INDUSTRY PROCESS
AND AUTOMATION SOLUTIONS

BONFIGLIOLI
RIDUTTORI

VF
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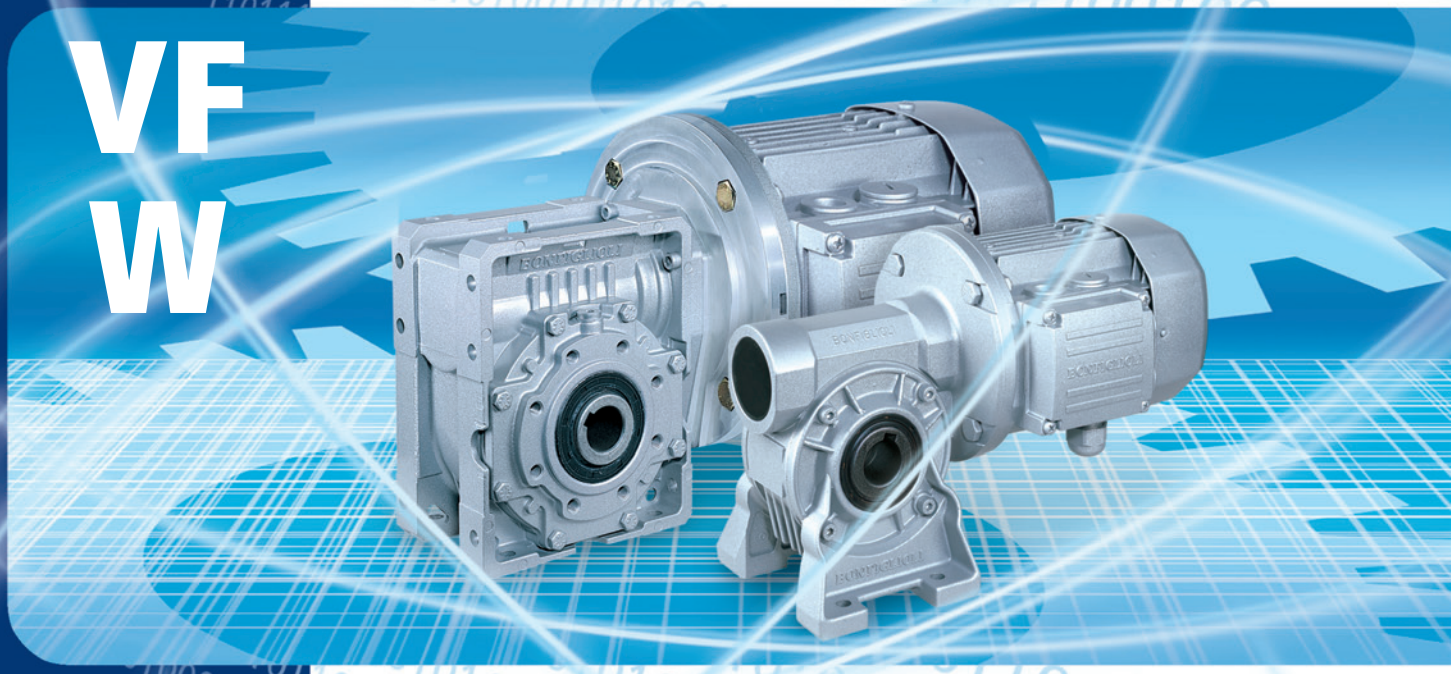

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BONFIGLIOLI

SUMMARY

Revisions
Refer to page 56 for the catalogue revision index.
Visit www.bonfiglioli.com to search for catalogues with up-to-date revisions.

1 GENERAL INFORMATION

1.1 SYMBOLS AND UNITS OF MEASURE

An **[N]** The **admissible thrust load** represents the force which can be applied axially to the gear unit's shaft, along with the rated radial load.

f_S **-** The **service factor** is a coefficient representing the severity of the duty for the operating cycle.

f_{TP} **-** The **adjusting factor** takes into account the influence of the ambient temperature in calculating the computational torque. This factor is relevant for worm gear units.

i **-** The **gear ratio** is expressed as the relationship of the input shaft speed to the output shaft speed.

$$i = \frac{n_1}{n_2}$$

I **-** The **intermittence** is defined as follows:

$$I = \frac{t_f}{t_f + t_r} \cdot 100$$

J_c **[Kgm^2]** **Moment of inertia of the driven load.**

J_m **[Kgm^2]** **Moment of inertia of the motor.**

J_R **[Kgm^2]** **Moment of inertia of the gear unit.**

K **-** The load **acceleration factor** is used to calculate the service factor, and is defined as follows:

$$K = \frac{J_c}{J_m}$$

K_R **-** The **transmission factor** is a computational parameter, proportional to the tension generated by an external transmission keyed to the gear unit shaft.

M_2 **[Nm]** Net **output torque**

Mn_2 **[Nm]** The **rated torque** at the output shaft.
The catalogue value is calculated for a service factor f_S= 1.

Mr_2 **[Nm]** The application's **required torque** .
This should always be less than or equal to the gear unit's rated torque Mn_2.

Mc_2 **[Nm]** **Computational torque**. This is a virtual parameter used to select the gear unit, by means of the equation:

$$M_{c2} = M_{r2} \cdot f_s$$

n **[min^{-1}]** **Shaft speed.**

Pn_1 **[kW]** **Rated power** at the input shaft, calculated for a service factor f_S = 1.

P_R **[kW]** The application's **required power** .

R_C **[N]** The **computational radial load** is generated by an external transmission and, for the input and output shafts respectively, can be calculated from the following equations:

$$R_{c1}[N] = \frac{2000 \cdot M_1[Nm] \cdot K_r}{d\,[mm]} \quad ; \quad R_{c2}[N] = \frac{2000 \cdot M_2[Nm] \cdot K_r}{d\,[mm]}$$

R_N **[N]** The **admissible radial load** should always be more than or equal to the computational radial load. The point value is given in the catalogue for each unit's gear frame size and transmission ratio, and refers to the shaft's centre line.

S **-** The **safety factor** is defined as follows:

$$S = \frac{Mn_2}{M_2} = \frac{Pn_1}{P_1}$$

t_a **[°C]** **Ambient temperature.**

t_f **[min]** The **operating time** is the total duration of the work cycle phases.

t_r **[min]** The **rest time** is the interval of no work between two phases.

Z_r **-** **Number** of starts per hour.

η_d **-** The **dynamic efficiency** is expressed as the ratio between the power measured at the output shaft and that applied to the input shaft:

$$\eta_d = \frac{P_2}{P_1} \cdot 100 \qquad [\%]$$

$[\,]_1$ This value refers to the input shaft.

$[\,]_2$ This value refers to the output shaft.

⚠ **Danger.** May cause slight injury to persons.

1.2 INTRODUCTION TO THE ATEX DIRECTIVES

1.2.1 EXPLOSIVE ATMOSPHERE

Under the provisions of Directive 94/9/EC, an explosive atmosphere is defined as a mixture:

a. of **flammable substances**, whether gas, vapour, mist or dust;
b. with **air**;
c. in certain **atmospheric conditions**;
d. in which, following ignition, combustion spreads to the entire unburned mixture (note that in the case of dust, the entire quantity of dust is not always completely burnt after combustion).

An atmosphere which may potentially be transformed into an explosive atmosphere due to operating and/or ambient conditions is defined as a **potentially explosive atmosphere**. The products governed by Directive 94/9/EC are intended for use only in a potentially explosive atmosphere defined in this way.

1.2.2 EUROPEAN HARMONISED ATEX STANDARDS

The European Union has issued two harmonisation guidelines in the area of health and safety. These directives are known as ATEX 100a and ATEX 137.

Directive ATEX 100a (EU/94/9/EC) stipulates the minimum safety requirements for products intended for use in explosion risk areas within the member countries of the European Union. The directive also assigns such equipment to **categories**, which are defined by the directive itself.

Directive ATEX 137 (EU/99/92/EC) defines the minimum health and safety requirements for the workplace, for working conditions and for the handling of products and materials in explosion risk areas. The directive also divides the workplace into **zones** and defines the criteria for the application of product **categories** in said zones.
The following table describes the **zones** into which the user of a plant, in which an explosive atmosphere may occur, is required to divide the equipment application areas.

Zones		Formation frequency of a potentially explosive atmosphere	Type of danger
Gaseous atmosphere G	Dusty atmosphere D		
0	20	Present continuously or for long periods	Permanent
1	21	Likely to occur in normal operation occasionally	Potential
2	22	Not likely to occur in normal operation but if it does occur will persist for short period only	Minimal

BONFIGLIOLI RIDUTTORI gear units selectedin this catalogue are suitable for installation in zones 1, 21, 2 and22, as highlightedin grey in the above table.
Electric motors described in this catalogue are certified in category 2D (125°C max. temperature) and
therefore suitable for installation in zones 21 and 22.

