions shown in table:

	thread		max cable diam.
K 63	M20 x 1.5	1 hole on each side	13 mm
K 71	M25 x 1.5	1 hole on each side	17 mm

Metric cable glands are available separately and as accessories in 10-pcs. packages.
Please see the codes in the table Below:

	Metric cable glands
K 63	**PM 20**
K 71	**PM 25**



M3.4 ELECTRIC CHARACTERISTICS

M3.4.1 Voltage

Single speed motors are supplied in the normal version for voltage values 230/400Y V, 50 Hz ± 10% voltage tolerance (Eurovoltage).
The plate indicates rated voltage 230/400 V and the allowed operating ranges as well, e.g.: 220-240 /380-415 Y, 50 Hz.
The name plate also reports the equivalent values for 60 Hz operation (i.e. 460 Y, 60 Hz) and the relevant voltage range, 440 - 480V Y, 60 Hz. (This does not apply to brake motors). Double-speed motors are rated for 400V standard voltage. Applicable tolerances are as per standards CEI EN 60034-1, IEC 60034 1.
Table below reports the different connection types depending on motor polarity.

Motor	Pole	Wiring options
K 63 - K 71	2, 4, 6	Δ / Y
	2/4	Δ / YY (Dahlander)
	2/6, 2/8	Y/Y (Two windings)

For operation on 230/460V 60 Hz, a standard YY/Y connection with 9-stud terminal box is provided. For this as well as for 330/575V Δ/Y 60 Hz supply, the name plate states normalized 50 Hz power rating.

M3.4.2 Frequency

The name plate of single-speed motors in the standard version reports, besides the operating voltages at 50 Hz, the voltage range for motors powered by 440 - 480V 60 Hz mains with power increased by about 20% (except for brake motors).
Power rating reported in the name plate of 60 Hz motors is as shown in the following table:

Motor	2 Pole P_n [kW]	4 Pole P_n [kW]	6 Pole P_n [kW]
K 63A	0.21	0.14	0.10
K 63B	0.30	0.21	0.14
K 63C	0.45	0.30	-
K 71A	0.45	0.30	0.21
K 71B	0.65	0.45	0.30
K 71C	0.90	0.65	0.45

For double-speed motors operating on 60 Hz, power increase will be 15%. If the required 60 Hz power corresponds to the normalized 50 Hz power, please specify option PN on order.
Motors wound for 230/400 V Δ/Y 50 Hz can be used with 60 Hz power grids according the values shown in the table below:

50 Hz	**60 Hz**				
	V	**P_n**	**M_n**	**M_a/M_n**	**n**
230 / 400 Δ / Y	230 / 400 Δ / Y	100	83	85	120
230 / 400 Δ / Y	265 / 460 Δ / Y*	120	100	100	120

* Not including brake motors with FC brake..

M3.5 BRAKE MOTORS

M3.5.1 General information

Brake motors use spring pressure brakes with DC coil, type FC. The brake is negative type brake, operated by spring action in the event of a power failure.
The electric and mechanical characteristics (excepting overall dimensions) are as for three-phase motors.

Main characteristics:

• Non-adjustable braking torques preset for motor rated torque.

• Brake disk with double friction lining (low wear, asbestos- free material).

• Mechanical hand release lever automatic fold-back mechanism for manual operations (on request, option R).

• Compensation spring to absorb mechanical vibration during rotation.

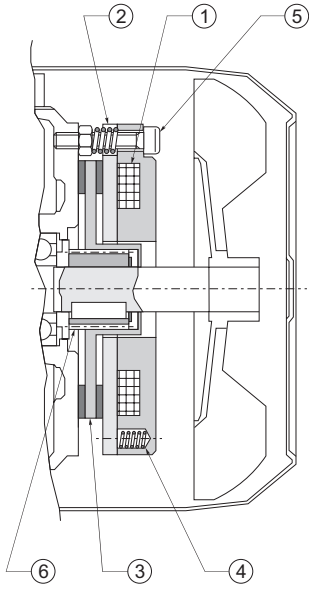
• Corrosion preventative treatment on all brake surfaces.

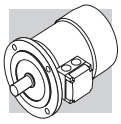
• Electric insulation to class F.

• Brake applies progressively and is suitable for light duty Operation.

