

VF-W Series

IE2-IE3

Wormgears



PRODUCTS &
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	Symbols	Units of Measure	Description
$A_{N1,2}$	[N]	Permissible axial force	$n_{1,2}$	[min ⁻¹]	Speed
f_s	–	Service factor	$P_{1,2}$	[kW]	Power
f_T	–	Thermal factor	$P_{N1,2}$	[kW]	Rated power
f_{TP}	–	Temperature factor	$P_{R1,2}$	[kW]	Power demand
i	–	Gear ratio	$R_{C1,2}$	[N]	Calculated radial force
l	–	Cyclic duration factor	$R_{N1,2}$	[N]	Permissible overhung load
J_C	[Kgm ²]	Mass moment of inertia to be driven	S	–	Safety factor
J_M	[Kgm ²]	Motor mass moment of inertia	t_a	[°C]	Ambient temperature
J_R	[Kgm ²]	Mass moment of inertia for the gear unit	t_s	[°C]	Surface temperature
K	–	Mass acceleration factor	t_o	[°C]	Oil temperature
K_r	–	Transmission element factor	t_f	[min]	Work time under constant load
$M_{1,2}$	[Nm]	Torque	t_r	[min]	Rest time
$M_{C1,2}$	[Nm]	Calculated torque	η_d	–	Dynamic efficiency
$M_{n1,2}$	[Nm]	Rated torque	η_s	–	Static efficiency
$M_{r1,2}$	[Nm]	Torque demand			

1 value applies to input shaft
2 value applies to output shaft



This symbol indicates important technical information.



This symbol refers to the angle the overhung load applies (viewing from drive end).



This symbol indicates situations of danger which, if ignored, may result in risks to personal health and safety.



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.



The symbol shows the page the information can be sorted from.

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 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 M_{r2} and service factor 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 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 P_2 to power applied at input shaft P_1 :

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

It may be worth highlighting that values of rated torque M_{n2} given in the catalogue take the dynamic efficiency into consideration. Values of η_d 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, refer to chapter "ALLOWED TEMPERATURE LIMITS" for information about the permitted values. If however, surface temperatures are to be expected near the upper limit, 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 n_1 to the output speed n_2 :

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

2.5 MOMENT OF INERTIA J_r [kgm²]

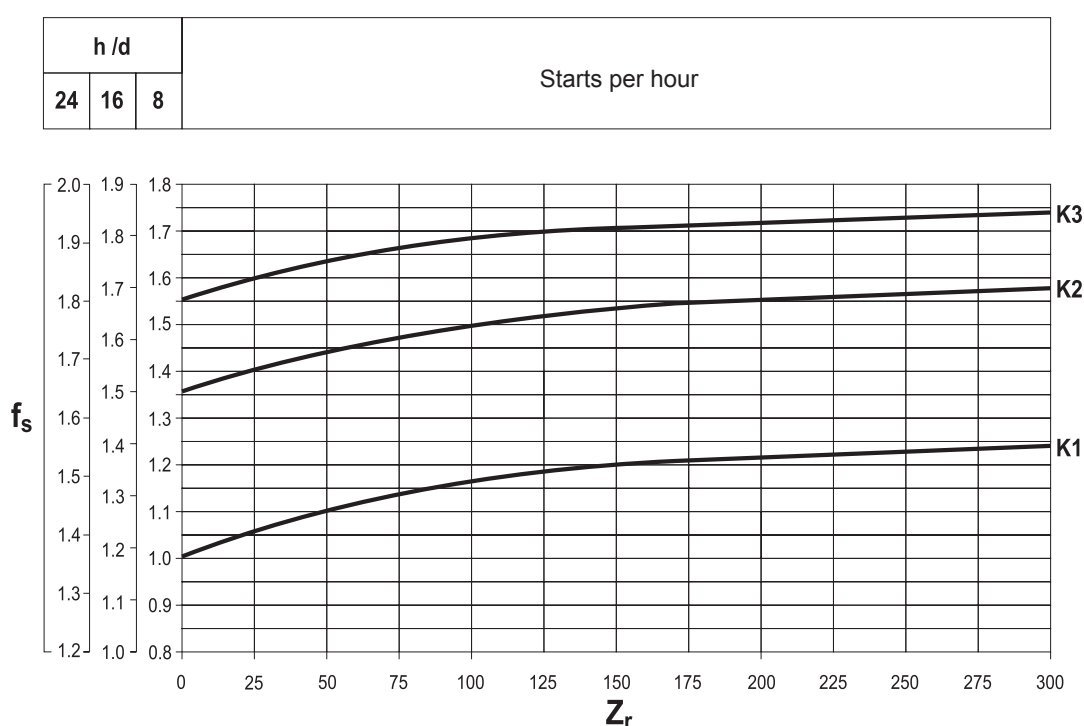
Moments of inertia specified in the catalogue refer to the input shaft of the gear unit and, as such, they can be simply added to the inertia of the motor, when this is combined.



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:

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


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

$K \leq 0,25$	→	K1 Uniform load
$0,25 < K \leq 3$	→	K2 Moderate shock load
$3 < K \leq 10$	→	K3 Heavy shock load
$K > 10$	→	please contact Bonfiglioli's Technical Service




3 ALLOWED TEMPERATURE LIMITS

Symbols	Description / Condition	Value (*)	
		Synthetic Oil	Mineral Oil
t_a	Ambient temperature		
$t_{au \text{ min}}$	Minimum operating ambient temperature	-30°C	-10°C
$t_{au \text{ Max}}$	Maximum operating ambient temperature	+50°C	+40°C
$t_{as \text{ min}}$	Minimum storage ambient temperature	-40°C	-10°C
$t_{as \text{ Max}}$	Maximum storage ambient temperature	+50°C	+50°C
t_s	Surface temperature		
$t_{s \text{ min}}$	Minimum gearbox surface temperature starting with partial load (#)	-25°C	-10°C
$t_{sc \text{ min}}$	Minimum gearbox surface temperature starting with full load	-10°C	-5°C
$t_{s \text{ Max}}$	Maximum casing surface temperature during continuous operation (measured next to the gearbox input)	+100°C	+100°C (@)
t_o	Oil temperature		
$t_{o \text{ Max}}$	Maximum oil temperature during continuous operation	+95°C	+95°C (@)

(*) = Refer to the table "Selection of the optimal oil viscosity" for further information about minimum and maximum values of different oil viscosity. For values of $t_a < -20^\circ\text{C}$ and $t_s, t_o > 80^\circ\text{C}$, choose (as permitted in the product configuration stage) the sealing type of the most suitable material to the type of application. If needed contact Bonfiglioli Technical Service. 

(@) = Continuous operation it is not advised if t_s and t_o range is 80°C to 95°C .

(#) = For full load start-up it is recommended to ramp-up and provide for greater absorption of the motor. If needed, contact Bonfiglioli Technical Service. 



4 SELECTION

4.1 Selecting a gearmotor

a) Determine service factor f_s as formerly specified.

b) Determine power required at gearbox input shaft:

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

c) Consult the gearmotor rating charts and locate the table corresponding to normalised power P_n :

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

Unless otherwise specified, power 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 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)			
	10	30	60	25%	40%	60%	Please contact us
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 P_n section within the gearmotor selection charts and locate the unit that features the desired output speed n_2 , or closest to, along with a safety factor S that meets or exceeds the applicable service factor 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 f_s .

b) Determine the computational torque 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 n_1 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 150% of rated torque M_{n2} . Upon evaluation and approval of Bonfiglioli Technical Service peak values up to 300% may be admitted.

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	
$Mg_2 = 0.5 \times Mg_3$	
Mg_2	Switching torque with two phase power-up
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.



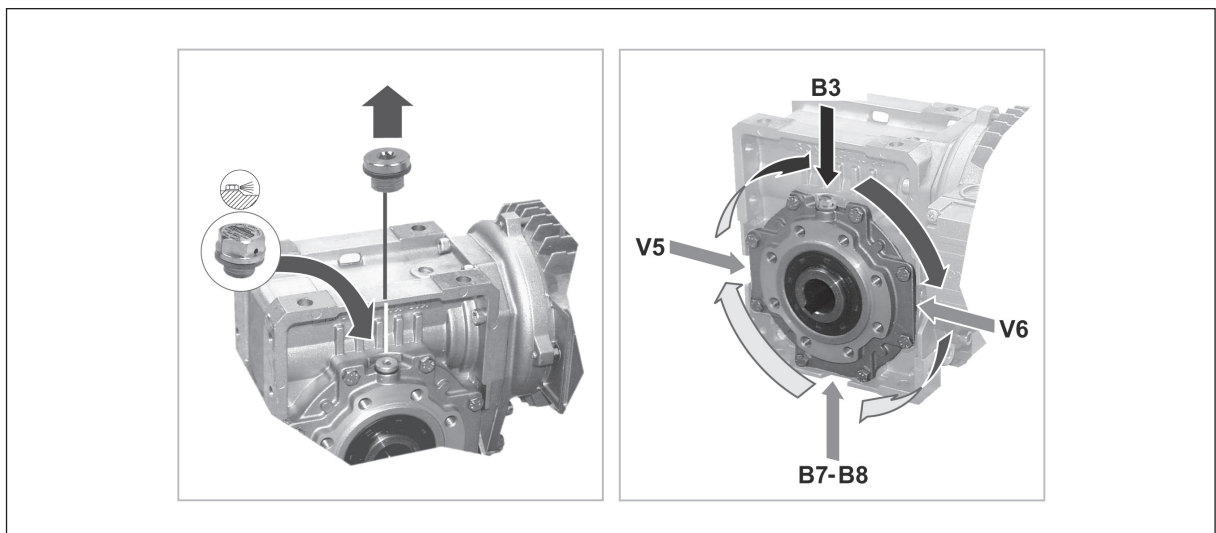
- b) Before being paint coated, any machined surfaces and the outer face of the oil seals must be protected to prevent paint drying out the rubber and jeopardising the sealing function.
- c) Parts fitted on the gearbox output shaft must be machined to ISO H7 tolerance to prevent interference fits that 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 LUBRICATION

Life lubricated gearboxes do not require any periodical oil changes.

Refer to the User's Manual available at www.bonfiglioli.com for indications about checking the oil level and its replacement for other types of gearboxes.

Do not mix mineral oils with synthetic oils and/or different brands.

However, oil level should be checked at regular intervals and topped up as required.

Check monthly if unit operates under intermittent duty, more frequently if duty is continuous.

7.1 Selection of the optimal oil viscosity (data relating to Shell Oils)

		Operating ambient temperature [C°]																		
		-40	-35	-30	-25	-20	-15	-10	-5	0	+5	+10	+15	+20	+25	+30	+35	+40	+45	+50
		suitability seals check				standard seals provided in the catalog														
Splash lubrication	Mineral oil	150 VG							*											
		220 VG	⊘						*											☎
		320 VG								*										
		460 VG									*									
	Synthetic oil (PAG)	150 VG				*														☎
		220 VG	⊘			*														
		320 VG				*														
	Synthetic oil (PAO)	150 VG				*														☎
		220 VG	⊘			*														
		320 VG				*														

Recommended operating limits

Allowed operating limits. ☎

Forbidden operating limits.

* = It is recommended to ramp-up and to provide for greater absorption of the motor.

If needed and in the event of impulse loads, contact Bonfiglioli Technical Service. ☎



7.2 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.



8 STORAGE

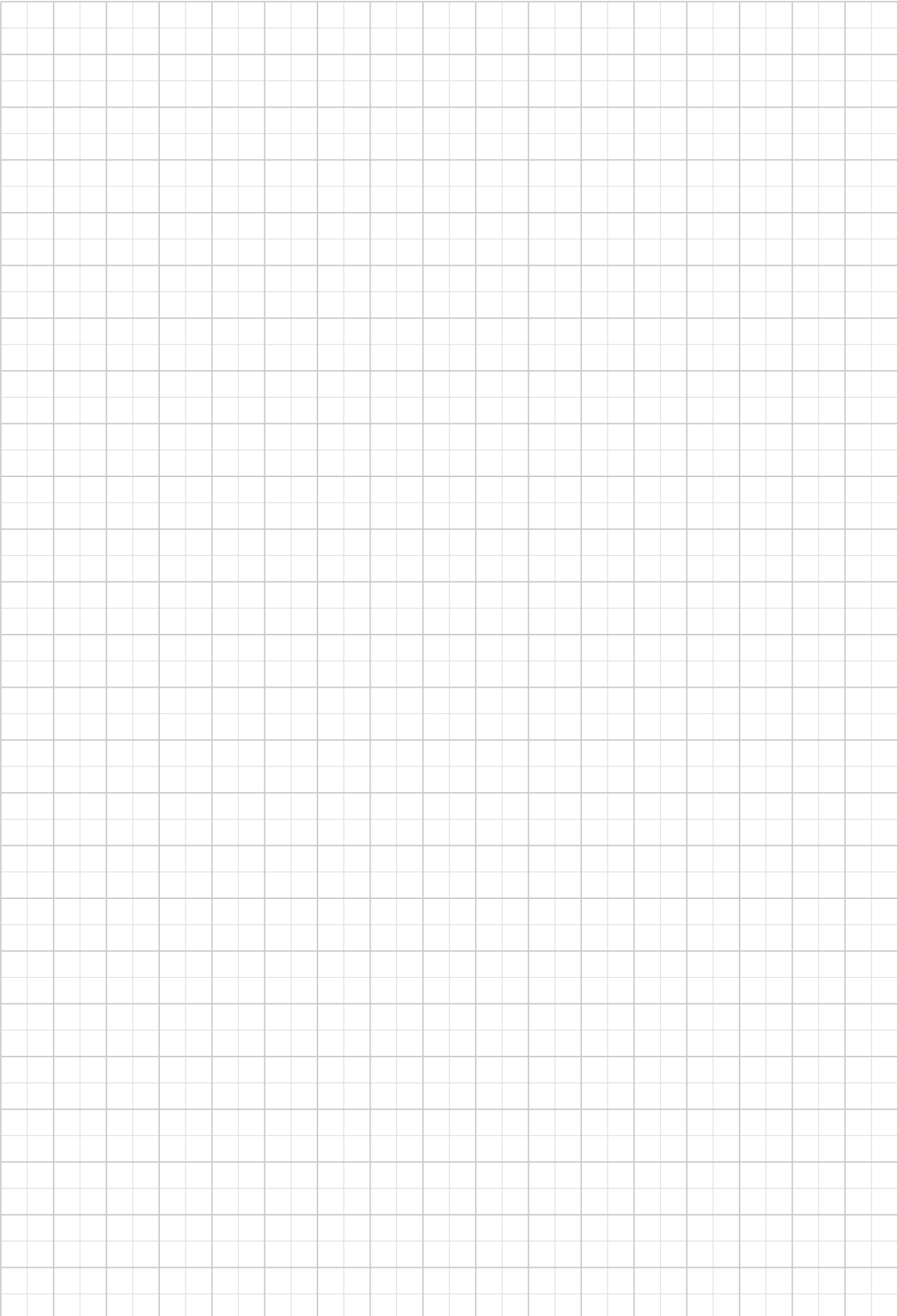
Observe the following instructions to ensure correct storage of the products:

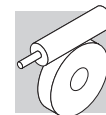
- a) Do not store outdoors, in areas exposed to weather or with excessive humidity.
- b) Always place boards, wood or other material between the products and the floor. The gearboxes should not have direct contact with the floor.
- c) In case of long-term storage all machined surfaces such as flanges, 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.

9 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).





WORMGEARS

10 DESIGN FEATURES

10.1 Key features common to all Bonfiglioli worm gears

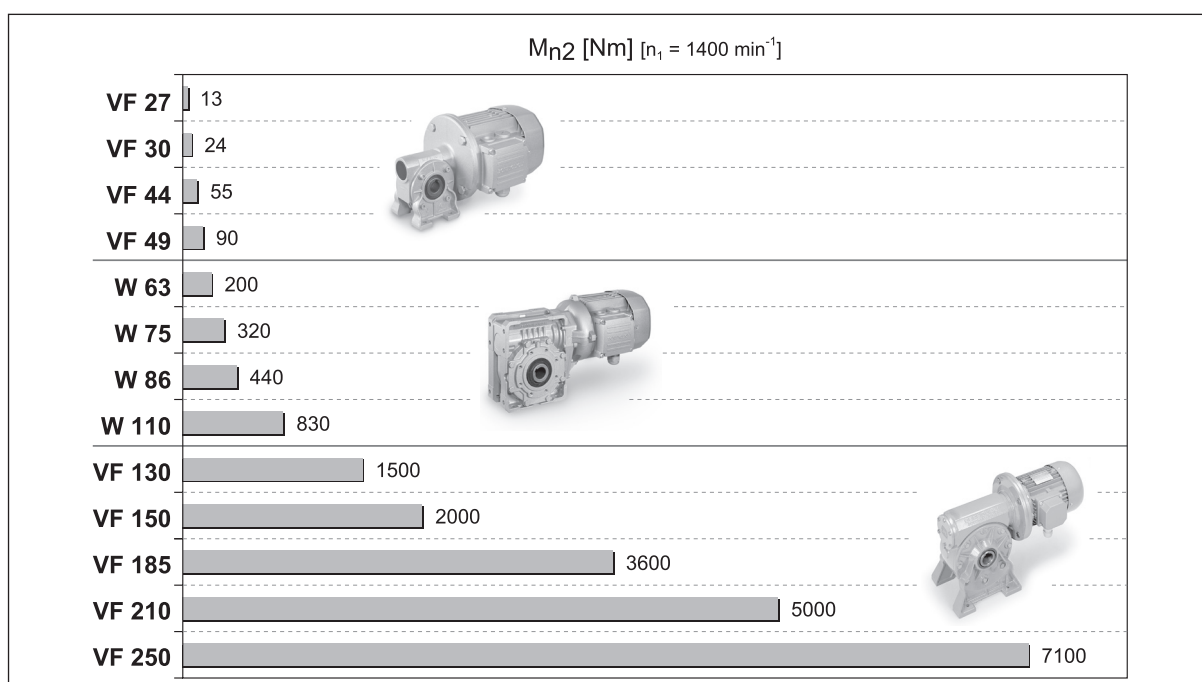
- Symmetrical hollow output shaft for facilitated mounting of the gear unit and plug-in shafts (after-sales kit only) on either side.
- Ground finished wormshafts and precise machining lend optimal efficiency and extremely low noise in operation.
- Numerous product configurations allow for foot, flange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

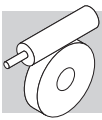
10.2 Key features of VF-style worm gears

- 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.

10.3 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.





11 VERSIONS

VF_		W_	
	<p>N VF 27 ... VF 250</p> <p>Foot mounted, underdriven</p>		<p>U W 63 ... W 110</p> <p>Universal gear case</p>
	<p>A VF 27 ... VF 250</p> <p>Foot mounted, overdriven</p>		
	<p>V VF 27 ... VF 250</p> <p>Foot mounted, wormshaft vertical</p>		
<p>F1 F2 FA1 FA2</p>	<p>F VF 27 ... VF 185</p> <p>Standard flange</p> <p>FA VF 44 ... VF 49</p> <p>Extended output flange</p>	<p>UF1 UF2</p>	<p>UF W 63 ... W 110</p> <p>Standard mounting flange</p>
<p>FC1 FC2 FR1 FR2</p>	<p>FC VF 130 ... VF 185</p> <p>Short flange</p> <p>FR VF 130 ... VF 185</p> <p>Short flange and reinforced bearings</p>		
<p>P1 P2 (VF 30...VF 250) (VF 130...VF 185)</p>	<p>P VF 30 ... VF 250</p> <p>Side cover for shaft mounting</p> <p>P1 = P2 VF 30 ... VF 49 VF 210, VF 250</p>	<p>UFC1 UFC2 UFCR1 UFCR2</p>	<p>UFC W 63 ... W 110</p> <p>Mounting flange reduced in length</p> <p>UFCR W 75</p> <p>Mounting flange reduced in length and diameter</p>
	<p>U VF 30 ... VF 49</p> <p>Foot mount</p>		

For combined gearboxes VF/VF, VF/W and W/VF, the versions refer to the second gearbox (machine side).



12 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_ UFR1_								
N								
A								
V								
F1 FA1 FC1 FR1								
F2 FA2 FC2 FR2								
P1								
P2								

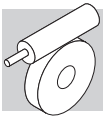
Shaft-mount cover



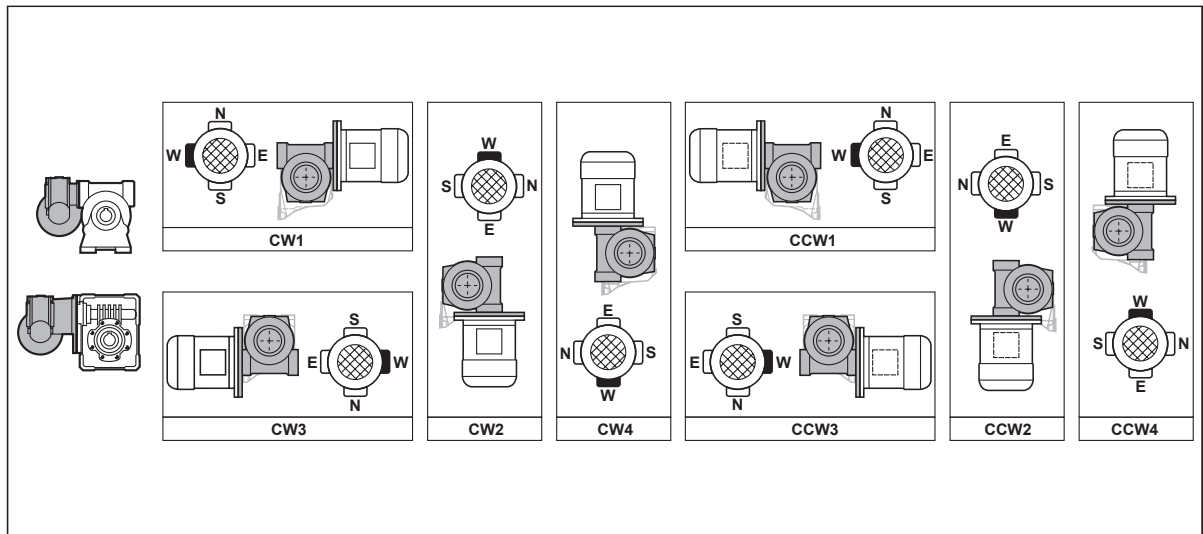
For units with the HS input (free shaft), all the mounting options shown are available.
 For units with the P (IEC), certain mounting options can be obtained only by using IEC flanges (B5 or B14) of the same size or smaller than those shown in following table.

		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				90B5-90B14	
	P1				90B5-90B14	
	F2	90B5-90B14	71B5-90B14	71B5-90B14	90B5-90B14	90B5-90B14
	FC2-FR2			90B5-90B14		
P2			90B5-90B14			
W/VF86/150	N	112B5-112B14	112B5-112B14	71B5-112B14	71B5-112B14	71B5-112B14
	A	112B5-112B14	90B5-112B14	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		90B5-112B14		112B5-112B14	
	P1		90B5-112B14		112B5-112B14	
	F2	112B5-112B14	71B5-90B14	71B5-90B14	112B5-112B14	112B5-112B14
	FC2-FR2		90B5-112B14	112B5-112B14		
P2			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	112B5-112B14
	V	112B5-90B14				90B5-112B14
	F1	112B5-112B14	90B5-112B14	112B5-112B14	90B5-112B14	112B5-112B14
	FC1-FR1				112B5-112B14	
	P1				112B5-112B14	
	F2	112B5-112B14	90B5-112B14	90B5-112B14	112B5-112B14	112B5-112B14
	FC2-FR2			112B5-112B14		
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



12.1 Terminal box position





13 DESIGNATION

GEAR UNIT


W 63 L1 UF1 — 24 S2 — B3

OPTIONS

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

MOTOR MOUNTING

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

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							

GEAR RATIO

SHAFT BORE

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

VERSION

TORQUE LIMITER

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

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
AC/DC
NB, SB, NBR, SBR

BRAKE HAND RELEASE
R, RM

BRAKE TORQUE

BRAKE TYPE
FD (d.c. brake)
FA (a.c. brake)

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

MOTOR MOUNTING
— (compact motor)
B5, B14 (IEC - motor)

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
1SC ... 3LB (compact motor)
56A ... 180L (IEC motor) BN 27, BN 44 (special motors)

MOTOR TYPE

M = compact 3-phase
BN = IEC 3-phase

ME = compact 3-phase, class IE2
BE = IEC 3-phase, class IE2

MX = compact 3-phase, class IE3
BX = IEC 3-phase, class IE3



14 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

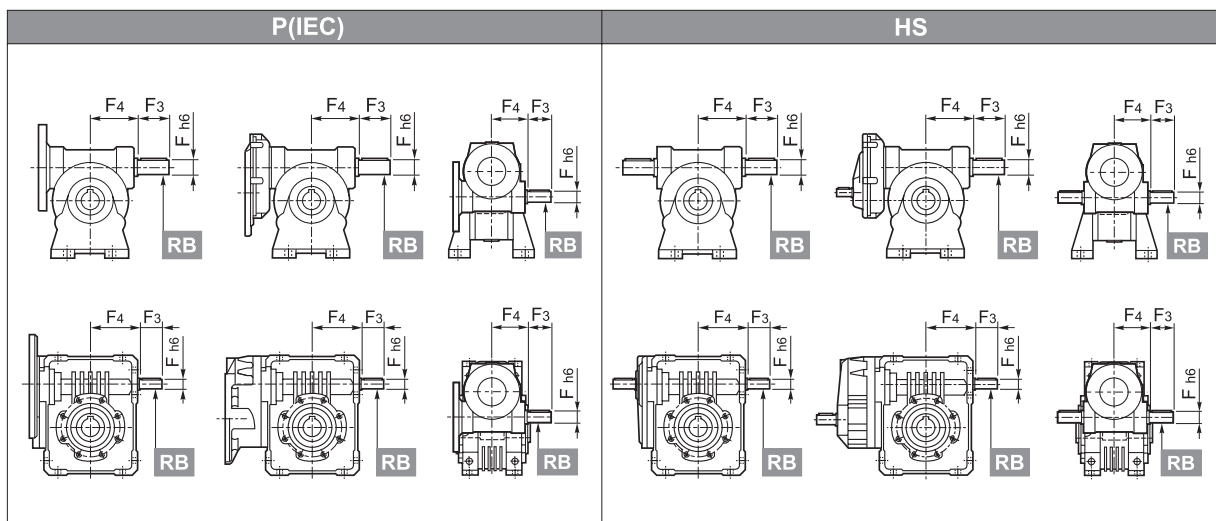
Gearboxes VF 130...VF 250 and W 110, usually supplied unlubricated, to be filled with synthetic oil currently used by BONFIGLIOLI RIDUTTORI according to the mounting position specified.

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

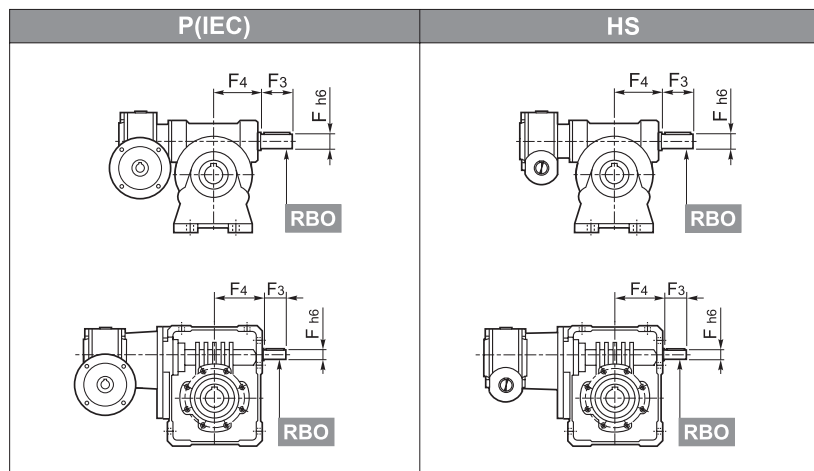
Double-ended input shaft at non-drive- end (with the exception of VF 27).





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	30	9	10.2	3	20	50	—	
	VFR	44	11	12.5	4	30	56	—	
	VF/VF	49	16	18	5	40	65	M6	
	W	63	18	20.5	6	40	74	M6	
		75	19	21.5	6	40	88.5	M6	
		WR	86	25	28	8	50	101.5	M8
	VF/W	110	25	28	8	60	127.5	M8	
		130	30	33	8	60	160	M8	
	VF	150	35	38	10	65	185	M8	
		VFR	185	40	43	12	70	214.5	M8
		W/VF	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

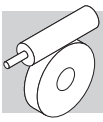
Oil seals from Fluoro elastomer compound on both the input and the output shaft, barring all VF 30's c/w option RB and VF 30_HS.

KA

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

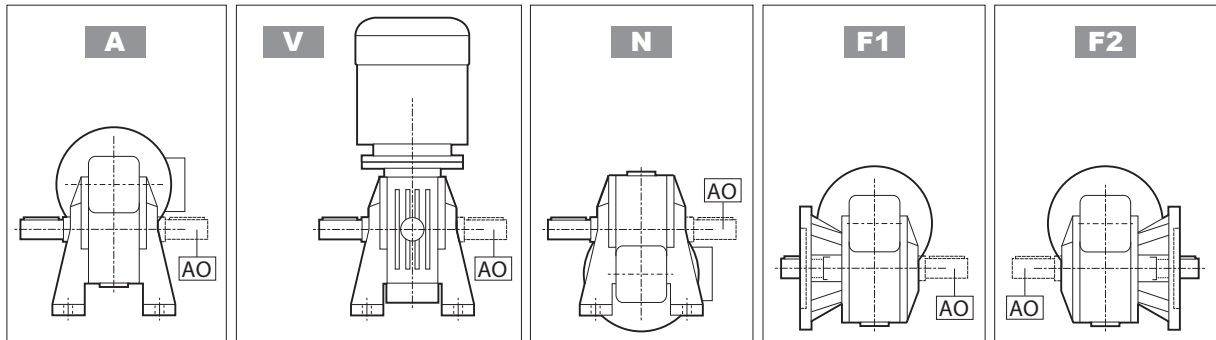
KV

VF_V interchangeability kit (barring W + option RB and W 110 in B6 mounting position). Option is available for units W 63 to W 110.



AO

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



SURFACE PROTECTION

When no specific protection class is requested, the painted (ferrous) surfaces of gearboxes are protected to at least corrosivity class C2 (UNI EN ISO 12944-2). For improved resistance to atmospheric corrosion, gearboxes can be delivered with **C3** and **C4** surface protection, obtained by painting the complete gearbox.

SURFACE PROTECTION	Typical environments	Maximum surface temperature	Corrosivity class according to UNI EN ISO 12944-2
C3	Urban and industrial environments with up to 100% relative humidity (medium air pollution)	120°C	C3
C4	Industrial areas, coastal areas, chemical plant, with up to 100% relative humidity (high air pollution)	120°C	C4

Gearboxes with optional protection to class **C3** or **C4** are available in a choice of colours.

If no specific colour is requested (see the "PAINTING" option) gearboxes are finished in RAL 7042.

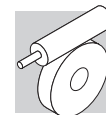
Gearboxes can also be supplied with surface protection for corrosivity class **C5** according to UNI EN ISO 12944-2. Contact our Technical Service for further details.

PAINTING

Gearboxes with optional protection to class C3 or C4 are available in the colours listed in the following table.

PAINTING	Colour	RAL number
RAL7042*	Traffic Grey A	7042
RAL5010	Gentian Blue	5010
RAL9005	Jet Black	9005
RAL9006	White Aluminium	9006
RAL9010	Pure White	9010

* Gearboxes are supplied in this standard colour if no other colour is specified.



NOTE – “PAINTING” options can only be specified in conjunction with “SURFACE PROTECTION” options.

CERTIFICATES

AC - Certificate of compliance

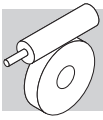
The document certifies the compliance of the product with the purchase order and the construction in conformity with the applicable procedures of the Bonfiglioli Quality System.

CC - Inspection certificate

The document entails checking on order compliance, the visual inspection of external conditions and of mating dimensions. Checking on main functional parameters in unloaded conditions is also performed along with oil seal proofing, both in static and in running conditions. Units inspected are sampled within the shipping batch and marked individually.

Motor options

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



15 MOUNTING POSITION AND TERMINAL BOX ANGULAR LOCATION

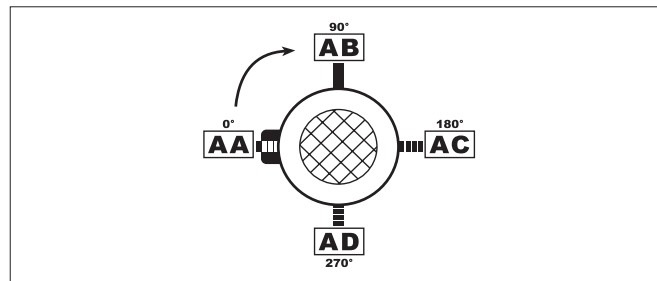
Location of motor terminal box can be specified by viewing the motor from the fan side; standard location is shown in black (W).

The terminal box positions indicated do not apply to VFR 44. Please refer to page 21 and pages 112-113 for designation and identification of design version.

Angular location of the brake release lever.

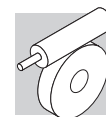
Unless otherwise specified, brake motors have the manual device side located, 90° apart from terminal box.

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.

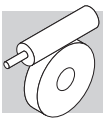


VF 27 _ ... VF 49 _ VFR 44 _ , VFR 49 _

				_HS	_S - _P (IEC)		
A	B3	B7	V5				← VF
	B6	B8	V6				← VFR
N	B3	B7	V5				← VF
	B6	B8	V6				← VFR
V	B3	B7	V5				← VF
	B6	B8	V6				← VFR
P	B3	B7	V5				← VF
	B6	B8	V6				← VFR
F	B3	B7	V5				← VF
	B6	B8	V6				← VFR
U	B3	B7	V5				← VF
	B6	B8	V6				← VFR

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.



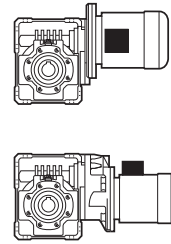
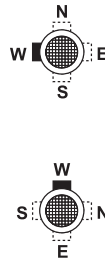
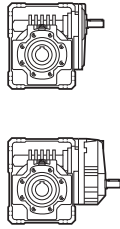
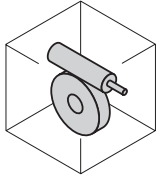
W 63 U ... W 110 U

WR 63 U ... WR 110 U

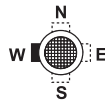
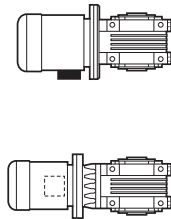
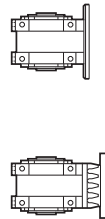
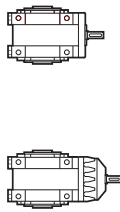
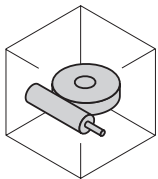
_HS

_S - _P (IEC)

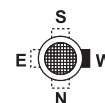
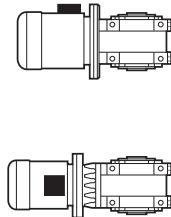
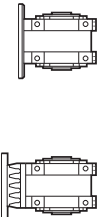
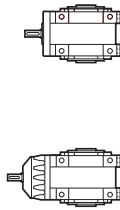
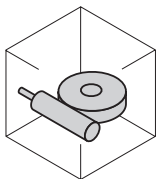
B3



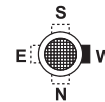
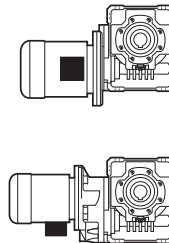
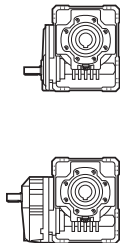
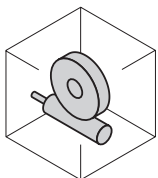
B6



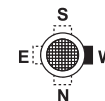
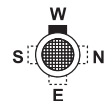
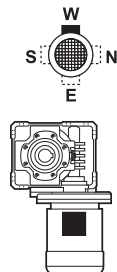
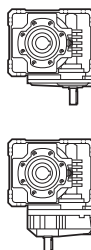
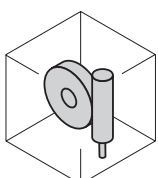
B7



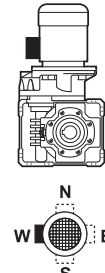
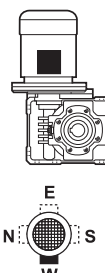
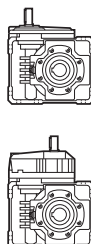
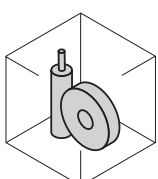
B8

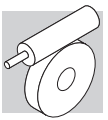


V5



V6



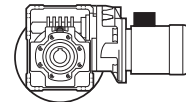
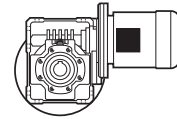
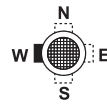
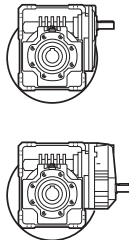
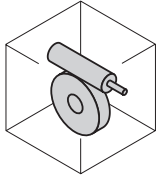


W 63 UF/UFC ... W 110 UF/UFC WR 63 UF/UFC ... WR 110 UF/UFC

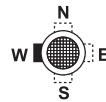
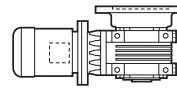
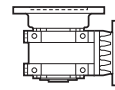
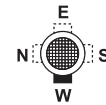
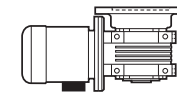
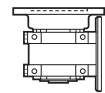
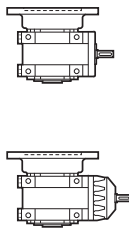
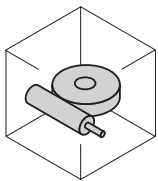
_HS

_S - _P (IEC)

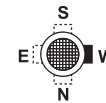
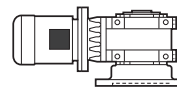
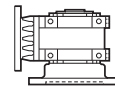
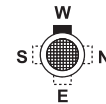
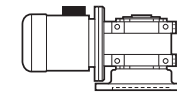
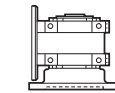
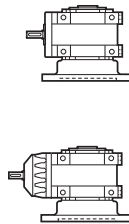
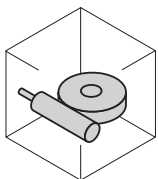
B3



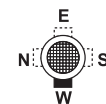
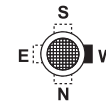
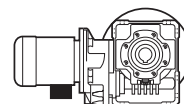
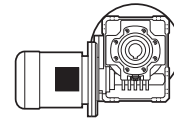
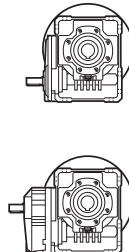
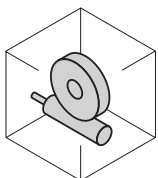
B6



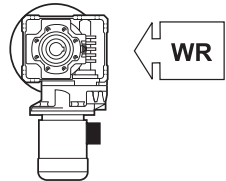
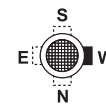
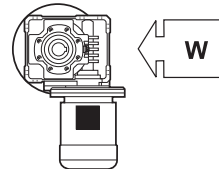
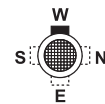
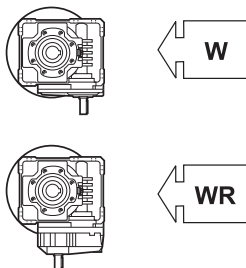
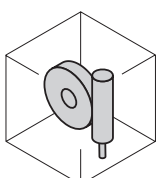
B7



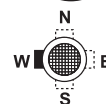
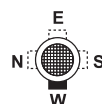
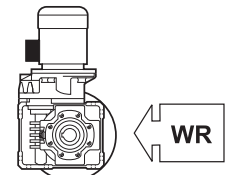
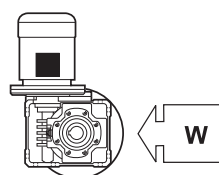
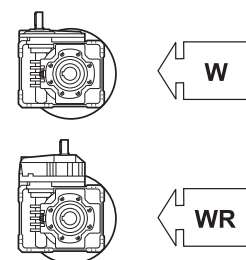
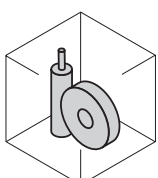
B8

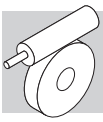


V5



V6





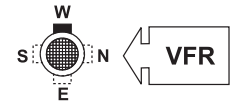
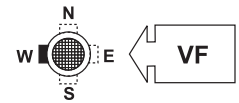
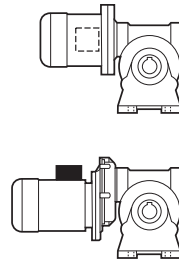
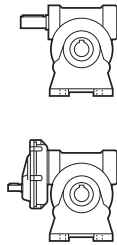
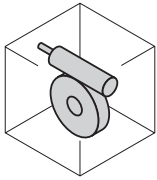
VF 130 A ... VF 250 A

VFR 130 A ... VFR 250 A

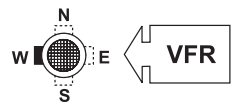
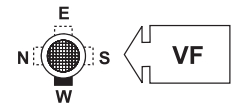
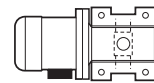
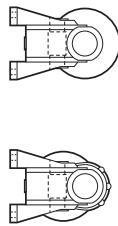
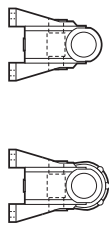
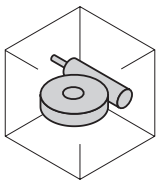
_HS

_P (IEC)

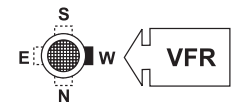
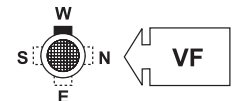
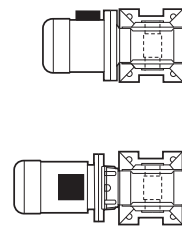
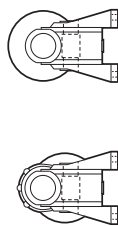
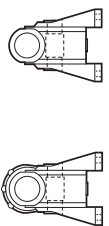
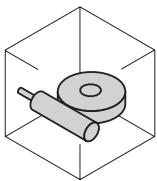
B3



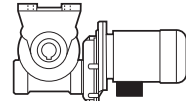
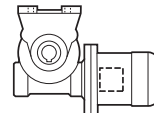
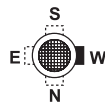
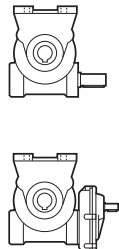
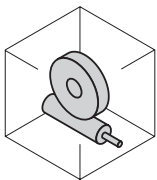
B6



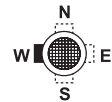
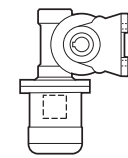
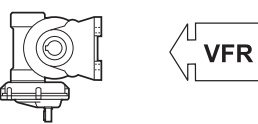
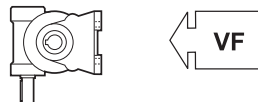
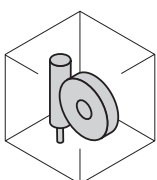
B7



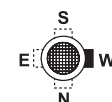
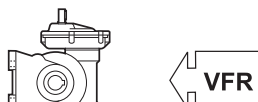
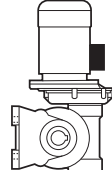
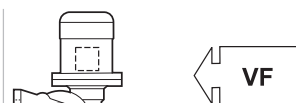
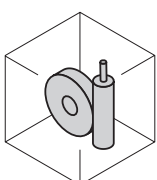
B8



V5



V6





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

	_HS		_P (IEC)	
B3				
B6				
B7				
B8				
V5				
V6				



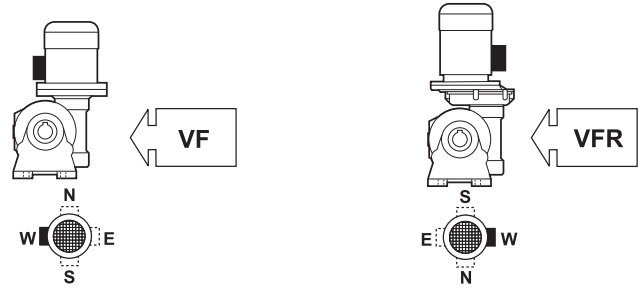
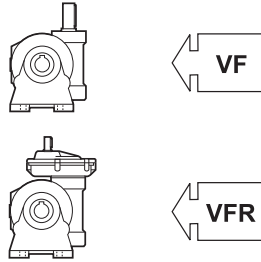
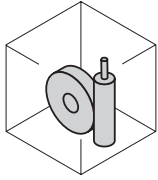
VF 130 V ... VF 250 V

VFR 130 V ... VFR 250 V

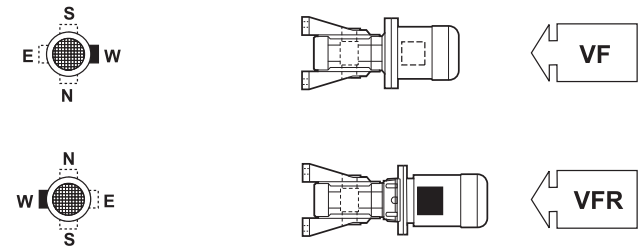
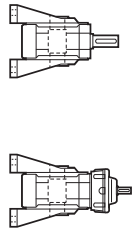
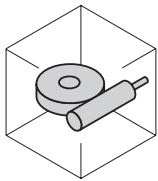
_HS

_P (IEC)

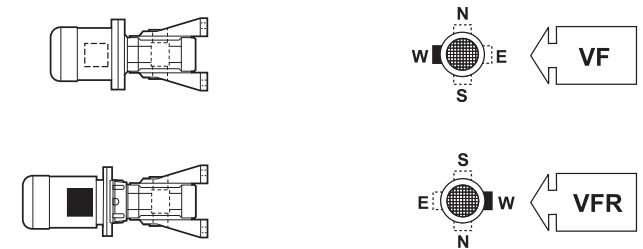
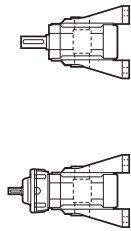
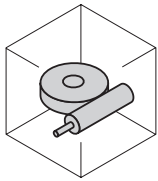
B3



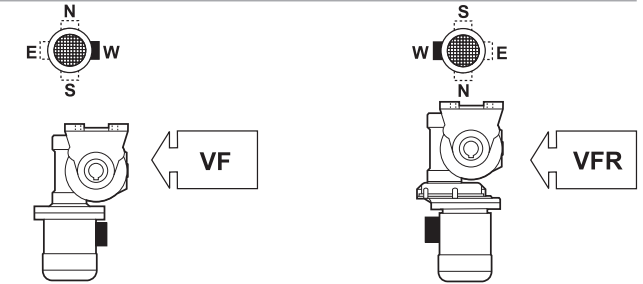
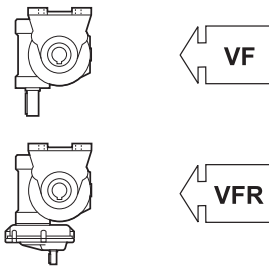
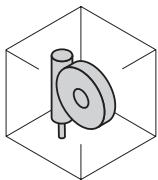
B6



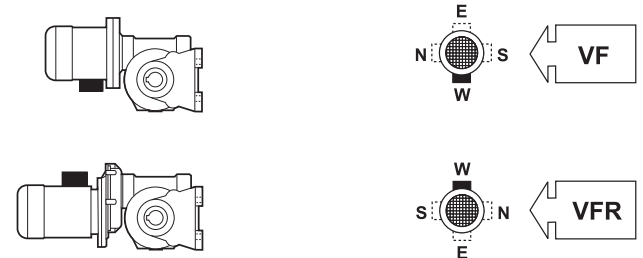
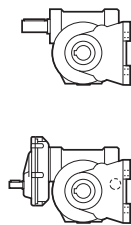
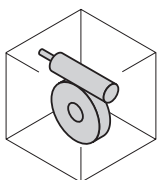
B7



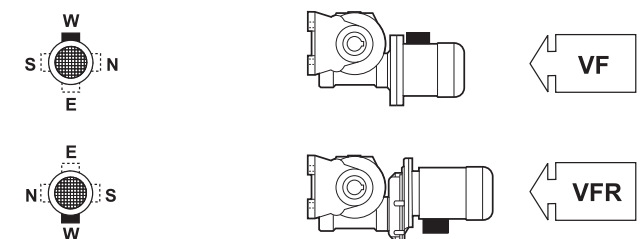
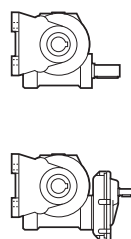
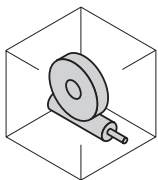
B8

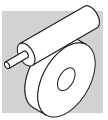


V5



V6



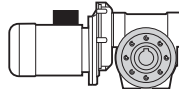
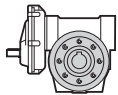
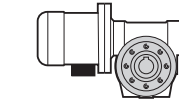
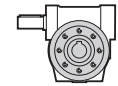
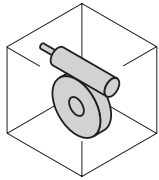


VF 130 P ... VF 250 P VFR 130 P ... VFR 250 P

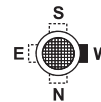
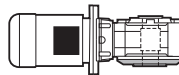
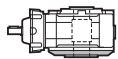
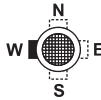
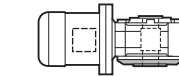
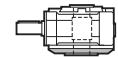
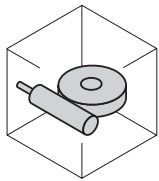
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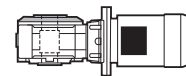
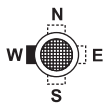
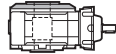
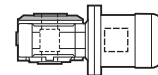
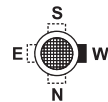
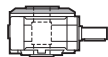
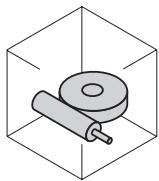
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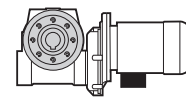
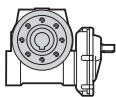
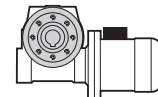
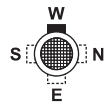
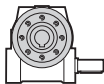
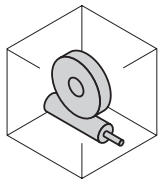
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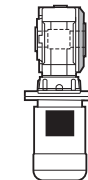
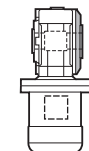
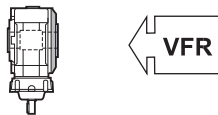
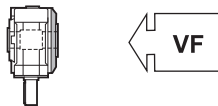
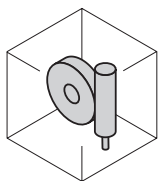
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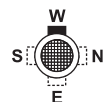
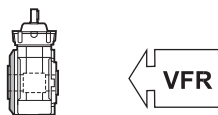
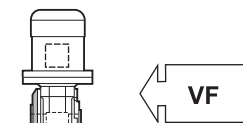
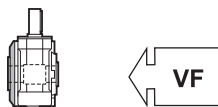
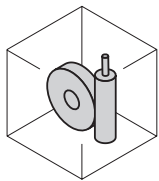
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V5



V6





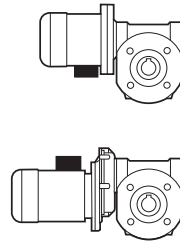
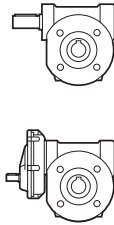
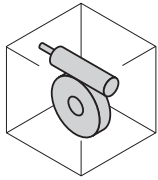
VF 130 F ... VF 250 F

VFR 130 F ... VFR 250 F

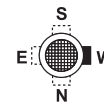
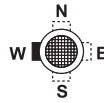
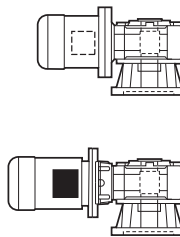
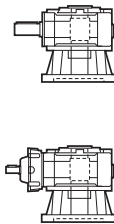
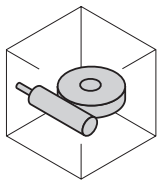
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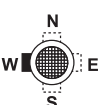
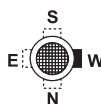
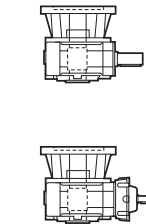
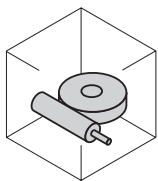
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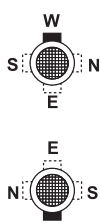
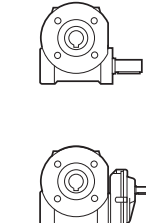
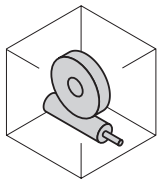
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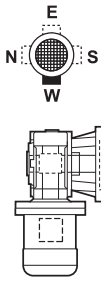
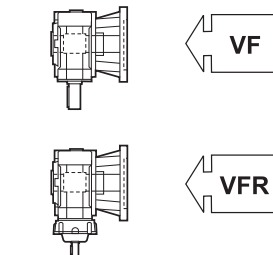
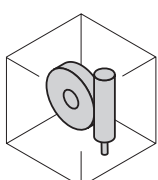
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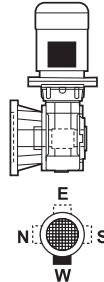
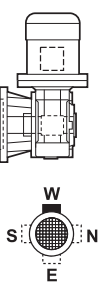
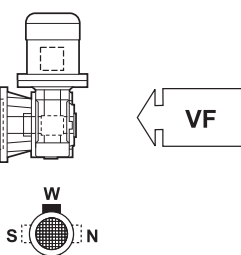
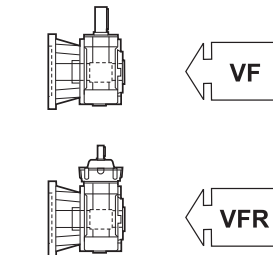
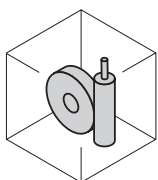
B8



V5



V6





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.

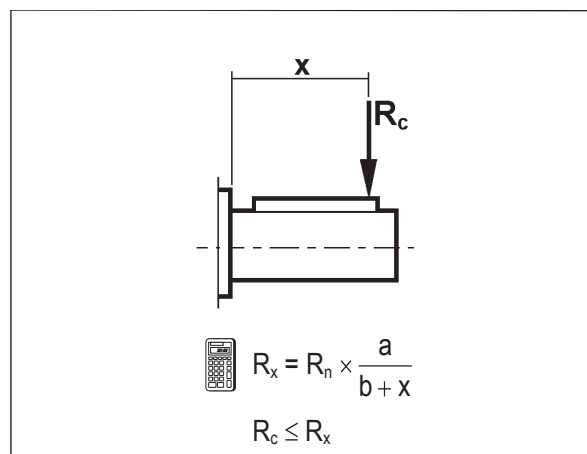
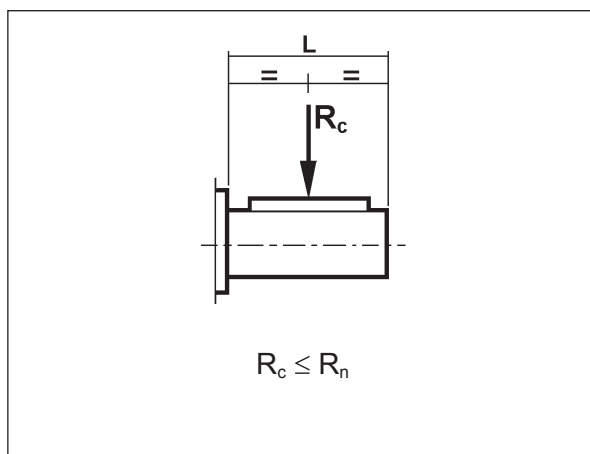
In the formulas given below, index (1) applies to parameters relating to input shaft, whereas index (2) refers to output shaft.

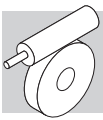
The load generated by an external transmission can be calculated with close approximation by the following equation:

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

$K_r = 1$		M [Nm]	
$K_r = 1.25$		d [mm]	
$K_r = 1.5 - 2.0$			

16.2 Overhung loading verification





16.3 Load location factor

	Output shaft		$R_{n2} \text{ max}$ [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:

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

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 [An] amounts to 50% of rated OHL [Rn] on same shaft.

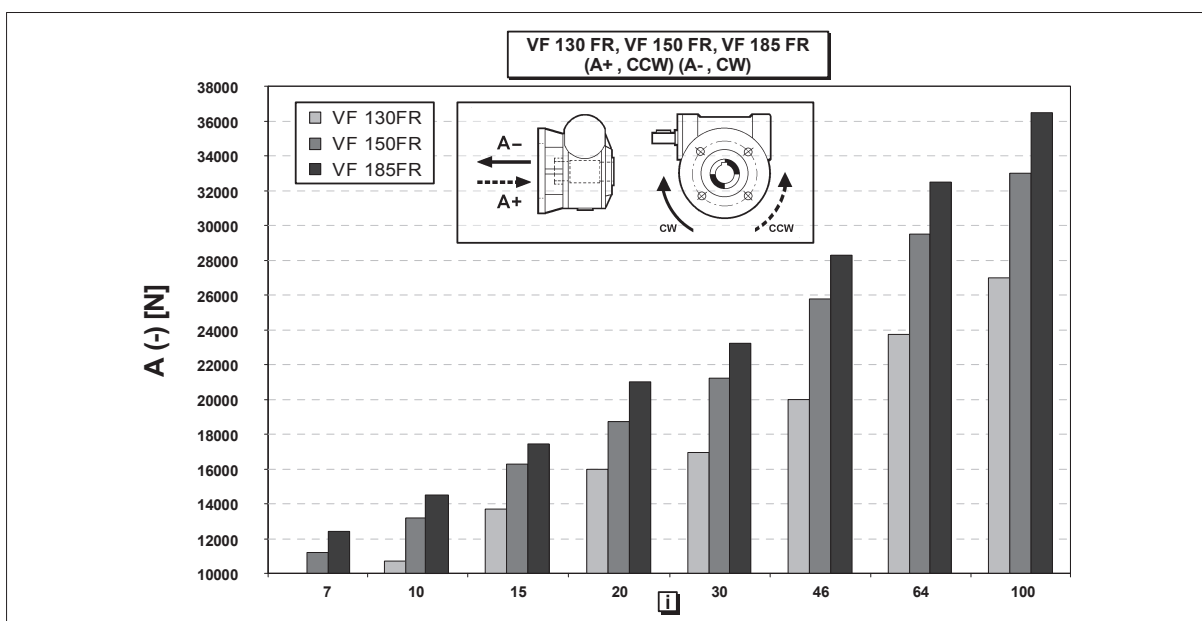
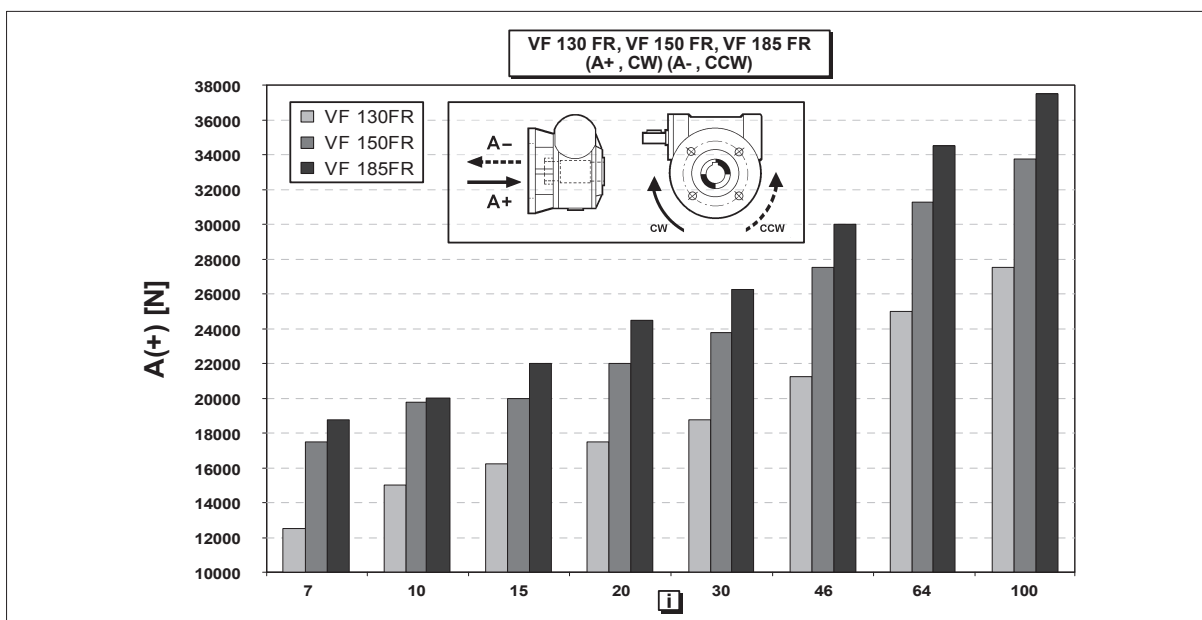
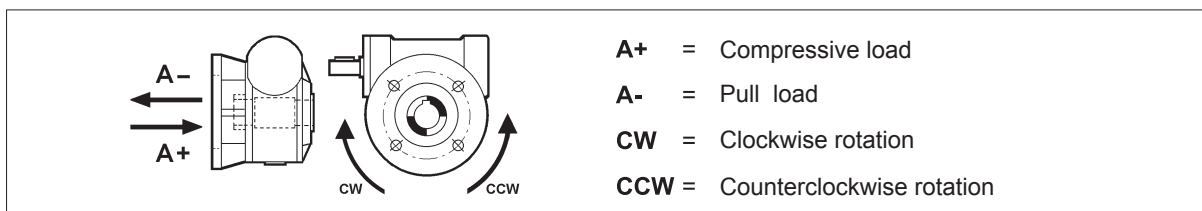
Where thrust loads exceed permissible value or largely prevail over radial loads, contact Bonfiglioli Riduttori for an in-depth analysis of the application.

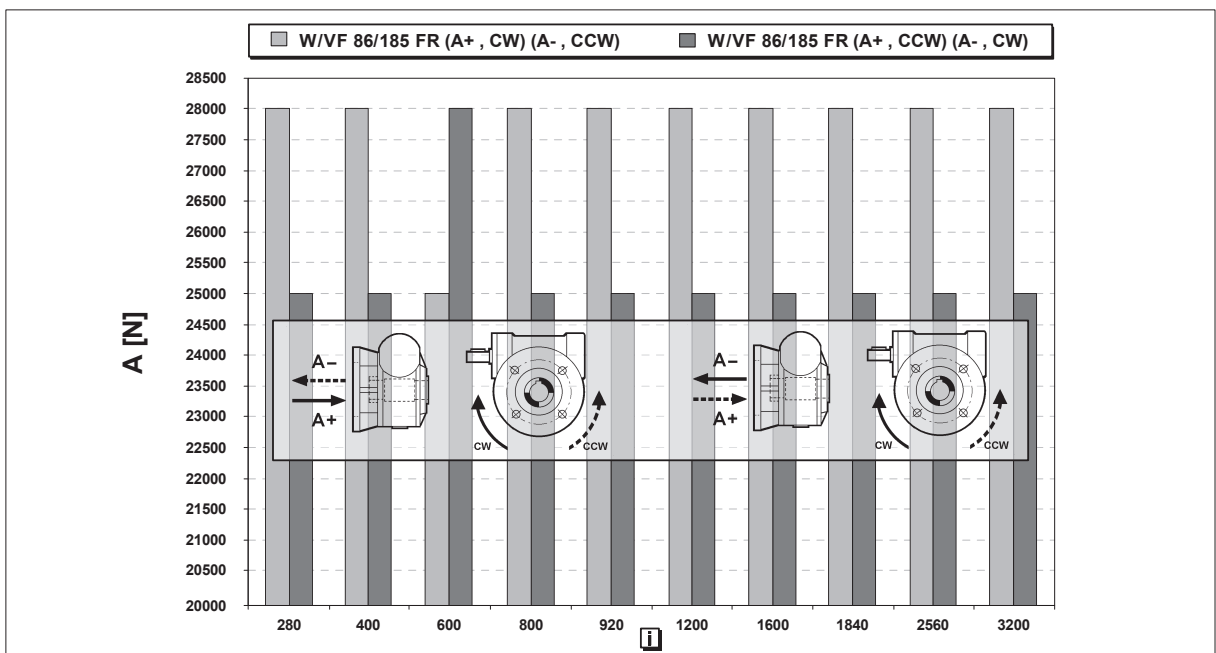
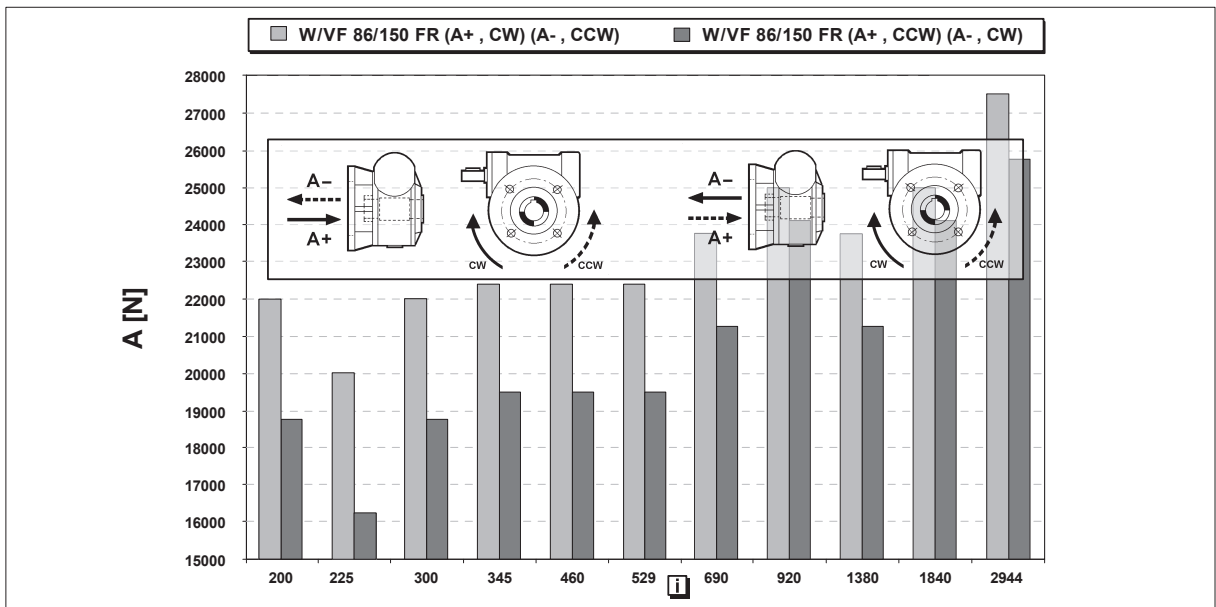
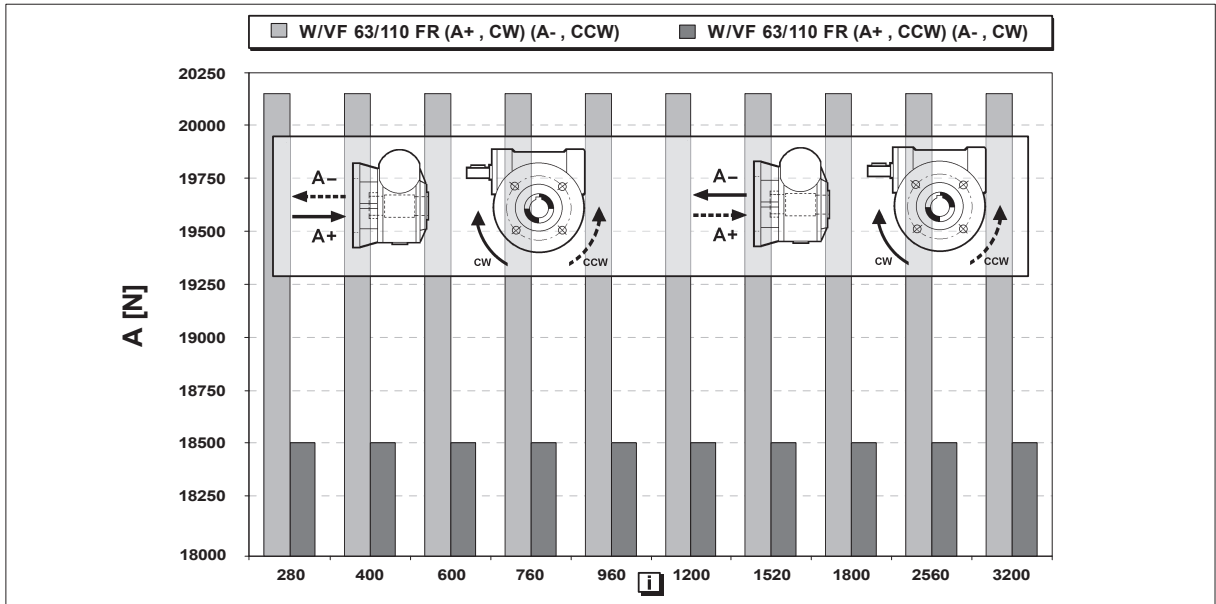


17.1 Maximum axial loading for FR version

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.







18 EFFICIENCY

Efficiency [η] depends on the following parameters:

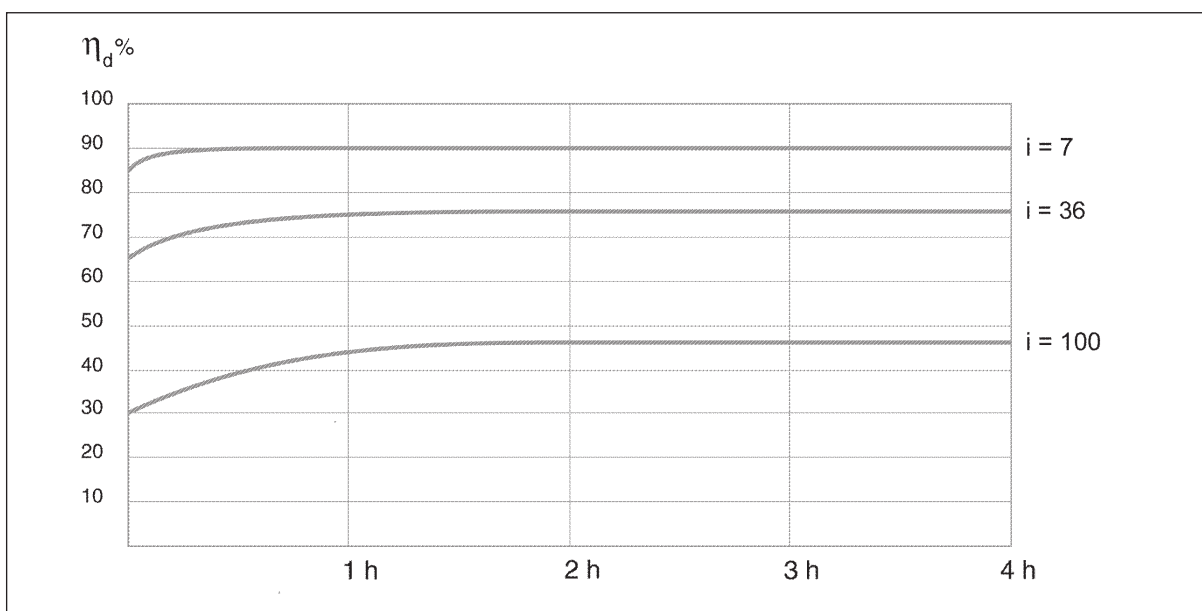
- helix angle of gearing
- driving speed
- running-in of gearing

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 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 greater 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 23	10 15 20 23	10 15 20 23
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 60	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		



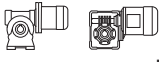

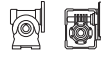


21 GEARMOTOR RATING CHARTS



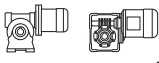

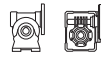


The selection of motors without brake takes into account the requirements of Regulation EC 640/2009 (see section **M** of this catalogue). When the motor rated power is below 0.75kW, BN/M motors can be provided.

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 BX, BE, MX and ME brakemotors are available on request.

0.04 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE1		 IEC 	
19.3	9	1.0	70	600			VF 27_70 P27 BN27A4	107
22.5	8	1.1	60	600			VF 27_60 P27 BN27A4	107
34	6	1.4	40	600			VF 27_40 P27 BN27A4	107
45	5	1.7	30	600			VF 27_30 P27 BN27A4	107
68	4	2.2	20	600			VF 27_20 P27 BN27A4	107
90	3	2.8	15	600			VF 27_15 P27 BN27A4	107
135	2	3.8	10	600			VF 27_10 P27 BN27A4	107
193	2	5.5	7	600			VF 27_7 P27 BN27A4	107

0.06 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE1		 IEC 	
0.59	203	1.0	2280	5000			VF/W 30/63_2280 P56 BN56A4	125
0.89	155	1.4	1520	5000			VF/W 30/63_1520 P56 BN56A4	125
1.1	122	1.7	1200	5000			VF/W 30/63_1200 P56 BN56A4	125
1.5	115	1.8	900	5000			VF/W 30/63_900 P56 BN56A4	125
1.9	113	1.9	720	5000			VF/W 30/63_720 P56 BN56A4	125
2.5	85	1.1	540	3450			VF/VF 30/49_540 P56 BN56A4	120
2.8	50	1.0	500	5000			VFR 44_500 S44 BN44B4	112
3.2	73	1.3	420	3450			VF/VF 30/49_420 P56 BN56A4	120
4.0	54	1.0	350	5000			VFR 44_350 S44 BN44B4	112
4.3	53	1.8	315	3450			VF/VF 30/49_315 P56 BN56A4	120
4.5	59	1.0	300	2500			VFR 44_300 S44 BN44B4	112
5.8	50	1.2	230	2500			VFR 44_230 S44 BN44B4	112
7.7	42	1.5	175	2500			VFR 44_175 S44 BN44B4	112
9.6	36	1.4	140	2500			VFR 44_140 S44 BN44B4	112
13.4	29	1.8	100	2500			VFR 44_100 S44 BN44B4	112
19.1	22	1.8	70	2500			VFR 44_70 S44 BN44B4	112
19.3	14	1.1	70	1600			VF 30_70 P56 BN56A4	108
22.5	13	1.5	60	1600			VF 30_60 P56 BN56A4	108
34	10	0.9	40	600			VF 27_40 P27 BN27B4	107
34	10	1.9	40	1650			VF 30_40 P56 BN56A4	108



0.06 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	IE1		IE1			
45	8	1.1	30	600			VF 27_30	P27	BN27B4	107
45	8	2.4	30	1340			VF 30_30	P56	BN56A4	108
68	6	1.5	20	600			VF 27_20	P27	BN27B4	107
68	6	2.9	20	1180			VF 30_20	P56	BN56A4	108
90	5	1.9	15	600			VF 27_15	P27	BN27B4	107
90	5	3.7	15	1080			VF 30_15	P56	BN56A4	108
135	4	2.6	10	590			VF 27_10	P27	BN27B4	107
135	3	4.7	10	950			VF 30_10	P56	BN56A4	108
193	2	3.6	7	530			VF 27_7	P27	BN27B4	107
193	2	6.4	7	840			VF 30_7	P56	BN56A4	108

0.09 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	IE1		IE1			
0.31	574	1.8	2800	8000			VF/W 49/110_2800	P63	BN63A6	137
0.42	579	1.0	2116	7000			VF/W 44/86_2116	P63	BN63A6	133
0.43	505	2.1	2070	8000			VF/W 49/110_2070	P63	BN63A6	137
0.48	503	1.1	1840	7000			VF/W 44/86_1840	P63	BN63A6	133
0.53	485	2.2	1656	8000			VF/W 49/110_1656	P63	BN63A6	137
0.64	377	1.5	1380	7000			VF/W 44/86_1380	P63	BN63A6	133
0.65	369	2.8	1350	8000			VF/W 49/110_1350	P63	BN63A6	137
0.73	363	1.1	1200	5750			VF/W 44/75_1200	P63	BN63A6	129
0.81	316	3.3	1080	8000			VF/W 49/110_1080	P63	BN63A6	137
0.89	232	0.9	1520	5000			VF/W 30/63_1520	P56	BN56B4	125
0.96	323	1.2	920	5750			VF/W 44/75_920	P63	BN63A6	129
0.96	332	1.7	920	7000			VF/W 44/86_920	P63	BN63A6	133
0.98	255	0.9	900	5000			VF/W 30/63_900	P63	BN63A6	125
1.1	183	1.1	1200	5000			VF/W 30/63_1200	P56	BN56B4	125
1.2	225	1.0	720	5000			VF/W 30/63_720	P63	BN63A6	125
1.3	267	1.5	700	5750			VF/W 44/75_700	P63	BN63A6	129
1.3	253	2.2	700	7000			VF/W 44/86_700	P63	BN63A6	133
1.5	172	1.2	900	5000			VF/W 30/63_900	P56	BN56B4	125
1.7	210	1.9	525	5750			VF/W 44/75_525	P63	BN63A6	129
1.7	200	2.8	525	7000			VF/W 44/86_525	P63	BN63A6	133
1.9	170	1.2	720	5000			VF/W 30/63_720	P56	BN56B4	125
2.2	164	2.4	400	5750			VF/W 44/75_400	P63	BN63A6	129
2.2	160	3.4	400	7000			VF/W 44/86_400	P63	BN63A6	133
2.4	145	1.4	570	5000			VF/W 30/63_570	P56	BN56B4	125
2.9	111	1.2	300	5000			WR 63_300	P63	BN63A6	124
2.9	120	1.7	300	6200			WR 75_300	P63	BN63A6	128
2.9	132	2.4	300	7000			WR 86_300	P63	BN63A6	132
3.0	117	1.8	450	5000			VF/W 30/63_450	P56	BN56B4	125
3.2	110	0.9	420	3450			VF/VF 30/49_420	P56	BN56B4	120
3.7	101	1.4	240	5000			WR 63_240	P63	BN63A6	124
3.7	105	2.1	240	6200			WR 75_240	P63	BN63A6	128
3.7	117	2.6	240	7000			WR 86_240	P63	BN63A6	132
4.2	84	0.9	210	3450			VFR 49_210	P63	BN63A6	118
4.3	80	1.2	315	3450			VF/VF 30/49_315	P56	BN56B4	120
4.3	84	2.5	315	5000			VF/W 30/63_315	P56	BN56B4	125
4.6	88	1.7	192	5000			WR 63_192	P63	BN63A6	124
4.9	79	0.9	180	3450			VFR 49_180	P63	BN63A6	118
4.9	90	3.1	180	6200			WR 75_180	P63	BN63A6	128
5.2	94	4.2	168	7000			WR 86_168	P63	BN63A6	132
5.5	62	1.0	245	2500			VF/VF 30/44_245	P56	BN56B4	114
6.5	66	1.2	135	3450			VFR 49_135	P63	BN63A6	118
6.5	71	2.5	135	5000			WR 63_135	P63	BN63A6	124
7.7	63	1.0	175	2900			VFR 44_175	S44	BN44C4	112
7.7	65	3.1	114	5000			WR 63_114	P63	BN63A6	124
8.1	58	1.4	108	3450			VFR 49_108	P63	BN63A6	118
8.8	41	1.3	100	3300			VF 49_100	P63	BN63A6	116
9.6	54	0.9	140	2900			VFR 44_140	S44	BN44C4	112
9.8	55	3.8	90	5000			WR 63_90	P63	BN63A6	124
10.5	48	1.9	84	3450			VFR 49_84	P63	BN63A6	118
11.0	37	1.6	80	3300			VF 49_80	P63	BN63A6	116
12.2	45	1.8	72	3450			VFR 49_72	P63	BN63A6	118
12.2	48	4.0	72	5000			WR 63_72	P63	BN63A6	124
12.6	35	1.1	70	2300			VF 44_70	P63	BN63A6	110
12.6	34	1.8	70	3300			VF 49_70	P63	BN63A6	116
13.4	43	1.2	100	2900			VFR 44_100	S44	BN44C4	112



0.09 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	Rn ₂ N	IE1		IE1			
14.7	32	1.4	60	2300			VF 44_60	P63	BN63A6	110
14.7	34	1.7	60	3300			VF 49_60	P63	BN63A6	116
16.3	36	2.2	54	3450			VFR 49_54	P63	BN63A6	118
19.1	33	1.2	70	2900			VFR 44_70	S44	BN44C4	112
19.1	27	1.8	46	2300			VF 44_46	P63	BN63A6	110
19.6	26	2.7	45	3300			VF 49_45	P63	BN63A6	116
21.0	30	2.8	42	3360			VFR 49_42	P63	BN63A6	118
22.0	22	0.9	40	1560			VF 30_40	P63	BN63A6	108
22.5	19	1.0	60	1600			VF 30_60	P56	BN56B4	108
24.4	22	3.4	36	3300			VF 49_36	P63	BN63A6	116
25.1	22	2.2	35	2300			VF 44_35	P63	BN63A6	110
29.3	18	1.2	30	1440			VF 30_30	P63	BN63A6	108
31	18	2.7	28	2300			VF 44_28	P63	BN63A6	110
34	15	1.2	40	1410			VF 30_40	P56	BN56B4	108
44	14	1.5	20	1230			VF 30_20	P63	BN63A6	108
44	14	3.1	20	2300			VF 44_20	P63	BN63A6	110
45	12	1.6	30	1290			VF 30_30	P56	BN56B4	108
59	11	1.8	15	1170			VF 30_15	P63	BN63A6	108
68	9	1.9	20	1140			VF 30_20	P56	BN56B4	108
69	9	1.0	20	600			VF 27_20	P27	BN27C4	107
88	8	2.3	10	1050			VF 30_10	P63	BN63A6	108
90	7	2.5	15	1050			VF 30_15	P56	BN56B4	108
92	7	1.3	15	600			VF 27_15	P27	BN27C4	107
126	6	3.2	7	920			VF 30_7	P63	BN63A6	108
135	5	3.1	10	920			VF 30_10	P56	BN56B4	108
138	5	1.7	10	565			VF 27_10	P27	BN27C4	107
193	4	4.3	7	820			VF 30_7	P56	BN56B4	108
197	4	2.5	7	510			VF 27_7	P27	BN27C4	107

0.12 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	Rn ₂ N	IE1		IE1			
0.31	775	1.4	2800	8000			VF/W 49/110_2800	P63	BN63B6	137
0.47	588	1.7	2800	8000			VF/W 49/110_2800	P63	BN63A4	137
0.53	654	1.6	1656	8000			VF/W 49/110_1656	P63	BN63B6	137
0.62	518	1.0	2116	7000			VF/W 44/86_2116	P63	BN63A4	133
0.63	507	2.0	2070	8000			VF/W 49/110_2070	P63	BN63A4	137
0.71	483	1.0	1840	7000			VF/W 44/86_1840	P63	BN63A4	133
0.79	435	2.3	1656	8000			VF/W 49/110_1656	P63	BN63A4	137
0.95	386	1.3	1380	7000			VF/W 44/86_1380	P63	BN63A4	133
0.97	354	2.8	1350	8000			VF/W 49/110_1350	P63	BN63A4	137
1.2	293	3.4	1080	8000			VF/W 49/110_1080	P63	BN63A4	137
1.4	322	1.1	920	5750			VF/W 44/75_920	P63	BN63A4	129
1.4	322	1.6	920	7000			VF/W 44/86_920	P63	BN63A4	133
1.5	236	0.9	900	5000			VF/W 30/63_900	P63	BN63A4	125
1.8	233	0.9	720	5000			VF/W 30/63_720	P63	BN63A4	125
1.9	257	1.4	700	5750			VF/W 44/75_700	P63	BN63A4	129
1.9	239	2.1	700	7000			VF/W 44/86_700	P63	BN63A4	133
2.3	199	1.1	570	5000			VF/W 30/63_570	P63	BN63A4	125
2.5	202	1.8	525	5750			VF/W 44/75_525	P63	BN63A4	129
2.5	193	2.6	525	7000			VF/W 44/86_525	P63	BN63A4	133
2.9	150	0.9	300	5000			WR 63_300	P63	BN63B6	124
2.9	162	1.2	300	6200			WR 75_300	P63	BN63B6	128
2.9	178	1.7	300	7000			WR 86_300	P63	BN63B6	132
2.9	161	1.3	450	5000			VF/W 30/63_450	P63	BN63A4	125
3.3	161	2.3	400	5750			VF/W 44/75_400	P63	BN63A4	129
3.3	143	3.5	400	7000			VF/W 44/86_400	P63	BN63A4	133
3.6	136	1.0	240	5000			WR 63_240	P63	BN63B6	124
3.6	142	1.5	240	6200			WR 75_240	P63	BN63B6	128
3.6	142	1.6	240	5000			VF/W 30/63_240	P63	BN63B6	125
3.6	158	2.0	240	7000			WR 86_240	P63	BN63B6	132
4.2	110	0.9	315	3450			VF/VF 30/49_315	P63	BN63A4	120
4.2	116	1.8	315	5000			VF/W 30/63_315	P63	BN63A4	125
4.4	108	1.2	300	5000			WR 63_300	P63	BN63A4	124
4.4	115	1.6	300	6200			WR 75_300	P63	BN63A4	128
4.4	129	2.1	300	7000			WR 86_300	P63	BN63A4	132
4.4	134	2.8	300	5750			VF/W 44/75_300	P63	BN63A4	129
4.8	121	2.3	180	6200			WR 75_180	P63	BN63B6	128
5.2	126	3.1	168	7000			WR 86_168	P63	BN63B6	132
5.2	125	3.0	250	5750			VF/W 44/75_250	P63	BN63A4	129

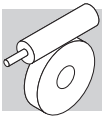


0.12 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	IE1		IE1			
5.5	94	1.0	240	3450			VF/VF 30/49_240	P63	BN63A4	120
5.5	97	1.4	240	5000			WR 63_240	P63	BN63A4	124
5.5	103	2.1	240	6200			WR 75_240	P63	BN63A4	128
5.5	99	2.1	240	5000			VF/W 30/63_240	P63	BN63A4	125
5.5	111	2.7	240	7000			WR 86_240	P63	BN63A4	132
5.8	109	2.9	150	6200			WR 75_150	P63	BN63B6	128
6.4	89	0.9	135	3300			VFR 49_135	P63	BN63B6	118
6.4	96	1.9	135	5000			WR 63_135	P63	BN63B6	124
6.8	86	1.8	192	5000			WR 63_192	P63	BN63A4	124
7.3	76	0.9	180	3300			VFR 49_180	P63	BN63A4	118
7.3	87	2.7	180	6200			WR 75_180	P63	BN63A4	128
8.7	55	0.9	100	3300			VF 49_100	P63	BN63B6	116
9.7	64	1.4	135	3450			VFR 49_135	P63	BN63A4	118
9.7	68	2.5	135	5000			WR 63_135	P63	BN63A4	124
10.9	50	1.2	80	3300			VF 49_80	P63	BN63B6	116
11.5	61	3.0	114	5000			WR 63_114	P63	BN63A4	124
12.1	55	1.5	108	3450			VFR 49_108	P63	BN63A4	118
13.1	41	1.2	100	3150			VF 49_100	P63	BN63A4	116
14.5	43	1.1	60	2300			VF 44_60	P63	BN63B6	110
15.3	53	3.6	57	5000			WR 63_57	P63	BN63B6	124
15.6	46	1.9	84	3450			VFR 49_84	P63	BN63A4	118
16.4	36	1.5	80	3150			VF 49_80	P63	BN63A4	116
18.2	42	1.8	72	3430			VFR 49_72	P63	BN63A4	118
18.7	34	0.9	70	3300			VF 44_70	P63	BN63A4	110
18.7	33	1.7	70	3150			VF 49_70	P63	BN63A4	116
21.8	30	1.3	60	2300			VF 44_60	P63	BN63A4	110
21.8	30	1.9	60	3150			VF 49_60	P63	BN63A4	116
24.3	34	2.2	54	3140			VFR 49_54	P63	BN63A4	118
28.5	25	1.5	46	2300			VF 44_46	P63	BN63A4	110
29.0	24	0.9	30	1360			VF 30_30	P63	BN63B6	108
29.1	25	2.6	45	3040			VF 49_45	P63	BN63A4	116
31	27	2.9	42	2920			VFR 49_42	P63	BN63A4	118
33	21	0.9	40	1360			VF 30_40	P63	BN63A4	108
36	21	3.3	36	2830			VF 49_36	P63	BN63A4	116
37	21	1.9	35	2300			VF 44_35	P63	BN63A4	110
44	17	1.2	30	1250			VF 30_30	P63	BN63A4	108
47	17	2.2	28	2300			VF 44_28	P63	BN63A4	110
58	15	1.4	15	1130			VF 30_15	P63	BN63B6	108
62	14	2.7	14	2150			VF 44_14	P63	BN63B6	110
66	13	1.4	20	1110			VF 30_20	P63	BN63A4	108
66	13	2.9	20	2100			VF 44_20	P63	BN63A4	110
87	10	1.8	15	1020			VF 30_15	P63	BN63A4	108
94	10	2.9	14	1870			VF 44_14	P63	BN63A4	110
124	8	2.4	7	900			VF 30_7	P63	BN63B6	108
131	7	2.3	10	900			VF 30_10	P63	BN63A4	108
138	6	1.1	20	560			VF 27_20	P27	BN27C2	107
138	7	2.2	20	840			VF 30_20	P56	BN56B2	108
183	5	1.4	15	520			VF 27_15	P27	BN27C2	107
187	5	3.1	7	810			VF 30_7	P63	BN63A4	108
275	4	2.0	10	460			VF 27_10	P27	BN27C2	107
275	4	3.4	10	740			VF 30_10	P56	BN56B2	108
393	3	2.8	7	410			VF 27_7	P27	BN27C2	107
393	3	4.7	7	660			VF 30_7	P56	BN56B2	108

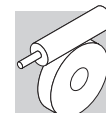
0.18 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	IE1		IE1			
0.28	978	1.9	3200	13800			W/VF 63/130_3200	P71	BN71A6	143
0.28	1345	3.3	3200	19500			W/VF 86/185_3200	P71	BN71A6	155
0.31	1406	1.9	2944	16000			W/VF 86/150_2944	P71	BN71A6	149
0.35	1027	1.8	2560	13800			W/VF 63/130_2560	P71	BN71A6	143
0.35	1320	3.3	2560	19500			W/VF 86/185_2560	P71	BN71A6	155
0.47	875	1.1	2800	8000			VF/W 49/110_2800	P63	BN63B4	137
0.49	1265	2.1	1840	16000			W/VF 86/150_1840	P71	BN71A6	149
0.50	894	2.1	1800	13800			W/VF 63/130_1800	P71	BN71A6	143
0.54	949	1.1	1656	8000			VF/W 49/110_1656	P71	BN71A6	137
0.59	871	2.1	1520	13800			W/VF 63/130_1520	P71	BN71A6	143
0.64	755	1.3	2070	8000			VF/W 49/110_2070	P63	BN63B4	137
0.65	1054	2.6	1380	16000			W/VF 86/150_1380	P71	BN71A6	149
0.75	733	2.5	1200	13800			W/VF 63/130_1200	P71	BN71A6	143
0.80	647	1.5	1656	8000			VF/W 49/110_1656	P63	BN63B4	137



0.18 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	IE1			IE1				
0.94	642	2.9	960	13800				W/VF 63/130_960	P71	BN71A6	143	
0.98	527	1.9	1350	8000				VF/W 49/110_1350	P63	BN63B4	137	
0.98	756	3.6	920	16000				W/VF 86/150_920	P71	BN71A6	149	
1.2	537	3.4	760	13800				W/VF 63/130_760	P71	BN71A6	143	
1.2	436	2.3	1080	8000				VF/W 49/110_1080	P63	BN63B4	137	
1.4	479	1.0	920	7000				VF/W 44/86_920	P63	BN63B4	133	
1.7	391	1.4	525	7000				VF/W 44/86_525	P71	BN71A6	133	
1.8	375	2.7	720	8000				VF/W 49/110_720	P63	BN63B4	137	
1.9	356	1.4	700	7000				VF/W 44/86_700	P63	BN63B4	133	
2.3	321	1.2	400	5750				VF/W 44/75_400	P71	BN71A6	129	
2.3	313	1.8	400	7000				VF/W 44/86_400	P71	BN71A6	133	
2.3	344	3.1	400	8000				VF/W 49/110_400	P71	BN71A6	137	
2.4	288	3.5	540	8000				VF/W 49/110_540	P63	BN63B4	137	
2.5	301	1.2	525	5750				VF/W 44/75_525	P63	BN63B4	129	
2.5	287	1.7	525	7000				VF/W 44/86_525	P63	BN63B4	133	
3.0	258	1.2	300	7000				WR 86_300	P71	BN71A6	132	
3.0	264	1.5	300	5750				VF/W 44/75_300	P71	BN71A6	129	
3.0	275	2.1	300	8000				WR 110_300	P71	BN71A6	136	
3.0	241	2.3	300	7000				VF/W 44/86_300	P71	BN71A6	133	
3.0	269	3.9	300	8000				VF/W 49/110_300	P71	BN71A6	137	
3.3	240	1.5	400	5750				VF/W 44/75_400	P63	BN63B4	129	
3.3	214	2.3	400	7000				VF/W 44/86_400	P63	BN63B4	133	
3.8	206	1.1	240	6200				WR 75_240	P71	BN71A6	128	
3.8	229	1.4	240	7000				WR 86_240	P71	BN71A6	132	
3.8	243	2.4	240	8000				WR 110_240	P71	BN71A6	136	
3.9	233	2.4	230	7000				VF/W 44/86_230	P71	BN71A6	133	
4.2	172	1.2	315	5000				VF/W 30/63_315	P63	BN63B4	125	
4.4	172	1.0	300	6200				WR 75_300	P63	BN63B4	128	
4.4	191	1.4	300	7000				WR 86_300	P63	BN63B4	132	
4.4	199	1.9	300	5750				VF/W 44/75_300	P63	BN63B4	129	
4.4	176	2.8	300	7000				VF/W 44/86_300	P63	BN63B4	133	
4.7	202	1.9	192	7000				WR 86_192	P71	BN71A6	132	
5.0	175	1.6	180	6200				WR 75_180	P71	BN71A6	128	
5.3	186	2.0	250	5750				VF/W 44/75_250	P63	BN63B4	129	
5.4	183	2.1	168	7000				WR 86_168	P71	BN71A6	132	
5.5	144	0.9	240	5000				WR 63_240	P63	BN63B4	124	
5.5	153	1.4	240	6200				WR 75_240	P63	BN63B4	128	
5.5	147	1.4	240	5000				VF/W 30/63_240	P63	BN63B4	125	
5.5	166	1.8	240	7000				WR 86_240	P63	BN63B4	132	
5.7	162	3.1	230	7000				VF/W 44/86_230	P63	BN63B4	133	
6.0	158	2.0	150	6200				WR 75_150	P71	BN71A6	128	
6.5	161	2.7	138	7000				WR 86_138	P71	BN71A6	132	
6.9	128	1.2	192	5000				WR 63_192	P63	BN63B4	124	
6.9	145	2.3	192	7000				WR 86_192	P63	BN63B4	132	
7.3	129	1.8	180	6200				WR 75_180	P63	BN63B4	128	
7.5	138	2.4	120	6200				WR 75_120	P71	BN71A6	128	
7.9	131	2.7	168	7000				WR 86_168	P63	BN63B4	132	
7.9	126	1.6	114	5000				WR 63_114	P71	BN71A6	124	
8.8	113	2.3	150	6200				WR 75_150	P63	BN63B4	128	
9.0	88	1.4	100	5000	W 63_100	S1	M1SC6	122	W 63_100	P71	BN71A6	124
9.0	96	1.7	100	6200	W 75_100	S1	M1SC6	126	W 75_100	P71	BN71A6	127
9.0	105	2.4	100	7000	W 86_100	S1	M1SC6	130	W 86_100	P71	BN71A6	131
9.8	102	1.7	135	5000				WR 63_135	P63	BN63B4	124	
10.0	107	1.9	90	5000				WR 63_90	P71	BN71A6	124	
11.0	98	3.1	120	6200				WR 75_120	P63	BN63B4	128	
11.3	79	1.6	80	5000	W 63_80	S1	M1SC6	122	W 63_80	P71	BN71A6	124
11.3	83	2.4	80	6200	W 75_80	S1	M1SC6	126	W 75_80	P71	BN71A6	127
11.3	90	3.1	80	7000	W 86_80	S1	M1SC6	130	W 86_80	P71	BN71A6	131
11.6	91	2.0	114	5000				WR 63_114	P63	BN63B4	124	
12.0	100	3.3	75	6200				WR 75_75	P71	BN71A6	128	
12.2	82	1.0	108	3450				VFR 49_108	P63	BN63B4	118	
14.7	75	2.5	90	5000				WR 63_90	P63	BN63B4	124	
15.0	61	1.1	60	3000				VF 49_60	P71	BN71A6	116	
15.0	60	1.1	180	3300				VFR 49_180	P63	BN63A2	118	
15.7	68	1.3	84	3420				VFR 49_84	P63	BN63B4	118	
16.5	54	1.0	80	3150				VF 49_80	P63	BN63B4	116	
18.3	63	1.2	72	3270				VFR 49_72	P63	BN63B4	118	
18.3	66	2.8	72	5000				WR 63_72	P63	BN63B4	124	
18.9	49	1.1	70	3150				VF 49_70	P63	BN63B4	116	
20.0	50	1.4	135	3280				VFR 49_135	P63	BN63A2	118	
20.0	54	2.9	45	5000				W 63_45	P71	BN71A6	124	
22.0	45	0.9	60	2300				VF 44_60	P63	BN63B4	110	
22.0	45	1.3	60	3150				VF 49_60	P63	BN63B4	116	
23.2	54	3.3	57	4910				WR 63_57	P63	BN63B4	124	
24.4	50	1.5	54	3010				VFR 49_54	P63	BN63B4	118	
28.7	38	1.0	46	2500				VF 44_46	P63	BN63B4	110	