As from 1 July 2003 the ATEX directives come into force throughout the entire European Union, and replace existing conflicting national and European laws on explosive atmospheres.
It should be emphasised that, for the first time, the directives also govern mechanical, hydraulic and pneumatic equipment, and not only electrical equipment as has been the case so far.
With regard to the Machinery Directive 98/37/EC it should be noted that directive 94/9/EC is a set of extremely specific requirements dedicated to the dangers deriving from potentially explosive atmospheres, whereas the Machinery Directive contains only very general explosion safety requirements (Annex I).
Consequently, as regards protection against explosion in potentially explosive atmospheres, Directive 94/9/EC (ATEX 100a) takes precedence over the Machinery Directive. The requirements of the Machinery Directive apply to all other risks regarding machinery.

1.2.3 LEVELS OF PROTECTION FOR THE VARIOUS CATEGORIES OF EQUIPMENT

The various categories of equipment must be able to operate in conformity with the Manufacturer's operational specifications, at certain defined levels of protection.

Protection level	Category		Type of protection	Operating conditions
	Group I	Group II		
Very high	M1		Two independent means of protection or safety capable of operating even when two independent faults occur	The equipment remains powered and operational even in the presence of an explosive atmosphere
Very high		**1**	Two independent means of protection or safety capable of operating even when two independent faults occur	The equipment remains powered and operational in zones 0, 1, 2 (G) and/or zones 20, 21, 22 (D)
High	M2		Protection suitable for normal operation and heavy duty conditions	Power to the equipment is shut off in the presence of a potentially explosive atmosphere
High		**2**	Protection suitable for normal operation and frequent faults or equipment in which malfunction is normal.	The equipment remains powered and operational in zones 1, 2 (G) and/or zones 21, 22 (D)
Normal		**3**	Protection suitable for normal operation	The equipment remains powered and operational in zones 2 (G) and/or 22 (D)

1.2.4 DEFINITION OF GROUPS (EN 1127-1)

Group I Applies to equipment intended for use underground in parts of mines and those parts of surface installations of such mines, liable to be endangered by firedamp and/or combustible dust.

Group II Applies to equipment intended for use in other places liable to be endangered by explosive atmospheres.

BONFIGLIOLI RIDUTTORI products may not therefore be installed in mines, classified in **Group I** and in **Group II**, category 1.

To summarise, the classification of equipment into groups, categories and zones is illustrated in the table below, whereby the availability of BONFIGLIOLI RIDUTTORI products is highlighted in grey.

Group	**I** mines, firedamp		**II** other potentially explosive areas (gas, dust)					
Category	M1	M2	1		2		3	
Atmosphere(1)			G	D	G	D	G	D
Zone			0	20	1	21	2	22
Type of protection gear unit					c, k	c, k	c, k	c, k
Type of protection motor					d, e	IP6X + temp.max	n(A)	IP5X o IP6X + temp. max

(1) **G** = gas **D** = dust

This catalogue describes BONFIGLIOLI RIDUTTORI **gear units and gearmotor**, intended for use in potentially explosive atmospheres, with limitation to categories 2 and 3.
The products described herein conform to the minimum safety requirements of European Directive 94/9/EC, which is part of the directives known as ATEX (ATmosphères EXplosibles).

1.2.5 DECLARATION OF CONFORMITY

The Declaration of Conformity, a copy of which is available in this catalogue, is the document which attests to the conformity of the product to Directive 94/9/EC.
The validity of the Declaration is bound to observance of the instructions given in the User, Installation and Service Manual for safe use of the product throughout its service life.
The instructions regarding ambient conditions are of particular importance inasmuch as failure to observe them during operation of the product renders the certificate null and void.
In case of doubt regarding the validity of the certificate of conformity, contact the BONFIGLIOLI RIDUTTORI technical department.

1.3 USE, INSTALLATION AND MAINTENANCE

The instructions for safe storage, handling and use of the product are given in the unit's User, Installation and Service Manual.
This can be downloaded from www.bonfiglioli.com/atex.html where the manual is available in PDF format in a number of languages.
This document must be kept in a suitable place, in the vicinity of the installed gear unit, as a reference for all persons authorised to work with or on the product throughout its service life.

The Manufacturer reserves the right to modify, supplement or improve the Manual, in the interests of the User.

1.4 SELECTING THE TYPE OF EQUIPMENT

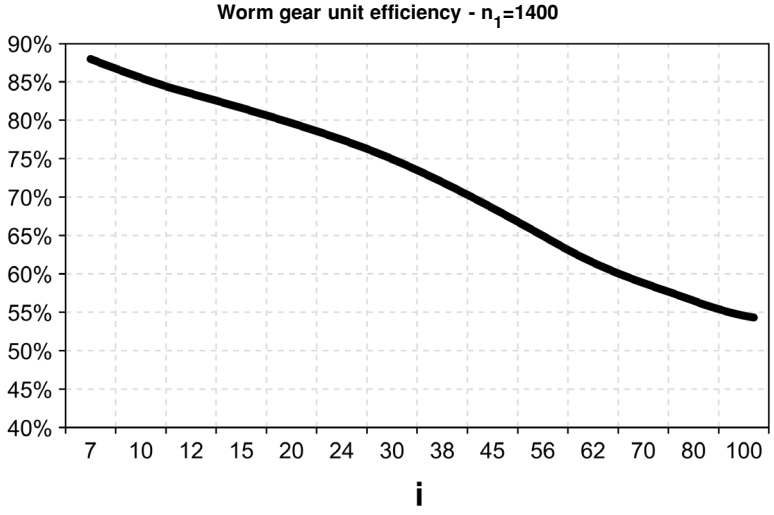
1.4.1 SELECTION PROCEDURE:

Determine the application service factor f_S in relation to the type of load (K factor), number of starts per hour Z_r and hours of operation per day.

Now determine the power required at the motor shaft:

$$P_{r1} = \frac{M_{r2} \cdot n_2}{9550 \cdot \eta_d} \quad [kW]$$

The efficiency value « η_d » can be determined as follows (approximately):



The selection procedure now depends on the type of gear unit, as follows:

a. gear unit equipped with IEC motor fitting
b. gear unit equipped with solid input shaft.

Proceed as follows:

1.4.2 SELECTING A GEARMOTOR

a. Determine service factor $\mathbf{f_s}$ as formerly specified.
b. Determine power required at gearbox input shaft:

$$P_{r1} = \frac{M_{r2} \cdot n_2}{9550 \cdot \eta_d} \quad [kW]$$

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

$$P_n \geq P_{r1}$$

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

$$P_n \geq \frac{P_{r1}}{f_m}$$

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

1.4.3 GEAR UNIT WITH MOTOR FITTING

- with reference to the rating charts, identify the gear unit which, for the required speed n_2, provides a rated power Pn_1 such that:

$$Pn_1 \geq Pr_1 \times f_s$$

- Select an electric motor rated:

$$P_1 \geq Pr_1$$

- Finally, check that the motor/gear unit combination generates a safety factor equal to or greater than the service factor for the application in question, in other words:

$$S = \frac{P_{n1}}{P_1} \geq f_s$$

- If the selected gear unit is of type C112, C212 or C312 with ratio i > 40 ,operating with a number of hourly starts Z > 30 ,correct the service factor taken from the graph by a factor of 1.2.
Finally, check that the recalculatedservice factor $\mathbf{f_s}$ still satisfies the condition S $\geqslant$ $\mathbf{f_s}$.

1.4.4 SPEED REDUCER WITH SOLID INPUT SHAFT

- Calculate the value of the computational torque:

$$Mc_2 = Mr_2 \times f_s \times f_{tp}$$

$\mathbf{f_{tp}}$				
Helical gear units C, A, F, S	Worm gear units VF, W			
$f_{tp} = 1$	Type of load	Ambient temperature [°C]		
		20°	30°	40°
	K1 uniform load	1.00	1.00	1.06
	K2 moderate shock load	1.00	1.02	1.12
	K3 heavy shock load	1.00	1.04	1.17

- for the speed n_2 closest to that required, select the gear unit with a rated torque Mn_2 equal to or greater than the computational torque Mc_2, in other words:

$$M_{n2} \geq M_{c2}$$

1.4.5 POST-SELECTION CHECKS

Once the gear unit or gearmotor has been selected, we recommend checking the selection as follows:

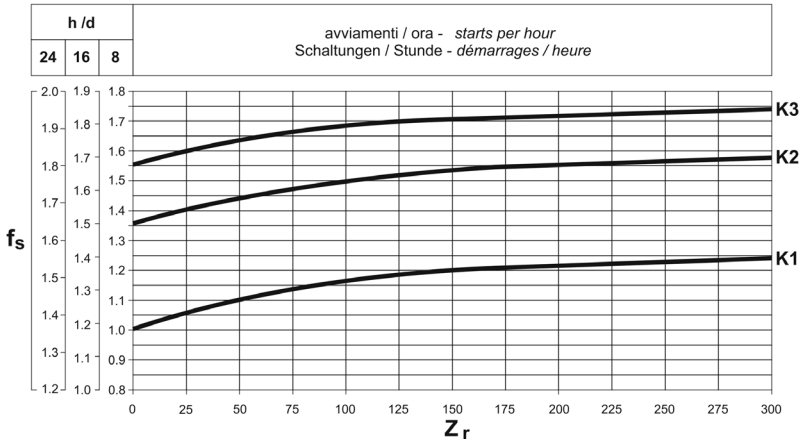
- **Momentary peak torque**
  The momentary peak torque is of the order of 200% of the rated torque Mn_2. Check that the point value of the peak torque satisfies this condition and equip the installation with a torque limiter if necessary.
- **Radial load**
  The catalogue gives the values of the maximum admissible radial load for both the input shaft « Rn_1 » and the output shaft « Rn_2 ». These values refer to a load applied at the shafts' centre lines and must always be greater than the actually applied load. See paragraph: Radial loads.
- **Thrust load**
  Check that the thrust component of the load does not exceed the maximum admissible value as given in the paragraph: Thrust loads.