M3.5.2 BRAKE

IP 54
(STANDARD)





M3.5.2.1 Construction and operation

The brake is installed at non-drive end and enclosed under the fan cowl as shown in diagram.
Brake consists of:

1 - electro-magnet housing the toroidal coil
2 - mobile armature
3 - axially independent brake disk connected to the shaft by the trailing hub
4 - brake springs
5 - screw for adjustment of the air gap
6 - disc trailing hub

In the event of a power failure, the brake springs push the armature plate against the motor end shield, locking the brake disk between the two.
When the coil is energized, the mobile armature is magnetized and overcomes spring action so that the brake is released.

M3.5.2.2 Brake power supply

The DC brake coil is fed by a rectifier accommodated in the terminal box.
The rectifier is wired to the brake coil at the factory.
On single speed motors, the rectifier is connected to the motor terminal box (star or phase voltage).
On double speed motors or also on single speed when expressly required, the brake can be fed separately with voltage value specified on the order.
Two auxiliary terminals are provided in the main conduit box for the wiring.
Standard input voltage to rectifier is 230V ± 10% 50/60 Hz.

M3.5.2.3 FC brakes technical specifications

Brake	Motor	Brake torque	Release	Braking		W_{max} [J]			W [MJ]	Pb [W]
		M_b [Nm]	t_1 [ms]	t_2 [ms]	t_{2c} [ms]	starts per hour				
FC02	**K 63**	3.5	30	90	10	3500	2000	200	30	12
FC12	**K 71**	7.5	50	80	8					

Key::
M_b = static braking torque (± 15%)
t_1 = brake release delay
t_2 = engagement delay with a.c. Disconnect and separate brake supply
t_{2c} = engagement delay with a.c. And d.c. Disconnect. Separate supplied brake
W = braking work between two successive air-gap adjustments
W_{max} = max work for each braking
P_b = coil absorbed power at 20°C ambient temp.

M3.6 SPECIAL EXECUTIONS

M3.6.1 Thermistors, E3

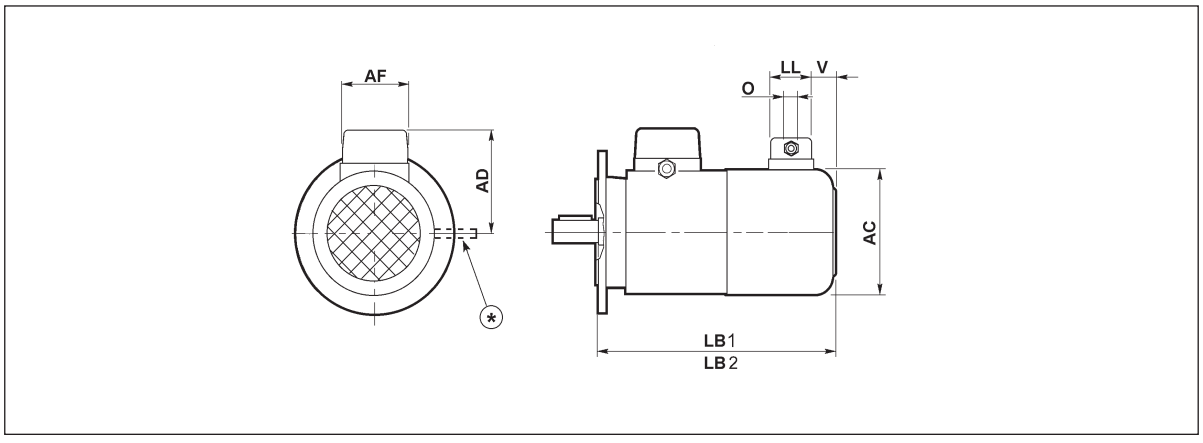
These are semi-conductors having rapid resistance variation when they are close to the rated intervention temperature.
These elements have several advantages: compact dimensions, rapid response time and, being contact-free, absolutely no wear.
Unlike bimetallic thermostats, they cannot directly intervene on currents of energizing coils, and must therefore be connected to a special control unit (triggering apparatus) to be interfaced with the external connections.
Thus protected, three PTCs connected in series are installed in the winding, the terminals of which are located on the auxiliary terminal board.

M3.6.2 Bimetallic thermostats, D3

These types of protective devices contain a bimetal disk inside a housing. When the rated intervention temperature is reached, the disk switches the contacts from their initial rest position.
As temperature falls, disk and contacts automatically return to rest position.