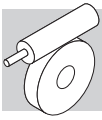


0.18 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	IE1		IE1			
29.3	37	1.8	45	2300			VF 49_45	P63	BN63B4	116
31	40	1.9	42	2810			VFR 49_42	P63	BN63B4	118
32	36	1.4	28	2290			VF 44_28	P71	BN71A6	110
37	31	2.2	36	2760			VF 49_36	P63	BN63B4	116
38	31	1.3	35	2430			VF 44_35	P63	BN63B4	110
47	26	1.5	28	2270			VF 44_28	P63	BN63B4	110
47	26	2.9	28	2560			VF 49_28	P63	BN63B4	116
55	23	2.7	24	2430			VF 49_24	P63	BN63B4	116
66	19	0.9	20	1040			VF 30_20	P63	BN63B4	108
66	20	1.9	20	2040			VF 44_20	P63	BN63B4	110
73	18	3.2	18	2230			VF 49_18	P63	BN63B4	116
77	16	1.8	35	1970			VF 44_35	P63	BN63A2	110
88	15	1.2	15	960			VF 30_15	P63	BN63B4	108
94	15	2.0	14	1830			VF 44_14	P63	BN63B4	110
132	11	1.5	10	860			VF 30_10	P63	BN63B4	108
132	11	2.7	10	1640			VF 44_10	P63	BN63B4	110
189	8	2.1	7	770			VF 30_7	P63	BN63B4	108
193	7	2.9	14	1470			VF 44_14	P63	BN63A2	110
270	5	2.2	10	710			VF 30_10	P63	BN63A2	108
386	4	3.1	7	640			VF 30_7	P63	BN63A2	108

0.25 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	IE1		IE1			
0.28	1358	1.4	3200	13800			WVF 63/130_3200	P71	BN71B6	143
0.28	1868	2.4	3200	19500			WVF 86/185_3200	P71	BN71B6	155
0.31	1952	1.4	2944	16000			WVF 86/150_2944	P71	BN71B6	149
0.43	945	1.9	3200	13800			WVF 63/130_3200	P71	BN71A4	143
0.43	1334	3.1	3200	19500			WVF 86/185_3200	P71	BN71A4	155
0.47	1380	1.9	2944	16000			WVF 86/150_2944	P71	BN71A4	149
0.49	1562	2.8	1840	19500			WVF 86/185_1840	P71	BN71B6	155
0.54	1022	1.8	2560	13800			WVF 63/130_2560	P71	BN71A4	143
0.54	1289	3.3	2560	19500			WVF 86/185_2560	P71	BN71A4	155
0.65	1464	1.8	1380	16000			WVF 86/150_1380	P71	BN71B6	149
0.66	1006	1.0	2070	8000			VF/W 49/110_2070	P71	BN71A4	137
0.75	1214	2.1	1840	16000			WVF 86/150_1840	P71	BN71A4	149
0.75	1019	1.8	1200	13800			WVF 63/130_1200	P71	BN71B6	143
0.76	875	2.1	1800	13800			WVF 63/130_1800	P71	BN71A4	143
0.83	863	1.2	1656	8000			VF/W 49/110_1656	P71	BN71A4	137
0.90	845	2.1	1520	13800			WVF 63/130_1520	P71	BN71A4	143
0.98	1049	2.6	920	16000			WVF 86/150_920	P71	BN71B6	149
1.0	1006	2.6	1380	16000			WVF 86/150_1380	P71	BN71A4	149
1.0	703	1.4	1350	8000			VF/W 49/110_1350	P71	BN71A4	137
1.1	708	2.5	1200	13800			WVF 63/130_1200	P71	BN71A4	143
1.2	746	2.5	760	13800			WVF 63/130_760	P71	BN71B6	143
1.3	581	1.7	1080	8000			VF/W 49/110_1080	P71	BN71A4	137
1.3	860	3.1	690	16000			WVF 86/150_690	P71	BN71B6	149
1.4	617	2.9	960	13800			WVF 63/130_960	P71	BN71A4	143
1.7	544	1.9	540	8000			VF/W 49/110_540	P71	BN71B6	137
1.7	543	1.0	525	7000			VF/W 44/86_525	P71	BN71B6	133
1.8	515	3.5	760	13800			WVF 63/130_760	P71	BN71A4	143
1.9	500	2.0	720	8000			VF/W 49/110_720	P71	BN71A4	137
2.0	474	1.1	700	7000			VF/W 44/86_700	P71	BN71A4	133
2.5	384	2.6	540	8000			VF/W 49/110_540	P71	BN71A4	137
2.6	383	1.3	525	7000			VF/W 44/86_525	P71	BN71A4	133
3.0	366	1.1	300	5750			VF/W 44/75_300	P71	BN71B6	129
3.0	382	1.5	300	8000			WR 110_300	P71	BN71B6	136
3.0	374	2.8	300	8000			VF/W 49/110_300	P71	BN71B6	137
3.4	319	1.2	400	5750			VF/W 44/75_400	P71	BN71A4	129
3.4	285	1.8	400	7000			VF/W 44/86_400	P71	BN71A4	133
3.4	313	3.2	400	8000			VF/W 49/110_400	P71	BN71A4	137
3.8	318	1.0	240	7000			WR 86_240	P71	BN71B6	132
3.8	337	1.7	240	8000			WR 110_240	P71	BN71B6	136
3.9	323	1.7	230	7000			VF/W 44/86_230	P71	BN71B6	133
3.9	311	3.4	230	8000			VF/W 49/110_230	P71	BN71B6	137
4.6	255	1.1	300	7000			WR 86_300	P71	BN71A4	132
4.6	266	1.4	300	5750			VF/W 44/75_300	P71	BN71A4	129
4.6	266	2.1	300	8000			WR 110_300	P71	BN71A4	136
4.6	234	2.1	300	7000			VF/W 44/86_300	P71	BN71A4	133
4.7	280	1.4	192	7000			WR 86_192	P71	BN71B6	132










0.25 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	IE1			IEC	IE1			
5.5	247	1.5	250	5750				VF/W 44/75_250	P71	BN71A4	129	
5.7	204	1.1	240	6200				WR 75_240	P71	BN71A4	128	
5.7	221	1.4	240	7000				WR 86_240	P71	BN71A4	132	
5.7	233	2.4	240	8000				WR 110_240	P71	BN71A4	136	
6.0	216	2.3	230	7000				VF/W 44/86_230	P71	BN71A4	133	
6.0	219	1.4	150	6200				WR 75_150	P71	BN71B6	128	
6.7	193	0.9	135	5000				WR 63_135	P71	BN71B6	124	
7.2	193	1.7	192	7000				WR 86_192	P71	BN71A4	132	
7.2	200	3.1	192	8000				WR 110_192	P71	BN71A4	136	
7.6	172	1.4	180	6200				WR 75_180	P71	BN71A4	128	
7.9	175	1.1	114	5000				WR 63_114	P71	BN71B6	124	
8.2	175	2.0	168	7000				WR 86_168	P71	BN71A4	132	
9.0	122	1.0	100	5000	W 63_100	S1	M1SD6	122				
9.0	133	1.2	100	6200	W 75_100	S1	M1SD6	126	W 75_100	P71	BN71B6	127
9.0	146	1.7	100	7000	W 86_100	S1	M1SD6	130	W 86_100	P71	BN71B6	131
9.2	151	1.7	150	6200				WR 75_150	P71	BN71A4	128	
10.0	151	2.7	138	7000				WR 86_138	P71	BN71A4	132	
10.0	160	2.3	90	6200				WR 75_90	P71	BN71B6	128	
10.2	136	1.3	135	5000				WR 63_135	P71	BN71A4	124	
11.3	110	1.1	80	5000	W 63_80	S1	M1SD6	122				
11.3	115	1.7	80	6200	W 75_80	S1	M1SD6	126	W 75_80	P71	BN71B6	127
11.3	125	2.2	80	7000	W 86_80	S1	M1SD6	130	W 86_80	P71	BN71B6	131
11.5	131	2.3	120	6200				WR 75_120	P71	BN71A4	128	
11.5	138	2.8	120	7000				WR 86_120	P71	BN71A4	132	
12.1	121	1.5	114	5000				WR 63_114	P71	BN71A4	124	
13.8	89	1.3	100	5000				W 63_100	P71	BN71A4	124	
13.8	96	1.6	100	6200				W 75_100	P71	BN71A4	127	
13.8	102	2.2	100	7000				W 86_100	P71	BN71A4	131	
15.3	100	1.9	90	5000				WR 63_90	P71	BN71A4	124	
15.3	108	3.0	90	6200				WR 75_90	P71	BN71A4	128	
17.2	78	1.5	80	5000				W 63_80	P71	BN71A4	124	
17.2	82	2.2	80	6200				W 75_80	P71	BN71A4	127	
17.2	89	2.9	80	7000				W 86_80	P71	BN71A4	131	
18.3	95	3.1	75	6200				WR 75_75	P71	BN71A4	128	
19.1	88	2.1	72	5000				WR 63_72	P71	BN71A4	124	
21.5	68	1.8	64	5000				W 63_64	P71	BN71A4	124	
22.9	68	3.0	60	6200				W 75_60	P71	BN71A4	127	
24.1	72	2.5	57	4780				WR 63_57	P71	BN71A4	124	
31	52	2.8	45	4550				W 63_45	P71	BN71A4	124	
31	59	3.0	45	4460				WR 63_45	P71	BN71A4	124	
32	50	1.0	28	2300				VF 44_28	P71	BN71B6	110	
36	46	3.4	38	4320				W 63_38	P71	BN71A4	124	
37	44	1.6	36	2670				VF 49_36	P71	BN71A4	116	
38	43	0.9	35	2300				VF 44_35	P71	BN71A4	110	
38	49	3.3	36	4160				WR 63_36	P71	BN71A4	124	
45	39	1.1	20	2190				VF 44_20	P71	BN71B6	110	
47	36	1.1	28	2190				VF 44_28	P71	BN71A4	110	
47	36	2.1	28	2480				VF 49_28	P71	BN71A4	116	
55	33	1.9	24	2360				VF 49_24	P71	BN71A4	116	
64	29	1.3	14	1980				VF 44_14	P71	BN71B6	110	
64	29	2.5	14	2260				VF 49_14	P71	BN71B6	116	
66	28	1.4	20	1970				VF 44_20	P71	BN71A4	110	
73	25	2.3	18	2170				VF 49_18	P71	BN71A4	116	
77	23	1.3	35	1930				VF 44_35	P63	BN63B2	110	
90	22	1.8	10	1780				VF 44_10	P71	BN71B6	110	
90	22	2.9	10	2040				VF 49_10	P71	BN71B6	116	
94	21	1.4	14	1770				VF 44_14	P71	BN71A4	110	
94	21	3.2	14	2010				VF 49_14	P71	BN71A4	116	
113	17	2.8	24	1930				VF 49_24	P63	BN63B2	116	
129	16	2.5	7	1590				VF 44_7	P71	BN71B6	110	
132	15	1.9	10	1590				VF 44_10	P71	BN71A4	110	
135	14	1.0	20	840				VF 30_20	P63	BN63B2	108	
180	11	1.3	15	780				VF 30_15	P63	BN63B2	108	
189	11	2.7	7	1420				VF 44_7	P71	BN71A4	110	
270	8	1.6	10	690				VF 30_10	P63	BN63B2	108	
270	8	2.9	10	1300				VF 44_10	P63	BN63B2	110	
386	5	2.2	7	620				VF 30_7	P63	BN63B2	108	

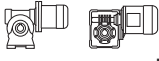





0.37 kW

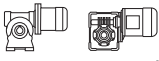



n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	  			  				
					IE1			IE1				
0.28	2734	1.6	3200	19500				W/VF 86/185_3200	P80	BN80A6	155	
0.31	2858	0.9	2944	16000				W/VF 86/150_2944	P80	BN80A6	149	
0.36	2684	1.6	2560	19500				W/VF 86/185_2560	P80	BN80A6	155	
0.43	1403	1.3	3200	13800				W/VF 63/130_3200	P71	BN71B4	143	
0.43	1981	2.1	3200	19500				W/VF 86/185_3200	P71	BN71B4	155	
0.47	2050	1.3	2944	16000				W/VF 86/150_2944	P71	BN71B4	149	
0.54	1519	1.2	2560	13800				W/VF 63/130_2560	P71	BN71B4	143	
0.54	1915	2.2	2560	19500				W/VF 86/185_2560	P71	BN71B4	155	
0.60	1771	1.0	1520	13800				W/VF 63/130_1520	P80	BN80A6	143	
0.66	2143	1.3	1380	16000				W/VF 86/150_1380	P80	BN80A6	149	
0.74	1803	1.4	1840	16000				W/VF 86/150_1840	P71	BN71B4	149	
0.74	1614	2.6	1840	19500				W/VF 86/185_1840	P71	BN71B4	155	
0.76	1300	1.4	1800	13800				W/VF 63/130_1800	P71	BN71B4	143	
0.86	1444	2.9	1600	19500				W/VF 86/185_1600	P71	BN71B4	155	
0.90	1255	1.4	1520	13800				W/VF 63/130_1520	P71	BN71B4	143	
0.99	1357	3.2	920	19500				W/VF 86/185_920	P80	BN80A6	155	
1.0	1495	1.7	1380	16000				W/VF 86/150_1380	P71	BN71B4	149	
1.0	1045	1.0	1350	8000				VF/W 49/110_1350	P71	BN71B4	137	
1.1	1052	1.7	1200	13800				W/VF 63/130_1200	P71	BN71B4	143	
1.3	864	1.2	1080	8000				VF/W 49/110_1080	P71	BN71B4	137	
1.3	1259	2.1	690	16000				W/VF 86/150_690	P80	BN80A6	149	
1.4	916	2.0	960	13800				W/VF 63/130_960	P71	BN71B4	143	
1.5	1068	2.4	920	16000				W/VF 86/150_920	P71	BN71B4	149	
1.7	797	1.3	540	8000				VF/W 49/110_540	P80	BN80A6	137	
1.7	1068	2.5	529	16000				W/VF 86/150_529	P80	BN80A6	149	
1.8	764	2.4	760	13800				W/VF 63/130_760	P71	BN71B4	143	
1.9	743	1.3	720	8000				VF/W 49/110_720	P71	BN71B4	137	
2.0	890	2.9	690	16000				W/VF 86/150_690	P71	BN71B4	149	
2.3	619	2.9	600	13800				W/VF 63/130_600	P71	BN71B4	143	
2.5	571	1.8	540	8000				VF/W 49/110_540	P71	BN71B4	137	
2.6	750	3.5	529	16000				W/VF 86/150_529	P71	BN71B4	149	
3.0	559	1.0	300	8000				WR 110_300	P80	BN80A6	136	
3.0	571	1.8	300	13800				VFR 130_300	P80	BN80A6	140	
3.0	547	1.9	300	8000				VF/W 49/110_300	P80	BN80A6	137	
3.4	423	1.2	400	7000				VF/W 44/86_400	P71	BN71B4	133	
3.4	464	2.2	400	8000				VF/W 49/110_400	P71	BN71B4	137	
3.8	494	1.2	240	8000				WR 110_240	P80	BN80A6	136	
3.8	503	2.4	240	13800				VFR 130_240	P80	BN80A6	140	
4.0	455	2.3	230	8000				VF/W 49/110_230	P80	BN80A6	137	
4.6	395	1.4	300	8000				WR 110_300	P71	BN71B4	136	
4.6	348	1.4	300	7000				VF/W 44/86_300	P71	BN71B4	133	
4.6	371	2.7	300	8000				VF/W 49/110_300	P71	BN71B4	137	
4.7	410	1.0	192	7000				WR 86_192	P80	BN80A6	132	
4.7	425	1.6	192	8000				WR 110_192	P80	BN80A6	136	
4.7	432	3.0	192	13800				VFR 130_192	P80	BN80A6	140	
5.4	372	1.0	168	7000				WR 86_168	P80	BN80A6	132	
5.4	391	2.0	168	8000				WR 110_168	P80	BN80A6	136	
5.4	391	3.4	168	13800				VFR 130_168	P80	BN80A6	140	
5.7	328	0.9	240	7000				WR 86_240	P71	BN71B4	132	
5.7	347	1.6	240	8000				WR 110_240	P71	BN71B4	136	
6.0	320	1.6	230	7000				VF/W 44/86_230	P71	BN71B4	133	
6.0	308	3.2	230	8000				VF/W 49/110_230	P71	BN71B4	137	
6.1	320	1.0	150	6200				WR 75_150	P80	BN80A6	128	
6.6	327	1.3	138	7000				WR 86_138	P80	BN80A6	132	
6.6	338	2.4	138	8000				WR 110_138	P80	BN80A6	136	
7.1	287	1.1	192	7000				WR 86_192	P71	BN71B4	132	
7.1	297	2.1	192	8000				WR 110_192	P71	BN71B4	136	
7.6	294	1.5	120	7000				WR 86_120	P80	BN80A6	132	
7.6	303	2.9	120	8000				WR 110_120	P80	BN80A6	136	
7.6	255	0.9	180	6200				WR 75_180	P71	BN71B4	128	
8.2	260	1.4	168	7000				WR 86_168	P71	BN71B4	132	
8.2	273	2.6	168	8000				WR 110_168	P71	BN71B4	136	
9.1	214	1.2	100	7000	W 86_100	S1	M1LA6	130	W 86_100	P80	BN80A6	131
9.1	224	1.2	150	6200					WR 75_150	P71	BN71B4	128
9.9	224	1.8	138	7000					WR 86_138	P71	BN71B4	132
9.9	235	3.0	138	8000					WR 110_138	P71	BN71B4	136
10.1	234	1.6	90	6200					WR 75_90	P80	BN80A6	128
11.4	168	1.2	80	6200	W 75_80	S1	M1LA6	126	W 75_80	P80	BN80A6	127
11.4	183	1.5	80	7000	W 86_80	S1	M1LA6	130	W 86_80	P80	BN80A6	131

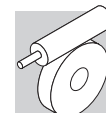


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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE1			 IE1	 IEC			 IE1
					W	S1	M1SD4		WR	P71	BN71B4	
11.4	195	1.6	120	6200					WR 75_120	P71	BN71B4	128
11.4	204	1.9	120	7000					WR 86_120	P71	BN71B4	132
12.0	179	1.0	114	5000					WR 63_114	P71	BN71B4	124
12.1	204	1.6	75	6200					WR 75_75	P80	BN80A6	128
13.2	196	2.0	69	7000					WR 86_69	P80	BN80A6	132
13.7	142	1.1	100	6200	W 75_100	S1	M1SD4	126	W 75_100	P71	BN71B4	127
13.7	152	1.5	100	7000	W 86_100	S1	M1SD4	130	W 86_100	P71	BN71B4	131
14.2	139	1.0	64	5000	W 63_64	S1	M1LA6	122	W 63_64	P80	BN80A6	124
15.2	140	1.5	60	6200	W 75_60	S1	M1LA6	126	W 75_60	P80	BN80A6	127
15.2	149	1.3	90	5000					WR 63_90	P71	BN71B4	124
15.2	160	2.0	90	6200					WR 75_90	P71	BN71B4	128
15.2	156	2.8	90	7000					WR 86_90	P71	BN71B4	132
16.3	144	2.3	56	7000	W 86_56	S1	M1LA6	130	W 86_56	P80	BN80A6	131
17.1	116	1.0	80	5000	W 63_80	S1	M1SD4	122	W 63_80	P71	BN71B4	124
17.1	122	1.5	80	6200	W 75_80	S1	M1SD4	126	W 75_80	P71	BN71B4	127
17.1	132	1.9	80	7000	W 86_80	S1	M1SD4	130	W 86_80	P71	BN71B4	131
18.3	141	2.1	75	6200					WR 75_75	P71	BN71B4	128
19.0	130	1.4	72	4830					WR 63_72	P71	BN71B4	124
19.9	133	2.8	69	7000					WR 86_69	P71	BN71B4	132
20.2	136	2.6	45	6200					WR 75_45	P80	BN80A6	128
21.4	101	1.2	64	4870	W 63_64	S1	M1SD4	122	W 63_64	P71	BN71B4	124
21.4	112	2.5	64	7000	W 86_64	S1	M1SD4	130	W 86_64	P71	BN71B4	131
22.8	101	2.0	60	6200	W 75_60	S1	M1SD4	126	W 75_60	P71	BN71B4	127
22.8	119	2.5	60	6200					WR 75_60	P71	BN71B4	128
22.8	119	3.2	60	7000					WR 86_60	P71	BN71B4	132
24.0	107	1.7	57	4540					WR 63_57	P71	BN71B4	124
24.5	101	3.0	56	7000	W 86_56	S1	M1SD4	130	W 86_56	P71	BN71B4	131
27.4	88	2.5	50	6200	W 75_50	S1	M1SD4	126	W 75_50	P71	BN71B4	127
30	73	0.9	45	2680					VF 49_45	P71	BN71B4	116
30	78	1.9	45	4400	W 63_45	S1	M1SD4	122	W 63_45	P71	BN71B4	124
30	88	2.0	45	4250					WR 63_45	P71	BN71B4	124
30	93	3.2	45	5880					WR 75_45	P71	BN71B4	128
34	74	3.4	40	5820	W 75_40	S1	M1SD4	126	W 75_40	P71	BN71B4	127
36	69	2.3	38	4180	W 63_38	S1	M1SD4	122	W 63_38	P71	BN71B4	124
38	62	1.1	36	2530					VF 49_36	P71	BN71B4	116
38	73	2.2	36	3980					WR 63_36	P71	BN71B4	124
46	57	2.8	30	3900	W 63_30	S1	M1SD4	122	W 63_30	P71	BN71B4	124
49	51	1.4	28	2360					VF 49_28	P71	BN71B4	116
57	46	1.4	24	2250					VF 49_24	P71	BN71B4	116
57	48	3.2	24	3650	W 63_24	S1	M1SD4	122	W 63_24	P71	BN71B4	124
65	42	1.7	14	1940					VF 49_14	P80	BN80A6	116
69	40	1.0	20	1870					VF 44_20	P71	BN71B4	110
72	40	3.8	19	3400	W 63_19	S1	M1SD4	122	W 63_19	P71	BN71B4	124
76	36	1.6	18	2080					VF 49_18	P71	BN71B4	116
79	33	0.9	35	1860					VF 44_35	P71	BN71A2	110
91	32	2.0	10	1930					VF 49_10	P80	BN80A6	116
98	29	1.0	14	1690					VF 44_14	P71	BN71B4	110
98	29	2.2	14	1940					VF 49_14	P71	BN71B4	116
117	24	2.0	24	1880					VF 49_24	P71	BN71A2	116
137	22	1.3	10	1520					VF 44_10	P71	BN71B4	110
137	22	2.7	10	1750					VF 49_10	P71	BN71B4	116
138	21	1.4	20	1570					VF 44_20	P71	BN71A2	110
153	19	2.3	18	1720					VF 49_18	P71	BN71A2	116
196	16	1.9	7	1360					VF 44_7	P71	BN71B4	110
196	16	3.5	7	1570					VF 49_7	P71	BN71B4	116
275	11	2.0	10	1260					VF 44_10	P71	BN71A2	110
393	8	2.8	7	1120					VF 44_7	P71	BN71A2	110

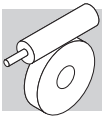
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n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE1			 IE1	 IEC			 IE1
					W/VF	P80	BN80B6					
0.29	4019	1.1	3200	19500					W/VF 86/185_3200	P80	BN80B6	155
0.36	3946	1.1	2560	19500					W/VF 86/185_2560	P80	BN80B6	155
0.43	2902	1.4	3200	19500					W/VF 86/185_3200	P80	BN80A4	155
0.47	3004	0.9	2944	16000					W/VF 86/150_2944	P80	BN80A4	149

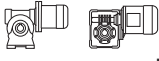





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




n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	IE1		IE1				
0.50	3362	1.3	1840	19500			W/VF 86/185_1840	P80	BN80B6	155	
0.54	2805	1.5	2560	19500			W/VF 86/185_2560	P80	BN80A4	155	
0.76	2642	1.0	1840	16000			W/VF 86/150_1840	P80	BN80A4	149	
0.76	2364	1.8	1840	19500			W/VF 86/185_1840	P80	BN80A4	155	
0.77	1905	0.9	1800	13800			W/VF 63/130_1800	P80	BN80A4	143	
0.87	2116	2.0	1600	19500			W/VF 86/185_1600	P80	BN80A4	155	
0.91	1838	1.0	1520	13800			W/VF 63/130_1520	P80	BN80A4	143	
1.0	1996	2.2	920	19500			W/VF 86/185_920	P80	BN80B6	155	
1.0	2190	1.2	1380	16000			W/VF 86/150_1380	P80	BN80A4	149	
1.2	1542	1.2	1200	13800			W/VF 63/130_1200	P80	BN80A4	143	
1.2	1542	2.7	1200	19500			W/VF 86/185_1200	P80	BN80A4	155	
1.3	1852	1.5	690	16000			W/VF 86/150_690	P80	BN80B6	149	
1.4	1342	1.3	960	13800			W/VF 63/130_960	P80	BN80A4	143	
1.5	1564	1.7	920	16000			W/VF 86/150_920	P80	BN80A4	149	
1.5	1460	2.9	920	19500			W/VF 86/185_920	P80	BN80A4	155	
1.5	1473	3.0	600	19500			W/VF 86/185_600	P80	BN80B6	155	
1.7	1300	3.2	800	19500			W/VF 86/185_800	P80	BN80A4	155	
1.7	1570	1.7	529	16000			W/VF 86/150_529	P80	BN80B6	149	
1.8	1120	1.6	760	13800			W/VF 63/130_760	P80	BN80A4	143	
2.0	1304	2.0	690	16000			W/VF 86/150_690	P80	BN80A4	149	
2.3	1028	1.0	400	8000			V/FW 49/110_400	P80	BN80B6	137	
2.3	907	2.0	600	13800			W/VF 63/130_600	P80	BN80A4	143	
2.6	837	1.2	540	8000			V/FW 49/110_540	P80	BN80A4	137	
2.6	1099	2.4	529	16000			W/VF 86/150_529	P80	BN80A4	149	
3.0	956	2.7	460	16000			W/VF 86/150_460	P80	BN80A4	149	
3.1	839	1.2	300	13800			VFR 130_300	P80	BN80B6	140	
3.1	805	1.3	300	8000			V/FW 49/110_300	P80	BN80B6	137	
3.5	680	1.5	400	8000			V/FW 49/110_400	P80	BN80A4	137	
3.5	665	2.7	400	13800			W/VF 63/130_400	P80	BN80A4	143	
3.8	740	1.6	240	13800			VFR 130_240	P80	BN80B6	140	
4.0	670	1.6	230	8000			V/FW 49/110_230	P80	BN80B6	137	
4.0	756	3.4	345	16000			W/VF 86/150_345	P80	BN80A4	149	
4.6	578	0.9	300	8000			WR 110_300	P80	BN80A4	136	
4.6	601	1.5	300	13800			VFR 130_300	P80	BN80A4	140	
4.6	544	1.8	300	8000			V/FW 49/110_300	P80	BN80A4	137	
4.8	625	1.1	192	8000			WR 110_192	P80	BN80B6	136	
5.0	529	3.4	280	13800			W/VF 63/130_280	P80	BN80A4	143	
5.8	508	1.1	240	8000			WR 110_240	P80	BN80A4	136	
5.8	517	2.2	240	13800			VFR 130_240	P80	BN80A4	140	
6.0	452	2.2	230	8000			V/FW 49/110_230	P80	BN80A4	137	
6.7	504	3.0	138	13800			VFR 130_138	P80	BN80B6	140	
7.2	435	1.4	192	8000			WR 110_192	P80	BN80A4	136	
7.2	443	2.7	192	13800			VFR 130_192	P80	BN80A4	140	
7.7	432	1.0	120	7000			WR 86_120	P80	BN80B6	132	
8.3	381	0.9	168	7000			WR 86_168	P80	BN80A4	132	
8.3	400	1.8	168	8000			WR 110_168	P80	BN80A4	136	
8.3	406	3.0	168	13800			VFR 130_168	P80	BN80A4	140	
9.2	325	1.5	100	8000	W 110_100	S2	M2SA6	134	P80	BN80B6	135
10.1	329	1.2	138	7000			WR 86_138	P80	BN80A4	132	
10.1	344	2.1	138	8000			WR 110_138	P80	BN80A4	136	
10.2	344	1.1	90	6200			WR 75_90	P80	BN80B6	128	
11.5	269	1.0	80	7000	W 86_80	S2	M2SA6	130	P80	BN80B6	131
11.6	286	1.1	120	6200			WR 75_120	P80	BN80A4	128	
11.6	299	1.3	120	7000			WR 86_120	P80	BN80A4	132	
11.6	308	2.6	120	8000			WR 110_120	P80	BN80A4	136	
12.3	300	1.1	75	6200			WR 75_75	P80	BN80B6	128	
13.3	288	1.4	69	7000			WR 86_69	P80	BN80B6	132	
13.3	295	2.5	69	8000			WR 110_69	P80	BN80B6	136	
13.8	225	1.0	100	7000	W 86_100	S1	M1LA4	130	P80	BN80A4	131
15.4	235	1.4	90	6200			WR 75_90	P80	BN80A4	128	
15.4	228	1.9	90	7000			WR 86_90	P80	BN80A4	132	
15.4	238	3.5	90	8000			WR 110_90	P80	BN80A4	136	
16.4	211	1.5	56	7000	W 86_56	S2	M2SA6	130	P80	BN80B6	131
17.3	180	1.0	80	6200	W 75_80	S1	M1LA4	126	P80	BN80A4	127
17.3	195	1.3	80	7000	W 86_80	S1	M1LA4	130	P80	BN80A4	131
18.5	207	1.4	75	6200			WR 75_75	P80	BN80A4	128	
20.1	196	1.9	69	7000			WR 86_69	P80	BN80A4	132	
20.1	201	3.2	69	8000			WR 110_69	P80	BN80A4	136	
20.4	162	1.0	45	4540	W 63_45	S2	M2SA6	122	P80	BN80B6	124
21.6	166	1.7	64	7000	W 86_64	S1	M1LA4	130	P80	BN80A4	131
23.0	148	1.3	60	6200	W 75_60	S1	M1LA4	126	P80	BN80A4	127
23.0	162	2.2	40	7000	W 86_40	S2	M2SA6	130	P80	BN80B6	131
23.2	175	1.7	60	6040			WR 75_60	P80	BN80A4	128	
23.2	175	2.2	60	7000			WR 86_60	P80	BN80A4	132	
24.2	143	1.2	38	4340	W 63_38	S2	M2SA6	122	P80	BN80B6	124
24.6	149	2.0	56	7000	W 86_56	S1	M1LA4	130	P80	BN80A4	131

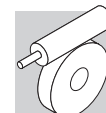


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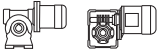



n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE1			 IE1	 IEC			 IE1
					W	S	M		W	P	BN	
27.6	129	1.7	50	5960	W 75_50	S1	M1LA4	126	W 75_50	P80	BN80A4	127
30	128	2.7	46	7000	W 86_46	S1	M1LA4	130	W 86_46	P80	BN80A4	131
31	115	1.3	45	4140	W 63_45	S1	M1LA4	122	W 63_45	P80	BN80A4	124
31	136	2.2	45	5580					WR 75_45	P80	BN80A4	128
31	133	2.9	45	7000					WR 86_45	P80	BN80A4	132
35	110	2.3	40	5610	W 75_40	S1	M1LA4	126	W 75_40	P80	BN80A4	127
35	114	2.9	40	7000	W 86_40	S1	M1LA4	130	W 86_40	P80	BN80A4	131
36	101	1.5	38	3950	W 63_38	S1	M1LA4	122	W 63_38	P80	BN80A4	124
40	105	3.3	23	7000	W 86_23	S2	M2SA6	130	W 86_23	P80	BN80B6	131
46	84	1.9	30	3700	W 63_30	S1	M1LA4	122	W 63_30	P80	BN80A4	124
46	88	3.1	30	5150	W 75_30	S1	M1LA4	126	W 75_30	P80	BN80A4	127
46	95	2.9	30	4950					WR 75_30	P80	BN80A4	128
49	76	1.0	28	2170					VF 49_28	P80	BN80A4	116
55	76	3.3	25	4880	W 75_25	S1	M1LA4	126	W 75_25	P80	BN80A4	127
58	69	0.9	24	2080					VF 49_24	P80	BN80A4	116
58	71	2.2	24	3480	W 63_24	S1	M1LA4	122	W 63_24	P80	BN80A4	124
66	62	1.1	14	1960					VF 49_14	P80	BN80B6	116
73	59	2.6	19	3260	W 63_19	S1	M1LA4	122	W 63_19	P80	BN80A4	124
77	53	1.1	18	1930					VF 49_18	P80	BN80A4	116
92	47	1.4	10	1800					VF 49_10	P80	BN80B6	116
92	47	3.2	15	3050	W 63_15	S1	M1LA4	122	W 63_15	P80	BN80A4	124
99	43	1.5	14	1810					VF 49_14	P80	BN80A4	116
115	39	3.6	12	2850	W 63_12	S1	M1LA4	122	W 63_12	P80	BN80A4	124
117	35	1.3	24	1800					VF 49_24	P71	BN71B2	116
131	35	3.7	7	2700	W 63_7	S2	M2SA6	122	W 63_7	P80	BN80B6	124
138	32	1.8	10	1650					VF 49_10	P80	BN80A4	116
141	30	1.0	20	1490					VF 44_20	P71	BN71B2	110
156	28	1.6	18	1650					VF 49_18	P71	BN71B2	116
197	23	2.4	7	1480					VF 49_7	P80	BN80A4	116
281	16	1.4	10	1210					VF 44_10	P71	BN71B2	110
281	16	2.7	10	1390					VF 49_10	P71	BN71B2	116
401	12	1.9	7	1080					VF 44_7	P71	BN71B2	110

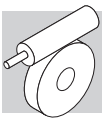
0.75 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE2		 IE3	 IE2	 IEC		 IE3		
					W	S			W	P		BE	BX
0.29	4867	1.3	3200	34500					VF/VF 130/210_3200	P90	BE90S6	160	
0.29	4623	1.9	3200	52000					VF/VF 130/250_3200	P90	BE90S6	166	
0.37	4672	1.4	2560	34500					VF/VF 130/210_2560	P90	BE90S6	160	
0.37	4478	2.0	2560	52000					VF/VF 130/250_2560	P90	BE90S6	166	
0.45	3852	1.1	3200	19500					W /VF 86/185_3200	P80	BE80B4	BX80B4	155
0.51	4478	1.0	1840	19500					W /VF 86/185_1840	P90	BE90S6		155
0.51	3918	1.6	1840	34500					VF/VF 130/210_1840	P90	BE90S6		160
0.51	4058	2.3	1840	52000					VF/VF 130/250_1840	P90	BE90S6		166
0.56	3724	1.1	2560	19500					W /VF 86/185_2560	P80	BE80B4	BX80B4	155
0.78	3138	1.3	1840	19500					W /VF 86/185_1840	P80	BE80B4	BX80B4	155
0.90	2809	1.5	1600	19500					W /VF 86/185_1600	P80	BE80B4	BX80B4	155
1.0	2659	1.6	920	19500					W /VF 86/185_920	P90	BE90S6		155
1.2	2046	0.9	1200	13800					W /VF 63/130_1200	P80	BE80B4	BX80B4	143
1.2	2046	2.0	1200	19500					W /VF 86/185_1200	P80	BE80B4	BX80B4	155
1.4	2466	1.1	690	16000					W /VF 86/150_690	P90	BE90S6		149
1.5	1781	1.0	960	13800					W /VF 63/130_960	P80	BE80B4	BX80B4	143
1.5	2076	1.2	920	16000					W /VF 86/150_920	P80	BE80B4	BX80B4	149
1.5	1938	2.1	920	19500					W /VF 86/185_920	P80	BE80B4	BX80B4	155
1.8	2092	1.3	529	16000					W /VF 86/150_529	P90	BE90S6		149
1.8	1725	2.4	800	19500					W /VF 86/185_800	P80	BE80B4	BX80B4	155
1.8	1486	1.2	760	13800					W /VF 63/130_760	P80	BE80B4	BX80B4	143
2.0	1730	1.5	690	16000					W /VF 86/150_690	P80	BE80B4	BX80B4	149
2.3	1204	1.5	600	13800					W /VF 63/130_600	P80	BE80B4	BX80B4	143
2.3	1354	3.1	600	19500					W /VF 86/185_600	P80	BE80B4	BX80B4	155
2.7	1460	1.7	529	16000					W /VF 86/150_529	P80	BE80B4	BX80B4	149
3.1	1269	2.0	460	16000					W /VF 86/150_460	P80	BE80B4	BX80B4	149
3.1	1140	1.2	300	16000					VFR 150_300	P90	BE90S6		146
3.1	1141	2.1	300	19500					VFR 185_300	P90	BE90S6		152
3.6	903	1.1	400	8000					VF/W 49/110_400	P80	BE80B4	BX80B4	137
3.6	882	2.0	400	13800					W /VF 63/130_400	P80	BE80B4	BX80B4	143
3.9	986	1.2	240	13800					VFR 130_240	P90	BE90S6		140
3.9	986	1.7	240	16000					VFR 150_240	P90	BE90S6		146
3.9	986	2.9	240	19500					VFR 185_240	P90	BE90S6		152



0.75 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 IE2 IE3				 IEC IE2 IE3					
4.2	1004	2.6	345	16000					W /VF 86/150_345	P80	BE80B4	BX80B4	149	
4.8	797	1.1	300	13800					VFR 130_300	P80	BE80B4	BX80B4	140	
4.8	723	1.4	300	8000					VF/W 49/110_300	P80	BE80B4	BX80B4	137	
4.8	873	3.0	300	16000					W /VF 86/150_300	P80	BE80B4	BX80B4	149	
4.9	862	2.3	192	16000					VFR 150_192	P90	BE90S6		146	
5.1	702	2.6	280	13800					W /VF 63/130_280	P80	BE80B4	BX80B4	143	
5.6	767	1.0	168	8000					WR 110_168	P90	BE90S6		136	
5.6	661	1.2	168	16000					VFR 150_168	P90	BE90S6		146	
5.9	394	1.9	240	13800					VFR 130_240	P80	BE80B4	BX80B4	140	
6.2	267	1.3	230	8000					VF/W 49/110_230	P80	BE80B4	BX80B4	137	
6.8	661	1.2	138	8000					WR 110_138	P90	BE90S6		136	
6.8	672	2.3	138	13800					VFR 130_138	P90	BE90S6		140	
7.4	577	1.1	192	8000					WR 110_192	P80	BE80B4	BX80B4	136	
7.5	587	2.0	192	13800					VFR 130_192	P80	BE80B4	BX80B4	140	
8.5	530	1.3	168	8000					WR 110_168	P80	BE80B4	BX80B4	136	
8.5	539	2.2	168	13800					VFR 130_168	P80	BE80B4	BX80B4	140	
9.4	434	1.1	100	8000	W110_100	S3	ME3SA6	134	W 110_100	P90	BE90S6		135	
9.4	448	1.7	100	13200					VF 130_100	P90	BE90S6		138	
10.4	436	0.9	138	7000					WR 86_138	P80	BE80B4	BX80B4	132	
10.4	455	1.6	138	8000					WR 110_138	P80	BE80B4	BX80B4	136	
10.3	464	3.0	138	13800					VFR 130_138	P80	BE80B4	BX80B4	140	
11.8	372	1.4	80	8000	W110_80	S3	ME3SA6	134	W 110_80	P90	BE90S6		135	
11.8	390	2.5	80	13200					VF 130_80	P90	BE90S6		138	
12.0	397	1.0	120	7000					WR 86_120	P80	BE80B4	BX80B4	132	
12.0	409	1.9	120	8000					WR 110_120	P80	BE80B4	BX80B4	136	
12.0	403	3.5	120	13800					VFR 130_120	P80	BE80B4	BX80B4	140	
13.6	394	1.9	69	8000					WR 110_69	P90	BE90S6		136	
14.3	311	1.5	100	8000	W110_100	S2	ME2SB4	MX2SB4	134	W 110_100	P80	BE80B4	BX80B4	135
14.7	307	1.0	64	7000	W86_64	S3	ME3SA6		130	W 86_64	P90	BE90S6		131
14.7	331	3.2	64	13200					VF 130_64	P90	BE90S6		138	
15.9	312	1.0	90	6200					WR 75_90	P80	BE80B4	BX80B4	128	
15.9	302	1.5	90	7000					WR 86_90	P80	BE80B4	BX80B4	132	
15.9	316	2.6	90	8000					WR 110_90	P80	BE80B4	BX80B4	136	
16.8	281	1.2	56	7000	W86_56	S3	ME3SA6		130	W 86_56	P90	BE90S6		131
16.8	289	2.2	56	8000	W110_56	S3	ME3SA6		134	W 110_56	P90	BE90S6		135
17.9	257	1.0	80	7000	W86_80	S2	ME2SB4	MX2SB4	130	W 86_80	P80	BE80B4	BX80B4	131
17.9	265	1.8	80	8000	W110_80	S2	ME2SB4	MX2SB4	134	W 110_80	P80	BE80B4	BX80B4	135
18.8	239	1.0	50	6200	W75_50	S3	ME3SA6		126	W 75_50	P90	BE90S6	BE90S6	127
19.1	275	1.1	75	5980						WR 75_75	P80	BE80B4	BX80B4	128
20.7	260	1.5	69	7000						WR 86_69	P80	BE80B4	BX80B4	132
20.7	267	2.4	69	8000						WR 110_69	P80	BE80B4	BX80B4	136
20.9	267	1.3	45	6010						WR 75_45	P90	BE90S6		128
22.4	219	1.3	64	7000	W86_64	S2	ME2SB4	MX2SB4	130	W 86_64	P80	BE80B4	BX80B4	131
22.4	225	2.4	64	8000	W110_64	S2	ME2SB4	MX2SB4	134	W 110_64	P80	BE80B4	BX80B4	135
23.5	207	1.3	40	5930	W75_40	S3	ME3SA6		126	W 75_40	P90	BE90S6		127
23.8	196	1.0	60	5960	W75_60	S2	ME2SB4	MX2SB4	126	W 75_60	P80	BE80B4	BX80B4	127
23.8	231	1.3	60	5640						WR 75_60	P80	BE80B4	BX80B4	128
23.8	231	1.6	60	7000						WR 86_60	P80	BE80B4	BX80B4	132
23.8	238	2.8	60	8000						WR 110_60	P80	BE80B4	BX80B4	136
25.5	197	1.5	56	7000	W86_56	S2	ME2SB4	MX2SB4	130	W 86_56	P80	BE80B4	BX80B4	131
25.5	202	3.0	56	8000	W110_56	S2	ME2SB4	MX2SB4	134	W 110_56	P80	BE80B4	BX80B4	135
28.6	171	1.3	50	5670	W75_50	S2	ME2SB4	MX2SB4	126	W 75_50	P80	BE80B4	BX80B4	127
30.6	169	2.0	46	7000	W86_46	S2	ME2SB4	MX2SB4	130	W 86_46	P80	BE80B4	BX80B4	131
30.6	171	3.5	46	8000	W110_46	S2	ME2SB4	MX2SB4	134	W 110_46	P80	BE80B4	BX80B4	135
32	151	1.0	45	3860	W63_45	S2	ME2SB4	MX2SB4	122	W 63_45	P80	BE80B4	BX80B4	124
32	180	1.6	45	5250						WR 75_45	P80	BE80B4	BX80B4	128
32	176	2.2	45	7000						WR 86_45	P80	BE80B4	BX80B4	132
36	144	1.8	40	5370	W75_40	S2	ME2SB4	MX2SB4	126	W 75_40	P80	BE80B4	BX80B4	127
36	150	2.2	40	7000	W86_40	S2	ME2SB4	MX2SB4	130	W 86_40	P80	BE80B4	BX80B4	131
38	133	1.2	38	3700	W63_38	S2	ME2SB4	MX2SB4	122	W 63_38	P80	BE80B4	BX80B4	124
41	140	2.5	23	7000	W86_23	S3	ME3SA6		130	W 86_23	P90	BE90S6		131
48	112	1.4	30	3490	W63_30	S2	ME2SB4	MX2SB4	122	W 63_30	P80	BE80B4	BX80B4	124
48	126	2.2	30	4680						WR 75_30	P80	BE80B4	BX80B4	128
48	116	2.3	30	4950	W75_30	S2	ME2SB4	MX2SB4	126	W 75_30	P80	BE80B4	BX80B4	127
48	115	3.3	30	7000	W86_30	S2	ME2SB4	MX2SB4	130	W 86_30	P80	BE80B4	BX80B4	131
57	100	2.5	25	4700	W75_25	S2	ME2SB4	MX2SB4	126	W 75_25	P80	BE80B4	BX80B4	127
60	94	1.7	24	3290	W63_24	S2	ME2SB4	MX2SB4	122	W 63_24	P80	BE80B4	BX80B4	124
62	94	3.4	23	7000	W86_23	S2	ME2SB4	MX2SB4	130	W 86_23	P80	BE80B4	BX80B4	131
72	83	3.0	20	4400	W75_20	S2	ME2SB4	MX2SB4	126	W 75_20	P80	BE80B4	BX80B4	127
75	77	1.9	19	3100	W63_19	S2	ME2SB4	MX2SB4	122	W 63_19	P80	BE80B4	BX80B4	124
95	63	2.4	15	2910	W63_15	S2	ME2SB4	MX2SB4	122	W 63_15	P80	BE80B4	BX80B4	124
102	57	1.1	14	1690						VF 49_14	P80	BE80B4	BX80B4	116



0.75 kW

n ₂ min-1	M ₂ Nm	S	i	R _{n2} N	IE2		IE3		IEC	IEC				
					IE2	IE3	IE2	IE3						
119	47	1.0	24	1710								116		
119	51	2.7	12	2740	W63_12	S2	ME2SB4	MX2SB4	122	VF 49_24	P80	BE80A2		116
134	46	2.8	7	2590						W 63_12	P80	BE80B4	BX80B4	124
143	42	1.4	10	1540						W 63_7	P90	BE90S6		124
143	43	3.3	10	2600	W63_10	S2	ME2SB4	MX2SB4	122	VF 49_10	P80	BE80B4	BX80B4	116
190	32	3.9	15	2440						W 63_10	P80	BE80B4	BX80B4	124
204	30	1.8	7	1400	W63_15	S2	ME2SA2		122	W 63_15	P80	BE80A2		124
204	31	3.9	7	2340						VF 49_7	P80	BE80B4	BX80B4	116
285	21	2.1	10	1340						W 63_7	P80	BE80B4	BX80B4	124
407	15.5	2.7	7	1200	W63_7	S2	ME2SB4	MX2SB4	122	VF 49_10	P80	BE80A2		116
										VF 49_7	P80	BE80A2		116

1.1 kW

n ₂ min-1	M ₂ Nm	S	i	R _{n2} N	IE2		IE3		IEC	IEC		
					IE2	IE3	IE2	IE3				
0.30	7126	0.9	3200	34500								160
0.30	6769	1.3	3200	52000								166
0.37	6841	0.9	2560	34500								160
0.37	6555	1.4	2560	52000								166
0.45	5213	1.2	3200	34500								160
0.45	4975	1.8	3200	52000								166
0.51	6965	0.9	1840	34500								160
0.51	5941	1.5	1840	52000								166
0.56	4549	1.4	2560	34500								160
0.56	4738	1.9	2560	52000								166
0.78	4631	0.9	1840	19500								155
0.78	4768	1.3	1840	34500								160
0.78	4223	2.1	1840	52000								166
0.90	4146	1.0	1600	19500								155
1.0	3892	1.1	920	19500								155
1.2	3020	1.4	1200	19500								155
1.5	2860	1.4	920	19500								155
1.8	2547	1.6	800	19500								155
2.0	2554	1.0	690	16000								149
2.3	1777	1.0	600	13800								143
2.3	1999	2.1	600	19500								155
2.7	2154	1.2	529	16000								149
3.1	1873	1.4	460	16000								149
3.2	1670	1.4	300	19500								152
3.6	1303	1.4	400	13800								143
3.6	1422	2.9	400	19500								155
3.9	1443	1.1	240	16000								146
3.9	1443	1.9	240	19500								152
4.2	1481	1.7	345	16000								149
4.8	1206	1.1	300	16000								146
4.8	1221	1.9	300	19500								152
4.8	1289	2.0	300	16000								149
4.9	1240	1.0	192	13800								140
5.1	1037	1.7	280	13800								143
5.9	1012	1.1	240	13800								140
5.9	1030	1.5	240	16000								146
5.9	1049	2.6	240	19500								152
6.3	1050	2.4	225	16000								149
6.8	983	1.5	138	13800								140
6.8	983	2.3	138	16000								146
7.2	947	2.7	200	16000								149
7.5	867	1.4	192	13800								140
7.5	881	1.9	192	16000								146
7.9	869	1.0	120	8000								136
8.0	866	3.4	180	19500								152
8.5	796	1.5	168	13800								140
8.5	808	2.1	168	16000								146
9.5	657	1.2	100	13200								138



1.1 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N										
					IE2	IE3			IE2	IE3				
10.3	674	1.1	138	8000					WR 110_138	P90	BE90S4	BX90S4	136	
10.3	685	1.9	138	13800					VFR 130_138	P90	BE90S4	BX90S4	140	
10.3	695	2.8	138	16000					VFR 150_138	P90	BE90S4	BX90S4	146	
10.5	661	1.4	90	8000					WR 110_90	P100	BE100M6		136	
11.8	570	1.6	80	13200					VF 130_80	P100	BE100M6		138	
12.0	604	1.3	120	8000					WR 110_120	P90	BE90S4	BX90S4	136	
12.0	595	2.3	120	13800					VFR 130_120	P90	BE90S4	BX90S4	140	
12.0	604	3.3	120	16000					VFR 150_120	P90	BE90S4	BX90S4	146	
14.3	459	1.0	100	8000	W110_100	S3	ME3SA4	MX3SA4	134	W 110_100	P90	BE90S4	BX90S4	135
14.3	518	1.1	100	12600					VF 130_100	P90	BE90S4	BX90S4	138	
15.9	467	1.8	90	8000					WR 110_90	P90	BE90S4	BX90S4	136	
15.9	473	3.1	90	13800					VFR 130_90	P90	BE90S4	BX90S4	140	
17.9	391	1.2	80	8000	W110_80	S3	ME3SA4	MX3SA4	134	W 110_80	P90	BE90S4	BX90S4	135
17.9	403	2.2	80	12600					VF 130_80	P90	BE90S4	BX90S4	138	
20.5	353	1.0	46	7000	W86_46	S3	ME3LA6		130	W 86_46	P100	BE100M6		131
20.5	373	3.1	46	13200					VF 130_46	P100	BE100M6		138	
20.7	383	1.0	69	7000					WR 86_69	P90	BE90S4	BX90S4	132	
20.7	394	1.6	69	8000					WR 110_69	P90	BE90S4	BX90S4	136	
20.7	388	3.3	69	13800					VFR 130_69	P90	BE90S4	BX90S4	140	
22.4	332	1.6	64	8000	W110_64	S3	ME3SA4	MX3SA4	134	W 110_64	P90	BE90S4	BX90S4	135
22.4	336	2.7	64	12600					VF 130_64	P90	BE90S4	BX90S4	138	
23.6	316	1.1	40	7000	W86_40	S3	ME3LA6		130	W 86_40	P100	BE100M6		131
23.8	342	1.1	60	7000					WR 86_60	P90	BE90S4	BX90S4	132	
23.8	351	1.9	60	8000					WR 110_60	P90	BE90S4	BX90S4	136	
25.5	290	1.0	56	7000	W86_56	S3	ME3SA4	MX3SA4	130	W 86_56	P90	BE90S4	BX90S4	131
25.5	299	2.0	56	8000	W110_56	S3	ME3SA4	MX3SA4	134	W 110_56	P90	BE90S4	BX90S4	135
25.5	303	3.1	56	12600					VF 130_56	P90	BE90S4	BX90S4	138	
31	249	1.4	46	7000	W86_46	S3	ME3SA4	MX3SA4	130	W 86_46	P90	BE90S4	BX90S4	131
31	252	2.4	46	8000	W110_46	S3	ME3SA4	MX3SA4	134	W 110_46	P90	BE90S4	BX90S4	135
32	266	1.1	45	5010					WR 75_45	P90	BE90S4	BX90S4	128	
32	259	1.5	45	7000					WR 86_45	P90	BE90S4	BX90S4	132	
32	266	2.7	45	8000					WR 110_45	P90	BE90S4	BX90S4	136	
36	213	1.2	40	4980	W75_40	S3	ME3SA4	MX3SA4	126	W 75_40	P90	BE90S4	BX90S4	127
36	222	1.5	40	7000	W86_40	S3	ME3SA4	MX3SA4	130	W 86_40	P90	BE90S4	BX90S4	131
36	225	3.0	40	8000	W110_40	S3	ME3SA4	MX3SA4	134	W 110_40	P90	BE90S4	BX90S4	135
38	214	1.3	38	4790					WR 75_37.5	P90	BE90S4	BX90S4	128	
41	205	1.6	23	7000	W86_23	S3	ME3LA6		130	W 86_23	P100	BE100M6		131
41	204	1.7	35	7000					WR 86_34.5	P90	BE90S4	BX90S4	132	
48	165	1.0	30	3130					W 63_30	P90	BE90S4	BX90S4	124	
48	186	1.5	30	4530					WR 75_30	P90	BE90S4	BX90S4	128	
48	171	1.6	30	4640	W75_30	S3	ME3SA4	MX3SA4	126	W 75_30	P90	BE90S4	BX90S4	127
48	183	1.9	30	7000					WR 86_30	P90	BE90S4	BX90S4	132	
48	169	2.2	30	7000	W86_30	S3	ME3SA4	MX3SA4	130	W 86_30	P90	BE90S4	BX90S4	131
57	148	1.7	25	4420	W75_25	S3	ME3SA4	MX3SA4	126	W 75_25	P90	BE90S4	BX90S4	127
59	138	1.1	24	2990					W 63_24	P90	BE90S4	BX90S4	124	
62	140	2.3	23	7000	W86_23	S3	ME3SA4	MX3SA4	130	W 86_23	P90	BE90S4	BX90S4	131
72	123	2.0	20	4160	W75_20	S3	ME3SA4	MX3SA4	126	W 75_20	P90	BE90S4	BX90S4	127
72	124	2.6	20	7000	W86_20	S3	ME3SA4	MX3SA4	130	W 86_20	P90	BE90S4	BX90S4	131
76	113	1.3	19	2840					W 63_19	P90	BE90S4	BX90S4	124	
95	92	1.6	15	2690					W 63_15	P90	BE90S4	BX90S4	124	
95	95	2.6	15	3850	W75_15	S3	ME3SA4	MX3SA4	126	W 75_15	P90	BE90S4	BX90S4	127
95	95	3.4	15	6820	W86_15	S3	ME3SA4	MX3SA4	130	W 86_15	P90	BE90S4	BX90S4	131
119	75	1.9	12	2550					W 63_12	P90	BE90S4	BX90S4	124	
143	64	2.2	10	2440					W 63_10	P90	BE90S4	BX90S4	124	
143	65	3.5	10	3420	W75_10	S3	ME3SA4	MX3SA4	126	W 75_10	P90	BE90S4	BX90S4	127
189	47	2.6	15	2330	W63_15	S2	ME2SB2		122	W 63_15	P80	BE80B2		124
204	45	2.6	7	2210					W 63_7	P90	BE90S4	BX90S4	124	
236	38	3.3	12	2190	W63_12	S2	ME2SB2		122	W 63_12	P80	BE80B2		124
283	32	3.9	10	2080	W63_10	S2	ME2SB2		122	W 63_10	P80	BE80B2		124









1.5 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N							
					IE2	IE3		IE2	IE2		
0.30	9240	1.0	3200	52000				VF/VF 130/250_3200	P100	BE100LA6	166
0.37	8948	1.0	2560	52000				VF/VF 130/250_2560	P100	BE100LA6	166
0.45	7012	0.9	3200	34500				VF/VF 130/210_3200	P90	BE90LA4 BX90LA4	160
0.45	6693	1.3	3200	52000				VF/VF 130/250_3200	P90	BE90LA4 BX90LA4	166
0.51	8109	1.1	1840	52000				VF/VF 130/250_1840	P100	BE100LA6	166
0.56	6120	1.0	2560	34500				VF/VF 130/210_2560	P90	BE90LA4 BX90LA4	160
0.56	6375	1.4	2560	52000				VF/VF 130/250_2560	P90	BE90LA4 BX90LA4	166
0.78	6415	1.0	1840	34500				VF/VF 130/210_1840	P90	BE90LA4 BX90LA4	160
0.78	5681	1.6	1840	52000				VF/VF 130/250_1840	P90	BE90LA4 BX90LA4	166
1.0	4893	1.3	920	34500				VF/VF 130/210_920	P100	BE100LA6	160
1.0	4893	1.9	920	52000				VF/VF 130/250_920	P100	BE100LA6	166
1.2	4064	1.0	1200	19500				W /VF 86/185_1200	P90	BE90LA4 BX90LA4	155
1.2	4620	1.4	800	34500				VF/VF 130/210_800	P100	BE100LA6	160
1.2	4863	1.9	800	52000				VF/VF 130/250_800	P100	BE100LA6	166
1.5	3849	1.1	920	19500				W /VF 86/185_920	P90	BE90LA4 BX90LA4	155
1.6	3921	1.7	600	34500				VF/VF 130/210_600	P100	BE100LA6	160
1.6	3921	2.3	600	52000				VF/VF 130/250_600	P100	BE100LA6	166
1.8	3426	1.2	800	19500				W /VF 86/185_800	P90	BE90LA4 BX90LA4	155
2.4	2689	1.5	600	19500				W /VF 86/185_600	P90	BE90LA4 BX90LA4	155
2.4	2918	2.2	400	34500				VF/VF 130/210_400	P100	BE100LA6	160
2.4	2857	3.2	400	52000				VF/VF 130/250_400	P100	BE100LA6	166
2.7	2898	0.9	529	16000				W /VF 86/150_529	P90	BE90LA4 BX90LA4	149
3.1	2520	1.0	460	16000				W /VF 86/150_460	P90	BE90LA4 BX90LA4	149
3.2	2280	1.0	300	19500				VFR 185_300	P100	BE100LA6	152
3.2	2234	1.6	300	34500				VFR 210_300	P100	BE100LA6	158
3.2	2370	2.2	300	52000				VFR 250_300	P100	BE100LA6	164
3.4	2128	3.0	280	34500				VF/VF 130/210_280	P100	BE100LA6	160
3.5	1753	1.0	400	13800				W /VF 63/130_400	P90	BE90LA4 BX90LA4	143
3.5	1913	2.2	400	19500				W /VF 86/185_400	P90	BE90LA4 BX90LA4	155
3.9	1969	0.9	240	16000				VFR 150_240	P100	BE100LA6	146
3.9	1969	1.4	240	19500				VFR 185_240	P100	BE100LA6	152
3.9	1969	2.2	240	34500				VFR 210_240	P100	BE100LA6	158
4.2	1993	1.3	345	16000				W /VF 86/150_345	P90	BE90LA4 BX90LA4	149
4.8	1643	1.4	300	19500				VFR 185_300	P90	BE90LA4 BX90LA4	152
4.8	1733	1.5	300	16000				W /VF 86/150_300	P90	BE90LA4 BX90LA4	149
4.9	1721	1.1	192	16000				VFR 150_192	P100	BE100LA6	146
5.1	1394	1.3	280	13800				W /VF 63/130_280	P90	BE90LA4 BX90LA4	143
5.1	1450	2.9	280	19500				W /VF 86/185_280	P90	BE90LA4 BX90LA4	155
5.3	1641	2.0	180	19500				VFR 185_180	P100	BE100LA6	152
5.3	1477	3.3	180	34500				VFR 210_180	P100	BE100LA6	158
5.6	1532	0.9	168	13800				VFR 130_168	P100	BE100LA6	140
6.0	1386	1.1	240	16000				VFR 150_240	P90	BE90LA4 BX90LA4	146
6.0	1411	1.9	240	19500				VFR 185_240	P90	BE90LA4 BX90LA4	152
6.4	1412	1.8	225	16000				W /VF 86/150_225	P90	BE90LA4 BX90LA4	149
7.2	1275	2.0	200	16000				W /VF 86/150_200	P90	BE90LA4 BX90LA4	149
7.4	1167	1.0	192	13800				VFR 130_192	P90	BE90LA4 BX90LA4	140
7.4	1185	1.4	192	16000				VFR 150_192	P90	BE90LA4 BX90LA4	146
7.9	1166	2.6	180	19500				VFR 185_180	P90	BE90LA4 BX90LA4	152
8.5	1071	1.1	168	13800				VFR 130_168	P90	BE90LA4 BX90LA4	140
8.5	1087	1.6	168	16000				VFR 150_168	P90	BE90LA4 BX90LA4	146
9.5	927	1.2	100	15500				VF 150_100	P100	BE100LA6	144
9.5	942	2.1	100	19500				VF 185_100	P100	BE100LA6	150
9.5	1001	3.3	150	16000				VFR 185_150	P90	BE90LA4 BX90LA4	152
10.3	921	1.4	138	13800				VFR 130_138	P90	BE90LA4 BX90LA4	140
10.3	934	2.1	138	16000				VFR 150_138	P90	BE90LA4 BX90LA4	146
10.5	902	1.0	90	8000				WR 110_90	P100	BE100LA6	136
10.5	998	3.2	90	19500				VFR 185_90	P100	BE100LA6	152
11.8	778	1.2	80	13200				VF 130_80	P100	BE100LA6	138
11.8	790	1.7	80	15500				VF 150_80	P100	BE100LA6	144
11.9	816	1.0	120	8000				WR 110_120	P90	BE90LA4 BX90LA4	136
12.0	801	1.7	120	13800				VFR 130_120	P90	BE90LA4 BX90LA4	140
12.0	813	2.4	120	16000				VFR 150_120	P90	BE90LA4 BX90LA4	146
13.7	787	1.0	69	8000				WR 110_69	P100	BE100LA6	136
13.7	776	1.9	69	13800				VFR 130_69	P100	BE100LA6	140
13.7	776	2.6	69	16000				VFR 150_69	P100	BE100LA6	146



1.5 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N	 			 					
					IE2	IE3		IE2	IE2				
14.8	671	2.2	64	15500				VF 150_64	P100	BE100LA6	144		
15.9	627	1.3	90	8000				WR 110_90	P90	BE90LA4 BX90LA4	136		
15.9	636	2.3	90	13800				VFR 130_90	P90	BE90LA4 BX90LA4	140		
15.9	645	3.1	90	16000				VFR 150_90	P90	BE90LA4 BX90LA4	146		
16.9	578	1.1	56	8000	W110_56	S3	ME3LB6	134	W 110_56	P100	BE100LA6	135	
16.9	595	1.8	56	13200				VF 130_56	P100	BE100LA6	138		
16.9	604	2.5	56	15500				VF 150_56	P100	BE100LA6	144		
17.8	542	1.6	80	12600				VF 130_80	P90	BE90LA4 BX90LA4	138		
20.5	497	1.3	46	8000	W110_46	S3	ME3LB6	134	W 110_46	P100	BE100LA6	135	
20.5	518	3.4	46	15500				VF 150_46	P100	BE100LA6	144		
20.7	529	1.2	69	8000				WR 110_69	P90	BE90LA4 BX90LA4	136		
20.7	523	2.4	69	13800				VFR 130_69	P90	BE90LA4 BX90LA4	140		
20.7	529	3.5	69	16000				VFR 150_69	P90	BE90LA4 BX90LA4	146		
22.3	446	1.2	64	8000	W110_64	S3	ME3SB4	MX3SB4	134	W 110_64	P90	BE90LA4 BX90LA4	135
22.3	453	2.0	64	12600				VF 130_64	P90	BE90LA4 BX90LA4	138		
23.6	444	2.7	40	13200				VF 130_40	P100	BE100LA6	138		
23.8	473	1.4	60	8000				WR 110_60	P90	BE90LA4 BX90LA4	136		
23.8	466	2.9	60	13800				VFR 130_60	P90	BE90LA4 BX90LA4	140		
25.6	402	1.5	56	8000	W110_56	S3	ME3SB4	MX3SB4	134	W 110_56	P90	BE90LA4 BX90LA4	135
25.6	407	2.3	56	12600				VF 130_56	P90	BE90LA4 BX90LA4	138		
31	334	1.0	46	7000	W86_46	S3	ME3SB4	MX3SB4	130	W 86_46	P90	BE90LA4 BX90LA4	131
31	339	1.8	46	8000	W110_46	S3	ME3SB4	MX3SB4	134	W 110_46	P90	BE90LA4 BX90LA4	135
31	348	3.1	46	12600				VF 130_46	P90	BE90LA4 BX90LA4	138		
32	350	1.1	45	7000				WR 86_45	P90	BE90LA4 BX90LA4	132		
32	359	2.0	45	8000				WR 110_45	P90	BE90LA4 BX90LA4	136		
35	299	1.1	40	7000	W86_40	S3	ME3SB4	MX3SB4	130	W 86_40	P90	BE90LA4 BX90LA4	131
35	303	2.2	40	8000	W110_40	S3	ME3SB4	MX3SB4	134	W 110_40	P90	BE90LA4 BX90LA4	135
38	292	0.9	25	4330	W75_25	S3	ME3LB6		126	W 75_25	P100	BE100LA6	127
38	287	0.9	38	4330				WR 75_37.5	P90	BE90LA4 BX90LA4	128		
41	279	1.2	23	7000	W86_23	S3	ME3LB6		130	W 86_23	P100	BE100LA6	131
41	275	1.3	35	7000				WR 86_34.5	P90	BE90LA4 BX90LA4	132		
48	251	1.1	30	4130				WR 75_30	P90	BE90LA4 BX90LA4	128		
48	230	1.2	30	4270	W75_30	S3	ME3SB4	MX3SB4	126	W 75_30	P90	BE90LA4 BX90LA4	127
48	245	1.4	30	7000				WR 86_30	P90	BE90LA4 BX90LA4	132		
48	227	1.6	30	7000	W86_30	S3	ME3SB4	MX3SB4	130	W 86_30	P90	BE90LA4 BX90LA4	131
48	230	3.1	30	8000	W110_30	S3	ME3SB4	MX3SB4	134	W 110_30	P90	BE90LA4 BX90LA4	135
57	199	1.3	25	4100	W75_25	S3	ME3SB4	MX3SB4	126	W 75_25	P90	BE90LA4 BX90LA4	127
62	188	1.7	23	7000	W86_23	S3	ME3SB4	MX3SB4	130	W 86_23	P90	BE90LA4 BX90LA4	131
62	190	2.8	23	8000	W110_23	S3	ME3SB4	MX3SB4	134	W 110_23	P90	BE90LA4 BX90LA4	135
72	166	1.5	20	3880	W75_20	S3	ME3SB4	MX3SB4	126	W 75_20	P90	BE90LA4 BX90LA4	127
72	168	1.9	20	7000	W86_20	S3	ME3SB4	MX3SB4	130	W 86_20	P90	BE90LA4 BX90LA4	131
72	168	3.4	20	8000	W110_20	S3	ME3SB4	MX3SB4	134	W 110_20	P90	BE90LA4 BX90LA4	135
75	153	1.0	19	2550				W 63_19	P90	BE90LA4 BX90LA4	124		
95	124	1.2	15	2450				W 63_15	P90	BE90LA4 BX90LA4	124		
95	127	2.0	15	3630	W75_15	S3	ME3SB4	MX3SB4	126	W 75_15	P90	BE90LA4 BX90LA4	127
95	128	2.4	15	6520				WR 86_15	P90	BE90LA4 BX90LA4	132		
95	127	2.6	15	6610	W86_15	S3	ME3SB4	MX3SB4	130	W 86_15	P90	BE90LA4 BX90LA4	131
120	102	1.4	12	2340				W 63_12	P90	BE90LA4 BX90LA4	124		
135	94	2.2	7	3150	W75_7	S3	ME3LB6		126	W 75_7	P100	BE100LA6	127
143	85	1.6	10	2250				W 63_10	P90	BE90LA4 BX90LA4	124		
143	87	2.6	10	3250	W75_10	S3	ME3SB4	MX3SB4	126	W 75_10	P90	BE90LA4 BX90LA4	127
143	87	3.3	10	5850	W86_10	S3	ME3SB4	MX3SB4	130	W 86_10	P90	BE90LA4 BX90LA4	131
190	65	1.9	15	2200				W 63_15	P90	BE90SA2	124		
190	67	3.4	15	3120	W75_15	S3	ME3SA2		126	W 75_15	P90	BE90SA2	127
204	62	1.9	7	2060				W 63_7	P90	BE90LA4 BX90LA4	124		
204	63	3.1	7	2920	W75_7	S3	ME3SB4	MX3SB4	126	W 75_7	P90	BE90LA4 BX90LA4	127
204	62	4.0	7	5240	W86_7	S3	ME3SB4	MX3SB4	130	W 86_7	P90	BE90LA4 BX90LA4	131
238	52	2.4	12	2080				W 63_12	P90	BE90SA2	124		
286	44	2.8	10	1980	W63_10	S3	ME3SA2		122	W 63_10	P90	BE90SA2	124









2.2 kW







n ₂ min-1	M ₂ Nm	S	i	R _{n2} N								
					IE2	IE3		IE2	IE3			
0.45	9879	0.9	3200	52000				VF/VF 130/250_3200	P100	BE100LA4	BX100LA4	166
0.56	9408	0.9	2560	52000				VF/VF 130/250_2560	P100	BE100LA4	BX100LA4	166
0.78	8385	1.1	1840	52000				VF/VF 130/250_1840	P100	BE100LA4	BX100LA4	166
0.89	7527	1.2	1600	52000				VF/VF 130/250_1600	P100	BE100LA4	BX100LA4	166
1.0	6884	0.9	920	34500				VF/VF 130/210_920	P112	BE112M6		160
1.0	6884	1.4	920	52000				VF/VF 130/250_920	P112	BE112M6		166
1.2	6174	1.0	1200	34500				VF/VF 130/210_1200	P100	BE100LA4	BX100LA4	160
1.2	6174	1.4	1200	52000				VF/VF 130/250_1200	P100	BE100LA4	BX100LA4	166
1.5	5004	1.2	920	34500				VF/VF 130/210_920	P100	BE100LA4	BX100LA4	160
1.5	5004	1.8	920	52000				VF/VF 130/250_920	P100	BE100LA4	BX100LA4	166
1.8	4821	1.3	800	34500				VF/VF 130/210_800	P100	BE100LA4	BX100LA4	160
1.8	4940	1.8	800	52000				VF/VF 130/250_800	P100	BE100LA4	BX100LA4	166
2.4	3969	1.0	600	19500				W /VF 86/185_600	P100	BE100LA4	BX100LA4	155
2.4	3792	1.6	600	34500				VF/VF 130/210_600	P100	BE100LA4	BX100LA4	160
2.4	3881	2.3	600	52000				VF/VF 130/250_600	P100	BE100LA4	BX100LA4	166
3.2	3143	1.2	300	34500				VFR 210_300	P112	BE112M6		158
3.2	3335	1.6	300	52000				VFR 250_300	P112	BE112M6		164
3.5	2823	1.5	400	19500				W /VF 86/185_400	P100	BE100LA4	BX100LA4	155
3.5	2940	2.1	400	34500				VF/VF 130/210_400	P100	BE100LA4	BX100LA4	160
3.5	2882	3.1	400	52000				VF/VF 130/250_400	P100	BE100LA4	BX100LA4	166
4.0	2771	1.0	240	19500				VFR 185_240	P112	BE112M6		152
4.0	2771	1.6	240	34500				VFR 210_240	P112	BE112M6		158
4.0	2873	2.0	240	52000				VFR 250_240	P112	BE112M6		164
4.8	2426	0.9	300	19500				VFR 185_300	P100	BE100LA4	BX100LA4	152
4.8	2426	1.4	300	34500				VFR 210_300	P100	BE100LA4	BX100LA4	158
4.8	2514	2.0	300	52000				VFR 250_300	P100	BE100LA4	BX100LA4	164
5.1	2141	1.9	280	19500				W /VF 86/185_280	P100	BE100LA4	BX100LA4	155
5.1	2141	2.9	280	34500				VF/VF 130/210_280	P100	BE100LA4	BX100LA4	160
5.7	2191	0.9	168	16000				VFR 150_168	P112	BE112M6		146
6.0	2082	1.3	240	19500				VFR 185_240	P100	BE100LA4	BX100LA4	152
6.0	2082	1.8	240	34500				VFR 210_240	P100	BE100LA4	BX100LA4	158
6.0	2152	2.5	240	52000				VFR 250_240	P100	BE100LA4	BX100LA4	164
7.4	1750	1.0	192	16000				VFR 150_192	P100	BE100LA4	BX100LA4	146
7.9	1720	1.7	180	19500				VFR 185_180	P100	BE100LA4	BX100LA4	152
7.9	1694	2.5	180	34500				VFR 210_180	P100	BE100LA4	BX100LA4	158
7.9	1773	3.5	180	52000				VFR 250_180	P100	BE100LA4	BX100LA4	164
8.0	1616	0.9	120	13800				VFR 130_120	P112	BE112M6		140
8.5	1605	1.1	168	16000				VFR 150_168	P100	BE100LA4	BX100LA4	146
9.5	1478	2.2	150	19500				VFR 185_150	P100	BE100LA4	BX100LA4	152
9.5	1478	3.0	150	34500				VFR 210_150	P100	BE100LA4	BX100LA4	158
9.6	1326	1.5	100	19000				VF 185_100	P112	BE112M6		150
10.3	1360	1.0	138	13800				VFR 130_138	P100	BE100LA4	BX100LA4	140
10.3	1379	1.4	138	16000				VFR 150_138	P100	BE100LA4	BX100LA4	146
10.6	1404	2.3	90	19500				VFR 185_90	P112	BE112M6		152
10.6	1385	3.3	90	34500				VFR 210_90	P112	BE112M6		158
11.9	1111	1.3	80	15500				VF 150_80	P112	BE112M6		144
11.9	1129	2.1	80	19000				VF 185_80	P112	BE112M6		150
12.0	1182	1.2	120	13800				VFR 130_120	P100	BE100LA4	BX100LA4	140
12.0	1200	1.6	120	16000				VFR 150_120	P100	BE100LA4	BX100LA4	146
12.0	1235	2.9	120	19500				VFR 185_120	P100	BE100LA4	BX100LA4	152
12.0	1235	4.1	120	34500				VFR 210_120	P100	BE100LA4	BX100LA4	158
13.8	1091	1.4	69	13800				VFR 130_69	P112	BE112M6		140
13.8	1091	1.9	69	16000				VFR 150_69	P112	BE112M6		146
14.3	956	1.2	100	14700				VF 150_100	P100	BE100LA4	BX100LA4	144
14.3	956	2.0	100	18000				VF 185_100	P100	BE100LA4	BX100LA4	150
14.9	931	1.2	64	13200				VF 130_64	P112	BE112M6		138
15.9	939	1.6	90	13800				VFR 130_90	P100	BE100LA4	BX100LA4	140
15.9	953	2.0	90	16000				VFR 150_90	P100	BE100LA4	BX100LA4	146
15.9	911	2.8	60	19000				VF 185_60	P112	BE112M6		150
15.9	1005	2.7	90	19500				VFR 185_90	P100	BE100LA4	BX100LA4	152
17.1	838	1.3	56	13200				VF 130_56	P112	BE112M6		138
17.8	800	1.1	80	12600				VF 130_80	P100	BE100LA4	BX100LA4	138
17.8	812	1.5	80	14700				VF 150_80	P100	BE100LA4	BX100LA4	144



2.2 kW

n ₂ min-1	M ₂ Nm	S	i	R _{n2} N	 			 						
					IE2	IE3		IE2	IE3					
17.8	812	2.6	80	18000				VF 185_80	P100	BE100LA4	BX100LA4	150		
20.7	771	1.7	69	13800				VFR 130_69	P100	BE100LA4	BX100LA4	140		
20.7	781	2.3	69	16000				VFR 150_69	P100	BE100LA4	BX100LA4	146		
20.8	718	1.6	46	13200				VF 130_46	P112	BE112M6		138		
20.8	728	2.4	46	15500				VF 150_46	P112	BE112M6		144		
21.2	762	1.1	45	8000				WR 110_45	P112	BE112M6		136		
22.3	668	1.4	64	12600				VF 130_64	P100	BE100LA4	BX100LA4	138		
22.3	678	1.9	64	14700				VF 150_64	P100	BE100LA4	BX100LA4	144		
23.8	697	1.0	60	8000				WR 110_60	P100	BE100LA4	BX100LA4	136		
23.8	688	1.9	60	13800				VFR 130_60	P100	BE100LA4	BX100LA4	140		
23.8	697	2.7	60	16000				VFR 150_60	P100	BE100LA4	BX100LA4	146		
23.8	653	3.4	60	18000				VF 185_60	P100	BE100LA4	BX100LA4	150		
23.9	631	1.2	40	8000				W 110_40	P112	BE112M6	BE112M6	135		
25.6	593	1.0	56	8000	W110_56	S3	ME3LA4	MX3LA4	134	W 110_56	P100	BE100LA4	BX100LA4	135
25.6	601	1.6	56	12600				VF 130_56	P100	BE100LA4	BX100LA4	138		
25.6	609	2.2	56	14200				VF 150_56	P100	BE100LA4	BX100LA4	144		
31	500	1.2	46	8000	W110_46	S3	ME3LA4	MX3LA4	134	W 110_46	P100	BE100LA4	BX100LA4	135
31	514	2.0	46	12600				VF 130_46	P100	BE100LA4	BX100LA4	138		
31	521	2.9	46	14700				VF 150_46	P100	BE100LA4	BX100LA4	144		
32	529	1.3	45	8000				WR 110_45	P100	BE100LA4	BX100LA4	136		
31	543	3.1	45	16000				VFR 150_45	P100	BE100LA4	BX100LA4	146		
35	447	1.5	40	8000	W110_40	S3	ME3LA4	MX3LA4	134	W 110_40	P100	BE100LA4	BX100LA4	135
35	447	2.4	40	12600				VF 130_40	P100	BE100LA4	BX100LA4	138		
35	453	3.4	40	14700				VF 150_40	P100	BE100LA4	BX100LA4	144		
42	398	2.6	23	13200				VF 130_23	P112	BE112M6		138		
48	335	1.1	30	7000	W86_30	S3	ME3LA4	MX3LA4	130	W 86_30	P100	BE100LA4	BX100LA4	131
48	339	2.1	30	8000	W110_30	S3	ME3LA4	MX3LA4	134	W 110_30	P100	BE100LA4	BX100LA4	135
48	348	3.0	30	12600				VF 130_30	P100	BE100LA4	BX100LA4	138		
62	277	1.2	23	6990	W86_23	S3	ME3LA4	MX3LA4	130	W 86_23	P100	BE100LA4	BX100LA4	131
62	280	1.9	23	8000	W110_23	S3	ME3LA4	MX3LA4	134	W 110_23	P100	BE100LA4	BX100LA4	135
62	280	3.1	23	12600				VF 130_23	P100	BE100LA4	BX100LA4	138		
72	244	1.0	20	3410	W75_20	S3	ME3LA4	MX3LA4	126	W 75_20	P100	BE100LA4	BX100LA4	127
72	247	1.3	20	6730	W86_20	S3	ME3LA4	MX3LA4	130	W 86_20	P100	BE100LA4	BX100LA4	131
72	247	2.3	20	8000	W110_20	S3	ME3LA4	MX3LA4	134	W 110_20	P100	BE100LA4	BX100LA4	135
95	187	1.3	15	3240	W75_15	S3	ME3LA4	MX3LA4	126	W 75_15	P100	BE100LA4	BX100LA4	127
95	187	1.8	15	6270	W86_15	S3	ME3LA4	MX3LA4	130	W 86_15	P100	BE100LA4	BX100LA4	131
95	185	3.2	15	8000	W110_15	S3	ME3LA4	MX3LA4	134	W 110_15	P100	BE100LA4	BX100LA4	135
136	133	1.6	7	2780				W 75_7	P112	BE112M6		127		
136	133	2.0	7	5540				W 86_7	P112	BE112M6		131		
143	129	1.8	10	2940	W75_10	S3	ME3LA4	MX3LA4	126	W 75_10	P100	BE100LA4	BX100LA4	127
143	129	2.2	10	5590	W86_10	S3	ME3LA4	MX3LA4	130	W 86_10	P100	BE100LA4	BX100LA4	131
191	98	2.3	15	2920	W75_15	S3	ME3LA2		126	W 75_15	P90	BE90L2		127
191	93	1.3	15	1980				W 63_15	P90	BE90L2		124		
204	93	2.1	7	2660	W75_7	S3	ME3LA4	MX3LA4	126	W 75_7	P100	BE100LA4	BX100LA4	127
204	92	2.7	7	5030	W86_7	S3	ME3LA4	MX3LA4	130	W 86_7	P100	BE100LA4	BX100LA4	131
239	75	1.6	12	1890				W 63_12	P90	BE90L2		124		
287	66	3.0	10	2610	W75_10	S3	ME3LA2		126	W 75_10	P90	BE90L2		127
287	63	1.9	10	1820				W 63_10	P90	BE90L2		124		
409	48	3.6	7	2350	W75_7	S3	ME3LA2		126	W 75_7	P90	BE90L2		127
409	46	2.3	7	1660				W 63_7	P90	BE90L2		124		

3 kW

n ₂ min-1	M ₂ Nm	S	i	R _{n2} N	 			 				
					IE2	IE3		IE2	IE3			
0.90	10403	0.9	1600	52000				VF/VF 130/250_1600	P100	BE100LB4	BX100LB4	166
1.0	9813	0.9	920	52000				VF/VF 130/250_920	P132	BE132S6		166
1.2	8534	1.1	1200	52000				VF/VF 130/250_1200	P100	BE100LB4	BX100LB4	166
1.5	6917	0.9	920	34500				VF/VF 130/210_920	P100	BE100LB4	BX100LB4	160
1.5	6917	1.3	920	52000				VF/VF 130/250_920	P100	BE100LB4	BX100LB4	166









3 kW







n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N										
					IE2	IE3		IE2	IE3					
1.8	6665	0.9	800	34500				VF/VF 130/210_800	P100	BE100LB4	BX100LB4	160		
1.8	6827	1.3	800	52000				VF/VF 130/250_800	P100	BE100LB4	BX100LB4	166		
2.5	5242	1.2	600	34500				VF/VF 130/210_600	P100	BE100LB4	BX100LB4	160		
2.5	5364	1.7	600	52000				VF/VF 130/250_600	P100	BE100LB4	BX100LB4	166		
3.2	4755	1.1	300	52000				VFR 250_300	P132	BE132S6		164		
3.6	3901	1.1	400	19500				W /VF 86/185_400	P100	BE100LB4	BX100LB4	155		
3.6	4064	1.6	400	34500				VF/VF 130/210_400	P100	BE100LB4	BX100LB4	160		
3.6	3983	2.3	400	52000				VF/VF 130/250_400	P100	BE100LB4	BX100LB4	166		
4.0	3950	1.1	240	34500				VFR 210_240	P132	BE132S6		158		
4.0	4096	1.4	240	52000				VFR 250_240	P132	BE132S6		164		
4.8	3353	1.0	300	34500				VFR 210_300	P100	BE100LB4	BX100LB4	158		
4.8	3475	1.4	300	52000				VFR 250_300	P100	BE100LB4	BX100LB4	164		
5.1	2958	1.4	280	19500				W /VF 86/185_280	P100	BE100LB4	BX100LB4	155		
5.1	2958	2.1	280	34500				VF/VF 130/210_280	P100	BE100LB4	BX100LB4	160		
5.1	3015	3.0	280	52000				VF/VF 130/250_280	P100	BE100LB4	BX100LB4	166		
6.0	2877	1.0	240	19500				VFR 185_240	P100	BE100LB4	BX100LB4	152		
6.0	2877	1.4	240	34500				VFR 210_240	P100	BE100LB4	BX100LB4	158		
6.0	2975	1.8	240	52000				VFR 250_240	P100	BE100LB4	BX100LB4	164		
8.0	2377	1.3	180	19500				VFR 185_180	P100	BE100LB4	BX100LB4	152		
8.0	2341	1.8	180	34500				VFR 210_180	P100	BE100LB4	BX100LB4	158		
8.0	2450	2.6	180	52000				VFR 250_180	P100	BE100LB4	BX100LB4	164		
9.6	2042	1.6	150	19500				VFR 185_150	P100	BE100LB4	BX100LB4	152		
9.6	1859	1.6	100	33000				VF 210_100	P132	BE132S6		156		
9.6	2042	2.2	150	34500				VFR 210_150	P100	BE100LB4	BX100LB4	158		
9.6	1920	2.5	100	50000				VF 250_100	P132	BE132S6		162		
9.6	2042	3.2	150	52000				VFR 250_150	P100	BE100LB4	BX100LB4	164		
10.4	1907	1.0	138	16000				VFR 150_138	P100	BE100LB4	BX100LB4	146		
11.9	1609	1.5	80	19000				VF 185_80	P132	BE132S6		150		
11.9	1585	2.1	80	33000				VF 210_80	P132	BE132S6		156		
12.1	1634	0.9	120	13800				VFR 130_120	P100	BE100LB4	BX100LB4	140		
12.1	1658	1.2	120	16000				VFR 150_120	P100	BE100LB4	BX100LB4	146		
12.1	1707	2.1	120	19500				VFR 185_120	P100	BE100LB4	BX100LB4	152		
12.1	1707	2.9	120	34500				VFR 210_120	P100	BE100LB4	BX100LB4	158		
12.1	1731	4.0	120	52000				VFR 250_120	P100	BE100LB4	BX100LB4	164		
14.4	1321	0.9	100	14700				VF 150_100	P100	BE100LB4	BX100LB4	144		
14.4	1321	1.4	100	18000				VF 185_100	P100	BE100LB4	BX100LB4	150		
15.9	1298	2.0	60	19000				VF 185_60	P132	BE132S6		150		
15.9	1280	2.9	60	33000				VF 210_60	P132	BE132S6		156		
16.0	1298	1.2	90	13800				VFR 130_90	P100	BE100LB4	BX100LB4	140		
16.0	1317	1.5	90	16000				VFR 150_90	P100	BE100LB4	BX100LB4	146		
16.0	1390	2.0	90	19500				VFR 185_90	P100	BE100LB4	BX100LB4	152		
16.0	1390	2.9	90	34500				VFR 210_90	P100	BE100LB4	BX100LB4	158		
18.0	1122	1.1	80	14700				VF 150_80	P100	BE100LB4	BX100LB4	144		
18.0	1122	1.9	80	18000				VF 185_80	P100	BE100LB4	BX100LB4	150		
20.8	1066	1.2	69	13800				VFR 130_69	P100	BE100LB4	BX100LB4	140		
20.8	1080	1.7	69	16000				VFR 150_69	P100	BE100LB4	BX100LB4	146		
22.5	923	1.0	64	12600				VF 130_64	P100	BE100LB4	BX100LB4	138		
22.5	936	1.4	64	14700				VF 150_64	P100	BE100LB4	BX100LB4	144		
24.0	951	1.4	60	13800				VFR 130_60	P100	BE100LB4	BX100LB4	140		
24.0	963	2.0	60	16000				VFR 150_60	P100	BE100LB4	BX100LB4	146		
24.0	902	2.5	60	18000				VF 185_60	P100	BE100LB4	BX100LB4	150		
25.7	831	1.2	56	12600				VF 130_56	P100	BE100LB4	BX100LB4	138		
25.7	842	1.6	56	14700				VF 150_56	P100	BE100LB4	BX100LB4	144		
28.8	772	3.2	50	18000				VF 185_50	P100	BE100LB4	BX100LB4	150		
32	710	1.5	46	12600				VF 130_46	P100	BE100LB4	BX100LB4	138		
32	720	2.2	46	14700				VF 150_46	P100	BE100LB4	BX100LB4	144		
32	720	1.0	45	8000				WR 110_45	P100	BE100LB4	BX100LB4	136		
32	750	2.3	45	16000				VFR 150_45	P100	BE100LB4	BX100LB4	146		
36	608	1.1	40	8000	W110_40	S3	ME3LB4	MX3LB4	134	W 110_40	P100	BE100LB4	BX100LB4	135
36	618	1.8	40	12600				VF 130_40	P100	BE100LB4	BX100LB4	138		
36	626	2.5	40	14700				VF 150_40	P100	BE100LB4	BX100LB4	144		
42	568	1.0	23	8000				W 110_23	P132	BE132S6		135		
42	568	1.8	23	13200				VF 130_23	P132	BE132S6		138		



3 kW

n ₂ min-1	M ₂ Nm	S	i	R _{n2} N	 			 					
					IE2	IE3		IE2	IE3				
48	462	1.5	30	8000	W110_30 S3	ME3LB4	MX3LB4	134	W 110_30	P100	BE100LB4	BX100LB4	135
48	482	2.2	30	12600					VF 130_30	P100	BE100LB4	BX100LB4	138
48	488	2.8	30	14700	W110_23 S3	ME3LB4	MX3LB4	134	VF 150_30	P100	BE100LB4	BX100LB4	144
48	518	2.9	30	16000					VFR 150_30	P100	BE100LB4	BX100LB4	146
62	382	1.4	23	8000					W 110_23	P100	BE100LB4	BX100LB4	135
62	388	2.3	23	12600					VF 130_23	P100	BE100LB4	BX100LB4	138
62	388	3.3	23	14700					VF 150_23	P100	BE100LB4	BX100LB4	144
72	336	1.0	20	6240					W86_20 S3	ME3LB4	MX3LB4	130	W 86_20
72	336	1.7	20	8000	W110_20 S3	ME3LB4	MX3LB4	134	W 110_20	P100	BE100LB4	BX100LB4	135
73	341	2.6	20	12600	W75_15 S3	ME3LB4	MX3LB4	126	VF 130_20	P100	BE100LB4	BX100LB4	138
96	259	1.0	15	2800					W 75_15	P100	BE100LB4	BX100LB4	127
96	259	1.3	15	5890	W86_15 S3	ME3LB4	MX3LB4	130	W 86_15	P100	BE100LB4	BX100LB4	131
96	256	2.4	15	8000	W110_15 S3	ME3LB4	MX3LB4	134	W 110_15	P100	BE100LB4	BX100LB4	135
96	262	3.5	15	11800					VF 130_15	P100	BE100LB4	BX100LB4	138
125	197	3.4	23	11000					VF 130_23	P100	BE100L2		138
144	179	1.3	10	2600	W75_10 S3	ME3LB4	MX3LB4	126	W 75_10	P100	BE100LB4	BX100LB4	127
144	179	1.6	10	5300	W86_10 S3	ME3LB4	MX3LB4	130	W 86_10	P100	BE100LB4	BX100LB4	131
144	177	3.1	10	8000	W110_10 S3	ME3LB4	MX3LB4	134	W 110_10	P100	BE100LB4	BX100LB4	135
192	131	1.7	15	2680	W75_15 S3	ME3LB2		126	W 75_15	P100	BE100L2		127
192	130	2.3	15	5070	W86_15 S3	ME3LB2		130	W 86_15	P100	BE100L2		131
206	128	1.5	7	2380	W75_7 S3	ME3LB4	MX3LB4	126	W 75_7	P100	BE100LB4	BX100LB4	127
206	127	2.0	7	4780	W86_7 S3	ME3LB4	MX3LB4	130	W 86_7	P100	BE100LB4	BX100LB4	131
288	90	2.3	10	2430	W75_10 S3	ME3LB2		126	W 75_10	P100	BE100L2		127
288	90	2.9	10	4510	W86_10 S3	ME3LB2		130	W 86_10	P100	BE100L2		131
411	64	2.7	7	2190	W75_7 S3	ME3LB2		126	W 75_7	P100	BE100L2		127
411	64	3.5	7	4040	W86_7 S3	ME3LB2		130	W 86_7	P100	BE100L2		131

4 kW

n ₂ min-1	M ₂ Nm	S	i	R _{n2} N	 			 				
					IE2	IE3		IE2	IE2			
1.5	9157	1.0	920	52000				VF/VF 130/250_920	P112	BE112M4	BX112M4	166
1.9	9039	1.0	800	52000				VF/VF 130/250_800	P112	BE112M4	BX112M4	166
2.5	6941	0.9	600	34500				VF/VF 130/210_600	P112	BE112M4	BX112M4	160
2.5	7102	1.3	600	52000				VF/VF 130/250_600	P112	BE112M4	BX112M4	166
3.7	5380	1.2	400	34500				VF/VF 130/210_400	P112	BE112M4	BX112M4	160
3.7	5273	1.7	400	52000				VF/VF 130/250_400	P112	BE112M4	BX112M4	166
4.0	5348	1.1	240	52000				VFR 250_240	P132	BE132MA6		164
4.8	4600	1.1	300	52000				VFR 250_300	P112	BE112M4	BX112M4	164
5.2	3917	1.1	280	19500				W /VF 86/185_280	P112	BE112M4	BX112M4	155
5.2	3917	1.6	280	34500				VF/VF 130/210_280	P112	BE112M4	BX112M4	160
5.2	3992	2.3	280	52000				VF/VF 130/250_280	P112	BE112M4	BX112M4	166
5.4	3867	1.3	180	34500				VFR 210_180	P132	BE132MA6		158
5.4	4440	1.5	180	52000				VFR 250_180	P132	BE132MA6		164
6.1	3809	1.0	240	34500				VFR 210_240	P112	BE112M4	BX112M4	158
6.1	3938	1.4	240	52000				VFR 250_240	P112	BE112M4	BX112M4	164
8.1	3147	1.0	180	19500				VFR 185_180	P112	BE112M4	BX112M4	152
8.1	3099	1.4	180	34500				VFR 210_180	P112	BE112M4	BX112M4	158
8.1	3244	1.9	180	52000				VFR 250_180	P112	BE112M4	BX112M4	164
9.7	2427	1.2	100	33000				VF 210_100	P132	BE132MA6		156
9.7	2507	1.9	100	50000				VF 250_100	P132	BE132MA6		162
9.8	2704	1.2	150	19500				VFR 185_150	P112	BE112M4	BX112M4	152
9.8	2704	1.7	150	34500				VFR 210_150	P112	BE112M4	BX112M4	158
9.8	2704	2.4	150	52000				VFR 250_150	P112	BE112M4	BX112M4	164
12.1	2195	0.9	120	16000				VFR 150_120	P112	BE112M4	BX112M4	146
12.1	2260	1.6	120	19500				VFR 185_120	P112	BE112M4	BX112M4	152
12.1	2260	2.2	120	34500				VFR 210_120	P112	BE112M4	BX112M4	158
12.1	2292	3.1	120	52000				VFR 250_120	P112	BE112M4	BX112M4	164
14.6	1749	1.1	100	18000				VF 185_100	P112	BE112M4	BX112M4	150
16.1	1695	1.5	60	19000				VF 185_60	P132	BE132MA6		150
16.1	1671	2.2	60	33000				VF 210_60	P132	BE132MA6		156