1.4.6 OPERATING CONDITIONS FOR ATEX-SPECIFIED EQUIPMENT

- Ambient temperature -20°C < to < +40°C.
- The gear unit must be installed in the mounting position specified in the order and given on the nameplate. Any deviation from this requirement must be approved in advance by BONFIGLIOLI RIDUTTORI.
- Do not under any circumstances install the gear unit with its shaft in an inclined orientation, unless previously authorised to do so by the BONFIGLIOLI RIDUTTORI Technical Service Department.
- The speed of the motor mounted to the gear unit must not exceed n = 1500 min^{-1}.
- Should the gearbox be connected to an inverter driven motor the latter must be explicitly suitable for the purpose and used in full compliance with the instructions set forth by the manufacturer. Under no circumstances the setting of the inverter shall allow the motor to exceed the maximum speed permitted (1500 min^{-1}) or overload the gearbox itself.
- All the instructions in the User Manual (www.bonfiglioli.com/atex.html) regarding installation, use and routine maintenance of the unit must be followed in full.

1.4.7 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 of 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 our Technical Service Department.



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:

$$K = \frac{J_c}{J_m}$$

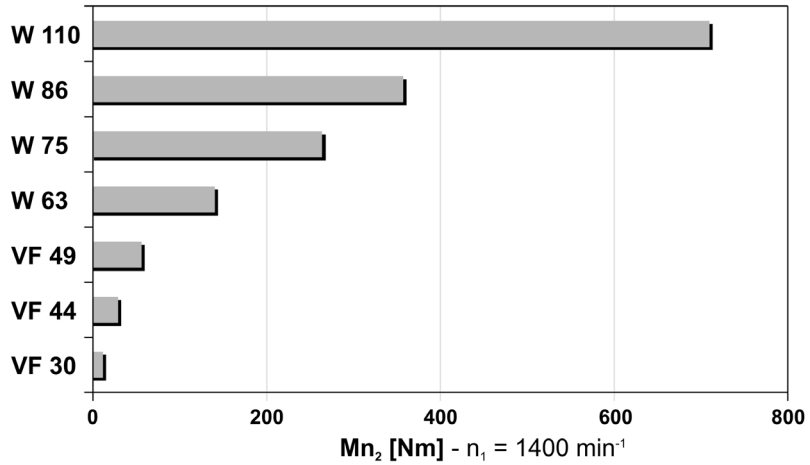
where:

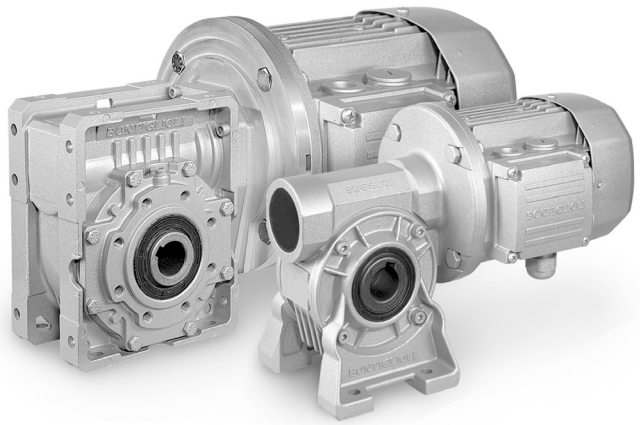
J_c moment of inertia of driven masses referred to motor shaft
J_m moment of inertia of motor

2 WORM GEAR UNITS FOR POTENTIALLY EXPLOSIVE ATMOSPHERES

2.1 CONSTRUCTION OF ATEX-SPECIFIED EQUIPMENT

- Equipped with service plugs for periodic lubricant level checks.
- Factory-charged with lubricant, depending on the mounting position specified in the order. (*)
- Viton® seal rings as standard.
- Side surfaces machined and tapped provide for extra mounting flexibility.
- No plastic component parts.
- Nameplate indication of the product category and type of protection.

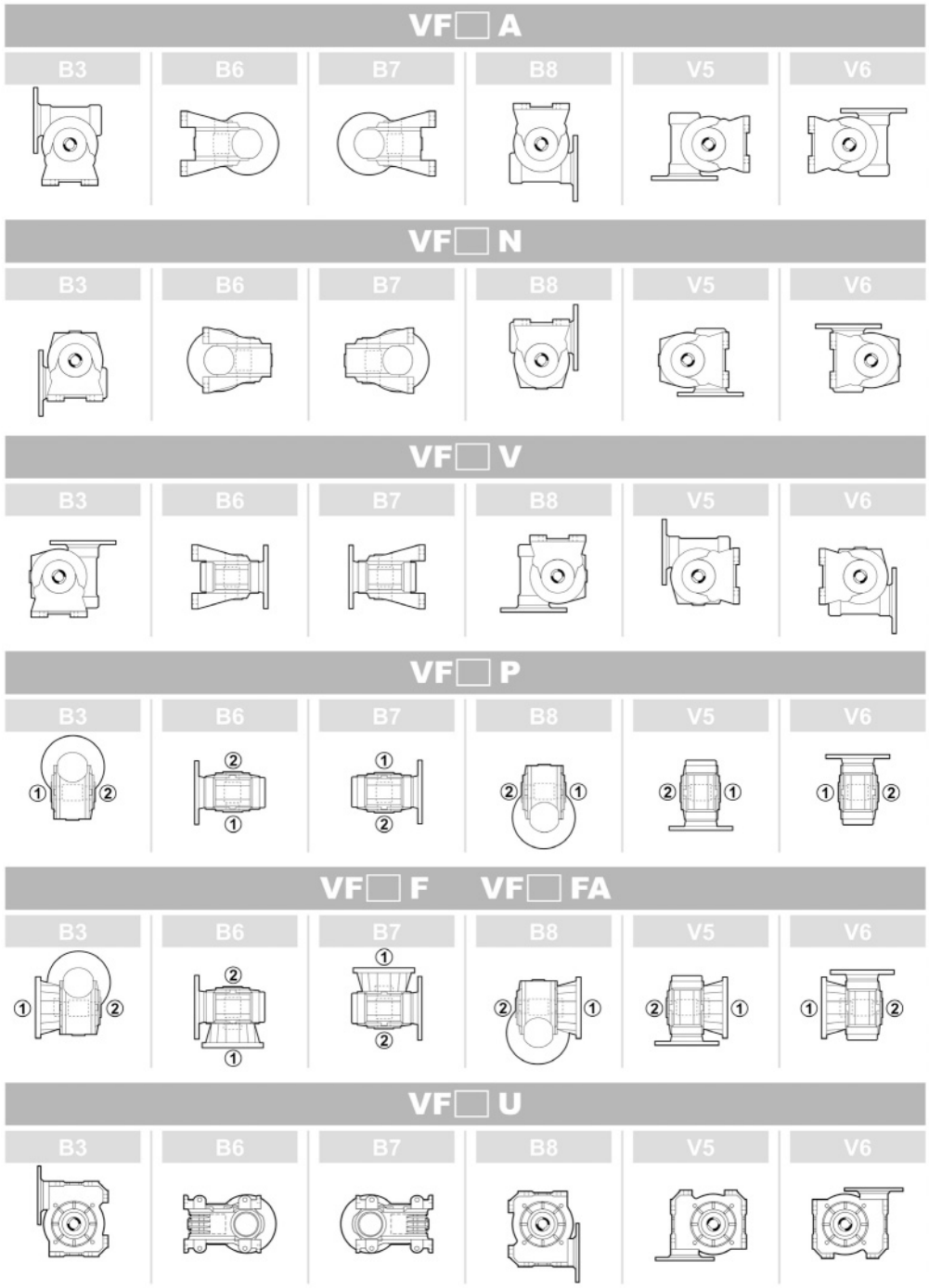




(*) With the exception of gear units: **W110_P(IEC)** in mounting positions **V5** and **V6** and **W110_HS** in position **B3**, **V5** and **V6**.