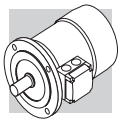
M3.6.3 Servo-ventilation U1

Motor K71 can be supplied with independent axial ventilation. It is cooled by an independently powered fan mounted inside the fan cover. Power supply is as follows: 1 x 230 V – 50/60 Hz
An encoder or tacho-generator can be fitted on request.
When this is the case, please contact Bonfiglioli Riduttori Customer Service.



	LB1	LB2	AC	AD	AF	LL	V	O	V - Hz	**In** (50/60 Hz) **[A]**
K 71	310	251	138	112	70	70	36	Pg11	1x230 V - 50/60 Hz	0.14

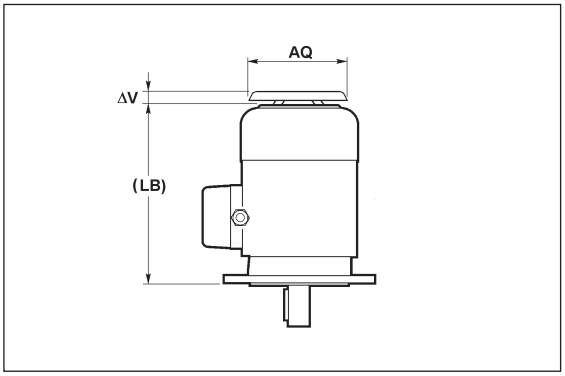
Key:
Overall length LB1 applies to standard motor, whilst LB2 to brake motor.

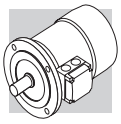


M3.6.4 Drip cover (RC)

Through the option RC a drip cover is supplied to the motor when this is mounted vertically down.
The cover protects the motor from solid bodies and dripping water.
The table below shows overall dimensions for the drip cover.

	AQ	ΔV	LB
K 63	118	24	190
K 71	134	27	219





M3.7 MOTOR RATING CHARTS

2 P — 3000 min^{-1} - S1

	Pn	n	Mn	η	cosφ	In	Is/In	Ms/Mn	Ma/Mn	brake	Mb	Without brake		With brake	
	kW	min^{-1}	Nm	%		A (400V)					Nm	Jm (• 10^{-4}) kgm^2	kg IMB5	Jm (• 10^{-4}) kgm^2	kg IMB5
K 63A2	0.18	2700	0.64	53	0.78	0.63	3.0	2.1	2.0	FC02	3.5	2.0	3.4	2.6	4.4
K 63B2	0.25	2700	0.88	62	0.78	0.75	3.3	2.3	2.3	FC02	3.5	2.3	3.8	2.9	4.8
K 63C2	0.37	2750	1.29	64	0.79	1.06	3.9	2.6	2.6	FC02	3.5	3.3	5.0	3.9	6.0
K 71A2	0.37	2810	1.26	70	0.78	0.98	4.8	2.8	2.6	FC12	7.5	3.5	5.4	4.1	6.4
K 71B2	0.55	2810	1.87	73	0.77	1.41	5.0	2.9	2.8	FC12	7.5	4.1	6.2	4.7	7.2
K 71C2	0.75	2800	2.6	74	0.77	1.90	5.1	3.1	2.8	FC12	7.5	5.0	7.3	5.7	8.3

4 P — 1500 min^{-1} - S1

K 63A4	0.12	1310	0.88	51	0.68	0.50	2.6	1.9	1.8	FC02	3.5	2.0	3.3	2.6	4.3
K 63B4	0.18	1320	1.30	53	0.68	0.72	2.6	2.2	2.0	FC02	3.5	2.3	3.7	2.9	4.7
K 63C4	0.25	1320	1.81	60	0.69	0.87	2.7	2.1	1.9	FC02	3.5	3.3	4.9	3.9	5.9
K 71A4	0.25	1375	1.74	62	0.77	0.76	3.3	1.9	1.7	FC12	7.5	5.8	4.9	6.4	5.9
K 71B4	0.37	1370	2.6	65	0.77	1.07	3.7	2.0	1.9	FC12	7.5	6.9	5.7	7.5	6.7
K 71C4	0.55	1380	3.8	69	0.74	1.55	4.1	2.3	2.3	FC12	7.5	9.1	7.1	9.7	8.1