4 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	Rn ₂ N						
					IE2	IE3		IE2	IE2	
16.1	1719	3.2	60	50000			VF 250_60	P132	BE132MA6	162
16.3	1719	0.9	90	13800			VFR 130_90	P112	BE112M4 BX112M4	140
16.3	1743	1.1	90	16000			VFR 150_90	P112	BE112M4 BX112M4	146
16.3	1840	1.5	90	19500			VFR 185_90	P112	BE112M4 BX112M4	152
16.3	1840	2.2	90	34500			VFR 210_90	P112	BE112M4 BX112M4	158
16.3	1888	3.2	90	52000			VFR 250_90	P112	BE112M4 BX112M4	164
18.3	1485	1.4	80	18000			VF 185_80	P112	BE112M4 BX112M4	150
21.0	1355	1.3	46	15500			VF 150_46	P132	BE132MA6	144
21.2	1411	0.9	69	13800			VFR 130_69	P112	BE112M4 BX112M4	140
21.2	1429	1.3	69	16000			VFR 150_69	P112	BE112M4 BX112M4	146
21.4	1433	3.4	45	34500			VFR 210_45	P132	BE132MA6	158
22.8	1240	1.1	64	14700			VF 150_64	P112	BE112M4 BX112M4	144
24.1	1162	1.0	40	13200			VF 130_40	P132	BE132MA6	138
24.1	1193	3.6	40	33000			VF 210_40	P132	BE132MA6	156
24.4	1259	1.1	60	13800			VFR 130_60	P112	BE112M4 BX112M4	140
24.4	1275	1.5	60	16000			VFR 150_60	P112	BE112M4 BX112M4	146
24.4	1194	1.9	60	18000			VF 185_60	P112	BE112M4 BX112M4	150
24.4	1307	2.5	60	19500			VFR 185_60	P112	BE112M4 BX112M4	152
24.4	1291	3.6	60	34500			VFR 210_60	P112	BE112M4 BX112M4	158
26.1	1100	0.9	56	12500			VF 130_56	P112	BE112M4 BX112M4	138
26.1	1115	1.2	56	14700			VF 150_56	P112	BE112M4 BX112M4	144
29.2	1022	2.4	50	18000			VF 185_50	P112	BE112M4 BX112M4	150
32	940	1.1	46	12600			VF 130_46	P112	BE112M4 BX112M4	138
32	953	1.6	46	14700			VF 150_46	P112	BE112M4 BX112M4	144
32	967	2.5	30	19000			VF 185_30	P132	BE132MA6	150
32	955	3.5	30	33000			VF 210_30	P132	BE132MA6	156
33	993	1.7	45	16000			VFR 150_45	P112	BE112M4 BX112M4	146
33	1017	2.8	45	19500			VFR 185_45	P112	BE112M4 BX112M4	152
36	762	0.9	80	12600			VF 130_80	P112	BE112M2	138
37	818	1.3	40	12600			VF 130_40	P112	BE112M4 BX112M4	138
37	829	1.9	40	14700			VF 150_40	P112	BE112M4 BX112M4	144
42	741	1.4	23	13200			VF 130_23	P132	BE132MA6	138
42	750	2.0	23	13200			VF 150_23	P132	BE132MA6	144
45	635	1.1	64	12600			VF 130_64	P112	BE112M2	138
48	624	1.1	30	8000			W 110_30	P112	BE112M4 BX112M4	135
48	638	1.6	30	12600			VF 130_30	P112	BE112M4 BX112M4	138
48	646	2.1	30	14700			VF 150_30	P112	BE112M4 BX112M4	144
48	686	2.2	30	16000			VFR 150_30	P112	BE112M4 BX112M4	146
63	515	1.0	23	8000			W 110_23	P112	BE112M4 BX112M4	135
63	480	1.6	46	12600			VF 130_46	P112	BE112M2	138
64	514	1.7	23	12600			VF 130_23	P112	BE112M4 BX112M4	138
64	514	2.5	23	14700			VF 150_23	P112	BE112M4 BX112M4	144
72	454	1.3	20	8000			W 110_20	P112	BE112M4 BX112M4	135
73	452	2.0	20	12400			VF 130_20	P112	BE112M4 BX112M4	138
96	344	1.0	15	5410			W 86_15	P112	BE112M4 BX112M4	131
96	340	1.8	15	8000			W 110_15	P112	BE112M4 BX112M4	135
97	346	3.4	10	12700			VF 150_10	P132	BE132MA6	144
98	347	2.7	15	11400			VF 130_15	P112	BE112M4 BX112M4	138
144	238	1.0	10	2160			W 75_10	P112	BE112M4 BX112M4	127
144	238	1.2	10	4940			W 86_10	P112	BE112M4 BX112M4	131
144	235	2.3	10	7840			W 110_10	P112	BE112M4 BX112M4	135
146	237	3.3	10	10100			VF 130_10	P112	BE112M4 BX112M4	138
193	174	1.3	15	2400			W 75_15	P112	BE112M2	127
193	172	1.7	15	4820			W 86_15	P112	BE112M2	131
206	173	1.1	7	1900			W 75_7	P112	BE112M4 BX112M4	127
206	171	1.5	7	4490			W 86_7	P112	BE112M4 BX112M4	131
206	171	3.0	7	7040			W 110_7	P112	BE112M4 BX112M4	135
290	119	1.7	10	2210			W 75_10	P112	BE112M2	127
290	119	2.2	10	4320			W 86_10	P112	BE112M2	131
414	84	2.0	7	2010			W 75_7	P112	BE112M2	127
414	84	2.7	7	3890			W 86_7	P112	BE112M2	131



5.5 kW

n ₂ min-1	M ₂ Nm	S	i	R _{n2} N	 			 				
					IE2	IE3		IE2	IE3			
2.4	9630	0.9	600	52000				VF/VF 130/250_600	P132	BE132S4	BX132S4	166
3.4	7714	1.2	280	52000				VF/VF 130/250_280	P160	BE160MA6		166
3.7	7295	0.9	400	34500				VF/VF 130/210_400	P132	BE132S4	BX132S4	160
3.7	7149	1.3	400	52000				VF/VF 130/250_400	P132	BE132S4	BX132S4	166
5.2	5311	1.2	280	34500				VF/VF 130/210_280	P132	BE132S4	BX132S4	160
5.2	5413	1.7	280	52000				VF/VF 130/250_280	P132	BE132S4	BX132S4	166
5.4	6029	1.1	180	52000				VFR 250_180	P160	BE160MA6		164
6.4	5024	1.0	150	34500				VFR 210_150	P160	BE160MA6		158
6.4	5105	1.3	150	52000				VFR 250_150	P160	BE160MA6		164
8.1	4202	1.0	180	34500				VFR 210_180	P132	BE132S4	BX132S4	158
8.1	4399	1.4	180	52000				VFR 250_180	P132	BE132S4	BX132S4	164
9.7	3296	0.9	100	33000				VF 210_100	P160	BE160MA6		156
9.7	3666	1.2	150	34500				VFR 210_150	P132	BE132S4	BX132S4	158
9.7	3666	1.8	150	52000				VFR 250_150	P132	BE132S4	BX132S4	164
12.1	2809	1.1	80	33000				VF 210_80	P160	BE160MA6		156
12.1	2895	1.7	80	50000				VF 250_80	P160	BE160MA6		162
12.2	3064	1.6	120	34500				VFR 210_120	P132	BE132S4	BX132S4	158
12.2	3108	2.3	120	52000				VFR 250_120	P132	BE132S4	BX132S4	164
14.6	2371	1.1	100	31500				VF 210_100	P132	BE132S4	BX132S4	156
14.6	2590	1.4	100	19500				VFR 185_100	P132	BE132S4	BX132S4	152
14.6	2480	1.5	100	47000				VF 250_100	P132	BE132S4	BX132S4	162
16.1	2301	1.1	60	19000				VF 185_60	P160	BE160MA6		150
16.1	2268	1.6	60	33000				VF 210_60	P160	BE160MA6		156
16.1	2334	2.4	60	50000				VF 250_60	P160	BE160MA6		162
16.2	2495	1.6	90	34500				VFR 210_90	P132	BE132S4	BX132S4	158
16.2	2561	2.3	90	52000				VFR 250_90	P132	BE132S4	BX132S4	164
18.3	2013	1.1	80	18000				VF 185_80	P132	BE132S4	BX132S4	150
18.3	2013	1.4	80	31500				VF 210_80	P132	BE132S4	BX132S4	156
18.3	2072	1.9	80	47000				VF 250_80	P132	BE132S4	BX132S4	162
19.5	2106	1.3	75	19500				VFR 185_75	P132	BE132S4	BX132S4	152
21.0	1839	0.9	46	15500				VF 150_46	P160	BE160MA6		144
21.4	1945	2.5	45	34500				VFR 210_45	P160	BE160MA6		158
21.4	1993	3.4	45	52000				VFR 250_45	P160	BE160MA6		164
24.1	1599	1.1	40	15500				VF 150_40	P160	BE160MA6		144
24.3	1620	1.4	60	18000				VF 185_60	P132	BE132S4	BX132S4	150
24.3	1598	1.9	60	31500				VF 210_60	P132	BE132S4	BX132S4	156
24.3	1751	2.7	60	34500				VFR 210_60	P132	BE132S4	BX132S4	158
24.3	1663	2.7	60	47000				VF 250_60	P132	BE132S4	BX132S4	162
24.3	1773	4.0	60	52000				VFR 250_60	P132	BE132S4	BX132S4	164
29.2	1430	1.3	50	15940				VFR 150_50	P132	BE132S4	BX132S4	146
29.2	1386	1.8	50	18000				VF 185_50	P132	BE132S4	BX132S4	150
29.2	1477	2.2	50	19500				VFR 185_50	P132	BE132S4	BX132S4	152
29.2	1386	2.4	50	31500				VF 210_50	P132	BE132S4	BX132S4	156
29.2	1386	3.2	50	47000				VF 250_50	P132	BE132S4	BX132S4	162
31	1292	1.2	46	14700				VF 150_46	P132	BE132S4	BX132S4	144
32	1248	1.0	30	13200				VF 130_30	P160	BE160MA6		138
32	1362	3.0	45	34500				VFR 210_45	P132	BE132S4	BX132S4	158
37	1109	1.0	40	12600				VF 130_40	P132	BE132S4	BX132S4	138
37	1123	1.4	40	14700				VF 150_40	P132	BE132S4	BX132S4	144
37	1138	2.3	40	18000				VF 185_40	P132	BE132S4	BX132S4	150
37	1138	3.1	40	31500				VF 210_40	P132	BE132S4	BX132S4	156
39	1101	1.5	38	15400				VFR 150_37.5	P132	BE132S4	BX132S4	146
39	1149	2.4	38	19500				VFR 185_37.5	P132	BE132S4	BX132S4	152
42	1006	1.0	23	13000				VF 130_23	P160	BE160MA6		138
42	1019	1.4	23	15300				VF 150_23	P160	BE160MA6		144
49	864	1.2	30	12600				VF 130_30	P132	BE132S4	BX132S4	138
49	875	1.6	30	14700				VF 150_30	P132	BE132S4	BX132S4	144
49	908	2.2	30	18000				VF 185_30	P132	BE132S4	BX132S4	150
49	908	3.4	30	31500				VF 210_30	P132	BE132S4	BX132S4	156
59	775	1.9	25	13400				VFR 150_25	P132	BE132S4	BX132S4	146
59	784	3.3	25	19500				VFR 185_25	P132	BE132S4	BX132S4	152
64	673	0.9	15	8000				W 110_15	P160	BE160MA6		135
64	696	1.3	23	12100				VF 130_23	P132	BE132S4	BX132S4	138
64	696	1.8	23	14000				VF 150_23	P132	BE132S4	BX132S4	144
73	605	0.9	20	8000				W 110_20	P132	BE132S4	BX132S4	135

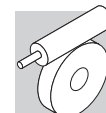


5.5 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N								
					IE2	IE3		IE2	IE3			
73	613	1.5	20	11700				VF 130_20	P132	BE132S4	BX132S4	138
73	613	2.1	20	13500				VF 150_20	P132	BE132S4	BX132S4	144
97	454	1.3	15	8000				W 110_15	P132	BE132S4	BX132S4	135
97	471	2.0	15	12800				VF 130_15	P132	BE132S4	BX132S4	138
97	476	2.4	15	12400				VF 150_15	P132	BE132S4	BX132S4	144
127	354	1.9	23	10400				VF 130_23	P132	BE132SA2		138
127	354	2.7	23	11800				VF 150_23	P132	BE132SA2		144
146	313	1.8	10	7330				W 110_10	P132	BE132S4	BX132S4	135
146	321	2.5	10	9680				VF 130_10	P132	BE132S4	BX132S4	138
146	321	3.3	10	11000				VF 150_10	P132	BE132S4	BX132S4	144
195	234	2.3	15	7060				W 110_15	P132	BE132SA2		135
209	227	2.2	7	6600				W 110_7	P132	BE132S4	BX132S4	135
209	227	3.3	7	8650				VF 130_7	P132	BE132S4	BX132S4	138
293	160	3.0	10	6290				W 110_10	P132	BE132SA2		135
293	162	3.6	10	8110				VF 130_10	P132	BE132SA2		138
418	113	4.0	7	5640				W 110_7	P132	BE132SA2		135
418	114	4.9	7	7230				VF 130_7	P132	BE132SA2		138

7.5 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N								
					IE2	IE3		IE2	IE3			
3.6	9554	0.9	400	52000				VF/VF 130/250_400	P132	BE132MA4	BX132MA4	166
5.2	7097	0.9	280	34500				VF/VF 130/210_280	P132	BE132MA4	BX132MA4	160
5.2	7233	1.2	280	52000				VF/VF 130/250_280	P132	BE132MA4	BX132MA4	166
6.4	7014	1.0	150	52000				VFR 250_150	P160	BE160MB6		164
8.0	5878	1.0	120	34500				VFR 210_120	P160	BE160MB6		158
8.1	5879	1.1	180	52000				VFR 250_180	P132	BE132MA4	BX132MA4	164
9.7	4676	1.0	100	50000				VF 250_100	P160	BE160MB6		162
9.7	4899	1.3	150	52000				VFR 250_150	P132	BE132MA4	BX132MA4	164
10.7	4809	0.9	90	34500				VFR 210_90	P160	BE160MB6		158
12.1	3978	1.3	80	50000				VF 250_80	P160	BE160MB6		162
12.1	4094	1.2	120	34500				VFR 210_120	P132	BE132MA4	BX132MA4	158
12.1	4153	1.7	120	52000				VFR 250_120	P132	BE132MA4	BX132MA4	164
14.6	3461	1.0	100	19500				VFR 185_100	P132	BE132MA4	BX132MA4	152
14.6	3314	1.1	100	47000				VF 250_100	P132	BE132MA4	BX132MA4	162
16.1	3117	1.2	60	33000				VF 210_60	P160	BE160MB6		156
16.2	3334	1.2	90	34500				VFR 210_90	P132	BE132MA4	BX132MA4	158
16.2	3422	1.7	90	52000				VFR 250_90	P132	BE132MA4	BX132MA4	164
18.2	2691	1.1	80	31500				VF 210_80	P132	BE132MA4	BX132MA4	156
18.2	2769	1.4	80	47000				VF 250_80	P132	BE132MA4	BX132MA4	162
19.4	2815	1.0	75	19500				VFR 185_75	P132	BE132MA4	BX132MA4	152
21.4	2672	1.8	45	34500				VFR 210_45	P160	BE160MB6		158
21.4	2739	2.5	45	52000				VFR 250_45	P160	BE160MB6		164
24.3	2164	1.0	60	18000				VF 185_60	P132	BE132MA4	BX132MA4	150
24.3	2135	1.4	60	31500				VF 210_60	P132	BE132MA4	BX132MA4	156
24.3	2340	2.0	60	31500				VFR 210_60	P132	BE132MA4	BX132MA4	158
24.3	2223	2.0	60	47000				VF 250_60	P132	BE132MA4	BX132MA4	162
24.3	2369	3.0	60	52000				VFR 250_60	P132	BE132MA4	BX132MA4	164
29.1	1911	1.0	50	14100				VFR 150_50	P132	BE132MA4	BX132MA4	146
29.1	1852	1.3	50	18000				VF 185_50	P132	BE132MA4	BX132MA4	150
29.1	1974	1.6	50	19500				VFR 185_50	P132	BE132MA4	BX132MA4	152
29.1	1852	1.7	50	31500				VF 210_50	P132	BE132MA4	BX132MA4	156
29.1	1852	2.4	50	47000				VF 250_50	P132	BE132MA4	BX132MA4	162
31	1727	0.9	46	14700				VF 150_46	P132	BE132MA4	BX132MA4	144
32	1821	2.2	45	34500				VFR 210_45	P132	BE132MA4	BX132MA4	158
32	1842	3.5	45	48800				VFR 250_45	P132	BE132MA4	BX132MA4	164
36	1501	1.0	40	14700				VF 150_40	P132	BE132MA4	BX132MA4	144
36	1521	1.7	40	18000				VF 185_40	P132	BE132MA4	BX132MA4	150
36	1521	2.3	40	31500				VF 210_40	P132	BE132MA4	BX132MA4	156
36	1541	3.2	40	47000				VF 250_40	P132	BE132MA4	BX132MA4	162
38	1471	1.1	38	13200				VFR 150_37.5	P132	BE132MA4	BX132MA4	146
38	1536	1.8	38	18300				VFR 185_37.5	P132	BE132MA4	BX132MA4	152
49	1155	0.9	30	11900				VF 130_30	P132	BE132MA4	BX132MA4	138
49	1170	1.1	30	14200				VF 150_30	P132	BE132MA4	BX132MA4	144
49	1214	1.6	30	18000				VF 185_30	P132	BE132MA4	BX132MA4	150
49	1214	2.6	30	31500				VF 210_30	P132	BE132MA4	BX132MA4	156



7.5 kW

n ₂ min-1	M ₂ Nm	S	i	R _{n2} N							
					IE2	IE3		IE2	IE2		
49	1257	3.1	30	33400			VFR 210_30	P132	BE132MA4	BX132MA4	158
49	1228	3.3	30	4440			VF 250_30	P132	BE132MA4	BX132MA4	162
59	1036	1.4	25	11000			VFR 150_25	P132	BE132MA4	BX132MA4	146
59	1048	2.4	25	16700			VFR 185_25	P132	BE132MA4	BX132MA4	152
64	931	0.9	23	11200			VF 130_23	P132	BE132MA4	BX132MA4	138
64	931	1.3	23	13200			VF 150_23	P132	BE132MA4	BX132MA4	144
64	958	2.3	15	16700			VF 185_15	P160	BE160MB6		150
73	819	1.1	20	10800			VF 130_20	P132	BE132MA4	BX132MA4	138
73	819	1.6	20	12700			VF 150_20	P132	BE132MA4	BX132MA4	144
97	614	1.0	15	7370			W 110_15	P132	BE132MA4	BX132MA4	135
97	629	1.4	15	10200			VF 130_15	P132	BE132MA4	BX132MA4	138
97	636	1.8	15	11700			VF 150_15	P132	BE132MA4	BX132MA4	144
127	479	1.4	23	9900			VF 130_23	P132	BE132SB2		138
127	479	2.0	23	11400			VF 150_23	P132	BE132SB2		144
138	462	2.5	7	10200			VF 150_7	P160	BE160MB6		144
146	424	1.3	10	6720			W 110_10	P132	BE132MA4	BX132MA4	135
146	429	1.8	10	9150			VF 130_10	P132	BE132MA4	BX132MA4	138
146	429	2.4	10	10500			VF 150_10	P132	BE132MA4	BX132MA4	144
195	320	1.7	15	6660			W 110_15	P132	BE132SB2		135
208	304	1.6	7	6100			W 110_7	P132	BE132MA4	BX132MA4	135
208	304	2.4	7	8210			VF 130_7	P132	BE132MA4	BX132MA4	138
208	307	3.3	7	9400			VF 150_7	P132	BE132MA4	BX132MA4	144
293	215	2.2	10	5980			W 110_10	P132	BE132SB2		135
293	217	2.8	10	7840			VF 130_10	P132	BE132SB2		138
418	153	2.9	7	5380			W 110_7	P132	BE132SB2		135
418	154	3.6	7	7010			VF 130_7	P132	BE132SB2		138

9.2 kW

n ₂ min-1	M ₂ Nm	S	i	R _{n2} N							
					IE2	IE3		IE2	IE3		
5.1	9054	1.0	280	52000			VF/VF 130/250_280	P132	BE132MB4		166
9.7	6132	1.1	150	52000			VFR 250_150	P132	BE132MB4	BX160MA4	164
12.1	5198	1.3	120	52000			VFR 250_120	P132	BE132MB4	BX160MA4	164
14.5	4149	0.9	100	47000			VF 250_100	P132	BE132MB4	BX160MA4	162
16.1	4173	1.0	90	34500			VFR 210_90	P132	BE132MB4	BX160MA4	158
16.1	4283	1.4	90	52000			VFR 250_90	P132	BE132MB4	BX160MA4	164
18.1	3368	0.9	80	31500			VF 210_80	P132	BE132MB4	BX160MA4	156
18.1	3466	1.1	80	47000			VF 250_80	P132	BE132MB4	BX160MA4	162
24.2	2672	1.1	60	31500			VF 210_60	P132	BE132MB4	BX160MA4	156
24.2	2929	1.6	60	34500			VFR 210_60	P132	BE132MB4	BX160MA4	158
24.2	2782	1.6	60	47000			VF 250_60	P132	BE132MB4	BX160MA4	162
24.2	2965	2.4	60	51900			VFR 250_60	P132	BE132MB4	BX160MA4	164
29.0	2319	1.1	50	18000			VF 185_50	P132	BE132MB4	BX160MA4	150
29.0	2471	1.3	50	18600			VFR 185_50	P132	BE132MB4		152
29.0	2319	1.4	50	31500			VF 210_50	P132	BE132MB4	BX160MA4	156
29.0	2319	1.9	50	47000			VF 250_50	P132	BE132MB4	BX160MA4	162
32	2279	1.8	45	34500			VFR 210_45	P132	BE132MB4	BX160MA4	158
32	2306	2.8	45	48000			VFR 250_45	P132	BE132MB4	BX160MA4	164
36	1904	1.4	40	18000			VF 185_40	P132	BE132MB4	BX160MA4	150
36	1904	1.8	40	31500			VF 210_40	P132	BE132MB4	BX160MA4	156
36	1928	2.5	40	47000			VF 250_40	P132	BE132MB4	BX160MA4	162
38	1884	0.9	38	11900			VFR 150_37.5	P132	BE132MB4		146
38	1922	1.5	38	17200			VFR 185_37.5	P132	BE132MB4		152
48	1464	0.9	30	11300			VF 150_30	P132	BE132MB4	BX160MA4	144
48	1519	1.3	30	17900			VF 185_30	P132	BE132MB4	BX160MA4	150
48	1519	2.0	30	31500			VF 210_30	P132	BE132MB4	BX160MA4	156
48	1574	2.4	30	32600			VFR 210_30	P132	BE132MB4	BX160MA4	158
48	1538	2.6	30	43900			VF 250_30	P132	BE132MB4	BX160MA4	162
48	1574	3.8	30	42800			VFR 250_30	P132	BE132MB4	BX160MA4	164
58	1297	1.2	25	11200			VFR 150_25	P132	BE132MB4		146
58	1312	2.0	25	15800			VFR 185_25	P132	BE132MB4		152
63	1165	1.1	23	12500			VF 150_23	P132	BE132MB4	BX160MA4	144
73	1025	0.9	20	10100			VF 130_20	P132	BE132MB4	BX160MA4	138
73	1025	1.3	20	12100			VF 150_20	P132	BE132MB4		144
73	1037	3.0	20	30400			VF 210_20	P132	BE132MB4	BX160MA4	156
97	787	1.2	15	9560			VF 130_15	P132	BE132MB4		138
97	796	1.4	15	11200			VF 150_15	P132	BE132MB4	BX160MA4	144
127	601	1.1	23	9510			VF 130_23	P132	BE132MB2		138



9.2 kW

n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N								
					IE2	IE3		IE2	IE3			
127	601	1.6	23	11000				VF 150_23	P132	BE132MB2	144	
145	531	1.0	10	6210				W 110_10	P132	BE132MB4	135	
145	537	1.5	10	8690				VF 130_10	P132	BE132MB4	138	
145	537	2.0	10	16100				VF 150_10	P132	BE132MB4	BX160MA4	144
195	396	1.4	15	6320				W 110_15	P132	BE132MB2	135	
207	380	1.3	7	5670				W 110_7	P132	BE132MB4	135	
207	380	1.9	7	7820				VF 130_7	P132	BE132MB4	138	
207	384	2.6	7	9030				VF 150_7	P132	BE132MB4	BX160MA4	144
292	271	1.8	10	5720				W 110_10	P132	BE132MB2	135	
292	274	2.2	10	7620				VF 130_10	P132	BE132MB2	138	
292	274	2.9	10	8690				VF 150_10	P132	BE132MB2	144	
417	192	2.3	7	5170				W 110_7	P132	BE132MB2	135	
417	194	2.9	7	6820				VF 130_7	P132	BE132MB2	138	

11 kW








n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N								
					IE2	IE3		IE2	IE2			
12.3	6130	1.1	120	52000				VFR 250_120	P160	BE160M4	BX160MB4	164
16.3	5051	1.2	90	52000				VFR 250_90	P160	BE160M4	BX160MB4	164
18.4	4087	0.9	80	47000				VF 250_80	P160	BE160M4	BX160MB4	162
24.5	3151	0.9	60	31500				VF 210_60	P160	BE160M4	BX160MB4	156
24.5	3454	1.3	60	34500				VFR 210_60	P160	BE160M4	BX160MB4	158
24.5	3281	1.4	60	47000				VF 250_60	P160	BE160M4	BX160MB4	162
24.5	3496	2.0	60	50900				VFR 250_60	P160	BE160M4	BX160MB4	164
29.4	2734	1.2	50	31500				VF 210_50	P160	BE160M4	BX160MB4	156
29.4	2734	1.6	50	47000				VF 250_50	P160	BE160M4	BX160MB4	162
33	2688	1.5	45	34500				VFR 210_45	P160	BE160M4	BX160MB4	158
33	2720	2.3	45	47100				VFR 250_45	P160	BE160M4	BX160MB4	164
37	2245	1.2	40	18500				VF 185_40	P160	BE160M4	BX160MB4	150
37	2245	1.5	40	31500				VF 210_40	P160	BE160M4	BX160MB4	156
37	2273	2.1	40	47000				VF 250_40	P160	BE160M4	BX160MB4	162
49	1791	1.1	30	17200				VF 185_30	P160	BE160M4	BX160MB4	150
49	1791	1.7	30	31500				VF 210_30	P160	BE160M4	BX160MB4	156
49	1856	2.0	30	31800				VFR 210_30	P160	BE160M4	BX160MB4	158
49	1813	2.2	30	43400				VF 250_30	P160	BE160M4	BX160MB4	162
49	1856	3.2	30	42100				VFR 250_30	P160	BE160M4	BX160MB4	164
74	1209	1.1	20	11400				VF 150_20	P160	BE160M4	BX160MB4	144
74	1223	1.8	20	15600				VF 185_20	P160	BE160M4	BX160MB4	150
74	1223	2.5	20	30000				VF 210_20	P160	BE160M4	BX160MB4	156
98	939	1.2	15	10600				VF 150_15	P160	BE160M4	BX160MB4	144
98	950	1.9	15	14200				VF 185_15	P160	BE160M4	BX160MB4	150
98	950	3.0	15	27700				VF 210_15	P160	BE160M4	BX160MB4	156
147	630	2.7	20	13300				VF 185_20	P160	BE160MA2		150
147	633	1.6	10	9670				VF 150_10	P160	BE160M4	BX160MB4	144
196	478	2.9	15	12200				VF 185_15	P160	BE160MA2		150
210	454	2.2	7	8660				VF 150_7	P160	BE160M4	BX160MB4	144
294	323	2.4	10	8440				VF 150_10	P160	BE160MA2		144
420	228	3.3	7	7530				VF 150_7	P160	BE160MA2		144

15 kW








n ₂ min ⁻¹	M ₂ Nm	S	i	R _{n2} N								
					IE2	IE3		IE2	IE3			
24.5	4474	1.0	60	47000				VF 250_60	P160	BE160L4	BX160LA4	162
24.5	4768	1.5	60	48700				VFR 250_60	P160	BE160L4	BX160LA4	164
29.4	3728	0.9	50	31500				VF 210_50	P160	BE160L4	BX160LA4	156
29.4	3728	1.2	50	47000				VF 250_50	P160	BE160L4	BX160LA4	162
32	3665	1.1	45	33200				VFR 210_45	P160	BE160L4	BX160LA4	158
32	3709	1.7	45	45200				VFR 250_45	P160	BE160L4	BX160LA4	164
37	3061	0.9	40	16600				VF 185_40	P160	BE160L4	BX160LA4	150
37	3061	1.1	40	31500				VF 210_40	P160	BE160L4	BX160LA4	156
37	3100	1.5	40	45900				VF 250_40	P160	BE160L4	BX160LA4	162
49	2443	1.2	30	31500				VF 210_30	P160	BE160L4	BX160LA4	156










15 kW

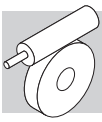
n ₂ min-1	M ₂ Nm	S	i	Rn ₂ N	 			  				
					IE2	IE3		IE2	IE3	IEC		
49	2531	1.5	30	30000				VFR 210_30	P160	BE160L4	BX160LA4	158
49	2473	1.6	30	42400				VF 250_30	P160	BE160L4	BX160LA4	162
49	2531	2.4	30	40600				VFR 250_30	P160	BE160L4	BX160LA4	164
74	1668	1.4	20	14300				VF 185_20	P160	BE160L4	BX160LA4	150
74	1668	1.9	20	29100				VF 210_20	P160	BE160L4	BX160LA4	156
74	1688	2.6	20	38100				VF 250_20	P160	BE160L4	BX160LA4	162
98	1280	0.9	15	9360				VF 150_15	P160	BE160L4	BX160LA4	144
98	1295	1.4	15	13200				VF 185_15	P160	BE160L4	BX160LA4	150
98	1295	2.2	15	27000				VF 210_15	P160	BE160L4	BX160LA4	156
98	1295	3.1	15	35100				VF 250_15	P160	BE160L4	BX160LA4	162
147	855	2.0	20	12700				VF 185_20	P160	BE160MB2		150
147	863	1.2	10	8720				VF 150_10	P160	BE160L4	BX160LA4	144
147	873	3.0	10	24000				VF 210_10	P160	BE160L4	BX160LA4	156
196	649	2.1	15	11600				VF 185_15	P160	BE160MB2		150
196	649	3.3	15	22700				VF 210_15	P160	BE160MB2		156
210	618	1.6	7	7840				VF 150_7	P160	BE160L4	BX160LA4	144
294	437	1.8	10	7960				VF 150_10	P160	BE160MB2		144
420	309	2.4	7	7120				VF 150_7	P160	BE160MB2		144

18.5 kW








n ₂ min-1	M ₂ Nm	S	i	Rn ₂ N	 			  				
					IE2	IE3		IE2	IE3	IEC		
29.4	4560	1.0	50	47000				VF 250_50	P180	BE180M4	BX180M4	162
37	3745	0.9	40	31500				VF 210_40	P180	BE180M4	BX180M4	156
37	3792	1.3	40	44900				VF 250_40	P180	BE180M4	BX180M4	162
49	2988	1.0	30	31200				VF 210_30	P180	BE180M4	BX180M4	156
49	3024	1.3	30	41500				VF 250_30	P180	BE180M4	BX180M4	162
74	2040	1.1	20	13200				VF 185_20	P180	BE180M4	BX180M4	150
74	2040	1.5	20	28300				VF 210_20	P180	BE180M4	BX180M4	156
74	2064	2.1	20	37400				VF 250_20	P180	BE180M4	BX180M4	162
98	1584	1.2	15	12200				VF 185_15	P180	BE180M4	BX180M4	150
98	1584	1.8	15	26200				VF 210_15	P180	BE180M4	BX180M4	156
98	1584	2.5	15	34500				VF 250_15	P180	BE180M4	BX180M4	162
147	1068	1.7	10	11400				VF 185_10	P180	BE180M4	BX180M4	150
147	1068	2.5	10	23400				VF 210_10	P180	BE180M4	BX180M4	156
147	1080	3.4	10	37800				VF 250_10	P180	BE180M4	BX180M4	162
196	805	1.1	15	8260				VF 150_15	P160	BE160L2		144
210	756	2.3	7	10100				VF 185_7	P180	BE180M4	BX180M4	150
210	756	3.0	7	21200				VF 210_7	P180	BE180M4	BX180M4	156
295	543	1.5	10	7550				VF 150_10	P160	BE160L2		144
421	384	2.0	7	6760				VF 150_7	P160	BE160L2		144

22 kW








n ₂ min-1	M ₂ Nm	S	i	Rn ₂ N	 			  				
					IE2	IE3		IE2	IE3	IEC		
37	4501	1.1	40	43900				VF 250_40	P180	BE180L4	BX180L4	162
49	3546	0.9	30	30200				VF 210_30	P180	BE180L4	BX180L4	156
49	3589	1.1	30	44700				VF 250_30	P180	BE180L4	BX180L4	162
74	2421	0.9	20	12200				VF 185_20	P180	BE180L4	BX180L4	150
74	2421	1.3	20	27500				VF 210_20	P180	BE180L4	BX180L4	156
74	2450	1.8	20	36700				VF 250_20	P180	BE180L4	BX180L4	162
99	1880	1.0	15	11300				VF 185_15	P180	BE180L4	BX180L4	150
99	1880	1.5	15	25500				VF 210_15	P180	BE180L4	BX180L4	156
99	1880	2.1	15	33900				VF 250_15	P180	BE180L4	BX180L4	162
148	1267	1.4	10	10700				VF 185_10	P180	BE180L4	BX180L4	150
148	1267	2.1	10	22900				VF 210_10	P180	BE180L4	BX180L4	156
148	1282	2.9	10	30300				VF 250_10	P180	BE180L4	BX180L4	162
210	898	1.9	7	9510				VF 185_7	P180	BE180L4	BX180L4	150
210	898	2.5	7	20800				VF 210_7	P180	BE180L4	BX180L4	156
210	908	3.5	7	27500				VF 250_7	P180	BE180L4	BX180L4	162










30 kW

n₂ min ⁻¹	M₂ Nm	S	i	R_{n2} N	  IE...		  IEC  IE...			
147	1754	2,1	10	29200			VF 250_10	P200	IEC200L4	166
210	1228	1,9	7	19700			VF 210_7	P200	IEC200L4	160
210	1242	2,6	7	26600			VF 250_7	P200	IEC200L4	166
295	874	2,3	10	19000			VF 210_10	P200	IEC200LA2	160
421	619	2,8	7	17200			VF 210_7	P200	IEC200LA2	160

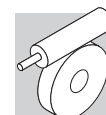
37 kW

n₂ min ⁻¹	M₂ Nm	S	i	R_{n2} N	  IE...		  IEC  IE...			
74	4107	1,1	20	22800			VF 250_20	P225	IEC225S4	166
99	3152	0,9	15	22600			VF 210_15	P225	IEC225S4	160
99	3152	1,3	15	31400			VF 250_15	P225	IEC225S4	166
148	2125	1,2	10	20500			VF 210_10	P225	IEC225S4	160
148	2149	1,7	10	28300			VF 250_10	P225	IEC225S4	166
211	1504	1,5	7	18800			VF 210_7	P225	IEC225S4	160
211	1521	2,1	7	25800			VF 250_7	P225	IEC225S4	166
296	1074	1,9	10	18400			VF 210_10	P200	IEC200L2	160
296	1086	2,6	10	24500			VF 250_10	P200	IEC200L2	166
423	760	2,3	7	16800			VF 210_7	P200	IEC200L2	160

45 kW

n₂ min ⁻¹	M₂ Nm	S	i	R_{n2} N	  IE...		  IEC  IE...			
74	4994	0,9	20	32300			VF 250_20	P225	IEC225M4	166
99	3833	1	15	30100			VF 250_15	P225	IEC225M4	166
148	2584	1	10	19200			VF 210_10	P225	IEC225M4	160
148	2613	1,4	10	27300			VF 250_10	P225	IEC225M4	166
211	1829	1,3	7	17800			VF 210_7	P225	IEC225M4	160
211	1850	1,7	7	25000			VF 250_7	P225	IEC225M4	166
296	1307	1,5	10	17800			VF 210_10	P200	IEC225M2	160
296	1321	2,1	10	24000			VF 250_10	P200	IEC225M2	166
423	925	1,9	7	16200			VF 210_7	P200	IEC225M2	160
423	935	2,6	7	21800			VF 250_7	P200	IEC225M2	166



The technical information shall be considered as indicative, the configurations should be matching the data provided by motors manufacturers on rated powers greater than 22 kW.



22 SPEED REDUCER RATING CHARTS



VF 27

13 Nm

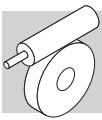
		i	η_s %	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	n_2	M_{n2}	P_{n1}	R_{n1}	R_{n2}	η_d	
				min ⁻¹	Nm	kW	N	N	%	min ⁻¹	Nm	kW	N	N	%	
				$n_1 = 2800 \text{ min}^{-1}$					$n_1 = 1400 \text{ min}^{-1}$							
VF 27	VF 27_7	7	67	400	7	0.34	—	330	86	200	9	0.23	35	410	83	167
	VF 27_10	10	62	280	7	0.24	—	400	84	140	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	
					$n_1 = 900 \text{ min}^{-1}$					$n_1 = 500 \text{ min}^{-1}$						
	VF 27_7	7	67	129	10	0.17	90	480	81	71	11	0.11	90	600	79	167
	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	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	%	
				$n_1 = 2800 \text{ min}^{-1}$					$n_1 = 1400 \text{ min}^{-1}$							
VF 30	VF 30_7	7	69	400	12	0.58	120	510	87	200	16	0.41	140	630	84	168
	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	
					$n_1 = 900 \text{ min}^{-1}$					$n_1 = 500 \text{ min}^{-1}$						
	VF 30_7	7	69	129	18	0.30	150	730	82	71	20	0.19	150	920	81	168
	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 ₁ = 2800 min ⁻¹							n ₁ = 1400 min ⁻¹									
			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 %					
VF 44	VF 44_7	7	71	400	22	1.1	220	950	88	200	29	0.71	220	1180	86	168			
	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	168			
	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 ₁ = 1400 min ⁻¹							n ₁ = 900 min ⁻¹							
			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 %			
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	170	
	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	η _s %	n ₁ = 2800 min ⁻¹						n ₁ = 1400 min ⁻¹						
				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 %	
				VF 49												
				400	41	2.0	400	950	88	200	54	1.3	400	1170	86	168
				280	44	1.5	400	1140	86	140	59	1.0	400	1410	84	
				200	49	1.2	400	1310	84	100	65	0.90	400	1630	81	
				156	44	0.87	400	1520	82	78	59	0.60	400	1890	78	
				117	47	0.73	400	1670	79	58	63	0.50	400	2110	75	
				100	56	0.78	400	1740	75	50	74	0.55	400	2170	71	
				78	52	0.59	400	1970	72	39	69	0.42	400	2460	67	
				62	49	0.46	400	2180	69	31	65	0.33	400	2725	63	
				47	44	0.34	400	2480	64	23.3	59	0.25	400	3100	58	
				40	41	0.28	400	2650	61	20.0	55	0.21	400	3150	54	
				35	41	0.25	400	2780	59	17.5	54	0.19	400	3150	52	
				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						
				129	61	0.97	400	1370	85	71	74	0.67	400	1670	83	168
				90	64	0.75	400	1670	82	50	74	0.49	400	2060	80	
				64	71	0.61	400	1920	78	36	78	0.39	400	2400	75	
				50	68	0.47	400	2190	75	27.8	74	0.30	400	2730	72	
				38	68	0.36	400	2480	71	20.8	74	0.24	400	3090	68	
				32	82	0.41	400	2540	67	17.9	88	0.26	400	3180	63	
				25.0	75	0.31	400	2880	63	13.9	80	0.20	400	3450	59	
				20.0	71	0.25	400	3190	59	11.1	78	0.17	400	3450	55	
				15.0	64	0.19	400	3300	53	8.3	69	0.12	400	3450	49	
				12.9	60	0.16	400	3300	50	7.1	69	0.11	400	3450	46	
				11.3	58	0.14	400	3300	47	6.3	59	0.09	400	3450	43	
				9.0	52	0.11	400	3300	42	5.0	59	0.08	400	3450	38	



95 Nm

		i	η _s %	n ₁ = 2800 min ⁻¹						n ₁ = 1400 min ⁻¹						
				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 %	
				VFR 49												
				67	71	0.65	230	1920	76	33	78	0.37	230	2500	74	169
				52	68	0.50	230	2180	74	25.9	74	0.28	230	2830	71	
				39	68	0.40	230	2470	70	19.4	74	0.22	230	3190	67	
				33	82	0.44	230	2520	66	16.6	88	0.25	230	3290	62	
				25.9	75	0.33	230	2860	62	12.9	80	0.19	230	3450	58	
				20.7	71	0.27	230	3160	58	10.3	88	0.18	230	3450	54	
				15.6	64	0.20	230	3300	52	7.7	69	0.12	230	3450	48	
				13.3	60	0.17	230	3300	49	6.6	69	0.11	230	3450	45	
				11.7	58	0.15	230	3300	46	5.8	59	0.09	230	3450	42	
				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						
				21.4	82	0.26	230	2960	72	11.9	90	0.16	230	3450	70	169
				16.7	79	0.20	230	3330	69	9.3	83	0.12	230	3450	67	
				12.5	79	0.16	230	3450	64	6.9	83	0.10	230	3450	62	
				10.7	91	0.17	230	3450	59	6.0	95	0.10	230	3450	57	
				8.3	84	0.13	230	3450	55	4.6	90	0.08	230	3450	52	
				6.7	82	0.11	230	3450	50	3.7	90	0.07	230	3450	48	
				5.0	75	0.09	230	3450	45	2.8	78	0.05	230	3450	42	
				4.3	75	0.08	230	3450	41	2.4	78	0.05	230	3450	39	
				3.8	64	0.06	230	3450	39	2.1	68	0.04	230	3450	36	
				3.0	63	0.06	230	3450	34	1.7	65	0.04	230	3450	32	

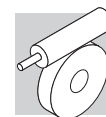


VF/VF 30/49

100 Nm



		i	η _s %	n ₁ = 1400 min ⁻¹						n ₁ = 900 min ⁻¹						
				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 %	
				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	170
	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)

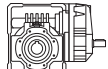



W 63 - WR 63

190 Nm

		i	η_s %	n_2	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	%		
				$n_1 = 2800 \text{ min}^{-1}$					$n_1 = 1400 \text{ min}^{-1}$								
W 63	W 63_7	7	70	400	105	4.9	480	1010	90	200	120	2.9	480	1550	88	168	
	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		
					$n_1 = 900 \text{ min}^{-1}$					$n_1 = 500 \text{ min}^{-1}$							
	W 63_7	7	70	129	130	2.0	480	1870	87	71	140	1.2	480	2420	84		168
	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	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	%		
				$n_1 = 2800 \text{ min}^{-1}$					$n_1 = 1400 \text{ min}^{-1}$								
WR 63	WR 63_21	21	69	133	130	2.1	180	1840	87	67	140	1.2	320	2510	84	169	
	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		
					$n_1 = 900 \text{ min}^{-1}$					$n_1 = 500 \text{ min}^{-1}$							
	WR 63_21	21	69	43	155	0.85	320	2960	82	23.8	170	0.53	320	3750	80		169
	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 ₁ = 1400 min ⁻¹						n ₁ = 900 min ⁻¹						
				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 %	
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	170
	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 ₁ = 2800 min ⁻¹						n ₁ = 1400 min ⁻¹						
				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 %	
				W 75	W 75_7	7	71	400	170	7.8	750	700	91	200	190	
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	168
	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 ₁ = 2800 min ⁻¹						n ₁ = 1400 min ⁻¹						
				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 %	
				WR 75	WR 75_21	21	70	133	205	3.3	500	2030	88	67	225	
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	169
	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

WR 75_P90 B5			i	η_s %	$n_1 = 2800 \text{ min}^{-1}$					$n_1 = 1400 \text{ min}^{-1}$							
					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 %
					WR 75_15	15	66	187	220	4.9	—	1960	89	93		250	2.9
WR 75_22.5	22.5	59	124	240	3.7	—	2530	86	62	270	2.1	—	3380	83			
WR 75_30	30	55	93	240	2.8	—	3020	84	47	270	1.7	—	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	0.74	—	6200	63			
WR 75_90	90	32	31	190	0.93	—	4460	67	15.6	215	0.59	—	6200	60			
WR 75_120	120	27	23.3	170	0.69	—	4960	61	11.7	195	0.44	—	6200	54			
WR 75_150	150	24	18.7	145	0.49	—	5150	58	9.3	160	0.32	—	6200	50			
					$n_1 = 900 \text{ min}^{-1}$					$n_1 = 500 \text{ min}^{-1}$							
WR 75_15	15	66	60	275	2.1	—	3150	84	33	330	1.4	—	3850	82	169		
WR 75_22.5	22.5	59	40	295	1.6	—	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	0.98	—	5610	69	11.1	370	0.64	—	6200	67			
WR 75_60	60	39	15	305	0.77	—	6200	63	8.3	330	0.48	—	6200	60			
WR 75_75	75	35	12	260	0.57	—	6200	58	6.7	310	0.39	—	6200	55			
WR 75_90	90	32	10	235	0.45	—	6200	55	5.6	280	0.32	—	6200	52			
WR 75_120	120	27	7.5	215	0.35	—	6200	49	4.2	220	0.21	—	6200	46			
WR 75_150	150	24	6.0	180	0.26	—	6200	44	3.3	200	0.17	—	6200	41			

400 Nm



VF/W 44/75			i	η_s %	$n_1 = 1400 \text{ min}^{-1}$					$n_1 = 900 \text{ min}^{-1}$							
					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 %
					VF/W 44/75_250	250	34	5.6	370	0.38	220	4560	57	3.6		400	0.29
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)





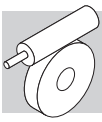
W 86 - WR 86

440 Nm

		i	η_s %	$n_1 = 2800 \text{ min}^{-1}$					$n_1 = 1400 \text{ min}^{-1}$							
				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 %
				W 86												
W 86	W 86_7	7	71	400	225	10.4	850	2930	91	200	250	5.9	850	3920	89	168
	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		
				$n_1 = 900 \text{ min}^{-1}$					$n_1 = 500 \text{ min}^{-1}$							
W 86	W 86_7	7	71	129	270	4.1	850	4670	88	71	295	2.6	850	5890	85	168
	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 %	$n_1 = 2800 \text{ min}^{-1}$					$n_1 = 1400 \text{ min}^{-1}$							
				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 %
				WR 86												
WR 86	WR 86_21	21	70	133	270	4.3	500	4590	88	67	295	2.4	500	6070	85	169
	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		
				$n_1 = 900 \text{ min}^{-1}$					$n_1 = 500 \text{ min}^{-1}$							
WR 86	WR 86_21	21	70	43	325	1.8	500	7000	83	23.8	355	1.1	500	7000	81	169
	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 %	$n_1 = 2800 \text{ min}^{-1}$						$n_1 = 1400 \text{ min}^{-1}$							
			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 %		
			WR 86_P90_B5													
WR 86_15	15	66	187	275	6.1	—	4130	88	93	310	3.5	—	5410	86	169	
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		
WR 86_96	96	36	29.2	265	1.2	—	7000	70	14.6	300	0.73	—	7000	63		
WR 86_120	120	32	23.3	240	0.88	—	7000	67	11.7	275	0.57	—	7000	59		
WR 86_150	150	28	18.7	220	0.69	—	7000	62	9.3	250	0.44	—	7000	55		
			$n_1 = 900 \text{ min}^{-1}$						$n_1 = 500 \text{ min}^{-1}$							
WR 86_15	15	66	60	345	2.6	—	6330	82	33	375	1.6	—	7000	81	169	
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	0.81	—	7000	73		
WR 86_45	45	44	20.0	440	1.4	—	7000	67	11.1	500	0.91	—	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		
WR 86_96	96	36	9.4	330	0.56	—	7000	58	5.2	390	0.39	—	7000	55		
WR 86_120	120	32	7.5	305	0.45	—	7000	53	4.2	310	0.27	—	7000	50		
WR 86_150	150	28	6.0	275	0.35	—	7000	49	3.3	310	0.24	—	7000	46		

550 Nm



	i	η_s %	$n_1 = 1400 \text{ min}^{-1}$						$n_1 = 900 \text{ min}^{-1}$						
			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 %	
			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	170
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

	i	η_s %	$n_1 = 2800 \text{ min}^{-1}$							$n_1 = 1400 \text{ min}^{-1}$							
			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 %			
			W 110														
W 110_7	7	71	400	445	20.7	1200	3710	90	200	500	11.8	1200	5020	89	168		
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			
			$n_1 = 900 \text{ min}^{-1}$							$n_1 = 500 \text{ min}^{-1}$							
W 110_7	7	71	129	540	8.3	1200	6040	88	71	595	5.2	1200	7680	86	168		
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

	i	η_s %	$n_1 = 2800 \text{ min}^{-1}$							$n_1 = 1400 \text{ min}^{-1}$							
			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 %			
			WR 110														
WR 110_21	21	70	133	540	8.6	700	5930	88	67	595	4.8	700	7950	86	169		
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			
			$n_1 = 900 \text{ min}^{-1}$							$n_1 = 500 \text{ min}^{-1}$							
WR 110_21	21	70	43	645	3.4	700	8000	84	23.8	715	2.2	700	8000	82	169		
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 %	$n_1 = 1400 \text{ min}^{-1}$							$n_1 = 900 \text{ min}^{-1}$						
			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 %		
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	170
	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 %	$n_1 = 2800 \text{ min}^{-1}$					$n_1 = 1400 \text{ min}^{-1}$							
					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 %
VF 130	VF 130_7	7	71	400	555	25	1500	4930	91	200	740	17.4	1500	5990	89	168	
	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			
					$n_1 = 900 \text{ min}^{-1}$					$n_1 = 500 \text{ min}^{-1}$							
VF 130	VF 130_7	7	71	129	850	13.0	1500	6980	88	71	1000	8.8	1500	8670	86	168	
	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 %	$n_1 = 2800 \text{ min}^{-1}$					$n_1 = 1400 \text{ min}^{-1}$								
					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 %	
VFR 130	VFR 130_60	60	58	47	1050	6.4	1000	12400	81	23.3	1350	4.3	1000	13800	78	169		
	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			
						$n_1 = 900 \text{ min}^{-1}$					$n_1 = 500 \text{ min}^{-1}$							
	VFR 130	VFR 130_60	60	58	15.0	1450	3.1	1000	13800	75	8.3	1600	1.9	1000	13800		74	169
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 ₁ = 1400 min ⁻¹						n ₁ = 900 min ⁻¹						
				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 %	
				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	170
	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	η _s %	n ₂ = 2800 min ⁻¹					n ₂ = 1400 min ⁻¹							
				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	168
	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	VF 150_7	7	72	129	1150	17.6	2200	7040	89	71	1400	12.2	2200	8560	87	168
	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	η _s %	n ₂ = 2800 min ⁻¹					n ₂ = 1400 min ⁻¹							
				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	169
	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	VFR 150_45	45	63	20.0	1950	5.2	1500	16000	79	11.1	2100	3.2	1500	16000	78	169
	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



W/VF 86/150	i	η_s %	$n_1 = 1400 \text{ min}^{-1}$						$n_1 = 900 \text{ min}^{-1}$						170
			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 %	
W/VF 86/150_200	200	29	7.0	2600	3.0	850	16000	64	4.5	2700	2.1	850	16000	61	
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	η_s %	$n_1 = 2800 \text{ min}^{-1}$					$n_1 = 1400 \text{ min}^{-1}$							
					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 %
VF 185	VF 185_7	7	72	400	1313	60	2800	4670	91	200	1750	41	2800	5570	90	168	
	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		
					$n_1 = 900 \text{ min}^{-1}$					$n_1 = 500 \text{ min}^{-1}$							
VF 185	VF 185_7	7	72	129	2000	30	2800	7120	89	71	2450	21	2800	8730	88	168	
	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	η_s %	$n_1 = 2800 \text{ min}^{-1}$					$n_1 = 1400 \text{ min}^{-1}$							
					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 %
VFR 185	VFR 185_90	90	53	31	2400	9.9	1700	19000	80	15.6	2800	6.0	1700	19500	76	169	
	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		
					$n_1 = 900 \text{ min}^{-1}$					$n_1 = 500 \text{ min}^{-1}$							
VFR 185	VFR 185_90	90	53	10.0	3200	4.6	1700	19500	73	5.6	3500	2.9	1700	19500	71	169	
	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



W/VF 86/185	i	η_s %	$n_1 = 1400 \text{ min}^{-1}$							$n_1 = 900 \text{ min}^{-1}$					170
			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 %	
			W/VF 86/185_280	280	31	5.0	4200	4.2	850	19500	52	3.2	4400	3.0	
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	η_s %	$n_1 = 2800 \text{ min}^{-1}$							$n_1 = 1400 \text{ min}^{-1}$							
			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 %			
VF 210	VF 210_7	7	71	400	1725	79	5300	14000	91	200	2300	54	5300	16700	90	168	
	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		
			$n_1 = 900 \text{ min}^{-1}$							$n_1 = 500 \text{ min}^{-1}$							
VF 210	VF 210_7	7	71	129	2700	41	5300	18800	89	71	3400	29	5300	21800	88	168	
	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	η_s %	$n_1 = 2800 \text{ min}^{-1}$							$n_1 = 1400 \text{ min}^{-1}$							
			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 %			
VFR 210	VFR 210_30	30	68	93	3150	36	1800	22100	87	47	3800	21.8	2200	27400	86	169	
	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		
				$n_1 = 900 \text{ min}^{-1}$							$n_1 = 500 \text{ min}^{-1}$						
VFR 210	VFR 210_30	30	68	30.0	4800	18.1	2300	30100	84	16.7	5500	11.8	2650	34500	82	169	
	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 %	$n_1 = 1400 \text{ min}^{-1}$					$n_1 = 900 \text{ min}^{-1}$							
					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 %
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	170	
	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

				n ₁ = 2800 min ⁻¹					n ₁ = 1400 min ⁻¹							
				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	%
VF 250	VF 250_7	7	71	400	2400	109	7000	18300	92	200	3200	75	7000	21900	91	168
	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	168
	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



				n ₁ = 2800 min ⁻¹					n ₁ = 1400 min ⁻¹							
				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	%
VFR 250	VFR 250_30	30	68	93	4800	54	2800	27800	89	47	6000	34	3500	34000	86	169
	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	169
	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 ₁ = 1400 min ⁻¹							n ₁ = 900 min ⁻¹						
			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 %		
			VF/VF 130/250	VF/VF 130/250_280	280	29	5.0	9000	8.9	1500	52000	53	3.2	9200		6.1
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 $S \geq f_s$.**

 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 $\frac{B5}{B14}$	—	7...70	—	—	—	—	—	—	—	—	—	—	—
P63 $\frac{B5}{B14}$	—	7...60	7...100	7...100	—	—	—	—	—	—	—	—	—
P71 $\frac{B5}{B14}$	—	—	7...35	7...60	7...100	$\frac{7...100}{—}$	$\frac{7...100}{—}$	—	—	—	—	—	—
P80 $\frac{B5}{B14}$	—	—	—	7...28	7...100	7...100	7...100	7...100	—	—	—	—	—
P90 $\frac{B5}{B14}$	—	—	—	—	7...30	7...100	7...100	7...100	$\frac{46...100}{—}$	—	—	—	—
P100 $\frac{B5}{B14}$	—	—	—	—	—	7...100	7...100	7...100	$\frac{7...80}{—}$	$\frac{23...100}{—}$	$\frac{50...100}{—}$	—	—
P112 $\frac{B5}{B14}$	—	—	—	—	—	7...100	7...100	7...100	$\frac{7...80}{—}$	$\frac{23...100}{—}$	$\frac{50...100}{—}$	—	—
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	VFR 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	$\frac{30...300}{\ominus (37.5;50)}$	$\frac{30...300}{\ominus (37.5;50)}$	—	—
P100 B5	—	—	—	—	—	21...300	30...300 #	$\frac{30...300}{\ominus (37.5;50)}$	$\frac{30...300}{\ominus (37.5;50)}$	30...300	30...300
P112 B5	—	—	—	—	—	21...300	30...300 #	$\frac{30...300}{\ominus (37.5;50)}$	$\frac{30...300}{\ominus (37.5;50)}$	30...300	30...300
P132 B5	—	—	—	—	—	—	—	$\frac{25...50 \#}{\ominus (30;45)}$	$\frac{25...100 \#}{\ominus (30;45)}$	30...300	30...300
P160 B5	—	—	—	—	—	—	—	—	—	30...300 #	30...300 #

■ Gear ratio of the helical pre-stage $i = 1.5$

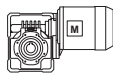
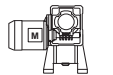
Motor-gearbox combinations marked with [#] feature a lowered key, supplied with the gearbox.






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 B14	245...2100	240...2700	240...2700	—	—	—	—	—	—	—	—
P63	B5 B14	245...2100	240...2700	240...2700	250...2800	230...2760	230...2800	—	—	—	—	—
P71	B5 B14	—	—	—	250...700	230...700	230...2400	280...3200	200...2944	280...3200	—	—
P80	B5 B14	—	—	—	—	—	230...540	280...3200	200...2944	280...3200	—	—
P90	B5 B14	—	—	—	—	—	—	280...1200	200...2944	280...3200	280...3200	280...3200
P100	B5 B14	—	—	—	—	—	—	—	200...2944	280...3200	280...3200	280...3200
P112	B5 B14	—	—	—	—	—	—	—	200...2944	280...3200	280...3200	280...3200
P132	B5	—	—	—	—	—	—	—	—	—	280...1600 #	280...1600 #

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

24.2 Compact motor

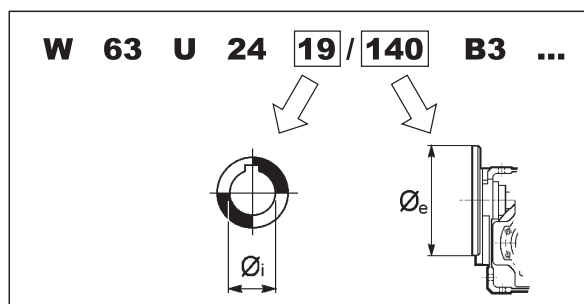
	M1	M2 - ME2 - MX2	ME3 - MX3		M1	ME2 - MX2	ME3 - MX3
W 63	7 ... 100	7 ... 100	⊖	W/VF 63/130	280 ... 3200	280 ... 3200	⊖
W 75	7 ... 100	7 ... 100	7 ... 100	W/VF 86/150	200 ... 2944	200 ... 2944	200 ... 2944
W 86	7 ... 100	7 ... 100	7 ... 100	W/VF 86/185	280 ... 3200	280 ... 3200	280 ... 3200
W 110	⊖	7 ... 100	7 ... 100				

24.3 Maximum installable power on input P_

		IEC_    (IM B5) (IM B14)																																
		P63			P71			P80			P90			P100			P112			P132			P160			P180			P200			P225		
		BN	BN	BN	BE	BX	BN	BE	BX	BN	BE	BX	BN	BE	BX	BN	BE	BX	BN	BE	BX	BN	BE	BX	BN	BE	BX	BN	BE	BX	BN	IEC		
[kW]	2p	0.37	0.75	1.5	1.1	—	2.2	2.2	—	4	3	—	4	4	—	9.2	9.2	—	18.5	18.5	—	22	—	—	30	45								
	4p	0.25	0.55	1.1	0.75	0.75	1.85	1.5	1.5	3	3	3	4	4	4	9.2	9.2	7.5	15	15	15	22	22	22	30	47								
	6p	0.12	0.37	0.75	—	—	1.1	0.75	—	1.85	1.5	—	2.2	2.2	—	5.5	4	—	11	7.5	—	15	—	—	18.5	30								

24.4 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.


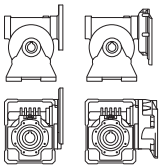
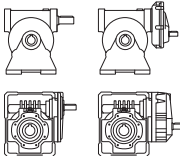
To determine the compatibility of a motor-gear unit assembly in terms of mechanical factors, double-check the selected configuration against the rating charts for power/speed.

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:

	<p>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.</p>		<p>Values refer to gearmotors, IEC style, less the motor.</p>
			<p>Values refer to speed reducers (solid input shaft).</p>

VF 27



		i	J ($\cdot 10^{-4}$) [kgm ²]				
			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 ($\cdot 10^{-4}$) [kgm ²]				
			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 ($\cdot 10^{-4}$) [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	—	—	—	—	—


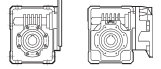
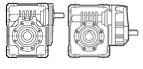


VF 49 - VFR 49

		i	J ($\cdot 10^{-4}$) [kgm ²]					
			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 ($\cdot 10^{-4}$) [kgm ²]									
												
			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 ($\cdot 10^{-4}$) [kgm ²]									
			 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	

		J ($\cdot 10^{-4}$) [kgm ²]
i		 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
	WR 75_90	90	5.7
	WR 75_120	120	5.7
WR 75_150	150	5.7	



W 86 - WR 86

		i	J ($\cdot 10^{-4}$) [kgm ²]									
			 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


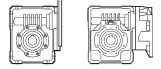
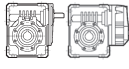
WR 86	WR 86_21	21	—	—	—	1.5	1.5	2.4	—	—	—	2.2
	WR 86_30	30	—	—	—	1.4	1.3	2.3	—	—	—	1.3
	WR 86_45	45	—	—	—	1.3	1.3	2.2	—	—	—	1.2
	WR 86_60	60	—	—	—	1.2	1.2	2.1	—	—	—	1.2
	WR 86_69	69	—	—	—	1.2	1.2	2.1	—	—	—	1.1
	WR 86_90	90	—	—	—	1.2	1.2	2.2	—	—	—	1.2
	WR 86_120	120	—	—	—	1.2	1.2	2.1	—	—	—	1.1
	WR 86_138	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

		J ($\cdot 10^{-4}$) [kgm ²]	
		i	 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
	WR 86_96	96	6.0
	WR 86_120	120	6.0
	WR 86_150	150	5.9





W 110 - WR 110

		i	J ($\cdot 10^{-4}$) [kgm ²]									
												
			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 ($\cdot 10^{-4}$) [kgm ²]					HS
			P80	P90	 P100	 P112	P132	
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	14	—	8.2
	VF 130_56	56	—	13	13	13	—	7.8
	VF 130_64	64	—	13	13	13	—	7.4
	VF 130_80	80	—	13	12	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 ($\cdot 10^{-4}$) [kgm ²]				
			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	8.3	8.3	8.3	—	9.2
	VFR 150_69	69	8.4	8.4	8.4	—	9.3
	VFR 150_90	90	8.7	8.7	8.7	—	9.7
	VFR 150_120	120	8.2	8.2	8.2	—	9.2
	VFR 150_138	138	7.9	7.9	7.9	—	8.9
	VFR 150_168	168	7.9	7.9	7.9	—	8.9
	VFR 150_192	192	7.8	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 ($\cdot 10^{-4}$) [kgm ²]						HS
			P90	P100	 P112	 P132	P160	P180	
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_30	30	17	17	17	—	—	—	18
	VFR 185_37.5	37.5	—	—	—	17	—	—	—
	VFR 185_45	45	12	12	12	—	—	—	13
	VFR 185_50	50	—	—	—	17	—	—	—
	VFR 185_60	60	12	12	12	—	—	—	13
	VFR 185_75	75	—	—	—	15	—	—	—
	VFR 185_90	90	10	10	10	—	—	—	11
	VFR 185_100	100	—	—	—	16	—	—	—
	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 ($\cdot 10^{-4}$) [kgm ²]							HS
			P100	P112	P132	P160	P180	P200	P225	
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



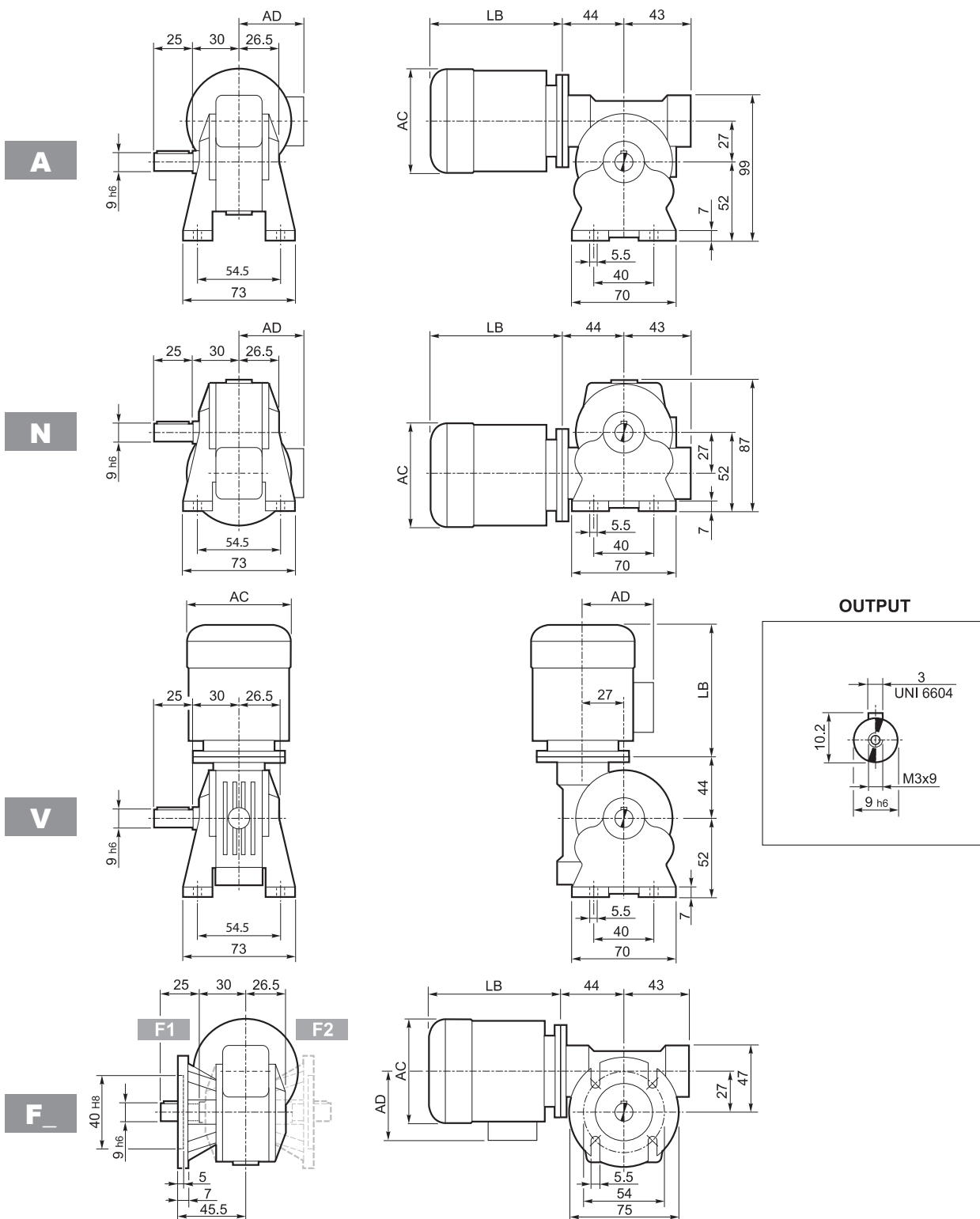
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

		i	J ($\cdot 10^{-4}$) [kgm ²]							
			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



26 DIMENSIONS FOR GEARMOTORS AN GEAR UNITS WITH IEC MOTOR INTERFACE

VF 27...BN27

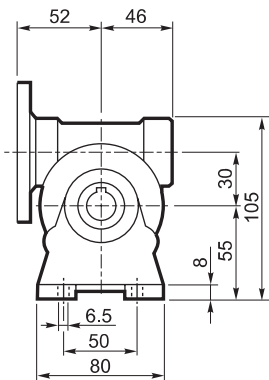
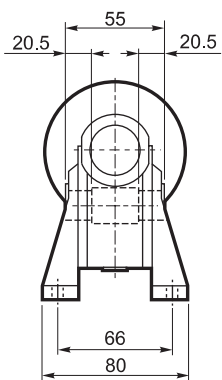


	P_n kW	n min ⁻¹	M_n Nm	η %	$\text{COS}\phi$	I_n A (400V)	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	J_m ($\cdot 10^{-4}$) kgm ²		LB	AC	AD
BN 27A4	0.04	1350	0.28	36	0.57	0.28	2.3	2.0	1.8	0.56	2.8	152	103	76
BN 27B4	0.06	1360	0.42	39	0.57	0.39	2.5	2.2	1.9	0.76	3.1	152	103	76
BN 27C4	0.09	1380	0.63	46	0.65	0.43	2.8	2.3	1.9	1.49	3.3	175	112	94

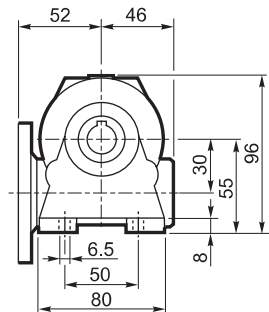
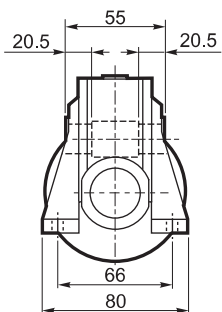


VF 30...P (IEC)

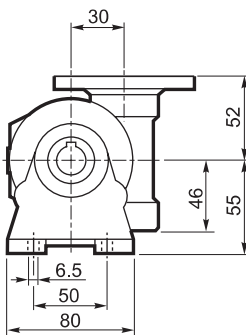
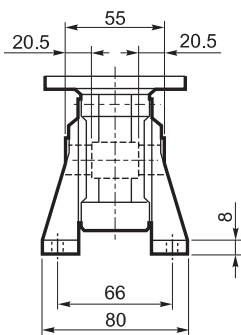
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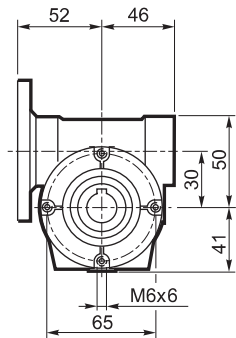
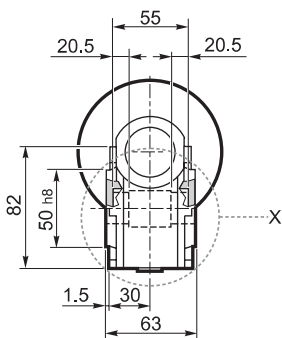
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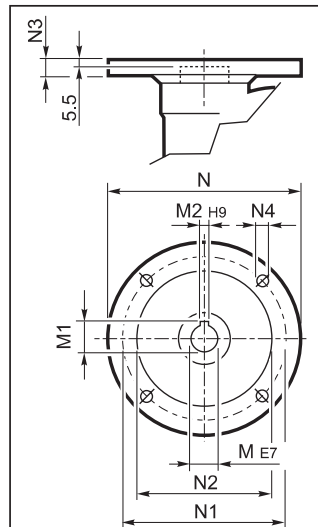
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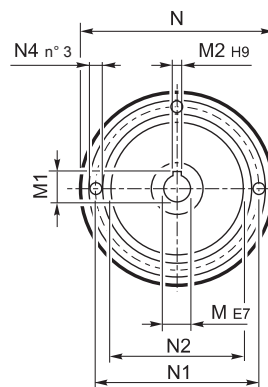
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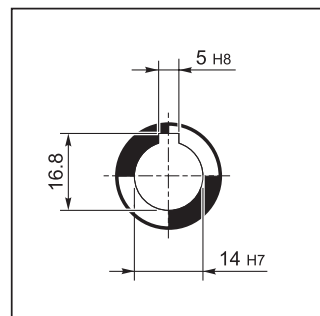
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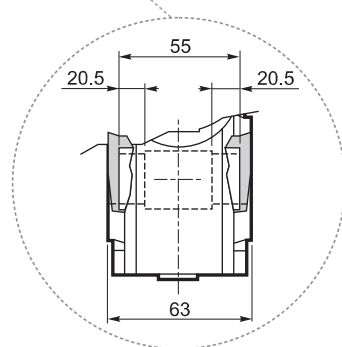
P56 B14



OUTPUT



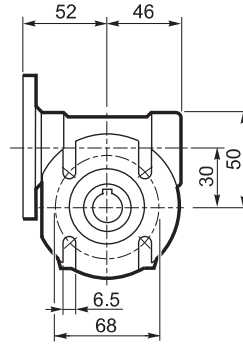
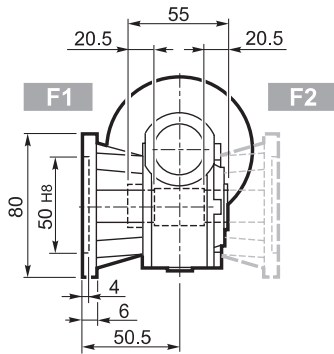
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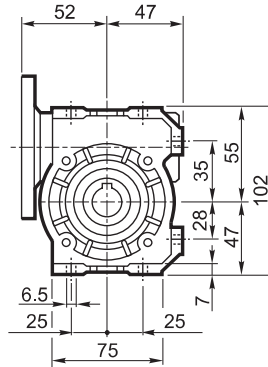
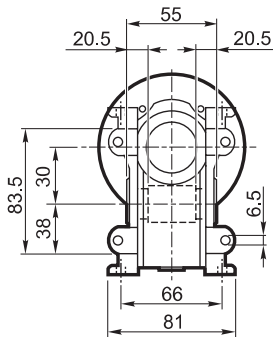


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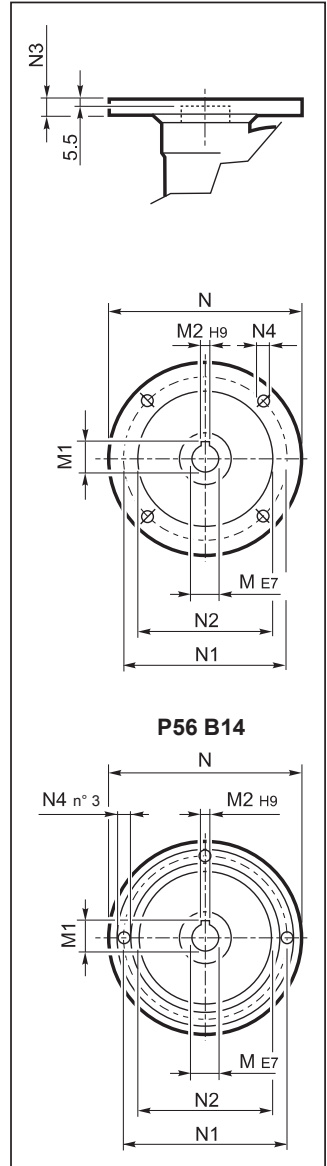
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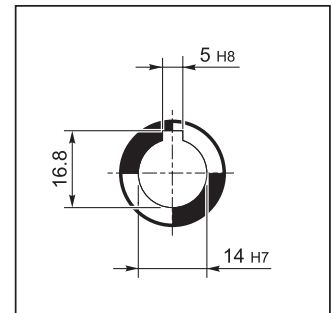
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INPUT



OUTPUT

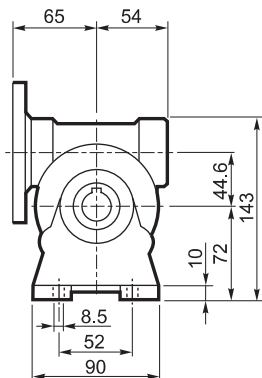
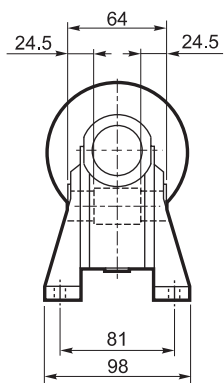


		M	M1	M2	N	N1	N2	N3	N4	
VF 30	P56 B5	9	10.4	3	120	100	80	7	7	1.1
VF 30	P56 B14	9	10.4	3	80	65	50	7	5.5	
VF 30	P63 B5	11	12.8	4	140	115	95	8	9.5	
VF 30	P63 B14	11	12.8	4	90	75	60	6	5.5	

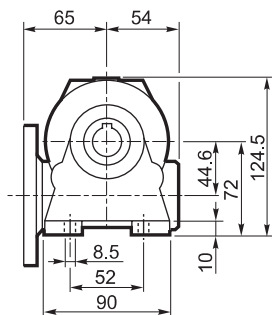
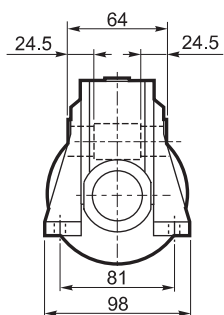


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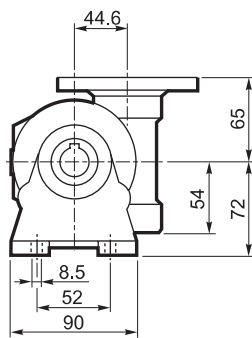
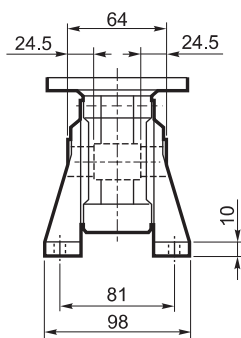
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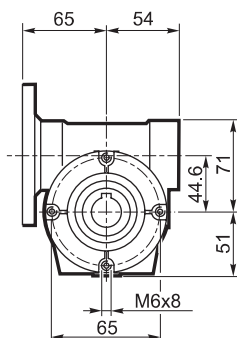
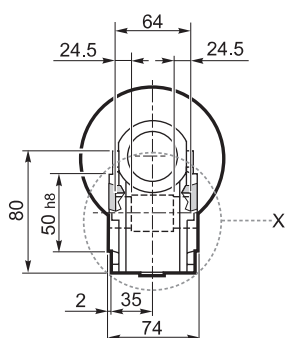
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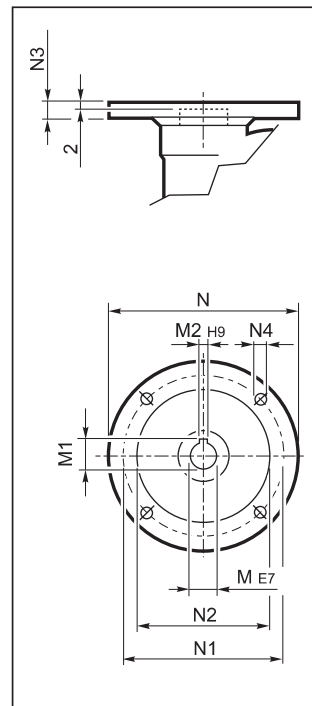
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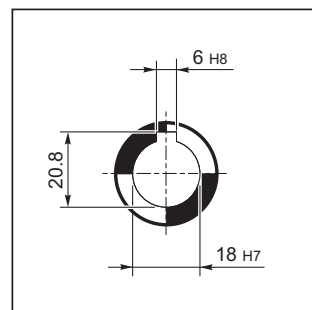
P



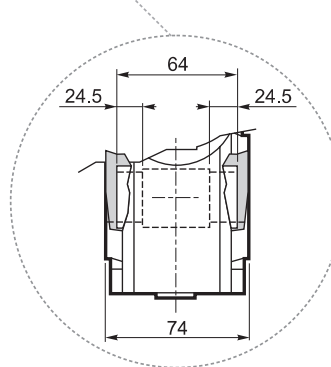
INPUT



OUTPUT

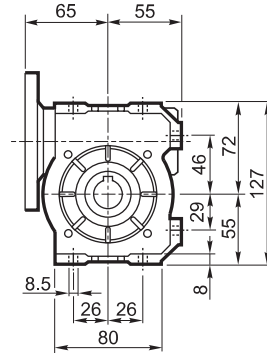
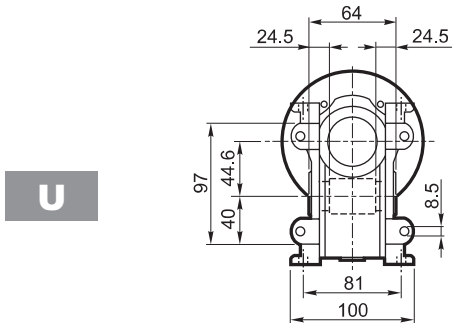
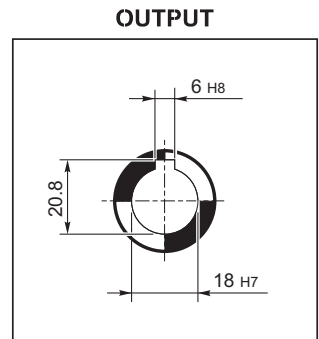
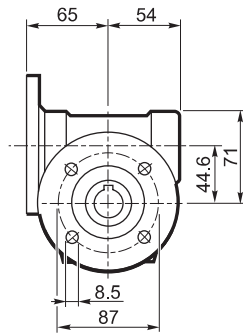
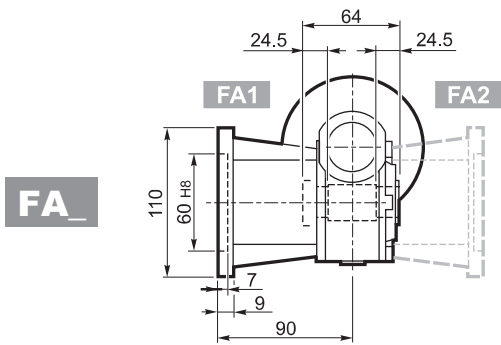
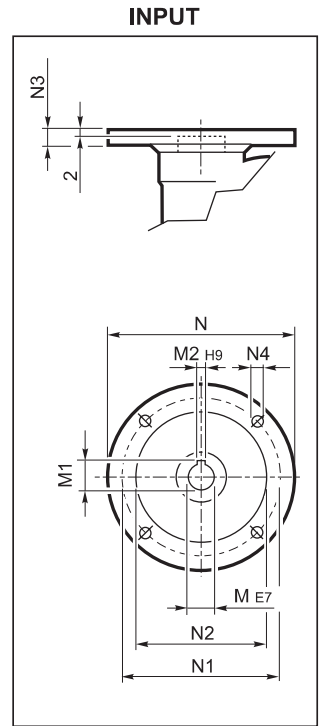
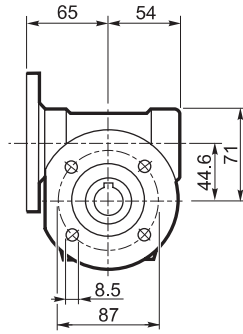
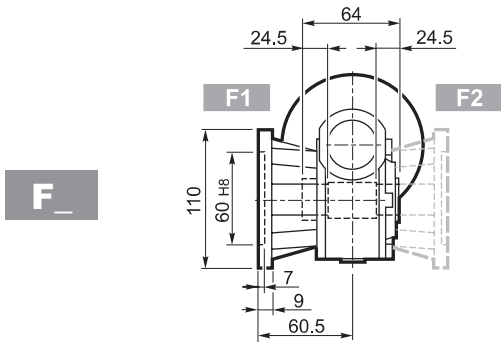


X





VF 44...P (IEC)

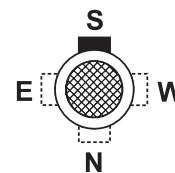
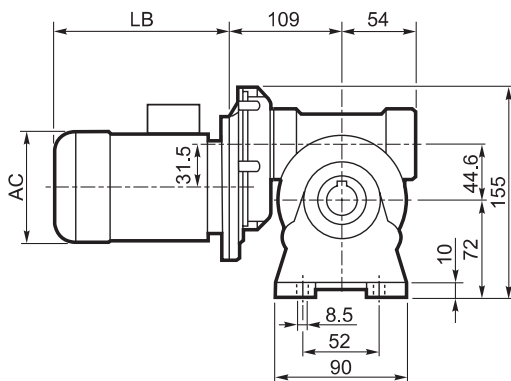
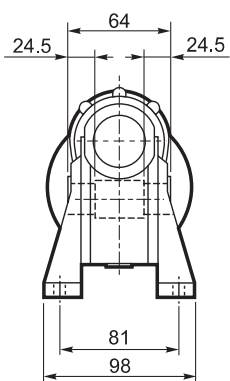


		M	M1	M2	N	N1	N2	N3	N4	
VF 44	P63 B5	11	12.8	4	140	115	95	10	9.5	2.0
VF 44	P71 B5	14	16.3	5	160	130	110	10	9.5	
VF 44	P63 B14	11	12.8	4	90	75	60	8	5.5	
VF 44	P71 B14	14	16.3	5	105	85	70	10	7	

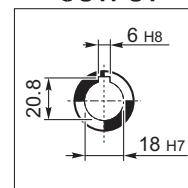


VFR 44...BN 44

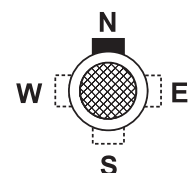
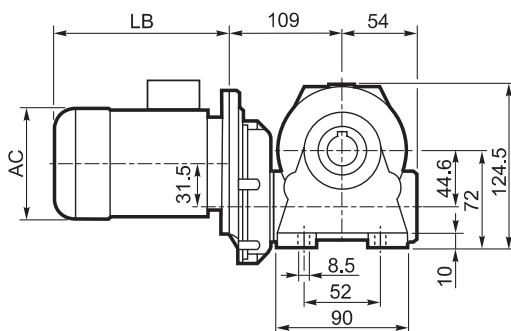
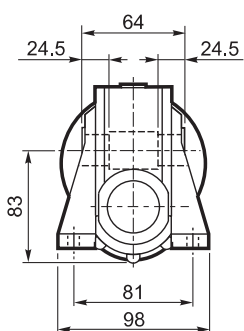
A



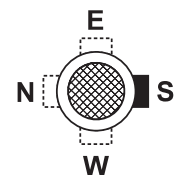
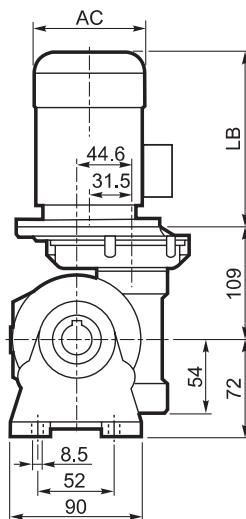
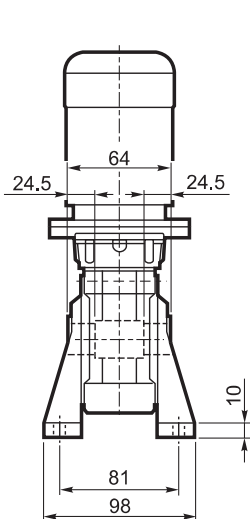
OUTPUT



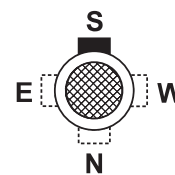
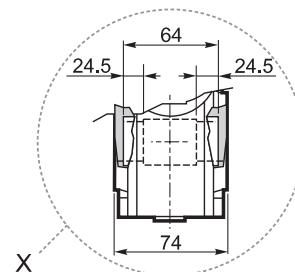
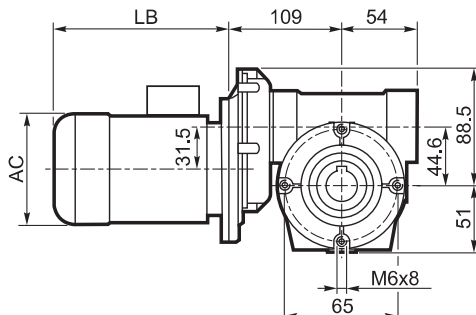
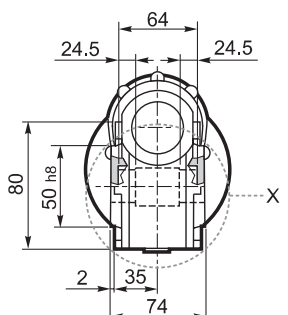
N



V



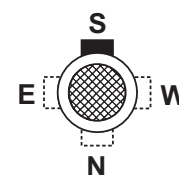
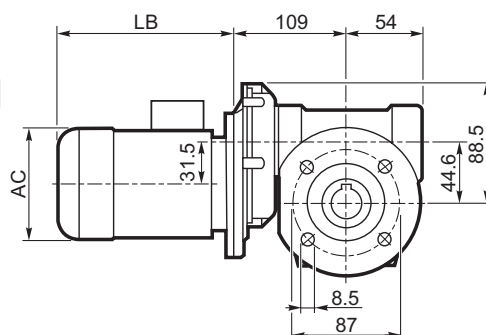
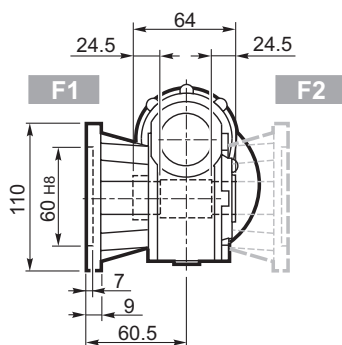
P



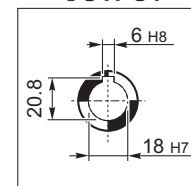


VFR 44...BN 44

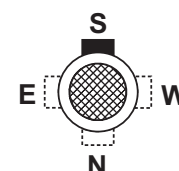
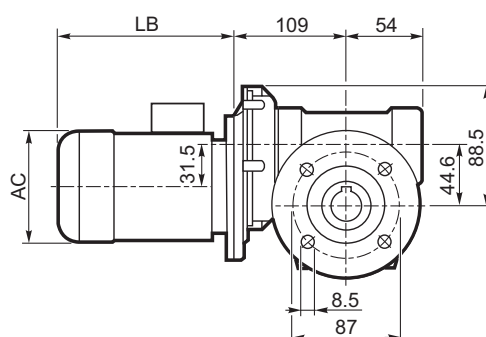
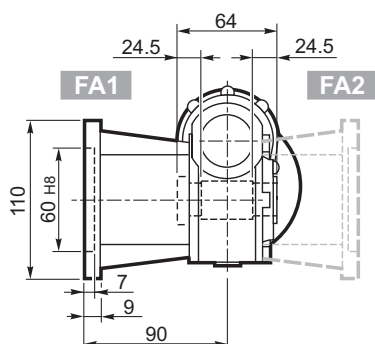
F_



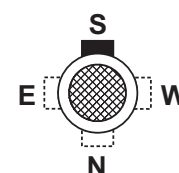
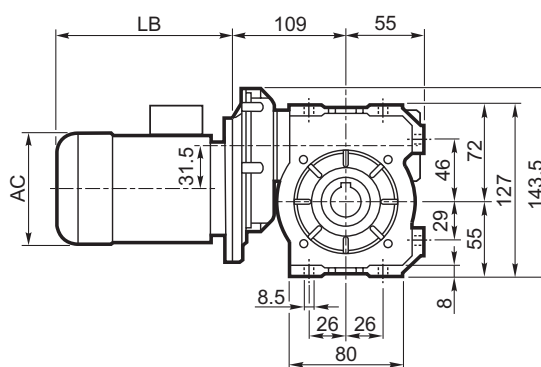
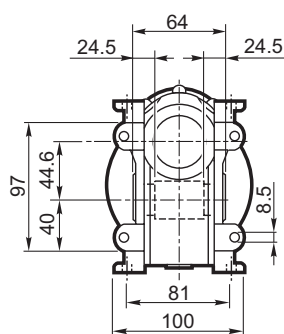
OUTPUT





FA_



U

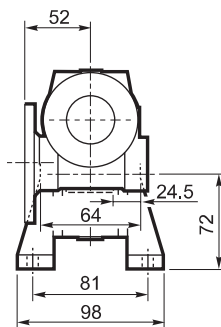
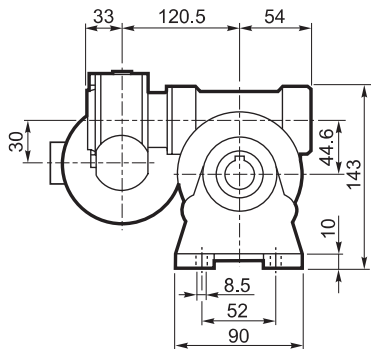


	P_n kW	n min ⁻¹	M_n Nm	η %	$\cos\phi$	I_n A (400V)	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	J_m ($\cdot 10^{-4}$) kgm ²		LB	AC	AD
BN 44B4	0.06	1380	0.42	40	0.58	0.38	2.4	2.3	1.9	1.22	4.7	168	112	94
BN 44C4	0.09	1380	0.63	46	0.65	0.43	2.8	2.3	2	1.49	4.6	168	112	94

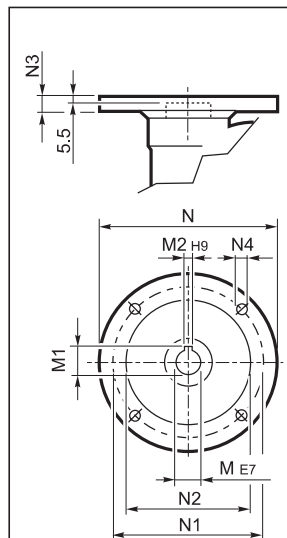


VF/VF 30/44...P (IEC)

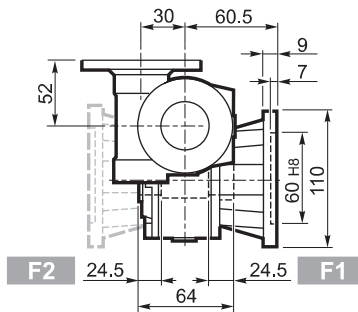
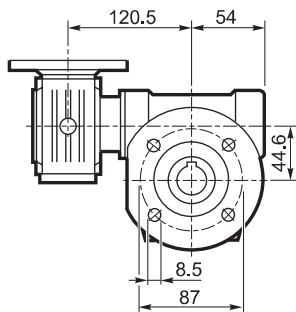
A



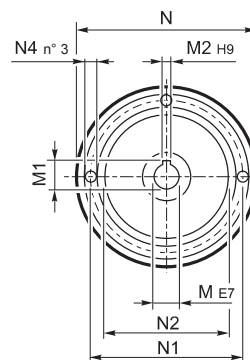
INPUT



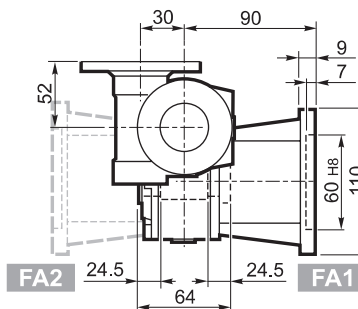
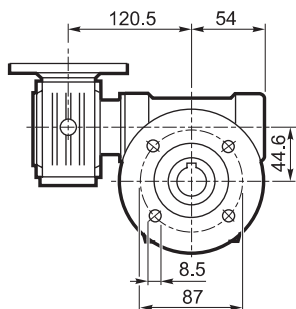
F_



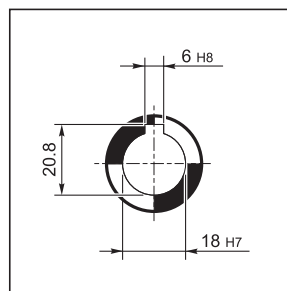
P56 B14



FA_



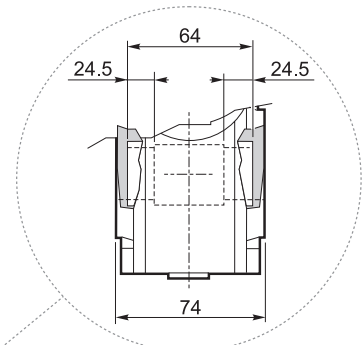
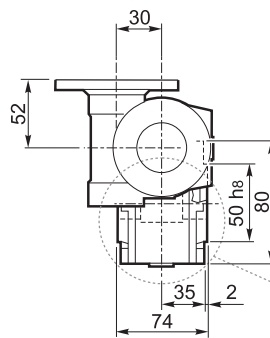
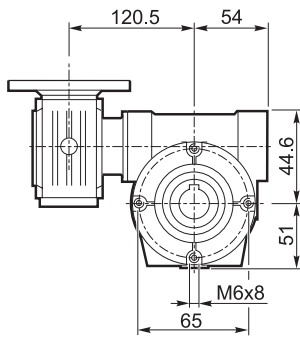
OUTPUT





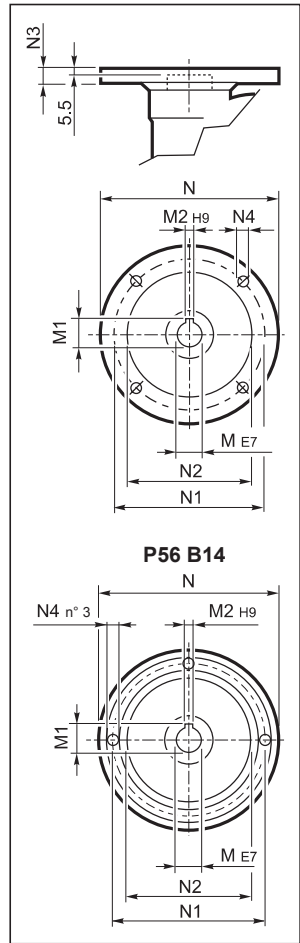
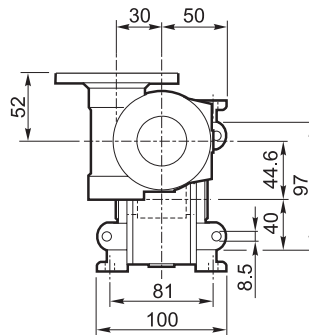
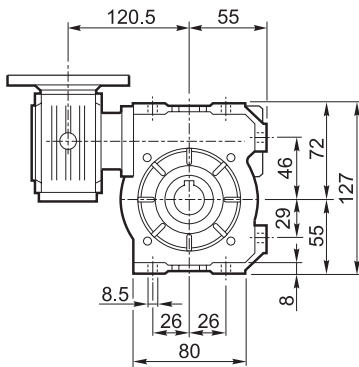
VF/VF 30/44...P (IEC)