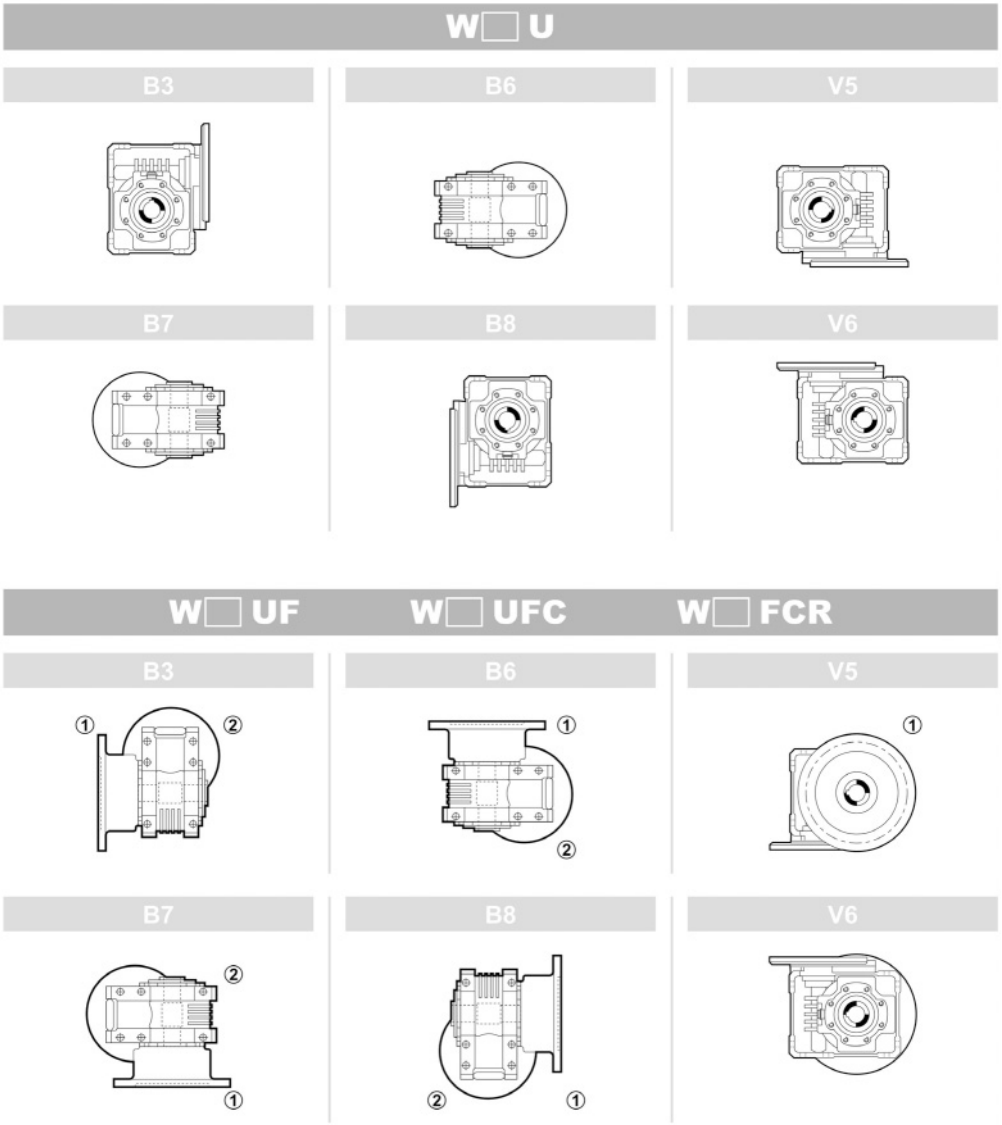
2.2 VERSIONS AND MOUNTING POSITIONS

2.2.1 VF SERIES



1 - 2 Flange location

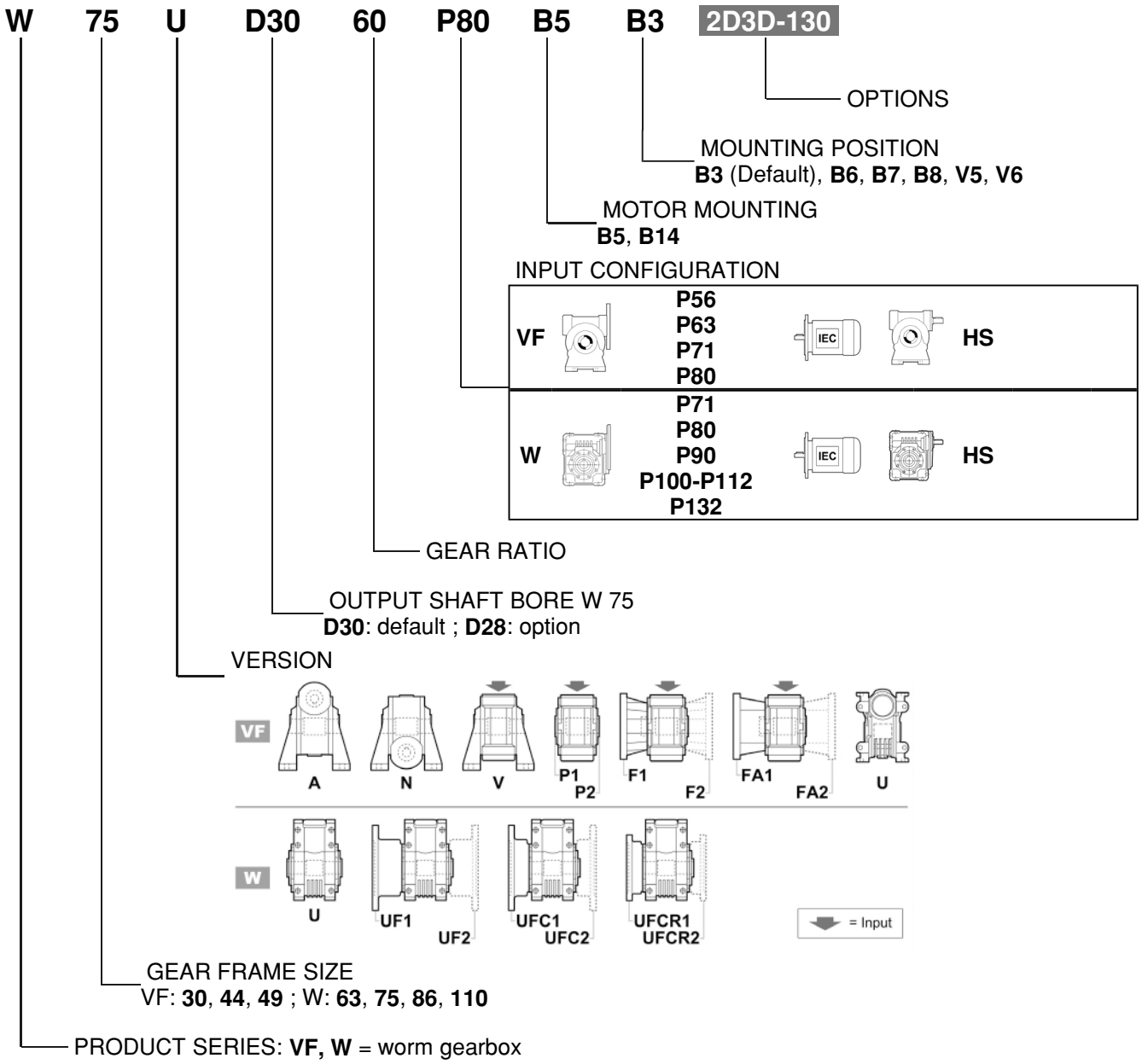
2.2.2 W SERIES



1 - 2 Flange location

2.3 ORDERING NUMBERS

2.3.1 VARIANTS OF GEAR UNIT

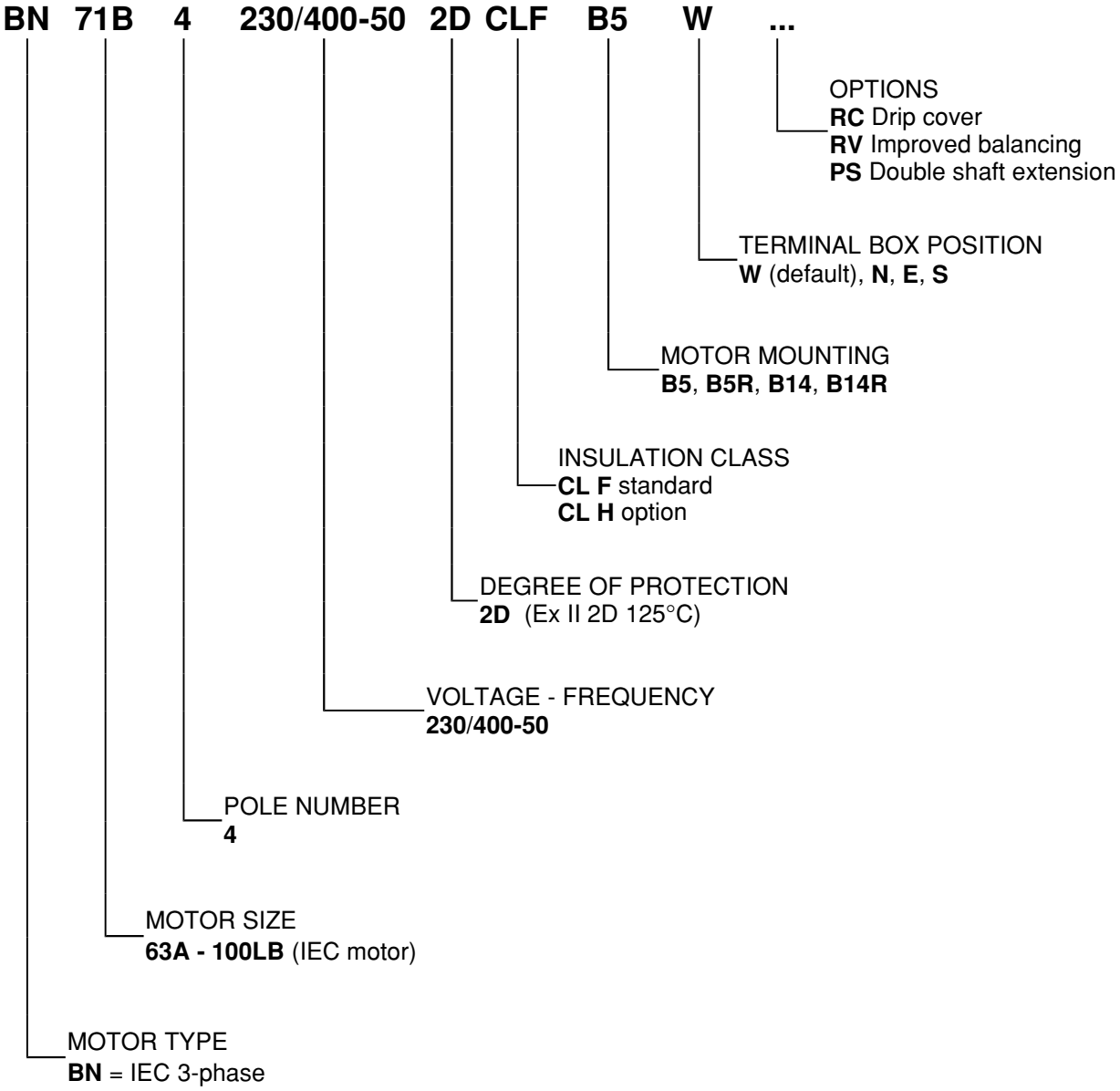


2.3.2 OPTIONS

The applicability of the various options is indicated in the technical data tables according to the specific configuration and gear ratio.

2D3D-160	The gear unit can be installed in zones 21 and 22 (categories 2D and 3D). The unit's surface temperature is less than 160°C.
2D3D-130	The gear unit can be installed in zones 21 and 22 (categories 2D and 3D). The unit's surface temperature is less than 130°C.
2G3G-T3	The gear unit can be installed in zones 1 and 2 (categories 2G and 3G). The temperature class is T3 (max. 200 °C).
2G3G-T4	The gear unit can be installed in zones 1 and 2 (categories 2G and 3G). The temperature class is T4 (max. 135 °C).

2.3.3 VARIANTS OF ELECTRIC MOTOR



2.4 LUBRICATION

The gear units are factory-charged with long-life synthetic lubricant in the quantity suitable for the mounting position specified in the order.
For transportation purposes these units are equipped with closed filler plugs. A vented plug, which the User must replace before putting the unit into service, is supplied along with each unit.
For a preliminary oil level check, insert a dipstick in the yellow filler plug opening as specified in the unit's User Manual.

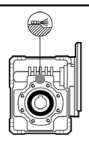
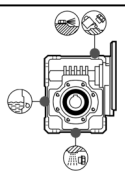
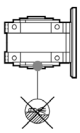
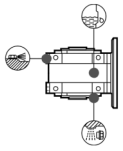
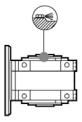
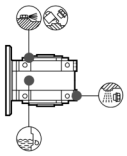
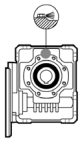
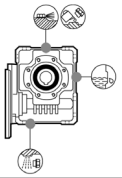
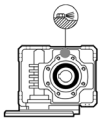
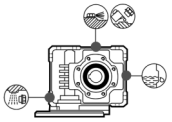
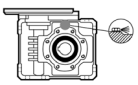
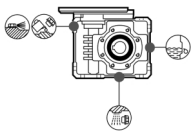
Lubricant charge [litres] for VF gear units:						
	B3	**B6**	**B7**	**B8**	**V5**	**V6**
VF 30	0.045	0.045	0.045	0.045	0.045	0.045
VF 44	0.075	0.075	0.075	0.075	0.075	0.075
VF 49	0.12	0.12	0.12	0.12	0.12	0.12