6 P — 1000 min^{-1} - S1

K 63A6	0.09	880	0.98	41	0.53	0.60	2.1	2.1	1.8	FC02	3.5	3.4	4.5	4.0	5.5
K 63B6	0.12	870	1.32	45	0.60	0.64	2.1	1.9	1.7	FC02	3.5	3.7	4.7	4.3	5.7
K 71A6	0.18	900	1.91	56	0.69	0.67	2.6	1.9	1.7	FC12	7.5	8.4	5.2	9.0	6.2
K 71B6	0.25	900	2.7	62	0.71	0.82	2.6	1.9	1.7	FC12	7.5	10.9	6.5	11.5	7.5
K 71C6	0.37	910	3.9	66	0.69	1.17	3.0	2.4	2.0	FC12	7.5	12.9	7.5	14.0	8.5

2/4 P — 3000/1500 min^{-1} - S1

K 63B	**2**	0.20	2700	0.71	56	0.79	0.65	3.5	2.1	1.9	FC02	3.5	2.7	4.2	3.3	5.2
	4	0.15	1350	1.06	49	0.64	0.69	2.6	1.8	1.9						
K 71A	**2**	0.28	2700	0.99	56	0.82	0.88	2.9	1.9	1.7	FC12	7.5	4.7	4.1	5.3	5.1
	4	0.20	1370	1.39	59	0.72	0.68	3.1	1.8	1.7						
K 71B	**2**	0.37	2780	1.27	62	0.82	1.05	3.5	1.8	1.8	FC12	7.5	5.8	4.9	6.4	5.9
	4	0.25	1400	1.71	60	0.73	0.82	3.3	2.0	1.9						
K 71C	**2**	0.45	2780	1.55	63	0.85	1.21	3.8	1.8	1.8	FC12	7.5	6.9	5.7	7.5	6.7
	4	0.30	1400	2.00	61	0.75	0.95	3.6	2.0	1.9						

2/6 P — 3000/1000 min^{-1} - S3 60/40%

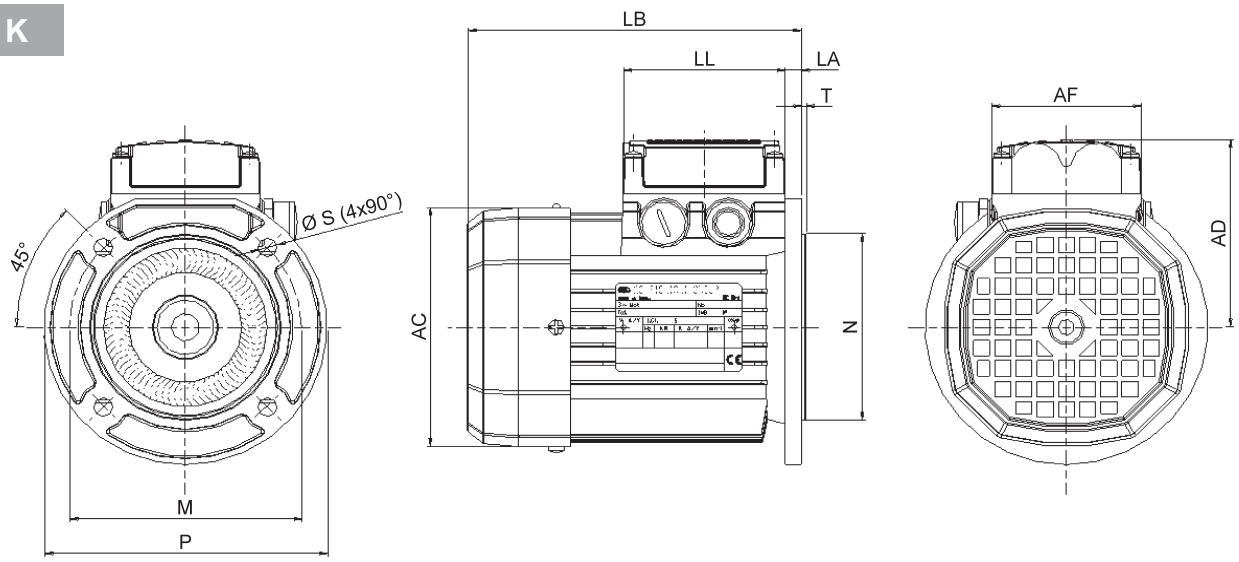
K 71A	**2**	0.25	2830	0.84	60	0.82	0.73	4.5	1.7	1.6	FC12	7.5	6.9	5.7	7.5	6.7
	6	0.08	910	0.84	43	0.70	0.38	2.1	1.4	1.4						
K 71B	**2**	0.37	2880	1.23	62	0.81	1.06	4.6	2.0	2.3	FC12	7.5	9.1	7.1	9.7	8.1
	6	0.12	900	1.27	44	0.73	0.54	2.3	1.4	1.5						