P



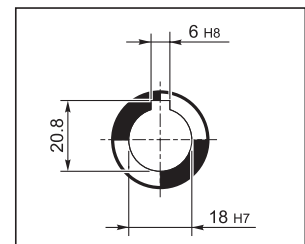
INPUT

U



P56 B14

OUTPUT

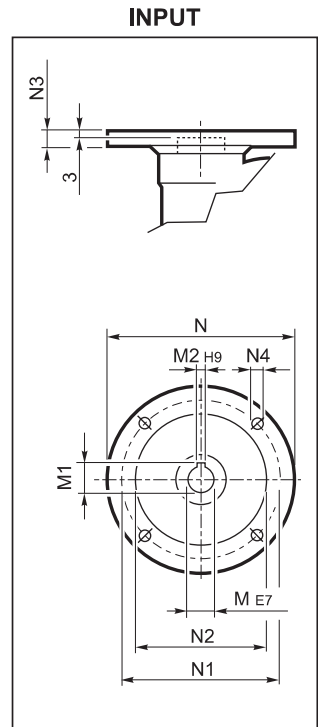
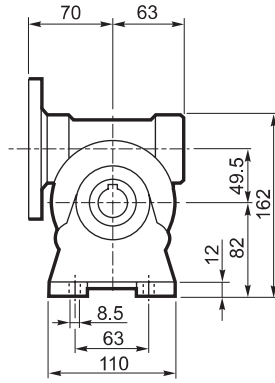
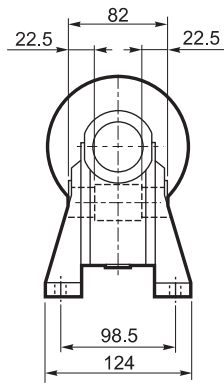


		M	M1	M2	N	N1	N2	N3	N4	
VF/VF 30/44	P56 B14	9	10.4	3	80	65	50	7	5.5	3.5
VF/VF 30/44	P63 B14	11	12.8	4	90	75	60	6	5.5	

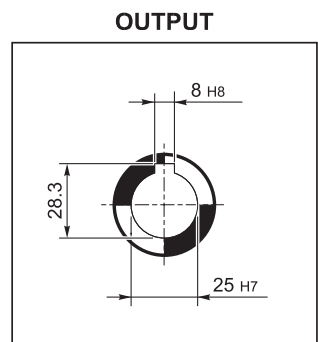
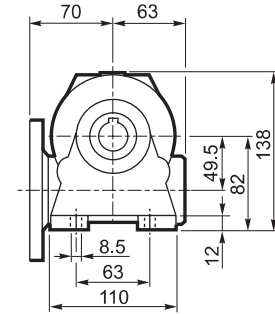
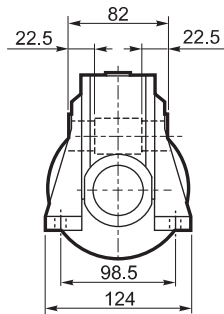


VF 49...P (IEC)

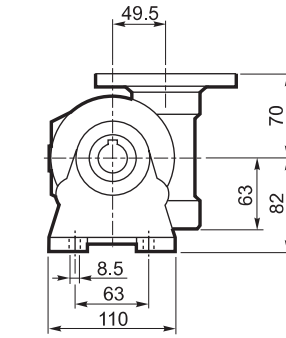
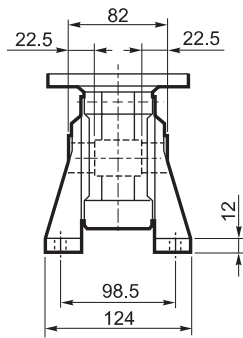
A



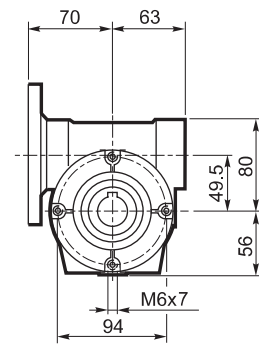
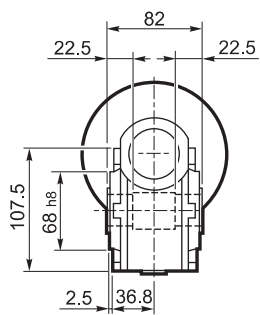
N



V



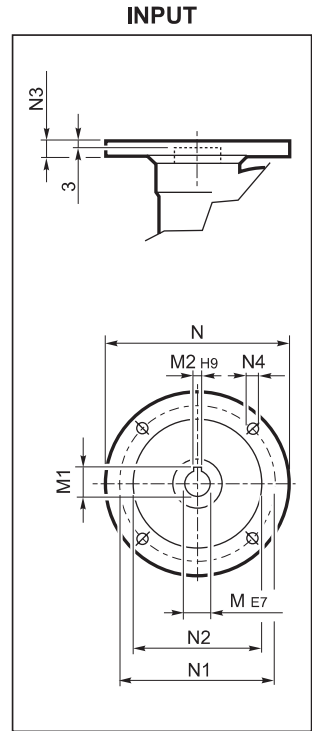
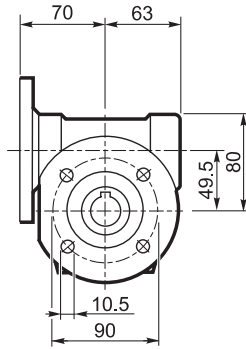
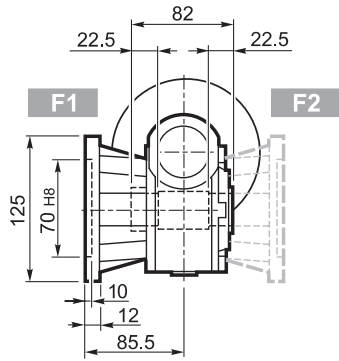
P



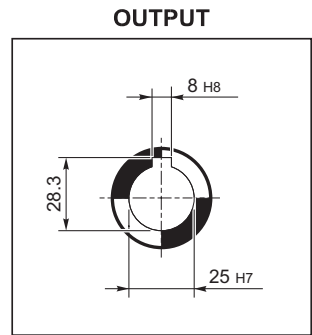
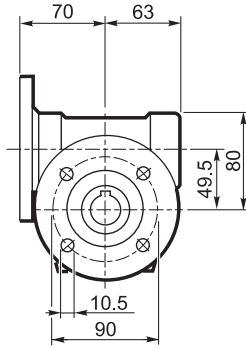
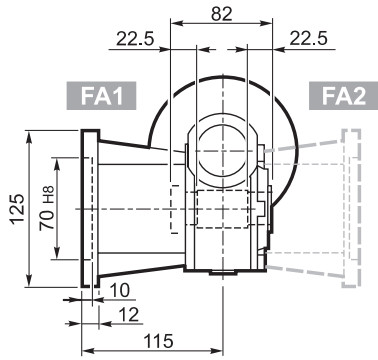


VF 49...P (IEC)

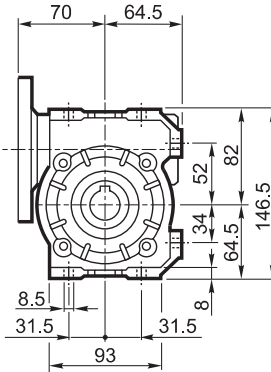
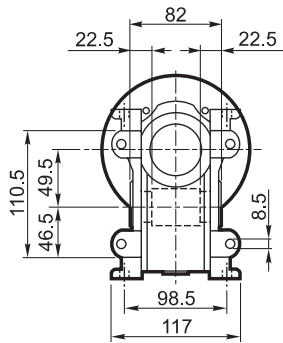
F_






FA_



U

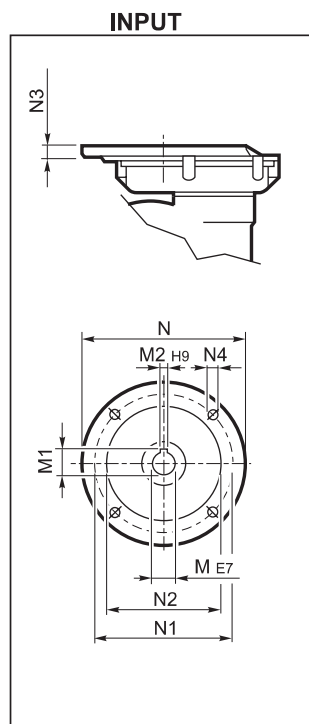
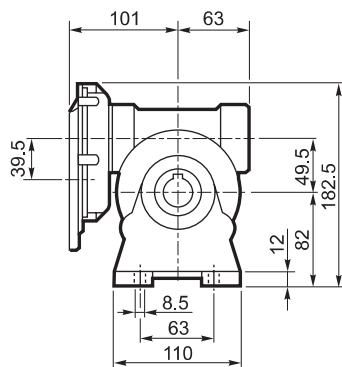
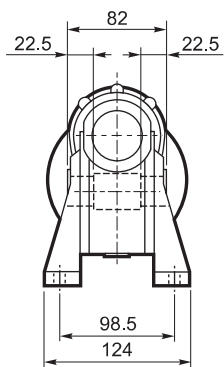


		M	M1	M2	N	N1	N2	N3	N4	
VF 49	P63 B5	11	12.8	4	140	115	95	10.5	9.5	3.0
VF 49	P71 B5	14	16.3	5	160	130	110	10.5	9.5	
VF 49	P80 B5	19	21.8	6	200	165	130	10	11.5	
VF 49	P63 B14	11	12.8	4	90	75	60	7	6	
VF 49	P71 B14	14	16.3	5	105	85	70	10.5	6.5	
VF 49	P80 B14	19	21.8	6	120	100	80	10	7	

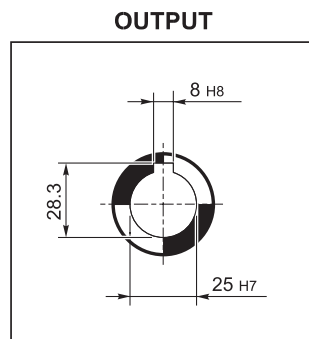
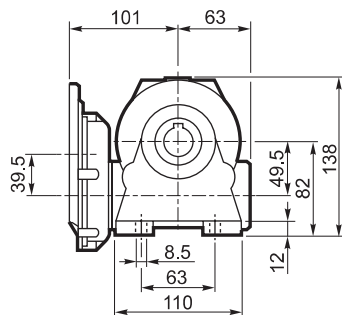
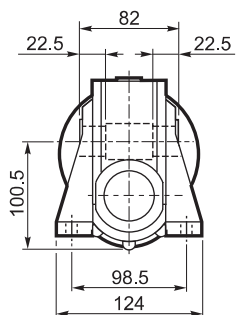


VFR 49...P (IEC)

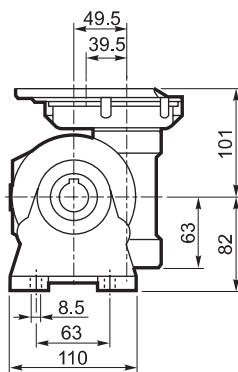
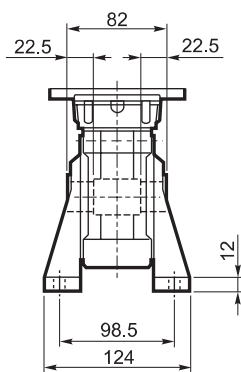
A



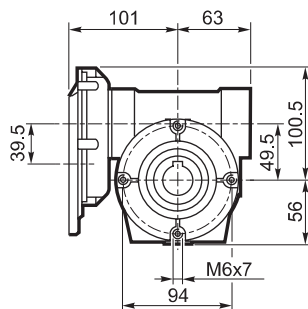
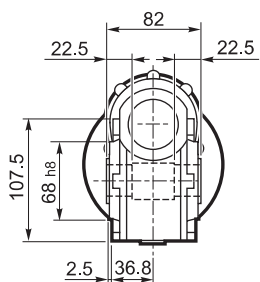
N



V

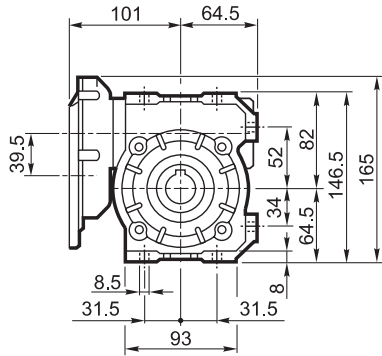
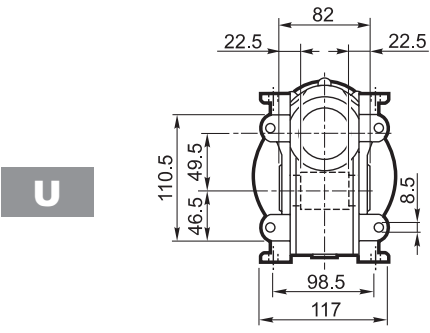
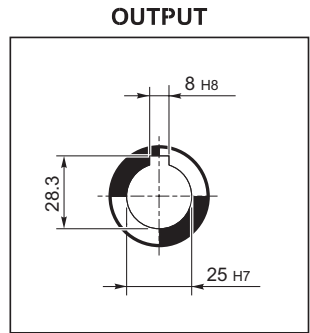
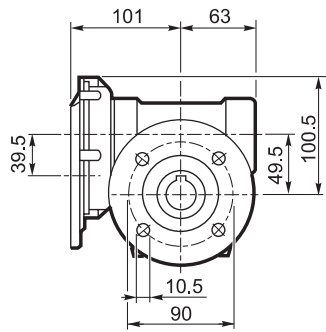
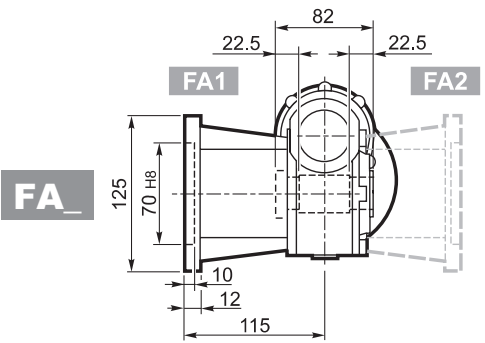
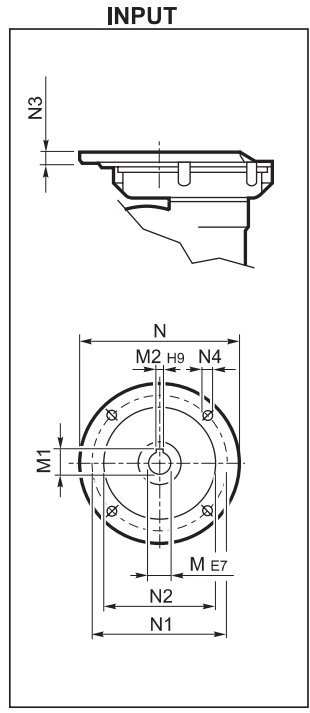
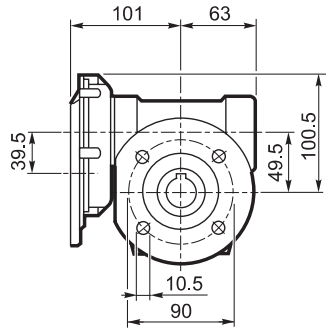
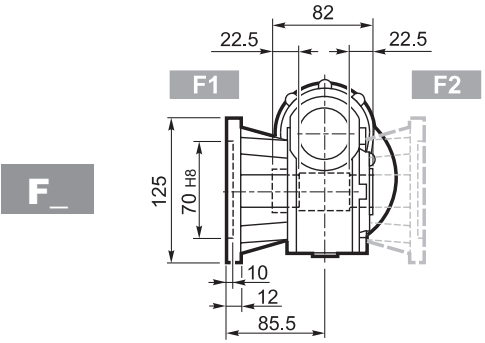


P





VFR 49...P (IEC)

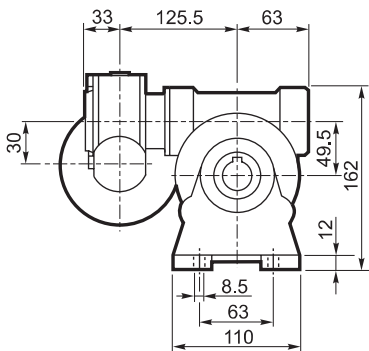


		M	M1	M2	N	N1	N2	N3	N4	
VFR 49	P63 B5	11	12.8	4	140	115	95	11	M8 x 19	5.0

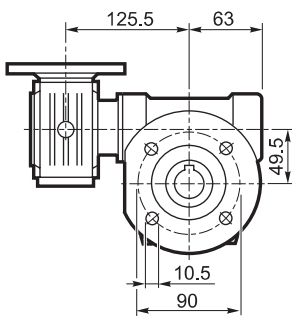


VF/VF 30/49...P (IEC)

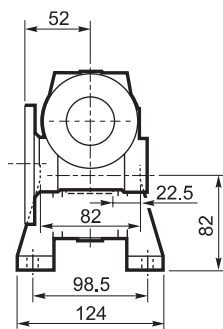
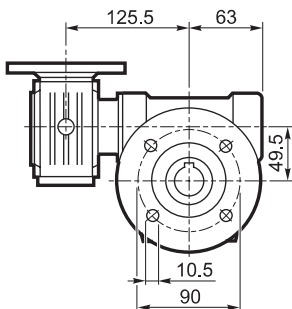
A



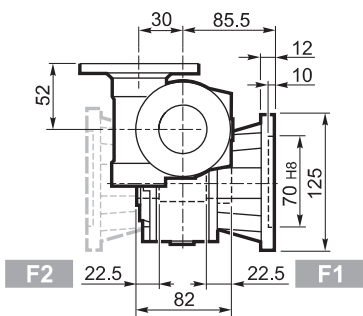
F



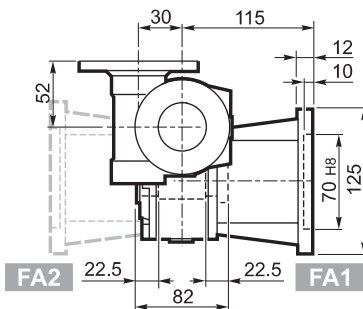
FA



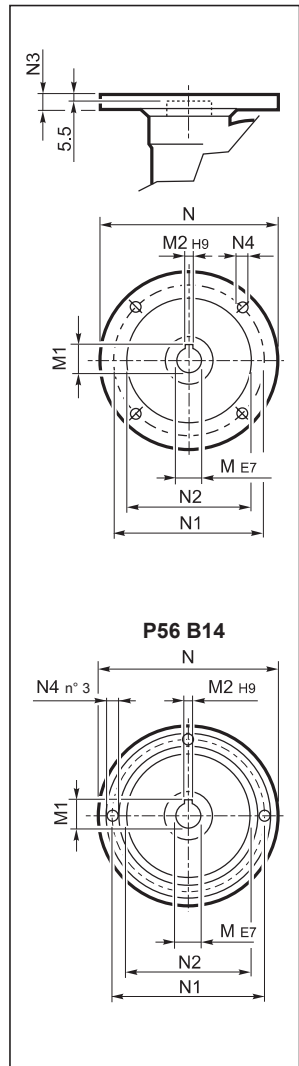
F2 **F1**



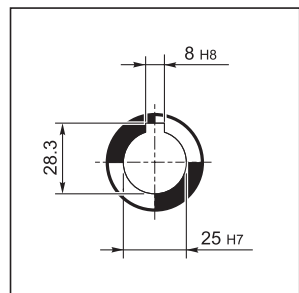
FA2 **FA1**



INPUT



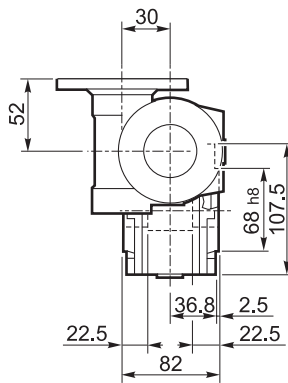
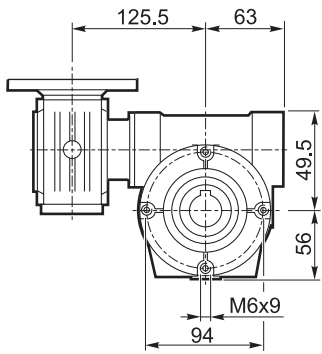
OUTPUT



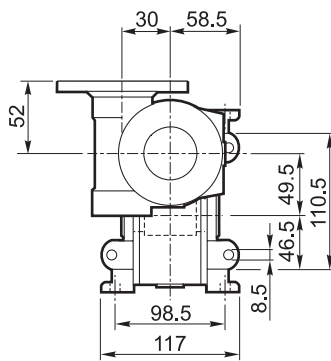
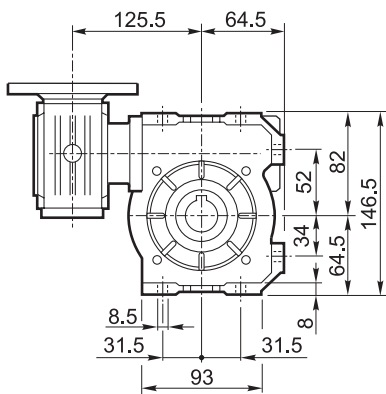


VF/VF 30/49...P (IEC)

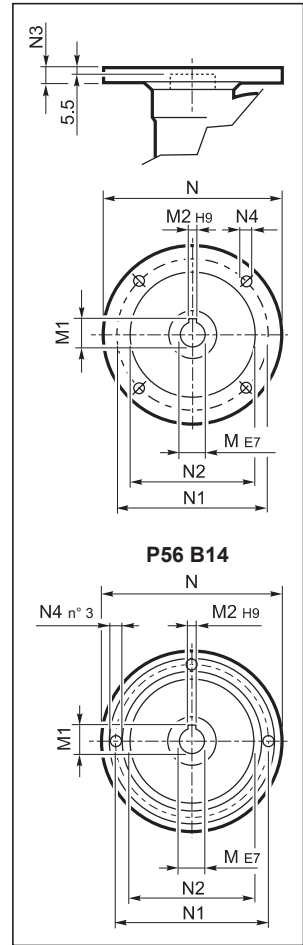
P



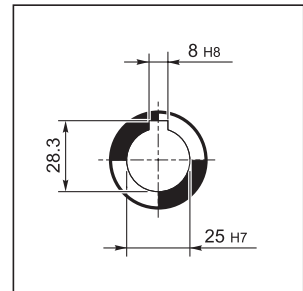
U



INPUT



OUTPUT

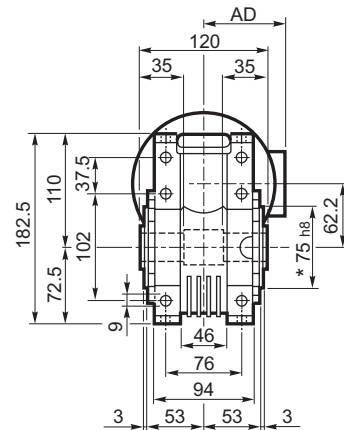
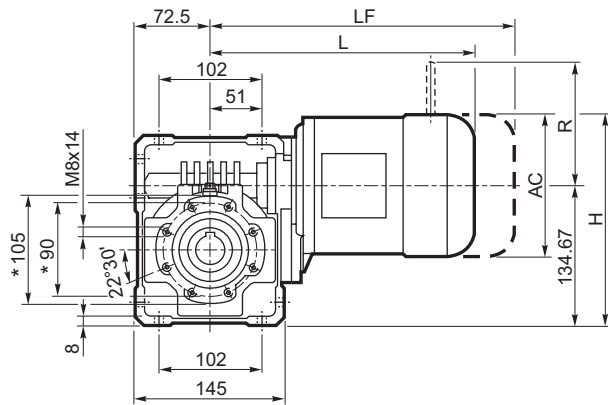


		M	M1	M2	N	N1	N2	N3	N4	
VF/VF 30/49	P56 B14	9	10.4	3	80	65	50	7	5.5	4.5
VF/VF 30/49	P63 B14	11	12.8	4	90	75	60	6	5.5	

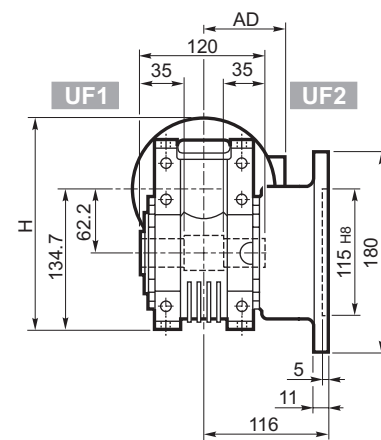
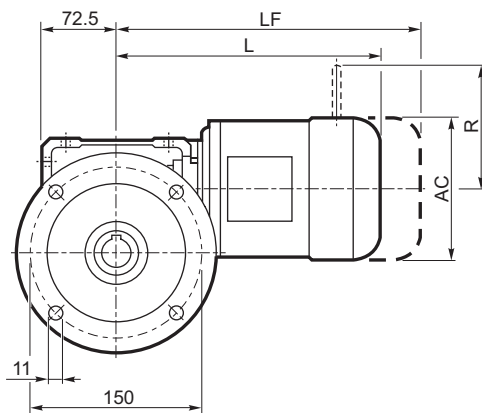


W 63...M/ME/MX

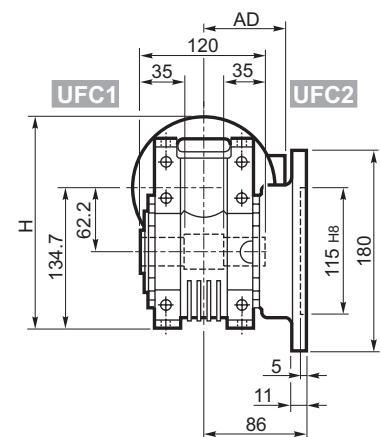
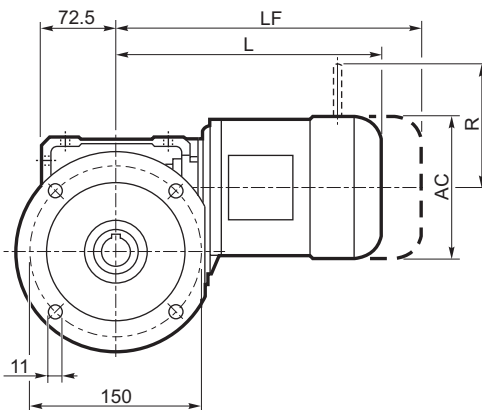
U



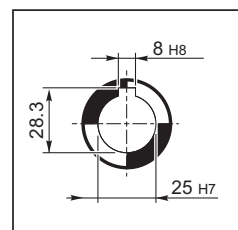
UF_



UFC_



OUTPUT



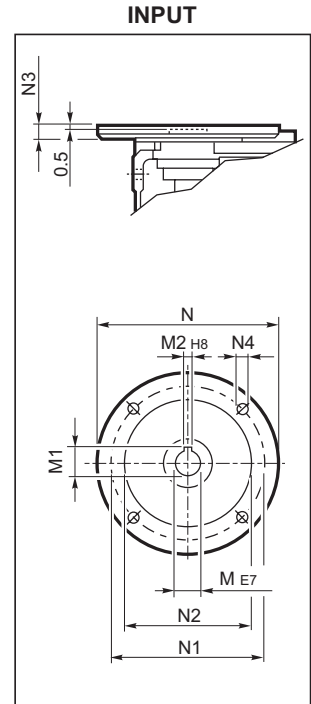
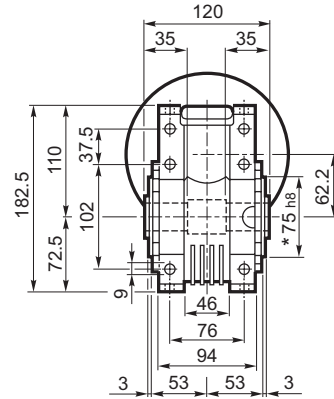
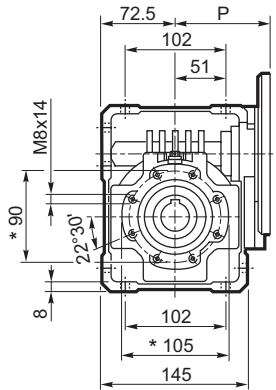
	M/ME/MX							M...FD M...FA		M...FD		M...FA	
	AC	H	L	AD	Kg	LF	Kg	R	AD	R	AD		
W 63 S1 M1	138	204	289	108	13	350	15	103	135	124	108		
W 63 S2 M2S	156	213	317	119	17	393	20	129	146	134	119		
W 63 S2 ME2S	156	213	317	119	17	—	—	—	—	—	—		
W 63 S2 MX2S	156	213	371	119	23	—	—	—	—	—	—		

* On both sides

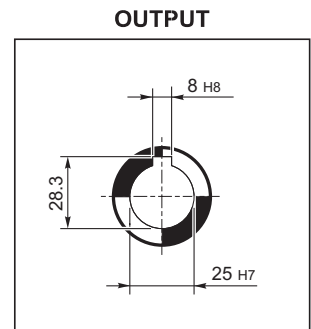
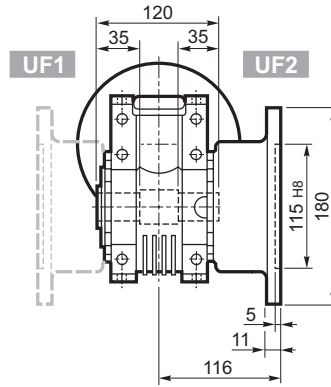
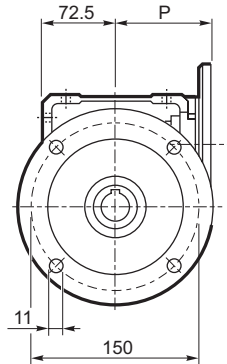


W 63...P (IEC)

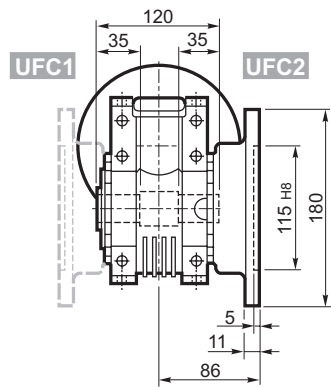
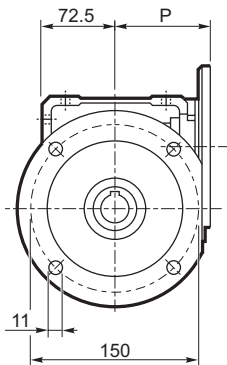
U



UF_



UFC_

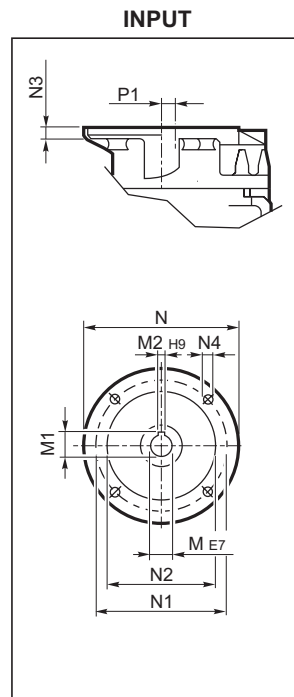
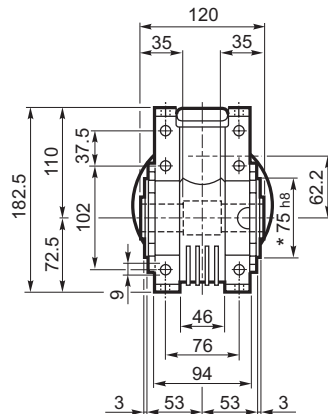
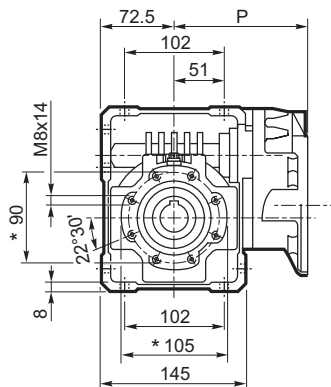


		M	M1	M2	N	N1	N2	N3	N4	P	
W 63	P71 B5	14	16.3	5	160	130	110	11	9	95	6.3
W 63	P80 B5	19	21.8	6	200	165	130	12	11.5	102	6.5
W 63	P90 B5	24	27.3	8	200	165	130	12	11.5	102	6.4
W 63	P71 B14	14	16.3	5	105	85	70	11	6.5	95	6.1
W 63	P80 B14	19	21.8	6	120	100	80	11	6.5	102	6.3
W 63	P90 B14	24	27.3	8	140	115	95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

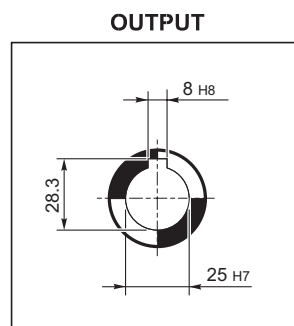
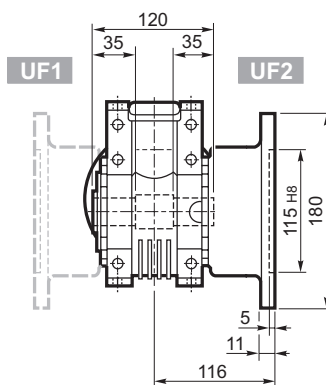
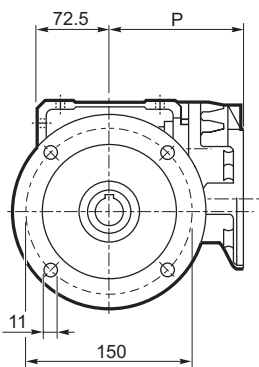


WR 63...P (IEC)

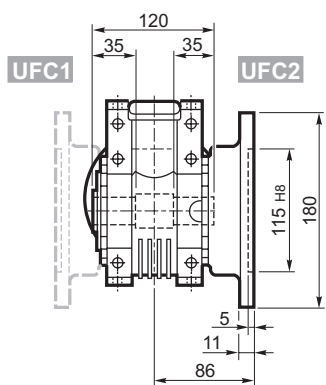
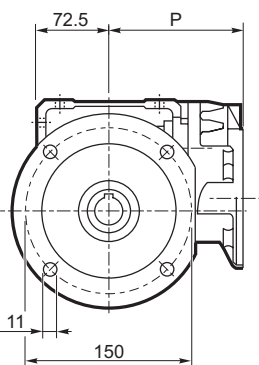
U



UF_



UFC_



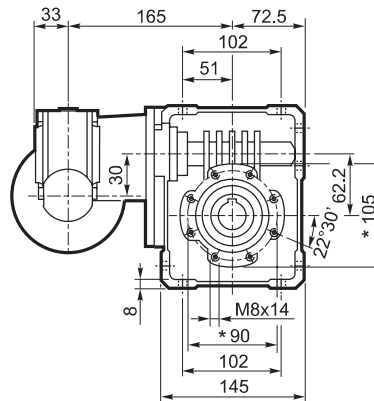
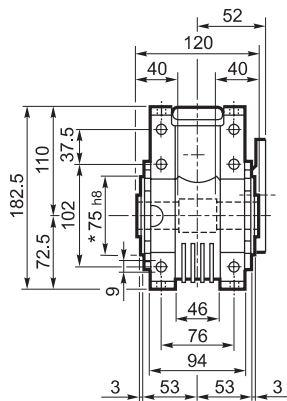
		M	M1	M2	N	N1	N2	N3	N4	P	P1	
WR 63	P63 B5	11	12.8	4	140	115	95	10	M8x10	133.5	11.42	7.1
WR 63	P71 B5	14	16.3	5	160	130	110	10	M8x10	133.5	11.42	

* On both sides

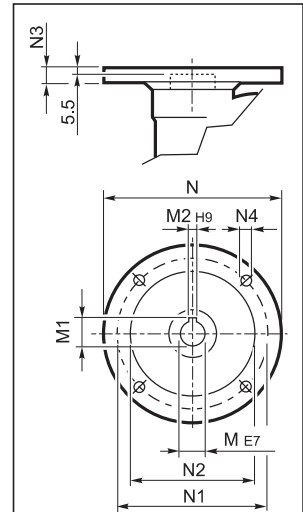


VF/W 30/63...P (IEC)

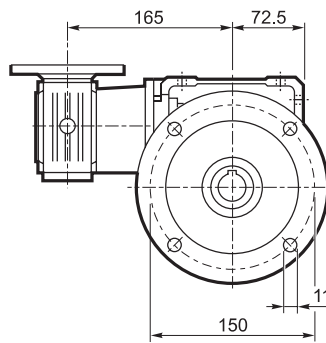
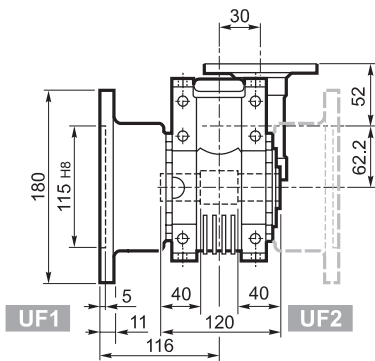
U



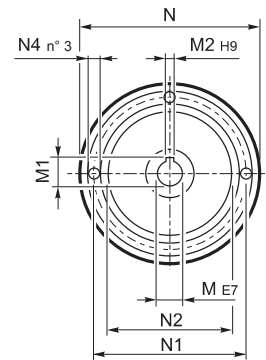
INPUT



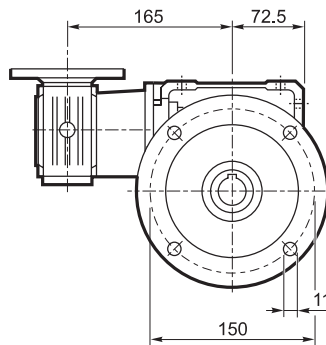
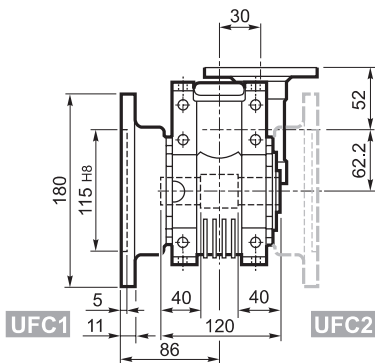
UF_



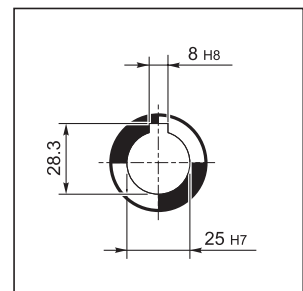
P56 B14



UFC_



OUTPUT



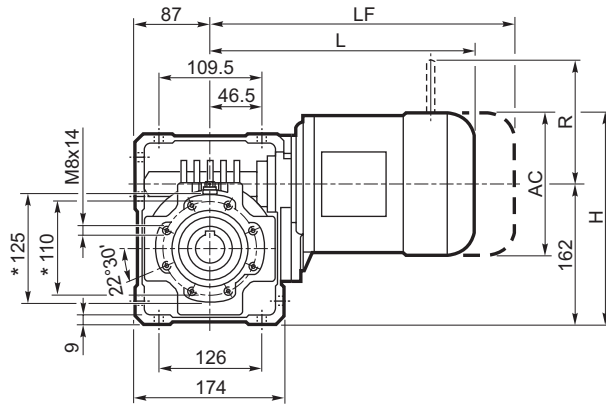
		M	M1	M2	N	N1	N2	N3	N4	
VF/W 30/63	P56 B5	9	10.4	3	120	100	80	7	7	8.0
VF/W 30/63	P63 B5	11	12.8	4	140	115	95	8	9.5	
VF/W 30/63	P56 B14	9	10.4	3	80	65	50	7	5.5	
VF/W 30/63	P63 B14	11	12.8	4	90	75	60	6	5.5	

* On both sides

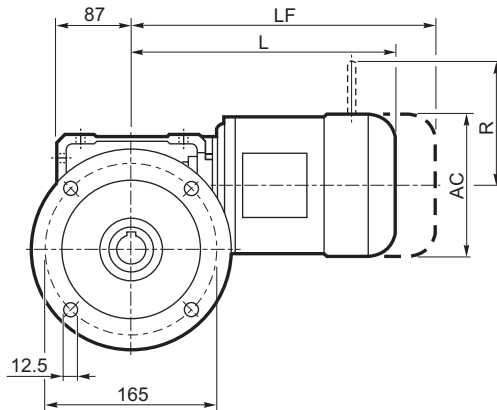


W 75...M/ME/MX

U

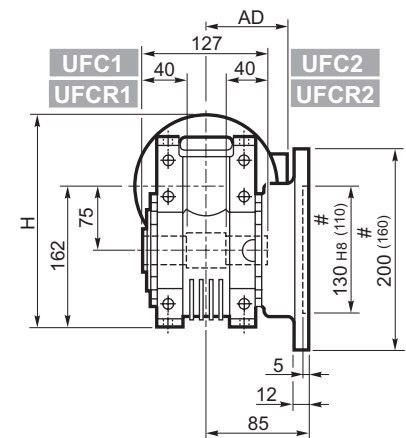
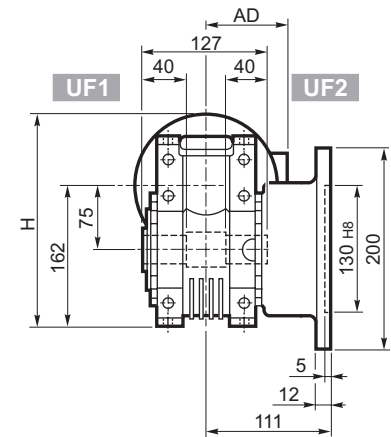
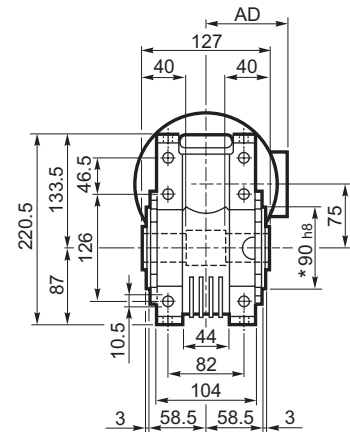
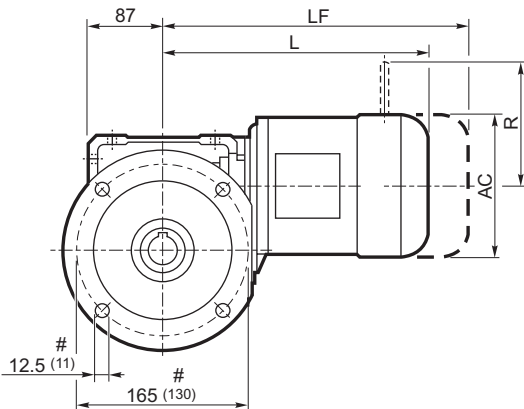


UF_

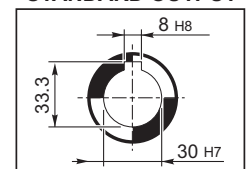


UFC_

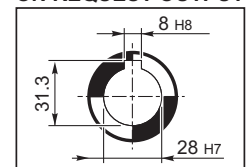
UFCR_#



STANDARD OUTPUT



ON REQUEST OUTPUT



			M/ME/MX					M...FD		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	156	240	333	119	18.5	—	—	—	—	—	—	—	—	
W 75	S2	MX2S	156	240	377	119	23.6	—	—	—	—	—	—	—	—	
W 75	S3	ME3S	195	258.5	376	142	27.1	—	—	—	—	—	—	—	—	
W 75	S3	MX3S	195	258.5	408	142	31.1	—	—	—	—	—	—	—	—	
W 75	S3	ME3L	195	258.5	408	142	32.6	—	—	—	—	—	—	—	—	
W 75	S3	MX3L	195	258.5	452	142	38.6	—	—	—	—	—	—	—	—	

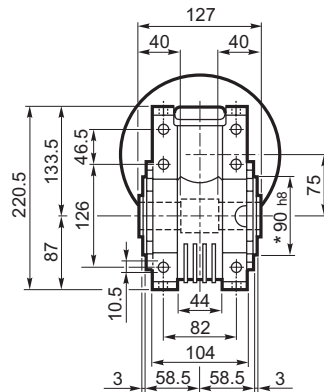
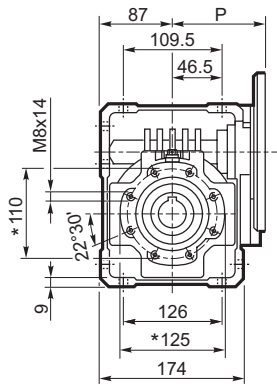
* On both sides

Reduced flange

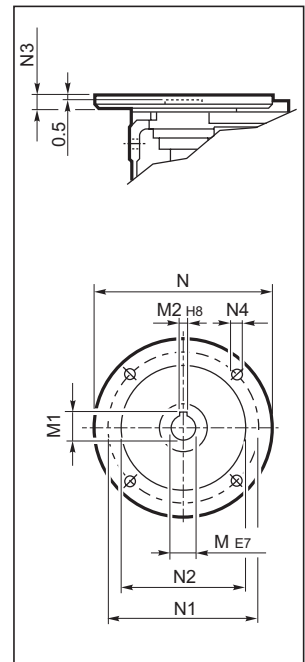


W 75...P (IEC)

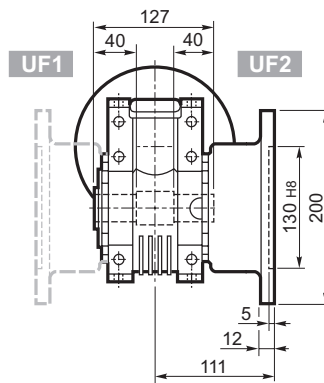
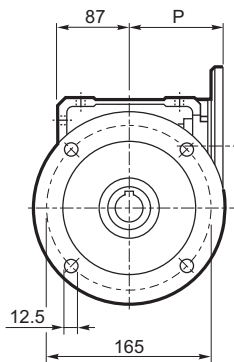
U



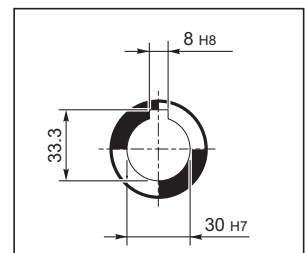
INPUT



UF_

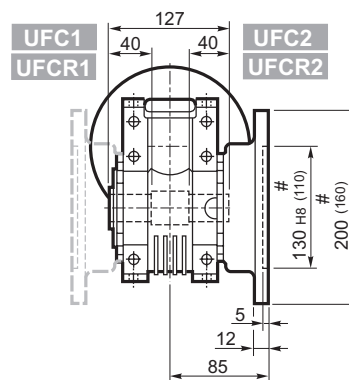
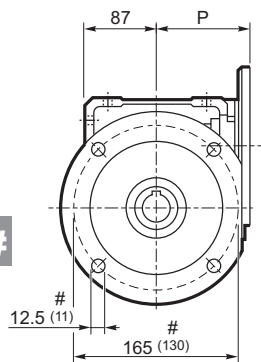


STANDARD OUTPUT

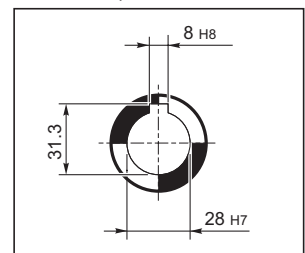


UFC_

UFCR_#



ON REQUEST OUTPUT



		M	M1	M2	N	N1	N2	N3	N4	P	
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

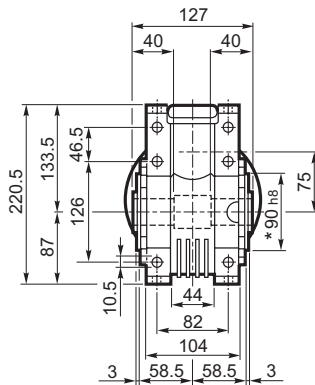
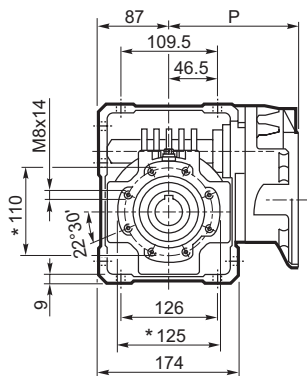
* On both sides

Reduced flange

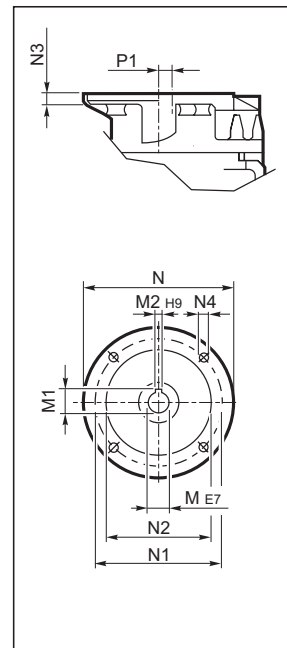


WR 75...P (IEC)

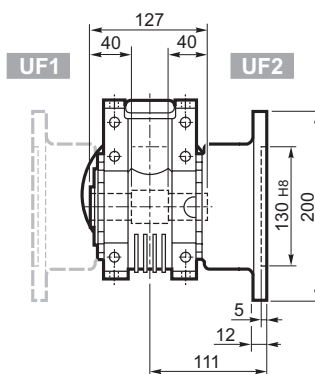
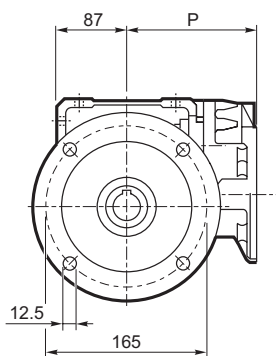
U



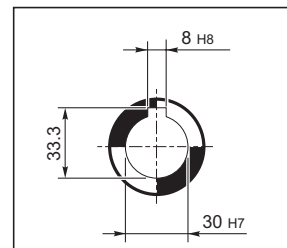
INPUT



UF_

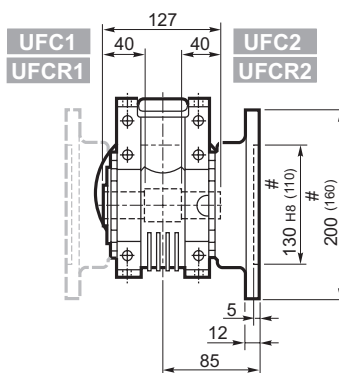
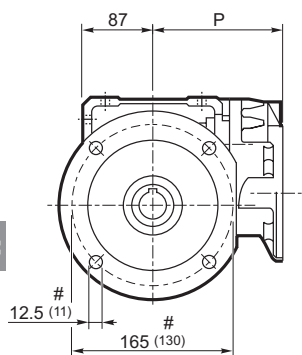


STANDARD OUTPUT

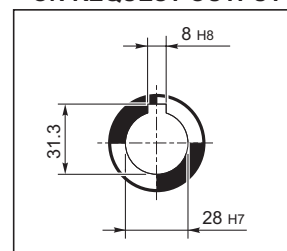


UFC_

UFCR_#



ON REQUEST OUTPUT



		M	M1	M2	N	N1	N2	N3	N4	P	P1	
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

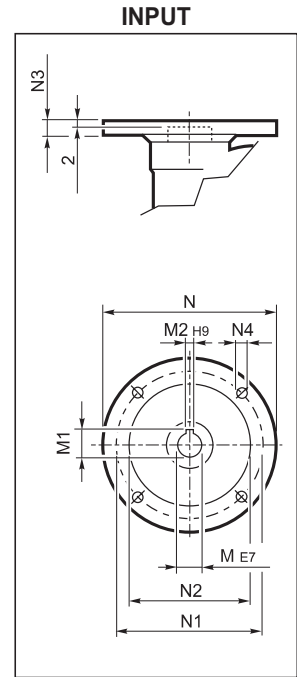
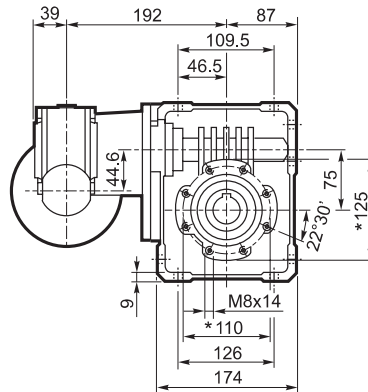
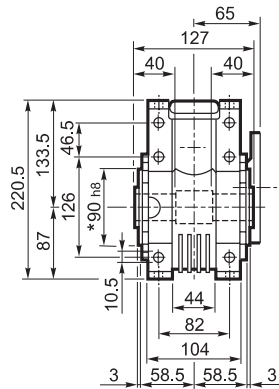
* On both sides

Reduced flange

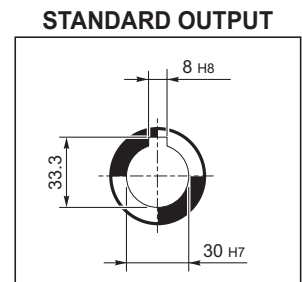
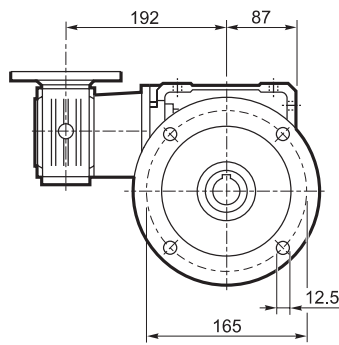
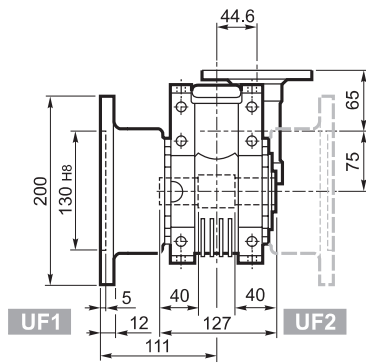


VF/W 44/75...P (IEC)

U

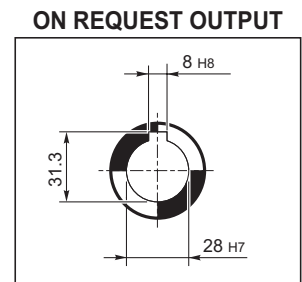
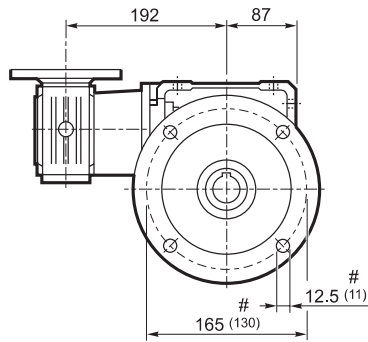
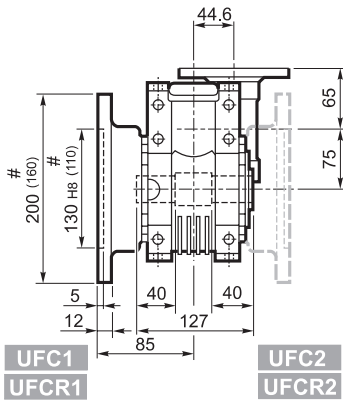


UF_



UFC_

UFCR_#



		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	

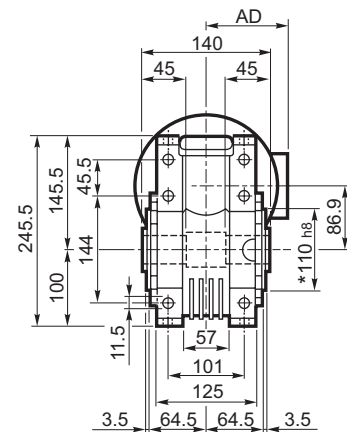
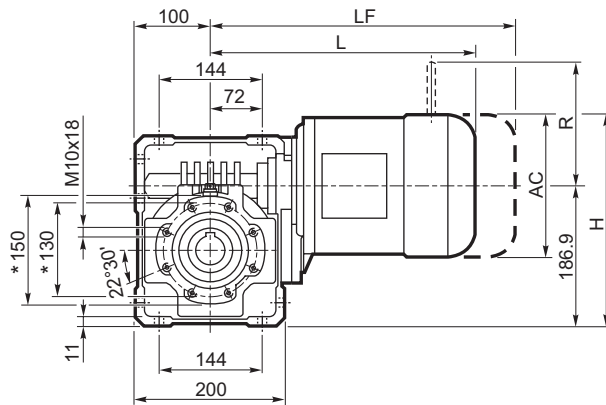
* On both sides

Reduced flange

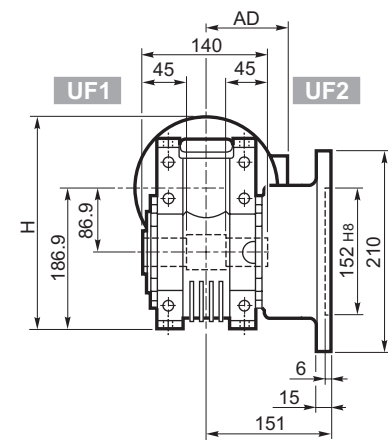
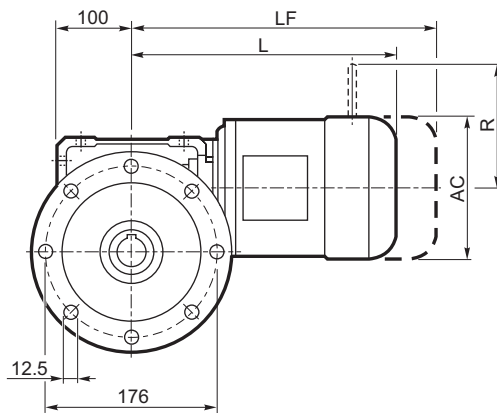


W 86...M/ME/MX

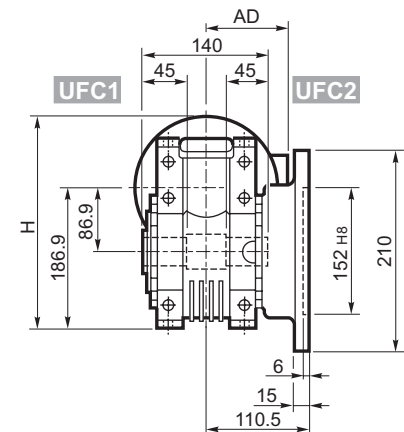
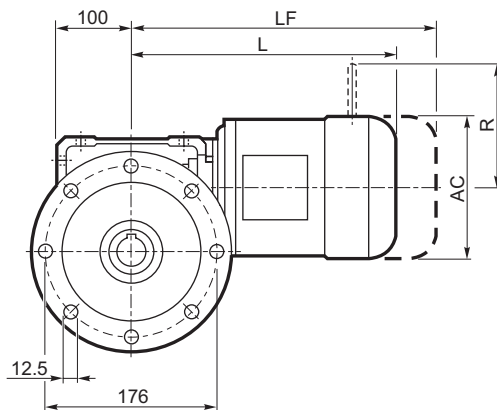
U



UF_

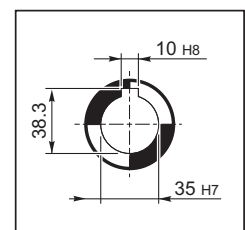


UFC_



			M/ME/MX				M...FD		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	S2	MX2S	156	265	393	119	27.7	—	—	—	—	—	—
W 86	S3	ME3S	195	283.5	392	142	31.2	—	—	—	—	—	—
W 86	S3	MX3S	195	283.5	424	142	34.2	—	—	—	—	—	—
W 86	S3	ME3L	195	283.5	424	142	36.7	—	—	—	—	—	—
W 86	S3	MX3L	195	283.5	468	142	42.7	—	—	—	—	—	—

OUTPUT

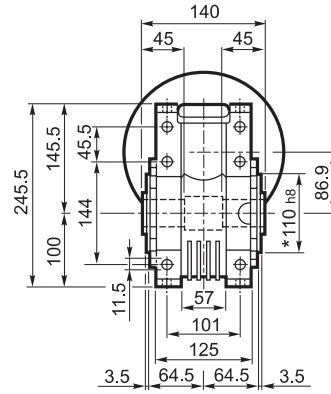
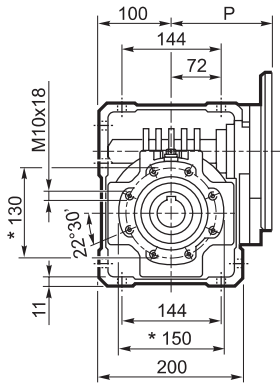


* On both sides

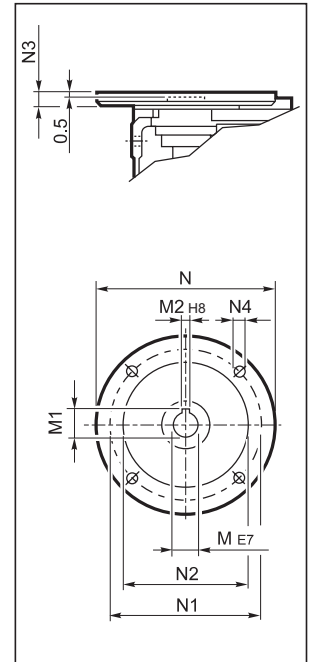


W 86...P (IEC)

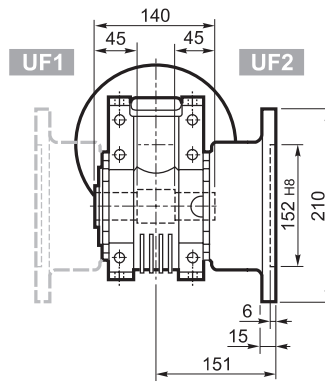
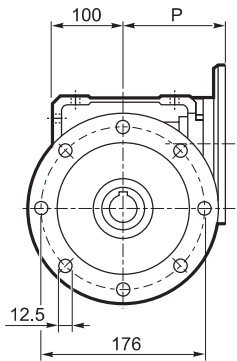
U



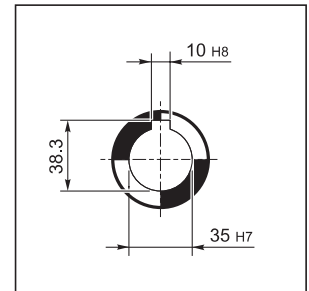
INPUT



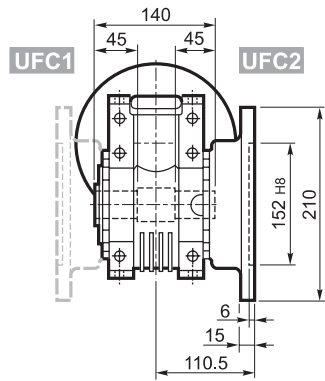
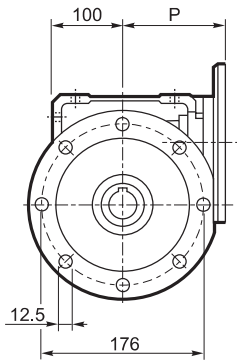
UF



OUTPUT



UFC



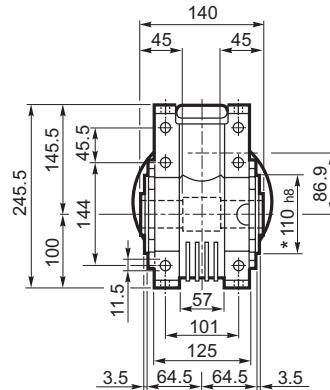
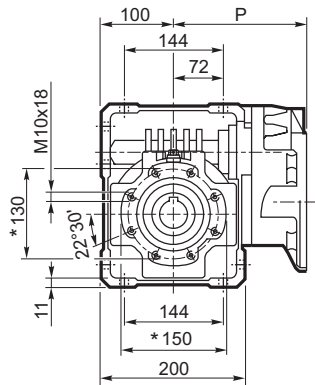
		M	M1	M2	N	N1	N2	N3	N4	P	
W 86	P71 B5	14	16.3	5	160	130	110	11	9	128	13.6
W 86	P80 B5	19	21.8	6	200	165	130	12	11.5	128	13.8
W 86	P90 B5	24	27.3	8	200	165	130	12	11.5	128	13.7
W 86	P100 B5	28	31.3	8	250	215	180	13	12.5	136	13.8
W 86	P112 B5	28	31.3	8	250	215	180	13	12.5	136	13.8
W 86	P80 B14	19	21.8	6	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

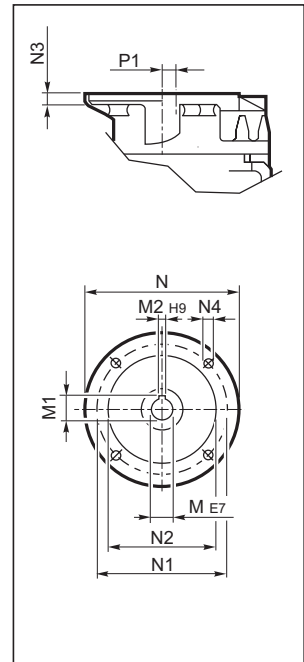


WR 86...P (IEC)

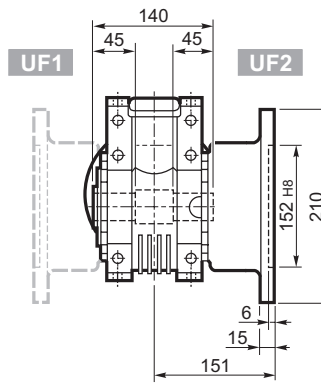
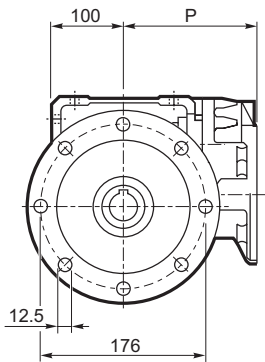
U



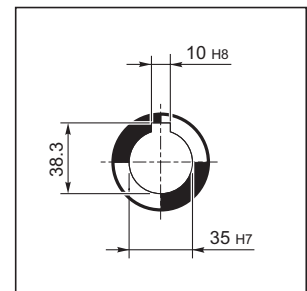
INPUT



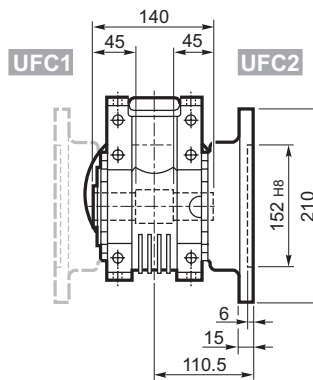
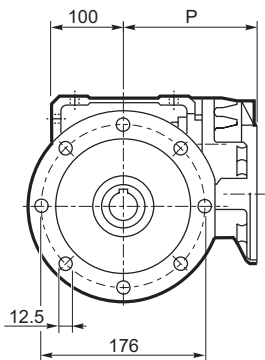
UF



OUTPUT



UFC



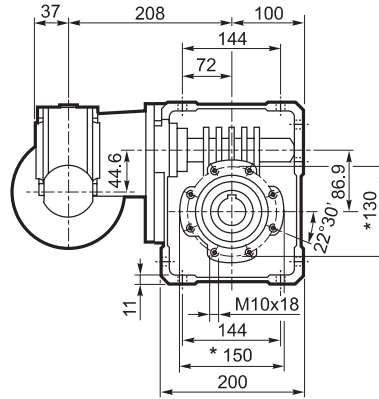
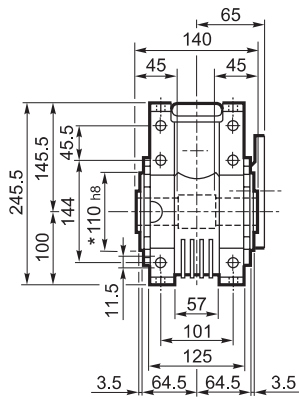
		M	M1	M2	N	N1	N2	N3	N4	P	P1	
WR 86	P63 B5	11	12.8	4	140	115	95	10	M8x10	168	35.4	14.3
WR 86	P71 B5	14	16.3	5	160	130	110	10	M8x10	168	35.4	14.4
WR 86	P80 B5	19	21.8	6	200	165	130	12	M10x13	179.5	22.9	15.2
WR 86	P90 B5	24	27.3	8	200	165	130	12	M10x13	179.5	22.9	15.3

* On both sides

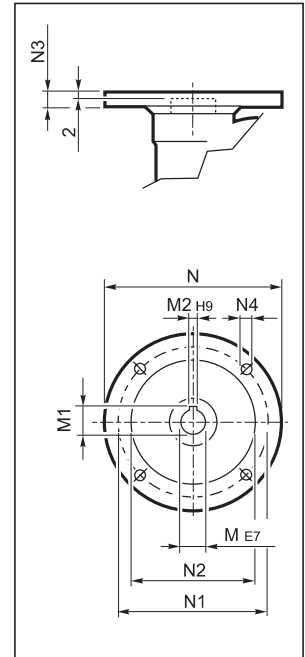


VF/W 44/86... P (IEC)

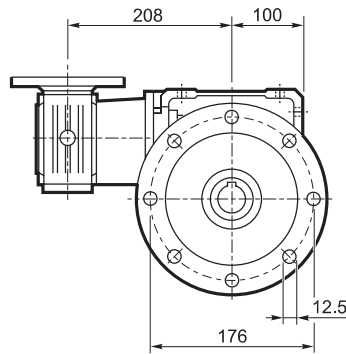
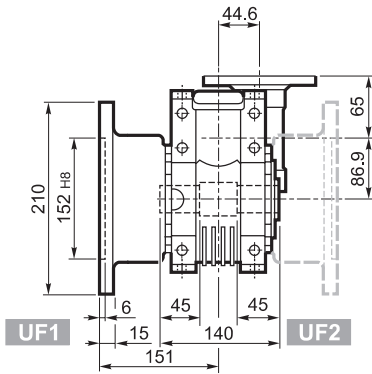
U



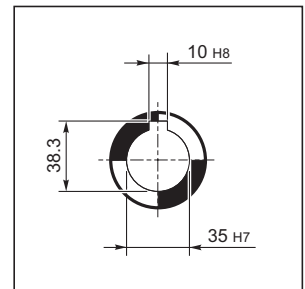
INPUT



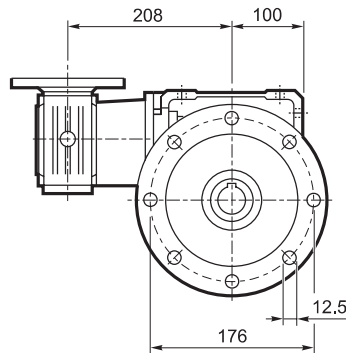
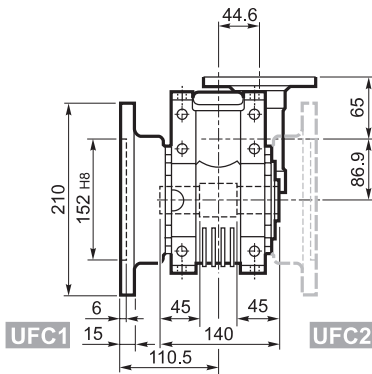
UF_



OUTPUT



UFC_



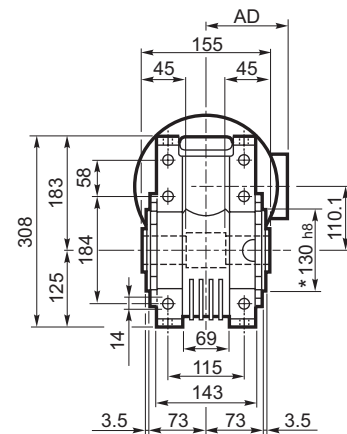
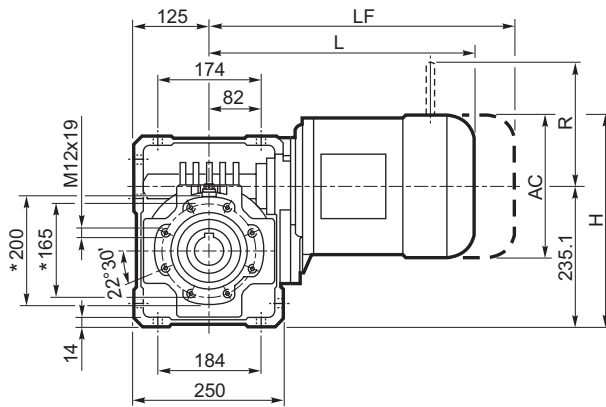
		M	M1	M2	N	N1	N2	N3	N4	Kg
		11	12.8	4	140	115	95	10	9.5	16.6
		14	16.3	5	160	130	110	10	9.5	
		11	12.8	4	90	75	60	8	5.5	
		14	16.3	5	105	85	70	10	7	

* On both sides

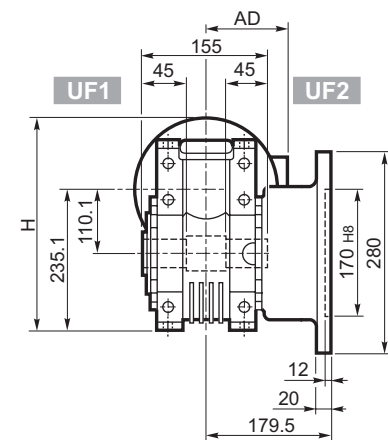
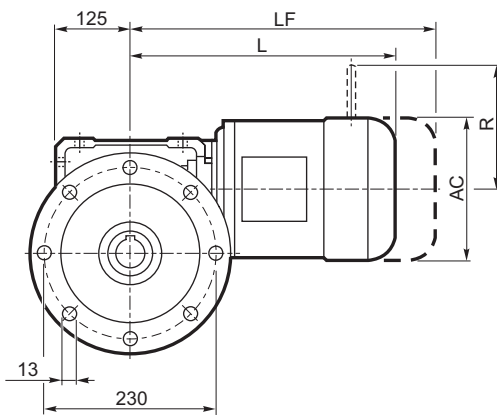


W 110...M/ME/MX

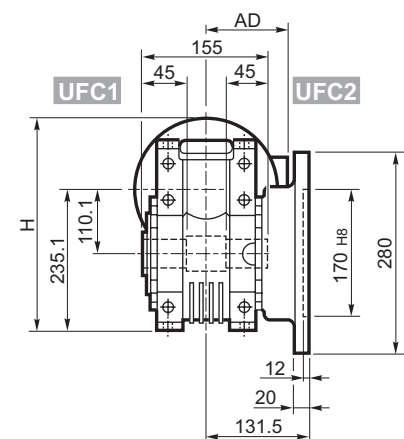
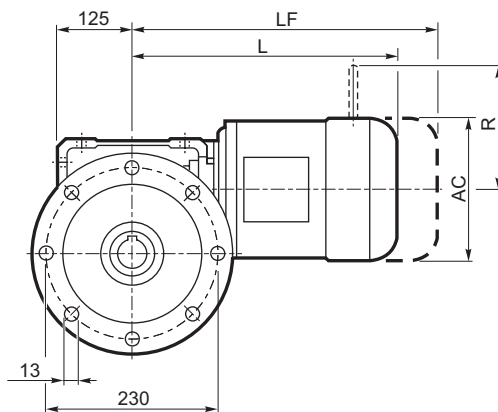
U



UF

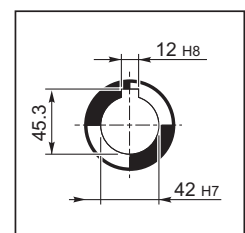


UFC



			M/ME/MX				Kg	M...FD M...FA		M...FD		M...FA	
			AC	H	L	AD		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	S2	MX2S	156	313	408	119	43.1	—	—	—	—	—	—
W 110	S3	ME3S	195	332	407	142	47.5	—	—	—	—	—	—
W 110	S3	MX3S	195	332	440	142	50.5	—	—	—	—	—	—
W 110	S3	ME3L	195	332	439	142	53	—	—	—	—	—	—
W 110	S3	MX3L	195	332	483	142	59	—	—	—	—	—	—

OUTPUT

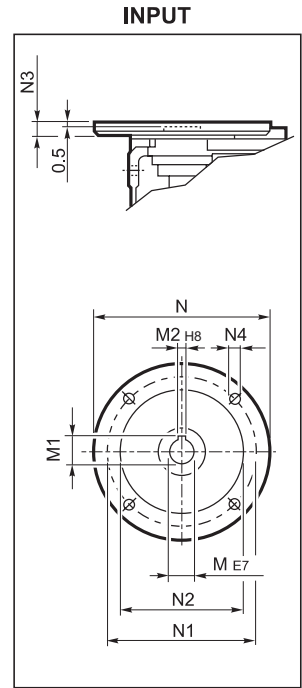
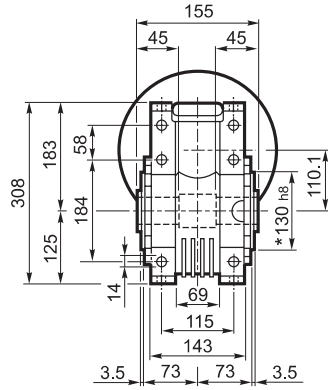
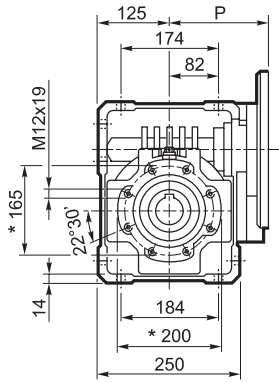


* On both sides

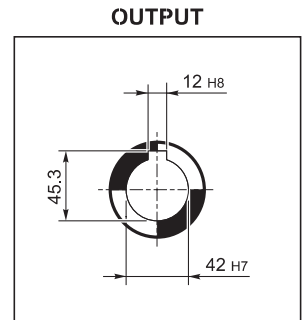
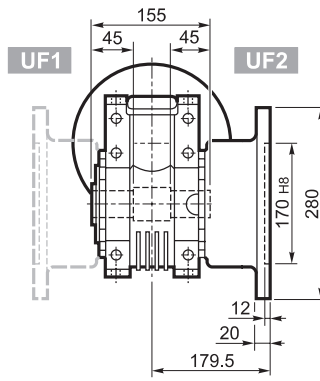
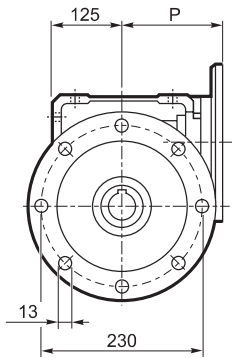


W 110...P (IEC)

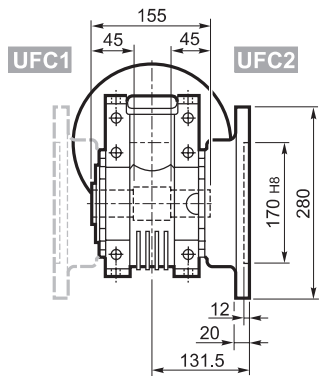
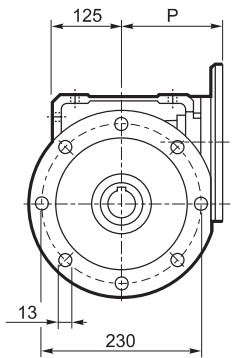
U



UF_



UFC_



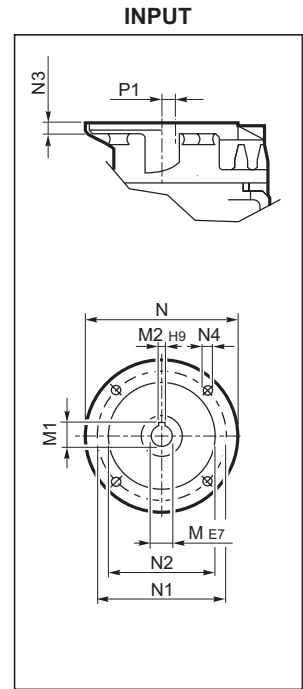
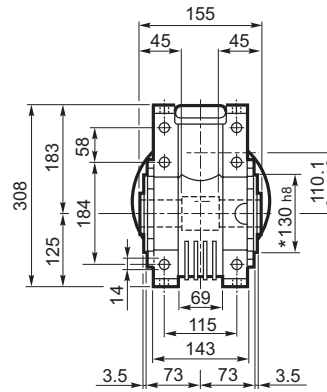
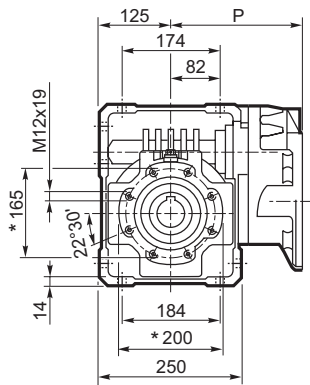
		M	M1	M2	N	N1	N2	N3	N4	P	
W 110	P80 B5	19	21.8	6	200	165	130	—	M10x12	143	28
W 110	P90 B5	24	27.3	8	200	165	130	—	M10x12	143	28
W 110	P100 B5	28	31.3	8	250	215	180	13	13	151	29
W 110	P112 B5	28	31.3	8	250	215	180	13	13	151	29
W 110	P132 B5	38	41.3	10	300	265	230	16	14	226	31
W 110	P80 B14	19	21.8	6	120	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

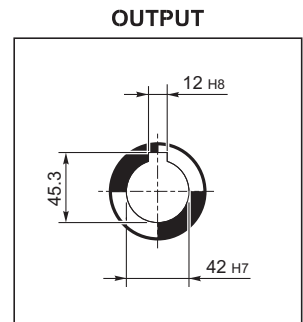
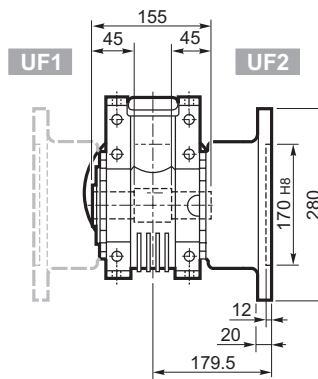
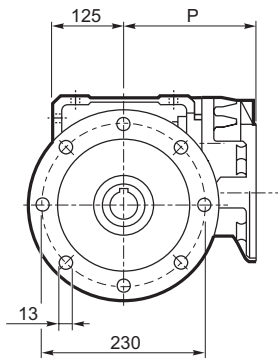


WR 110...P (IEC)

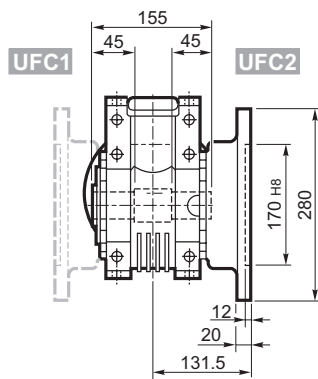
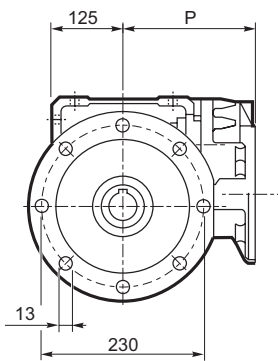
U



UF_



UFC_



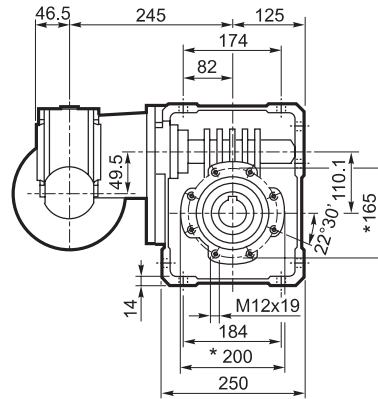
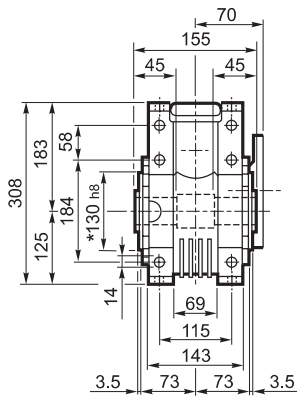
		M	M1	M2	N	N1	N2	N3	N4	P	P1	
WR 110	P71 B5	14	16.3	5	160	130	110	10	M8x14	185	58.6	30.5
WR 110	P80 B5	19	21.8	6	200	165	130	14	M10x15	204	21.1	31
WR 110	P90 B5	24	27.3	8	200	165	130	14	M10x15	204	21.1	31
WR 110	P100 B5	28	31.3	8	250	215	180	14	M12x13	213	21.1	32
WR 110	P112 B5	28	31.3	8	250	215	180	14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

* On both sides

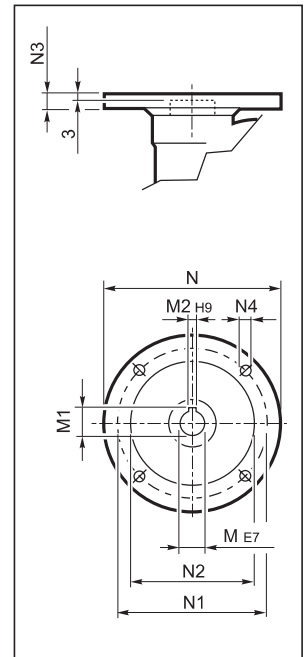


VF/W 49/110...P (IEC)

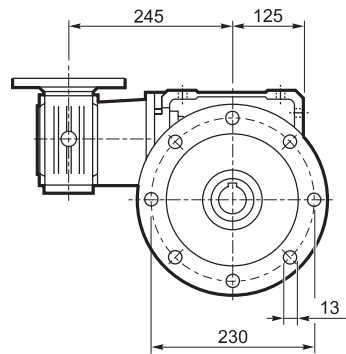
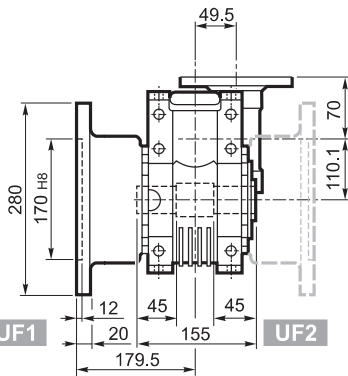
U



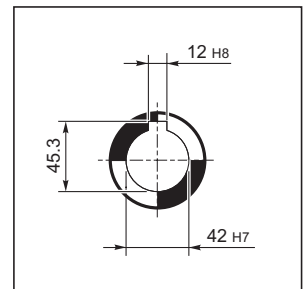
INPUT



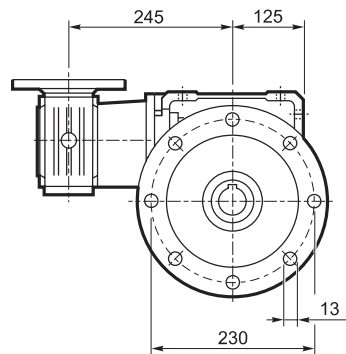
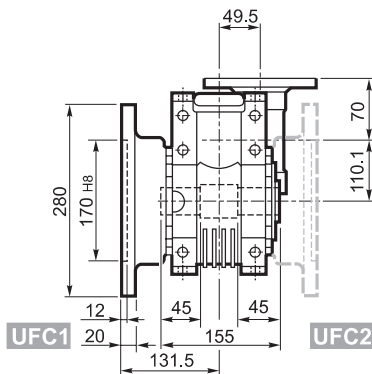
UF



OUTPUT



UFC



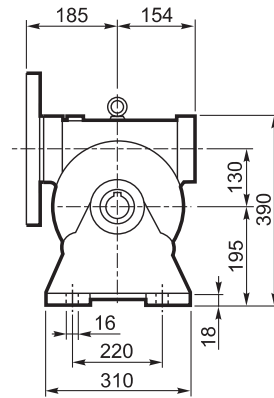
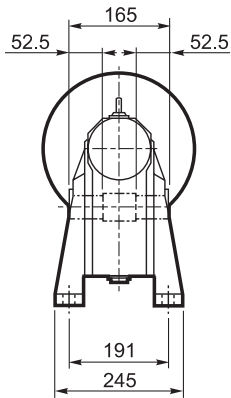
		M	M1	M2	N	N1	N2	N3	N4	
										33
VF/W 49/110	P63 B5	11	12.8	4	140	115	95	10.5	9.5	
VF/W 49/110	P71 B5	14	16.3	5	160	130	110	10.5	9.5	
VF/W 49/110	P80 B5	19	21.8	6	200	165	130	10	11.5	
VF/W 49/110	P63 B14	11	12.8	4	90	75	60	7	6	
VF/W 49/110	P71 B14	14	16.3	5	105	85	70	10.5	6.5	
VF/W 49/110	P80 B14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

* On both sides

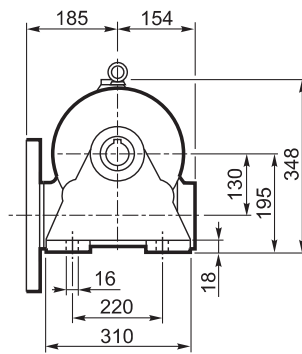
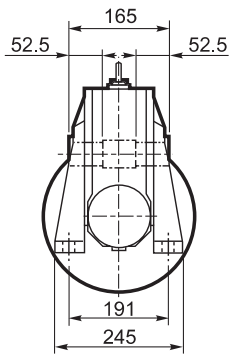


VF 130...P (IEC)

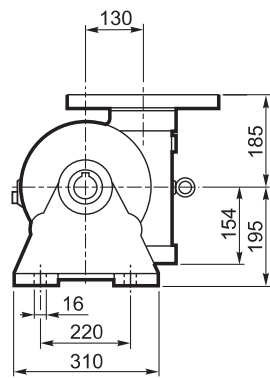
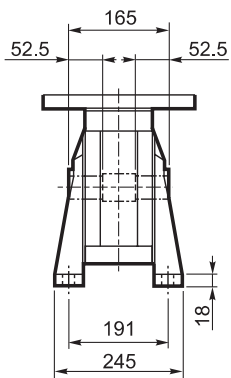
A



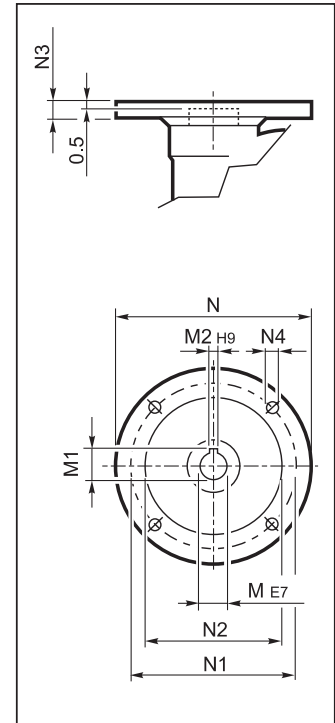
N



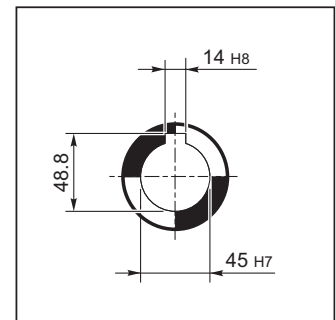
V



INPUT

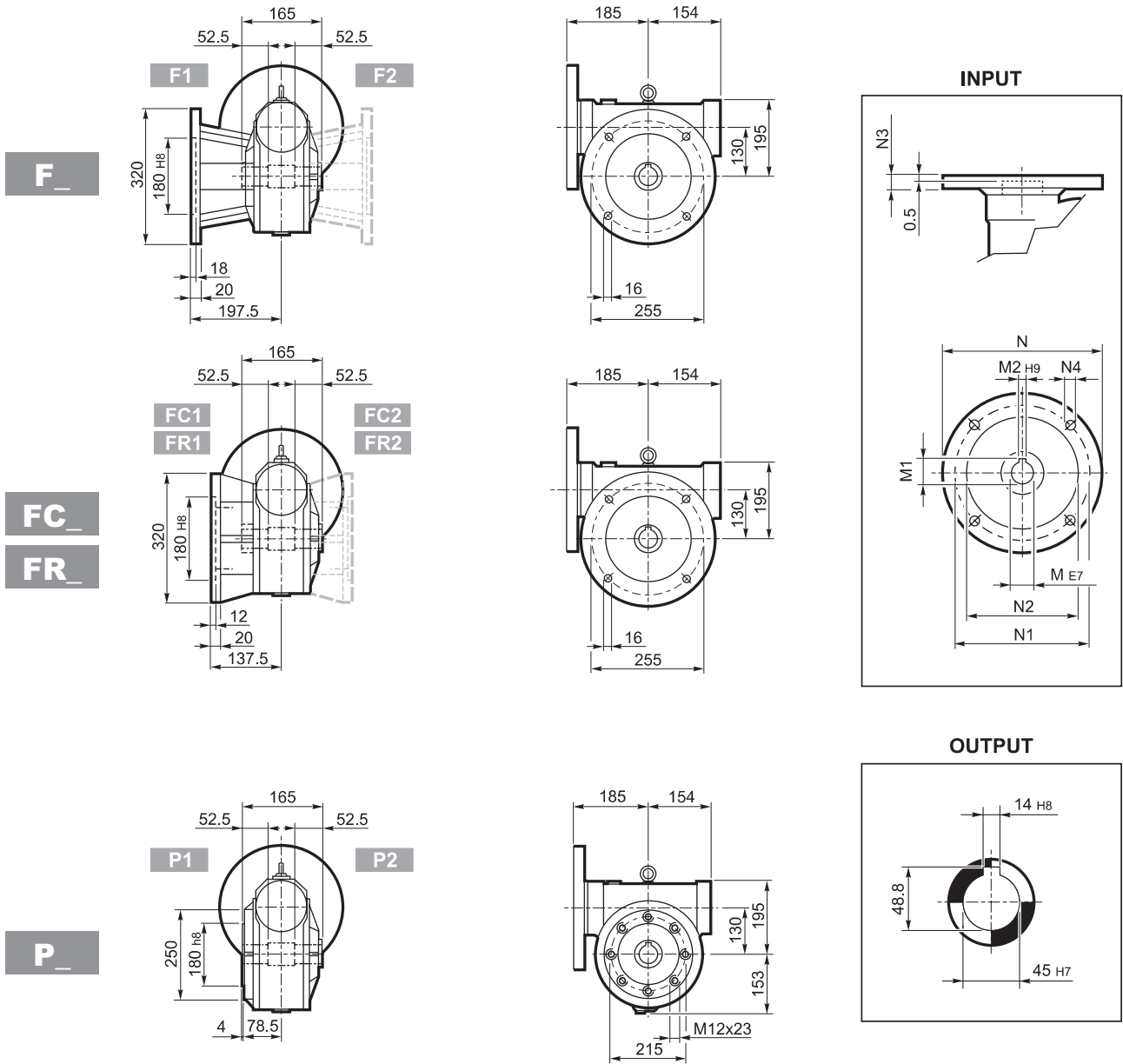





OUTPUT





VF 130...P (IEC)



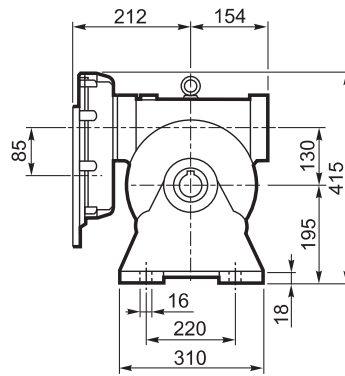
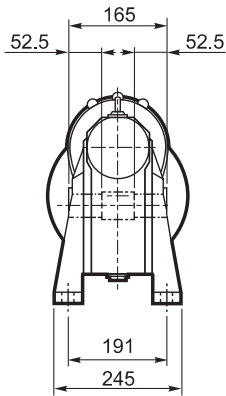
		M	M1	M2	N	N1	N2	N3	N4	 Kg
VF130	P90 B5	24	27.3	8	200	165	130	17	11	49
VF130	P100 B5	28	31.3	8	250	215	180	17	13	
VF130	P112 B5	28	31.3	8	250	215	180	17	13	
VF130	P132 B5	38	40.1#	10	300	265	230	17	13	