Shell Tivela oil S 320

Lubricant charge [litres] for W gear units							
	i =	**B3**	**B6**	**B7**		**V5**	**V6**
W63	**7, 10, 12, 15**	0.31	0.31	0.31	0.31	0.31	0.31
	19, 24, 30, 38, 45, 64	0.38	0.38	0.38	0.38	0.38	0.38
W75	**7, 10, 15**	0.48	0.48	0.48	0.48	0.48	0.48
	30, 40	0.52	0.52	0.52	0.52	0.52	0.52
	20, 25, 50, 60, 80, 100	0.56	0.56	0.56	0.56	0.56	0.56
W86	**7, 10, 15**	0.64	0.64	0.64	0.64	0.64	0.64
	30	0.73	0.73	0.73	0.73	0.73	0.73
	20, 23, 40, 46, 56, 64, 80, 100	0.90	0.90	0.90	0.90	0.90	0.90
	input	**B3**	**B6**	**B7**	**B8**	**V5**	**V6**
W110*	**P80...P132**	1.50	1.65	1.65	1.90	1.70	1.60
	HS 7 ⩽ i ⩽ 15	1.50	1.65	1.65	1.90	1.70	1.60
	HS 20 ⩽ i ⩽ 100	2.70	1.65	1.65	1.90	1.70	1.60

*Worm gears type **W110** and **WR110** configured for mounting positions **B3**, **V5** and **V6** will be supplied unlubricated.

Shell Tivela oil S 320

Filling/breather plug Level plug Drain plug	**W 63, W 75, W86**	**W 110**
B3		
B6		
B7		
B8		
V5		
V6		

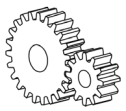
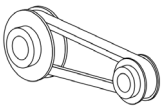
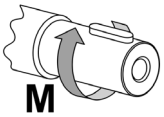
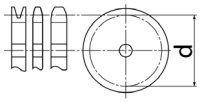
2.5 ADMISSIBLE OVERHUNG LOADS

2.5.1 RADIAL LOADS

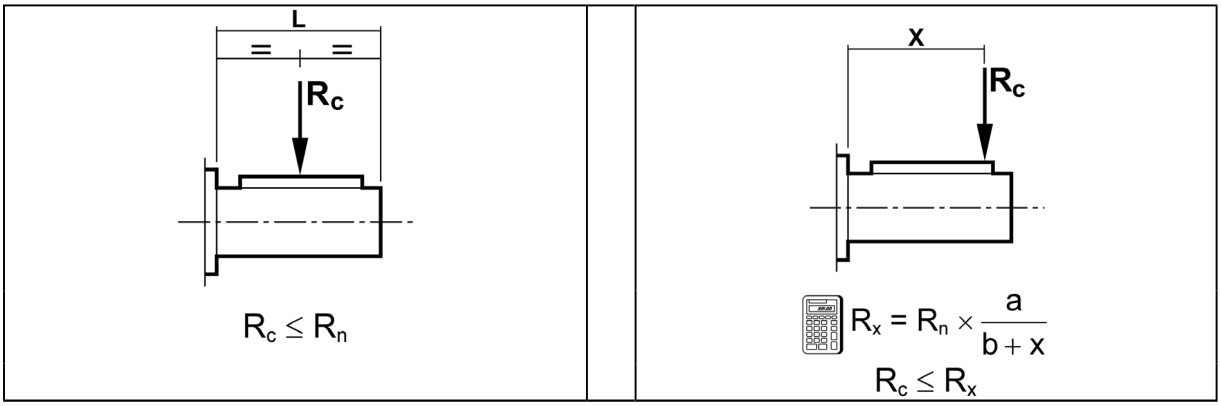
2.5.1.1 CALCULATING THE RESULTING OVERHUNG LOAD

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

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

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

2.5.1.2 OVERHUNG LOADING VERIFICATION



2.5.1.3 LOAD LOCATION FACTOR

	a	b	c
VF 30	60	45	1
VF 44	71	51	1
VF 49	99	69	1
W 63	132	102	1
W 75	139	109	1
W 86	149	119	1
W 100	173	136	1

2.5.2 THRUST LOADS An_1, An_2

Permissible thrust loads on input [A_{n1}] and output [A_{n2}] shafts are obtained from the radial loading for the shaft under consideration [R_{n1}] and [R_{n2}] through the following equation:

$$A_{n1} = R_{n1} \cdot 0{,}2$$

$$A_{n2} = R_{n2} \cdot 0{,}2$$

The thrust loads calculated through these formulas apply to thrust forces occurring at the same time as rated radial loads. In the only case that no overhung load acts on the shaft the value of the admissible thrust load [A_n] amounts to 50% of rated OHL [R_n] on same shaft.