2/8 P — 3000/750 min^{-1} - S3 60/40%

K 71A	**2**	0.25	2790	0.86	60	0.86	0.70	3.3	1.8	2.0	FC12	7.5	10.9	6.5	11.5	7.5
	8	0.06	680	0.84	28	0.64	0.48	2.0	1.9	1.9						
K 71B	**2**	0.37	2800	1.26	62	0.85	1.01	4.0	1.8	1.9	FC12	7.5	12.9	7.5	13.5	8.5
	8	0.09	670	1.28	32	0.73	0.56	1.8	1.4	1.5						

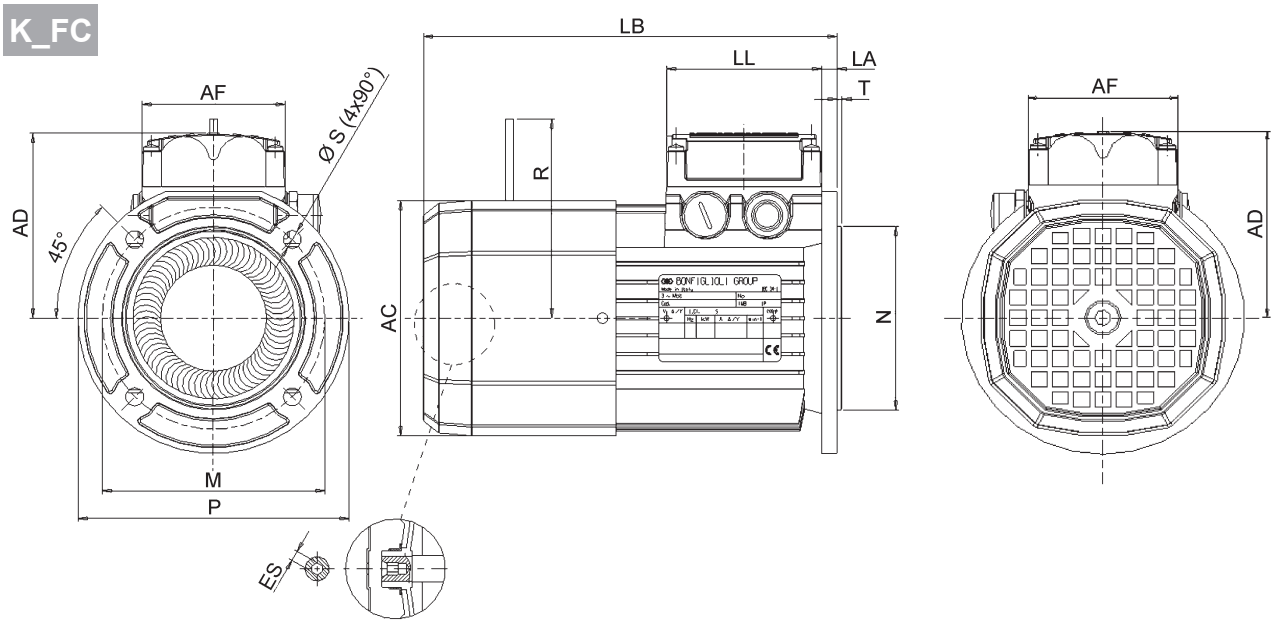
M3.8 MOTORS DIMENSIONS

K



	Flange						Motor				
	M	**N**	**P**	**S**	**T**	**LA**	**AC**	**LB**	**AD**	**AF**	**LL**
K 63	115	95	140	9.5	2.5	8	122	165	95	74	80
K 71	130	110	160	9.5	3.5	7.5	139	186	108	74	80

K_FC



	Flange						Motor						
	M	**N**	**P**	**S**	**T**	**LA**	**AC**	**LB**	**AD**	**AF**	**LL**	**R**	**ES**
K 63	115	95	140	9.5	2.5	8	122	213.5	95	74	80	103	5
K 71	130	110	160	9.5	3.5	7.5	139	219	108	74	80	103	5

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	Description

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