Lowered key

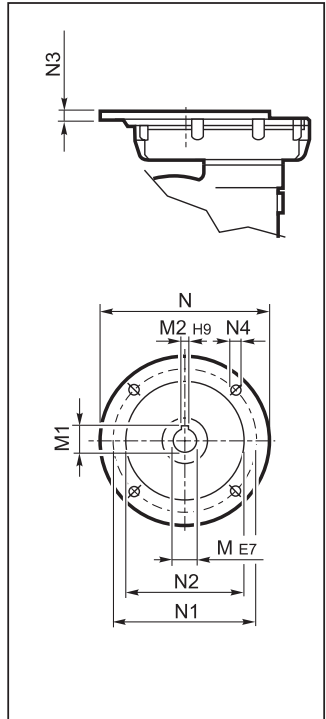


VFR 130...P (IEC)

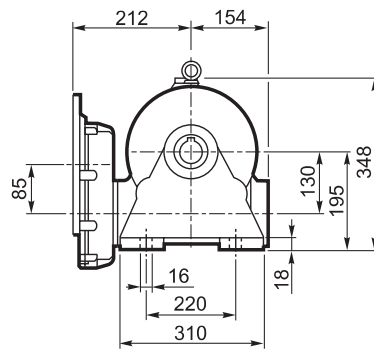
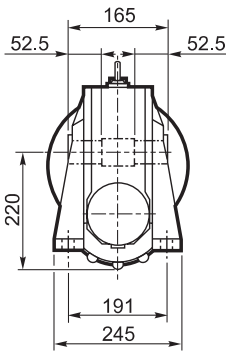
A



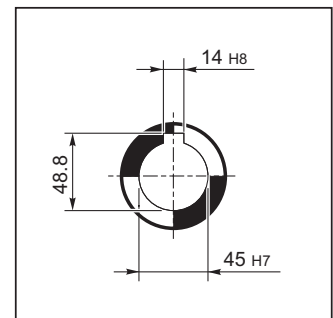
INPUT



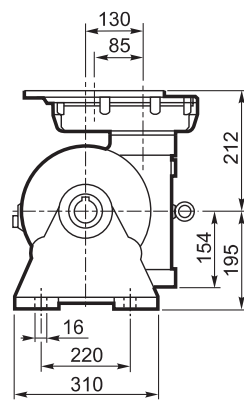
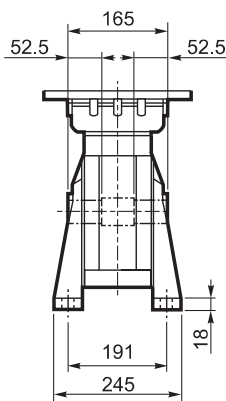
N



OUTPUT

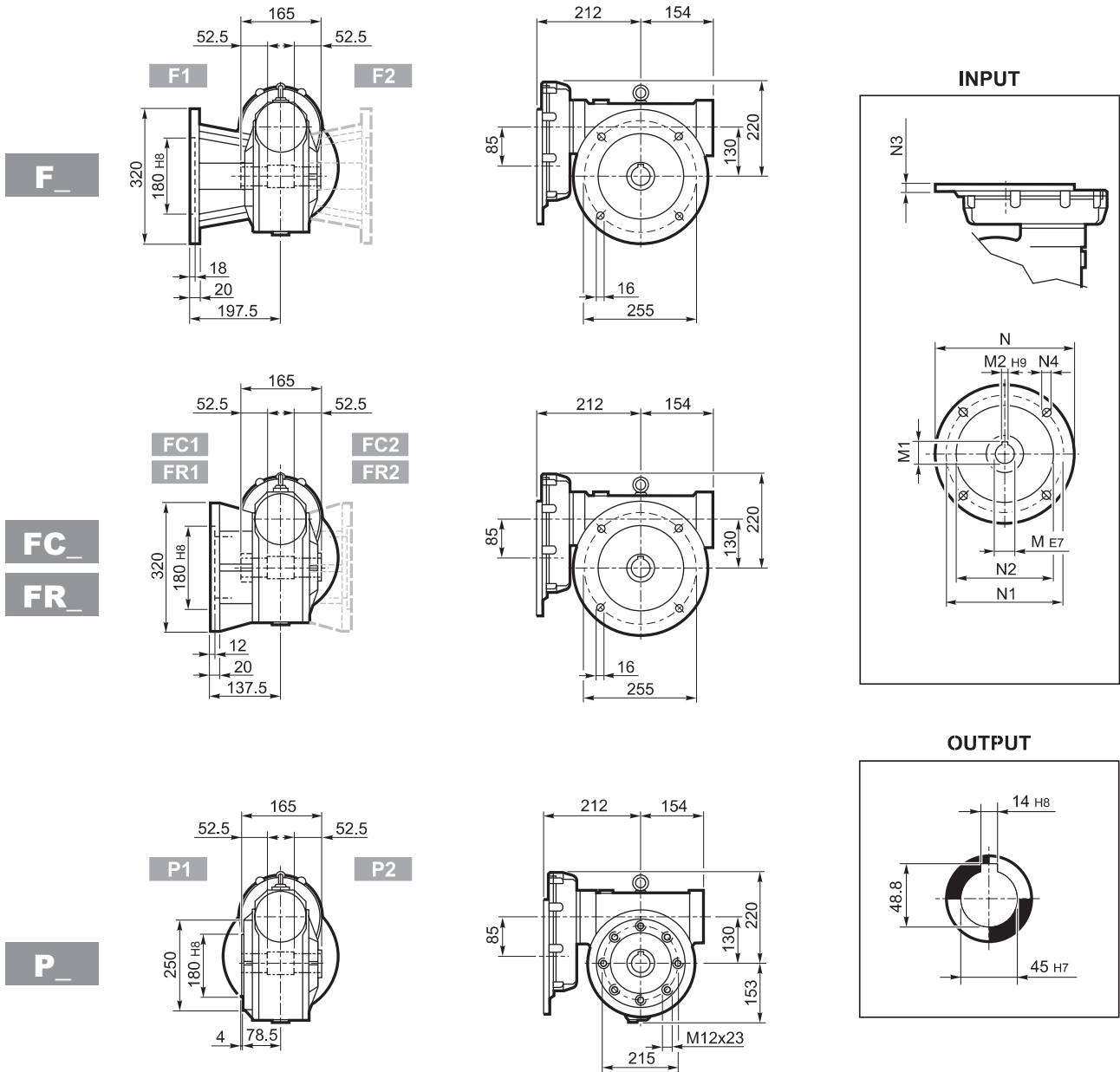





V





VFR 130...P (IEC)



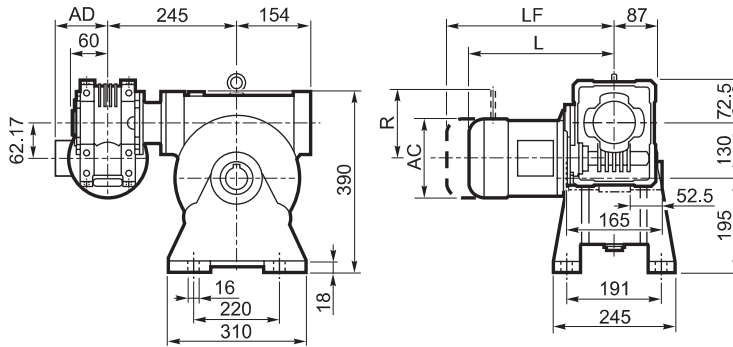
		M	M1	M2	N	N1	N2	N3	N4	
VFR 130	P80 B5	19 K6	21.8	6	200	165	130	12	M10x25	57
VFR 130	P90 B5	24 K6	27.3	8	200	165	130	12	M10x25	
VRF 130	P100 B5	28 J6	29.1#	8	250	215	180	13	M12x35	
VRF 130	P112 B5	28 J6	29.1#	8	250	215	180	13	M12x35	

Lowered key



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

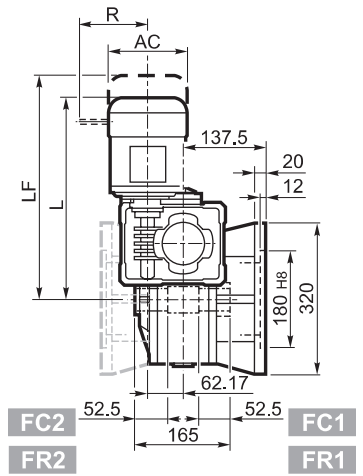
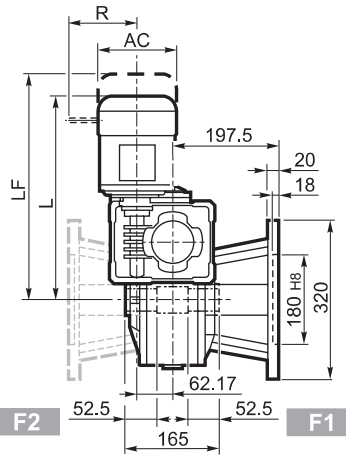
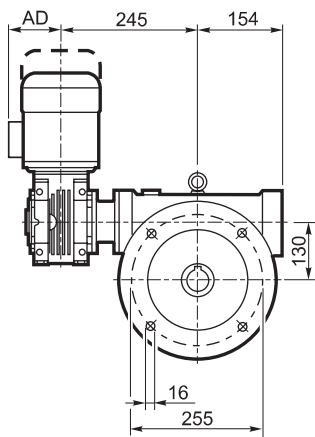
A



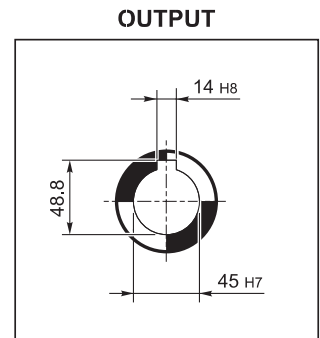
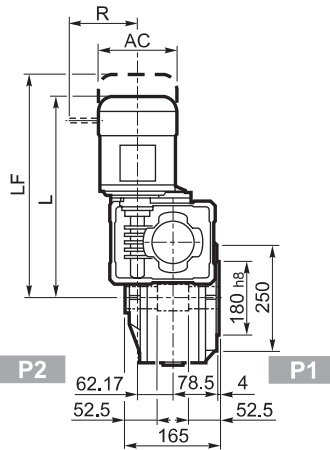
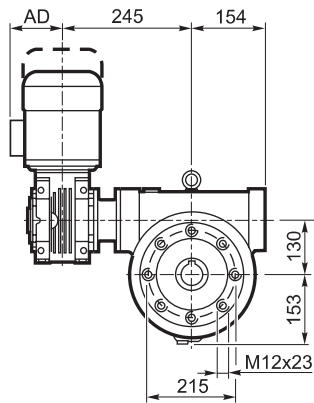
F_

FC_

FR_



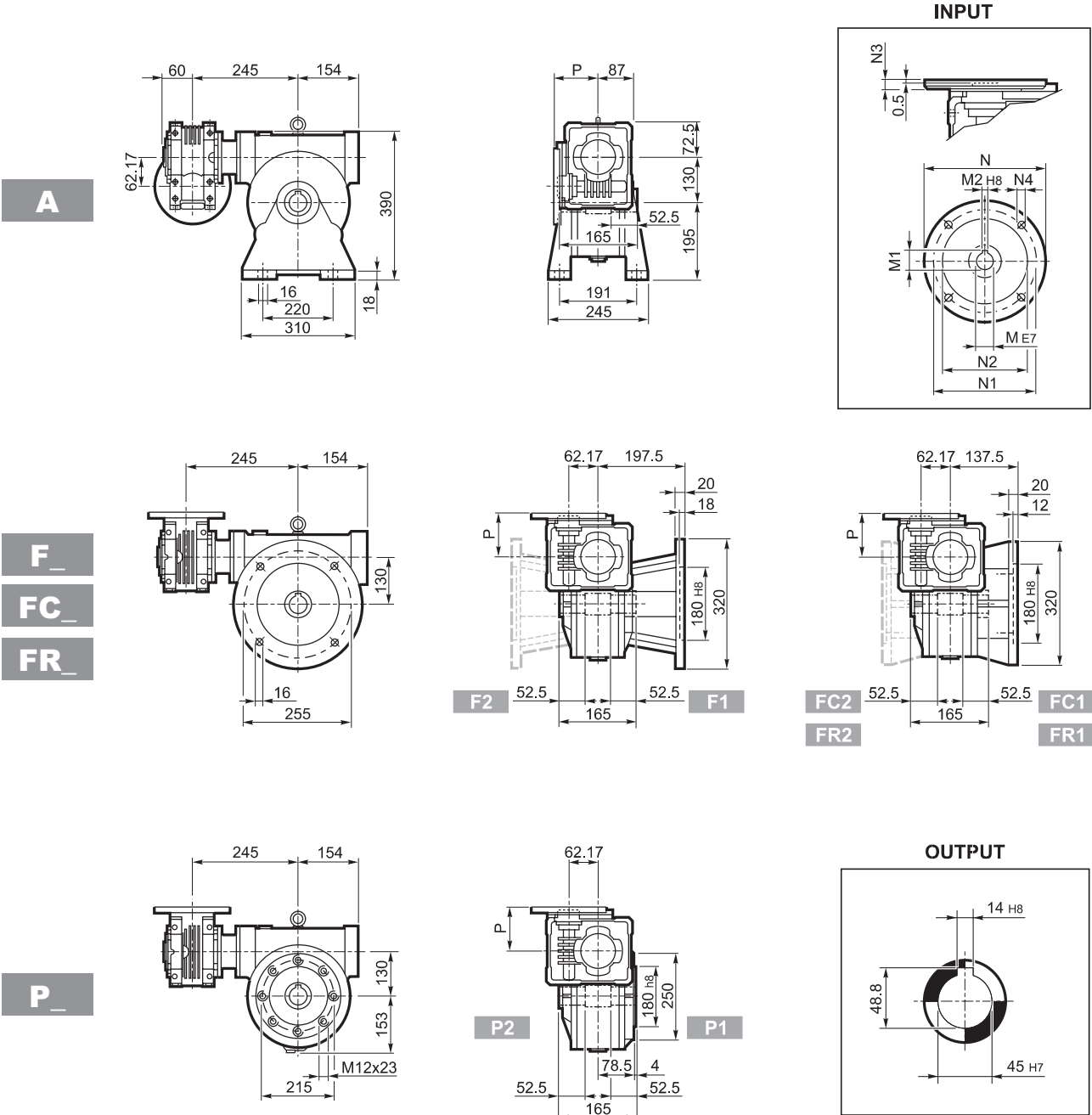
P_






			M/ME/MX				M...FD M...FA		M...FD		M...FA	
			AC	L	AD	Kg	LF	Kg	R	AD	R	AD
			138	419	108	63	480	65	103	135	124	108
W/VF 63/130	S2	ME2S	156	447	119	68	—	—	—	—	—	—
W/VF 63/130	S2	MX2S	156	491	119	73.1	—	—	—	—	—	—



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

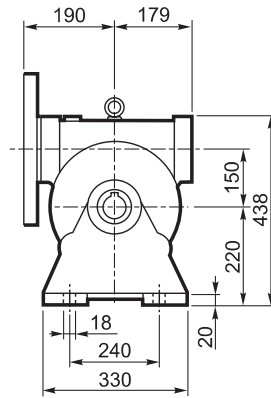
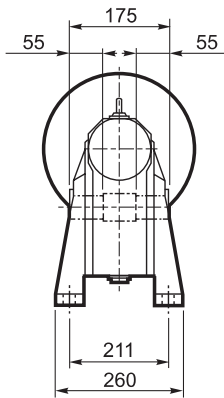


		M	M1	M2	N	N1	N2	N3	N4	P	
W/VF 63/130	P71 B5	14	16.3	5	160	130	110	11	9	95	57
W/VF 63/130	P80 B5	19	21.8	6	200	165	130	12	11.5	102	
W/VF 63/130	P90 B5	24	27.3	8	200	165	130	12	11.5	102	
W/VF 63/130	P71 B14	14	16.3	5	105	85	70	11	6.5	95	
W/VF 63/130	P80 B14	19	21.8	6	120	100	80	11	6.5	102	
W/VF 63/130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

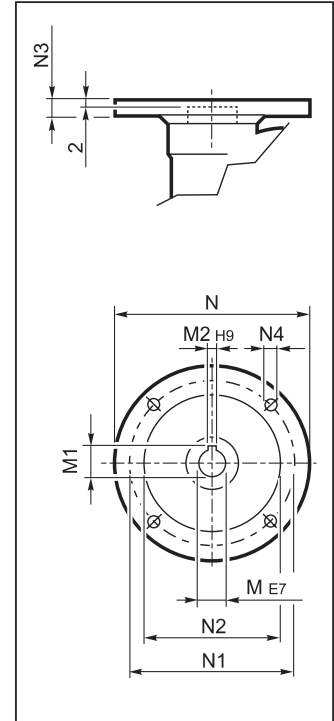


VF 150...P (IEC)

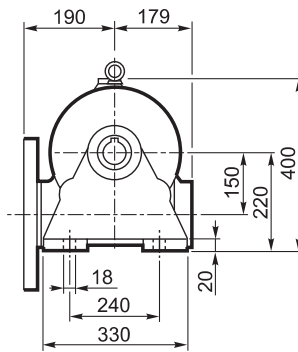
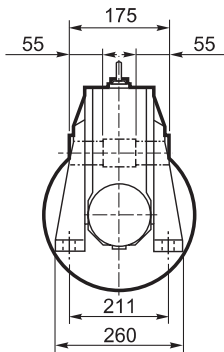
A



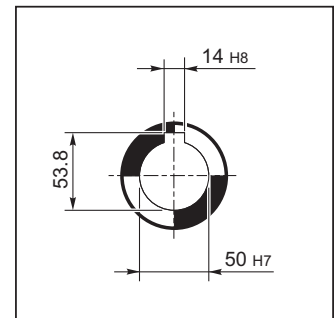
INPUT



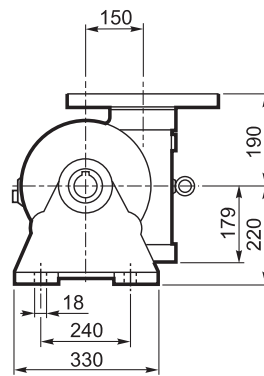
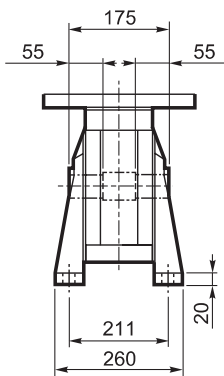
N



OUTPUT

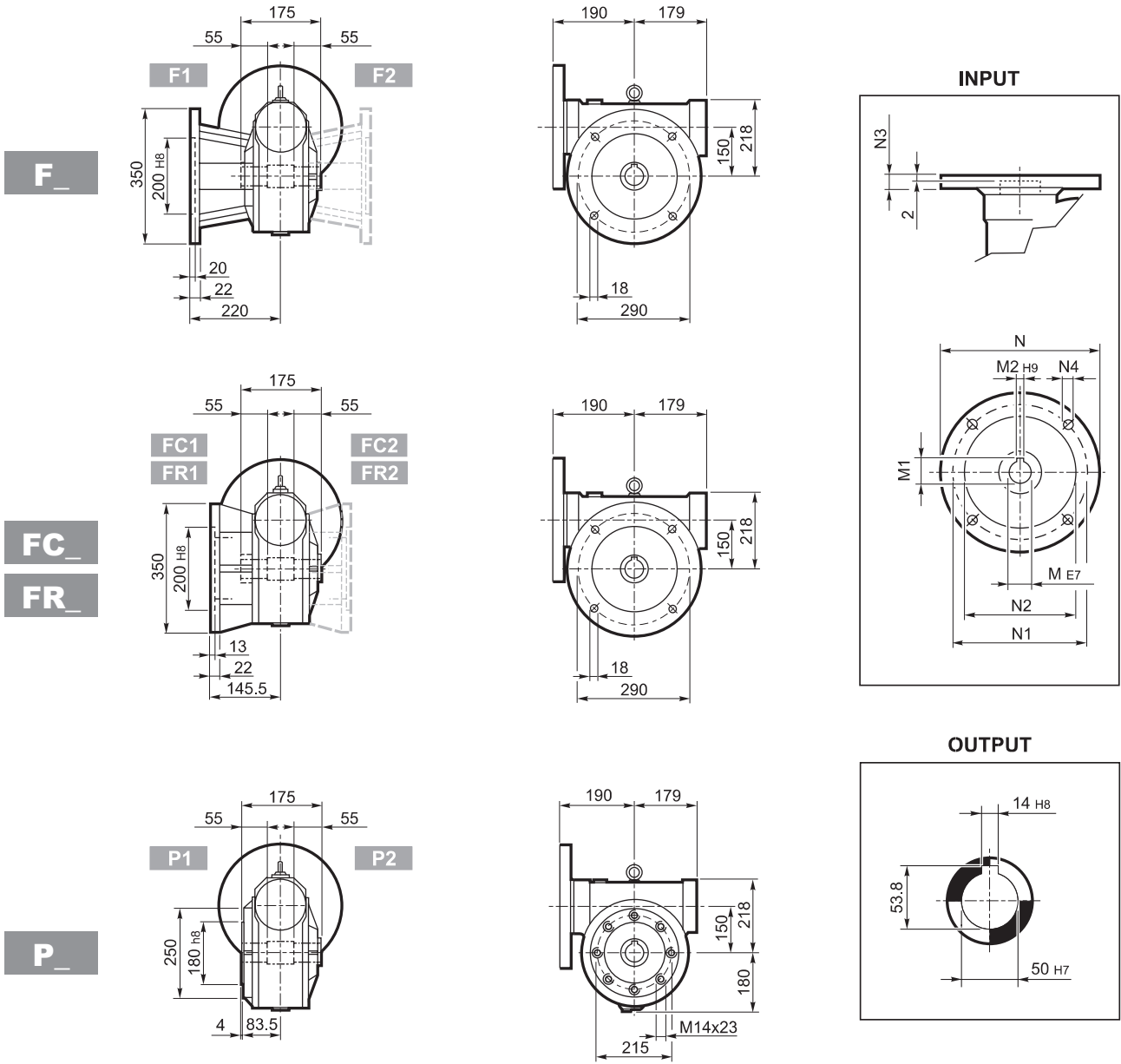





V





VF 150...P (IEC)



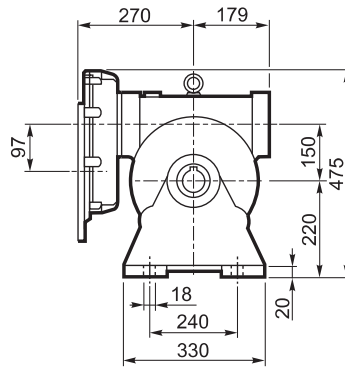
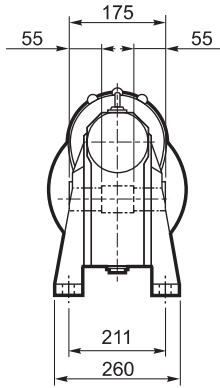
		M	M1	M2	N	N1	N2	N3	N4	
VF 150	P100 B5	28	31.3	8	250	215	180	11	13	60
VF 150	P112 B5	28	31.3	8	250	215	180	11	13	
VF 150	P132 B5	38	41.3	10	300	265	230	16	13	
VF 150	P160 B5	42	44.6#	12	350	300	250	18	18	

Lowered key

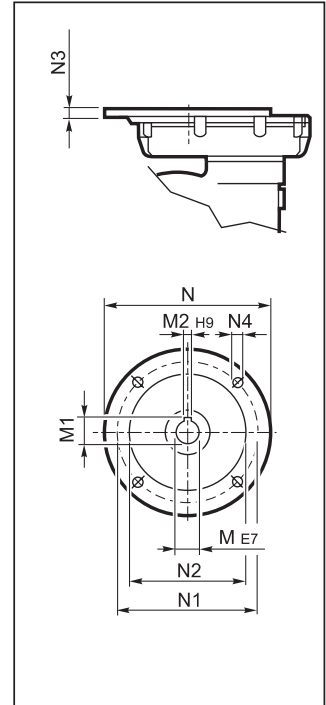


VFR 150...P (IEC)

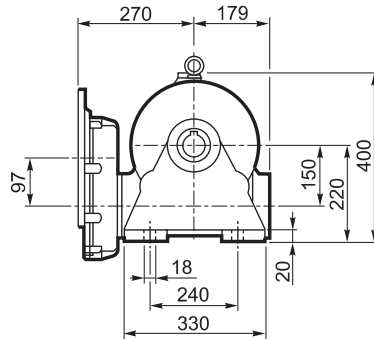
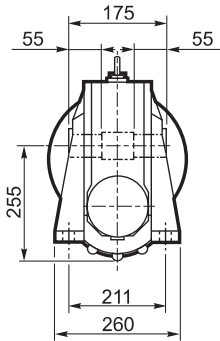
A



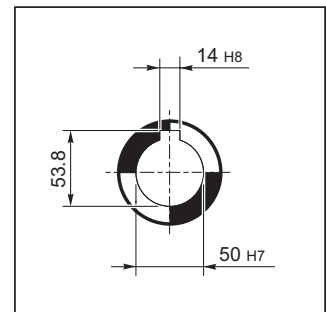
INPUT



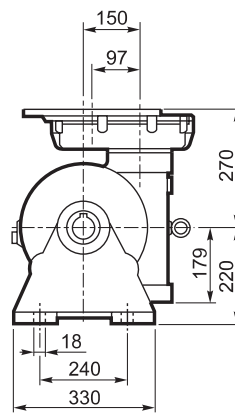
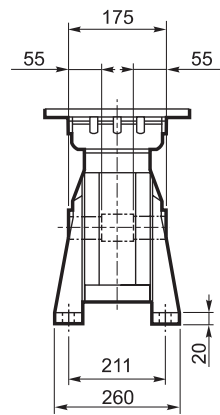
N



OUTPUT

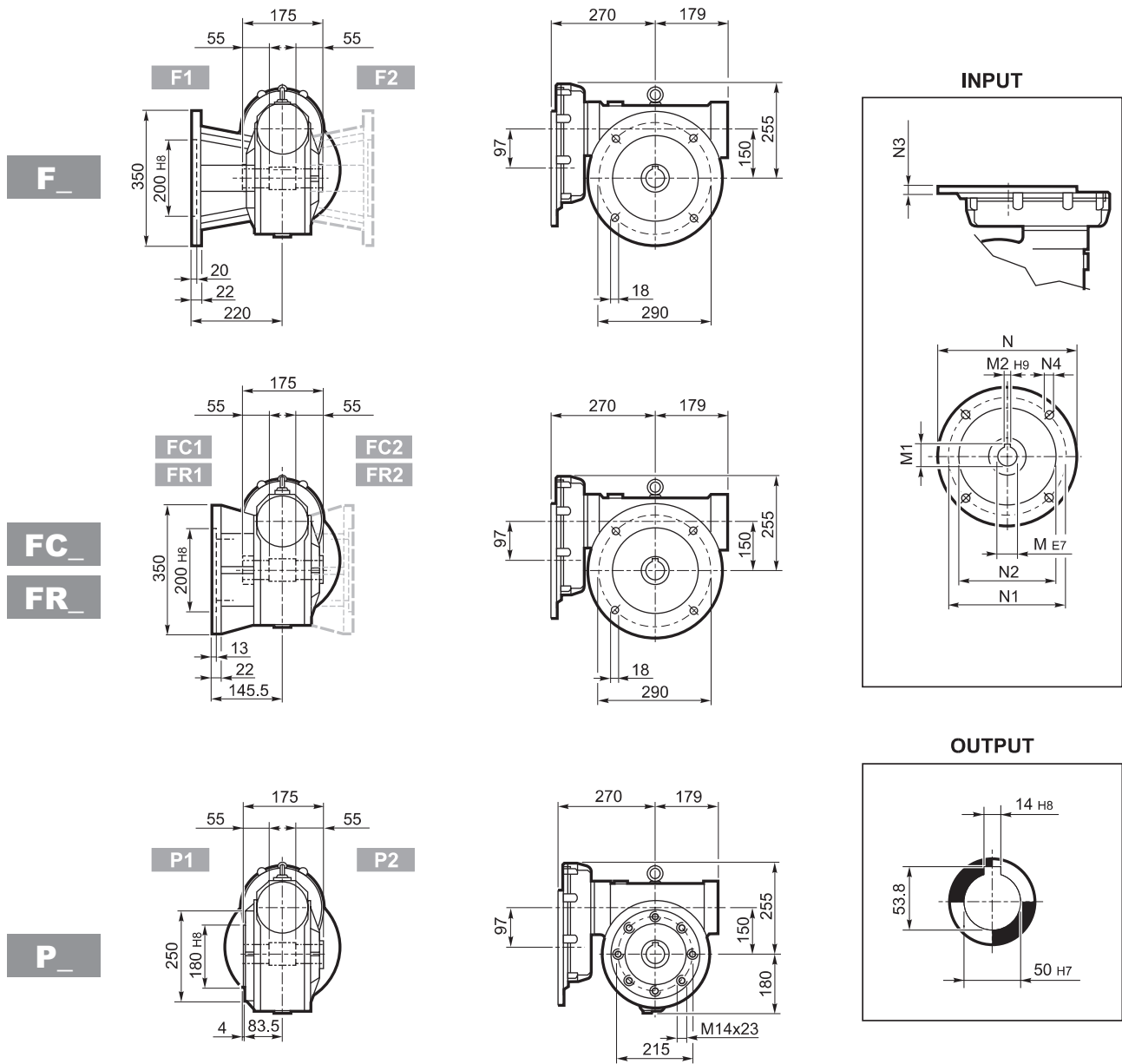





V





VFR 150...P (IEC)



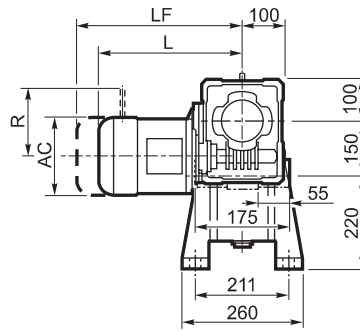
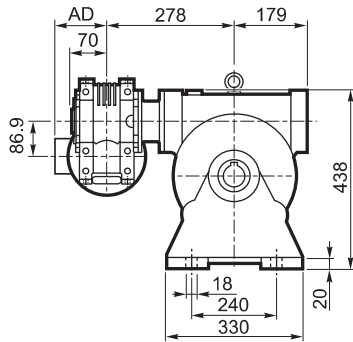
		M	M1	M2	N	N1	N2	N3	N4	
VFR 150	P90 B5	24 K6	27.3	8	200	165	130	13	M10x25	71
VRF 150	P100 B5	28 K6	31.3	8	250	215	180	13	M12x35	
VRF 150	P112 B5	28 J6	31.3	8	250	215	180	13	M12x35	
VFR 150	P132 B5	38 J6	39.6#	10	300	265	230	13	M12x35	

Lowered key



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

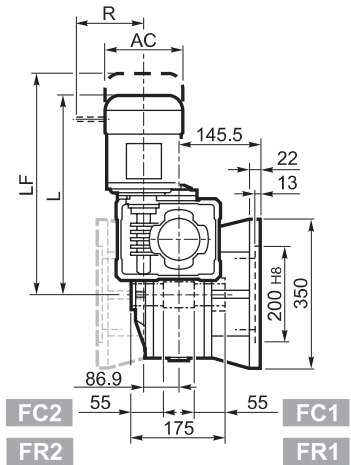
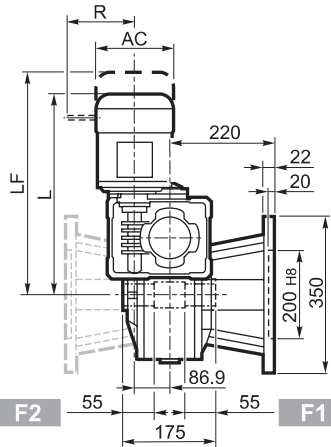
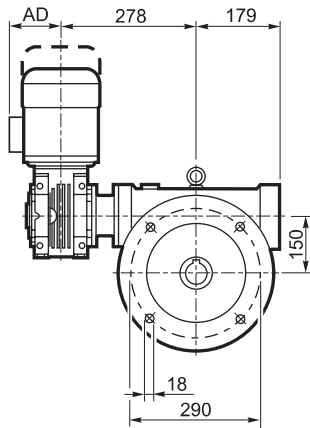
A



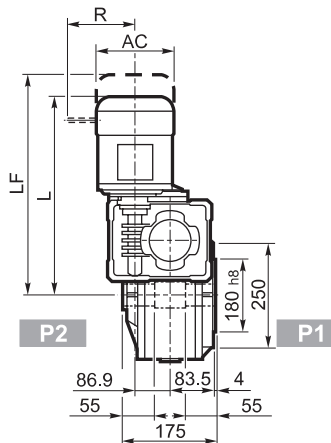
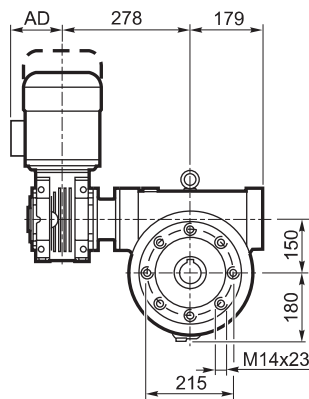
F_

FC_

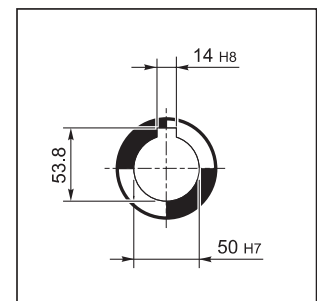
FR_



P_



OUTPUT

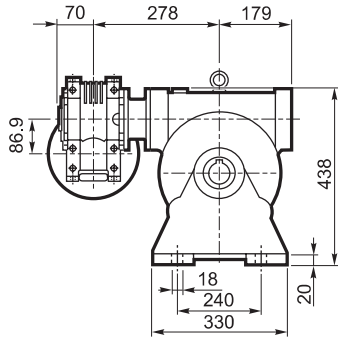


			M/ME/MX				M...FD M...FA		M...FD		M...FA	
			AC	L	AD	Kg	LF	Kg	R	AD	R	AD
W/VF 86/150	S1	M1	138	474	108	82	385	84	103	135	124	108
W/VF 86/150	S2	ME2S	156	499	119	86	—	—	—	—	—	—
W/VF 86/150	S2	MX2S	156	543	119	91.1	—	—	—	—	—	—
W/VF 86/150	S3	ME3S	195	542	142	92.5	—	—	—	—	—	—
W/VF 86/150	S3	MX3S	195	574	142	95.5	—	—	—	—	—	—
W/VF 86/150	S3	ME3L	195	574	142	98	—	—	—	—	—	—
W/VF 86/150	S3	MX3L	195	618	142	104	—	—	—	—	—	—

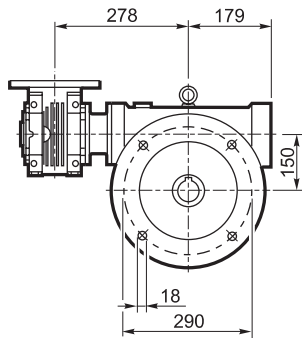
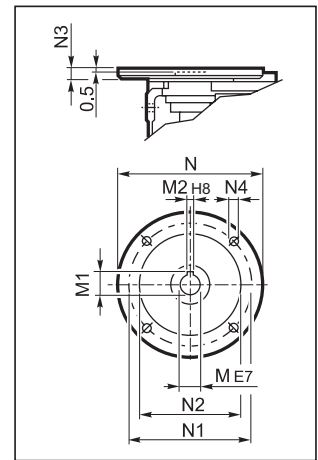
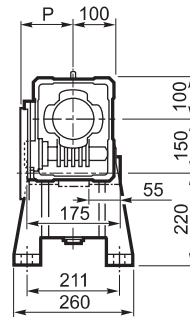


W/VF 86/150...P (IEC)

INPUT



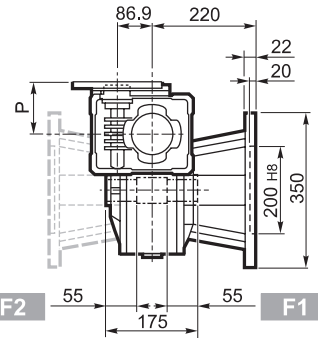
A



F

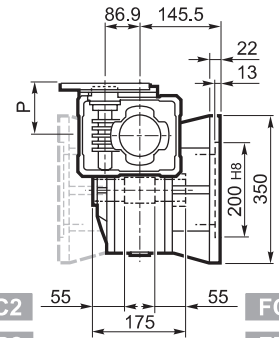
FC

FR



F2

F1

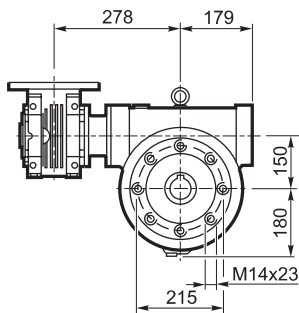


FC2

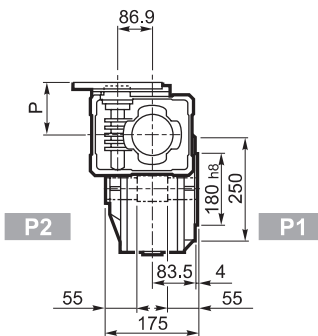
FC1

FR2

FR1



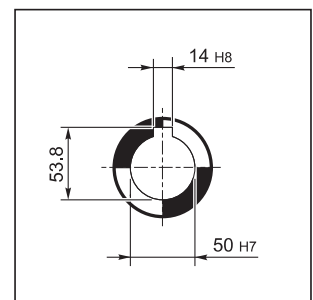
P



P2

P1

OUTPUT

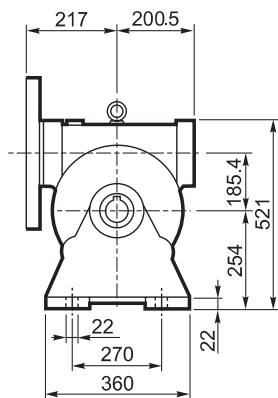
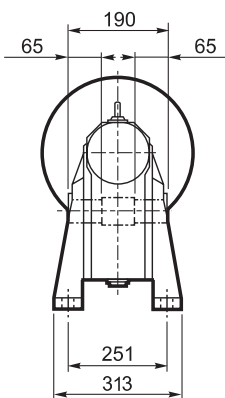


		M	M1	M2	N	N1	N2	N3	N4	P	
W/VF 86/150	P71 B5	14	16.3	5	160	130	110	11	9	128	75
W/VF 86/150	P80 B5	19	21.8	6	200	165	130	12	11.5	128	
W/VF 86/150	P90 B5	24	27.3	8	200	165	130	12	11.5	128	
W/VF 86/150	P100 B5	28	31.3	8	250	215	180	13	12.5	136	
W/VF 86/150	P112 B5	28	31.3	8	250	215	180	13	12.5	136	
W/VF 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	

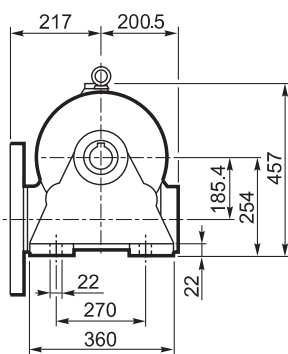
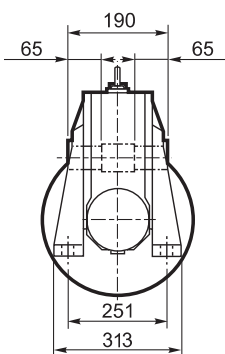


VF 185...P (IEC)

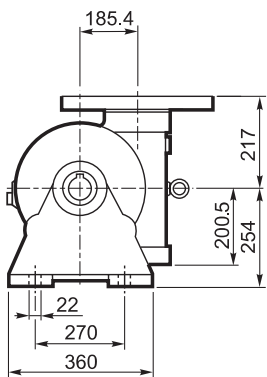
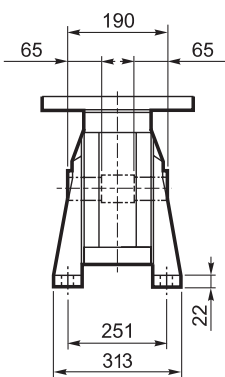
A



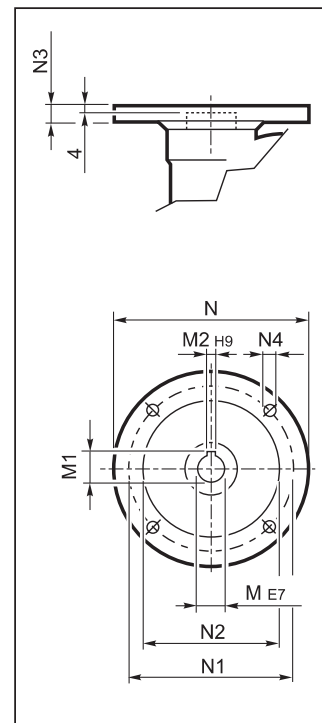
N



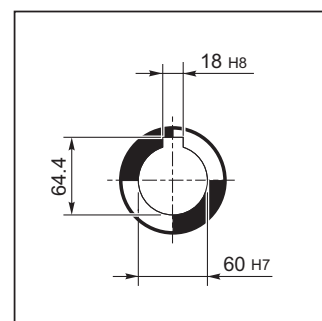
V



INPUT

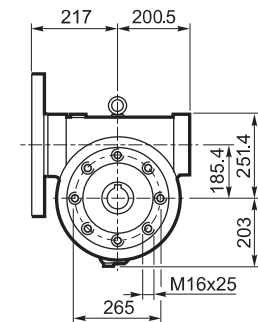
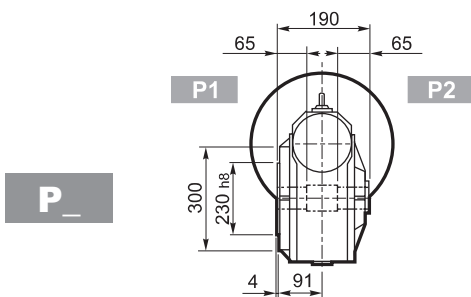
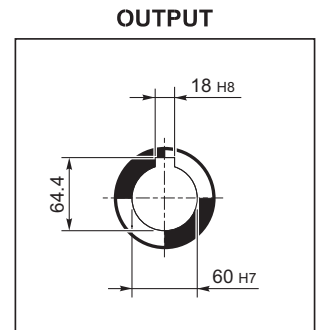
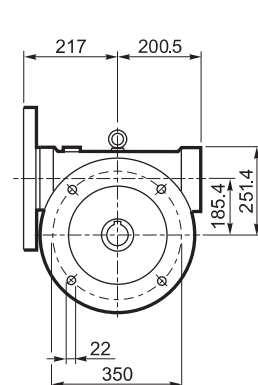
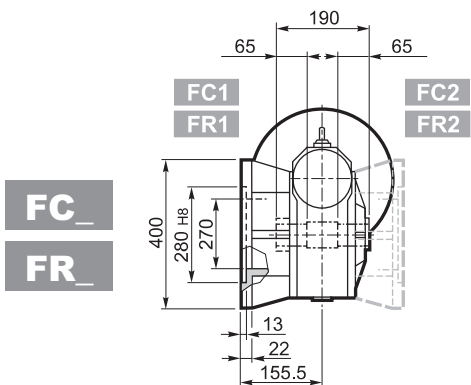
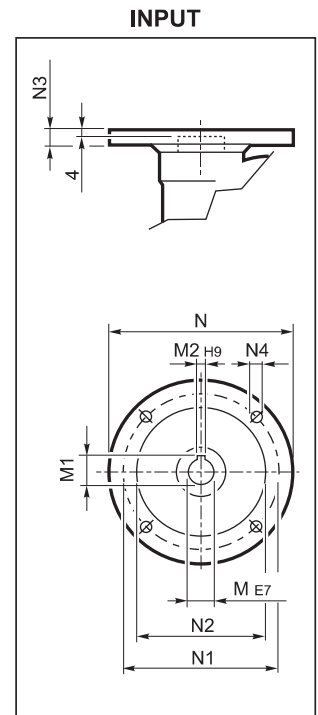
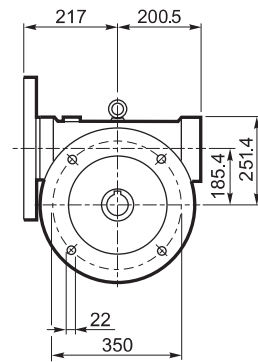
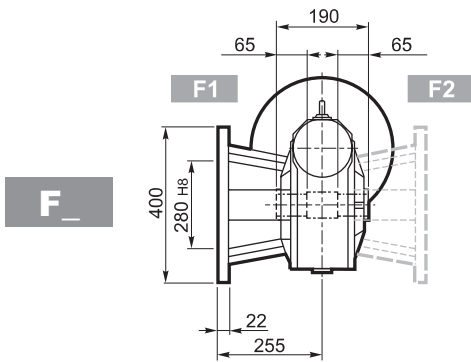


OUTPUT





VF 185...P (IEC)



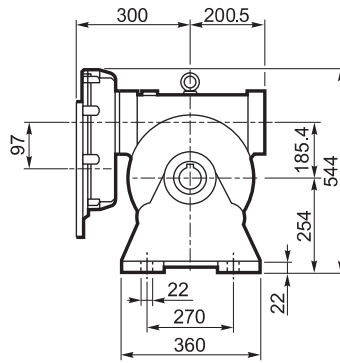
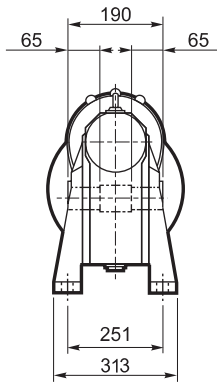
		M	M1	M2	N	N1	N2	N3	N4	
VF 185	P100 B5	28	31.3	8	250	215	180	16	13	94
VF 185	P112 B5	28	31.3	8	250	215	180	16	13	
VF 185	P132 B5	38	41.3	10	300	265	230	16	13	
VF 185	P160 B5	42	45.3	12	350	300	250	18	18	
VF 185	P180 B5	48	51.2#	14	350	300	250	18	18	

Lowered key

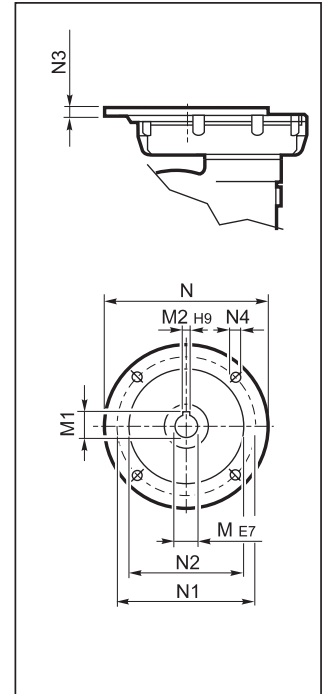


VFR 185...P (IEC)

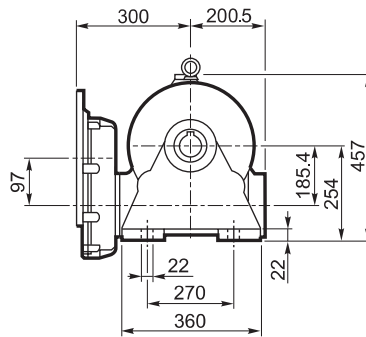
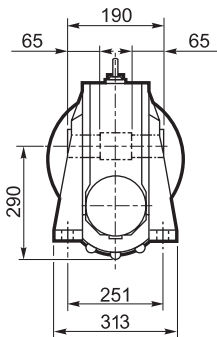
A



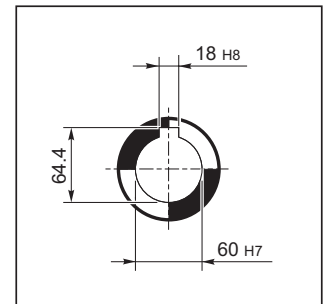
INPUT



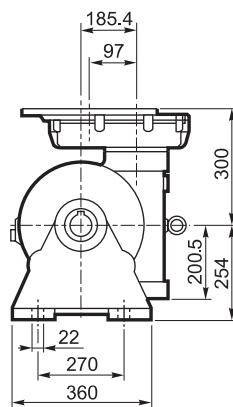
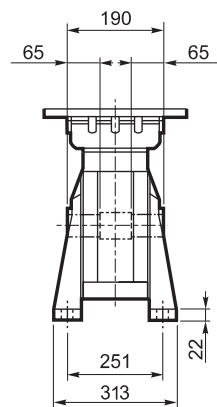
N



OUTPUT

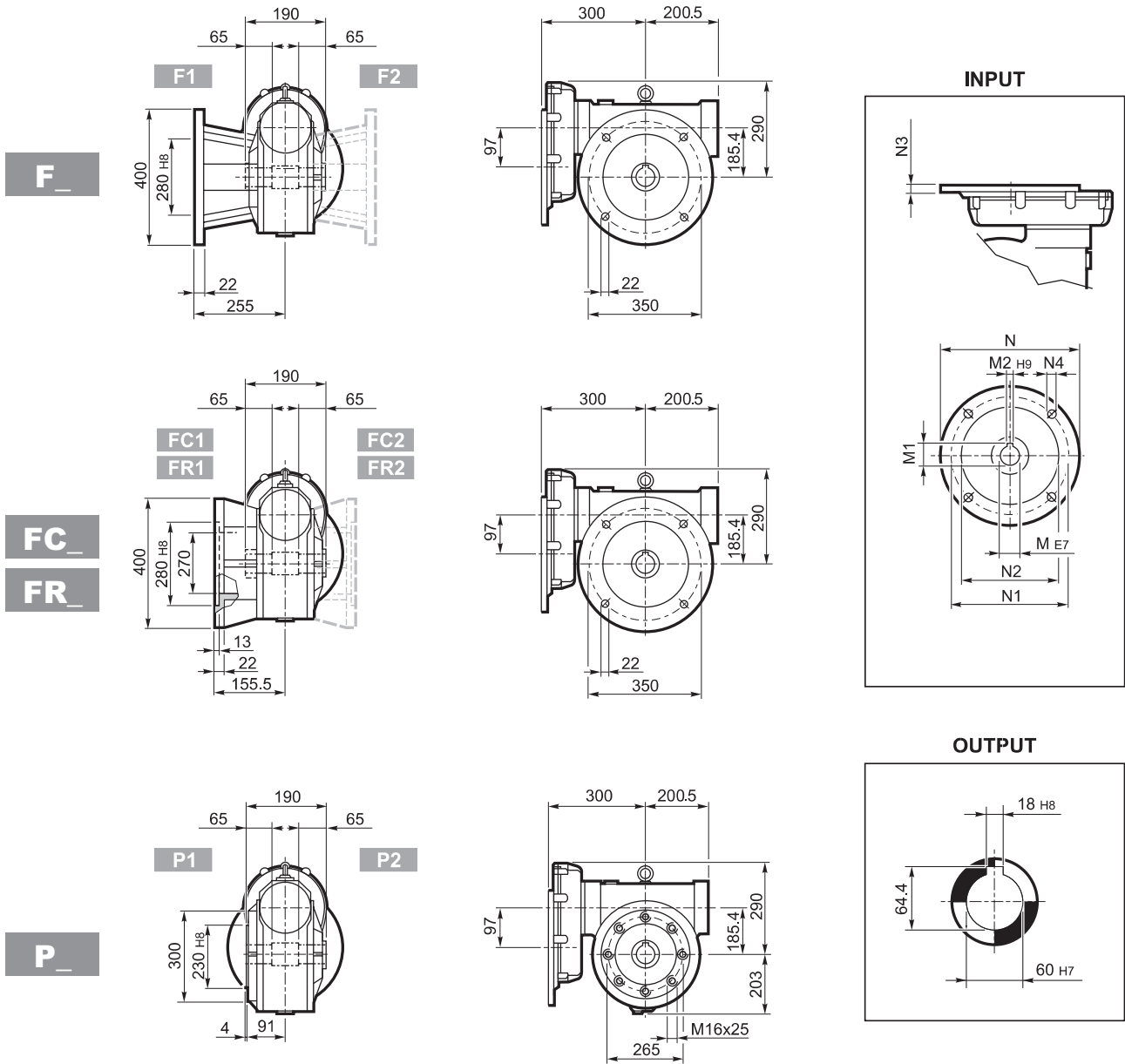





V





VFR 185...P (IEC)

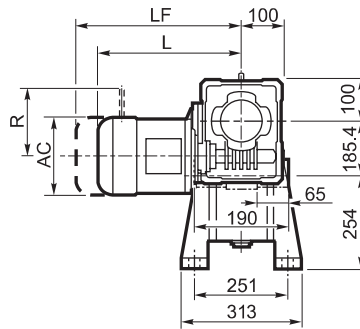
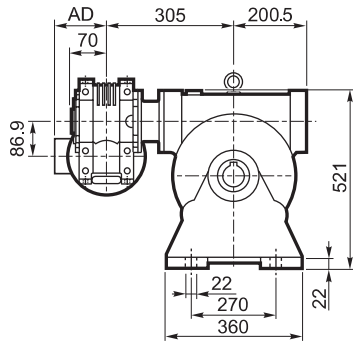


		M	M1	M2	N	N1	N2	N3	N4	 Kg
VFR 185	P90 B5	24 K6	27.3	8	200	165	130	13	M10x25	110
VRF 185	P100 B5	28 K6	31.3	8	250	215	180	13	M12x35	
VRF 185	P112 B5	28 K6	31.3	8	250	215	180	13	M12x35	
VFR 185	P132 B5	38 J6	39.6#	10	300	265	230	13	M12x35	

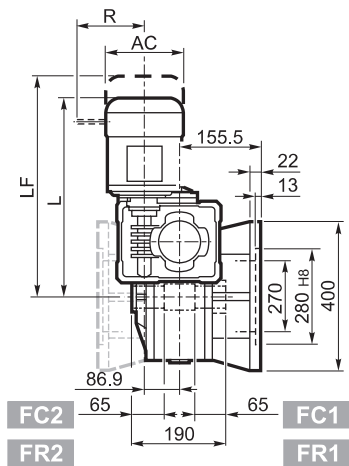
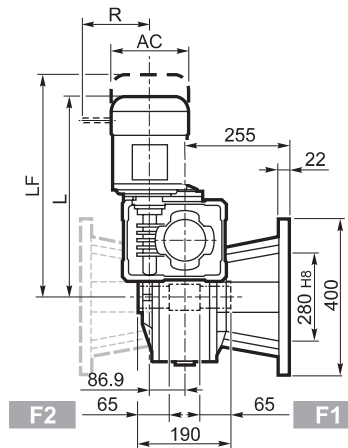
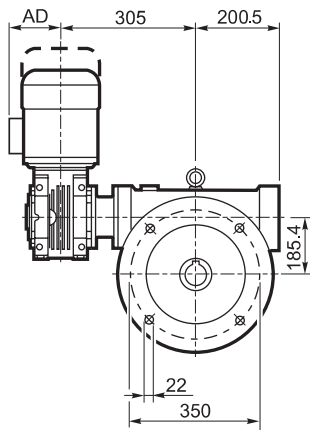
Lowered key



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



A



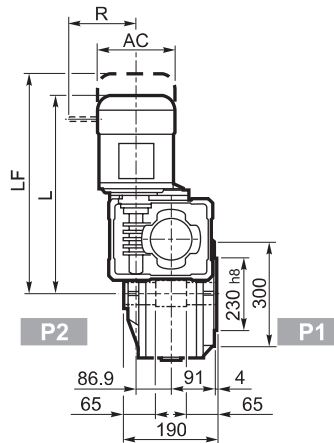
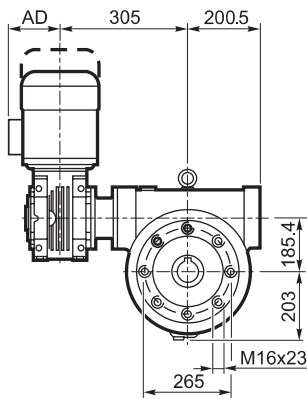
F_

FC_

FR_

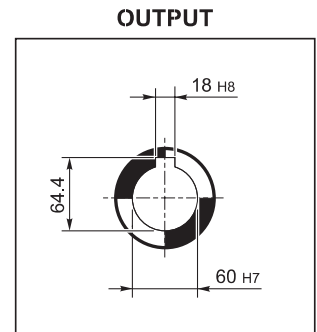
F2 **F1**

FC2 **FC1**
FR2 **FR1**



P_

P2 **P1**



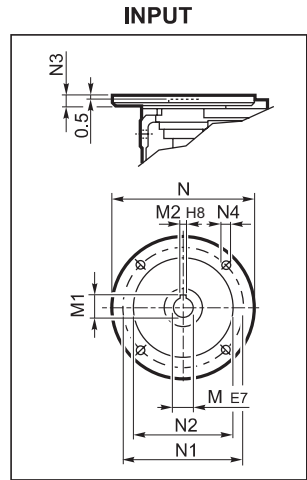
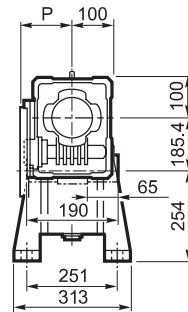
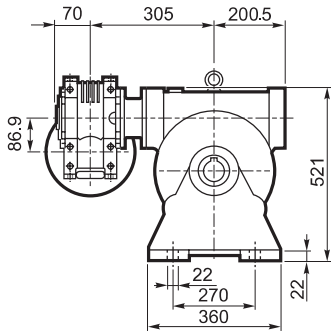
OUTPUT

			M/ME/MX				M...FD M...FA		M...FD		M...FA	
			AC	L	AD	Kg	LF	Kg	R	AD	R	AD
			138	509	108	116	570	118	103	135	124	108
W/VF 86/185	S2	ME2S	156	534	119	120	—	—	—	—	—	—
W/VF 86/185	S2	MX2S	156	578	119	125.1	—	—	—	—	—	—
W/VF 86/185	S3	ME3S	195	577	142	126.5	—	—	—	—	—	—
W/VF 86/185	S3	MX3S	195	609	142	129.5	—	—	—	—	—	—
W/VF 86/185	S3	ME3L	195	609	142	132	—	—	—	—	—	—
W/VF 86/185	S3	MX3L	195	653	142	138	—	—	—	—	—	—



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

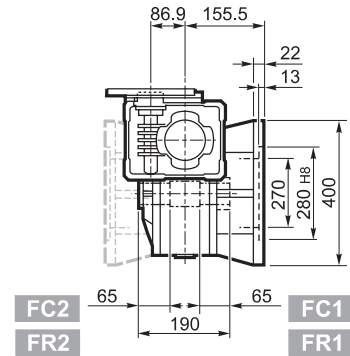
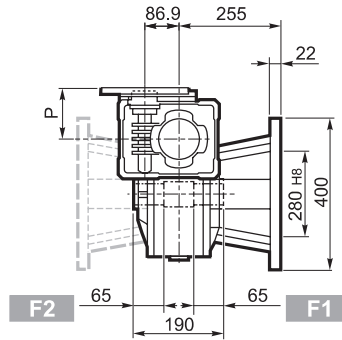
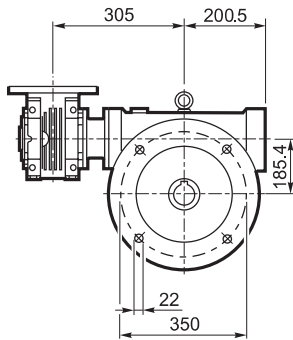
A



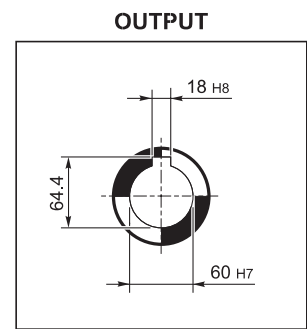
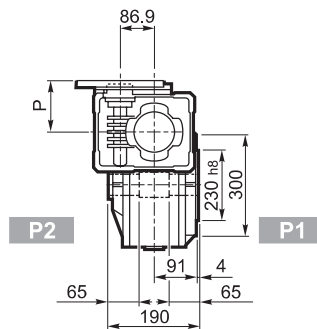
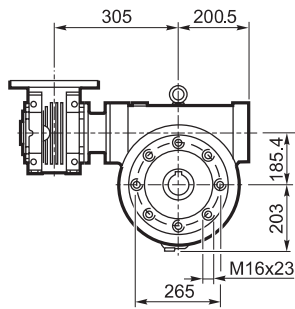
F_

FC_

FR_



P_

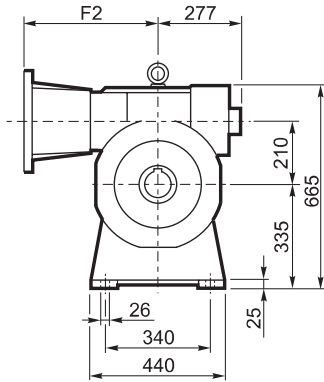
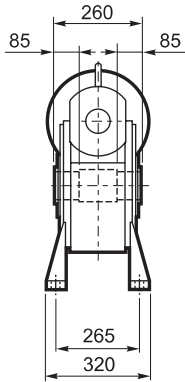


		M	M1	M2	N	N1	N2	N3	N4	P	
W/VF 86/185	P71 B5	14	16.3	5	160	130	110	11	9	128	109
W/VF 86/185	P80 B5	19	21.8	6	200	165	130	12	11.5	128	
W/VF 86/185	P90 B5	24	27.3	8	200	165	130	12	11.5	128	
W/VF 86/185	P100 B5	28	31.3	8	250	215	180	13	12.5	136	
W/VF 86/185	P112 B5	28	31.3	8	250	215	180	13	12.5	136	
W/VF 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	

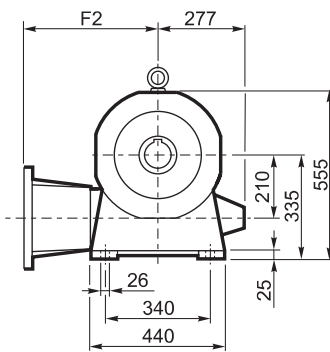
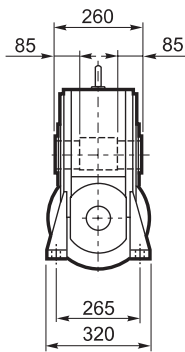


VF 210...P (IEC)

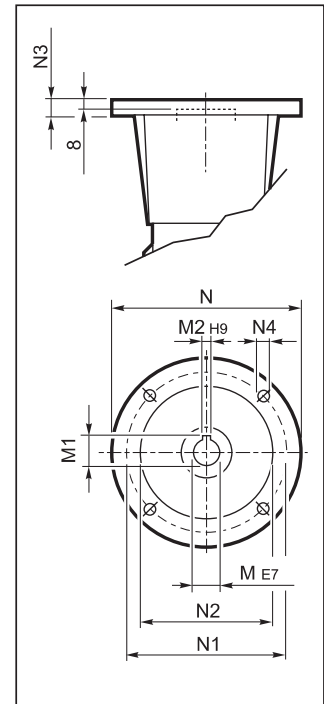
A



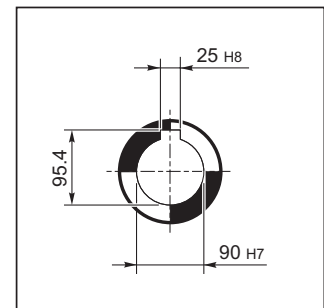
N

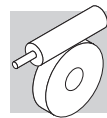


INPUT



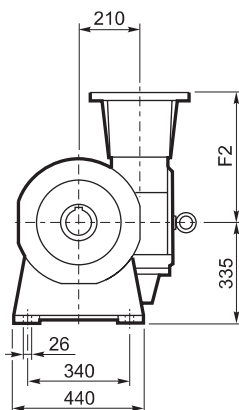
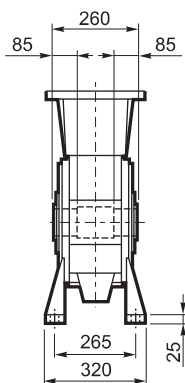
OUTPUT



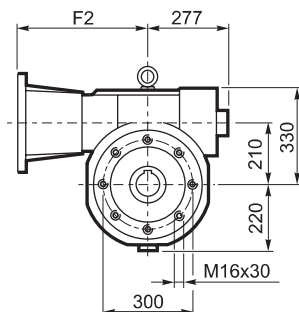
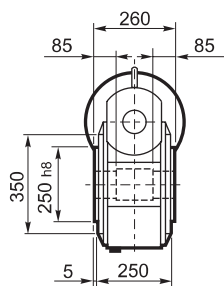


VF 210...P (IEC)

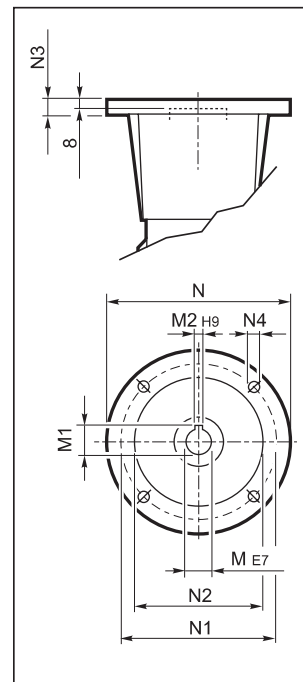
V



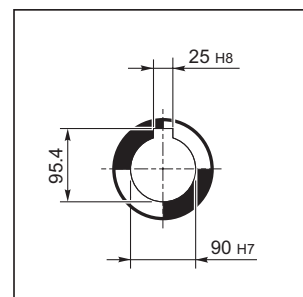
P



INPUT



OUTPUT



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

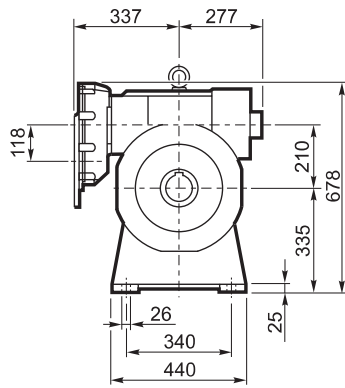
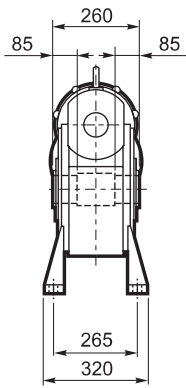
		F2	M	M1	M2	N	N1	N2	N3	N4	
VF 210	P132 B5	485	38	41.3	10	300	265	230	25	M12	210
VF 210	P160 B5	460	42	45.3	12	350	300	250	22	18	
VF 210	P180 B5	460	48	51.8	14	350	300	250	22	18	
VF 210	P200 B5	485	55	59.3	16	400	350	300	25	M16	
VF 210	P225 B5	490	60	64.4	18	450	400	350	22	18 #	

N° 8 holes at 45°

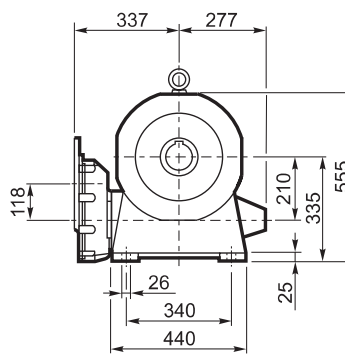
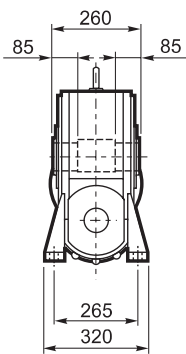


VFR 210...P (IEC)

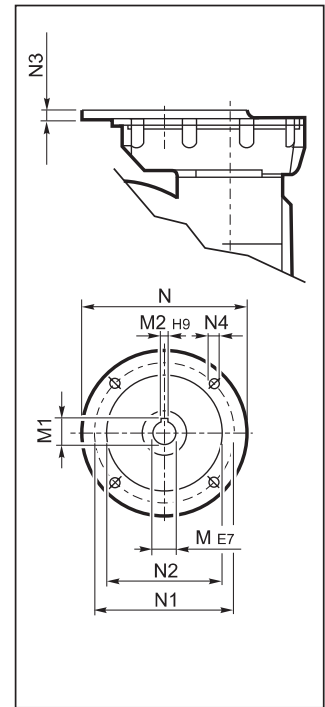
A



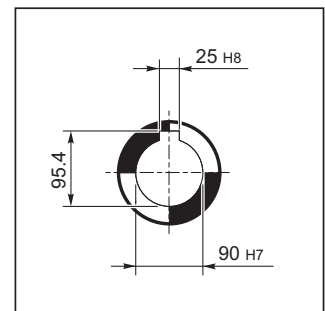
N



INPUT



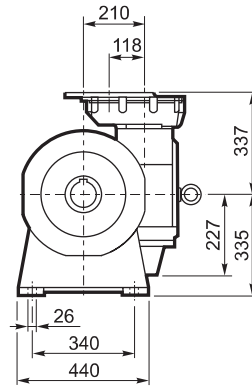
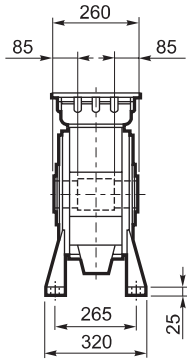
OUTPUT



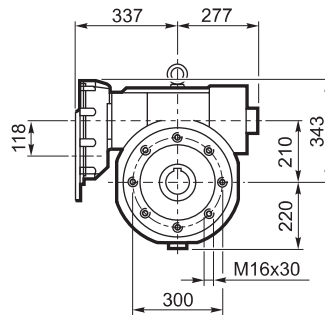
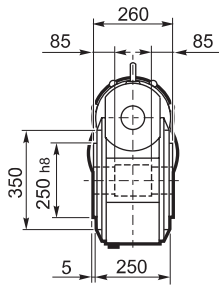


VFR 210...P (IEC)

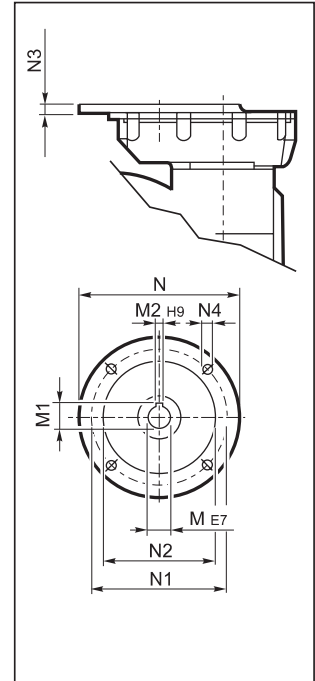
V



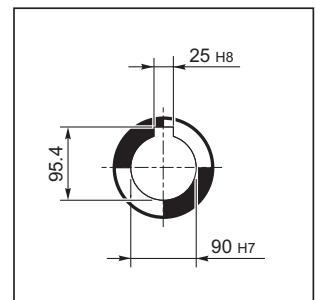
P






INPUT



OUTPUT



Fan cooling as standard on versions A and P.

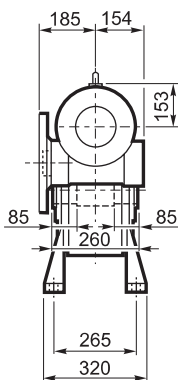
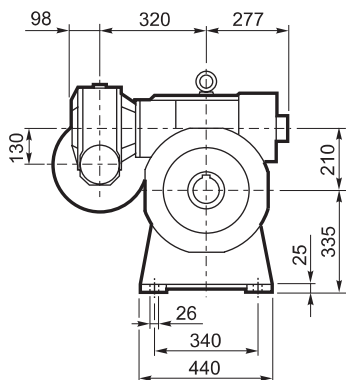
		M	M1	M2	N	N1	N2	N3	N4	
VRF 210	P100 B5	28 K6	31.3	8	250	215	180	13	M12x35	185
VRF 210	P112 B5	28 K6	31.3	8	250	215	180	13	M12x35	
VFR 210	P132 B5	38 J6	41.3	10	300	265	230	13	M12x35	
VFR 210	P160 B5	42 J6	44.3#	12	350	300	250	18	M16x60	

Lowered key

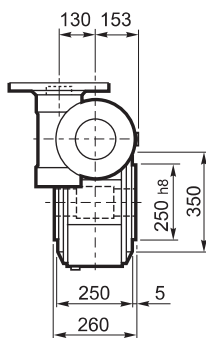
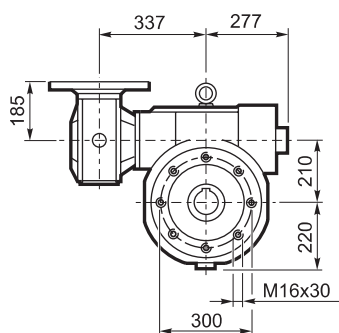


VF/VF 130/210...P (IEC)

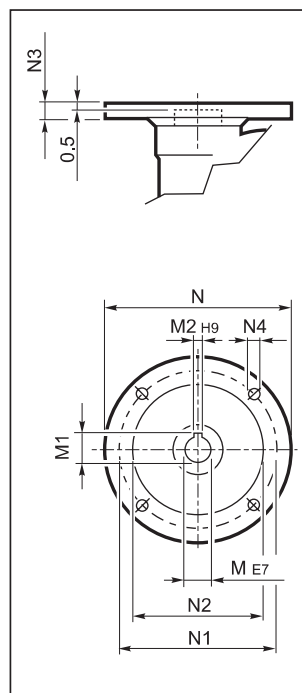
A



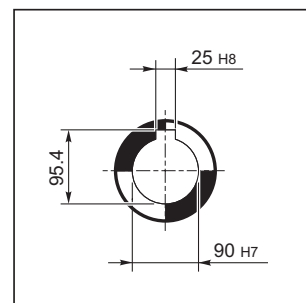
P






INPUT



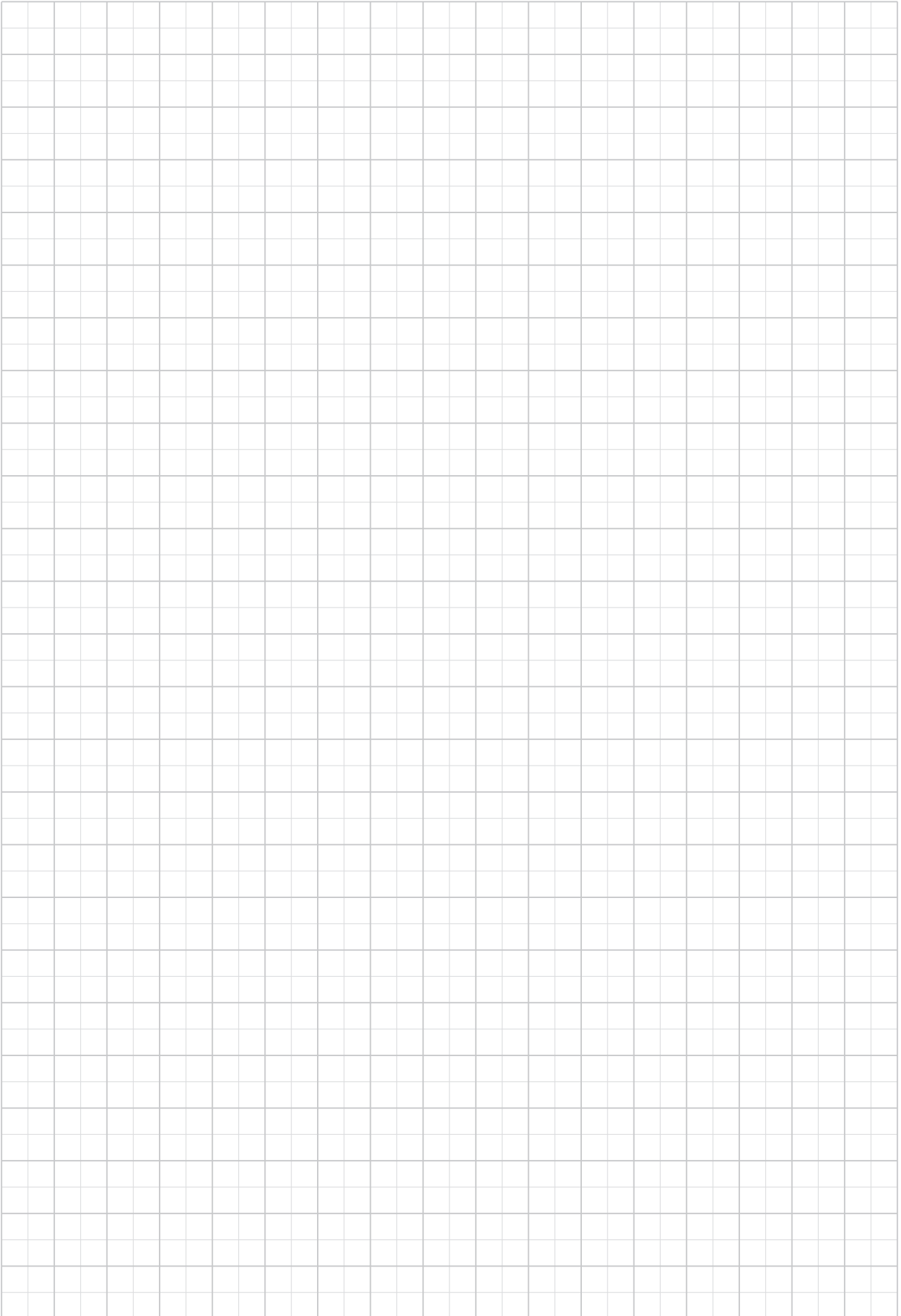
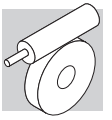
OUTPUT



Fan cooling as standard on versions A and P.

		M	M1	M2	N	N1	N2	N3	N4	
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	

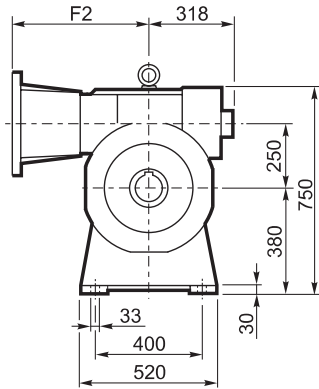
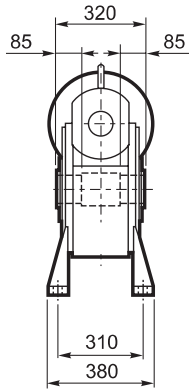
Lowered key



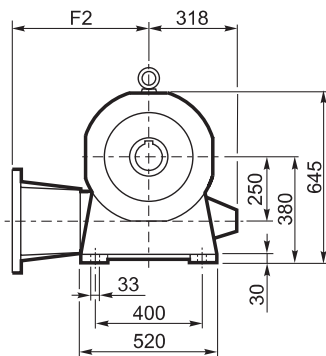
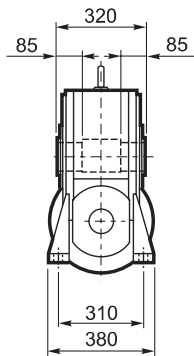


VF 250...P (IEC)

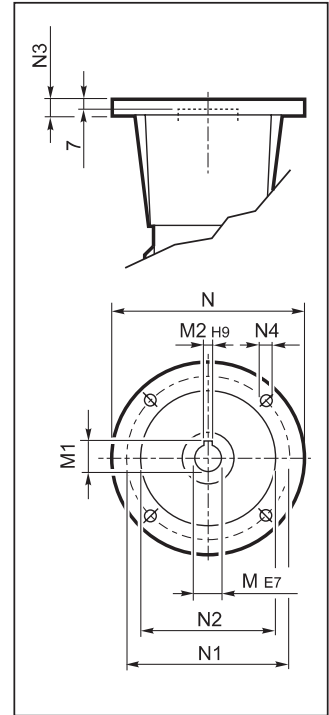
A



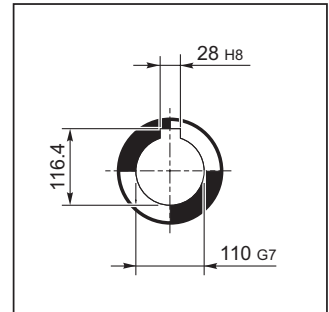
N



INPUT



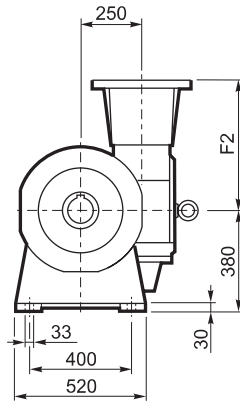
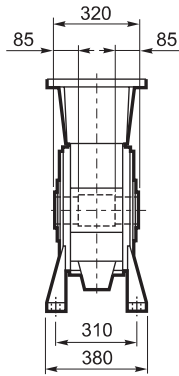
OUTPUT



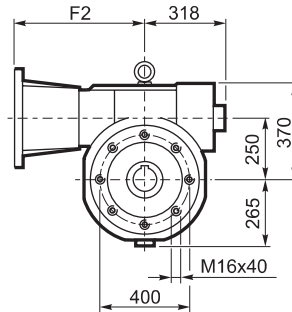
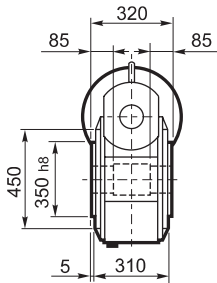


VF 250...P (IEC)

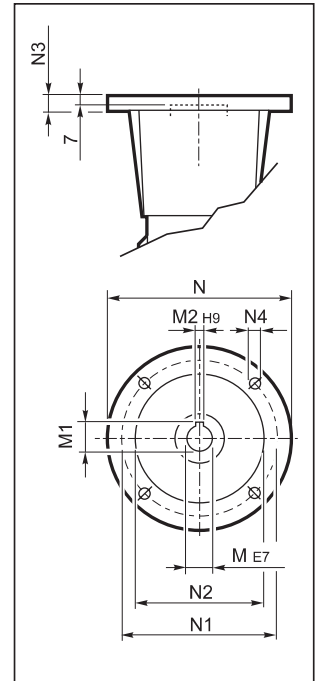
V



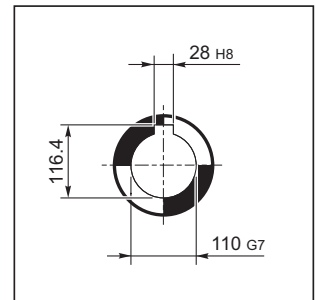
P



INPUT



OUTPUT



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

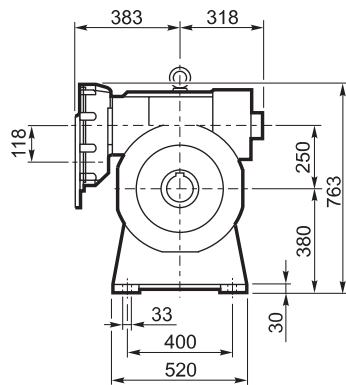
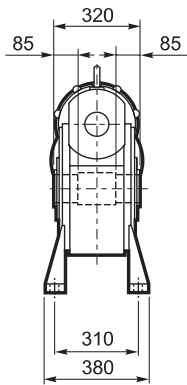
		F2	M	M1	M2	N	N1	N2	N3	N4	
VF 250	P132 B5	531	38	41.3	10	300	265	230	25	M12	310
VF 250	P160 B5	506	42	45.3	12	350	300	250	22	18	
VF 250	P180 B5	506	48	51.8	14	350	300	250	22	18	
VF 250	P200 B5	531	55	59.3	16	400	350	300	25	M16	
VF 250	P225 B5	536	60	64.4	18	450	400	350	22	18#	

N° 8 holes at 45°

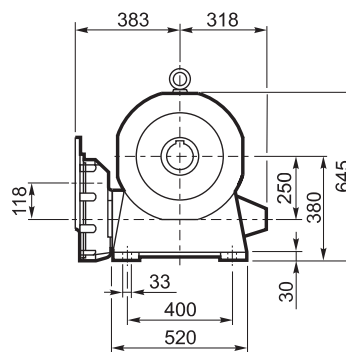
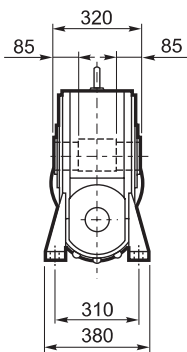


VFR 250...P (IEC)

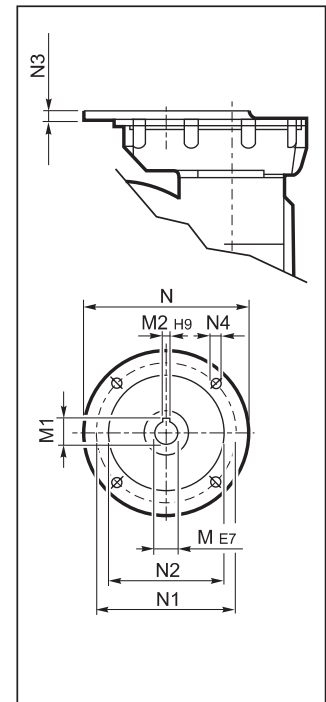
A



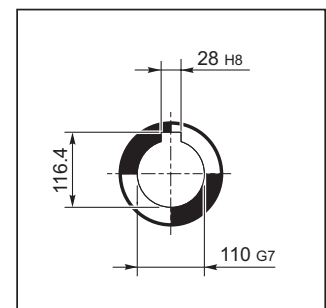
N



INPUT



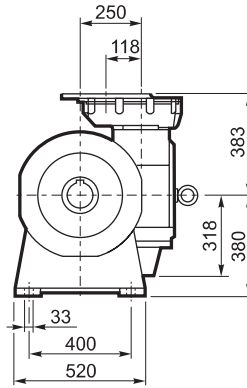
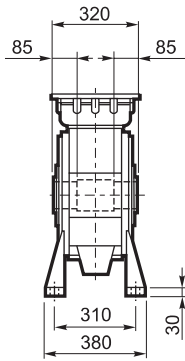
OUTPUT



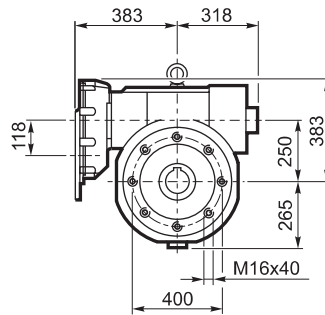
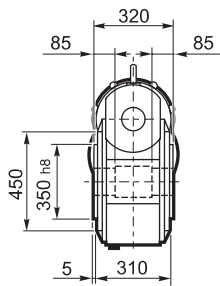


VFR 250...P (IEC)

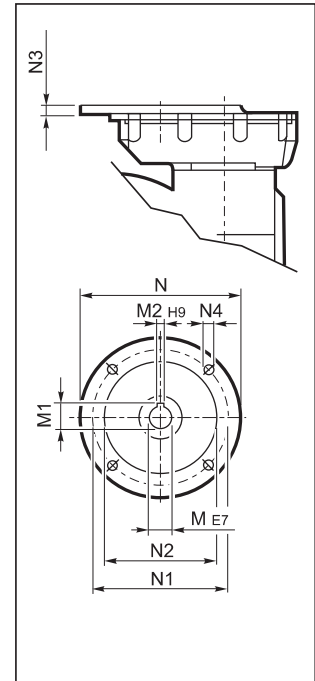
V



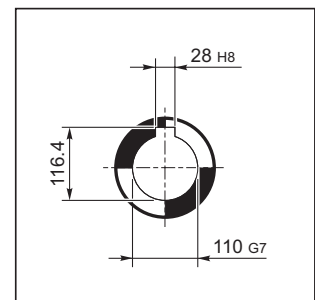
P



INPUT



OUTPUT



Fan cooling as standard on versions A and P.

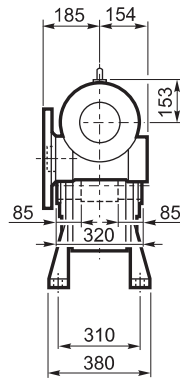
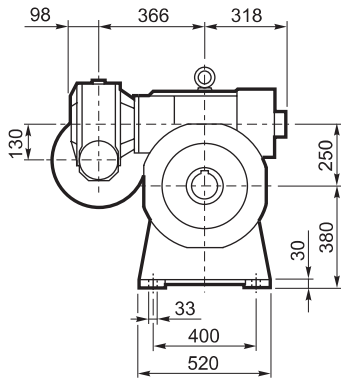
		M	M1	M2	N	N1	N2	N3	N4	kg
VFR 250	P100 B5	28 K6	31.3	8	250	215	180	13	M12x35	295
VFR 250	P112 B5	28 K6	31.3	8	250	215	180	13	M12x35	
VFR 250	P132 B5	38 J6	41.3	10	300	265	230	13	M12x35	
VFR 250	P160 B5	42 J6	44.3#	12	350	300	250	18	M16x60	

Lowered key

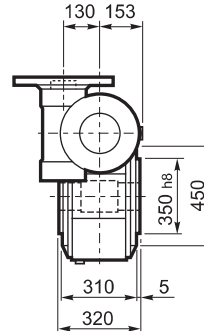
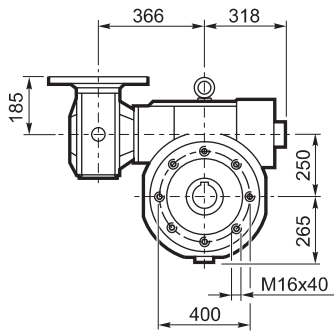


VF/VF 130/250...P (IEC)

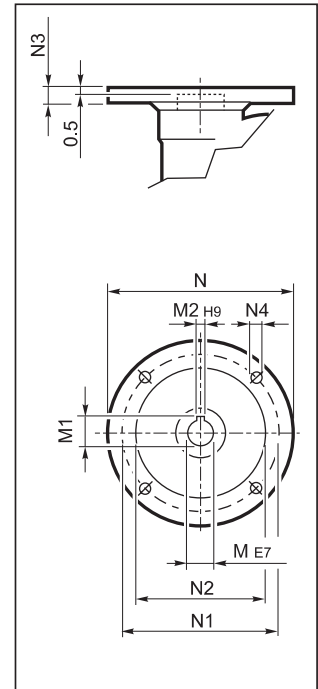
A



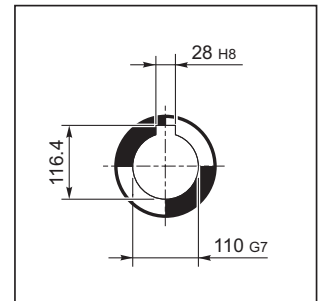
P



INPUT



OUTPUT



Fan cooling as standard on versions A and P.

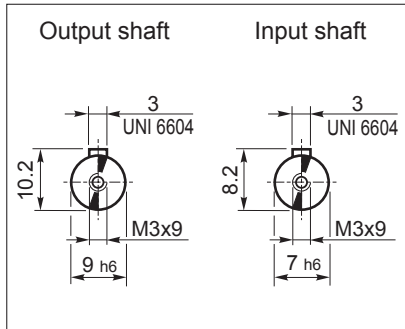
		M	M1	M2	N	N1	N2	N3	N4	
VF/VF 130/250	P 90 B5	24	27.3	8	200	165	130	17	11	325
VF/VF 130/250	P100 B5	28	31.3	8	250	215	180	17	13	
VF/VF 130/250	P112 B5	28	31.3	8	250	215	180	17	13	
VF/VF 130/250	P132 B5	38	40.1#	10	300	265	230	17	13	

Lowered key

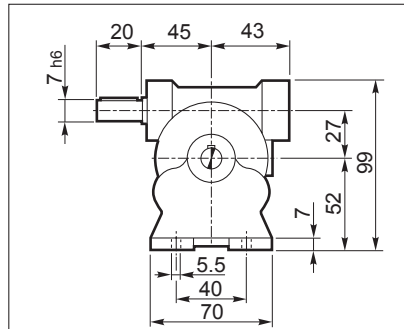


27 DIMENSIONS FOR GEAR UNITS WITH SOLID INPUT SHAFT

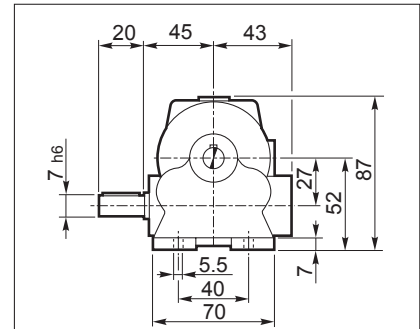
VF 27...HS



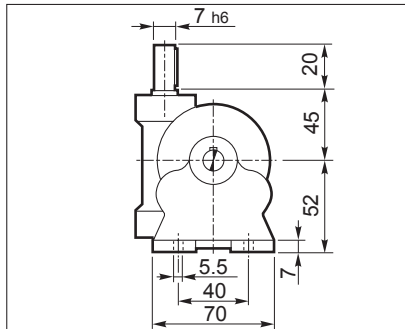
VF 27_A..HS



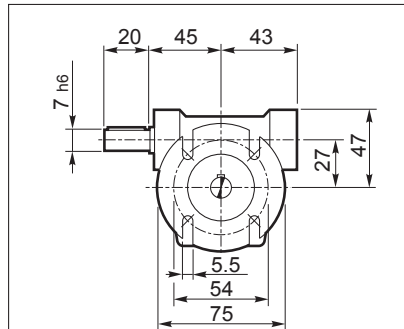
VF 27_N..HS



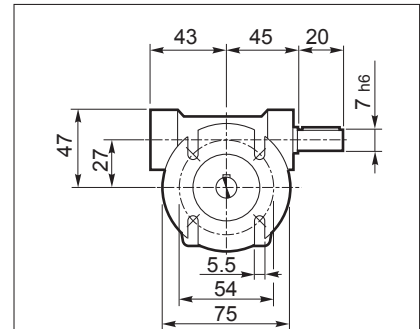
VF 27_V..HS



VF 27_F1..HS



VF 27_F2..HS



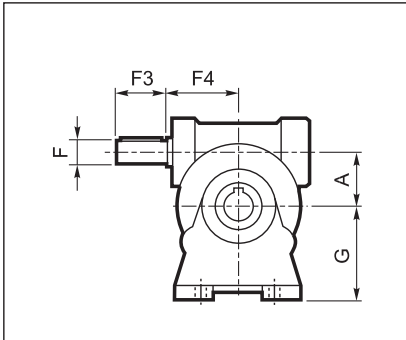
VF 27_HS	0.73

Dimensions common to the other configurations can be found at page 107.