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

2.6 GEARMOTOR RATING CHARTS

0.12 kW					
n_2 min^{-1}	M_2 Nm	S	i	Rn_2 N	IEC
18.7	34	1.4	70	3270	**VF49_ 70 P63 BN63A4**
21.8	31	1.0	60	2770	**VF44_ 60 P63 BN63A4**
21.8	30	1.5	60	3110	**VF49_ 60 P63 BN63A4**
28.5	26	1.2	46	2550	**VF44_ 46 P63 BN63A4**
29.1	25	1.7	45	2840	**VF49_ 45 P63 BN63A4**
36	21	2.0	36	2650	**VF49_ 36 P63 BN63A4**
37	21	1.4	35	2340	**VF44_ 35 P63 BN63A4**
47	17.4	1.7	28	2180	**VF44_ 28 P63 BN63A4**
47	17.4	2.4	28	2450	**VF49_ 28 P63 BN63A4**
55	15.7	2.8	24	2330	**VF49_ 24 P63 BN63A4**
66	13.5	2.2	20	1960	**VF44_ 20 P63 BN63A4**
73	12.4	3.5	18	2130	**VF49_ 18 P63 BN63A4**
87	9.8	1.0	15	950	**VF30_ 15 P63 BN63A4**
94	9.9	2.9	14	1750	**VF44_ 14 P63 BN63A4**
131	7.0	1.4	10	840	**VF30_ 10 P63 BN63A4**
131	7.3	3.9	10	1570	**VF44_ 10 P63 BN63A4**
187	5.1	2.0	7	750	**VF30_ 7 P63 BN63A4**

0.18 kW					
n_2 min^{-1}	M_2 Nm	S	i	Rn_2 N	IEC
18.9	50	1.0	70	3150	**VF49_ 70 P63 BN63B4**
22.0	45	1.0	60	3000	**VF49_ 60 P63 BN63B4**
29.3	38	1.2	45	2750	**VF49_ 45 P63 BN63B4**
37	31	1.4	36	2570	**VF49_ 36 P63 BN63B4**
38	31	1.0	35	2260	**VF44_ 35 P63 BN63B4**
47	26	1.2	28	2110	**VF44_ 28 P63 BN63B4**
47	26	1.6	28	2380	**VF49_ 28 P63 BN63B4**
55	23	1.9	24	2270	**VF49_ 24 P63 BN63B4**
66	20	1.5	20	1900	**VF44_ 20 P63 BN63B4**
73	18.5	2.3	18	2070	**VF49_ 18 P63 BN63B4**
94	14.8	2.0	14	1700	**VF44_ 14 P63 BN63B4**
94	14.6	2.9	14	1920	**VF49_ 14 P63 BN63B4**
132	10.4	1.0	10	790	**VF30_ 10 P63 BN63B4**
132	10.9	2.7	10	1530	**VF44_ 10 P63 BN63B4**
132	10.9	3.8	10	1730	**VF49_ 10 P63 BN63B4**
189	7.6	1.3	7	710	**VF30_ 7 P63 BN63B4**
189	7.8	3.7	7	1360	**VF44_ 7 P63 BN63B4**

0.25 kW

n_2 min^{-1}	M_2 Nm	S	i	Rn_2 N	 IEC
13.2	99	1.3	100	6200	**W75_ 100 P71 BN71A4**
13.2	107	2.0	100	7000	**W86_ 100 P71 BN71A4**
13.2	112	4.0	100	8000	**W110_ 100 P71 BN71A4**
16.5	85	2.1	80	6200	**W75_ 80 P71 BN71A4**
16.5	93	2.8	80	7000	**W86_ 80 P71 BN71A4**
20.6	79	3.6	64	7000	**W86_ 64 P71 BN71A4**
20.6	71	1.8	64	4730	**W63_ 64 P71 BN71A4**
22.0	71	2.8	60	6200	**W75_ 60 P71 BN71A4**
26.4	61	3.6	50	5960	**W75_ 50 P71 BN71A4**
29.3	55	2.2	45	4250	**W63_ 45 P71 BN71A4**
35	48	2.5	38	4040	**W63_ 38 P71 BN71A4**
37	44	1.0	36	2480	**VF49_ 36 P71 BN71A4**
44	40	3.0	30	3750	**W63_ 30 P71 BN71A4**
47	36	1.2	28	2300	**VF49_ 28 P71 BN71A4**
55	33	1.4	24	2200	**VF49_ 24 P71 BN71A4**
55	34	3.5	24	3500	**W63_ 24 P71 BN71A4**
66	28	1.1	20	1830	**VF44_ 20 P71 BN71A4**
73	26	1.7	18	2020	**VF49_ 18 P71 BN71A4**
94	21	1.4	14	1650	**VF44_ 14 P71 BN71A4**
94	20	2.1	14	1870	**VF49_ 14 P71 BN71A4**
132	15.2	1.9	10	1480	**VF44_ 10 P71 BN71A4**
132	15.2	2.8	10	1690	**VF49_ 10 P71 BN71A4**
189	10.9	2.7	7	1320	**VF44_ 7 P71 BN71A4**
189	10.9	3.8	7	1510	**VF49_ 7 P71 BN71A4**

0.37 kW

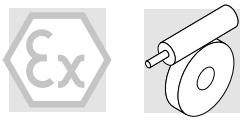
n_2 min^{-1}	M_2 Nm	S	i	Rn_2 N	 IEC
13.7	152	1.4	100	7000	**W86_ 100 P71 BN71B4**
17.1	122	1.5	80	6200	**W75_ 80 P71 BN71B4**
17.1	132	1.9	80	7000	**W86_ 80 P71 BN71B4**
21.4	112	2.5	64	7000	**W86_ 64 P71 BN71B4**
21.4	101	1.2	64	4480	**W63_ 64 P71 BN71B4**
22.8	101	2.0	60	6060	**W75_ 60 P71 BN71B4**
24.5	101	3.0	56	7000	**W86_ 56 P71 BN71B4**
27.4	88	2.5	50	5730	**W75_ 50 P71 BN71B4**
30	87	3.9	46	7000	**W86_ 46 P71 BN71B4**
30	78	1.5	45	4040	**W63_ 45 P71 BN71B4**
34	74	3.4	40	5370	**W75_ 40 P71 BN71B4**
36	69	1.7	38	3850	**W63_ 38 P71 BN71B4**
46	57	2.1	30	3590	**W63_ 30 P71 BN71B4**
57	48	2.5	24	3360	**W63_ 24 P71 BN71B4**
72	40	3.0	19	3130	**W63_ 19 P71 BN71B4**
76	37	1.2	18	1910	**VF49_ 18 P71 BN71B4**
91	32	3.7	15	2920	**W63_ 15 P71 BN71B4**
98	29	1.0	14	1550	**VF44_ 14 P71 BN71B4**
98	29	1.5	14	1780	**VF49_ 14 P71 BN71B4**
137	22	1.3	10	1400	**VF44_ 10 P71 BN71B4**
137	22	1.9	10	1610	**VF49_ 10 P71 BN71B4**
196	15.5	1.9	7	1250	**VF44_ 7 P71 BN71B4**
196	15.5	2.6	7	1440	**VF49_ 7 P71 BN71B4**

0.55 kW

n_2 min^{-1}	M_2 Nm	S	i	Rn_2 N	IEC
13.8	236	1.9	100	8000	**W110_ 100 P80 BN80A4**
17.3	201	2.3	80	8000	**W110_ 80 P80 BN80A4**
17.3	180	1.0	80	6200	**W75_ 80 P80 BN80A4**
17.3	195	1.3	80	7000	**W86_ 80 P80 BN80A4**
21.6	171	3.1	64	8000	**W110_ 64 P80 BN80A4**
21.6	166	1.7	64	7000	**W86_ 64 P80 BN80A4**
23.0	148	1.3	60	5770	**W75_ 60 P80 BN80A4**
24.6	149	2.0	56	7000	**W86_ 56 P80 BN80A4**
24.6	153	3.9	56	8000	**W110_ 56 P80 BN80A4**
27.6	129	1.7	50	5480	**W75_ 50 P80 BN80A4**
30	128	2.7	46	7000	**W86_ 46 P80 BN80A4**
31	115	1.0	45	3790	**W63_ 45 P80 BN80A4**
35	110	2.3	40	5160	**W75_ 40 P80 BN80A4**
35	114	2.9	40	7000	**W86_ 40 P80 BN80A4**
36	101	1.2	38	3620	**W63_ 38 P80 BN80A4**
46	84	1.4	30	3400	**W63_ 30 P80 BN80A4**
46	88	3.1	30	4750	**W75_ 30 P80 BN80A4**
55	76	3.3	25	4490	**W75_ 25 P80 BN80A4**
58	71	1.7	24	3200	**W63_ 24 P80 BN80A4**
69	63	4.0	20	4200	**W75_ 20 P80 BN80A4**
73	59	2.0	19	2990	**W63_ 19 P80 BN80A4**
92	47	2.5	15	2800	**W63_ 15 P80 BN80A4**
99	43	1.0	14	1660	**VF49_ 14 P80 BN80A4**
115	39	3.1	12	2630	**W63_ 12 P80 BN80A4**
138	32	1.3	10	1510	**VF49_ 10 P80 BN80A4**
138	33	3.7	10	2490	**W63_ 10 P80 BN80A4**
197	23	1.8	7	1360	**VF49_ 7 P80 BN80A4**

0.75 kW

n_2 min^{-1}	M_2 Nm	S	i	Rn_2 N	IEC
14.0	317	1.4	100	8000	**W110_ 100 P80 BN80B4**
17.5	270	1.7	80	8000	**W110_ 80 P80 BN80B4**
21.9	229	2.3	64	8000	**W110_ 64 P80 BN80B4**
21.9	223	1.3	64	7000	**W86_ 64 P80 BN80B4**
23.3	200	1.0	60	5450	**W75_ 60 P80 BN80B4**
25.0	201	1.5	56	7000	**W86_ 56 P80 BN80B4**
25.0	206	2.9	56	8000	**W110_ 56 P80 BN80B4**
28.0	174	1.3	50	5190	**W75_ 50 P80 BN80B4**
30	172	2.0	46	7000	**W86_ 46 P80 BN80B4**
30	174	3.4	46	8000	**W110_ 46 P80 BN80B4**
35	147	1.7	40	4920	**W75_ 40 P80 BN80B4**
35	153	2.2	40	7000	**W86_ 40 P80 BN80B4**
47	114	1.1	30	3180	**W63_ 30 P80 BN80B4**
47	118	2.3	30	4550	**W75_ 30 P80 BN80B4**
47	117	3.0	30	7000	**W86_ 30 P80 BN80B4**
56	102	2.4	25	4320	**W75_ 25 P80 BN80B4**
58	96	1.3	24	3010	**W63_ 24 P80 BN80B4**
61	96	3.3	23	7000	**W86_ 23 P80 BN80B4**
70	85	2.9	20	4050	**W75_ 20 P80 BN80B4**
70	86	3.7	20	7000	**W86_ 20 P80 BN80B4**
74	79	1.5	19	2840	**W63_ 19 P80 BN80B4**
93	65	3.8	15	3730	**W75_ 15 P80 BN80B4**
93	64	1.9	15	2670	**W63_ 15 P80 BN80B4**



0.75 kW

n_2 min^{-1}	M_2 Nm	S	i	Rn_2 N	IEC
117	52	2.3	12	2510	**W63_ 12 P80 BN80B4**
140	44	2.7	10	2390	**W63_ 10 P80 BN80B4**
200	31	1.3	7	1280	**VF49_ 7 P80 BN80B4**
200	32	3.6	7	2150	**W63_ 7 P80 BN80B4**

1.1 kW

n_2 min^{-1}	M_2 Nm	S	i	Rn_2 N	IEC
17.5	396	1.2	80	8000	**W110_ 80 P90 BN90S4**
21.9	336	1.6	64	8000	**W110_ 64 P90 BN90S4**
25.0	294	1.0	56	7000	**W86_ 56 P90 BN90S4**
25.0	303	2.0	56	8000	**W110_ 56 P90 BN90S4**
30	252	1.3	46	7000	**W86_ 46 P90 BN90S4**
30	255	2.3	46	8000	**W110_ 46 P90 BN90S4**
35	216	1.2	40	4540	**W75_ 40 P90 BN90S4**
35	225	1.5	40	7000	**W86_ 40 P90 BN90S4**
35	228	2.9	40	8000	**W110_ 40 P90 BN90S4**
47	173	1.6	30	4230	**W75_ 30 P90 BN90S4**
47	171	2.1	30	7000	**W86_ 30 P90 BN90S4**
56	150	1.7	25	4040	**W75_ 25 P90 BN90S4**
61	143	3.8	23	8000	**W110_ 23 P90 BN90S4**
61	142	2.3	23	7000	**W86_ 23 P90 BN90S4**
70	125	2.0	20	3810	**W75_ 20 P90 BN90S4**
70	126	2.5	20	6840	**W86_ 20 P90 BN90S4**
74	115	1.0	19	2580	**W63_ 19 P90 BN90S4**
93	96	2.6	15	3530	**W75_ 15 P90 BN90S4**
93	96	3.4	15	6290	**W86_ 15 P90 BN90S4**
93	93	1.3	15	2450	**W63_ 15 P90 BN90S4**
117	77	1.6	12	2330	**W63_ 12 P90 BN90S4**
140	65	1.9	10	2220	**W63_ 10 P90 BN90S4**
140	66	3.5	10	3140	**W75_ 10 P90 BN90S4**
200	46	2.5	7	2020	**W63_ 7 P90 BN90S4**

1.5 kW

n_2 min^{-1}	M_2 Nm	S	i	Rn_2 N	IEC
22.0	455	1.2	64	8000	**W110_ 64 P90 BN90LA4**
25.2	410	1.5	56	8000	**W110_ 56 P90 BN90LA4**
31	346	1.7	46	8000	**W110_ 46 P90 BN90LA4**
35	305	1.1	40	7000	**W86_ 40 P90 BN90LA4**
35	309	2.2	40	8000	**W110_ 40 P90 BN90LA4**
47	235	1.2	30	3870	**W75_ 30 P90 BN90LA4**
47	232	1.5	30	7000	**W86_ 30 P90 BN90LA4**
47	235	3.0	30	8000	**W110_ 30 P90 BN90LA4**
56	203	1.2	25	3720	**W75_ 25 P90 BN90LA4**
61	192	1.7	23	6850	**W86_ 23 P90 BN90LA4**
61	194	2.8	23	8000	**W110_ 23 P90 BN90LA4**
71	171	3.3	20	8000	**W110_ 20 P90 BN90LA4**
71	169	1.5	20	3530	**W75_ 20 P90 BN90LA4**
71	171	1.9	20	6580	**W86_ 20 P90 BN90LA4**
94	126	0.9	15	2200	**W63_ 15 P90 BN90LA4**

1.5 kW

n_2 min^{-1}	M_2 Nm	S	i	Rn_2 N	IEC
94	130	1.9	15	3310	**W75_ 15 P90 BN90LA4**
94	130	2.5	15	6090	**W86_ 15 P90 BN90LA4**
118	104	1.2	12	2110	**W63_ 12 P90 BN90LA4**
141	87	1.4	10	2040	**W63_ 10 P90 BN90LA4**
141	89	2.6	10	2970	**W75_ 10 P90 BN90LA4**
141	89	3.2	10	5390	**W86_ 10 P90 BN90LA4**
201	64	3.0	7	2670	**W75_ 7 P90 BN90LA4**
201	63	3.9	7	4830	**W86_ 7 P90 BN90LA4**
201	63	1.8	7	1870	**W63_ 7 P90 BN90LA4**