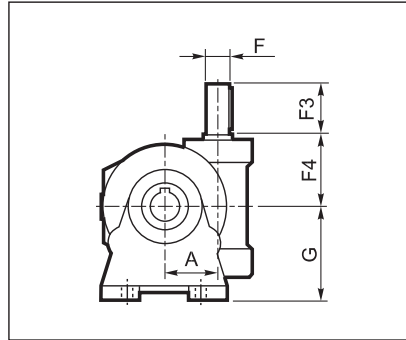


VF...HS - W...HS

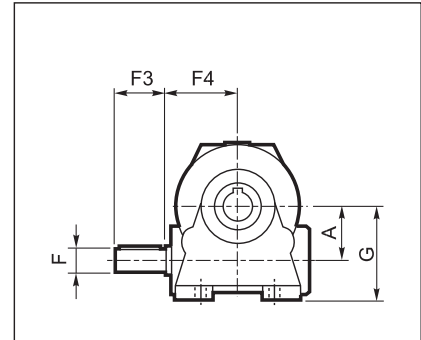
VF_A..HS



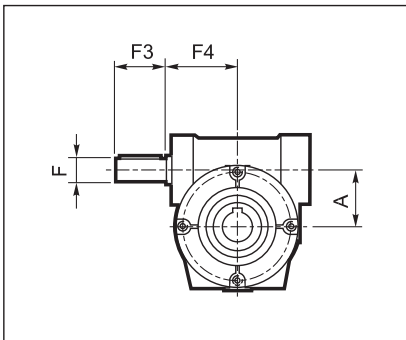
VF_V..HS



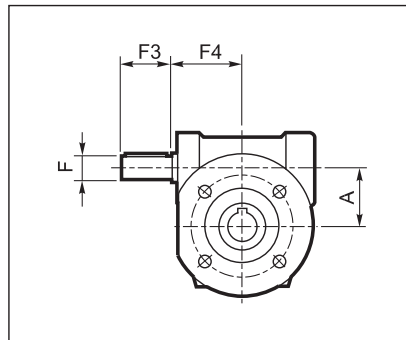
VF_N..HS



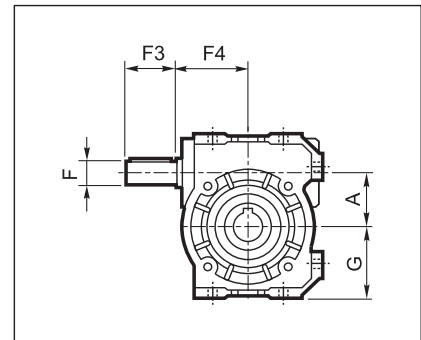
VF_P..HS



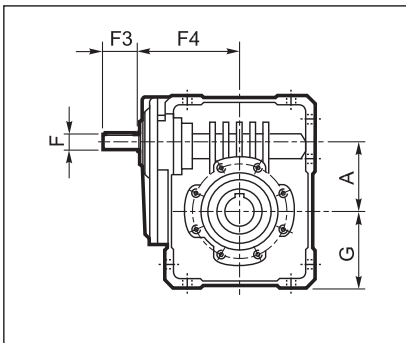
VF_FA/FC/FR/F..HS



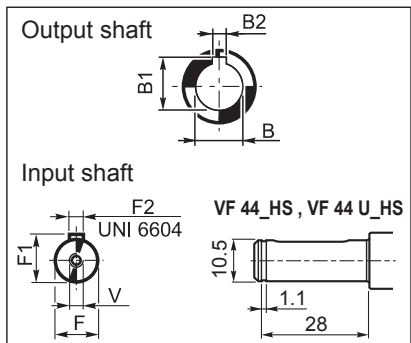
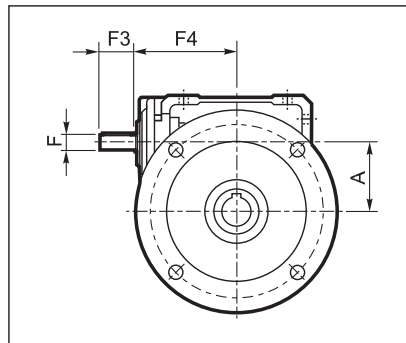
VF_U..HS



W_U..HS



W_UF/UFC/UFCR..HS



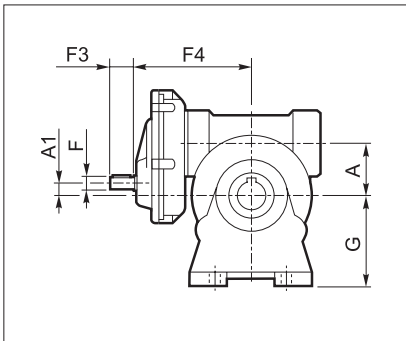
	A	B	B1	B2	F	F1	F2	F3	F4	G	V	Kg
VF 30_HS	30	14 H7	16.3	5	9 h6	10.2	3	20	50	55	—	1.1
VF 30_U_HS										47		
VF 44_HS	44.6	18 H7	20.8	6	11 h6	12.5	4	30	54	72	—	2.0
VF 44_U_HS										55		
VF 49_HS	49.5	25 H7	28.3	8	16 h6	18	5	40	65	82	M6x16	3.0
VF 49_U_HS										64.5		
W 63_HS	62.17	25 H7	28.3	8	18 h6	20.5	6	40	110.5	72.5	M6x16	6.4
W 75_HS	75	30(28) H7	33.3(31.3)	8	19 h6	21.5	6	40	128	87	M6x16	10.0
W 86_HS	86.9	35 H7	38.3	10	25 h6	28	8	50	144	100	M8x19	14.1
W 110_HS	110.1	42 H7	45.3	12	25 h6	28	8	60	168	125	M8x19	27
VF 130_HS	130	45 H7	48.8	14	30 h6	33	8	60	160	195	M8x20	49
VF 150_HS	150	50 H7	53.8	14	35 h6	38	10	65	185	220	M8x20	60
VF 185_HS	185.4	60 H7	64.4	18	40 h6	43	12	70	214.5	254	M8x20	94
VF 210_HS	210	90 H7	95.4	25	48 h6	51.5	14	110	230	335	M16x40	175
VF 250_HS	250	110 G7	116.4	28	55 h6	59	16	110	275.5	380	M16x40	275

Dimensions common to the other configurations can be found from page 108 to 163.

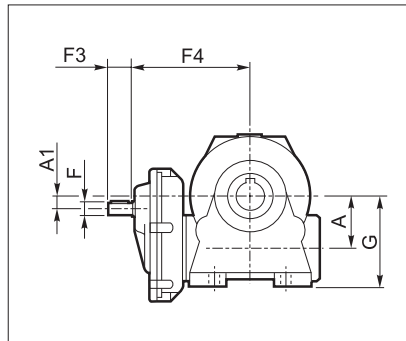


VFR...HS - WR...HS

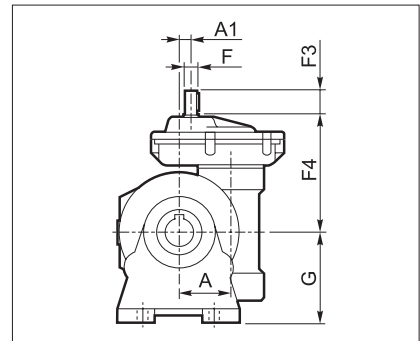
VFR_A..HS



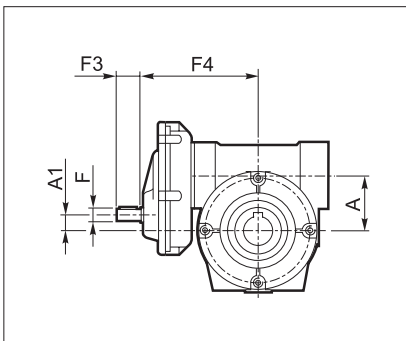
VFR_N..HS



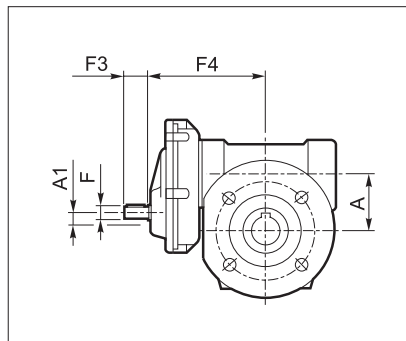
VFR_V..HS



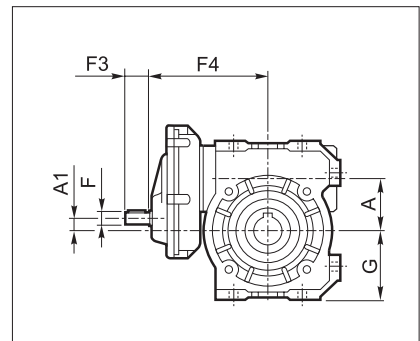
VFR_P..HS



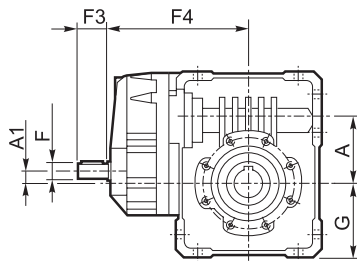
VFR_FA/FC/FR/F..HS



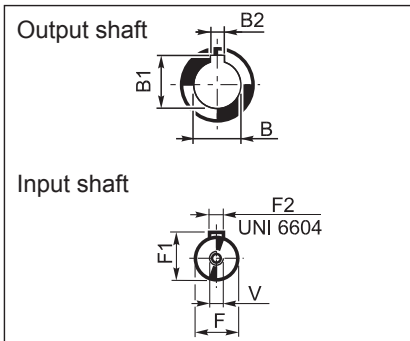
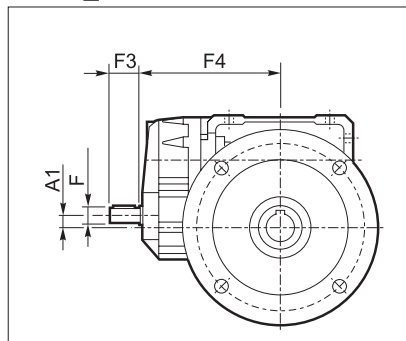
VFR_U..HS



WR_U..HS



WR_UF/UFC/UFCR..HS



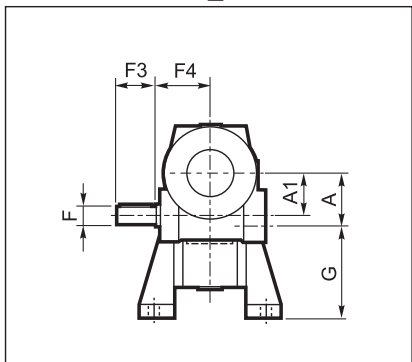
	A	A1	B	B1	B2	F	F1	F2	F3	F4	G	V	Kg
VFR 49_HS	49.5	10	25 H7	28.3	8	11 h6	12.5	4	23	110	82	M4x10	5
VFR 49 U HS											64.5		
WR 63_HS	62.17	11.42	25 H7	28.3	8	14 h6	16	5	30	138	72.5	M5x12.5	7.1
WR 75_HS	75	11	30(28) H7	33.3(31.3)	8	19 h6	21.5	6	40	162	87	M6x16	11.1
WR 86_HS	86.9	22.9	35 H7	38.3	10	19 h6	21.5	6	40	178	100	M6x16	14.7
WR 110_HS	110.1	21.1	42 H7	45.3	12	24 h6	27	8	50	201	125	M8x19	34
VFR 130_HS	130	45	45 H7	48.8	14	24 h6	27	8	50	228	195	M8x20	57
VFR 150_HS	150	53	50 H7	53.8	14	28 h6	31	8	60	280	220	M8x20	71
VFR 185_HS	185.4	88.4	60 H7	64.4	18	28 h6	31	8	60	310	254	M8x20	110
VFR 210_HS	210	92	90 H7	95.4	25	38 h6	41	10	80	335	335	M10x25	185
VFR 250_HS	250	132	110 G7	116.4	28	38 h6	41	10	80	383	380	M10x25	295

Dimensions common to the other configurations can be found from page 118 to 165.

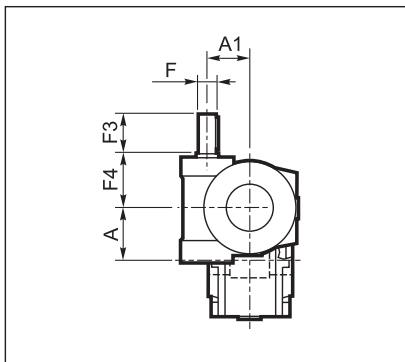


VF/VF...HS - VF/W...HS - W/VF...HS

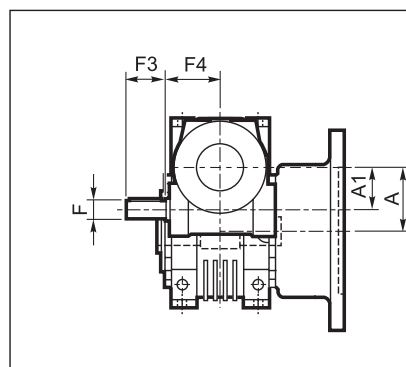
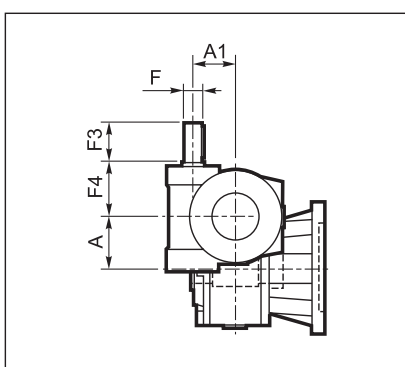
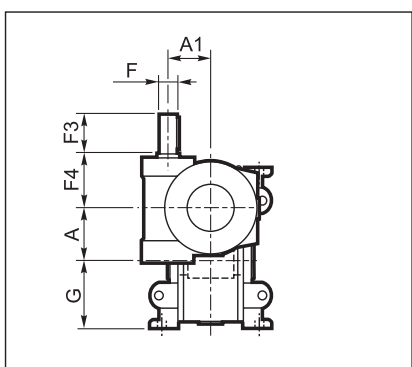
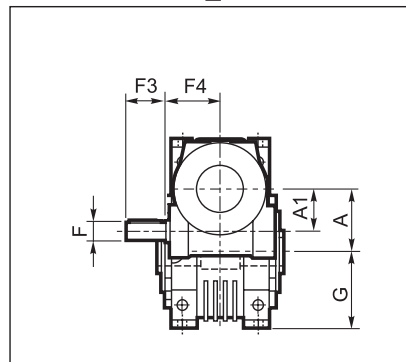
**VF/VF_A..HS
W/VF_A..HS**



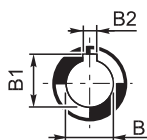
**VF/VF_P..HS
W/VF_P..HS**



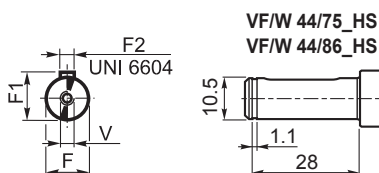
**VF/VF_P..HS
W/VF_P..HS**



Output shaft



Input shaft



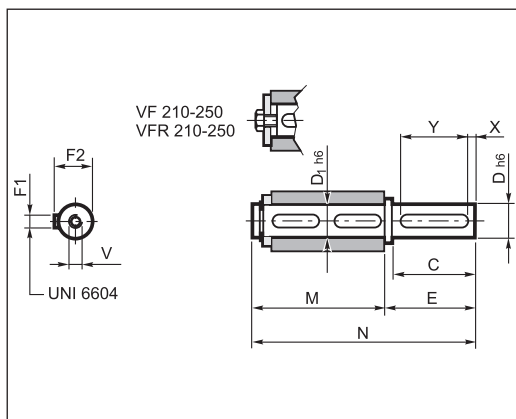
	A	A1	B	B1	B2	F	F1	F2	F3	F4	G	V	Kg
VF/VF 30/44_HS	44.6	30	18 H7	20.8	6	9 h6	10.2	3	20	50	72	—	3.5
VF/VF 30/44 U HS											55		
VF/VF 30/49_HS	49.5	30	25 H7	28.3	8	9 h6	10.2	3	20	50	82	—	4.5
VF/VF 30/49 U HS											64.5		
VF/W 30/63_HS	62.17	30	25 H7	28.3	8	9 h6	10.2	3	20	50	100	—	7.5
VF/W 44/75_HS	75	44.6	30 (28) H7	33.3 (31.3)	8	11 h6	12.5	4	30	54	115	—	16.1
VF/W 44/86_HS	86.9	44.6	35 H7	38.3	10	11 h6	12.5	4	30	54	142	—	42
VF/W 49/110_HS	110.0	49.5	42 H7	45.3	12	16 h6	18	5	40	65	170	M6x16	46
W/VF 63/130_HS	130	62.17	45 H7	48.8	14	18 h6	20.5	6	40	110.5	72.5	M6x16	74
W/VF 86/150_HS	150	86.9	50 H7	53.8	14	25 h6	28	8	50	144	100	M8x19	108
W/VF 86/185_HS	185.4	86.9	60 H7	64.4	18	25 h6	28	8	50	144	100	M8x19	109
VF/VF 130/210_HS	210	130	90 H7	95.4	25	30 h6	33	8	60	160	335	M8	225
VF/VF 130/250_HS	250	130	110 G7	116.4	28	30 h6	33	8	60	160	380	M8	325

Dimensions common to the other configurations can be found from page 114 to 166.

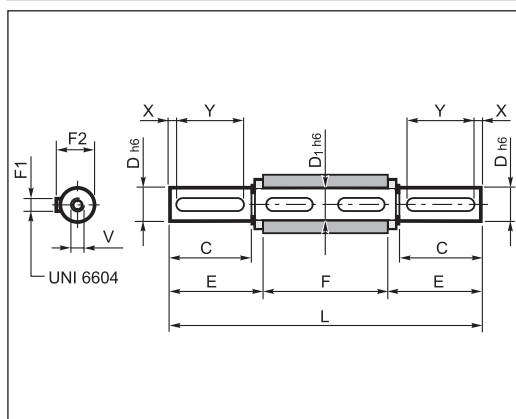


28 ACCESSORIES

28.1 Plug-in output shaft

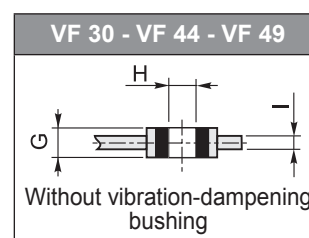
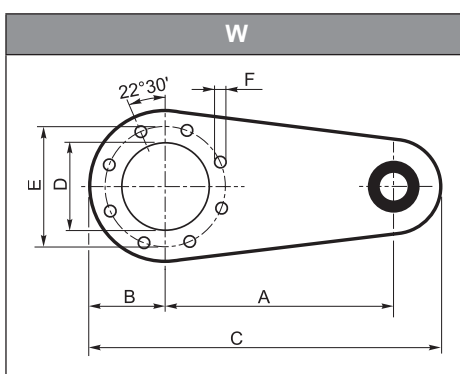
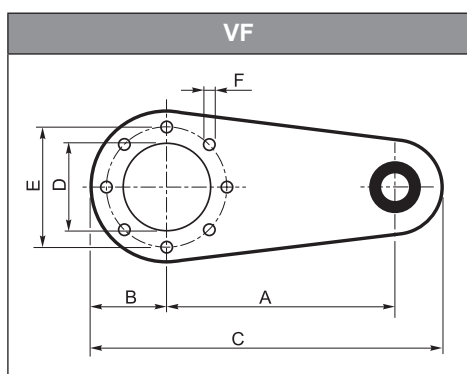


		C	D	D1	E	F1	F2	M	N	V	X	Y
VF	30	30	14	14	35	5	16	61	96	M5x13	5	20
VFR	44	40	18	18	45	6	20.5	70	115	M6x16	5	30
VF/VF	49	60	25	25	65	8	28	89	154	M8x19	5	50
	63	60	25	25	65	8	28	127	192	M8x19	5	50
W	75_D28	60	28	30	65	8	31	134	199	M8x20	5	50
WR	75_D30	60	30	30	65	8	33	134	199	M10x22	5	50
VF/W	86	60	35	35	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

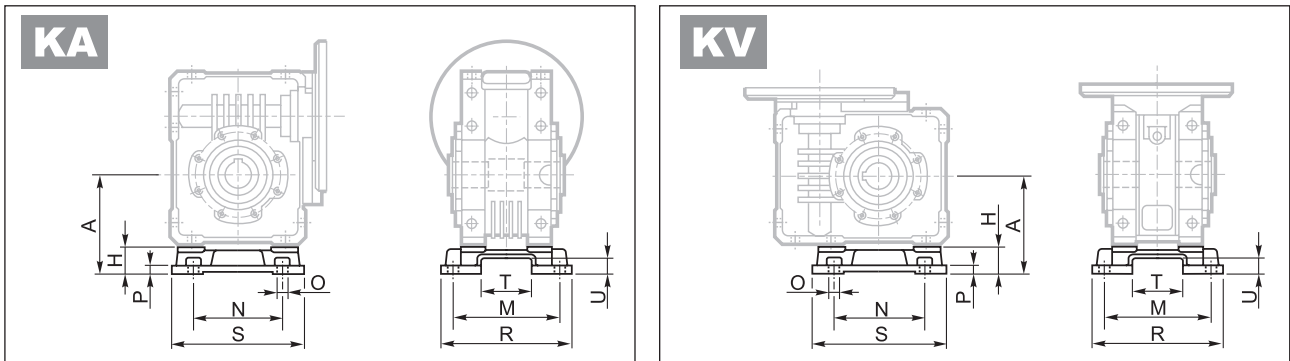
28.2 Torque arm



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

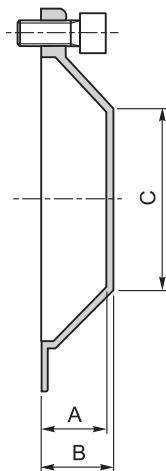


28.3 VF-interchangeable foot kits KA, KV



	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



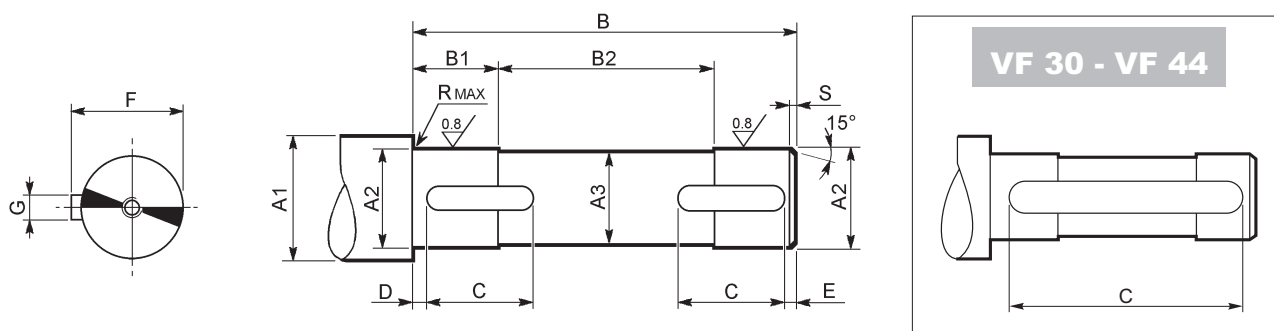
	A	B	C
W 63 - WR 63	26.5	29	Ø35
W 75 - WR 75	24.5	27	Ø54
W 86 - WR 86	26.5	29	Ø71
W 110 - WR110	27.5	30	Ø89




29 CUSTOMER'S SHAFT

Make the driven shaft to be coupled to the gear unit's output shaft from a good quality steel, respecting the dimensions given in the table.

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	48.5	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

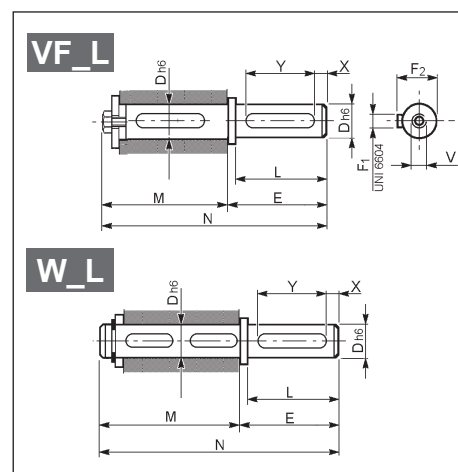
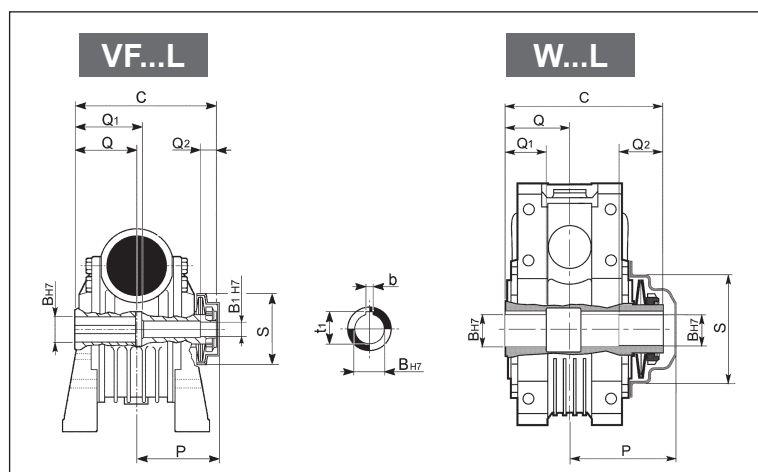
L1								L2								
	N	A	V	U	F1 FC1 FR1 FA1	F2 FC2 FR2 FA2**	P1 P2		N	A	V	U	F1 FC1 FR1 FA1**	F2 FC2 FR2 FA2	P1 P2	
VF VF/VF*									VF VF/VF*							
	U	UF1 UFC1	UF2 UFC2	UFCR1	UFCR2				U	UF1 UFC1	UF2 UFC2	UFCR1	UFCR2			
W VF/W*									W VF/W*							

* 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}	B _{1H7}	t ₁	b	L	D _{h6}	E	F ₁	F ₂	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.

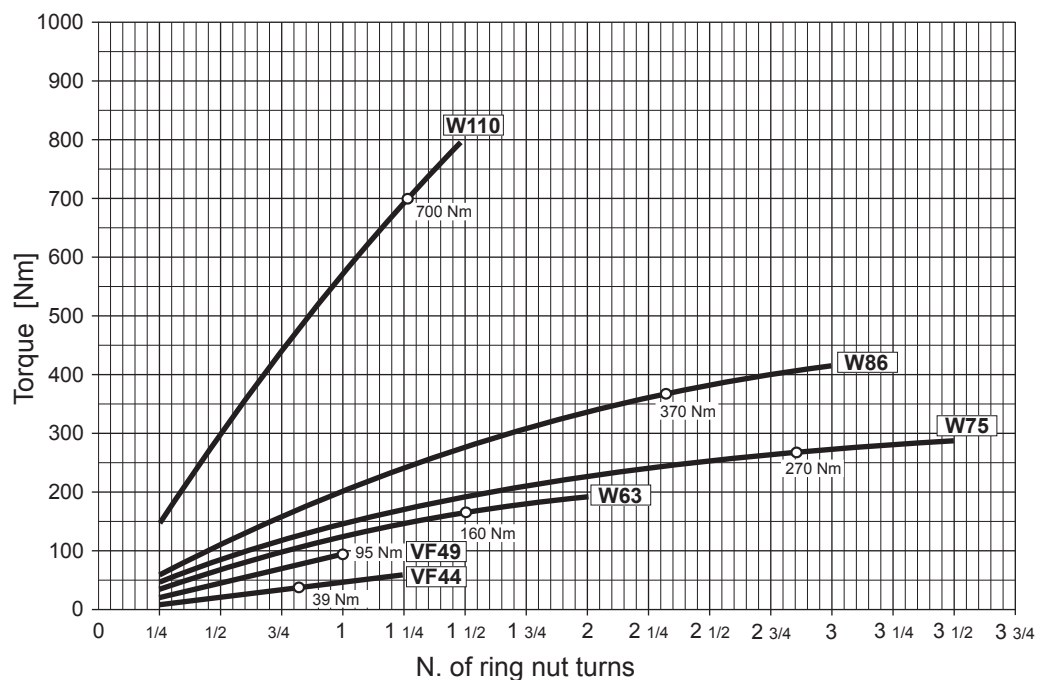
Same steps, with the exception of step (2), must be followed when a different torque setting is required.

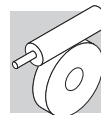
1. Ring nut is tightened until spring washers are sufficiently loaded that manual rotation is hardly possible.

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.





VF-EP / W-EP - GEARBOXES AND GEARMOTORS FOR CORROSIVE AND ASEPTIC ENVIRONMENTS

31 MAIN BENEFITS OF THE EP (Enhanced Protection) SERIES

All companies involved in food and beverage, chemical and pharma industries can now rely on a newly designed range of gearmotors tailored to effectively operate in the extremely hygienic and harsh environments characterizing these sectors.

Perfectly suited for the food & beverage industries

Corrosion resistant

Resisting the harshest environments

Can be cleaned/sanitized with most detergents

MAIN FEATURES

Standard:

- Stainless steel hollow shaft, mounting hardware and tag
- Completely sealed gearbox (unvented)
- Unused tapped holes closed with button plugs
- Specific vents for water draining
- Motor protection IP56
- C5 Corrosion protection or FDA&NSF approved food grade paintings

Main Options:

- Wash down duty oil seals
- NSF (H1) and FDA approved food grade lubricant



MAIN BENEFITS OF THE EP VERSION

Thanks to the completely sealed gearbox housing, surface paintings and protection, gearmotors of the EP series ensures risk free operation in harsh and hygienic environments and facilitate the gearmotor sanitizing processes.

The whole gearmotor, indeed, is protected through a high performances multi-layered epoxy coating with elevated resistance to corrosion and abrasion.

Two different finishing coatings can be selected:

- The first one guarantee C5 corrosion protection class according to ISO 9223 and it is available as standard in RAL9006
- The second one is specifically dedicated to the food&beverage industry and registered by NSF and FDA as compatible for the utilization in incidental food contact areas as well as for drinking water contact. Furthermore, besides an improved corrosion resistance, this painting is also resistant to most of the detergents commonly used in food&beverage industries.

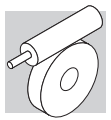
NOTE: This finishing is automatically selected when the specified colors for the gearmotor is Light Blue*(PLB) or White*(PWH).

*Note: No RAL color can be specified as panting is organic based.

Finally, the EP Gearmotor can be further tailored to specific requirements through various options and mounting accessories.

Frame sizes available in EP version: 44 (excepted VFR), 49, 63, 75, 86.

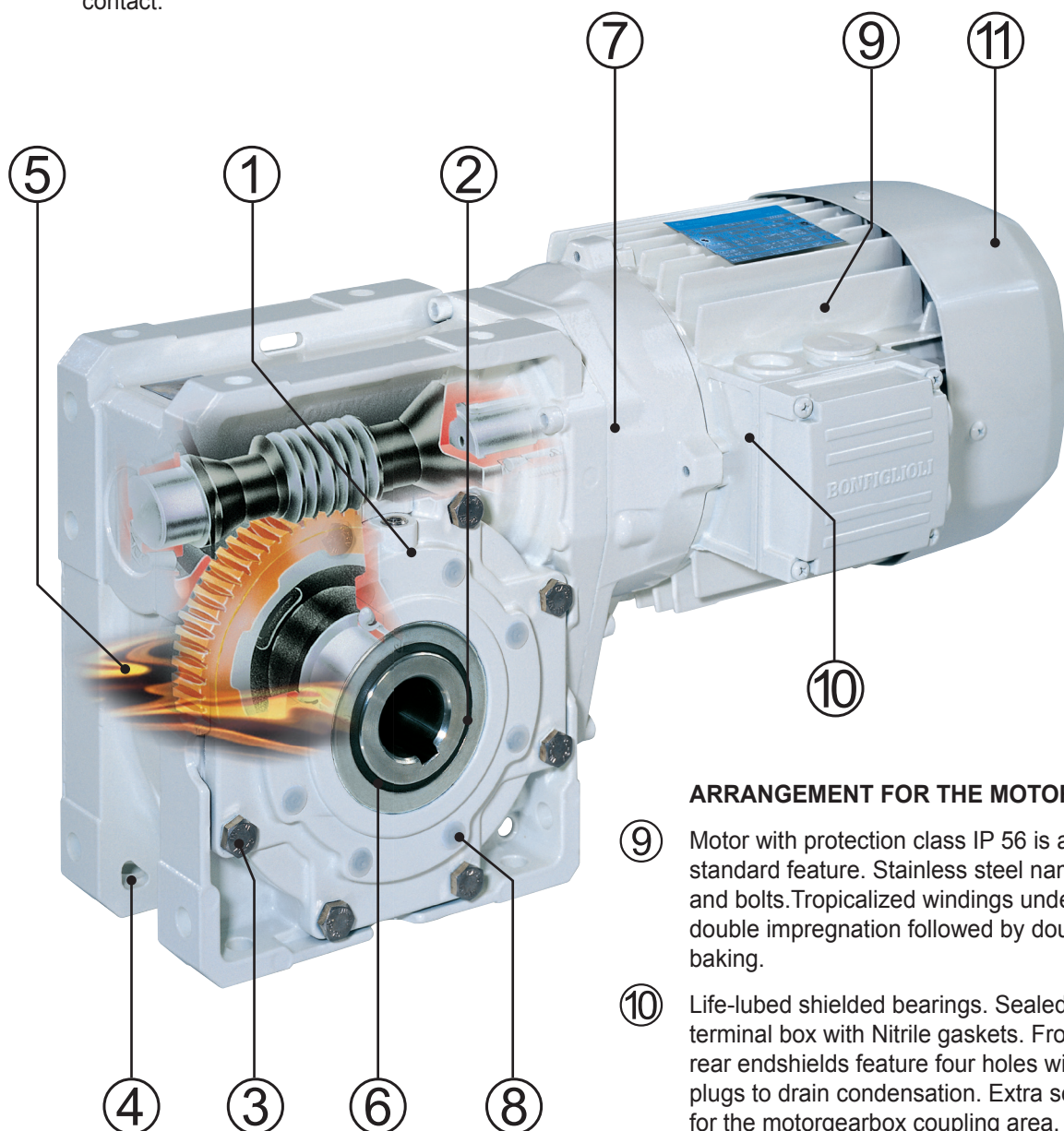
Available EP motors: 0,12 to 4 kW, both compact type and IEC, 2, 4 and 6 poles.



ARRANGEMENT FOR THE GEAR UNIT

- ① The speed reducer is fully sealed to minimise contamination of the environment.
- ② Stainless steel output shaft - AISI 316.
- ③ Stainless steel nameplate and bolts.
- ④ Dedicated housing design to facilitate water draining
- ⑤ In option is available lubricant H1-class synthetic oil registered by NSF for the food-processing and pharmaceutical industries . In compliance with FDA for incidental food contact.

- ⑥ Availability of washdown duty double lip oil seals with stainless steel frame.
- ⑦ Exterior surfaces are primed and paint finished with a two-part epoxy coating, FDA and NSF approved (depending on color choice) for incidental food contact.
- ⑧ Button plugs for unused mounting holes.



ARRANGEMENT FOR THE MOTOR

- ⑨ Motor with protection class IP 56 is a standard feature. Stainless steel nameplate and bolts. Tropicalized windings undergo double impregnation followed by double baking.
- ⑩ Life-lubed shielded bearings. Sealed terminal box with Nitrile gaskets. Front and rear endshields feature four holes with screw plugs to drain condensation. Extra sealing for the motorgearbox coupling area.
- ⑪ Chemically inert fan.



GEAR UNIT

W-EP — 63 U 30 P90 B14 B3 PWH

OPTIONS

PAINTING

NP* unpainted	
PWH (FDA & NSF Compliant)	
PLB (FDA & NSF Compliant)	
RAL9006 (Highly corrosion resistant C5)	

MOUNTING POSITION

VF-EP 44 VF-EP 49	B3
W-EP 63 W-EP 75 W-EP 86	B3 (default), B6, B7, B8, V5, V6

MOTOR MOUNTING
B5, B14 (IEC standard)

INPUT CONFIGURATION

	VF-EP	VF-EP R	W-EP	W-EP R
P(IEC)	 P63...P80	 P63	 P71...P112	 P63...P90
s_			 S1...S3	

GEAR RATIO

VERSION

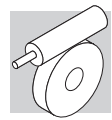
GEAR FRAME SIZE
VF-EP: **44, 49**
W-EP: **63, 75, 86**

- (blank)
- R** (helical-worm gear unit VF-EP 44)

GEAR TYPE

VF-EP
W-EP

* Note: If the gearbox is requested in NP (Unpainted) version with torque arm, the latter is provided coated with a light grey primer completely over-paintable.


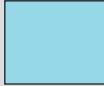
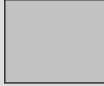


MOTOR

BE-EP 80B 4 B14 230/400-50 CLF PWH

OPTIONS

PAINTING

NP* unpainted	
PWH (FDA & NSF Compliant)	
PLB (FDA & NSF Compliant)	
RAL9006 (Highly corrosion resistant C5)	

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

INSULATION CLASS
CL F standard
CL H option

VOLTAGE-FREQUENCY

VERSION
— (integral motor)
B5, B14 (IEC motor)

POLE NUMBER
2, 4, 6,

MOTOR SIZE
1SC ... 3LC (integral motors)
63 ... 112 (IEC motors)

MOTOR TYPE

M-EP = 3-phase integral **ME-EP** = 3-phase integral, class IE2
BN-EP = 3-phase IEC **BE-EP** = 3-phase IEC, class IE2



33 GEARBOX OPTIONS

PX

Wash down duty oil seals for the output shaft. The particular oil seals, offered as an option, make the gearmotor suitable for arduous environments where frequent washdowns occur, often with high-pressure hot water, together with sanitizing agents. The stainless steel screen and the low friction PTFE double lip design provide an extended life and improved sealing function even under extreme conditions with the presence of aggressive media.

PV

Fluoro elastomer rings on output shaft. Stainless steel loading spring.

UH1

Food grade synthetic lubricant. The gearbox is factory filled with “long life” lubricant, approved for incidental food contact and registered as H1 by the NSF for the food and pharma industry, it also satisfy the FDA 21 CFR Sec. 178.3570 norms.

It's polyglycol-based synthetic nature, not only extends the application range from temperatures of -25°C to $+150^{\circ}\text{C}$, but does not require periodical oil change thus, with the absence of contamination, the gearbox is virtually maintenance-free.

CERTIFICATES

AC - Certificate of compliance

The document certifies the compliance of the product with the purchase order and the construction in conformity with the applicable procedures of the Bonfiglioli Quality System.

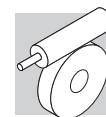
CC - Inspection certificate

The document entails checking on order compliance, the visual inspection of external conditions and of mating dimensions. Checking on main functional parameters in unloaded conditions is also performed along with oil seal proofing, both in static and in running conditions. Units inspected are sampled within the shipping batch and marked individually.

34 MOTOR OPTIONS

The available options for for all EP motors are: D3, E3, K1, H1, NH1, RC, RV, ACM, CC, CUS, S2, S3, S9.

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



35 OTHERS INFORMATION ABOUT GEARBOX AND GEARMOTOR

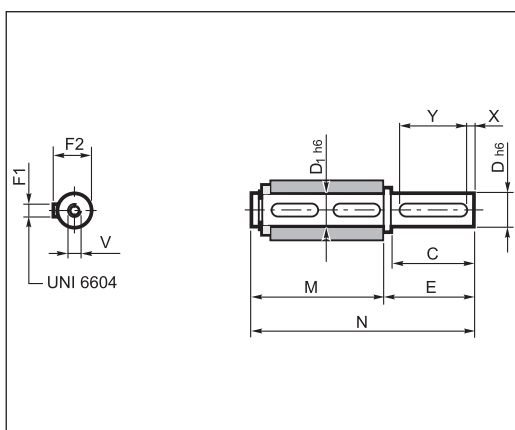
Mounting positions, technical data, motor availability, moments of inertia and dimensions of **VF-EP** e **W-EP** series don't change among equivalent **VF** and **W** product series. In the same way, information about all **EP** motors don't change among equivalent series motors. All of these information can be obtained in the related chapters of this catalogue.

36 THE ACCESSORIES FOR THE _EP SERIES

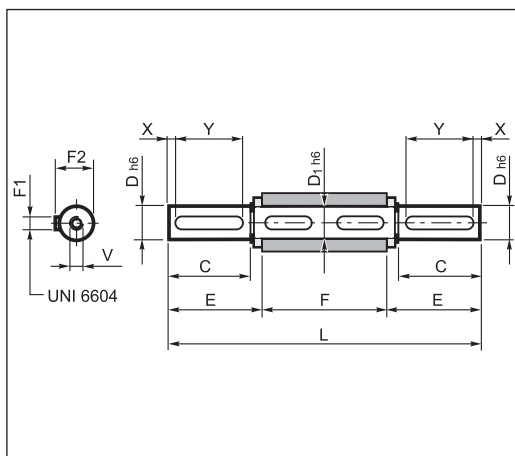
Depending on the mounting pattern, the gearbox can be complemented with the following pieces of equipment:

- AISI 316 stainless steel plug-in solid shaft, both single and double projection
- epoxy paint coated torque arm (specify the acronym among those shown in the related figure)
- safety cover for the unused hollow shaft area – plastic type for W63, W75 and W86 units, metal type nitrile coated for VF 44 and VF 49, with stainless steel fasteners. IP 56 protection achieved after assembling.

36.1 Plug-in output shaft



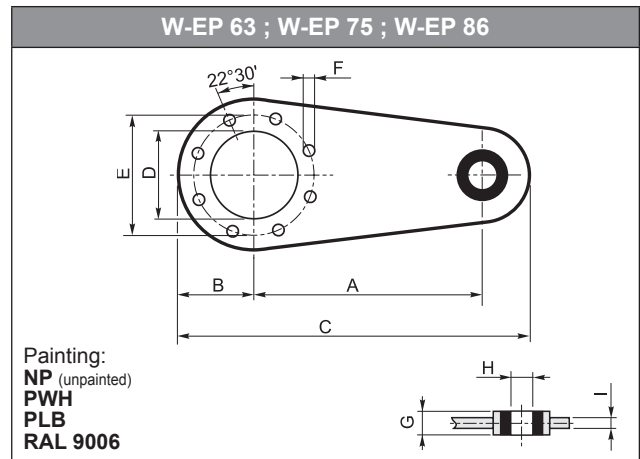
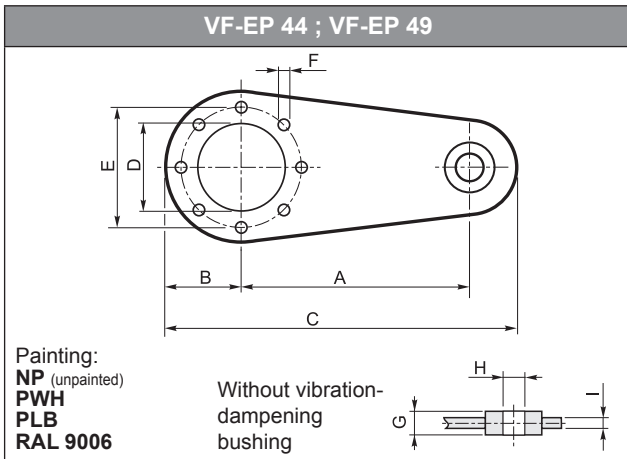
	C	D	D1	E	F1	F2	M	N	V	X	Y
VF-EP 44	40	18	18	45	6	20.5	70	115	M6x16	5	30
VF-EP 49 VF-EP R 49	60	25	25	65	8	28	89	154	M8x19	5	50
W-EP 63 W-EP R 63	60	25	25	65	8	28	127	192	M8x19	5	50
W-EP 75 W-EP R 75	60	30	30	65	8	33	134	199	M10x22	5	50
W-EP 86 W-EP R 86	60	35	35	65	10	38	149	214	M10x22	5	50



	C	D	D1	E	F	F1	F2	L	V	X	Y
VF-EP 44	40	18	18	42.7	64	6	20.5	149.4	M6x16	5	30
VF-EP 49 VF-EP R 49	60	25	25	63.2	82	8	28	208.4	M8x19	5	50
W-EP 63 W-EP R 63	60	25	25	63.2	120	8	28	246.4	M8x19	5	50
W-EP 75 W-EP R 75	60	30	30	64	127	8	33	255	M10x22	5	50
W-EP 86 W-EP R 86	60	35	35	64	140	10	38	268	M10x22	5	50

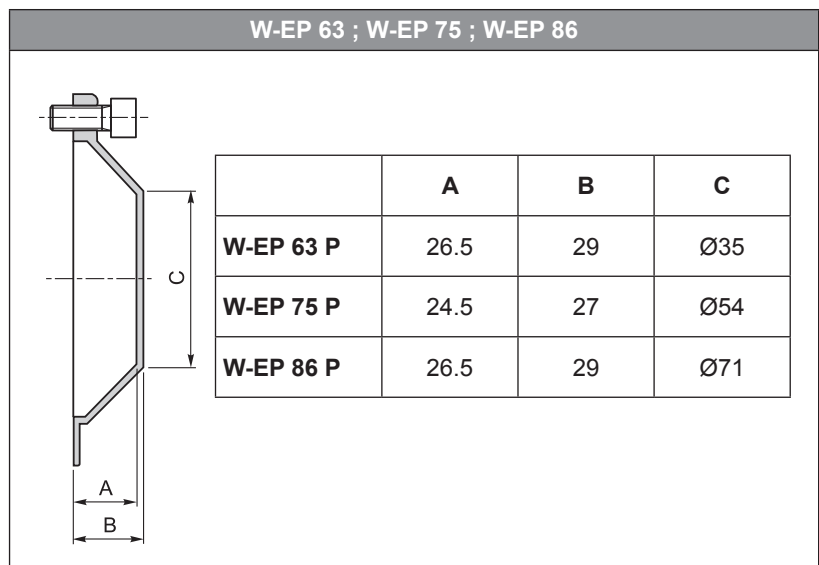
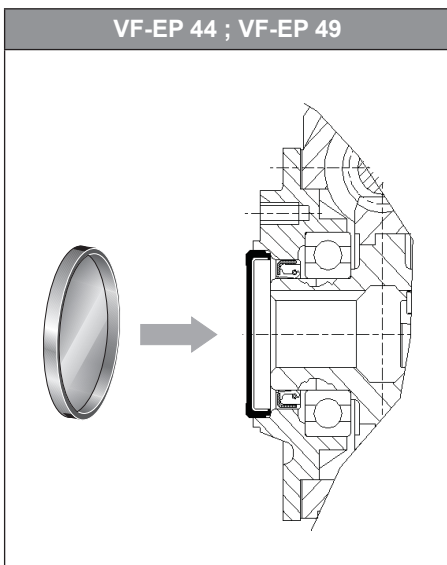


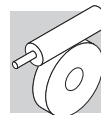
36.2 Torque arm



	A	B	C	D	E	F	G	H	I
VF-EP 44	100	40	157.5	50	65	7	14	8	4
VF-EP 49 VF-EP R 49	100	55	172.5	68	94	7	14	8	4
W-EP 63 W-EP R 63	150	55	233	75	90	9	20	10	6
W-EP 75 W-EP R 75	200	63	300	90	110	9	25	20	6
W-EP 86 W-EP R 86	200	80	318	110	130	11	25	20	6

36.3 Safety cover





RVS LIMIT-STOP DEVICE

37 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 40.

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 next page).

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.

37.1 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 to main relays.

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.





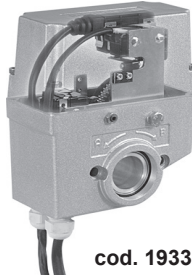
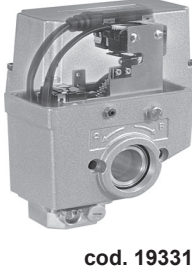
RVS ME DM: features the combination of the two options described above.

Regardless to the variant the RVS limit switch device offers the following features:

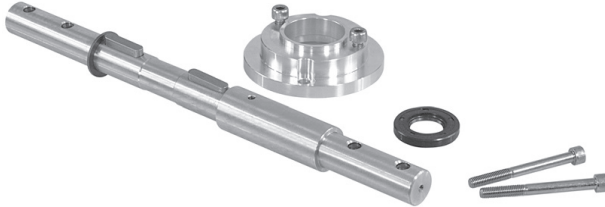
- Extremely quiet operation
- Space efficiency
- Ease of installation and setting
- Overall protection IP55
- Adjustment range within a maximum of 43 revolutions of drive shaft.

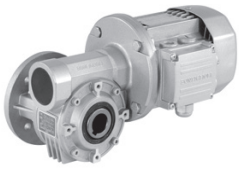
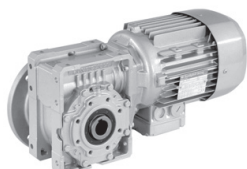
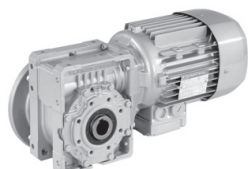
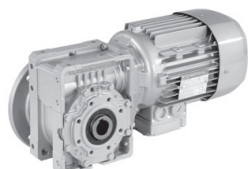
38 ORDERING CODES

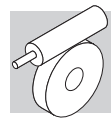
Determine which device or variant best suits the specific application and locate the part number in the table below:

RVS	RVS ME	RVS DM	RVS ME DM
 <p>cod. 193312025</p>	 <p>cod. 193312026</p>	 <p>cod. 193312027</p>	 <p>cod. 193312028</p>

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

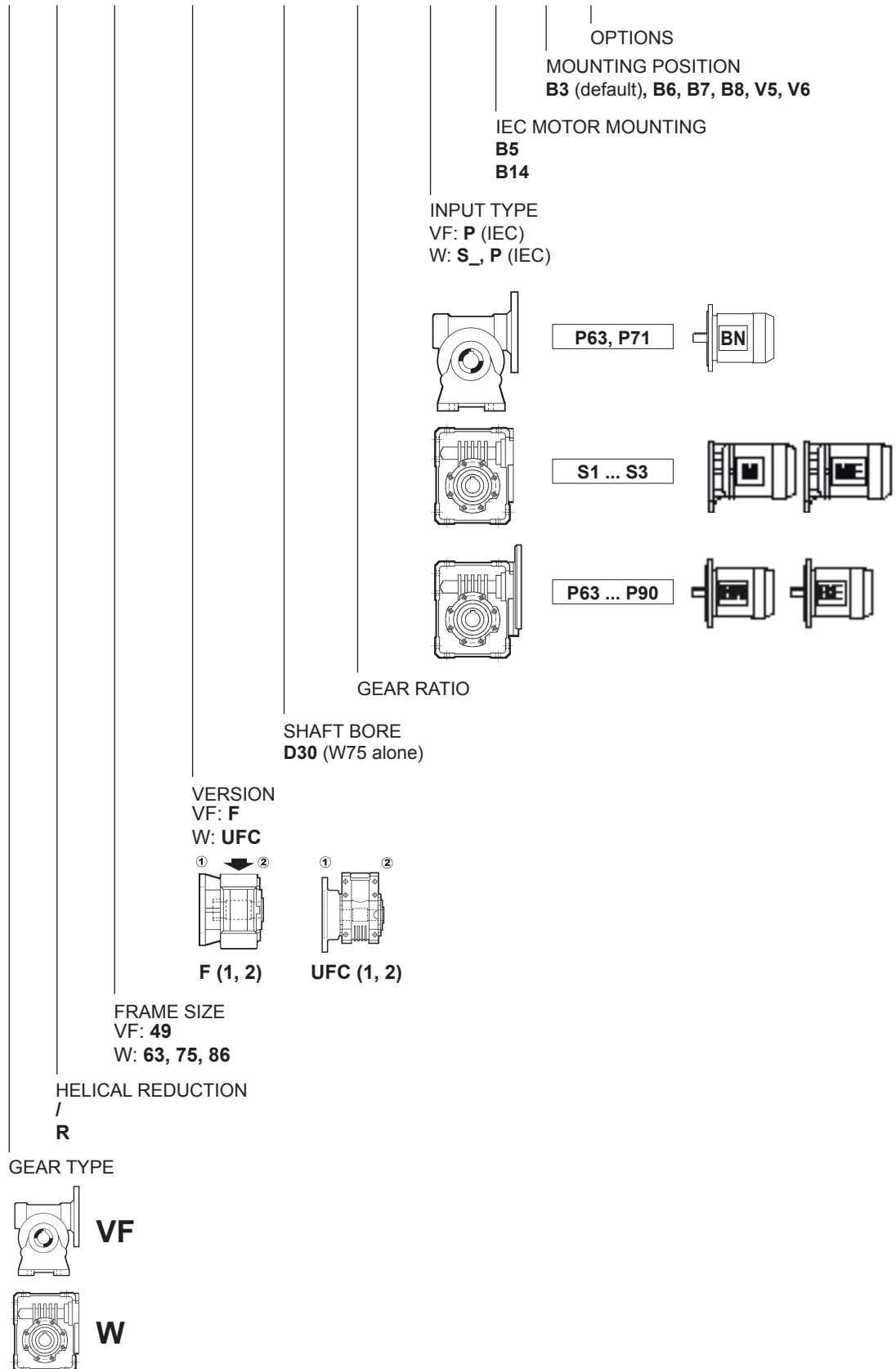
 <p>VF 49 F - VFR 49 F</p>	 <p>W 63 UFC - WR 63 UFC</p>	 <p>W 75 UFC - WR 75 UFC</p>	 <p>W 86 UFC - WR 86 UFC</p>
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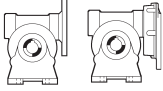

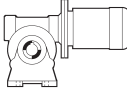
39 DESIGNATION

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

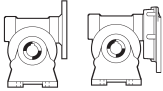

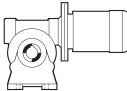
W R 75 UFC1 D30 240 P71 B5 B3



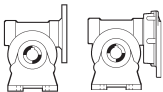

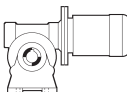
**40 GEARMOTOR SELECTION****0.12 kW**

n_2 min ⁻¹	M_2 Nm	i			
			IE1		IE1
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
17.5	37	80	VF 49_80	P63	BN63A4
20.0	34	70	VF 49_70	P63	BN63A4
23.3	31	60	VF 49_60	P63	BN63A4

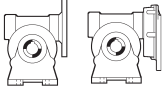
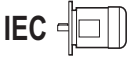
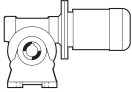
0.18 kW

n_2 min ⁻¹	M_2 Nm	i			
			IE1		IE1
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
20.0	49	70	VF 49_70	P63	BN63B4
23.3	45	60	VF 49_60	P63	BN63B4

0.25 kW

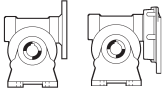

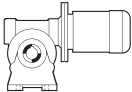
n_2 min ⁻¹	M_2 Nm	i			
			IE1		IE1
4.7	214	300	WR 63_300	P71	BN71A4
5.8	192	240	WR 63_240	P71	BN71A4
7.3	170	192	WR 63_192	P71	BN71A4
10.4	136	135	WR 63_135	P71	BN71A4
12.3	121	114	WR 63_114	P71	BN71A4
14.0	82	100	VF 49_100	P71	BN71A4
17.5	72	80	VF 49_80	P71	BN71A4
20.0	66	70	VF 49_70	P71	BN71A4
23.3	61	60	VF 49_60	P71	BN71A4

0.37 kW

n_2 min ⁻¹	M_2 Nm	i		IEC 	
				IE1	IE1
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
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

W 63_100 S1 M1SD4

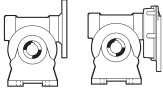

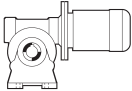
0.55 kW

n_2 min ⁻¹	M_2 Nm	i		IEC 	
				IE1	IE1
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
17.5	170	80	W 63_80	P80	BN80A4
21.9	148	64	W 63_64	P80	BN80A4
23.3	148	60	W 75_60	P80	BN80A4

W 63_100 S1 M1LA4
W 63_80 S1 M1LA4

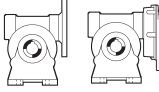
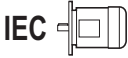
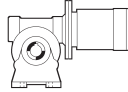
W 63_64 S1 M1LA4
W 75_60 S1 M1LA4

0.75 kW

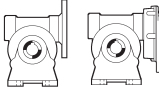
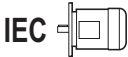
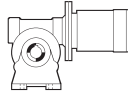
n_2 min ⁻¹	M_2 Nm	i		IEC 	
				IE2	IE2
7.4	557	192	WR 86_192	P80	BE80B4
8.5	504	168	WR 86_168	P80	BE80B4
9.5	435	150	WR 75_150	P80	BE80B4
10.3	436	138	WR 86_138	P80	BE80B4
11.9	378	120	WR 75_120	P80	BE80B4
14.3	275	100	W 75_100	P80	BE80B4
17.9	236	80	W 75_80	P80	BE80B4
22.3	195	64	W 63_64	P80	BE80B4
23.8	196	60	W 75_60	P80	BE80B4

W 75_100 S2 ME2SB4
W 75_80 S2 ME2SB4
W 63_64 S2 ME2SB4
W 75_60 S2 ME2SB4

**1.1 kW**

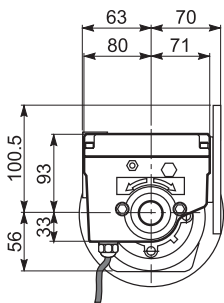
n_2 min ⁻¹	M_2 Nm	i	  IE2	 IE2	
10.4	643	138	WR 86_138	P90 BE90S4	
11.9	586	120	WR 86_120	P90 BE90S4	
14.3	437	100	W 86_100	P90 BE90S4	W 86_100 S3 ME2SA4
17.9	379	80	W 86_80	P90 BE90S4	W 86_80 S3 ME3SA4
22.3	322	64	W 86_64	P90 BE90S4	W 86_60 S3 ME3SA4

1.5 kW

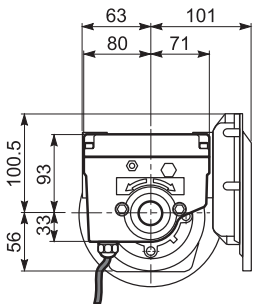
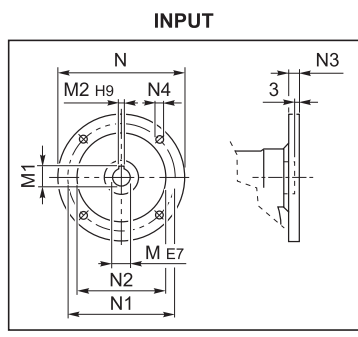
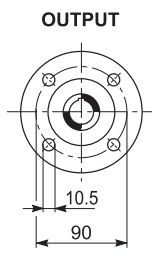
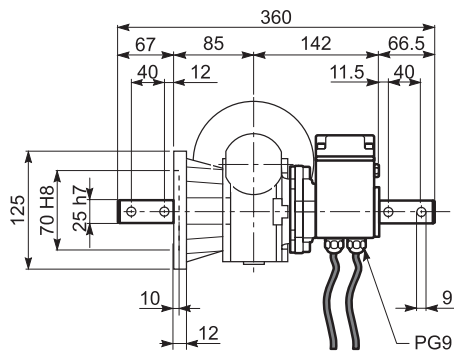
n_2 min ⁻¹	M_2 Nm	i	  IE2	 IE2	
11.9	792	120	WR 86_120	P90 BE90LA4	
17.9	512	80	W 86_80	P90 BE90LA4	W 86_80 S3 ME3SB4
22.3	435	64	W 86_64	P90 BE90LA4	W 86_60 S3 ME3SB4

41 DIMENSIONS

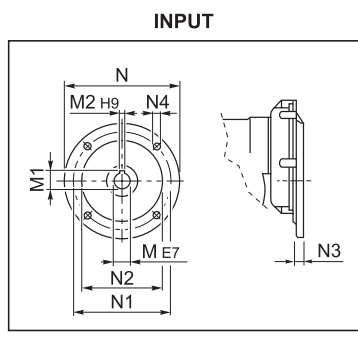
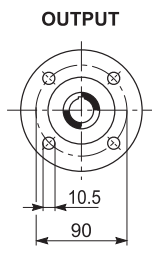
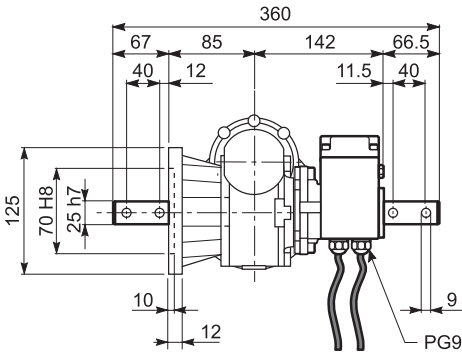
VF 49_F - VFR 49_F



VF 49_F



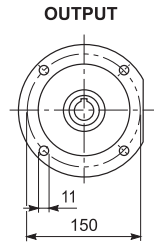
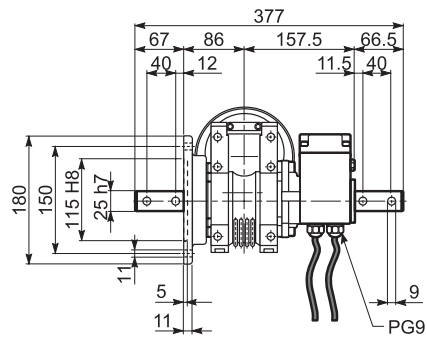
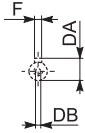
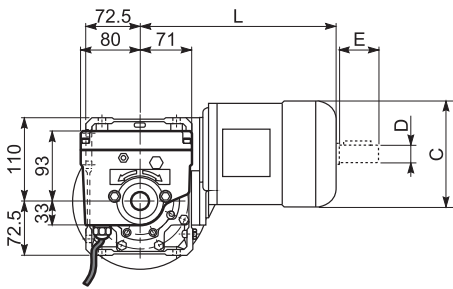
VFR 49_F



	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

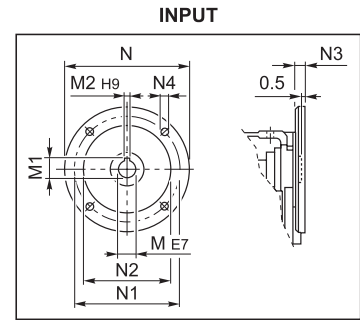
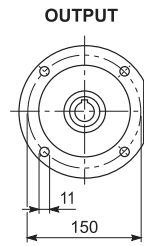
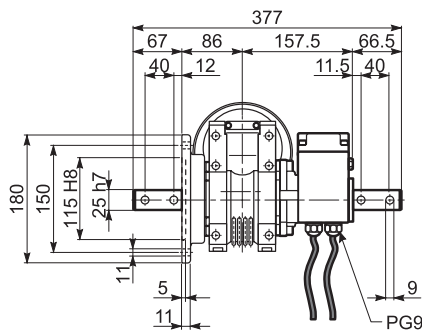
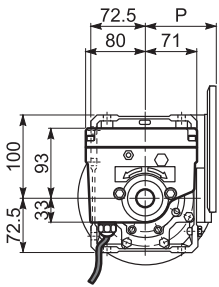


W 63 UFC_M/ME - W 63 UFC - WR 63 UFC

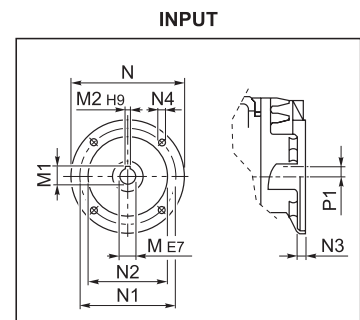
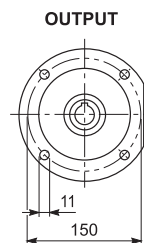
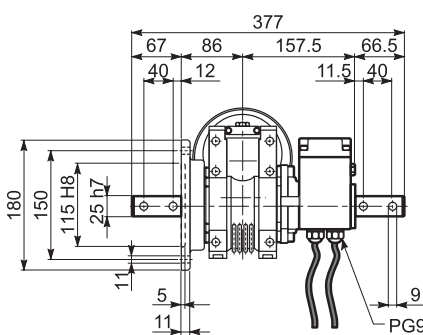
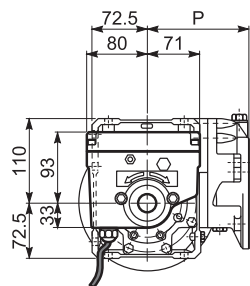


W 63 UFC_M/ME

	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

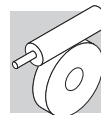


W 63 UFC

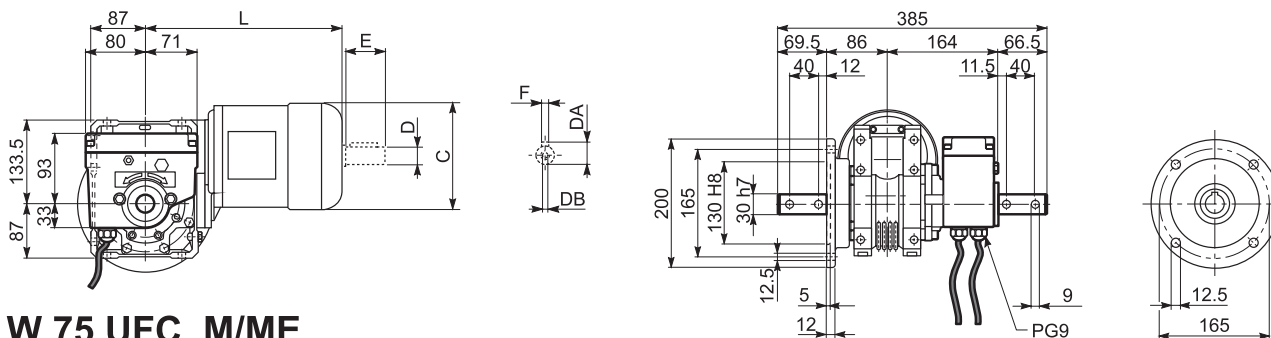


WR 63 UFC

	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

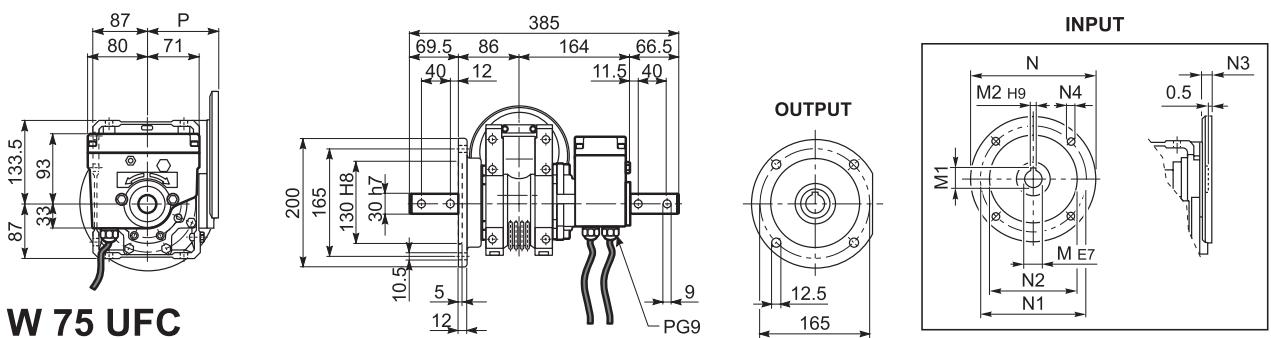


W 75 UFC_M/ME - W 75 UFC - WR 75 UFC

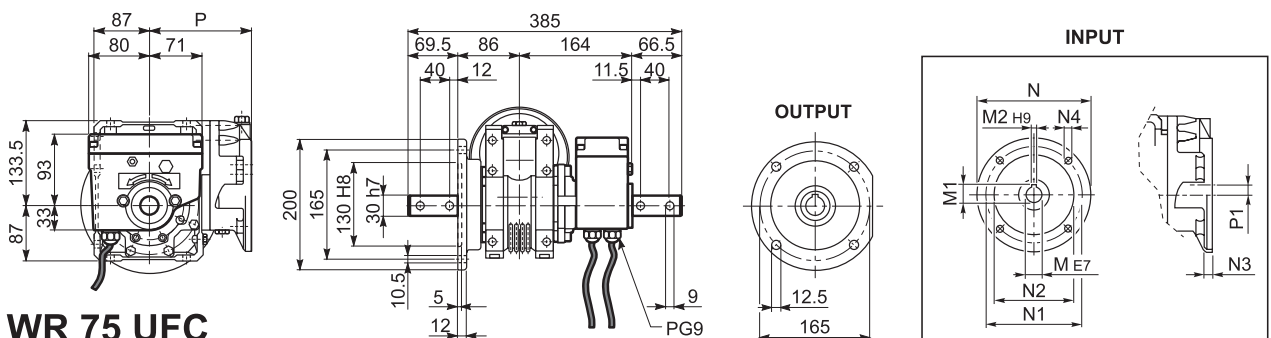


W 75 UFC_M/ME

	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

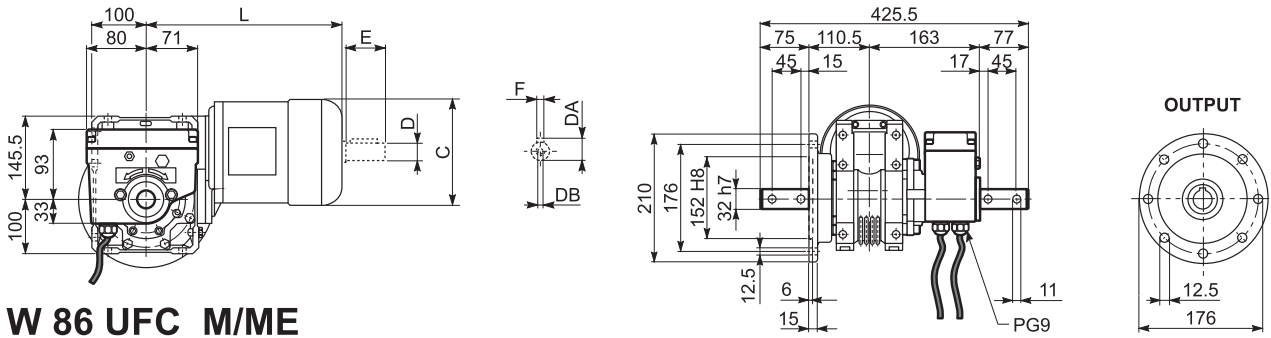


WR 75 UFC

	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

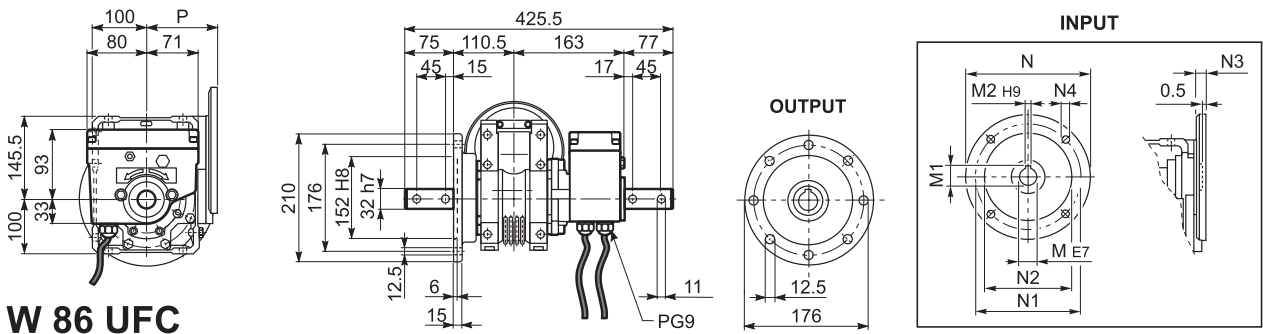


W 86 UFC_M/ME - W 86 UFC - WR 86 UFC

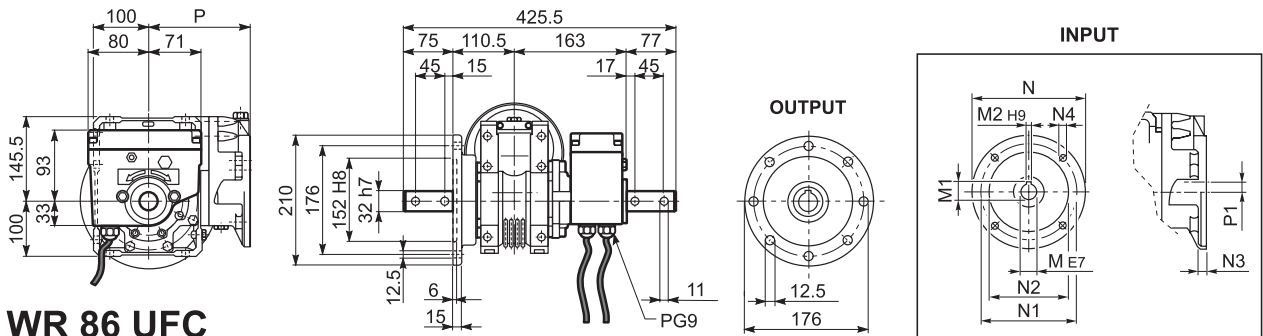


W 86 UFC_M/ME

	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

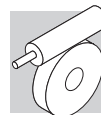
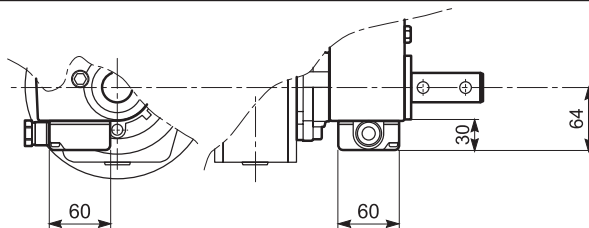


W 86 UFC

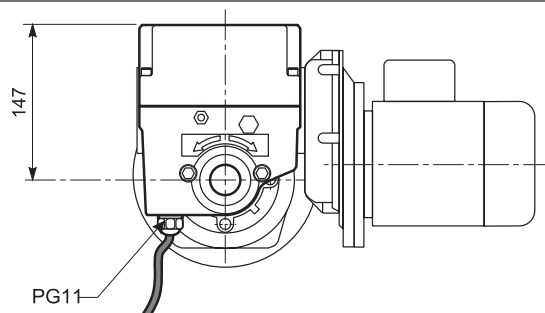


WR 86 UFC

	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

**42 OPTIONS****Limit switch modifications****ME**

Version with terminal box

DM

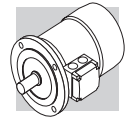
Four microswitch version



ELECTRIC MOTORS

M1 SYMBOLS AND UNITS OF MEASUREMENT

Symbols	Units of Measure	Description	Symbols	Units of Measure	Description
$\cos\varphi$	–	Power factor	n	[min ⁻¹]	Rated speed
η	–	Efficiency	P_B	[W]	Power drawn by the brake at 20°C
f_m	–	Power adjusting factor	P_n	[kW]	Motor rated power
I	–	Cyclic duration factor	P_r	[kW]	Required power
I_N	[A]	Rated current	t_1	[ms]	Brake response time with one-way rectifier
I_S	[A]	Locked rotor current	t_{1s}	[ms]	Brake response time with electronic-controlled rectifier
J_C	[Kgm ²]	Load moment of inertia	t_2	[ms]	Brake reaction time with a.c. disconnect
J_M	[Kgm ²]	Moment of inertia	t_{2c}	[ms]	Brake reaction time with a.c. and d.c. disconnect
K_c	–	Torque factor	t_a	[°C]	Ambient temperature
K_d	–	Load factor	t_f	[min]	Work time at constant load
K_J	–	Inertia factor	t_r	[min]	Rest time
M_A	[Nm]	Mean breakaway torque	W	[J]	Braking work between service interval
M_B	[Nm]	Brake torque	W_{max}	[J]	Maximum brake work for each braking
M_N	[Nm]	Rated torque	Z	[1/h]	Permissible starting frequency, loaded
M_L	[Nm]	Counter-torque during acceleration	Z_0	[1/h]	Max. permissible unloaded starting frequency (I = 50%)
M_S	[Nm]	Starting torque			



M2 INTRODUCTION

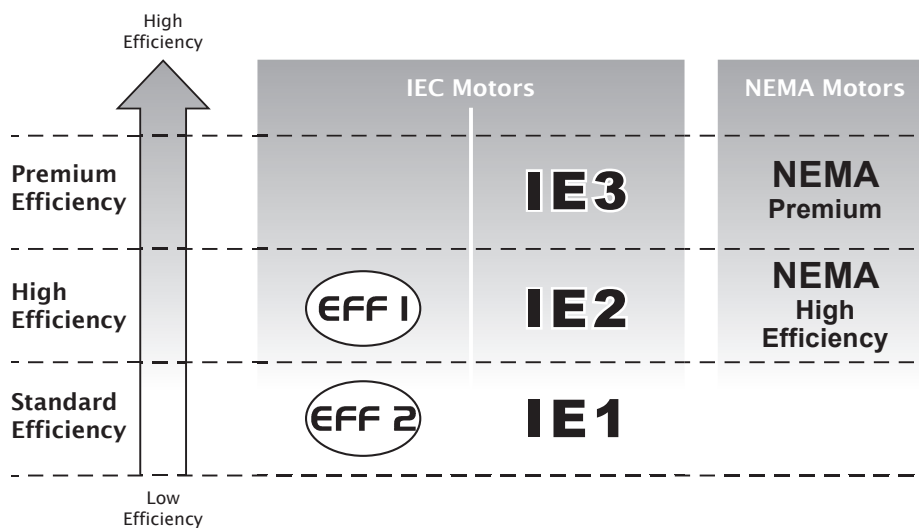
Efficiency classes and test methods

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 60034-30-1, "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 60034-30-1 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 4000 metres a.s.l.;
 - in ambient temperatures above 60 °C;
 - at maximum operating temperatures above 400 °C;
 - in ambient temperatures below -30 °C (all motors) or below 0 °C (water-cooled motors);
 - with incoming liquid coolants at temperatures below 0 °C or above 32 °C;
 - in potentially explosive atmospheres as defined by Directive 2014/34/EU.



M3 GENERAL CHARACTERISTICS

M3.1 Production range

The asynchronous three-phase electric motors BX, BE, BN, MX, ME and M of BONFIGLIOLI RIDUTTORI's production, are available in basic designs IMB5 and IMB14 and derived versions. Motors are the enclosed type with outer fan and cage-type rotor for use in industrial environments. Standard versions of BX-BE/MX-ME motors are 230/400V Δ/Y (400/690V Δ/Y in sizes BX-BE 160 and BX- BE 180), 50 Hz motors, with a tolerance of $\pm 10\%$. Standard BN/M motors are designed to operate from a rated voltage 230/400V Δ/Y (400/690V Δ/Y for frame sizes BN 160 through BN 200) 50 Hz, with $\pm 10\%$ tolerance.

M3.2 Standards

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

(F01)

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 60034-30-1	IEC 60034-30-1
Standard method for determining losses and efficiency from tests	CEI EN 60034-2-1	IEC 60034-2-1

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

(F02)

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



M3.3 Directives 2006/95/EC (LVD) and 2004/108/EC (EMC)

BX, BE, BN, MX, ME 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 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.

M3.4 EU Directive 2012/19/EU - Information on disposal



This product should not be mixed with general household waste. Disposal has to be carried out in conformity with EU Directive 2012/19/EU where established, and in accordance to national regulations.

Fulfill disposal in accordance with any other legislation in force throughout the country.

M3.5 Tolerances

As per the Norms CEI EN 60034-1, applicable the tolerances here below apply to the following quantities.

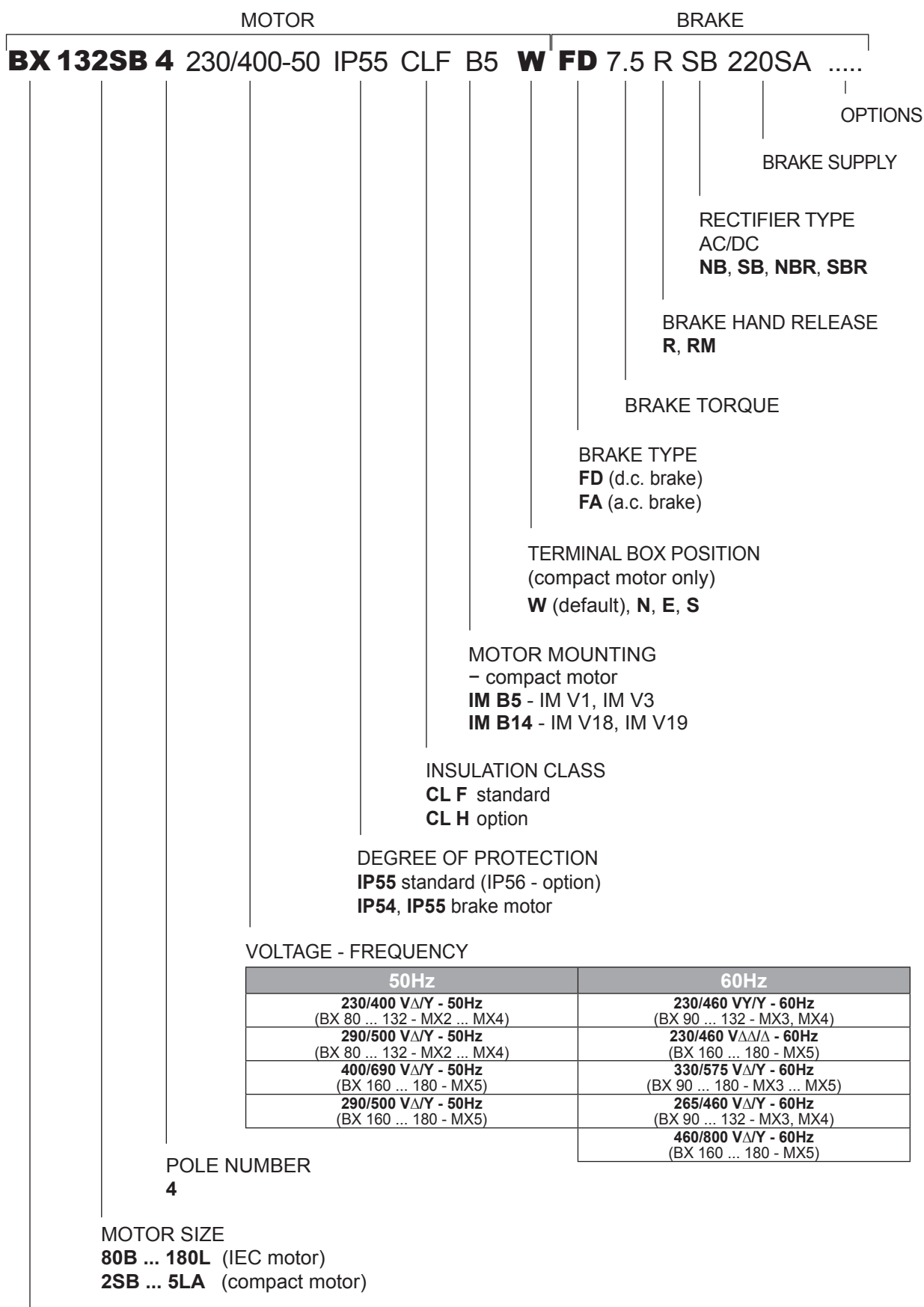
(F03)

-0.15 (1 - η) P \leq 50kW	Efficiency
-(1 - $\cos\phi$)/6 min 0.02 max 0.07	Power factor
\pm 20% *	Slip
+20%	Locked rotor current
-15% +25%	Locked rotor torque
-10%	Max. torque

(*) \pm 30% for motors with P_n < 1 kW



M4 MOTOR DESIGNATION



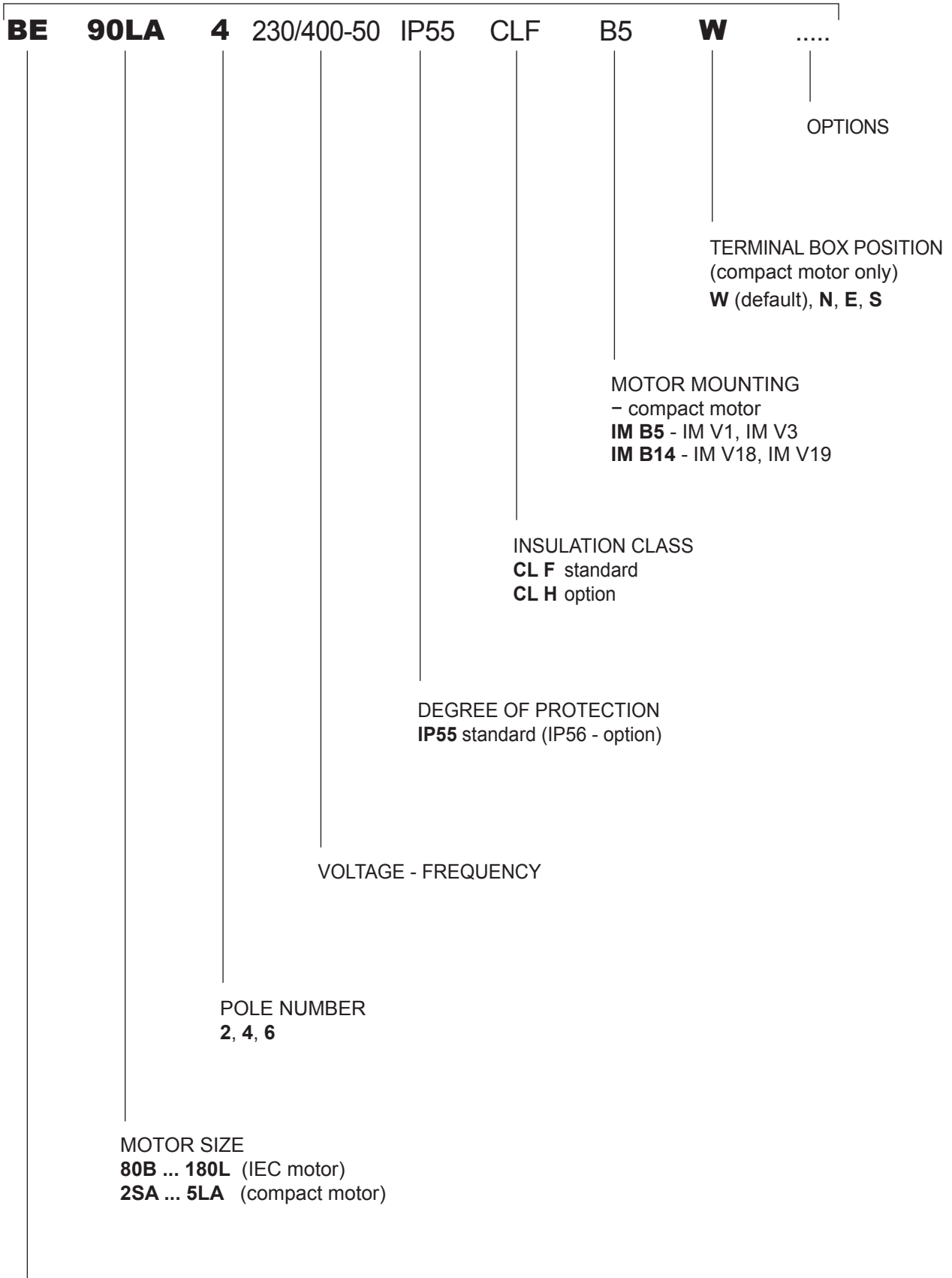
MOTOR TYPE

BX = IEC 3-phase, class IE3

MX = compact 3-phase, class IE3



MOTOR



MOTOR TYPE

BE = IEC 3-phase, class IE2

ME = compact 3-phase, class IE2



MOTOR

BRAKE

BN 90LA 4 230/400-50 IP55 CLF B5 W FD 7.5 R SB 220SA

OPTIONS

BRAKE SUPPLY

RECTIFIER TYPE
AC/DC
NB, SB, NBR, SBR

BRAKE HAND RELEASE
R, RM

BRAKE TORQUE

BRAKE TYPE
FD (d.c. brake)
FA (a.c. brake)

TERMINAL BOX POSITION
(compact motor only)
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 standard
CL H option

DEGREE OF PROTECTION
IP55 standard (IP56 - option)
IP54, IP55 brake motor

VOLTAGE - FREQUENCY

POLE NUMBER
2, 4, 6, 2/4, 2/6, 2/8, 2/12, 4/6, 4/8

MOTOR SIZE
56A ... 200LA (IEC motor)
0B ... 5SB (compact motor)

MOTOR TYPE
BN = IEC 3-phase **M** = IEC compact 3-phase



M5 VARIANTS AND OPTIONS

M5.1 Variants

(F04)

Description	Default	Option	Page
Voltage	230/400/50		
Protection class	BX - BE - BN - MX - ME - M IP 55	IP 56	
	BX_FD - BX_FA - BN_FD - BN_FA MX_FD - MX_FA - M_FD - M_FA IP 54	IP 55	
Insulation class	CLF	CLH	
Design version	BX - BE - BN B5 B5 R	B14 B14 R	

Default values.

M5.2 Options

(F05)

Description	Catalogue numbers						Availability	Page
	D3	K1	E3					
Thermal protective devices	D3	K1	E3				BX - BE - BN MX - ME - M	
50 Hz normalized power	PN						BN M	
Feedback devices	EN1	EN2	EN3	EN4	EN5	EN6	BX - BE - BN MX - ME - M	
Anti-condensate heaters	H1	NH1					BX - BE - BN MX - ME - M	
Tropicalized windings	TP						BX - BE - BN MX - ME - M	
Double-extended shaft	PS						BX - BE - BN MX - ME - M	
Rotor balancing grade B	RV						BX - BE - BN MX - ME - M	
External mechanical protections	RC	TC					BX - BE - BN MX - ME - M	
Forced ventilation	U1	U2*					BX - BE - BN MX - ME - M	
Certification CSA/UL	CUS						BX - BE - BN MX - ME - M	
Bureau of Indian Standard Certification	BIS						BE	
China Compulsory Certification	CCC						BE - BN ME - M	
Plug connector	CON						BX - BE - BN MX - ME - M	
Surface protection	C_						BX - BE - BN MX - ME - M	
Painting	RAL						BX - BE - BN MX - ME - M	
Certificates	ACM						BX - BE - BN MX - ME - M	
Inspection certificate	CC						BX - BE - BN MX - ME - M	
Backstop device	AL	AR					MX - ME - M	
Type of duty	S2	S3	S9				BN M	

* Only for motors BN and M



M5.3 Brake-related options

(F06)

Description	Catalogue numbers				Availability	Page
Brake torque	Refer to the specific brake type					223 226
Manual release lever	R	RM			BX - BN MX - M	228
Release lever orientation	AB	AA	AC	AD	BX - BN MX - M	229
DC brake rectifier	NB	NBR	SB	SBR	BX - BN MX - M	222
Soft-start flywheel	F1				BN M	230
Capacitive filter	CF				BX - BN MX - M	230
Brake separate power supply (*)	...SA	...SD			BX - BN MX - M	222 226
Brake functionality check	MSW				BX - BN MX - M	234
Additional cable entry for brake motors	IC				BX - BN MX - M	234

(*) Specify voltage.

Default values.

M5.4 Example of identification nameplate

1	IEC EN 60034	Bonfiglioli Riduttori	CE	4
	3~Mot BE 90LA 4		Cod. 8U09030001	
2	No 1003001 - 6954785	S 1	IM B 5 15,1 kg	5
	kW 1,5	CL F IP 55 Amb 40 °C		
	Hz	V ± 10%	A min ⁻¹ cos φ	
	50 ○	230/400 Δ/Y	6,1/3,5 1430 ○ 0,74	
3	60	265/460 Δ/Y	5,4/3,1 1730 0,73	
	50Hz-IE2	83.5(100%) - 83.0(75%) - 80.0(50%)		6
	60Hz-IE2	84.5(100%) - 83.9(75%) - 80.7(50%)		

- 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



M6 MECHANICAL FEATURES

M6.1 Versions

EC-normalised BX, BE and BN motors are available in the design versions as indicated in the table below here after as per Standards EN 60034-7 (BX/BE), CEI EN 60034-14 (BN).

Mounting versions are:

IM B5 (basic)

IM V1, IM V3 (derived)

IM B14 (basic)

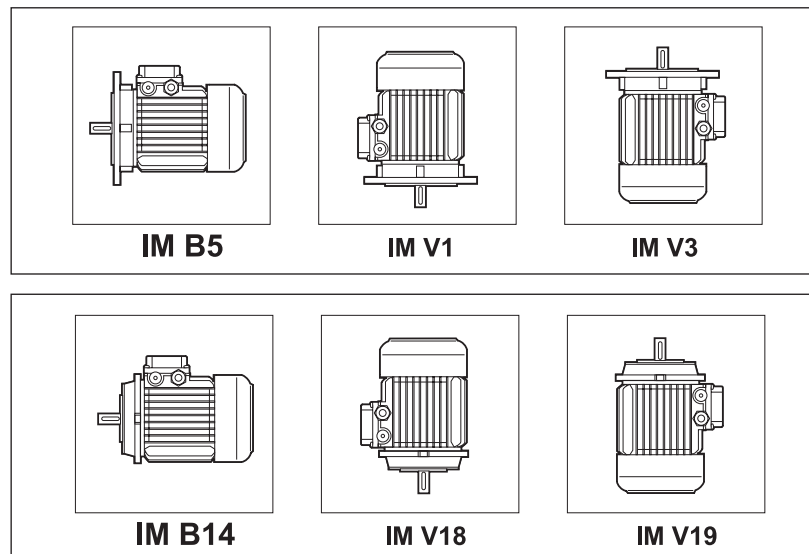
IM V18, IM V19 (derived)

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

(F07)





Flange output motors are also available with reduced coupling dimensions, as indicated in the table below - executions **B5R**, **B14R**. Their use in combination with gearboxes must be however coherent with the maximum installable power on gearboxes themselves (see chapter “Motor availability”). In case this condition is not met need to contact the Technical Service for the checking of the combination.

(F08)

	BN/BE 71	BX/BE/BN 80	BX/BE/BN 90	BX/BE/BN 100	BX/BE/BN 112	BX/BE/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

M6.2 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 solid particles (option **RC**).

(F09)

		IP 54	IP 55	IP 56
BX - BE - BN	MX - ME - M	●	standard	 on request
BX_FD BX_FA BN_FD BN_FA	MX_FD MX_FA M_FD M_FA	standard	 on request	●



IP			5			5		
0		Not protected	0		Not protected			
1		Protected against extraneous solid bodies having $\varnothing \geq 50$ mm	1		Protected against vertical water drips			
2		Protected against extraneous solid bodies having $\varnothing \geq 12.5$ mm	2		Protected against vertical water drips inclined up to 15°			
3		Protected against extraneous solid bodies having $\varnothing \geq 2.5$ mm	3		Protected against rain			
4		Protected against extraneous solid bodies having $\varnothing \geq 1.0$ mm	4		Protected against water splashes			
5		Protected against dust	5		Protected against jets of water			
6		No dust ingress	6		Protected against powerful jets of water			
			7		Protected against the effects of temporary immersion			
			8		Protected against the effects of continuous immersion			

M6.3 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.

M6.4 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.

M6.5 Noise

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



M6.6 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.

M6.7 Terminal box



Terminal board features 6 studs for eyelet terminal connection (9 studs execution for US voltage "Dual Voltage"). 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. 8 (brake FD), 9 (brake FA).

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.



(F10)

		No. of terminals	Terminal threads	Wiremax cross section area sq mm ²
BX 80, BX 90 BE 80, BE 90 BN 56 ... BN 90	MX2, MX3 ME2 M05 ... M2	6	M4	2.5
BX 100 ... BX 132 BE 100 ... BE 132 BN 100 ... BN 160MR	MX3, MX4 ME3, ME4 M3 ... M4	6	M5	6
BX 160 - BE 160 ... BE 180M BN 160M ... BN 180M	ME5 MX5 - M5	6	M6	16
BX 180 - BE 180L BN 180L ... BN 200L	- -	6	M8	25
BX 80 ... BX 132 BE 80 ... BE 132 BN 63 ... BN 160MR	MX2 ... MX4 ME2 ... ME4 M05 ... M4	9	M4	6
BX 160 ... BX 180 BE 160 ... BE 180 BN 160M ... BN 200L	MX5 ME5 M5	9	M6	16

M6.8 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.

(F11)

		Cable gland and dimensions		Maximum cable diameter allowed [mm]
BN 63	M05	2 x M20 x 1.5	1 Hole on each side	13
BN 71 - BE 71	M1	2 x M25 x 1.5		17
BX 80, BX 90 - BE 80, BE 90 BN 80, BN 90	MX2, MX3 - ME2 M2	2 x M25 x 1.5		17
BX 100, BX 112 - BE 100, BE 112 BN 100	MX3, MX4 - ME3 M3	2 x M32 x 1.5	2 Holes on each side	21
		2 x M25 x 1.5		17
BN 112	-	2 x M32 x 1.5		21
		2 x M25 x 1.5		17
BX 132 - BE 132 BN 132...BN 160MR	MX4 - ME4 M4	4 x M32 x 1.5		21
BX 160 - BE 160, BX 180 - BE 180 BN 160M...BN 200L	MX5 - ME5 M5	2 x M40 x 1.5	Pivoting, 4 x 90°	28




M6.9 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

(F12)

	DE	NDE	
	MX, ME, M	M	M_FD, M_FA
M05	6004 2Z C3	6201 2Z C3	6201 2RS C3
M1	6004 2Z C3	6202 2Z C3	6202 2RS C3
MX2 - ME2 - M2	6007 2Z C3	6204 2Z C3	6204 2RS C3
MX3 - ME3 - M3	6207 2Z C3	6206 2Z C3	6206 2RS C3
MX4 - ME4 - M4	6309 2Z C3	6308 2Z C3	6308 2RS C3
MX5 - ME5 - M5	6309 2Z C3	6309 2Z C3	6309 2RS C3

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



M7 ELECTRICAL CHARACTERISTICS

M7.1 Voltage



Single speed motors are provided in standard execution either for nominal voltage 230 / 400 V Δ/Y , 50 Hz, or 400 / 690 V Δ/Y , 50 Hz, with a voltage tolerance of $\pm 10\%$, according to what is specified on the below table.

On all the motors BN and M, for which the voltage / frequency configuration is not included on the below table, the voltage tolerance is reduced down to $\pm 5\%$.

For the operation out of the tolerance boundaries, the temperature may exceed by 10 K the limit provided by the adopted insulation class.

The motors are suitable for operation on distribution European grid with voltage complying with the publication IEC 60038.

(F13)


Efficiency class			V_{mot} $\pm 10\%$ 3~	Configuration
IE3	BX 80 ... BX 132	MX2 ... MX4	230 / 400 V - Δ/Y - 50 Hz	standard
	BX 160, BX 180	MX 5	400 / 690 V - Δ/Y - 50 Hz	standard
IE2	BE 71 ... 132	ME2 ... ME4	230 / 400 V - Δ/Y - 50 Hz	standard
			460 V Y - 60 Hz ¹	standard
	BE 160, BE 180	ME5	400 / 690 V - Δ/Y - 50 Hz	At request, carries no extra charge
			460 V Δ - 60 Hz ¹	standard
IE1	BN 56 ... BN 132	M0 ... M4	230 / 400 V - Δ/Y - 50 Hz	standard
			400 / 690 V - Δ/Y - 50 Hz	At request, carries no extra charge
	BN 160 ... BN 200	M5	460 V Y - 60 Hz	standard
			400 / 690 V - Δ/Y - 50 Hz	standard
			460 V Δ - 60 Hz	standard

¹ 4 pole motor only

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

The table below shows the wiring options available.

(F14)

Number of poles		Winding connection
2	BE 80 ... BE 160, BN 63 ... BN 200	Δ / Y ⁽²⁾
4	BX 80 ... BX 180 BE 80 ... BE 180, BN 56 ... BN 200	
6	BE 90 ... BE 160, BN 63 ... BN 200	
8	BN 71 ... BN 132	
2/4	BN 63 ... BN 132	Δ / YY (Dahlander)
2/6	BN 71 ... BN 132	Y / Y (Two windings)
2/8	BN 71 ... BN 132	
2/12	BN 80 ... BN 132	
4/6	BN 71 ... BN 132	
4/8	BN 80 ... BN 132	Δ / YY (Dahlander)

⁽²⁾ Motors with voltage in ratio 2 (ex. 230/460 - 60) will be equipped with a 9 pin terminal box with winding connection either $\Delta \Delta / \Delta$ or YY / Y (except 6 pole BN 63 Δ / Y)



M7.2 Frequency

Rated output power BN / M for 60 Hz operation is shown in the following diagram.

(F15)

		P _n [kW]						P _n [kW]			
		2P	4P	6P	8P (*)			2P	4P	6P	8P (*)
BN 56A	–	–	0.07	–	–	BN 100L	M3LA	3.5	–	–	–
BN 56B	M0B	–	0.1	–	–	BN 100LA	–	–	2.5	1.8	0.9
BN 63A	M05A	0.21	0.14	0.1	–	BN 100LB	M3LB	4.7	3.5	2.2	1.3
BN 63B	M05B	0.3	0.21	0.14	–	BN 112M	–	4.7	4.7	2.5	1.8
BN 63C	M05C	0.45	0.3	–	–	–	M3LC	–	4.7	2.5	–
BN 71A	–	0.45	0.3	0.21	0.1	BN 132S	M4SA	–	6.5	3.5	2.5
–	M1SC	–	–	0.21	–	BN 132SA	–	6.5	–	–	–
BN 71B	M05SD	0.65	0.45	0.3	0.14	BN 132SB	M4SB	8.7	–	–	–
BN 71C	M1LA	0.9	0.65	0.45	–	BN 132M	–	11	–	–	3.5
BN 80A	–	0.9	0.65	0.45	0.21	BN 132MA	M4LA	–	8.7	4.6	–
BN 80B	M2SA	1.3	0.9	0.65	0.30	BN 132MB	M4LB	–	11	6.5	–
BN 80C	M2SB	1.8	1.3	0.9	–	BN 160MR	M4LC	12.5	12.5	–	–
BN 90S	–	–	1.3	0.9	0.45	BN 160M	M5SA	–	–	8.6	–
BN 90SA	–	1.8	–	–	–	BN 160MB	–	17.5	–	–	–
BN 90SB	–	2.2	–	–	–	–	M5SB	17.5	17.5	–	–
BN 90L	–	2.5	–	1.3	0.65	BN 160L	–	21.5	17.5	12.6	–
BN 90LA	M3SA	–	1.8	–	–	–	M5SC	21.5	–	–	–
BN 90LB	–	–	2.2	–	–	BN 180M	M5LA	24.5	21.5	–	–
						BN 180L	–	–	25.3	17.5	–
						BN 200L	–	–	34	–	–
						BN 200LA	–	34	–	22	–

(*) Excluded M_ motors

BX / BE / MX / ME motors are available at 60 Hz on a 4 pole configuration only, and their power rating is the same as their 50 Hz counterpart. Double speed BN / M motors supplied at 60 Hz will have an increase of nominal power, referred to 50 Hz, equal to 15%, whereas double speed BX / BE / MX / ME motors are not available. If a nominal power rating, equal to the normalised nominal power rating at 50 Hz, was requested to be on a nameplate of a motor meant to be voltage supplied at 60 Hz, the PN option shall be specified on the motor designation. Motors normally designed for a 50 Hz frequency may be used on a 60 Hz operating grid, but the related data shall be updated according to the following table. Motors designated for 50 Hz operation show on the nameplate also the values for 60 Hz operation (excluding motors in CUS execution and brake motors). See the following table.

(F16)

	50 Hz		60 Hz		
	V - 50 Hz	V - 60 Hz	P _n - 60 Hz	M _n , M _a /M _n - 60 Hz	n [min ⁻¹] - 60 Hz
BE/ME	230/400 Δ/Y	265 - 460 Δ Y	1	0.83	1.2
	400/690 Δ/Y	460 Δ			
BN/M	230/400 Δ/Y	220 - 240 Δ			
	–	380 - 415 Y			
	400/690 Δ/Y	380 - 415 Δ			
BN/M	230/400 Δ/Y	265 - 280 Δ			
	–	440 - 480 Y			
	400/690 Δ/Y	440 - 480 Δ			



M7.3 Ambient temperature

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 table below.

(F17)

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.

M7.4 50 HZ normalized power

PN

With this option, motor name plate includes 50 Hz normalized power information even when motor is designated for operation with 60 Hz power mains. For 60 Hz supplies along with voltages 230/460V and 575V the PN option is applied by default.

M7.5 Motors for USA and Canada

CUS

CUS option is available in NEMA Design C execution for BN, BE, M, ME motors, and NEMA Design B for BX motors, with regards to the electrical features. Motors are certified in compliance with CSA (Canadian Standard) C22.2 N° 100 and UL (Underwriters Laboratory) UL 1004-1 standards, as stated on UL file E308649.

BN, BE, M, ME motors nameplates show the below marks:



BX, MX motors nameplates show the below marks and are certified in compliance with the energy efficiency standards in effect in the USA and Canada, respectively provided by DOE (10 CFR Part 431) and NRCAN (Energy Efficiency Regulations), tested according to CSA C390 standard.





NOTES:

1. Starting from **June, 1st 2016**, CUS motors whose efficiency is below IE3 (i.e. “Premium Efficiency”) cannot be any longer sold in the USA and Canada, unless one or more of the following conditions apply:

- Double speed motors;
- Motors plated for a non - continuous duty (<80%);
- Motors intended to be operated through variable frequency drive only (properly equipped with “Inverter Duty Only” label, or similar).

2. BX 100, MX3LA and MX3LB motors are available for the USA only and not for Canada, and the related marks reported on the nameplates are the following:



The CUS option does not apply to servo-ventilated motors.

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

(F18)

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

CUS option is applicable onto 50 Hz operating motors as well (motors BX, MX excluded).

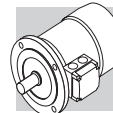
Motors with voltage in ratio 2 (e.g. 230/460-60; 220/440-60) feature, as standard, a 9-stud terminal board. For some executions, as well as for 575V-60Hz supply, the nominal rating is coincident with the correspondent 50Hz rating.

For DC brake motors type FD, 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:

(F19)

BX_FD - BN_FD MX_FD - M_FD	BX_FA - BN_FA MX_FA - M_FA	Power supply
Connected to terminal box 1~230V c.a.	Separate power supply 230V Δ	230SA
	Separate power supply 460V Y	460SA




M7.6 Motors certified for India

BIS

Low voltage motors $\geq 0.37\text{kW}$ manufactured or imported in India must be certified from Bureau of Indian Standard and provided with a mark certifying motor compliance to IS 12615 standard. BE motors with power from 0.37 to 3.7kW included are available with the above mentioned certification and, when BIS option is selected, are provided with the nameplate reporting the following logo:



BE motor with BIS option are available with the following nominal Voltage/Frequency combinations:

(F20)		V_{mot}
	$71 \leq \text{BE} \leq 112$	230/400 - 50 Hz

M7.7 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:



CCC option is not currently available for IE3 motors.
CCC option is not currently available for servo - ventilated motors.

M7.8 Insulation class

CL F

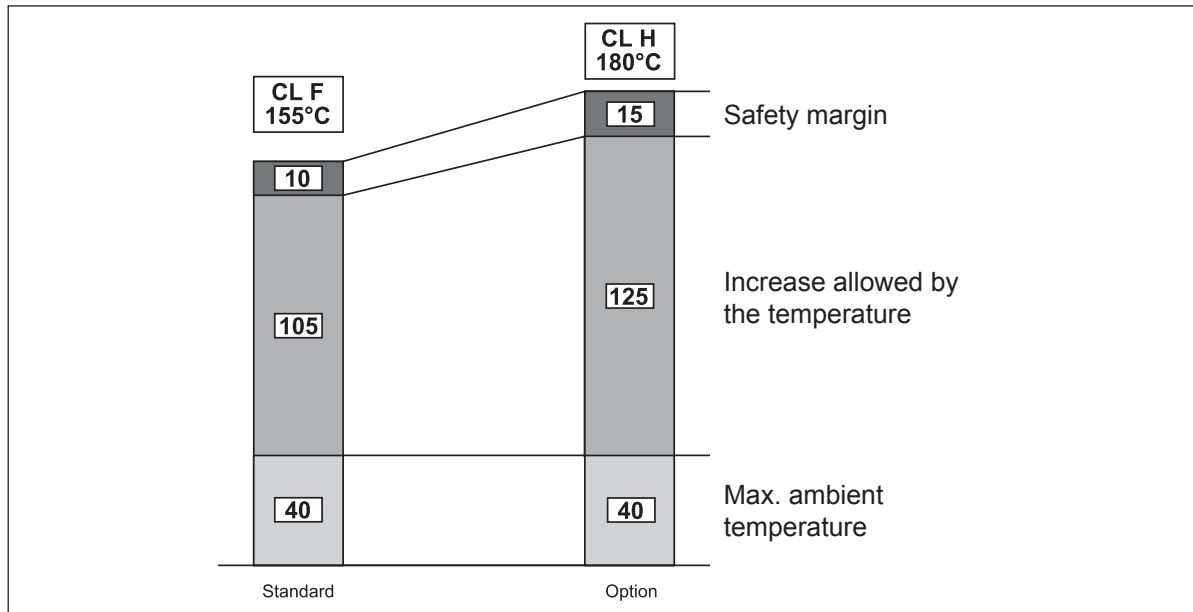
Bonfiglioli motors use class **F** insulating materials (enamelled wire, insulators, impregnation resins) as compare to the standard motor. In standard motors, stator windings over temperature normally stays below the 80 K limit corresponding to class B over temperature. A careful selection of insulating 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.
 Not available for motors in compliance with CSA e UL standards (CUS option).

(F21)



M7.9 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.

(F22)

	Type of duty						Contact us
	S2			S3 *			
	Duration (min)			Intermittence (I)			
f_m	10	30 (*)	60	25%	40%	70% (*)	
	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.

(*) Default values from options (tab. F05).



M7.9.1 Cyclic duration factor:

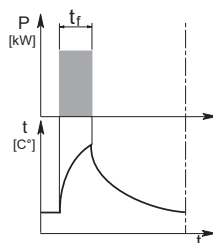
$$I = \frac{t_f}{t_f + t_r} \cdot 100 \quad (01)$$

t_f = work time under constant load

t_r = rest time

M7.9.2 Limited duration duty S2

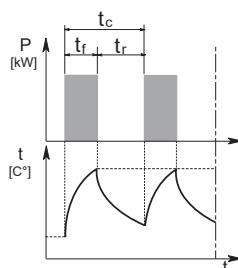
This type of duty is characterized by operation at constant load for a limited time, which is shorter than the time required to reach thermal equilibrium, followed by a rest period of sufficient duration to restore ambient temperature in the motor.



M7.9.3 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.





M7.10 Inverter-controlled motors

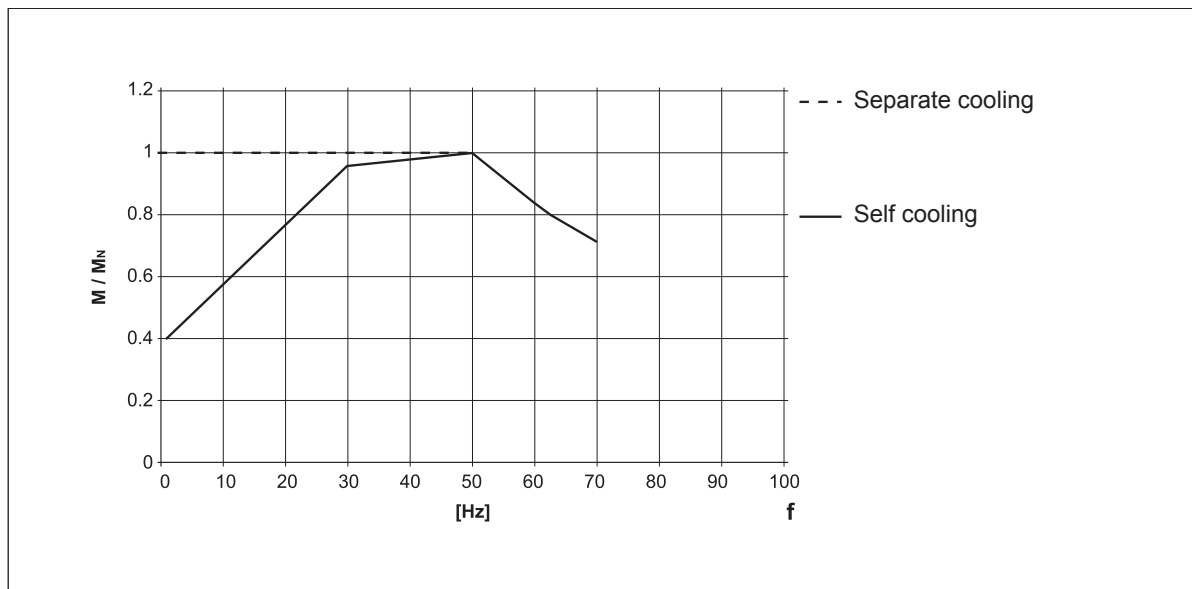
The electric motors Bonfiglioli may be used in combination with PWM inverters with rated voltage at transformer input up to 500 V. Standard motors use a phase insulating system with separators, class 2 enamelled wire and class H impregnation resins (1600V peak-to-peak voltage pulse capacity and rise edge $t_s > 0.1 \mu s$ at motor terminals). Typical torque/speed curves referred to S1 duty for motors with base frequency $f_b = 50$ Hz is are reported in the table below.

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.

(F23)



The following table reports the mechanical speed limit for motors operating above rated frequency:

(F24)

		n [min ⁻¹]		
		2p	4p	6p
≤ BE 112 - BN 112	ME2, ME3 M05 ... M3	5200	4000	3000
≥ BE 132 - BN 132	ME4, ME5 M4, M5	4500	4000	3000
BX 80 ... BX 180	MX2 ... MX5		4000	

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.



M7.11 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.

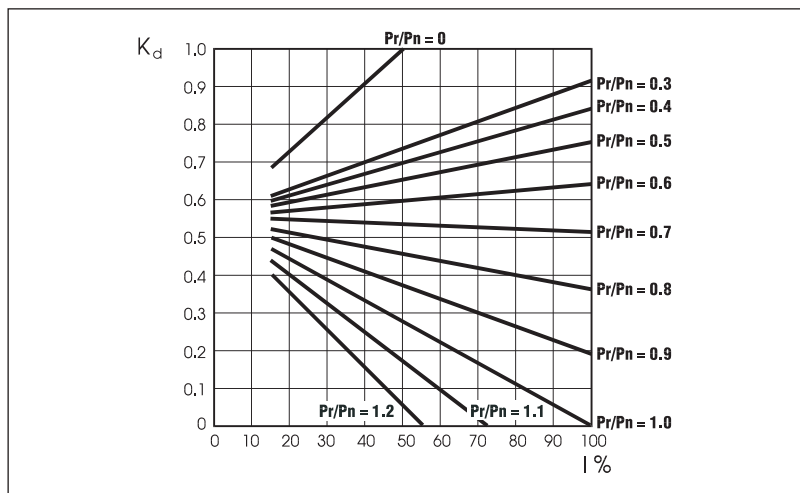
To give a practical example for an application characterized by inertia J_c , drawing power P_r and requiring mean torque at start-up M_L the actual number of starts per hour for the motor can be calculated approximately through the following equation:

$$Z = \frac{Z_0 \cdot K_c \cdot K_d}{K_J} \quad (02)$$

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 the following table

(F25)



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 tables (F31), (F39) and dependent on the number of switches (c/h).

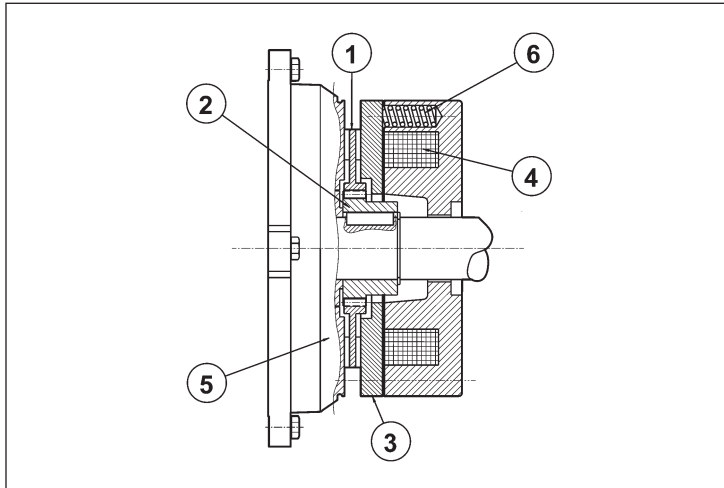


M8 ASYNCHRONOUS BRAKE MOTORS

M8.1 Operation

Versions with incorporated brake use spring-applied DC (FD option) or AC (FA 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.

(F26)



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.

M8.2 Most significant features

- High braking torques (normally $M_b \approx 2 M_n$), 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 FD; option **R** for FA).
- Corrosion-proof treatment on all brake surfaces.
- Insulation class F.

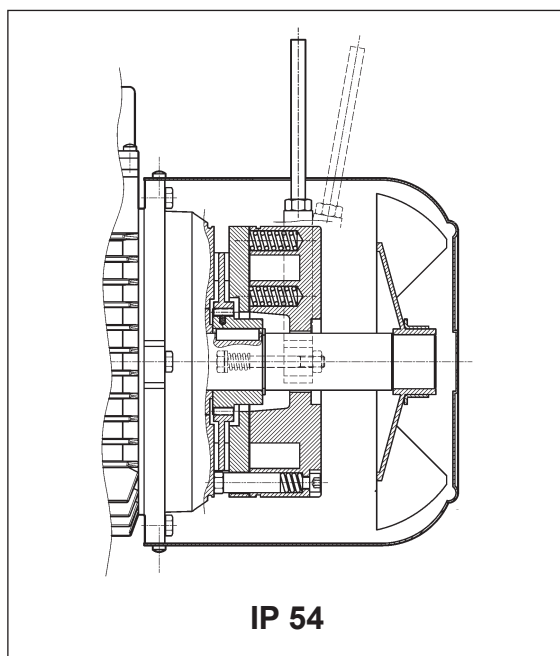


M9 DC BRAKE MOTORS TYPE BX_FD, BN_FD, MX_FD and M_FD

Frame sizes: BX 80 ... BX 180L - BN 63 ... BN 200L / MX2SB ... MX5LA - M05 ... M5

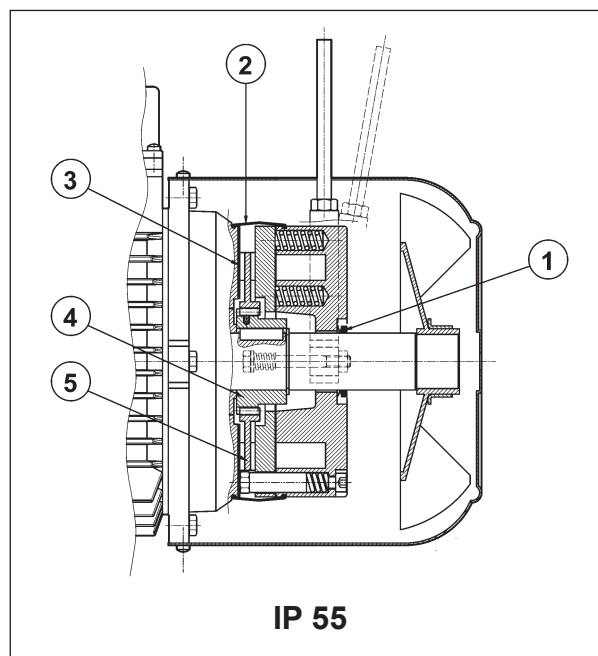
BE/ME motors may be available equipped with the FD brake, for further information please contact our Technical Department.

(F27)



IP 54

(F28)



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.

M9.1 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 shield and brake disc
- ④ stainless steel hub
- ⑤ stainless steel brake disc



M9.2 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 V_B is as indicated in the following table, regardless of mains frequency:
(F29)

2, 4, 6 P				1 speed	
		BN_FD / M_FD $V_{mot} \pm 10\%$ 3 ~		brake connected to terminal board power supply	separate power supply
BX 80...BX 132 BN 63...BN 132	MX2...MX4 M05...M4LB	230/400 V – 50 Hz	230 V	standard	specify V_B SA o V_B SD
BX 160...BX 180 BN 160...BN 200	MX5 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:

(F30)

2/4, 2/6, 2/8, 2/12, 4/6, 4/8 P				2 speed	
		BN_FD / M_FD $V_{mot} \pm 10\%$ 3 ~		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 ($V_{DC} \approx 0,45 \times V_{AC}$) is available in versions **NB**, **SB**, **NBR** e **SBR**, as detailed in the table below:

(F31)

		brake		
			standard	on request
BN 63	M05	FD 02		
BN 71	M1	FD 03 FD 53		
BX 80 - BN 80	MX2 - M2	FD 04		
BX 90S - BN 90S	—	FD 14		
BX 90L - BN 90L	—	FD 05		
BX 100 - BN 100	MX3 - M3	FD 15		
—		FD 55		
BX 112 - BN 112	—	FD 06S		
BX 132 - BN 132 - BN 160MR	MX4 - M4	FD 56 FD 06 FD 07		
BX 160 - BN 160L - BN 180M	MX5 - M5	FD 08		
BX 180 - BN 180L - BN 200M	—	FD 09		

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



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 intervention (braking condition reinstatement) 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: 230Vac ±10%, 400Vac ± 10%, 50/60 Hz (with power supply); 100Vdc ±10%, 180Vdc ± 10% (with SD option).

M9.3 FD brake technical specifications

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

(F32)

Brake	Brake torque M_b [Nm] springs			Release		Braking		W_{max} per brake operation [J]			W [MJ]	P [W]
	6	4	2	t_1	t_{1s}	t_2	t_{2c}	10 s/h	100 s/h	1000 s/h		
				[ms]	[ms]	[ms]	[ms]					
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 t_1 , t_{1s} , t_2 , t_{2c} 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, specific pressure); Therefore the declared wear rate must be considered as indicative.

M9.4 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 V_B 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 (F32) – 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 (F33) – 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 (F31).

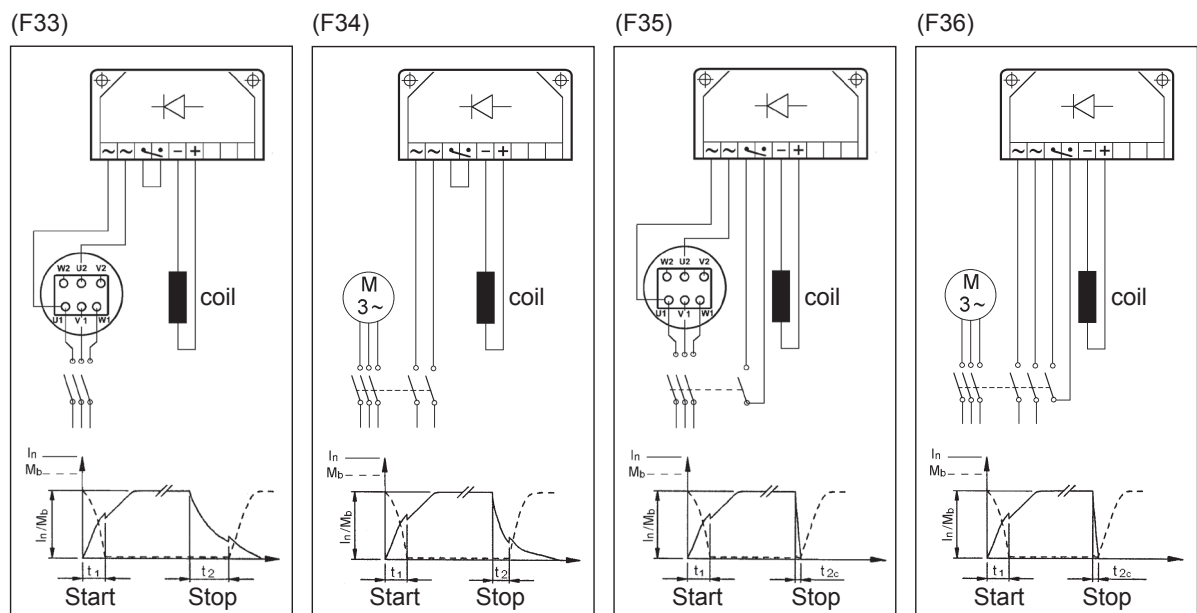
Table (F34) – Brake coil power supply from motor terminals and AC/DC line interruption.

Quick stop with operation times t_{2c} as per table (F31).

Table (F35) – Brake coil with separate power supply and AC/DC line interruption.

Stop time decreases by values t_{2c} indicated in the table (F31).

The brake may be voltage supplied directly from the motor terminal box (from tab. F32 to tab. F35) only if the nominal voltage of the brake is the same as the smaller voltage of the motor.

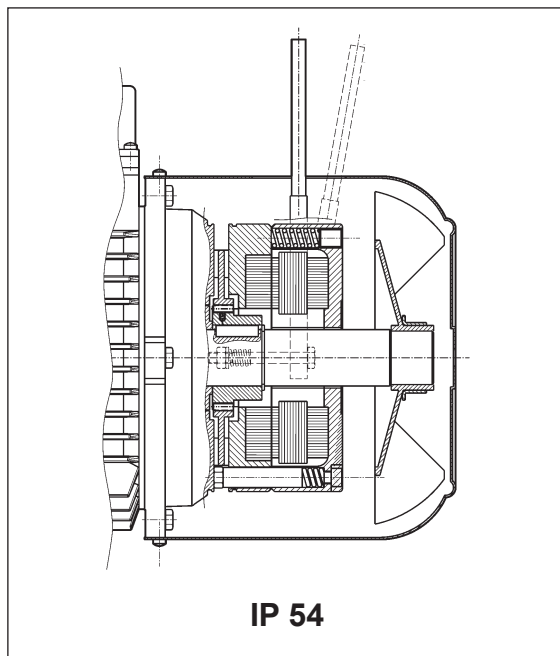




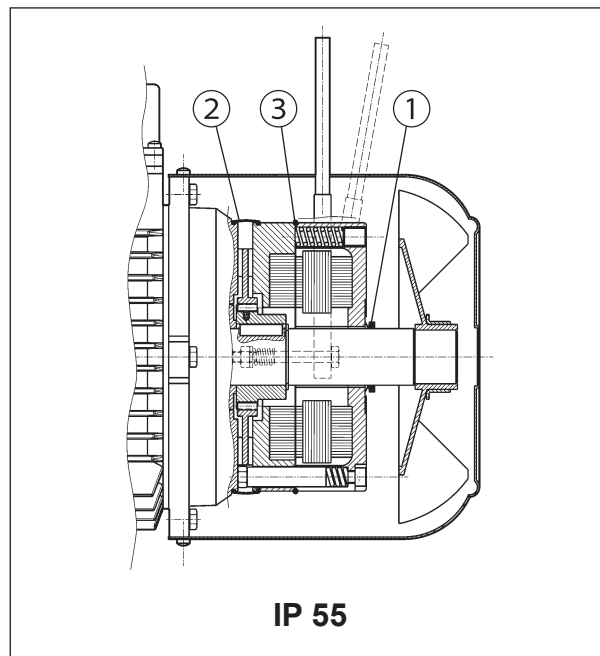
M10 AC BRAKE MOTORS TYPE BX_FA, BN_FA, MX_FA and M_FA

Frame sizes: BX 80 ... BX 160L - BN 63 ... BN 180M / MX2SB ... MX5LA - M05 ... M5

(F37)



(F38)



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. (F39).

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.

M10.1 Degree of protection

Standard protection class is IP54.

Brake motor FA 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 O-ring



M10.2 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:

(F39)

single-pole motor	BX 80...BX 132 BN 63...BN 132	BX 160 BN 160...BN 180
	230Δ / 400Y V ±10% – 50 Hz	400Δ/ 690Y V ±10% – 50 Hz
	265Δ / 460Y ±10% - 60 Hz	460Y – 60 Hz

switch-pole motors (separate power supply line)	BN 63...BN 132
	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.

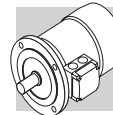
M10.3 Technical specifications of FA brakes

(F40)

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.

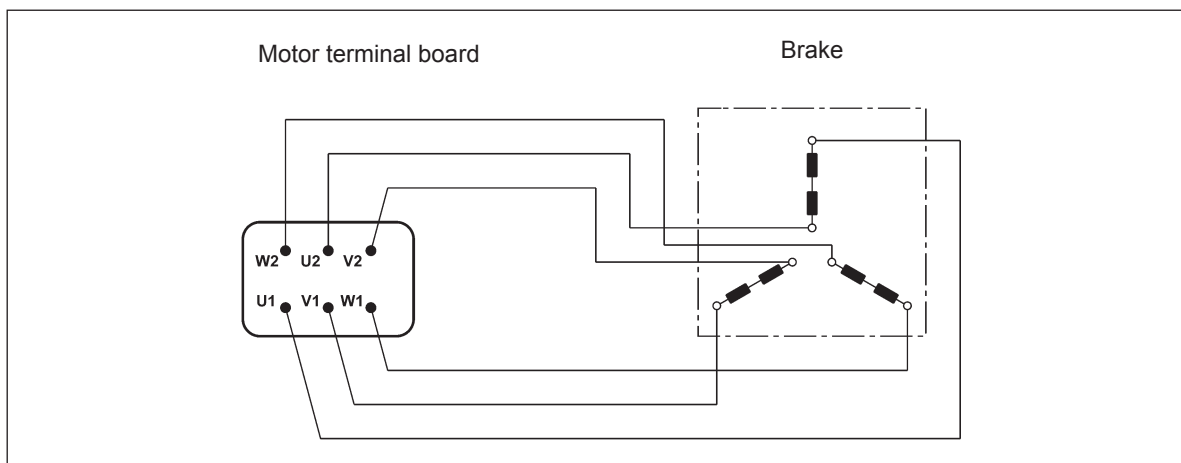


The brake pad wear depends on the operating/ambient conditions (temperature, humidity, angular speed, specific pressure); Therefore the declared wear rate must be considered as indicative.

M10.4 FA brake connections

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

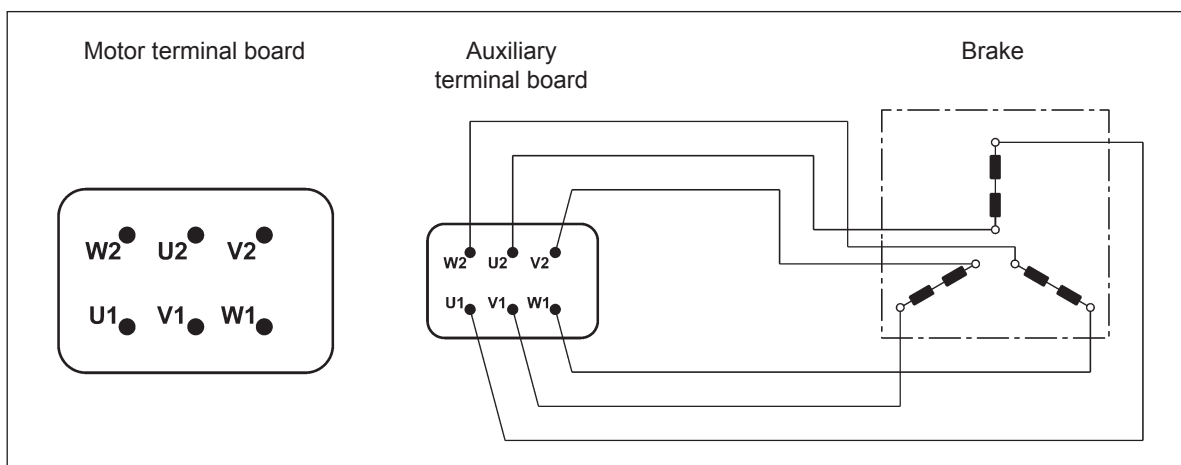
(F41)



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 below:

(F42)



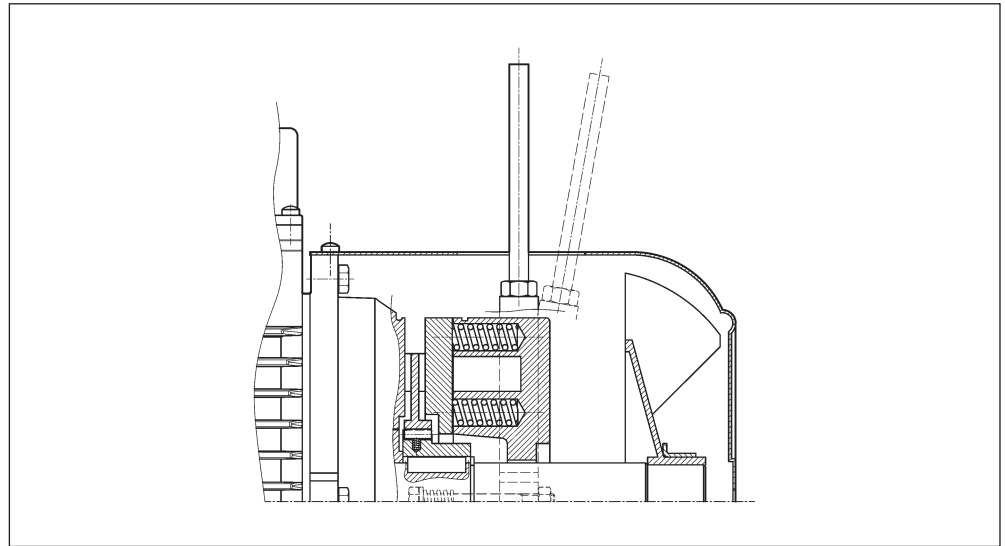


M11 BRAKE RELEASE SYSTEMS

Spring-applied brakes type FD 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.

R

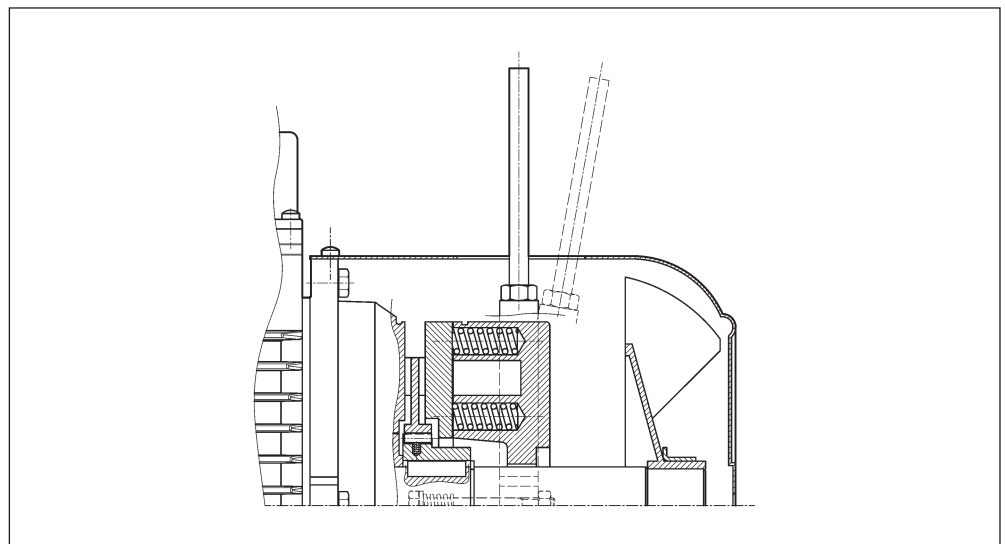
(F43)



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

RM

(F44)



On brake motors type 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:



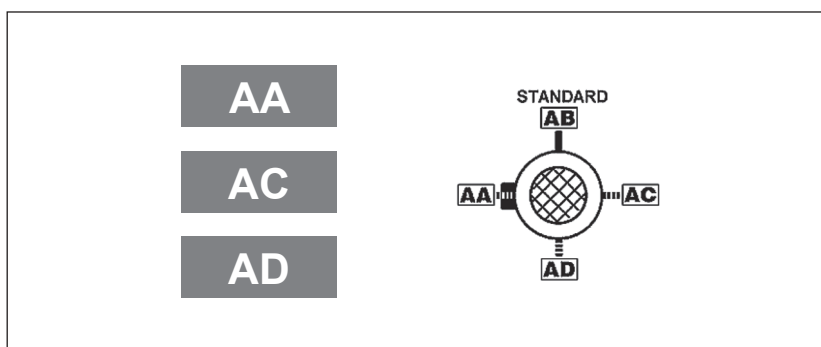
(F45)

	R	RM
BX_FD	BX 80 ... BX 180	BX 80 ... BX 132
BN_FD	BN 63 ... BN 200	BN 63 ... BN 132 FD07
MX_FD	MX2 ... MX5	MX2 ... MX4
M_FD	M05 ... M5	M05 ... M4LA
BX_FA	BX 80 ... BX 160	⊖
BN_FA	BN 63 ... BN 180M	⊖
MX_FA	MX2 ... MX5	⊖
M_FA	M05 ... M5	⊖

M11.1 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:

(F46)



M11.2 Separate brake supply

...SA

The brake coil is directly fed through an independent line, separately from the motor. In this case the rated voltage for the coil must be specified, e.g.230SA. The option is applicable to all motors with brake type FD and FA.

...SD

The brake coil is directly fed with DC current and the rectifier is out of the scope for supply. The rated voltage for the coil must be specified, e.g. 24SD.





M12 OPTIONS

M12.1 Soft-start / stop

F1

An optional flywheel - option F1 - is available for applications requiring soft starting or stopping. The flywheel's added inertia uses up kinetic energy during starting and returns it back during braking, thus catering for more progressive and gradual shock loads. The optional flywheel is available for brake motors type BN_FD with specific characteristics as detailed in the table below:

(F47)

Main data for flywheel of motore type: BN_FD, M_FD			
		Fly-wheel weight [Kg]	Fly-wheel inertia [Kgm ²]
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

M12.2 Capacitive filter

CF

An optional capacitive filter is available for brake motors type FD only. When the suitable capacitive filter is installed upstream of the rectifier (option CF), motors comply with the emission limits required by standard EN61000-6-3:2007“ Electromagnetic Compatibility – Generic Emission Standard – Part 6-3: Residential, commercial and light industrial environment”.

M12.3 Thermal protective devices

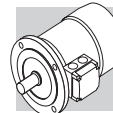
In addition to the standard protection provided by the magneto-thermal device, motors can be supplied with built-in thermal probes to protect the winding against overheating caused, by insufficient ventilation or by an intermittent duty.

This additional protection should always be specified for servoventilated motors (IC416).

M12.4 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.

M12.5 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.

M12.6 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 BX / BE and MX / ME motors on the sizes specified on the following table. All double speed motors are excluded. The connectors CON 1 / CON 2 are available for BX-BE/MX-ME and BN/M motors without brake and for brakemotors equipped with DC brake type FD, 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.

The CON option is not available when at least one of the next options are selected: the U2, CUS, IC.



Specifications

(F48)

Option	CON 1
Motor size	BX 80 ... BX 112 / MX2, MX3 / BE 71 ... BE 112 / ME2, ME3 BN 63 ... BN 112 / 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

(F49)

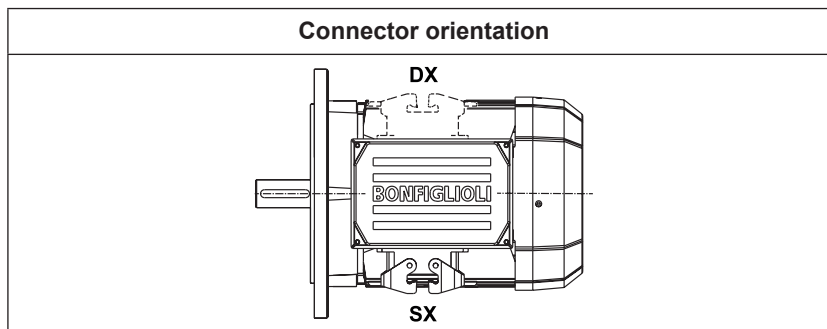
Option	CON 2
Motor size	BX 80 ... BX 132 / MX2, MX3 / BE 71 ... BE 132 / ME2 ... ME4 BN 63 ... BN 160MR / M05 ... M4
Connector view	
Type of connector	Harting Han Modular
Housing	Han EMC 10B with 2 levers
Module type	Module C + Module E + Module E
Numbers of pins - nominal current	3 x 36A / 6 x 16A
Voltage	500 Vac
Contact connection	Crimping contacts

(F50)

Option	CON 3
Motor size	BX 80 ... BX 132M / MX2, MX3 / BN 63 ... BN 160MR / M05 ... M4
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





(F51)



(F52)

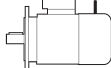
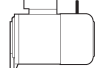
Motors without brake dimensions

		AD (mm)	AF (mm)	AH (mm)	LL (mm)	V ^(*) (mm)
BN 63	M05	136	110	45	165	4.5
BN 71 - BE 71	M1	149	110	45	165	15.5
BX 80 - BE 80 - BN 80	MX2 - ME2 - M2	160	110	45	165	16.5
BX 90 - BE 90 - BN 90	MX3	162	110	45	165	31.5
BX 100 - BE 100 - BN 100	MX3 - ME3 - M3	171	110	45	165	37.5
BX 112 - BE 112 - BN 112	MX4	186	110	45	165	39
BX 132 - BE 132 - BN 132	MX4 - ME4 - M4	210	140	45	188	45.5
BN 160MR	—	210	140	45	188	161

(*) Dimension valid only for motors BX, BE and BN.

(F53)

Motors with FD brake dimensions

		AD (mm)	AF (mm)	AH (mm)	LL (mm)	V ^(*) (mm)
BN 63	M05	136	110	45	165	4.5
BN 71	M1	149	110	45	165	1.5
BX 80 - BN 80	MX2 - M2	160	110	45	165	18.5
BX 90 - BN 90	—	162	110	45	165	39.5
BX 100 - BN 100	MX3 - M3	171	110	45	165	63.5
BX 112 - BN 112	—	186	110	45	165	75
BX 132 - BN 132	MX4 - M4	210	140	45	188	122
BN 160MR	—	210	140	45	188	161

(*) Dimension valid only for motors BN and BX



M12.7 Control of brake operation

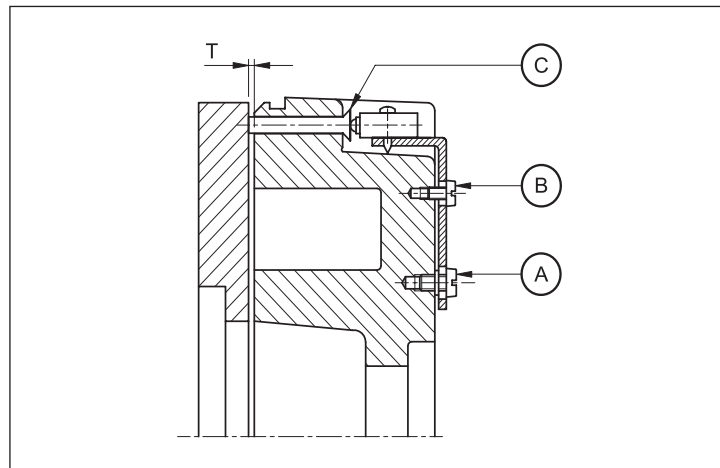
MSW

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.

The microswitch is provided with three lead wires (NC, NO, COM). The next figure shown the main components of the brake equipped with microswitch.

(F54)



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

M12.8 Additional cable entry for brakemotors

IC

The terminal box cover of brakemotors BX 80 ... BX 132 - BN 63...BN 160MR/ MX2...MX4 - M05...M4 is provided with two additional cable entry M16 x 1.5 (one cable entry per side).

The terminal box cover of brakemotors BX 160 ... BX 180 - BN 160...BN 200 / MX5 - M5 is provided with an additional cable entry M16 x 1.5 next to the cable entry used for the brake.

M12.9 Anti-condensation heaters

H1

NH1

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:



(F55)

	H1	NH1
	1~ 230V ± 10% P [W]	1~ 115V ± 10% P [W]
BX 80 BE 80 BN 56 ... BN 80	10	10
BX 90 ... BX 132 BE 90 ... BE 132MB BN 90 ... BN 160MR	25	25
BX 160, BX 180 BE 160, BE 180 BN 160, BN 200	50	50

Warning!

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

M12.10 Tropicalization

TP

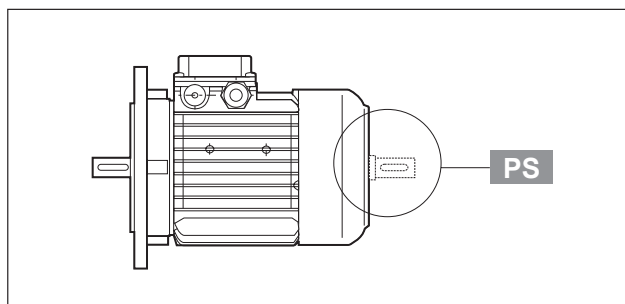
When option **TP** is specified, motor windings receive additional protection for operation in high humidity and temperature conditions.

M12.11 Second shaft extension

PS

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

(F56)




M12.12 Backstop device

AL **AR**

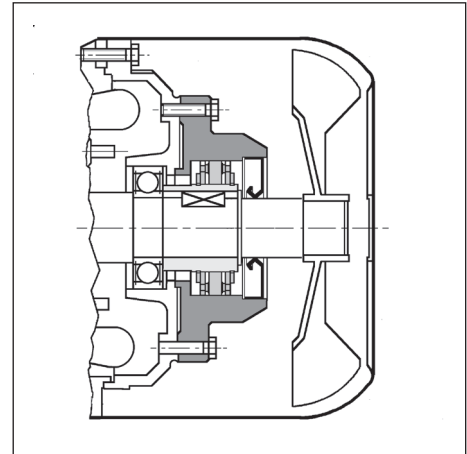
For applications where backdriving must be avoided, motors equipped with an anti run-back device can be used (available for the MX/ME and M series only). While allowing rotation in the direction required, this device operates instantaneously in case of a power failure, preventing the shaft from running 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 (F56) shows rated and maximum locking torques for the anti run-back devices. A diagram of the device can be seen in Table (F57). 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.



(F57)

	Rated locking torque [Nm]	Max. locking torque [Nm]	Release speed [min ⁻¹]
M1	6	10	750
ME2 M2	16	27	650
ME3 M3	54	92	520
MX4 - ME4 M4	110	205	430

(F58)



M12.13 Rotor balancing

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.

(F59)

Vibration level	Angular velocity n [min ⁻¹]	Limits of the vibration velocity (mm/s) BX 80 ≤ H ≤ BX 180L BE 80 ≤ H ≤ BE 180L BN 56 ≤ H ≤ BN 200
A	600 < n < 3600	1.6
B	600 < n < 3600	0.70

Values are obtained from measurements on freely suspended motor during noload operation; tolerance ±10%.

M12.14 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, M1, BE 80, ME2, BX 80 and MX2 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 motors with rear shaft projection (PS option) are excluded.



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.

(F60)

Extra length for serv ventilated motors			
		ΔL_1	ΔL_2
BN 71	M1	93	32
BX 80 - BE 80 - BN 80	MX2 - ME2 - M2	127	55
BX 90 - BE 90 - BN 90	MX3	131	48
BX 100 - BE 100 - BN 100	MX3 - ME3 - M3	119	28
BX 112 - BE 112 - BN 112	MX4	130	31
BX 132 - BE 132 - BN 132	MX4 - ME4 - M4	161	51
BX 160 - BE 160, BX 180 - BE 180	MX5 - ME5	184	–

ΔL_1 = extra length to LB value of corresponding standard motor.

ΔL_2 = extra length to LB value of corresponding brake motor.
Only for BN motors.

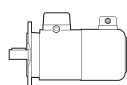
U1



Fan wiring terminals are housed in a separate terminal box.

In brake motors of size BN 71 ... BN 160MR, M1 ... M4L, 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).

(F61)



		V a.c. $\pm 10\%$	Hz	P [W]	I [A]
BN 71	M1	1 ~ 230	50 / 60	22	0.12
BX 80 - BE 80 BN 80	MX2 - ME2 M2			22	0.12
BX 90 - BE 90 BN 90	MX3			40	0.30
BX 100 - BE 100 BN 100	MX3 - ME3 M3			50	0.25
BX 112 - BE 112 BN 112	MX4	3 ~ 230 Δ / 400Y	50	50	0.26 / 0.15
BX 132 - BE 132 BN 132 ... BN 160MR	MX4 - ME4 M4L			110	0.38 / 0.22
BX 160 - BE 160 BN 160M ... BN 180M	MX5 - ME5 M5			180	1.25 / 0.72
BX 180 - BE 180 BN 180L ... BN 200L	–			250	1.51 / 0.87

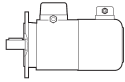




U2

Fan terminals are wired in the motor terminal box.

The **U2** option does not apply to motors BX, BE, MX, ME and to motors with option CUS (compliant to norms CSA and UL).

(F62)



		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	3 ~ 230Δ / 400Y		40	0.26 / 0.09
BN 112	—			50	0.26 / 0.15
BN 132 ... BN 160MR	M4L			110	0.38 / 0.22

M12.15 Rain canopy



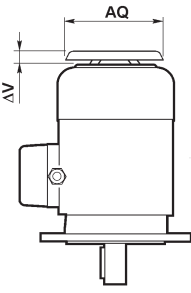
RC

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.

(F63)

		AQ	ΔV	
BN 63	M05	118	24	
BN 71 - BE 71	M1	134	27	
BX 80 - BE 80 BN 80	MX2 - ME2 M2	152	25	
BX 90 - BE 90 BN 90	MX3	168	30	
BX 100 - BE 100 BN 100	MX3 - ME3 M3	190	28	
BX 112 - BE 112 BN 112	MX4	211	32	
BX 132 - BE 132 BN 132...BN 160MR	MX4 - ME4 M4	254	32	
BX 160 - BE 160 BN 160M...BN 180M	MX5 - ME5 M5	302	36	
BX 180 - BE 180 BN 180L...BN 200L	—	340	36	



M12.16 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, PS, U1, U2.

Overall dimensions are the same as drip cover type RC.

TC option is not available for BX motors.

M12.17 Feedback units

Motors may be combined with six 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.

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.

(F64)

	EN1	EN2	EN3	EN4	EN5	EN6
Interface	TTL/RS 422	TTL/RS 422	HTL/push-pull	Sinus 0.5 V _{PP}	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, \bar{Z})	—	—
Max. output frequency [kHz]	600			200		
Max. speed [min ⁻¹]	6000 (9000 min ⁻¹ for 10 s)					
Temperature range [°C]	-30 ... +100					
Protection class	IP 65					



(F65)

EN1, EN2, EN3, EN4, EN5, EN6	
BX 80 ... BX 180L	MX2 ... MX5L
BE 71 ... BE 180L	ME2S ... ME5L
BN 63 ... BN 200L	M05 ... M5
BX 80_FD ... BX 180_FD	MX2_FD ... MX5_FD
BN 63_FD ... BN 200L_FD	M05_FD ... M5_FD
BX 80_FA ... BX 160_FA	MX2_FA ... MX5_FA
BN 63_FA ... BN 200L_FA	M05_FA ... M5_FA

(F66)

EN_ + U1		
		L3
BX 160 - BE 160 - BN 160M...BN 180M	MX5 - ME5 - M5	72
BX 180 - BE 180 - BN 180L...BN 200L	-	82
BX 160_FD - BN 160M_FD...BN 180M_FD	MX5_FD - M5_FD	35
BX 180_FD - BN 180L_FD...BN 200L_FD	-	41

If the encoder device (option EN_) is specified on motors BX 80 ... BX 132 - MX2 ... MX4 - BE 80 ... BE 132 - ME2 ... ME4 - BN 71 ... BN 160MR - 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.



M12.18 Surface protection

C
_

When no specific protection class is requested, the painted (ferrous) surfaces of motors are protected to at least corrosivity class C2 (UNI EN ISO 12944-2). For improved resistance to atmospheric corrosion, motors can be delivered with C3 and C4 surface protection.

(F67)

SURFACE PROTECTION	Typical environments	Maximum surface temperature	Corrosivity class according to UNI EN ISO 12944-2
C3	Urban and industrial environments with up to 100% relative humidity (medium air pollution)	120°C	C3
C4	Industrial areas, coastal areas, chemical plant, with up to 100% relative humidity (high air pollution)	120°C	C4

Motors with optional protection to class C3 or C4 are available in a choice of colours. If no specific colour is requested (see the “PAINTING” option) motors are finished in RAL 7042.

Motors can also be supplied with surface protection for corrosivity class C5 according to UNI EN ISO 12944-2. Contact our Technical Service for further details.

M12.19 Painting

RAL

Gearboxes with optional protection to class C3 or C4 are available in the colours listed in the following table.

(F68)

PAINTING	Colour	RAL number
RAL7042*	Traffic Grey A	7042
RAL5010	Gentian Blue	5010
RAL9005	Jet Black	9005
RAL9006	White Aluminium	9006
RAL9010	Pure White	9010

* Gearboxes are supplied in this standard colour if no other colour is specified.

NOTE – “PAINTING” options can only be specified in conjunction with “SURFACE PROTECTION” options.



M12.20 Certificates

ACM

Certificate of compliance of motors

The document certifies the compliance of the product with the purchase order and the construction in conformity with the applicable procedures of the Bonfiglioli Quality System.

CC



Inspection certificate

The document entails checking on order compliance, the visual inspection of external conditions and instrumental testing of the electrical characteristics in unloaded conditions. Units inspected are sampled within the shipping batch and marked individually.

M13 TABLES OF MOTORS CORRELATION



M13.1 50 Hz Motors

(F69)



2 pole							
	Efficiency class	IE1	IE2	IE3	IE1	IE2	IE3
P _n [kW]	0.06						
	0.09						
	0.12						
	0.18	BN 63A 2			M 05A 2		
	0.25	BN 63B 2			M 05B 2		
	0.37	BN 71A 2			M 05C 2		
	0.55	BN 71B 2			M 1SD 2		
	0.75	BN 71C 2 BN 80A 2	BE 80A 2		M 1LA 2	ME 2SA 2	
	1.1	BN 80B 2	BE 80B 2		M 2SA 2	ME 2SB 2	
	1.5	BN 90SA 2	BE 90SA 2		M 2SB 2		
	1.85	BN 90SB 2					
	2.2	BN 90L 2	BE 90L 2		M 3SA 2		
	3	BN 100L 2	BE 100L 2		M 3LA 2	ME 3LB 2	
	4	BN 112M 2	BE 112M 2		M 3LB 2		
	5.5	BN 132SA 2	BE 132SA 2		M 4SA 2	ME 4SA 2	
	7.5	BN 132SB 2	BE 132SB 2		M 4SB 2	ME 4LA 2	
	9.2	BN 132M 2	BE 132MB 2		M 4LA 2	ME 4LB 2	
	11	BN 160MR 2 BN 160M 2	BE 160MA 2		M 4LC 2	ME 5SA 2	
	15	BN 160MB 2	BE 160MB 2		M 5SB 2	ME 5SB 2	
	18.5	BN 160L 2	BE 160L 2		M 5SC 2	ME 5LA 2	
22	BN 180M 2			M 5LA 2			
30	BN 200LA 2						



(F70)

4 pole							
Efficiency class	IE1	IE2	IE3	IE1	IE2	IE3	
Pn [kW]	0.06	BN 56A 4					
	0.09	BN 56B 4			M 0B 4		
	0.12	BN 63A 4			M 05A 4		
	0.18	BN 63B 4			M 05B 4		
	0.25	BN 63C 4			M 05C 4		
		BN 71A 4					
	0.37	BN 71B 4			M 1SD 4		
	0.55	BN 71C 4			M 1LA 4		
		BN 80A 4					
	0.75	BN 80B 4	BE 80B 4	BX 80B 4	M 2SA 4	ME 2SB 4	MX 2SB 4
	1.1	BN 80C 4	BE 90S 4	BX 90S 4	M 2SB 4	ME 3SA 4	MX 3SA 4
		BN 90S 4					
	1.5	BN 90LA 4	BE 90LA 4	BX 90LA 4	M 3SA 4	ME 3SB 4	MX 3SB 4
	1.85	BN 90LB 4					
	2.2	BN 100LA 4	BE 100LA 4	BX 100LA 4	M 3LA 4	ME 3LA 4	MX 3LA 4
	3	BN 100LB 4	BE 100LB 4	BX 100LB 4	M 3LB 4	ME 3LB 4	MX 3LB 4
	4	BN 112M 4	BE 112M 4	BX 112M 4	M 3LC 4	ME 4SA 4	MX 4SA 4
	5.5	BN 132S 4	BE 132S 4	BX 132SB 4	M 4SA 4	ME 4SB 4	MX 4SB 4
	7.5	BN 132MA 4	BE 132MA 4	BX 132MA 4	M 4LA 4	ME 4LA 4	MX 4LA 4
	9.2	BN 132MB 4	BE 132MB 4	BX 160MA 4	M 4LB 4	ME 4LB 4	MX 5SA 4
11	BN 160MR 4	BE 160M 4	BX 160MB 4	M 4LC 4	ME 5SA 4	MX 5SB 4	
	BN 160M 4						
15	BN 160L 4	BE 160L 4	BX 160L 4	M 5SB 4	ME 5LA 4	MX 5LA 4	
18.5	BN 180M 4	BE 180M 4	BX 180M 4	M 5LA 4			
22	BN 180L 4	BE 180L 4	BX 180L 4				
30	BN 200L 4						



(F71)

6 pole							
Efficiency class	IE1	IE2	IE3	IE1	IE2	IE3	
Pn [kW]	0.06						
	0.09	BN 63A 6			M 05A 6		
	0.12	BN 63B 6			M 05B 6		
	0.18	BN 71A 6			M 1SC 6		
	0.25	BN 71B 6			M 1SD 6		
		BN 71C 6					
	0.37	BN 80A 6			M 1LA 6		
	0.55	BN 80B 6			M 2SA 6		
	0.75	BN 80C 6	BE 90S 6		M 2SB 6		
		BN 90S 6					
	1.1	BN 90L 6	BE 100M 6		M 3SA 6	ME 3LA 6	
	1.5	BN 100LA 6	BE 100LA 6		M 3LA 6	ME 3LB 6	
	1.85	BN 100LB 6			M 3LB 6		
	2.2	BN 112M 6	BE 112M 6		M 3LC 6		
	3	BN 132S 6	BE 132S 6		M 4SA 6	ME 4SB 6	
	4	BN 132MA 6	BE 132MA 6		M 4LA 6	ME 4LA 6	
	5.5	BN 132MB 6	BE 160MA 6		M 4LB 6	ME 5SA 6	
	7.5	BN 160M 6	BE 160MB 6		M 5SA 6	ME 5SB 6	
	9.2						
	11	BN 160L 6			M 5SB 6		
15	BN 180L 6						
18.5	BN 200LA 6						
22							
30							





M13.2 60 Hz Motors

(F72)



2 pole							
Efficiency class		IE1	IE2	IE3	IE1	IE2	IE3
Pn [kW]	0.06						
	0.09						
	0.12						
	0.18	BN 63A 2			M 05A 2		
	0.25	BN 63B 2			M 05B 2		
	0.37	BN 71A 2			M 05C 2		
	0.55	BN 71B 2			M 1SD 2		
	0.75	BN 71C 2 BN 80A 2			M 1LA 2		
	1.1	BN 80B 2			M 2SA 2		
	1.5	BN 90SA 2			M 2SB 2		
	1.85	BN 90SB 2					
	2.2	BN 90L 2			M 3SA 2		
	3	BN 100L 2			M 3LA 2		
	3.7	BN 112M 2			M 3LB 2		
	5.5	BN 132SA 2			M 4SA 2		
	7.5	BN 132SB 2			M 4SB 2		
	9.2	BN 132M 2			M 4LA 2		
	11	BN 160MR 2 BN 160M 2			M 4LC 2		
	15	BN 160MB 2			M 5SB 2		
18.5	BN 160L 2			M 5SC 2			
22	BN 180M 2			M 5LA 2			
30	BN 200LA 2						

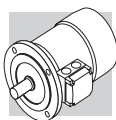
(F73)

4 pole							
Efficiency class		IE1	IE2	IE3	IE1	IE2	IE3
Pn [kW]	0.06	BN 56A 4					
	0.09	BN 56B 4			M 0B 4		
	0.12	BN 63A 4			M 05A 4		
	0.18	BN 63B 4			M 05B 4		
	0.25	BN 63C 4 BN 71A 4			M 05C 4		
	0.37	BN 71B 4			M 1SD 4		
	0.55	BN 71C 4 BN 80A 4			M 1LA 4		
	0.75	BN 80B 4	BE 80B 4	BX 90SR 4	M 2SA 4	ME 2SB 4	MX 2SB 4
	1.1	BN 80C 4 BN 90S 4	BE 90S 4	BX 90S 4	M 2SB 4	ME 3SA 4	MX 3SA 4
	1.5	BN 90LA 4	BE 90LA 4	BX 90LA 4	M 3SA 4	ME 3SB 4	MX 3SB 4
	1.85	BN 90LB 4					
	2.2	BN 100LA 4	BE 100LA 4	BX 100LA 4	M 3LA 4	ME 3LA 4	MX 3LA 4
	3	BN 100LB 4	BE 100LB 4	BX 100LB 4	M 3LB 4	ME 3LB 4	MX 3LB 4
	3.7	BN 112M 4	BE 112M 4	BX 112M 4	M 3LC 4	ME 4SA 4	MX 4SA 4
	5.5	BN 132S 4	BE 132S 4	BX 132SB 4	M 4SA 4	ME 4SB 4	MX 4SB 4
	7.5	BN 132MA 4	BE 132MA 4	BX 132MA 4	M 4LA 4	ME 4LA 4	MX 4LA 4
	9.2	BN 132MB 4	BE 132MB 4	BX 160MA 4	M 4LB 4	ME 4LB 4	MX 5SA 4
	11	BN 160MR 4 BN 160M 4	BE 160M 4	BX 160MB 4	M 4LC 4	ME 5SA 4	MX 5SB 4
	15	BN 160L 4	BE 160L 4	BX 160L 4	M 5SB 4	ME 5LA 4	MX 5LA 4
	18.5	BN 180M 4	BE 180M 4	BX 180M 4	M 5LA 4		
22	BN 180L 4	BE 180L 4	BX 180L 4				
30	BN 200L 4						



(F74)

6 pole							
Efficiency class		IE1	IE2	IE3	IE1	IE2	IE3
P _n [kW]	0.06						
	0.09	BN 63A 6			M 05A 6		
	0.12	BN 63B 6			M 05B 6		
	0.18	BN 71A 6			M 1SC 6		
	0.25	BN 71B 6			M 1SD 6		
		BN 71C 6					
	0.37	BN 80A 6			M 1LA 6		
	0.55	BN 80B 6			M 2SA 6		
	0.75	BN 80C 6			M 2SB 6		
		BN 90S 6					
	1.1	BN 90L 6			M 3SA 6		
	1.5	BN 100LA 6			M 3LA 6		
	1.85	BN 100LB 6			M 3LB 6		
	2.2	BN 112M 6			M 3LC 6		
	3	BN 132S 6			M 4SA 6		
	3.7	BN 132MA 6			M 4LA 6		
	5.5	BN 132MB 6			M 4LB 6		
	7.5	BN 160M 6			M 5SA 6		
	9.2						
	11	BN 160L 6			M 5SB 6		
15	BN 180L 6						
18.5	BN 200LA 6						
22							
30							








M14 MOTOR RATING CHARTS BX-MX

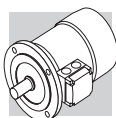
4 P		1500 min ⁻¹ - S1															50 Hz - IE3						
		d.c. brake															a.c. brake						
P _n kW	CE	P _n kW	n min ⁻¹	M _n Nm	I _n 400V A	η%		cos φ	I _s I _n	M _s M _n	M _a M _n	KVA code	J _m x 10 ⁻⁴ kgm ²	IM B5 Kg	FD			FA					
						100%	75%								Mod	M _b Nm	J _m x 10 ⁻⁴ kgm ²	IM B5 Kg	Mod	M _b Nm	J _m x 10 ⁻⁴ kgm ²	IM B5 Kg	
0.75		BX 80B	4	1425	5.0	1.61	82.5	83.9	0.81	6.5	1.8	J	35	16	FD 04	15	37	19.9	FA 04	15	37	19.8	
1.1		BX 90S	4	1425	7.4	2.44	84.1	84.1	0.77	3.4	2.2	J	27	16	FD 14	15	29	20.2	FA 14	15	29	20.1	
1.5		BX 90LA	4	1420	10.1	3.3	85.3	86.2	0.78	3.1	1.9	J	31	17	FD 05	26	35	23	FA 05	26	35	23.7	
2.2		BX 100LA	4	1445	14.5	5.1	86.7	86.2	0.72	3.6	2.4	K	58	24	FD 15	40	62	31	FA 15	40	62	31	
3		BX 100LB	4	1445	19.8	6.7	87.7	87.7	0.74	3.9	2.6	K	73	29	FD 15	40	77	36	FA 15	40	77	36	
4		BX 112M	4	1445	26	8.1	88.6	88.9	0.8	3.8	2.5	J	130	38	FD 06S	60	139	48	FA 06S	60	139	50	
5.5		BX 132SB	4	1460	36	10.6	89.6	89.2	0.83	3.6	2.3	J	310	57	FD 56	75	320	70	FA 06	75	320	71	
7.5		BX 132MA	4	1460	49	15.0	90.4	90.9	0.80	3.8	2.5	K	360	67	FD 06	100	370	80	FA 07	100	370	85	
9.2		BX 160MA	4	1465	60	17.8	91.0	92.1	0.82	3.6	2.1	J	650	95	FD 08	170	725	125	FA 08	170	725	124	
11		BX 160MB	4	1465	72	20.5	91.4	92.9	0.84	3.4	1.9	J	780	110	FD 08	170	855	140	FA 08	170	855	139	
15		BX 160L	4	1465	98	28.1	92.1	93.2	0.82	4.1	2.3	K	890	121	FD 08	200	965	151	FA 08	200	965	150	
18.5		BX 180M	4	1480	119	32.9	92.6	94.1	0.85	2.6	2.3	M	1560	155	FD 09	300	1760	195					
22		BX 180L	4	1475	142	38.2	93.0	93.6	0.88	2.5	2.0	L	1660	163	FD 09	300	1860	203					





Note: for more details on the available energy certifications look at the catalog's dedicated section.








4 P		1800 min ⁻¹ - S1													60 Hz - Nema Premium									
P _n kW		n min ⁻¹	M _n Nm	I _n 460V A	η%		cos φ	I _s I _n	M _s M _n	M _a M _n	KVA code	J _m x 10 ⁻⁴ kgm ²	IM B5 	d.c. brake				a.c. brake						
					100%	75%								FD				FA						
					Mod	M _b Nm								J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b Nm	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b Nm	J _m x 10 ⁻⁴ kgm ²	IM B5 	
0.75	BX 90SR	4	1755	4.1	1.48	85.5	86.4	83.9	0.73	8.0	3.7	2.5	L	27	16	20.2	20.1	15	29	29	20.1	15	29	20.1
1.1	BX 90S	4	1740	6.0	2.15	86.5	85.9	83.0	0.74	8.2	4.1	2.8	K	27	16	20.2	20.1	15	29	29	20.1	15	29	20.1
1.5	BX 90LA	4	1735	8.3	2.91	86.5	86.5	84.4	0.75	7.4	3.6	2.5	K	31	17	23	23.7	26	35	35	23.7	26	35	23.7
2.2	BX 100LA	4	1760	11.9	4.4	89.5	88.6	86.2	0.71	9.9	4.8	3.6	N	73	29	36	36	40	77	77	36	40	77	36
3	BX 100LB	4	1750	16.4	5.9	89.5	88.9	86.7	0.71	9.1	4.4	3.3	M	73	29	36	36	40	77	77	36	40	77	36
3.7	BX 112M	4	1760	20	6.7	89.5	89.5	89.1	0.77	10.4	4.7	3.4	M	130	38	48	50	60	139	139	48	60	139	50
5.5	BX 132SB	4	1770	30	9.9	91.7	92.0	90.2	0.76	10.7	5.1	4.6	N	410	77	90	91	75	420	420	90	75	420	91
7.5	BX 132MA	4	1770	41	13.4	91.7	91.3	89.7	0.76	11.0	4.9	4.4	N	410	77	90	95	100	420	420	90	100	420	95
9.2	BX 160MA	4	1770	50	15.6	92.4	92.5	91.6	0.8	9.1	4.1	2.6	L	650	95	125	124	170	725	725	125	170	725	124
11	BX 160MB	4	1770	59	18.2	92.4	92.9	92.0	0.82	9.3	4.0	2.4	L	780	110	140	139	170	855	855	140	170	855	139
15	BX 160L	4	1770	81	24.5	93.0	93.5	92.5	0.81	10.9	4.8	2.8	M	890	121	151	150	200	965	965	151	200	965	150
18.5	BX 180M	4	1780	99	28.6	93.6	94.5	93.2	0.85	13.0	2.9	2.7	N	1560	155	195	195	300	1760	1760	195	300	1760	195
22	BX 180L	4	1775	118	33.1	93.6	94.2	93.1	0.87	11.5	2.8	2.4	M	1660	163	203	203	300	1860	1860	203	300	1860	203

Note: for more details on the available energy certifications look at the catalog's dedicated section.



4 P		1500 min ⁻¹ - S1															50 Hz - IE3			
		d.c. brake															a.c. brake			
		FD															FA			
P _n		n	M _n	I _n 400V	η%	cos φ	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	KVA code	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b Nm	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b Nm	J _m x 10 ⁻⁴ kgm ²	IM B5 
0.75	MX 2SB	4	5.0	1.61	82.5	83.9	83.2	50%	1.8	J	35	16	FD 04	15	37	19.9	FA 04	15	37	19.8
1.1	MX 3SA	4	7.3	2.46	84.1	85.5	83.5	75%	2.0	J	35	17	FD 15	15	26	24	FA 15	15	26	24
1.5	MX 3SB	4	9.9	3.3	85.3	86.8	85.4	50%	2.0	J	43	20	FD 15	26	47	27	FA 15	26	47	27
2.2	MX 3LA	4	14.5	5.1	86.7	86.2	84.0	75%	2.4	K	58	24	FD 15	40	62	31	FA 15	40	62	31
3	MX 3LB	4	19.8	6.7	87.7	87.7	86.0	50%	2.6	K	73	29	FD 15	40	77	36	FA 15	40	77	36
4	MX 4SA	4	26	7.8	88.6	89.9	88.7	75%	2.5	J	225	45	FD 56	75	235	58	FA 06	75	235	59
5.5	MX 4SB	4	36	10.6	89.6	89.9	88.8	50%	2.3	J	310	57	FD 56	75	320	70	FA 06	75	320	71
7.5	MX 4LA	4	49	15.0	90.4	90.9	90.2	75%	2.5	K	360	67	FD 06	100	370	80	FA 07	100	370	85
9.2	MX 5SA	4	60	17.8	91.0	92.1	91.7	50%	2.1	J	650	95	FD 08	170	725	125	FA 08	170	725	124
11	MX 5SB	4	72	20.5	91.4	92.9	92.5	75%	1.9	J	780	110	FD 08	170	855	140	FA 08	170	855	139
15	MX 5LA	4	98	28.1	92.1	93.2	92.6	50%	2.3	K	890	121	FD 08	200	965	151	FA 08	200	965	150



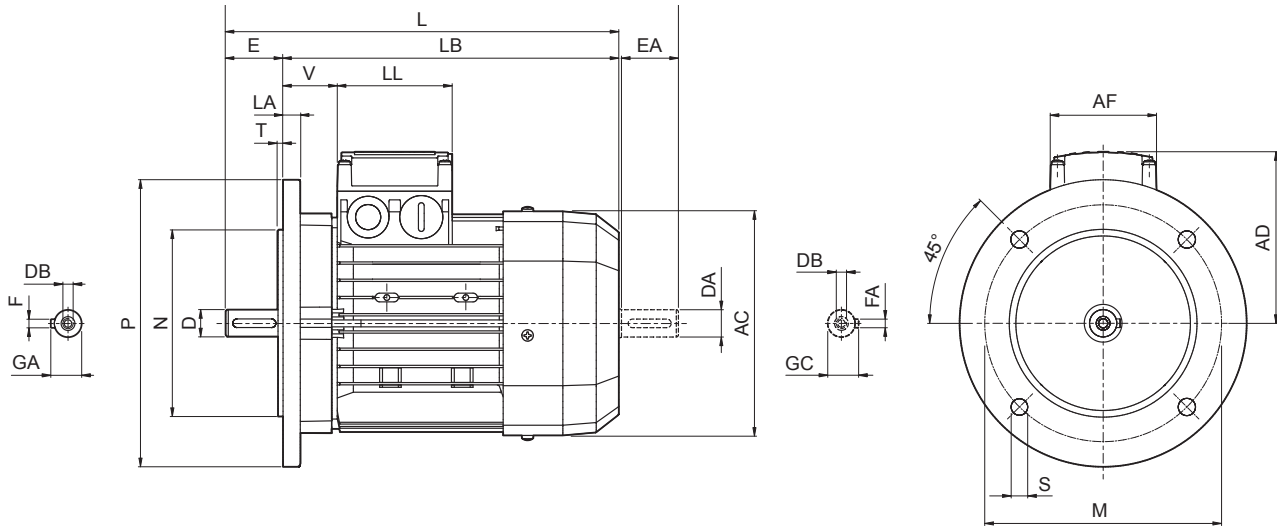
4 P		1800 min ⁻¹ - S1											60 Hz - IE3											
P _n kW		n min ⁻¹	M _n Nm	I _n 460V A	η%			cos φ	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	KVA code	J _m x 10 ⁻⁴ kgm ²	IM B5 	d.c. brake				a.c. brake					
					100%	75%	50%								FD				FA					
					M _b Nm	J _m x 10 ⁻⁴ kgm ²	IM B5 								Mod	M _b Nm	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b Nm	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	M _b Nm
0.75	MX 2SB	4	1755	4.1	1.48	85.5	86.4	83.9	0.73	8.0	2.5	L	27	16	20.2	FD 14	15	29	20.2	20.2	FA 14	15	29	20.1
1.1	MX 3SA	4	1755	6.0	2.19	86.5	86.0	83.0	0.73	7.9	2.5	L	35	17	24	FD 15	15	26	24	24	FA 15	15	26	24
1.5	MX 3SB	4	1755	8.2	2.96	86.5	87.2	85.0	0.72	8.5	2.9	L	43	20	27	FD 15	26	47	27	27	FA 15	26	47	27
2.2	MX 3LA	4	1760	11.9	4.4	89.5	88.6	86.2	0.71	9.9	3.6	N	73	29	36	FD 15	40	77	36	36	FA 15	40	77	36
3	MX 3LB	4	1750	16.4	5.9	89.5	88.9	86.7	0.71	9.1	3.3	M	73	29	36	FD 15	40	77	36	36	FA 15	40	77	36
3.7	MX 4SA	4	1770	20.0	6.6	89.5	89.8	87.7	0.78	9.9	3.4	M	225	45	58	FD 56	75	235	58	58	FA 06	75	235	59
5.5	MX 4SB	4	1770	30	9.9	91.7	92.0	90.2	0.76	10.7	4.6	N	410	77	90	FD 56	75	420	90	420	FA 06	75	420	91
7.5	MX 4LA	4	1770	41	13.4	91.7	91.3	89.7	0.76	11.0	4.4	N	410	77	90	FD 06	100	420	90	420	FA 07	100	420	95
9.2	MX 5SA	4	1770	50	15.6	92.4	92.5	91.6	0.8	9.1	2.6	L	650	95	125	FD 08	170	725	125	725	FA 08	170	725	124
11	MX 5SB	4	1770	59	18.2	92.4	92.9	92.0	0.82	9.3	2.4	L	780	110	140	FD 08	170	855	140	855	FA 08	170	855	139
15	MX 5LA	4	1770	81	24.5	93.0	93.5	92.5	0.81	10.9	2.8	M	890	121	151	FD 08	200	965	151	965	FA 08	200	965	150



M15 MOTORS DIMENSIONS BX-MX

BX - IM B5 - CE/CCC

BX-MX

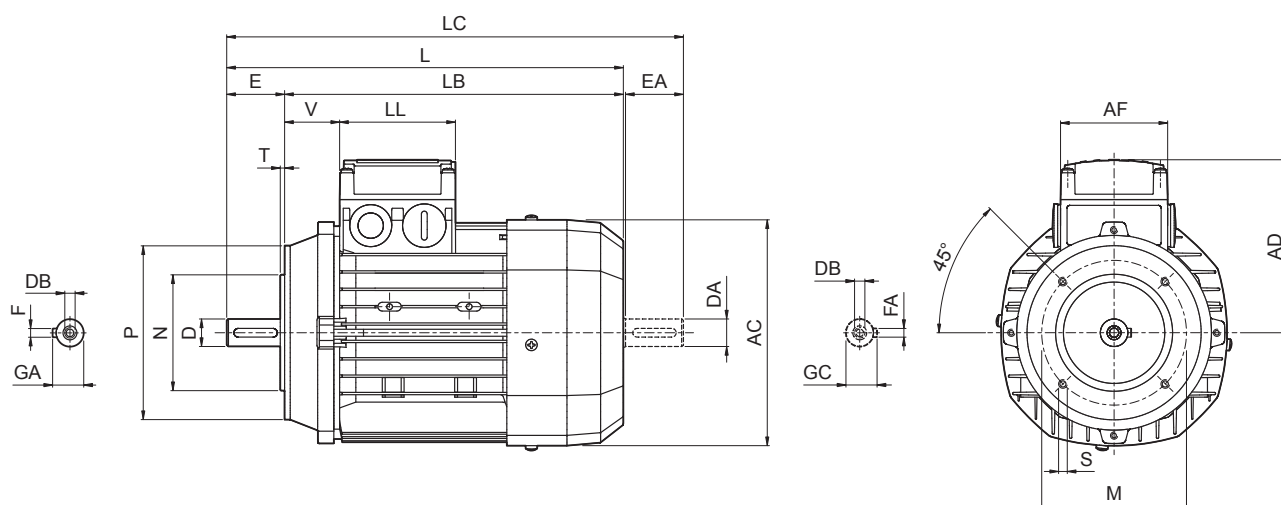


	Shaft					Flange						Motor																					
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V														
BX 80 B	19 14 ⁽¹⁾	40 30 ⁽¹⁾	M6 M5 ⁽¹⁾	21.5 16 ⁽¹⁾	6 5 ⁽¹⁾							156	320	280	351	119	74	80	38														
BX 90 S	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾	165	130	200	11.5	3.5	11.5	176	326	276	368	133			44														
BX 90 LA																																	
BX 100 LA	28 24 ⁽¹⁾	60 50 ⁽¹⁾	M10 M8 ⁽¹⁾	31 27 ⁽¹⁾	8 8 ⁽¹⁾	215	180	250	14	4	14	195	410	350	462	142	98	98	50														
BX 100 LB																																	
BX 112 M																					15	219	430	370	482	157			52				
BX 132 SB	38 28 ⁽¹⁾	80 60 ⁽¹⁾	M12 M10 ⁽¹⁾	41 31 ⁽¹⁾	10 8 ⁽¹⁾	265	230	300			20	258	493	413	556	193	118	118	58														
BX 132 MA																																	
BX 160 MA	42 38 ⁽¹⁾	110 80 ⁽¹⁾	M16 M12 ⁽¹⁾	45 41 ⁽¹⁾	12 10 ⁽¹⁾						15	310	596	486	680	245			51														
BX 160 MB																																	
BX 160 L																						300	250	350	18.5	5			640	530	724		187
BX 180 M	48 42 ⁽¹⁾	110 110 ⁽¹⁾	M16 M16 ⁽¹⁾	51.5 45 ⁽¹⁾	14 12 ⁽¹⁾						18	348	708	598	823	261			52														
BX 180 L																																	

N.B.: 1) These values refer to the rear shaft end (PS).



BX - IM B14 - CE/CCC



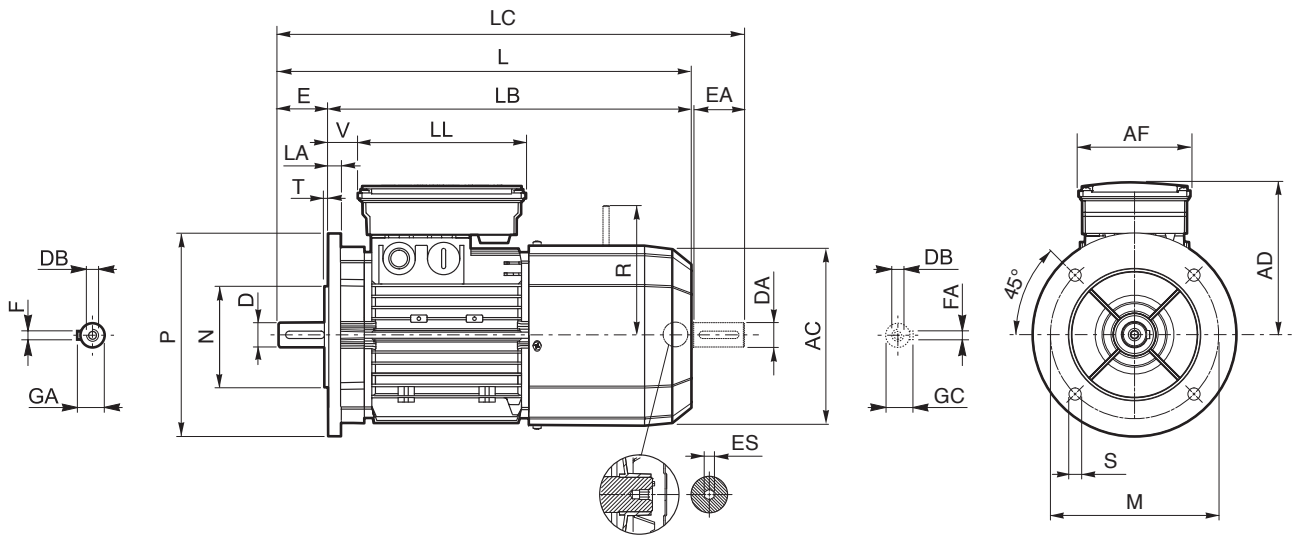
	Shaft					Housing					Motor							
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V
BX 80 B	19 14 ⁽¹⁾	4 30 ⁽¹⁾	M6 M5 ⁽¹⁾	21.5 16 ⁽¹⁾	6 5 ⁽¹⁾	100	80	120	M6		156	320	280	351	119	74	80	38
BX 90 S	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾	115	95	140	M8	3	176	326	276	368	133	98	98	44
BX 90 LA																		
BX 100 LA	28 24 ⁽¹⁾	60 50 ⁽¹⁾	M10 M8 ⁽¹⁾	31 27 ⁽¹⁾	8 8 ⁽¹⁾	130	110	160	M8	3.5	195	410	350	462	142	98	98	50
BX 100 LB																		
BX 112 M																		
BX 132 SB	38 28 ⁽¹⁾	80 60 ⁽¹⁾	M12 M10 ⁽¹⁾	41 31 ⁽¹⁾	10 8 ⁽¹⁾	165	130	200	M10	4	258	493	413	556	193	118	118	58

N.B.: 1) These values refer to the rear shaft end (PS).



BX - IM B5 - FD/FA - CE/CCC

BX-MX

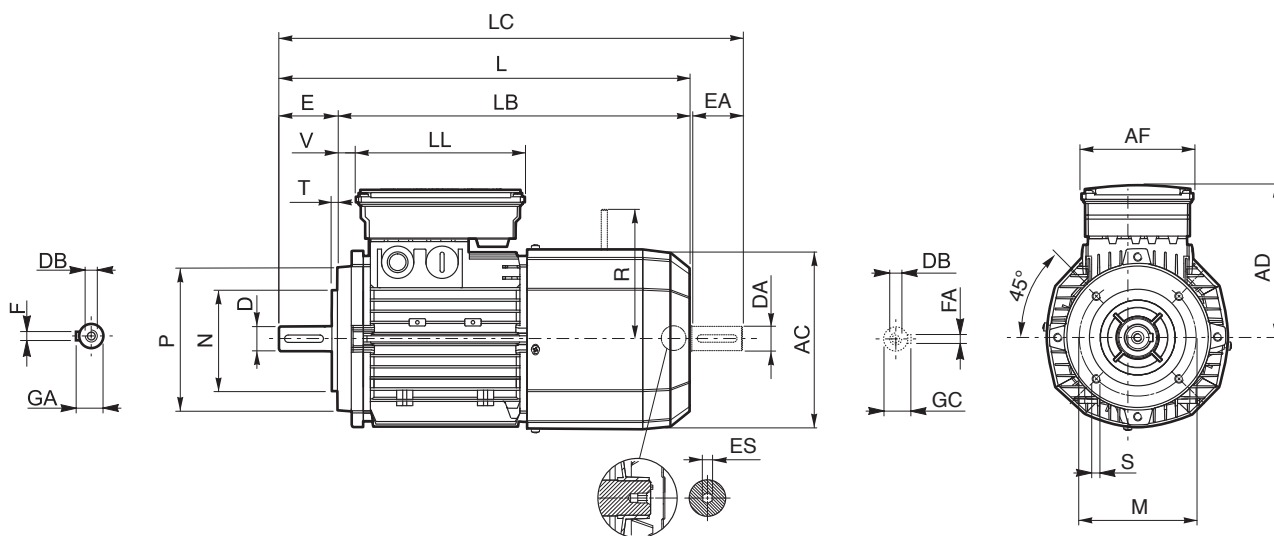


	Shaft					Flange						Motor											
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	R		ES ⁽²⁾	
																					FD	FA	
BX 80 B	19 14 ⁽¹⁾	40 30 ⁽¹⁾	M6 M5 ⁽¹⁾	21.5 16 ⁽¹⁾	6 5 ⁽¹⁾								156	392	352	423	143	98	133	25			5
BX 90 S	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾	165	130	200	11.5	3.5	11.5		176	410	360	452	146			32	129	134	
BX 90 LA																							
BX 100 LA											14		195	502	442	554	155	110	165		160	160	
BX 100 LB	28 24 ⁽¹⁾	60 50 ⁽¹⁾	M10 M8 ⁽¹⁾	31 27 ⁽¹⁾	8 8 ⁽¹⁾	215	180	250												37			6
BX 112 M									14	4	15		219	527	467	579	170			39	199	198	
BX 132 SB											16		258	603	523	667						200	
BX 132 MA	38 28 ⁽¹⁾	80 60 ⁽¹⁾	M12 M10 ⁽¹⁾	41 31 ⁽¹⁾	10 8 ⁽¹⁾	265	230	300						627	547	690	210	140	188	46	204	226	
BX 160 MA														736	626	820							
BX 160 MB	42 38 ⁽¹⁾	110 80 ⁽¹⁾	M16 M12 ⁽¹⁾	45 41 ⁽¹⁾	12 10 ⁽¹⁾						15	310					245			51	266	247	
BX 160 L						300	250	350	18.5	5				780	670	864		187	187				—
BX 180 M																							
BX 180 L	48 42 ⁽¹⁾	110 110 ⁽¹⁾	M16 M16 ⁽¹⁾	51.5 45 ⁽¹⁾	14 12 ⁽¹⁾						18	348	866	756	981	261				52	305	—	

N.B.: 1) These values refer to the rear shaft end (PS). 2) "ES" hexagon is not present with PS option



BX - IM B14 - FD/FA - CE/CCC



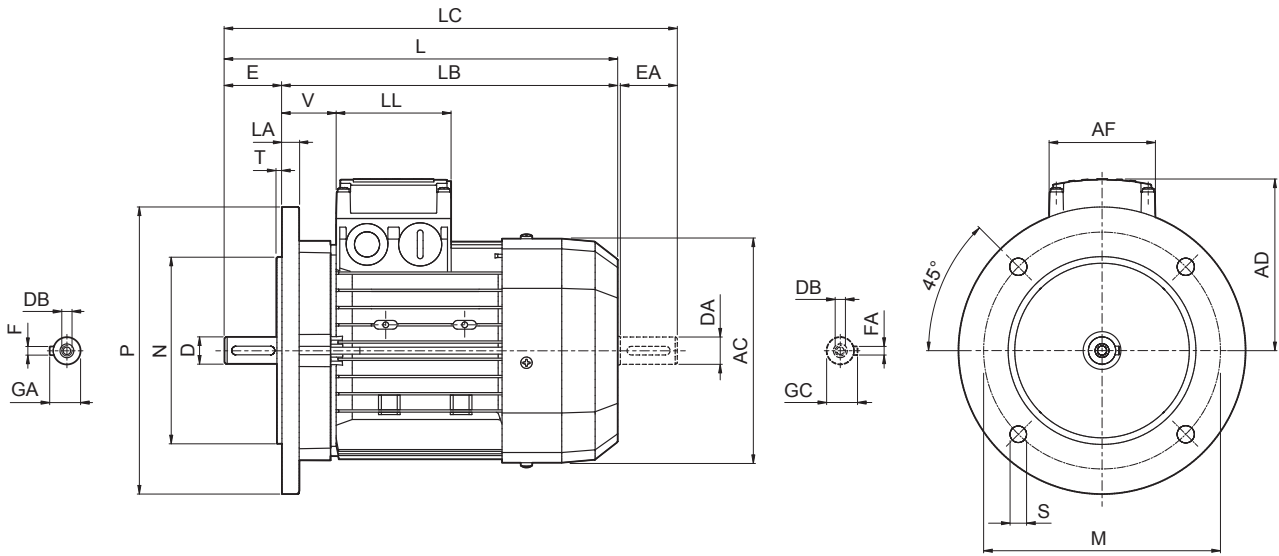
	Shaft					Housing					Motor											
	D	E	DB	GA	F	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V	R		ES ⁽²⁾	
	DA	EA	GC	FA	GC	FA	GC	FA	GC	FA	GC	FA	GC	FA	GC	FA	GC	FA	GC	FD	FA	ES ⁽²⁾
BX 80 B	19 14 ⁽¹⁾	40 30 ⁽¹⁾	M6 M5 ⁽¹⁾	21.5 16 ⁽¹⁾	6 5 ⁽¹⁾	100	80	120	M6		156	392	352	423	143	98	133	25		129	134	5
BX 90 S	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾	115	95	140	M8	3	176	410	360	452	146			32				6
BX 90 LA																						
BX 100 LA	28 24 ⁽¹⁾	60 50 ⁽¹⁾	M10 M8 ⁽¹⁾	31 27 ⁽¹⁾	8 8 ⁽¹⁾	130	110	160	M8	3.5	195	502	442	554	155	110	165	37				
BX 100 LB																						
BX 112 M																						
BX 132 SB	38 28 ⁽¹⁾	80 60 ⁽¹⁾	M12 M10 ⁽¹⁾	41 31 ⁽¹⁾	10 8 ⁽¹⁾	165	130	200	M10	4	258	603	523	667	210	140	188	46	204	198	200	226
BX 132 MA												627	547	690							200	

N.B.: 1) These values refer to the rear shaft end (PS). 2) "ES" hexagon is not present with PS option



BX - IM B5 - CUS

BX-MX

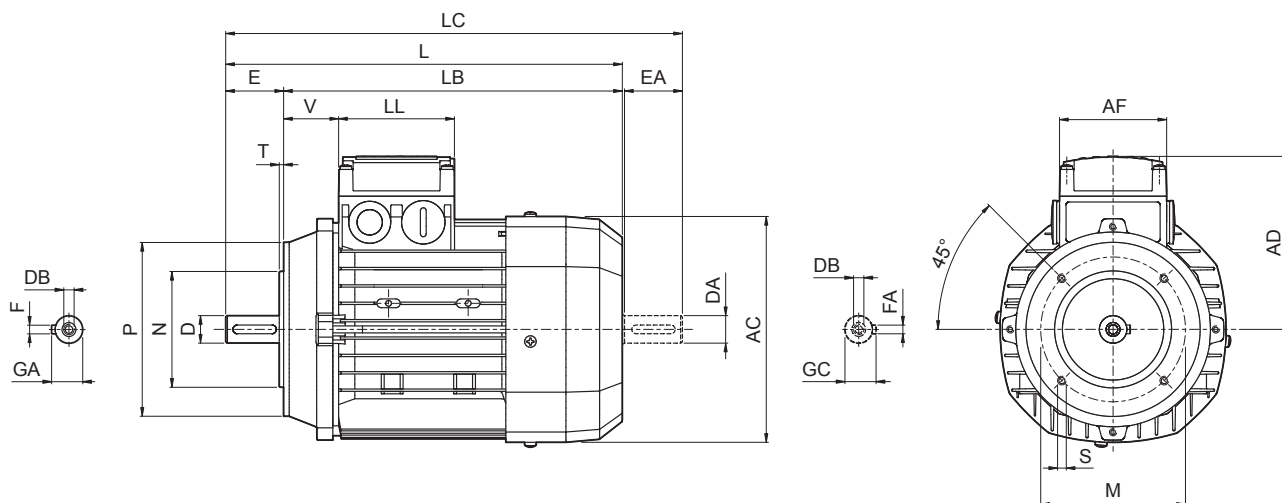


	Shaft					Flange					Motor								
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V
BX 90SR	19	40	M6	21.5	6	165	130	200	11.5	3.5	11.5	176	316	276	358	133			44
BX 90LA	19 ⁽¹⁾	40 ⁽¹⁾	M6 ⁽¹⁾	21.5 ⁽¹⁾	6 ⁽¹⁾														
BX 100LA	28	60	M10	31	8	215	180	250	14	4	14	195	410	350	462	142	98	98	50
BX 100LB																			
BX 112M																			
BX 132SB	38	80	M12	41	10	265	230	300	14	4	20	258	552	472	615	193	118	118	58
BX 132MA																			
BX 160MA	42	110	M16	45	12	300	250	350	18.5	5	15	310	596	486	680	245	187	187	51
BX 160MB																			
BX 160L																			
BX 180M	48	110	M16	51.5	14						18	348	708	598	823	261			52
BX 180L																			

N.B.: 1) These values refer to the rear shaft end (PS).



BX - IM B14 - CUS



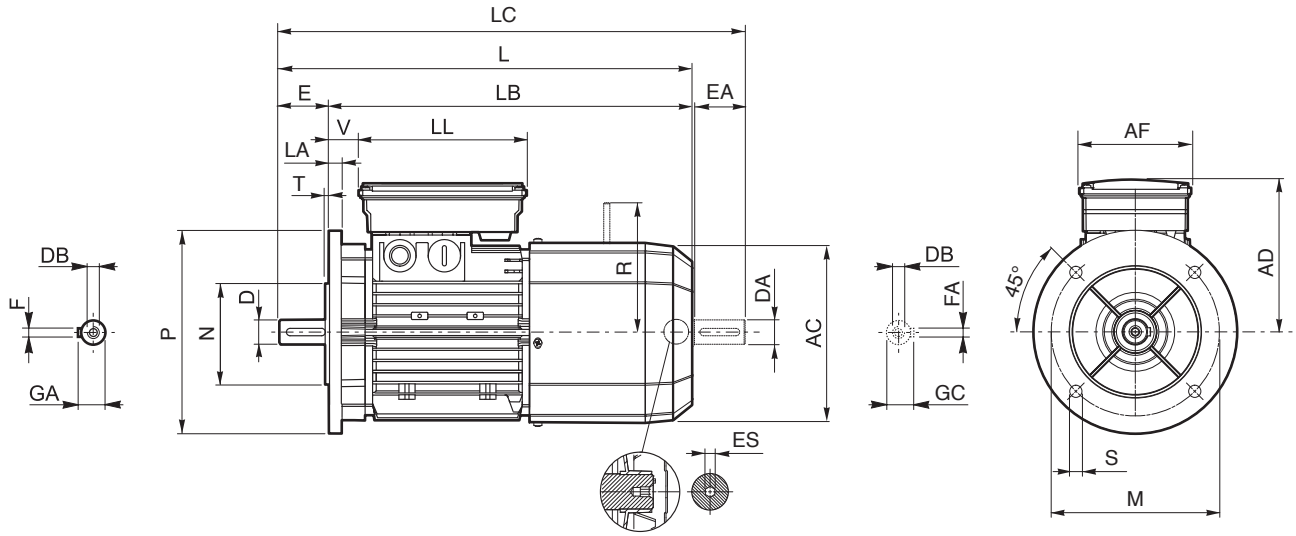
	Shaft					Housing					Motor								
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V	
BX 90 SR	19 19 ⁽¹⁾	40 40 ⁽¹⁾	M6 M6 ⁽¹⁾	21.5 21.5 ⁽¹⁾	6 6 ⁽¹⁾	100	80	120	M6	3	176	316	276	358	133	98	98	44	
BX 90 S	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾	115	95	140	M8			3.5		195					326
BX 90 LA											219		430						370
BX 100 LA	28 24 ⁽¹⁾	60 50 ⁽¹⁾	M10 M8 ⁽¹⁾	31 27 ⁽¹⁾	8 8 ⁽¹⁾	130	110	160	M10	4	258	552	472	615	193	118	118	52	
BX 100 LB																		58	
BX 112 M																		58	
BX 132 SB	38 28 ⁽¹⁾	80 60 ⁽¹⁾	M12 M10 ⁽¹⁾	41 31 ⁽¹⁾	10 8 ⁽¹⁾	165	130	200	M10	4	258	552	472	615	193	118	118	58	
BX 132 MA																		58	

N.B.: 1) These values refer to the rear shaft end (PS).



BX - IM B5 - FD/FA - CUS

BX-MX

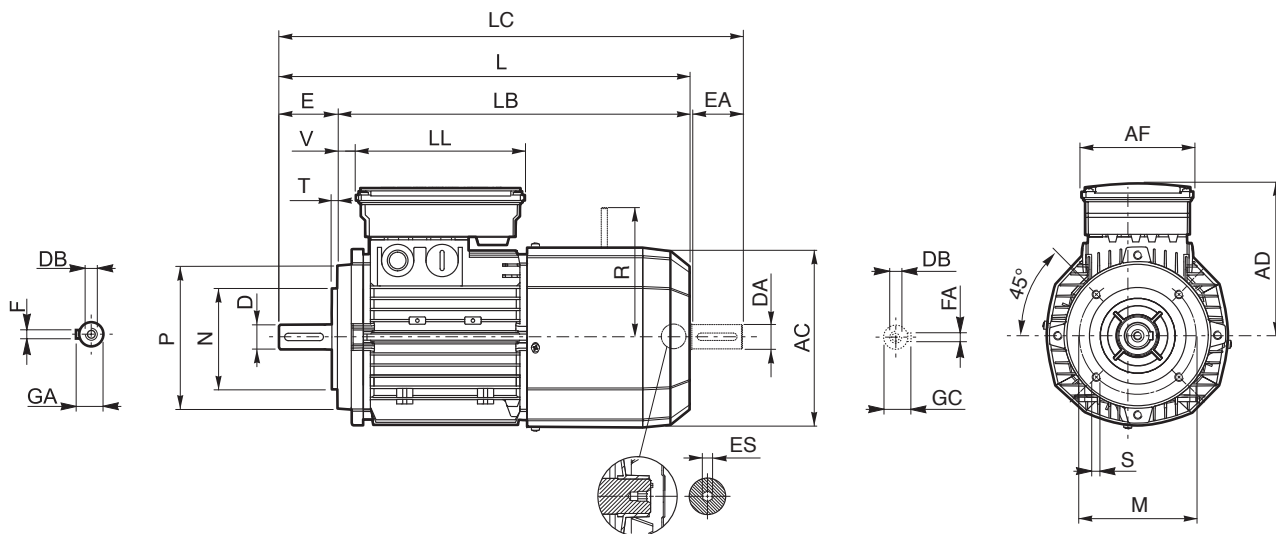


	Shaft					Flange					Motor												
	D	E	DB	GA	F	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	R		ES	
	DA	EA	M	GC	FA															FD	FA	(2)	
BX 90 SR	19 19 ⁽¹⁾	40 40 ⁽¹⁾	M6 M6 ⁽¹⁾	21.5 21.5 ⁽¹⁾	6 6 ⁽¹⁾								400		442						129	134	
BX 90 S	24 19 ⁽¹⁾	50 40 ⁽¹⁾	M8 M6 ⁽¹⁾	27 21.5 ⁽¹⁾	8 6 ⁽¹⁾	165	130	200	11.5	3.5	11.5	176		360		146			32				
BX 90 LA													410		452			110	165				
BX 100 LA											14	195	502	442	554	155			37		160	160	6
BX 100 LB	28 24 ⁽¹⁾	60 50 ⁽¹⁾	M10 M8 ⁽¹⁾	31 27 ⁽¹⁾	8 8 ⁽¹⁾	215	180	250															
BX 112 M									14	4	15	219	527	467	579	170			39	199	198		
BX 132 SB											16	258	661	581	724	210	140	188	46	204	200		
BX 132 MA	38 28 ⁽¹⁾	80 60 ⁽¹⁾	M12 M10 ⁽¹⁾	41 31 ⁽¹⁾	10 8 ⁽¹⁾	265	230	300													226		
BX 160 MA													736	626	820								
BX 160 MB	42 38 ⁽¹⁾	110 80 ⁽¹⁾	M16 M12 ⁽¹⁾	45 41 ⁽¹⁾	12 10 ⁽¹⁾						15	310				245			51	266	247		
BX 160 L						300	250	350	18.5	5			780	670	864			187	187				
BX 180 M											18	348	866	756	981	261				52	305		
BX 180 L	48 42 ⁽¹⁾	110 110 ⁽¹⁾	M16 M16 ⁽¹⁾	51.5 45 ⁽¹⁾	14 12 ⁽¹⁾																		

N.B.: 1) These values refer to the rear shaft end (PS). 2) "ES" hexagon is not present with PS option



BX - IM B14 - FD/FA - CUS



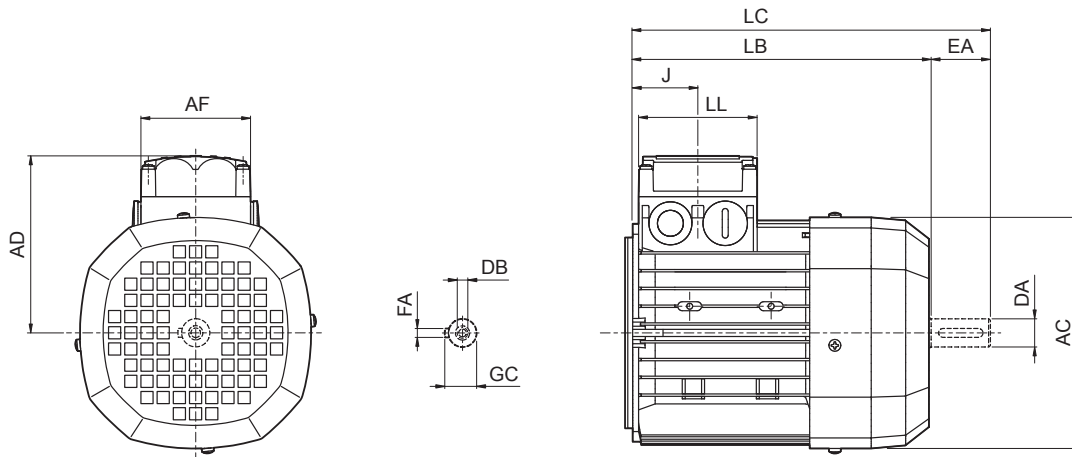
	Shaft					Housing					Motor												
	D	E	DB	GA	F	M	N	P	S	T	AC	L	LB	LC	AD	AF	LL	V	R		ES ⁽²⁾		
	DA	EA	GC	FA	GC	FA	GC	FA	GC	FA	GC	FA	GC	FA	GC	FA	GC	FA	GC	FD	FA	ES ⁽²⁾	
BX 90 SR	19	40	M6	21.5	6	100	80	120	M6			400		442									
BX 90 S	24	50	M8	27	8	115	95	140		3	176		360		146			32		129	134		
BX 90 LA	19 ⁽¹⁾	40 ⁽¹⁾	M6 ⁽¹⁾	21.5 ⁽¹⁾	6 ⁽¹⁾							410		452			110	165					
BX 100 LA									M8											160	160	6	
BX 100 LB	28	60	M10	31	8	130	110	160		3.5	195	502	442	554	155			37					
BX 112 M	24 ⁽¹⁾	50 ⁽¹⁾	M8 ⁽¹⁾	27 ⁽¹⁾	8 ⁽¹⁾						219	527	467	579	170			39		199	198		
BX 132 SB	38	80	M12	41	10	165	130	200	M10	4	258	661	581	724	210	140	188	46			200		
BX 132 MA	28 ⁽¹⁾	60 ⁽¹⁾	M10 ⁽¹⁾	31 ⁽¹⁾	8 ⁽¹⁾																226		

N.B.: 1) These values refer to the rear shaft end (PS). 2) "ES" hexagon is not present with PS option



MX

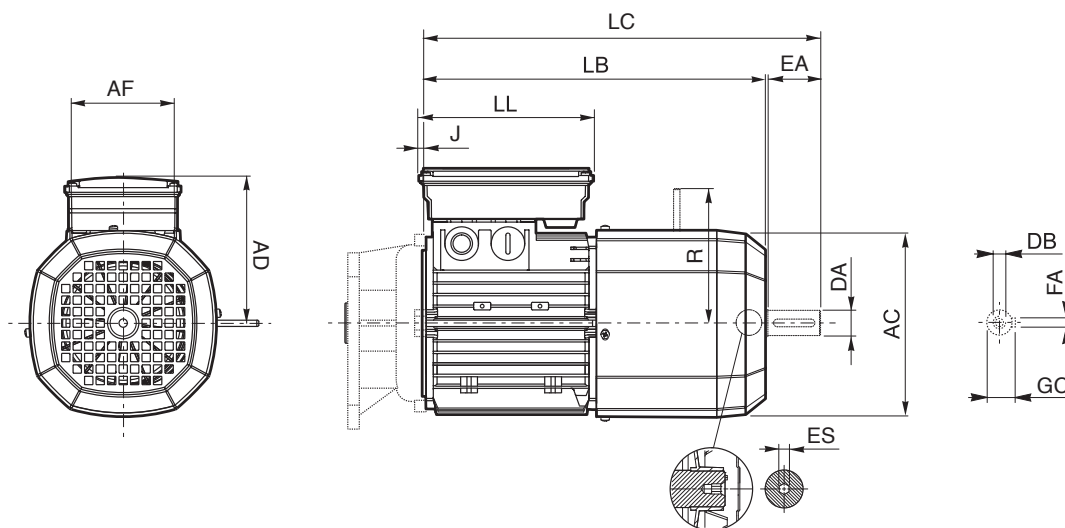
BX-MX



	Rear shaft end					Motor						
	DA	EA	DB	GC	FA	AC	LB	LC	AF	LL	J	AD
MX 2SB	14	30	M5	16	5	156	246	278	74	80	44	119
MX 3SA	24	50	M8	27	8	195	265	317	98	98	53.5	142
MX 3SB							305	357				
MX 3LA												
MX 3LB												
MX 4SA	28	60	M10	31		258	361	424	118	118	64.5	193
MX 4SB							396	459				
MX 4LA												
MX 5SA	38	80	M12	41	10	310	418	502	187	187	77	245
MX 5SB							462	546				
MX 5LA												



MX - FD/FA



	Rear shaft end					Motor									
	DA	EA	DB	GC	FA	AC	LB	LC	AF	LL	J	AD	R FD FA		ES ⁽¹⁾
MX 2SB	14	30	M5	16	5	156	318	349	98	133	9	143	129	134	5
MX 3SA	24	50	M8	27	8	195	355	407	110	165	7	155	160	160	6
MX 3SB							397	450							
MX 3LA															
MX 3LB															
MX 4SA	28	60	M10	31	8	258	470	534	140	188	7	210	204	200	6
MX 4SB							494	558						226	
MX 4LA															
MX 5SA	38	80	M12	41	10	310	558	644	187	187	17	245	266	247	—
MX 5SB							602	686							
MX 5LA															

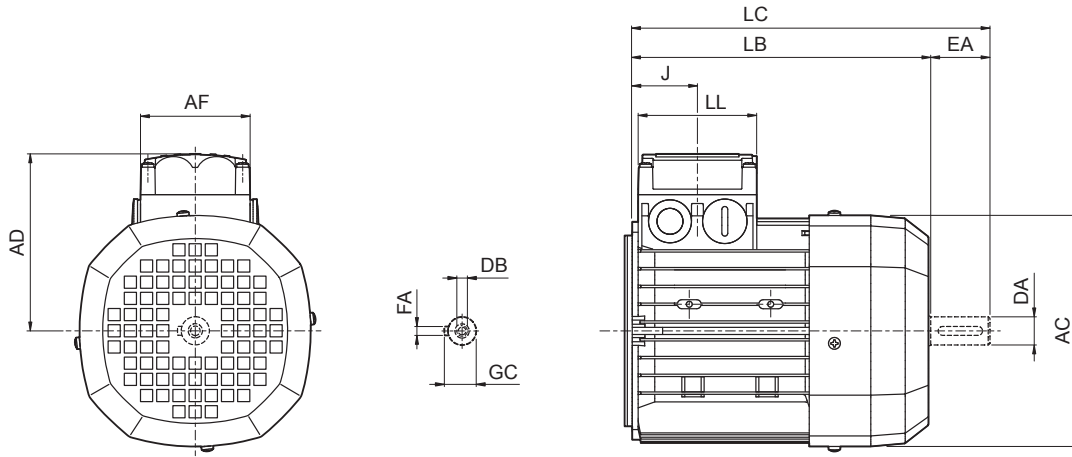
N.B.:

1) "ES" hexagon is not present with PS option



MX - CUS

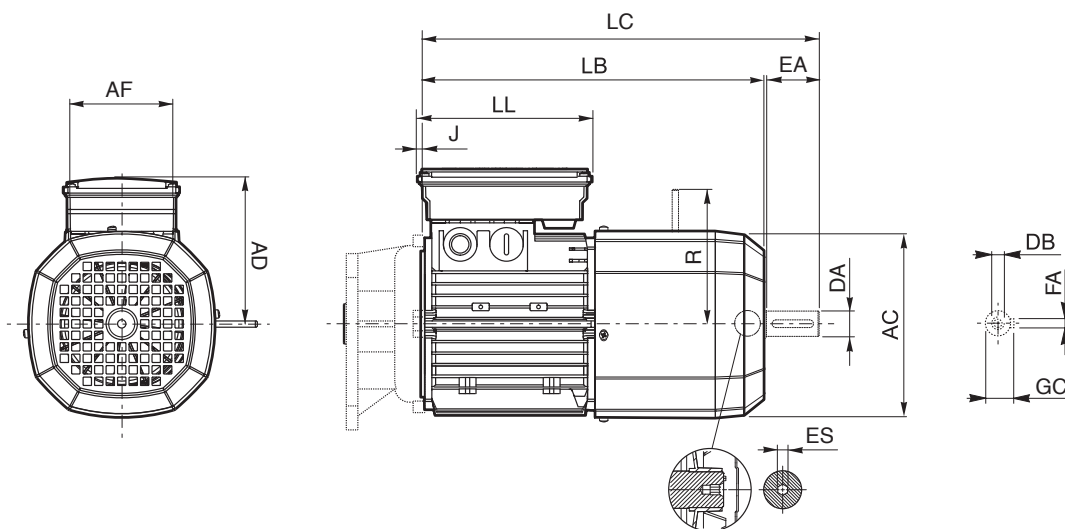
BX-MX



	Rear shaft end					Motor						
	DA	EA	DB	GC	FA	AC	LB	LC	AF	LL	J	AD
MX 2SB	14	30	M5	16	5	176	262	293	98	98	79	133
MX 3SA	24	50	M8	27	8	195	265	317				
MX 3SB							305	357				
MX 3LA												
MX 3LB							361	424	118	118	64.5	193
MX 4SA	28	60	M10	31	258	420	483					
MX 4SB												
MX 4LA												
MX 5SA	38	80	M12	41	10	310	418	502	187	187	77	245
MX 5SB							462	546				
MX 5LA												

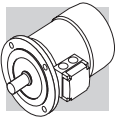


MX - FD/FA - CUS



	Rear shaft end					Motor																				
	DA	EA	DB	GC	FA	AC	LB	LC	AF	LL	J	AD	R FD FA		ES ⁽¹⁾											
MX 2SB	14	30	M5	16	5	176	347	379			-17	146	129	134	6											
MX 3SA	24	50	M8	27	8	195	355	407	110	165	7	155	160	160												
MX 3SB																										
MX 3LA																										
MX 3LB							397	450																		
MX 4SA	28	60	M10	31	10	258	470	534	140	188	140	188	210	204		200										
MX 4SB																										
MX 4LA																				528	592					
MX 5SA	38	80	M12	41	10	310	558	644	187	187	17	245	266	247	—											
MX 5SB																										
MX 5LA																				602	686					

N.B.:
1) "ES" hexagon is not present with PS option


M16 MOTOR RATING CHARTS BE-ME
BE-ME

2 P	3000 min⁻¹ - S1	50 Hz - IE2
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

P _n kW		n min ⁻¹	M _n Nm	I _n 400V A	η%			cos φ	I _s I _n	M _s M _n	M _a M _n	J _m x 10 ⁻⁴ kgm ²	IM B5 	
					100%	75%	50%							
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
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P _n kW		n min ⁻¹	M _n Nm	I _n 400V A	η%			cos φ	I _s I _n	M _s M _n	M _a M _n	J _m x 10 ⁻⁴ kgm ²	IM B5 	
					100%	75%	50%							
0.37	BE 71B	4	1385	2.55	1.05	70.1	69.3	64.2	0.75	4.0	2.3	2.2	6.9	5.9
0.55	BE 80A	4	1405	3.7	1.41	75.1	74.9	71.2	0.76	4.3	2.2	1.9	15	8.2
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
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P _n kW		n min ⁻¹	M _n Nm	I _n 400V A	η%			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
					100%	75%	50%						
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

BE-ME





BE-ME

2 P	3000 min⁻¹ - S1	50 Hz - IE2
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

P _n kW		n min ⁻¹	M _n Nm	I _n 400V A	η%			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 B9 	
					100%	75%	50%							
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
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P _n kW		n min ⁻¹	M _n Nm	I _n 400V A	η%			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 B9 	
					100%	75%	50%							
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
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P _n kW		n min ⁻¹	M _n Nm	I _n 400V A	η%			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 B9 	
					100%	75%	50%							
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

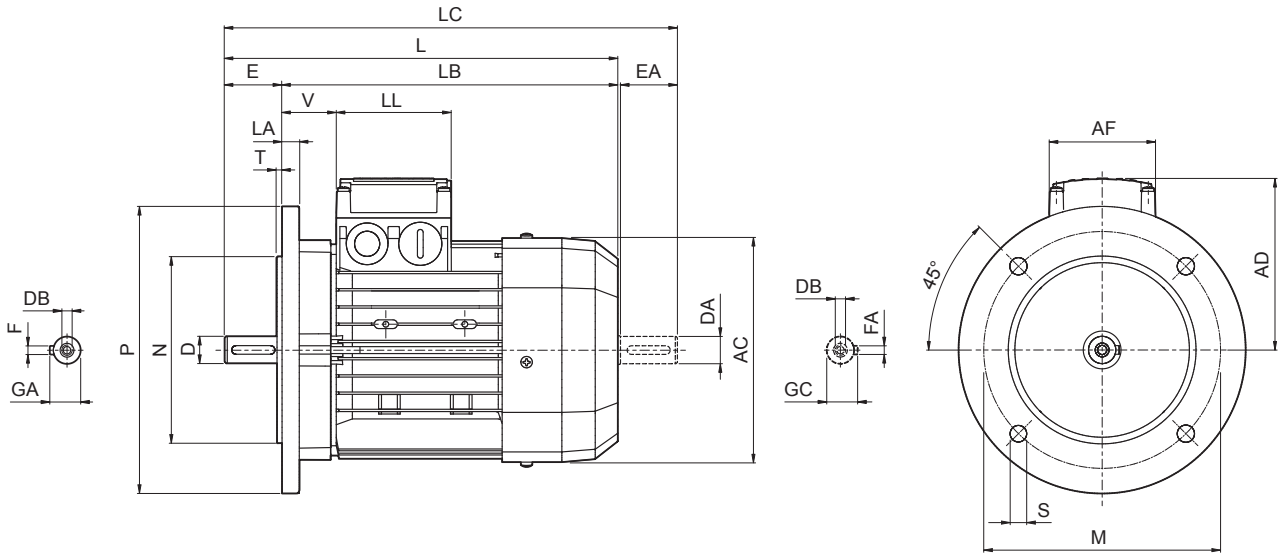
BE-ME



M17 MOTORS DIMENSIONS BE-ME

BE - IM B5

BE-ME



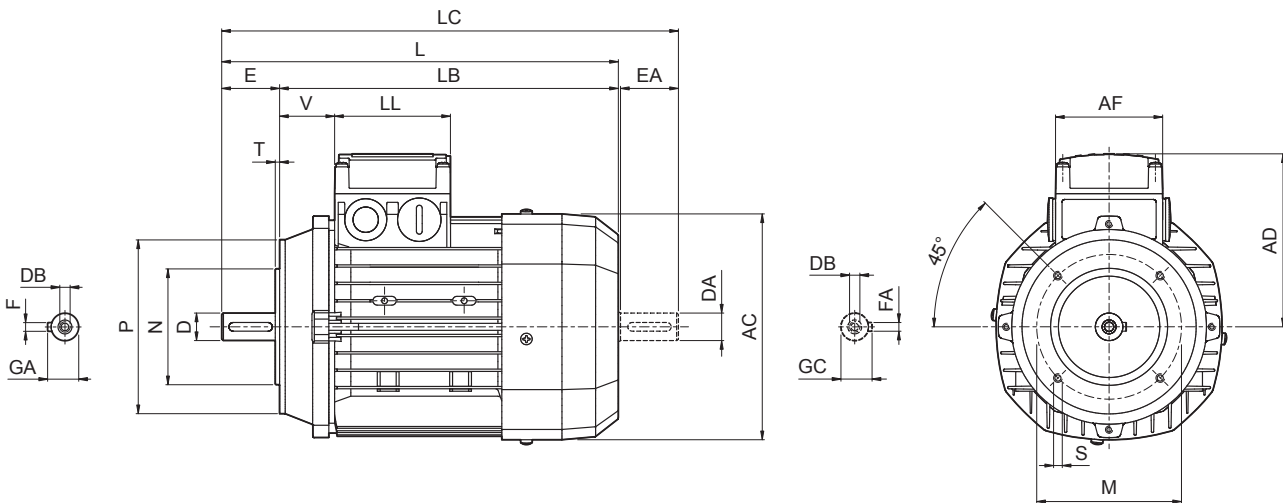
	Shaft					Flange					Motor									
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V	
BE 71	14	30	M5	16	5	130	110	160	9.5	3.5	10	138	249	219	281	108	74	80	37	
BE 80	19	40	M6	21.5	6	165	130	200	11.5		156	274	234	315	119	98			98	38
BE 90 S	24	50	M8	27	8						215	180	250	14	4		176	326		276
BE 90 L						11.5	195	367	307	429						142	50			
BE 100	28	60	M10	31	10	265	230	300	14	4	14	195	367	307	429	142	193	118	118	50
BE 112											15	219	385	325	448	157				52
BE 132 S	38	80	M12	41	10	265	230	300	14	4	20	258	493	413	576	193	118	118	58	
BE 132 MA													528	448	611					
BE 132 MB													528	448	611					
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													640	530	724					
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													708	598	823					

N.B.:

1) These values refer to the rear shaft end.



BE - IM B14



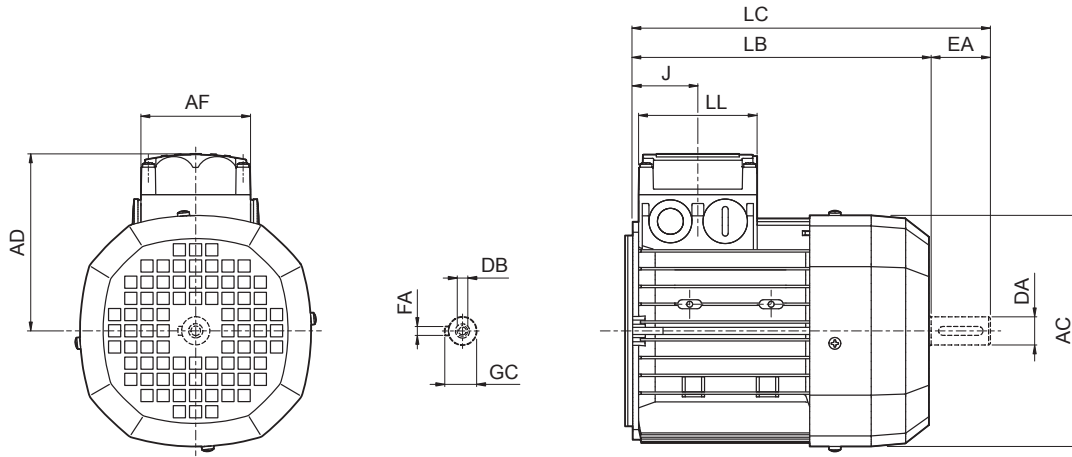
BE-ME

	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 71	14	30	M5	16	5	85	70	105	M6	2.5	138	249	219	281	108	74	80	37
BE 80	19	40	M6	21.5	6	100	80	120			156	274	234	315	119			
BE 90 S	24	50	M8	27	8	115	95	140	M8	3	176	326	276	378	133	98	98	44
BE 90 L											195	367	307	429	142			
BE 100	28	60	M10	31	130	110	160	M10	3.5	219	385	325	448	157	52			
BE 112										258	493	413	576	193	118	118	58	
BE 132 S	38	80	M12	41	10	165	130	200	M10	4	528	448	611					
BE 132 MA																		
BE 132 MB																		



ME




BE-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							262	325				
ME 4S	38	80	M12	10	41	258	361	444	118	118	64.5	193
ME 4L							396	479				
ME 4LB												
ME 5S	310	418	502	187	187	77	245					
ME 5L								462	546			



M18 MOTOR RATING CHARTS BN-M

2P		3000 min ⁻¹ - S1																50 Hz									
		d.c. brake																a.c. brake									
		P _n kW		n min ⁻¹	M _n Nm	IE1	η (100%) %	η (75%) %	η (50%) %	cosφ	I _n 400V A	I _s I _n	M _s M _n	M _a M _n	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb Nm	Z ₀ 1/h	NB	SB	J _m x 10 ⁻⁴ kgm ²	IM B5 	IMod	Mb Nm	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²
FD	FA																										
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	FA 02	1.75	4800	2.6	5.0
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	FA 02	1.75	4800	3.0	5.4
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	FA 02	3.5	4500	3.9	6.6
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	FA 03	3.5	4200	4.6	7.8
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	FA 03	5	4200	5.3	8.6
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	FA 03	5	3600	6.1	9.7
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	FA 04	5	3200	9.4	12.4
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	FA 04	10	3000	10.6	13.3
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	FA 04	15	2600	13.0	15.1
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	FA 14	15	2200	14.1	16.4
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	FA 14	15	2200	18.3	18.1
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	FA 05	26	2200	21	20.7
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	FA 15	26	1600	35	27
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	FA 15	40	1000	43	30
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	FA 06S	40	950	66	40
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	FA 06	50	600	112	49
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	FA 06	50	550	154	56
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 06	75	—	430	—	—	189	66	FA 06	75	430	189	67
11	BN 160MR	2	2920	36	87.6	87.0	86.0	0.88	20.6	6.9	2.9	2.5	210	65	FD 06	50	—	600	—	—	112	48	FA 06	50	600	112	49
15	BN 160MB	2	2930	49	89.6	89.4	88.0	0.86	28.1	7.1	2.6	2.3	340	84	FD 06	50	—	550	—	—	154	55	FA 06	50	550	154	56
18.5	BN 160L	2	2930	60	90.4	90.1	89.0	0.86	34	7.6	2.7	2.3	420	97	FD 06	75	—	430	—	—	189	66	FA 06	75	430	189	67
22	BN 180M	2	2930	72	89.9	89.7	89.5	0.88	40	7.8	2.6	2.4	490	109	FD 06	75	—	430	—	—	189	66	FA 06	75	430	189	67
30	BN 200LA	2	2930	98	90.7	90.1	87.6	0.89	54	7.8	2.7	2.9	770	140	FD 06	75	—	430	—	—	770	140	FA 06	75	430	770	140

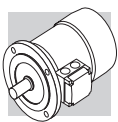
○ = n.a. • = IE1






6P **1000 min⁻¹ - S1** **50 Hz**

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 	d.c. brake						a.c. brake						
															FD			FA			FD			FA			
															Mod	Mb Nm	Z ₀ 1/h	NB	SB	Mod	Mb Nm	Z ₀ 1/h	IM B5 	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb Nm
0.09	BN 63A	6	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	9000	14000	FA 02	3.5	14000	4.0	6.3	4.0	6.3
0.12	BN 63B	6	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	9000	14000	FA 02	3.5	14000	4.3	6.6	4.3	6.4
0.18	BN 71A	6	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	8100	13500	FA 03	5.0	13500	9.5	8.2	9.5	7.9
0.25	BN 71B	6	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	7800	13000	FA 03	5.0	13000	12	9.4	12	9.1
0.37	BN 71C	6	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	5100	9500	FA 03	7.5	9500	14	10.4	14	10.1
0.37	BN 80A	6	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	5200	8500	FA 04	10	8500	23	13.8	23	13.7
0.55	BN 80B	6	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	4800	7200	FA 04	15	7200	27	15.2	27	15.1
0.75	BN 80C	6	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	3400	6400	FA 04	15	6400	30	16.1	30	16.0
0.75	BN 90S	6	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	3400	6500	FA 14	15	6500	28	16.8	28	16.7
1.1	BN 90L	6	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	2700	5000	FA 05	26	5000	37	21	37	22
1.5	BN 100LA	6	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	1900	4100	FA 15	40	4100	86	28	86	29
1.85	BN 100LB	6	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	1700	3600	FA 15	40	3600	99	30	99	31
2.2	BN 112M	6	22	●	78.5	79.0	76.5	0.73	5.5	4.8	2.2	2.0	168	32	FD 06S	60	—	2100	—	2100	FA 06S	60	2100	177	42	177	44
3	BN 132S	6	30	●	79.7	77.0	75.1	0.76	7.1	5.1	1.9	1.8	216	36	FD 56	75	—	1400	—	1400	FA 06	75	1400	226	49	226	50
4	BN 132MA	6	40	●	81.4	81.5	79.5	0.77	9.2	5.5	2.0	1.8	295	45	FD 06	100	—	1200	—	1200	FA 07	100	1200	305	58	305	63
5.5	BN 132MB	6	56	●	83.1	80.9	79.1	0.78	12.2	6.1	2.1	1.9	383	56	FD 07	150	—	1050	—	1050	FA 07	150	1050	406	72	406	74
7.5	BN 160M	6	75	●	85.0	85.0	84.8	0.81	15.7	5.9	2.2	2.0	740	83	FD 08	170	—	900	—	900	FA 08	170	900	815	112	815	113
11	BN 160L	6	109	●	86.4	86.5	85.9	0.81	22.7	6.6	2.5	2.3	970	103	FD 08	200	—	800	—	800	FA 08	200	800	1045	133	1045	133
15	BN 180L	6	148	●	87.7	88.0	87.3	0.82	30	6.2	2.0	2.4	1550	130	FD 09	300	—	600	—	600	FA 09	300	600	1750	170	1750	170
18.5	BN 200LA	6	184	●	88.6	88.0	87.3	0.81	37	5.9	2.0	2.3	1700	145	FD 09	400	—	450	—	450	FA 09	400	450	1900	185	1900	185





○ = n.a. ● = IE1

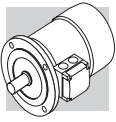






8P		750 min ⁻¹ - S1														50 Hz							
		d.c. brake														a.c. brake							
		P _n kW		n min ⁻¹	M _n Nm	η %	cosφ	I _n 400V A	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	$\frac{J_m}{kgm^2}$	IM B5 	Mod	Mb Nm	Z _o 1/h	NB	SB	$\frac{J_m}{kgm^2}$	IM B5 	Mod	Mb Nm	Z _o 1/h
FD 03	FD 03																						
0.09	BN 71A	8	1.26	47	0.59	0.47	2.3	2.4	2.3	10.9	6.7	FD 03	3.5	9000	16000	12.0	9.4	FA 03	3.5	16000	12.0	9.1	
0.12	BN 71B	8	1.69	51	0.59	0.58	2.1	2.3	2.2	12.9	7.7	FD 03	5.0	9000	16000	14.0	10.4	FA 03	5.0	16000	14.0	10.1	
0.18	BN 80A	8	2.49	51	0.60	0.85	2.4	2.2	2.2	15	8.2	FD 04	5.0	6500	11000	16.6	12.1	FA 04	5.0	11000	16.6	12.0	
0.25	BN 80B	8	3.51	54	0.63	1.06	2.4	2.0	1.9	20	9.9	FD 04	10.0	6000	10000	22	13.8	FA 04	10.0	10000	23	13.7	
0.37	BN 90S	8	5.2	58	0.60	1.53	2.6	2.3	2.1	26	12.6	FD 14	15.0	4800	7500	28	16.8	FA 14	15.0	7500	28	16.7	
0.55	BN 90L	8	7.8	62	0.60	2.13	2.6	2.2	2.0	33	15	FD 05	26	4000	6400	37	21	FA 05	26	6400	37	22	
0.75	BN 100LA	8	10.2	68	0.63	2.53	3.4	1.9	1.7	82	22	FD 15	26	2800	4800	86	28	FA 15	26	4800	86	29	
1.1	BN 100LB	8	15.0	68	0.64	3.65	3.2	1.7	1.7	95	24	FD 15	40	2500	4000	99	30	FA 15	40	4000	99	31	
1.5	BN 112M	8	20.2	71	0.66	4.6	3.7	1.8	1.9	168	32	FD 06S	60	—	3000	177	42	FA 06S	60	3000	177	44	
2.2	BN 132S	8	29.6	75	0.66	6.4	3.8	1.8	2.0	295	45	FD 56	75	—	2300	305	58	FA 06	75	2300	305	56	
3	BN 132MA	8	40.4	76	0.69	8.3	3.9	1.6	1.8	370	53	FD 06	100	—	1900	394	69	FA 07	100	1900	406	74	



2/4P **3000/1500 min⁻¹ - S1** **50 HZ**





P _n kW		n min ⁻¹	M _n Nm	η %	cos φ	I _n 400V A	I _s I _n	M _s M _n	M _a M _n	J _m x 10 ⁻⁴ kgm ²	IM B5 	d.c. brake						a.c. brake						
												FD			FA			FD			FA			
												Mod	Mb Nm	Z ₀ 1/h	NB	SB	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb Nm	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	
0.20	BN 63B	2	2700	0.71	0.82	0.64	3.5	2.1	1.9	2.9	4.4	FD 02	3.5	2200	2600	5100	3.5	2600	5100	3.5	2600	5100	3.5	5.9
0.15		4	1350	1.06	0.67	0.66	2.6	1.8	1.7					4000										
0.28	BN 71A	2	2700	0.99	0.82	0.88	2.9	1.9	1.7	4.7	4.4	FD 03	3.5	2100	2400	4800	3.5	2400	4800	3.5	2400	4800	3.5	6.8
0.20		4	1370	1.39	0.72	0.68	3.1	1.8	1.7					3800										
0.37	BN 71B	2	2740	1.29	0.82	1.16	3.5	1.8	1.8	5.8	5.1	FD 03	5.0	1400	2100	4200	5.0	2100	4200	5.0	2100	4200	5.0	7.5
0.25		4	1390	1.72	0.73	0.82	3.3	2.0	1.9					2900										
0.45	BN 71C	2	2780	1.55	0.85	1.21	3.8	1.8	1.8	6.9	5.9	FD 03	5.0	1400	2100	4200	5.0	2100	4200	5.0	2100	4200	5.0	8.3
0.30		4	1400	2.0	0.73	0.94	3.6	2.0	1.9					2800										
0.55	BN 80A	2	2800	1.9	0.85	1.48	3.9	1.7	1.7	15	8.2	FD 04	5.0	1600	2300	4000	5.0	2300	4000	5.0	2300	4000	5.0	12.0
0.37		4	1400	2.5	0.79	1.01	4.1	1.8	1.9					3000										
0.75	BN 80B	2	2780	2.6	0.85	1.96	3.8	1.9	1.8	20	9.9	FD 04	10	1400	1600	3600	10	1600	3600	10	1600	3600	10	13.7
0.55		4	1400	3.8	0.81	1.44	3.9	1.7	1.7					2700										
1.1	BN 90S	2	2790	3.8	0.82	2.73	4.7	2.3	2.0	21	12.2	FD 14	10	1500	1600	2800	10	1600	2800	10	1600	2800	10	16.3
0.75		4	1390	5.2	0.79	2.08	4.6	2.4	2.2					2300										
1.5	BN 90L	2	2780	5.2	0.85	3.64	4.5	2.4	2.1	28	14.0	FD 05	26	1050	1200	2000	26	1200	2000	26	1200	2000	26	21
1.1		4	1390	7.6	0.81	2.69	4.7	2.5	2.2					1600										
2.2	BN 100LA	2	2800	7.5	0.85	5.2	4.5	2.0	1.9	40	18.3	FD 15	26	600	900	2300	26	900	2300	26	900	2300	26	25
1.5		4	1410	10.2	0.79	3.8	4.7	2.0	2.0					1300										
3.5	BN 100LB	2	2850	11.7	0.84	7.5	5.4	2.2	2.1	61	25	FD 15	40	500	900	2100	40	900	2100	40	900	2100	40	32
2.5		4	1420	16.8	0.80	5.5	5.2	2.2	2.2					1000										
4	BN 112M	2	2880	13.3	0.83	8.8	6.1	2.4	2.0	98	30	FD 06S	60	—	700	107	40	700	107	60	700	107	60	42
3.3		4	1420	22.2	0.80	7.4	5.1	2.1	2.0					—	1200			1200						
5.5	BN 132S	2	2890	18.2	0.87	11.4	5.9	2.4	2.0	213	44	FD 56	75	—	350	223	57	350	223	75	350	223	75	58
4.4		4	1440	29	0.84	9.2	5.3	2.2	2.0					—	900			900						
7.5	BN 132MA	2	2900	25	0.87	15.2	6.5	2.4	2.0	270	53	FD 06	100	—	350	280	66	350	280	100	350	280	100	71
6		4	1430	40	0.85	12.1	5.8	2.3	2.1					—	900			900						
9.2	BN 132MB	2	2920	30	0.86	18.6	6.0	2.6	2.2	319	59	FD 07	150	—	300	342	75	300	342	150	300	342	150	77
7.3		4	1440	48	0.85	14.6	5.5	2.3	2.1					—	800			800						

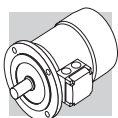


2/6P		3000/1000 min ⁻¹ - S3 60/40%														50 HZ								
		d.c. brake														a.c. brake								
		FD							FA							FA		FA						
P _n kW		n min ⁻¹	M _n Nm	η %	cosφ	I _n 400V A	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb Nm	Z ₀ 1/h	NB	SB	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb Nm	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	
0.25	BN 71A	2	0.84	60	0.82	0.73	4.3	1.9	1.8	6.9	5.9	FD 03	1.75	1500	1700	10000	8.0	8.6	FA 03	2.5	1700	13000	8.0	8.3
0.08		6	0.84	43	0.70	0.38	2.1	1.4	1.5															
0.37	BN 71B	2	1.23	62	0.80	1.08	4.4	1.9	1.8	9.1	7.3	FD 03	3.5	1000	1300	9000	10.2	10.0	FA 03	3.5	1300	11000	10.2	9.7
0.12		6	1.27	44	0.73	0.54	2.4	1.4	1.5															
0.55	BN 80A	2	1.88	63	0.86	1.47	4.5	1.9	1.7	20	9.9	FD 04	5.0	1500	1800	4100	22	13.8	FA 04	5.0	1800	6300	22	13.7
0.18		6	1.85	52	0.65	0.77	3.3	2.0	1.9															
0.75	BN 80B	2	2.6	66	0.87	1.89	4.3	1.8	1.6	25	11.3	FD 04	5.0	1700	1900	3800	27	15.2	FA 04	5.0	1900	6000	27	15.1
0.25		6	2.6	54	0.67	1.00	3.2	1.7	1.8															
1.10	BN 90L	2	3.7	67	0.84	2.82	4.7	2.1	1.9	28	14.0	FD 05	13	1400	1600	3400	32	20	FA 05	13	1600	5200	32	21
0.37		6	3.8	59	0.71	1.27	3.3	1.6	1.6															
1.5	BN 100LA	2	5	73	0.84	3.53	5.1	1.9	2.0	40	18.3	FD 15	13	1000	1200	2900	44	24	FA 15	13	1200	4000	44	25
0.55		6	5.6	64	0.67	1.85	3.5	1.7	1.8															
2.2	BN 100LB	2	7.2	77	0.85	4.9	5.9	2.0	2.0	61	25	FD 15	26	700	900	2100	65	31	FA 15	26	900	3000	65	32
0.75		6	7.5	67	0.64	2.5	3.3	1.9	1.8															
3	BN 112M	2	9.9	78	0.87	6.4	6.3	2.0	2.1	98	30	FD 06S	40	—	1000	—	107	40	FA 06S	40	1000	2600	107	32
1.1		6	11.1	72	0.64	3.4	3.9	1.8	1.8															
4.5	BN 132S	2	14.8	78	0.84	9.9	5.8	1.9	1.8	213	44	FD 66	37	—	500	—	223	57	FA 06	37	500	2100	223	58
1.5		6	14.9	74	0.67	4.4	4.2	1.9	2.0															
5.5	BN 132M	2	18.0	78	0.87	11.7	6.2	2.1	1.9	270	53	FD 66	50	—	400	—	280	66	FA 06	50	400	1900	280	67
2.2		6	22	77	0.71	5.8	4.3	2.1	2.0															







2/8P **3000/750 min⁻¹ - S3 60/40%** **50 Hz**

P _n kW		n min ⁻¹	M _n Nm	η	cos φ	I _n 400V A	I _s I _n	M _s M _n	M _a M _n	J _m x 10 ⁻⁴ kgm ²	IM B5 	d.c. brake						a.c. brake						
												FD			FA			FD			FA			
												Mod	Mb Nm	Z ₀ 1/h	NB	SB	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb Nm	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	
0.25	BN 71A	2	2790	0.86	0.87	0.68	3.9	1.8	1.9	10.9	6.7	FD 03	1.75	1300	1400	1400	1400	12	9.4	FA 03	2.5	1400	12	9.1
0.06		8	680	0.84	0.61	0.46	2.0	1.8	1.9					10000	13000	13000								
0.37	BN 71B	2	2800	1.26	0.86	0.99	3.9	1.8	1.9	12.9	7.7	FD 03	3.5	1200	1300	1300	1300	14	10.4	FA 03	3.5	1300	14	10.1
0.09		8	670	1.28	0.75	0.51	1.8	1.4	1.5					9500	13000	13000								
0.55	BN 80A	2	2830	1.86	0.86	1.40	4.4	2.1	2.0	20	9.9	FD 04	5.0	1500	1800	1800	1800	22	13.8	FA 04	5.0	1800	22	13.7
0.13		8	690	1.80	0.64	0.72	2.3	1.6	1.7					5600	8000	8000								
0.75	BN 80B	2	2800	2.6	0.88	1.81	4.6	2.1	2.0	25	11.3	FD 04	10	1700	1900	1900	1900	27	15.2	FA 04	10	1900	27	15.1
0.18		8	690	2.5	0.66	0.92	2.3	1.6	1.7					4800	7300	7300								
1.10	BN 90L	2	2830	3.7	0.84	3.00	4.5	2.1	1.9	28	14.0	FD 05	13	1400	1600	1600	1600	32	20	FA 05	13	1600	32	21
0.28		8	690	3.9	0.63	1.34	2.4	1.8	1.9					3400	5100	5100								
1.5	BN 100LA	2	2880	5.0	0.85	3.69	4.7	1.9	1.8	40	18.3	FD 15	13	1000	1200	1200	1200	44	25	FA 15	13	1200	44	25
0.37		8	690	5.1	0.63	1.84	2.1	1.6	1.6					3300	5000	5000								
2.4	BN 100LB	2	2900	7.9	0.82	5.6	5.4	2.1	2.0	61	25	FD 15	26	550	700	700	700	65	31	FA 15	26	700	65	32
0.55		8	700	7.5	0.58	2.5	2.6	1.8	1.8					2000	3500	3500								
3	BN 112M	2	2900	9.9	0.87	6.5	6.3	2.1	1.9	98	30	FD 06S	40	—	900	—	900	107	40	FA 06S	40	900	107	42
0.75		8	690	10.4	0.65	2.8	2.5	1.6	1.6					—	2900	2900								
4	BN 132S	2	2870	13.3	0.84	9.4	5.6	2.3	2.4	213	44	FD 66	37	—	500	—	500	223	57	FA 06	37	500	223	58
1		8	690	13.8	0.62	3.5	2.9	1.9	1.8					—	3500	3500								
5.5	BN 132M	2	2870	18.3	0.84	12.6	6.1	2.4	2.5	270	53	FD 06	50	—	400	—	400	280	66	FA 06	50	400	280	67
1.5		8	690	21	0.63	5.1	2.9	1.9	1.9					—	2400	2400								







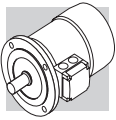
2/12P **3000/500 min-1 - S3 60/40%** **50 Hz**





P _n kW		n min ⁻¹	M _n Nm	η	cos φ	I _n 400V A	I _s I _n	M _s M _n	M _a M _n	J _m x 10 ⁻⁴ kgm ²	IM B5 	d.c. brake						a.c. brake					
												FD			FA			FD			FA		
												Mod	Mb Nm	Z ₀ 1/h	NB	SB	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb Nm	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 
0.55 0.09	BN 80B	2 12	1.86 2.0	64 30	0.89 0.63	1.39 0.69	4.2 1.8	1.6 1.9	1.7 1.8	25	11.3	FD 04	5.0	1000 8000	1300 12000	27	15.2	FA 04	5.0	1300 12000	27	15.1	
0.75 0.12	BN 90L	2 12	2.6 2.7	56 26	0.89 0.63	2.17 1.06	4.2 1.7	1.8 1.4	1.7 1.6	26	12.6	FD 05	13	1000 4600	1150 6300	30	18.6	FA 05	13	1150 6300	30	19.3	
1.10 0.18	BN 100LA	2 12	3.7 4.0	65 26	0.85 0.54	2.87 1.85	4.5 1.5	1.6 1.3	1.8 1.5	40	18.3	FD 15	13	700 4000	900 6000	44	25	FA 15	13	900 6000	44	25	
1.5 0.25	BN 100LB	2 12	4.9 5.4	67 36	0.86 0.46	3.76 2.18	5.6 1.8	1.9 1.7	1.9 1.8	54	22	FD 15	13	700 3800	900 5000	58	28	FA 15	13	900 5000	58	29	
2 0.3	BN 112M	2 12	6.6 6.2	74 46	0.88 0.43	4.43 2.19	6.5 2.0	2.1 2.1	2.0 2.0	98	30	FD 06S	20	— —	800 3400	107	40	FA 06S	20	800 3400	107	42	
3 0.5	BN 132S	2 12	9.8 10.2	74 51	0.87 0.43	6.7 3.3	6.8 2.0	2.3 1.7	1.9 1.6	213	44	FD 56	37	— —	450 3000	223	57	FA 06	37	450 3000	223	58	
4 0.7	BN 132M	2 12	13.1 14.5	75 53	0.89 0.44	8.6 4.3	5.9 1.9	2.4 1.7	2.3 1.6	270	53	FD 56	37	— —	400 2800	280	66	FA 06	37	400 2800	280	67	



4/6P **1500/1000 min⁻¹ - S1** **50 HZ**





P _n kW		n min ⁻¹	M _n Nm	η %	cos φ	I _n 400V A	I _s I _n	M _s M _n	M _a M _n	J _m x 10 ⁻⁴ kgm ²	IM B5 	d.c. brake						a.c. brake					
												FD			FA			FD			FA		
												Mod	Mb Nm	Z ₀ 1/h	NB	SB	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb Nm	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 
0.22 0.13	BN 71B	4 6	1.5 1.4	64 43	0.74 0.67	0.67 0.65	3.9 2.3	1.8 1.6	1.9 1.7	9.1	7.3	FD 03	3.5	2500 5000	3500 9000	10.2	10.0	FA 03	3.5	3500 9000	10.2	10.2	
0.30 0.20	BN 80A	4 6	2.0 2.1	61 54	0.82 0.66	0.87 0.81	3.5 3.2	1.3 1.9	1.5 2.0	15	8.2	FD 04	5.0	2500 4000	3100 6000	16.6	12.1	FA 04	5.0	3100 6000	16.6	16.6	
0.40 0.26	BN 80B	4 6	2.7 2.7	63 55	0.75 0.70	1.22 0.97	3.9 2.7	1.8 1.5	1.8 1.6	20	9.9	FD 04	10	1800 3600	2300 5500	22	13.8	FA 04	10	2300 5500	22	22	
0.55 0.33	BN 90S	4 6	3.7 3.4	70 62	0.78 0.70	1.45 1.10	4.5 3.7	2.0 2.3	1.9 2.0	21	12.2	FD 14	10	1500 2500	2100 4100	23	16.1	FA 14	10	2100 4100	23	23	
0.75 0.45	BN 90L	4 6	5.0 4.7	74 66	0.78 0.71	1.88 1.39	4.3 3.3	1.9 2.0	1.8 1.9	28	14	FD 05	13	1400 2300	2000 3600	32	20	FA 05	13	2000 3600	32	32	
1.1 0.8	BN 100LA	4 6	7.2 8.0	74 65	0.79 0.69	2.72 2.57	5.0 4.1	1.7 1.9	1.9 2.1	82	22	FD 15	26	1400 2100	2000 3300	86	28	FA 15	26	2000 3300	86	86	
1.5 1.1	BN 100LB	4 6	9.9 11.1	75 72	0.79 0.68	3.65 3.24	5.1 4.3	1.7 2.0	1.9 2.1	95	25	FD 15	26	1300 2000	1800 3000	99	31	FA 15	26	1800 3000	99	99	
2.3 1.5	BN 112M	4 6	15.2 14.9	75 73	0.78 0.72	5.7 4.1	5.2 4.9	1.8 2.0	1.9 2.0	168	32	FD 06S	40	— —	1600 2400	177	42	FA 06S	40	1600 2400	177	177	
3.1 2	BN 132S	4 6	20 20	83 77	0.83 0.75	6.5 4.9	5.9 4.5	2.1 2.1	2.0 2.1	213	44	FD 66	37	— —	1200 1900	223	57	FA 06	37	1200 1900	223	223	
4.2 2.6	BN 132MA	4 6	27 26	84 79	0.82 0.72	8.8 6.6	5.9 4.3	2.1 2.0	2.2 2.0	270	53	FD 06	50	— —	900 1500	280	66	FA 06	50	900 1500	280	280	



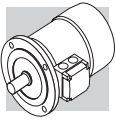
4/8P		1500/750 min ⁻¹ - S1														50 HZ							
		d.c. brake														a.c. brake							
		FD							FA							FA		FA					
P _n		n	M _n	η	cos φ	I _n	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	J _m	IM B5	Mod	Mb	Z ₀	1/h	J _m	IM B5	Mod	Mb	Z ₀	1/h	J _m	IM B5
kW		min ⁻¹	Nm	%		A				kgm ²			Nm			kgm ²			Nm			kgm ²	
0.37	BN 80A	4	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	FA 04	10	3500	7000	16.6	12.0
0.18		8	2.5	44	0.60	0.98	2.2	1.5	1.6					4500	7000								
0.55	BN 80B	4	3.8	65	0.86	1.42	3.8	1.7	1.6	20	9.9	FD 04	10	2200	2900	22	13.8	FA 04	10	2900	6500	22	13.7
0.30		8	4.3	49	0.65	1.36	2.3	1.7	1.8					4200	6500								
0.65	BN 90S	4	4.5	73	0.85	1.51	4.0	1.9	1.9	28	13.6	FD 14	15	2300	2800	30	17.8	FA 14	15	2800	6000	30	17.7
0.35		8	4.8	49	0.57	1.81	2.5	2.1	2.2					3500	6000								
0.9	BN 90L	4	6.3	73	0.87	2.05	3.8	1.8	1.8	30	15.1	FD 05	26	1700	2100	34	21	FA 05	26	2100	4200	34	22
0.5		8	7.1	57	0.62	2.04	2.4	2.1	2.0					2500	4200								
1.30	BN 100LA	4	8.7	72	0.83	3.14	4.3	1.7	1.8	82	22	FD 15	40	1300	1700	86	28	FA 15	40	1700	3400	86	29
0.70		8	9.6	58	0.64	2.72	2.8	1.8	1.8					2000	3400								
1.8	BN 100LB	4	12.1	69	0.87	4.3	4.2	1.6	1.7	95	25	FD 15	40	1200	1700	99	31	FA 15	40	1700	2600	99	32
0.9		8	12.3	62	0.63	3.3	3.2	1.7	1.8					1600	2600								
2.2	BN 112M	4	14.6	77	0.85	4.9	5.3	1.8	1.8	168	32	FD 06S	60	—	—	177	42	FA 06S	60	1200	2000	177	43
1.2		8	16.1	70	0.63	3.9	3.3	1.9	1.8					—	—								
3.6	BN 132S	4	24	80	0.82	7.9	6.5	2.1	1.9	295	45	FD 56	75	—	—	305	58	FA 06	75	1000	1400	305	59
1.8		8	24	72	0.55	6.6	4.6	1.9	2.0					—	—								
4.6	BN 132M	4	30	81	0.83	9.9	6.5	2.2	1.9	383	56	FD 06	100	—	—	393	69	FA 07	100	1000	1300	406	74
2.3		8	31	73	0.54	8.4	4.4	2.3	2.0					—	—								




2P **3000 min⁻¹ - S1** **50 Hz**

P _n kW		n min ⁻¹	M _n Nm	IE1	η (100%) %	η (75%) %	η (50%) %	cosφ	I _n 400V A	$\frac{I_s}{I_n}$	$\frac{M_s}{M_n}$	$\frac{M_a}{M_n}$	J _m x 10 ⁻⁴ kgm ²	IM B5 	d.c. brake						a.c. brake						
															FD			FA			FD			FA			
															Mod	M _b Nm	Z ₀ 1/h	NB	SB	Mod	M _b Nm	Z ₀ 1/h	IM B5 	J _m x 10 ⁻⁴ kgm ²	IM B5 	M _b Nm	Z ₀ 1/h
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	3900	4800	2.6	4.9	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	3900	4800	3.0	5.3	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	3600	4500	3.9	6.5	FA 02	3.5	4500	3.9	6.3
0.55	M 15D	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	2900	4200	5.3	8.5	FA 03	5	4200	5.3	8.2
0.75	M 15A	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	1900	3300	6.1	9.6	FA 03	5	3300	6.1	9.3
1.1	M 25A	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	1500	3000	10.6	11.9	FA 04	10	3000	10.6	12.6
1.5	M 25B	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	1300	2600	13.0	9.9	FA 04	15	2600	13.0	14.4
2.2	M 35A	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	1100	2400	28	22	FA 15	26	2400	28	23
3	M 35LA	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	700	1600	35	25	FA 15	26	1600	35	26
4	M 35LB	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	450	900	43	28	FA 15	40	900	43	29
5.5	M 45A	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	—	600	112	46	FA 06	50	600	112	47
7.5	M 45B	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	—	550	154	53	FA 06	50	550	154	54
9.2	M 45LA	2	2930	30	87.0	86.5	83.6	0.86	17.7	6.7	2.8	2.3	178	51	FD 06	75	—	430	—	430	189	64	FA 06	75	430	189	65
11	M 45LC	2	2920	36	87.6	87.0	86.0	0.88	20.6	6.9	2.9	2.5	210	60	FD 06	75	—	—	—	—	—	—	—	—	—	—	—
15	M 55B	2	2930	49	89.6	89.4	88.0	0.86	28.1	7.1	2.6	2.3	340	70	FD 06	75	—	—	—	—	—	—	—	—	—	—	—
18.5	M 55C	2	2930	60	90.4	90.1	89.0	0.86	34	7.6	2.7	2.3	420	83	FD 06	75	—	—	—	—	—	—	—	—	—	—	—
22	M 55LA	2	2930	72	89.9	89.7	89.5	0.88	40	7.8	2.6	2.4	490	95	FD 06	75	—	—	—	—	—	—	—	—	—	—	—

○ = n.a. ● = IE1







4P		1500 min ⁻¹ - S1														50 Hz										
		d.c. brake														a.c. brake										
		FD														FA										
P _n		n	M _n	IE1	η (100%)	η (75%)	η (50%)	cosφ	In	Is	Ms	Mia	J _m	IM B5	Mod	Mb	Z _c	NB	SB	J _m	IM B5	Mb	Z _c	J _m	IM B5	
kW		min ⁻¹	Nm		%	%	%		A				kgm ²	kg		Nm	1/h			kgm ²	kg	Nm	1/h	kgm ²	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		1.75	10000	13000	2.6	4.9		1.75	13000	2.6	4.7
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	3.5	10000	13000	3.0	5.3	FA 02	3.5	13000	3.0	5.1
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	3.9	6.5	FA 02	3.5	10000	3.9	6.3
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	8.0	8.2	FA 03	5	9400	8.0	7.9
0.37	M 15D	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	10.2	9.6	FA 03	7.5	8700	10.2	9.3
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	22	13.1	FA 04	15	7800	22	13.0
0.75	M 25A	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	27	14.5	FA 04	15	5300	27	14.4
1.1	M 25B	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	38	22	FA 15	26	4900	38	23
1.5	M 35A	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	44	24	FA 15	40	4700	44	24
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	54	27	FA 15	40	4400	54	28
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	61	29	FA 15	40	4300	61	30
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 45A	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	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	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	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	FA 07	150	850	382	83
15	M 55B	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

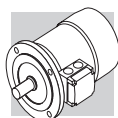
○ = n.a. ● = IE1



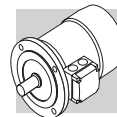
6P **1000 min⁻¹ - S1** **50 Hz**

P _n kW		n min ⁻¹	M _n Nm	IE1	η (100%) %	η (75%) %	η (50%) %	cosφ	I _n 400V A	I _s I _n	M _s M _n	M _a M _n	J _m x 10 ⁻⁴ kgm ²	IM B5 	d.c. brake								a.c. brake			
															FD				FA				FA			
															Mod	Mb Nm	Z ₀ 1/h	NB	SB	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb Nm	Z ₀ 1/h	IM B5 	Mb Nm
0.09	M 05A	6	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	3.5	14000	4.0	5.8
0.12	M 05B	6	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	3.5	14000	4.3	6.1
0.18	M 15C	6	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	5	13500	9.5	7.5
0.25	M 15D	6	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	5	13000	12	8.7
0.37	M 1LA	6	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	7.5	9500	14	9.7
0.55	M 25A	6	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	15	7200	27	14.4
0.75	M 25B	6	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	15	6400	30	15.3
1.1	M 35A	6	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	26	5000	37	24
1.5	M 3LA	6	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	40	4100	86	28
1.85	M 3LB	6	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	40	3600	99	30
2.2	M 3LC	6	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	40	1900	99	30
3	M 45A	6	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	75	1400	226	48
4	M 4LA	6	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	100	1200	305	57
5.5	M 4LB	6	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	150	1050	406	72
7.5	M 55A	6	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	170	900	800	98
11	M 55B	6	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	200	800	1030	118

○ = n.a. ● = IE1

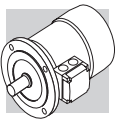


2/4P		3000/1500 min ⁻¹ - S1														50 Hz							
		d.c. brake														a.c. brake							
		P _n kW	IM B5	n min ⁻¹	M _n Nm	η %	cos φ	I _n 400V A	I _s I _n	M _s M _n	M _a M _n	J _m x 10 ⁻⁴ kgm ²	IM B5 Kg	Mod	Mb Nm	FD		FA					
Z ₀ 1/h	NB															SB	Z ₀ 1/h	IM B5 Kg	J _m x 10 ⁻⁴ kgm ²	Mod	Mb Nm	Z ₀ 1/h	IM B5 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	5100	FA 02	3.5	2600	5100	3.5	5.6
0.15		4	1350	1.06	49	0.67	0.66	2.6	1.8	1.7													
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	4800	FA 03	3.5	2400	4800	5.8	6.4
0.20		4	1370	1.39	59	0.68	1.02	3.1	1.8	1.7													
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	4200	FA 03	5	2100	4200	6.9	7.1
0.25		4	1390	1.72	60	0.73	0.82	3.3	2.0	1.9													
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	4200	FA 03	5	2100	4200	8.0	7.9
0.30		4	1400	2.0	63	0.74	0.93	3.8	2.1	1.9													
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	4600	FA 03	5	2200	4600	10.2	9.3
0.37		4	1400	2.5	68	0.72	1.09	3.9	2.2	2.0													
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	3600	FA 04	10	1600	3600	22	13.0
0.55		4	1400	3.8	68	0.81	1.44	3.9	1.7	1.7													
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	3100	FA 04	10	1500	3100	27	14.5
0.75		4	1410	5.1	75	0.81	1.78	4.5	2.1	2.0													
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	2600	FA 15	26	1000	2600	38	23
1.1		4	1420	7.4	77	0.78	2.6	4.3	2.1	2.0													
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	2300	FA 15	26	900	2300	44	24
1.5		4	1410	10.2	73	0.79	3.8	4.7	2.0	2.0													
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	2100	FA 15	40	900	2100	65	30
2.5		4	1420	16.8	82	0.80	5.5	5.2	2.2	2.2													
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	—	FA 06	50	400	—	233	56
3.8		4	1430	25.4	81	0.84	8.1	5.2	2.1	2.1													
5.5	M 4SB	2	2890	18.2	80	0.87	11.4	5.9	2.4	2.0	213	42	FD 06	75	—	350	—	FA 06	75	350	—	223	56
4.4		4	1440	29	82	0.84	9.2	5.3	2.2	2.0													
7.5	M 4LA	2	2900	25	82	0.87	15.2	6.5	2.4	2.0	270	51	FD 06	100	—	350	—	FA 07	100	350	—	280	65
6		4	1430	40	84	0.85	12.1	5.8	2.3	2.1													
9.2	M 4LB	2	2920	30	83	0.86	18.6	6.0	2.6	2.2	319	57	FD 07	150	—	300	—	FA 07	150	300	—	342	75
7.3		4	1440	48	85	0.85	14.6	5.5	2.3	2.1													



2/6P **3000/1000 min⁻¹ - S3 60/40%** **50 Hz**




P _n kW		d.c. brake														a.c. brake							
		FD														FA							
		IM B5 Kg	J _m x 10 ⁻⁴ kgm ²	Ma Mn	Ms Mn	Is In	In 400V A	cosφ	η	M _n Nm	n min ⁻¹	M _b Nm	Mod	IM B5 Kg	J _m x 10 ⁻⁴ kgm ²	Z ₀ 1/h	SB	NB	Mod	M _b Nm	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 Kg
0.25	M 1SA	2	2850	0.84	60	0.82	0.82	0.73	4.3	1.9	1.8	6.9	5.5	1.75	1500	1700	8.0	8.2	FA 03	1.75	1700	8.0	7.9
0.08		6	910	0.84	43	0.70	0.70	0.38	2.1	1.4	1.5		10000	13000						13000			
0.37	M 1LA	2	2880	1.23	62	0.80	0.80	1.08	4.4	1.9	1.8	9.1	6.9	3.5	1000	1300	10.2	9.6	FA 03	3.5	1300	10.2	9.3
0.12		6	900	1.27	44	0.73	0.73	0.54	2.4	1.4	1.5		9000	11000						11000			
0.55	M 2SA	2	2800	1.88	63	0.86	0.86	1.47	4.5	1.9	1.7	20	9.2	5	1500	1800	22	13.1	FA 04	5	1800	22	13.0
0.18		6	930	1.85	52	0.65	0.65	0.77	3.3	2.0	1.9		4100	6300						6300			
0.75	M 2SB	2	2800	2.6	66	0.87	0.87	1.89	4.3	1.8	1.6	25	10.6	5	1700	1900	27	14.5	FA 04	5	1900	27	14.4
0.25		6	930	2.6	54	0.67	0.67	1.00	3.2	1.7	1.8		3800	6000						6000			
1.1	M 3SA	2	2870	3.7	71	0.82	0.82	2.73	4.9	1.8	1.9	34	15.5	13	1000	1300	38	22	FA 15	13	1300	38	23
0.37		6	930	3.8	63	0.70	0.70	1.21	3.1	1.5	1.8		3500	5000						5000			
1.5	M 3LA	2	2880	5.0	73	0.84	0.84	3.53	5.1	1.9	2.0	40	17	13	1000	1200	44	24	FA 15	13	1200	44	24
0.55		6	940	5.6	64	0.67	0.67	1.85	3.5	1.7	1.8		2900	4000						4000			
2.2	M 3LB	2	2900	7.2	77	0.85	0.85	4.9	5.9	2.0	2.0	61	23	26	700	900	65	29	FA 15	26	900	65	30
0.75		6	950	7.5	67	0.64	0.64	2.5	3.3	1.9	1.8		2100	3000						3000			
3	M 4SA	2	2910	9.9	74	0.88	0.88	6.6	5.6	2.0	2.1	170	36	37	—	600	182	48	FA 06	37	600	182	50
1.1		6	960	10.9	73	0.68	0.68	3.2	4.5	2.2	2.0		—	—	—	2200	—	—	—	2200	—	—	—
4.5	M 4SB	2	2910	14.8	78	0.84	0.84	9.9	5.8	1.9	1.8	213	42	37	—	500	223	55	FA 06	37	500	223	56
1.5		6	960	14.9	74	0.67	0.67	4.4	4.2	1.9	2.0		—	—	—	2100	—	—	—	2100	—	—	—
5.5	M 4LA	2	2920	18.0	78	0.87	0.87	11.7	6.2	2.1	1.9	270	51	50	—	400	280	64	FA 06	50	400	280	65
2.2		6	960	22	77	0.71	0.71	5.8	4.3	2.1	2.0		—	—	—	1900	—	—	—	1900	—	—	—



2/8P		3000/750 min ⁻¹ - S3 60/40%														50 Hz						
		d.c. brake														a.c. brake						
		P _n kW	IM B5 Kg	n min ⁻¹	M _n Nm	η %	cos φ	I _n 400V A	I _s I _n	M _s M _n	M _a M _n	J _m x 10 ⁻⁴ kgm ²	IM B5 Kg	Mod	Mb Nm	FD		FA				
Z ₀ 1/h	NB															SB	J _m x 10 ⁻⁴ kgm ²	IM B5 Kg	Mod	Mb Nm	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²
0.37 0.09	M 1LA	2	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	FA 03	3.5	1300	14	9.7
		8	1.28	34	0.75	0.51	1.8	1.4	1.5	9500	13000	13000										
0.55 0.13	M 2SA	2	1.86	66	0.86	1.40	4.4	2.1	2.0	20	9.2	FD 04	5	1500	1800	22	13.1	FA 04	5	1800	22	13.0
		8	1.80	41	0.64	0.72	2.3	1.6	1.7	5600	8000	8000										
0.75 0.18	M 2SB	2	2.6	68	0.88	1.81	4.6	2.1	2.0	25	10.6	FD 04	10	1700	1900	27	14.5	FA 04	10	1900	27	14.4
		8	2.5	43	0.66	0.92	2.3	1.6	1.7	4800	7300	7300										
1.1 0.28	M 3SA	2	3.7	69	0.84	2.74	4.6	1.8	1.7	34	15.5	FD 15	13	1000	1300	38	22	FA 15	13	1300	38	23
		8	3.9	44	0.56	1.64	2.3	1.4	1.7	3400	5000	5000										
1.5 0.37	M 3LA	2	5.0	69	0.85	3.69	4.7	1.9	1.8	40	17	FD 15	13	1000	1200	44	24	FA 15	13	1200	44	24
		8	5.1	46	0.63	1.84	2.1	1.6	1.6	3300	5000	5000										
2.4 0.55	M 3LB	2	7.9	75	0.82	5.6	5.4	2.1	2.0	61	23	FD 15	26	550	700	65	29	FA 15	26	700	65	30
		8	7.5	54	0.58	2.5	2.6	1.8	1.8	2000	3500	3500										
3 0.75	M 4SA	2	9.8	72	0.85	7.1	5.6	2.0	1.8	162	36	FD 56	37	—	600	182	48	FA 06	37	600	182	50
		8	10.1	61	0.64	2.8	3.0	1.7	1.8	—	3400	3400										
4 1	M 4SB	2	13.3	73	0.84	9.4	5.6	2.3	2.4	213	42	FD 56	37	—	500	223	55	FA 06	37	500	223	56
		8	13.8	66	0.62	3.5	2.9	1.9	1.8	—	3500	3500										
5.5 1.5	M 4LA	2	18.3	75	0.84	12.6	6.1	2.4	2.5	270	51	FD 06	50	—	400	280	64	FA 06	50	400	280	65
		8	21	68	0.63	5.1	2.9	1.9	1.9	—	2400	2400										



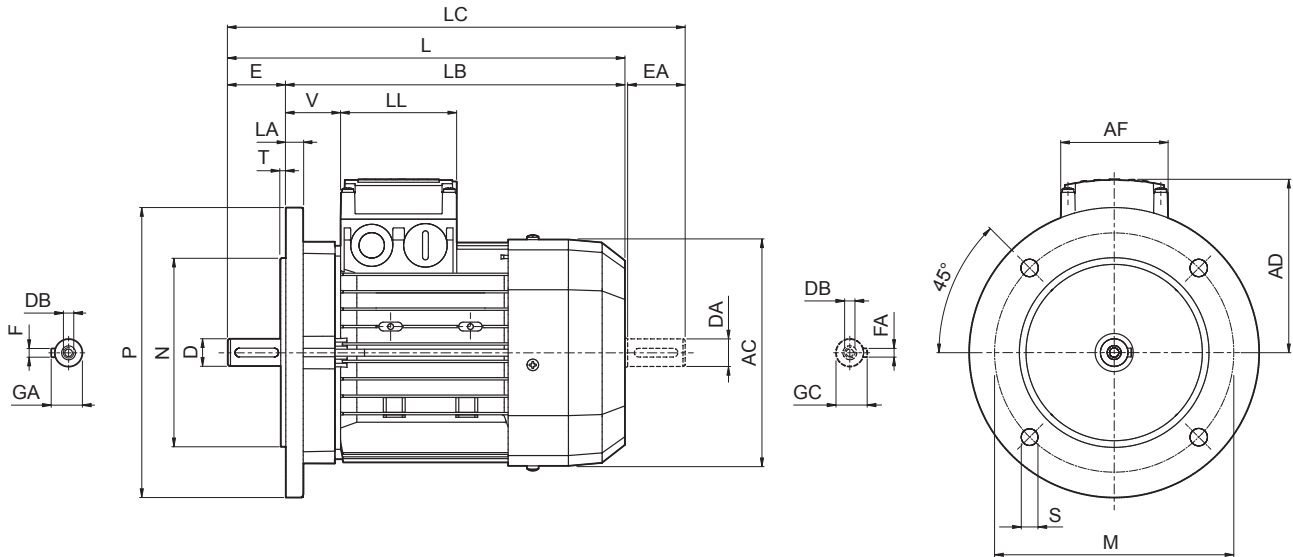
2/12P **3000/500 min⁻¹ - S3 60/40%** **50 Hz**

P _n kW		n min ⁻¹	M _n Nm	η %	cos φ	I _n 400V A	I _s I _n	M _s M _n	M _a M _n	J _m x 10 ⁻⁴ kgm ²	IM B5 	d.c. brake						a.c. brake					
												FD			FA			FD			FA		
												Mod	Mb Nm	Z ₀ 1/h	NB	SB	Mod	Mb Nm	Z ₀ 1/h	J _m x 10 ⁻⁴ kgm ²	IM B5 	Mod	Mb Nm
0.55	M 2SA	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	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											
0.75	M 3SA	2900	2.5	65	0.81	2.06	5.2	1.9	2.1	34	15.5	FD 15	13	700	900	38	22	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											
1.1	M 3LA	2850	3.7	65	0.85	2.87	4.5	1.6	1.8	40	17	FD 15	13	700	900	44	24	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											
1.5	M 3LB	2900	4.9	67	0.86	3.76	5.6	1.9	1.9	54	21	FD 15	13	700	900	58	27	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											
2	M 3LC	2850	6.7	70	0.84	4.9	4.9	1.8	1.7	61	23	FD 55	18	—	700	65	29	FA 15	18	700	65	30	
0.3	12	450	6.4	38	0.47	2.4	1.7	1.6	1.7		—	3500											
3	M 4SA	2920	9.8	74	0.87	6.7	6.8	2.3	1.9	213	42	FD 56	37	—	450	223	55	FA 06	37	450	223	56	
0.5	12	470	10.2	51	0.43	3.3	2.0	1.7	1.6		—	3000											
4	M 4LA	2920	13.1	75	0.89	8.6	5.9	2.4	2.3	270	51	FD 56	37	—	400	280	64	FA 06	37	400	280	65	
0.7	12	460	14.5	53	0.44	4.3	1.9	1.7	1.6		—	2800											



M19 MOTORS DIMENSIONS BN-M

BN - IM B5



BN-M

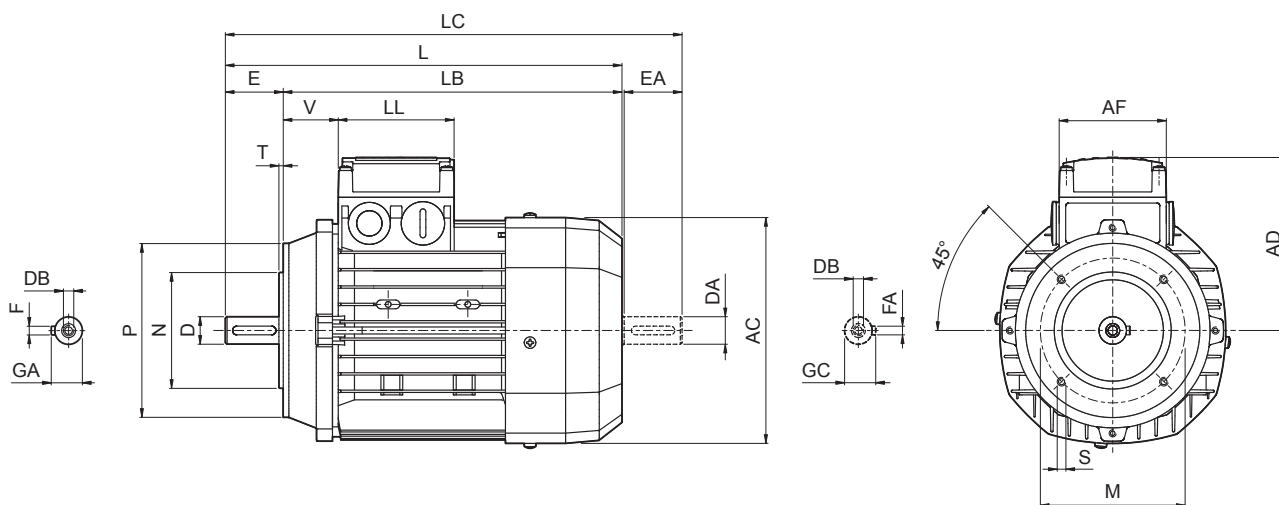
	Shaft					Flange					Motor								
	D DA	E EA	DB	GA GC	F FA	M	N	P	S	T	LA	AC	L	LB	LC	AD	AF	LL	V
BN 56	9	20	M3	10.2	3	100	80	120	7	3	8	110	185	165	207	91	74	80	34
BN 63	11	23	M4	12.5	4	115	95	140	9.5		10	121	207	184	232	95			26
BN 71	14	30	M5	16	5	130	110	160			11.5	11.5	138	249	219	281			108
BN 80	19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

NOTE:

1) These values refer to the rear shaft end.



BN - IM B14

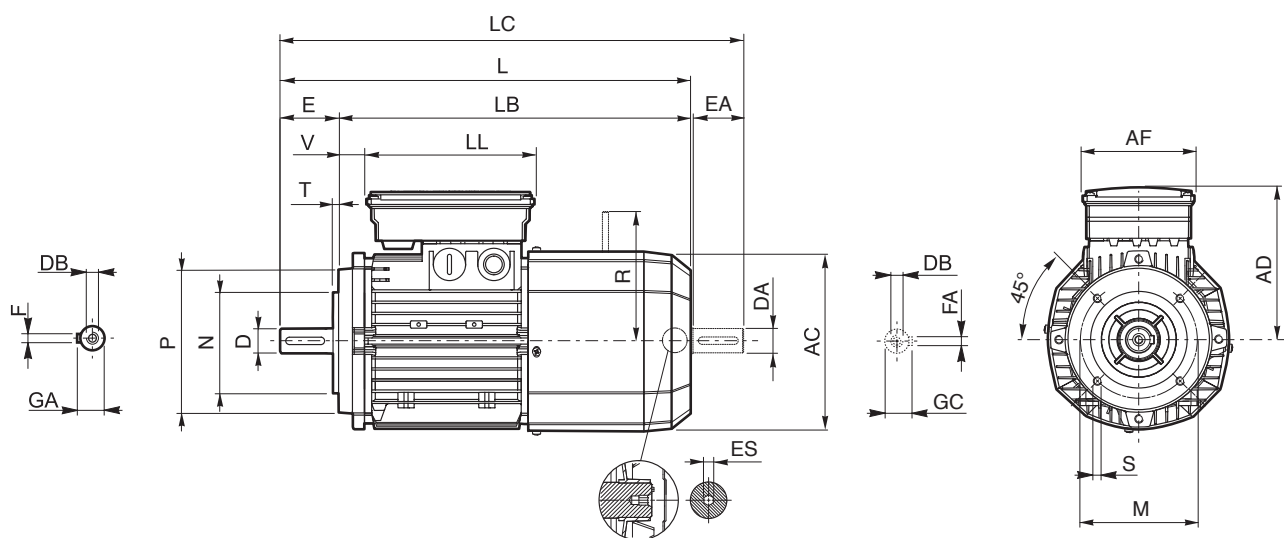


BN-M

	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			121	207	184	232	95			26
BN 71	14	30	M5	16	5	85	70	105	M6		138	249	219	281	108			37
BN 80	19	40	M6	21.5	6	100	80	120		3	156	274	234	315	119	38		
BN 90	24	50	M8	27	8	115	95	140	M8		176	326	276	378	133	98	98	44
BN 100	28	60	M10	31		130	110	160		3.5	195	367	307	429	142			50
BN 112					219	385	325	448	157		52							
BN 132	38	80	M12	41	10	165	130	200	M10	4	258	493	413	576	193	118	118	58



BN_FD ; IM B14



BN-M

	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		138	310	280	342	135			25	103	
BN 80	19	40	M6	21.5	6	100	80	120			156	346	306	388	146			41	129	
BN 90 S	24	50	M8	27	8	115	95	140	M8	3	176	409	359	461	110	165	39	129	6	
BN 90 L																				146
BN 100	28	60	M10	31		130	110	160		3.5	195	458	398	521			158	62		199
BN 112											219	484	424	547			173	73		199
BN 132	38	80	M12	41	10	165	130	200	M10	4	258	603	523	686	210	140	188	46	204 ⁽¹⁾	

NOTE:

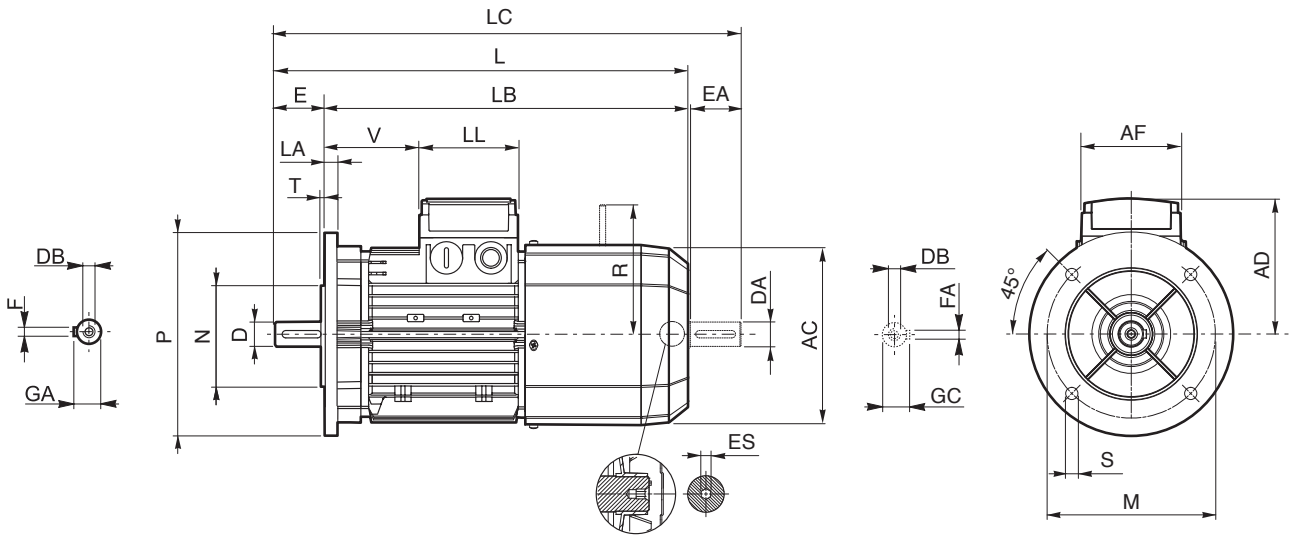
1) For FD07 brake value R=226.

ES hexagon is not supplied with PS option.



BN_FA - IM B5

BN-M



	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				138	310	280	342	108			68	124	
BN 80	19	40	M6	21.5	6	165	130	200	11.5	3.5	11.5	156	346	306	388	119	98	98	83	134	6
BN 90	24	50	M8	27	8							176	409	359	461	133			95	160	
BN 100	28	60	M10	31	8	215	180	250	14	4	14	195	458	398	521	142	98	98	119	198	6
BN 112						15	219	484				424	547	157	128						
BN 132	38	80	M12	41	10	265	230	300	14	5	20	258	603	523	686	210	140	188	46	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	310	672	562	755	193	
BN 160 M									736	626	820	245					187	187	51	247	—
BN 160 L	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	—
BN 180 M													780	670	864	245	187	187	51	247	—

NOTE:

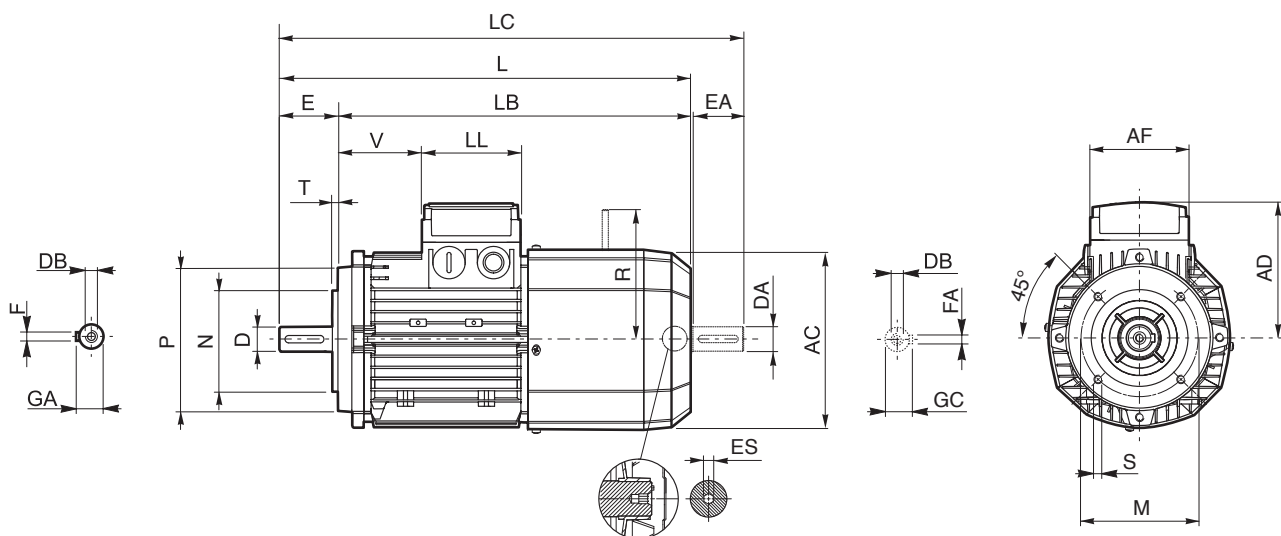
- 1) These values refer to the rear shaft end.
- 2) For FA07 brake value R=217.

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 motors

ES hexagon is not supplied with PS option.



BN_FA - IM B14



BN-M

	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		138	310	280	342	108			68	124	
BN 80	19	40	M6	21.5	6	100	80	120	M6	156	346	306	388	119	83			134		
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		130	110	160		3.5	195	458	398	521	142			119	198	
BN 112						219	484	424		547	157	128	198							
BN 132	38	80	M12	41	10	165	130	200	M10	4	258	603	523	686	210	140	188	46	200 ⁽¹⁾	

NOTE:

1) For FA07 brake value R=217.

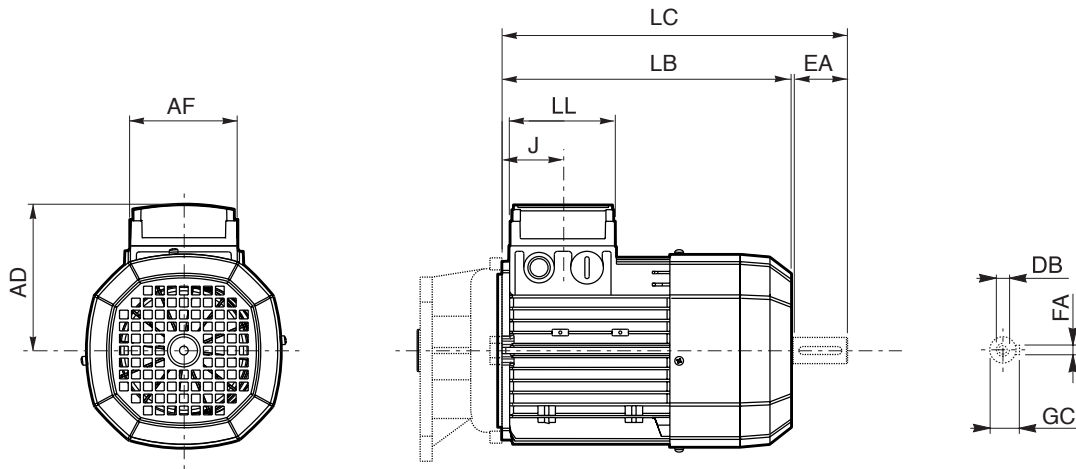
Dimensions AD, AF, LL and V, relevant to terminal box of motors BN...FA featuring the separate brake supply (option SA), are coincident with corresponding dimensions of same-size BN...FD motors

ES hexagon is not supplied with PS option.



M

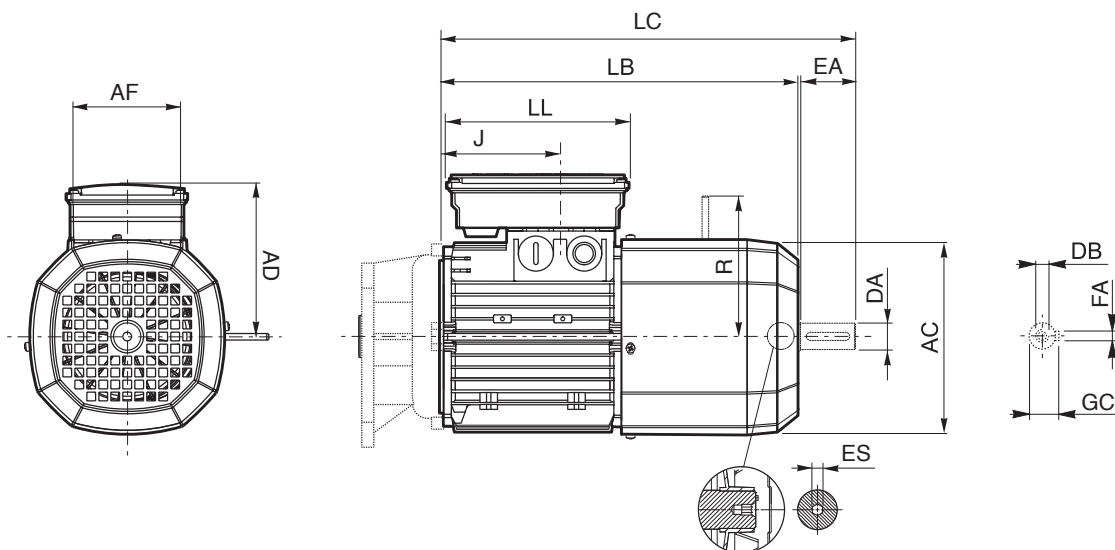
BN-M



	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			48	95
M 1	14	30	M5	5	16	138	187	219			45	108
M 2 S	19	40	M6	6	21.5	156	202	245			44	119
M 3 S	28	60	M10	8	31	195	230	293	98	98	53.5	142
M 3 L							262	325				
M 4	38	80	M12	10	41	258	361	444	118	118	64.5	193
M 4 LC							396	479				
M 5 S						310	418	502	187	187	77	245
M 5 L							462	546				



M_FD



BN-M

	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			73	135	103	
M 2 S	19	40	M6	6	21.5	156	272	314			88	146	129	
M 3 S	28	60	M10	8	31	195	326	389	110	165	124.5	158	160	6
M 3 L							353	416						
M 4	38	80	M12	10	41	258	470	553	140	188	185.5	210	204 (1)	
M 4 LC							495	578			64.5		226	
M 5 S						310	602	686	187	187	77	245	266	—
M 5 L														

NOTE:

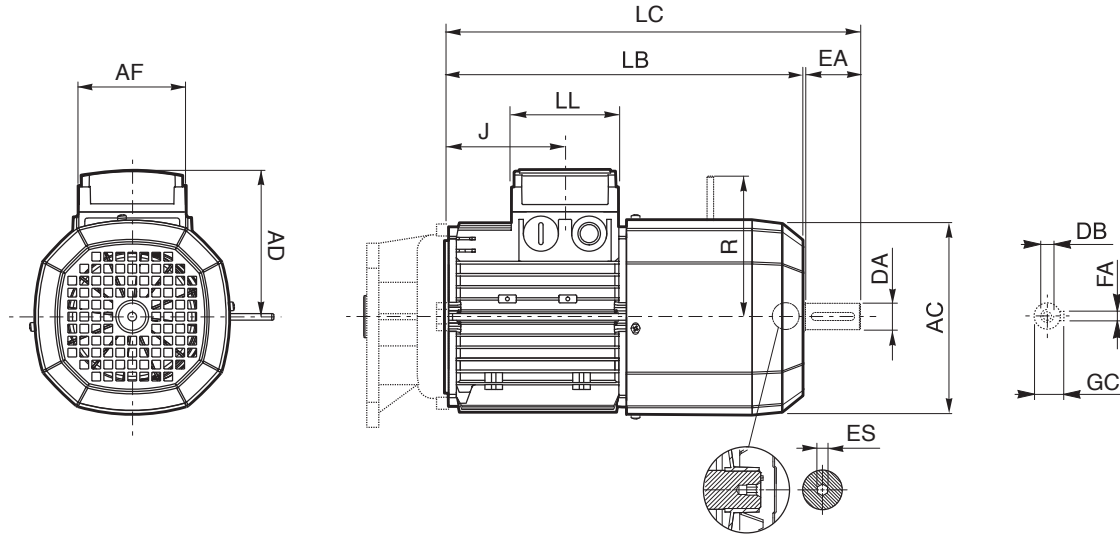
1) For FD07 brake value R=226.

ES hexagon is not supplied with PS option.



M_FA

BN-M



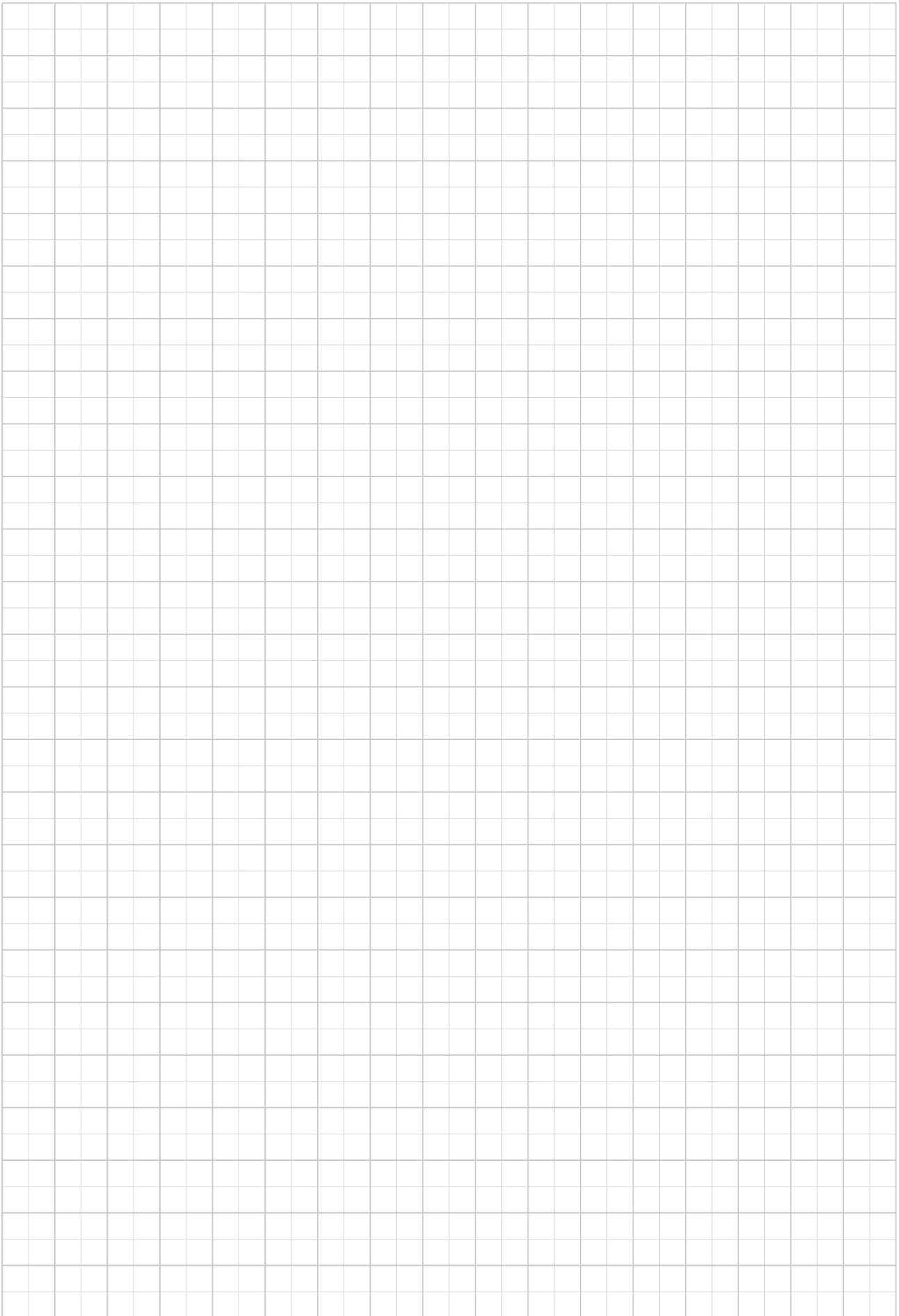
	Rear shaft end					Motor								
	DA	EA	DB	FA	GC	AC	LB	LC	AF	LL	J	AD	R	ES
M 05	11	23	M4	4	12.5	121	231	256	74	80	48	95	116	5
M 1	14	30	M5	5	16	138	248	280			73	108	124	
M 2 S	19	40	M6	6	21.5	156	272	314			88	119	134	
M 3 S	28	60	M10	8	31	195	326	389	98	98	124.5	142	160	6
M 3 L							353	416						
M 4	38	80	M14	10	41	258	470	553	140	188	185.5	210	200 (1)	
M 4 LC							495	578			64.5		217	
M 5 S			M12			310	558	642	187	187	77	245	247	—
M 5 L														

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 motors

ES hexagon is not supplied with PS option.





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177...184	Updated VF-EP / W-EP gearbox chapter.
196...294	Updated "electric motors" section.

2019_05_10

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HEADQUARTERS

Bonfiglioli Riduttori S.p.A.
Via Giovanni XXIII, 7/A
40012 Lippo di Calderara di Reno
Bologna (Italy)
tel: +39 051 647 3111
fax: +39 051 647 3126
bonfiglioli@bonfiglioli.com
www.bonfiglioli.com