2.2 kW

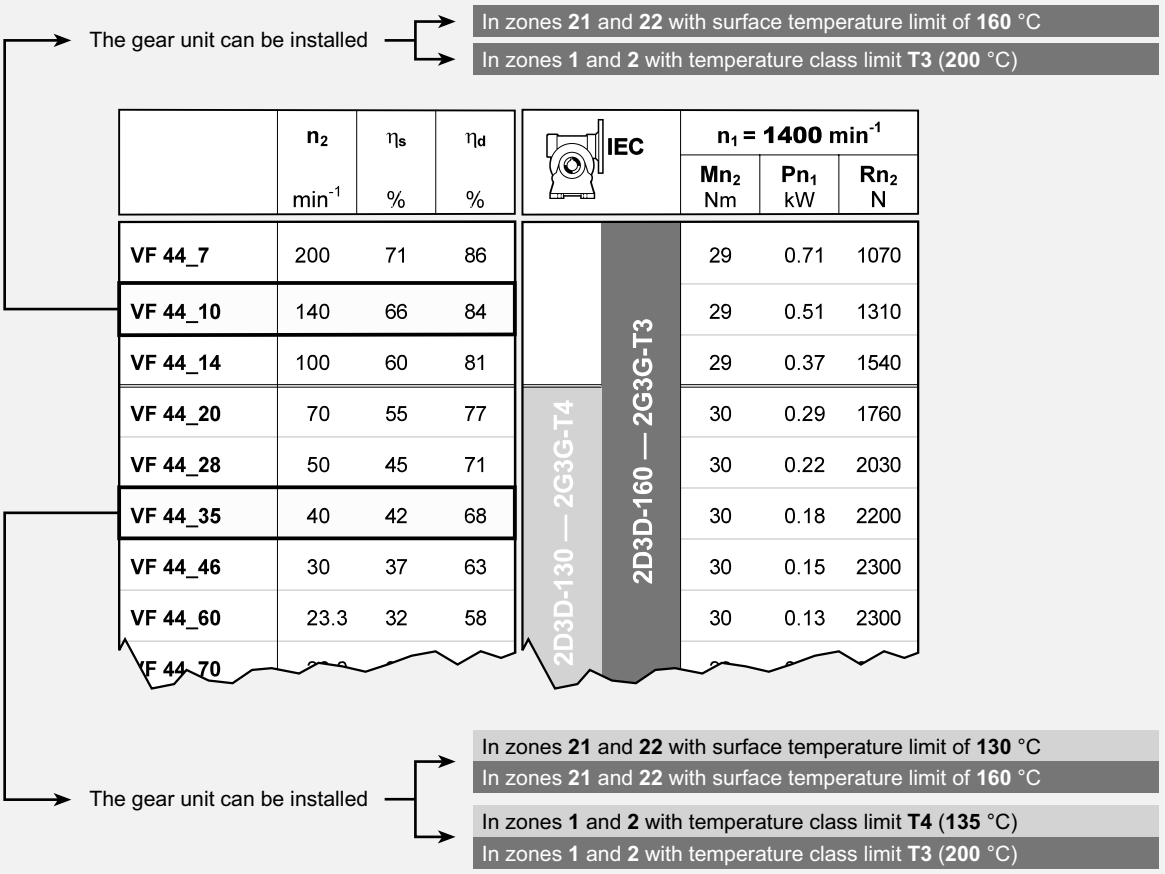
n_2 min^{-1}	M_2 Nm	S	i	Rn_2 N	IEC
25.2	601	1.0	56	8000	**W110_ 56 P100 BN100LA4**
31	507	1.2	46	8000	**W110_ 46 P100 BN100LA4**
35	453	1.5	40	8000	**W110_ 40 P100 BN100LA4**
47	340	1.0	30	6850	**W86_ 30 P100 BN100LA4**
47	344	2.0	30	8000	**W110_ 30 P100 BN100LA4**
61	281	1.1	23	6380	**W86_ 23 P100 BN100LA4**
61	284	1.9	23	8000	**W110_ 23 P100 BN100LA4**
71	250	2.3	20	8000	**W110_ 20 P100 BN100LA4**
71	247	1.0	20	3060	**W75_ 20 P100 BN100LA4**
71	250	1.3	20	6150	**W86_ 20 P100 BN100LA4**
94	190	1.3	15	2920	**W75_ 15 P100 BN100LA4**
94	190	1.7	15	5750	**W86_ 15 P100 BN100LA4**
94	188	3.2	15	8000	**W110_ 15 P100 BN100LA4**
141	131	1.8	10	2670	**W75_ 10 P100 BN100LA4**
141	131	2.2	10	5130	**W86_ 10 P100 BN100LA4**
201	94	2.0	7	2420	**W75_ 7 P100 BN100LA4**
201	93	2.7	7	4620	**W86_ 7 P100 BN100LA4**

3 kW

n_2 min^{-1}	M_2 Nm	S	i	Rn_2 N	IEC
35	618	1.1	40	8000	**W110_ 40 P100 BN100LB4**
47	469	1.5	30	8000	**W110_ 30 P100 BN100LB4**
61	388	1.4	23	8000	**W110_ 23 P100 BN100LB4**
71	341	1.7	20	8000	**W110_ 20 P100 BN100LB4**
71	341	0.9	20	5660	**W86_ 20 P100 BN100LB4**
94	259	1.3	15	5360	**W86_ 15 P100 BN100LB4**
94	256	2.3	15	8000	**W110_ 15 P100 BN100LB4**
141	179	1.6	10	4840	**W86_ 10 P100 BN100LB4**
141	177	3.1	10	7480	**W110_ 10 P100 BN100LB4**
201	127	2.0	7	4380	**W86_ 7 P100 BN100LB4**
201	127	3.9	7	6700	**W110_ 7 P100 BN100LB4**

2.7 - RATING CHARTS

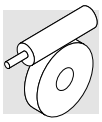
Selection example:



	n_2 min^{-1}	η_s %	η_d %	IEC	n_1 = 1400 min^{-1} Mn_2 Nm	Pn_1 kW	Rn_2 N
VF 44_7	200	71	86	2D3D-160 — 2G3G-T3	29	0.71	1070
VF 44_10	140	66	84		29	0.51	1310
VF 44_14	100	60	81		29	0.37	1540
VF 44_20	70	55	77	2D3D-130 — 2G3G-T4	30	0.29	1760
VF 44_28	50	45	71		30	0.22	2030
VF 44_35	40	42	68		30	0.18	2200
VF 44_46	30	37	63		30	0.15	2300
VF 44_60	23.3	32	58		30	0.13	2300
VF 44_70							

	n_2 min^{-1}	η_s %	η_d %	IEC	n_1 = 1400 min^{-1} Mn_2 Nm	Pn_1 kW	Rn_2 N	n_1 = 1400 min^{-1} Mn_2 Nm	Pn_1 kW	Rn_1 N	Rn_2 N
VF 30_7	200	69	84	2D3D-160 — 2G3G-T3	10	0.25	630				
VF 30_10	140	64	81		10	0.18	770				
VF 30_15	93	56	76		10	0.13	910				
VF 30_20	70	51	73		10	0.10	1030				
VF 30_30	47	41	65		10	0.08	1200				
VF 30_40	35	36	60		10	0.06	1340				
VF 30_60	23	29	51		11	0.05	1540				
VF 30_70	20.0	26	48	2D3D-130 — 2G3G-T4	11	0.05	1600				

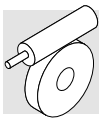
30 Nm — VF 44



	n_2	η_s	η_d	IEC	n_1 = 1400 min^{-1}				n_1 = 1400 min^{-1}			
					Mn_2	Pn_1	Rn_2		Mn_2	Pn_1	Rn_1	Rn_2
	min^{-1}	%	%		Nm	kW	N		Nm	kW	N	N
VF 44_7	200	71	86	2D3D-160 — 2G3G-T3	29	0.71	1070	2D3D-160 — 2G3G-T3	29	0.71	200	1070
VF 44_10	140	66	84		29	0.51	1310		29	0.51	220	1310
VF 44_14	100	60	81		29	0.37	1540		29	0.37	220	1540
VF 44_20	70	55	77	2D3D-130 — 2G3G-T4	30	0.29	1760	2D3D-130 — 2G3G-T4	30	0.29	220	1760
VF 44_28	50	45	71		30	0.22	2030		30	0.22	220	2030
VF 44_35	40	42	68		30	0.18	2200		30	0.18	220	2200
VF 44_46	30	37	63		30	0.15	2300		30	0.15	220	2300
VF 44_60	23.3	32	58		30	0.13	2300		30	0.13	220	2300
VF 44_70	20.0	30	55		29	0.11	2300		29	0.11	220	2300

48 Nm — VF 49

	n_2	η_s	η_d	IEC	n_1 = 1400 min^{-1}				n_1 = 1400 min^{-1}			
					Mn_2	Pn_1	Rn_2		Mn_2	Pn_1	Rn_1	Rn_2
	min^{-1}	%	%		Nm	kW	N		Nm	kW	N	N
VF 49_7	200	70	86	2D3D-160 — 2G3G-T3	41	1.00	1140	2D3D-160 — 2G3G-T3	41	1.00	400	1140
VF 49_10	140	65	84		42	0.73	1390		42	0.73	400	1390
VF 49_14	100	59	81		42	0.54	1630		42	0.54	400	1630
VF 49_18	78	55	78	2D3D-130 — 2G3G-T4	43	0.45	1810	2D3D-130 — 2G3G-T4	43	0.45	400	1810
VF 49_24	58	50	75		44	0.36	2050		44	0.36	400	2050
VF 49_28	50	43	71		42	0.31	2170		42	0.31	400	2170
VF 49_36	39	39	67		43	0.26	2400		43	0.26	400	2400
VF 49_45	31	35	63		44	0.23	2620		44	0.23	400	2620
VF 49_60	23.3	30	58		45	0.19	2920		45	0.19	400	2920
VF 49_70	20.0	28	54		48	0.19	3090		48	0.19	400	3090



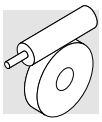
W 63 — 125 Nm

	n_2 min^{-1}	η_s %	η_d %	IEC	n_1 = 1400 min^{-1} Mn_2 Nm	Pn_1 kW	Rn_2 N		n_1 = 1400 min^{-1} Mn_2 Nm	Pn_1 kW	Rn_1 N	Rn_2 N
W 63_7	200	70	88	2D3D-160 — 2G3G-T3	115	2.7	1380	2G3G-T3	115	2.7	480	1380
W 63_10	140	66	86		120	2.0	1780		120	2.0	480	1780
W 63_12	117	63	85		120	1.7	1990		120	1.7	480	1990
W 63_15	93	59	83	2D3D-130 — 2G3G-T4	120	1.4	2260	2G3G-T4	120	1.4	480	2260
W 63_19	74	55	81		120	1.1	2550		120	1.1	480	2550
W 63_24	58	52	78		120	0.94	2850		120	0.94	480	2850
W 63_30	47	44	74		120	0.79	3140		120	0.79	480	3140
W 63_38	36.8	40	70		120	0.66	3480		120	0.66	480	3480
W 63_45	31.1	37	67		120	0.58	3740		120	0.58	480	3740
W 63_64	21.9	31	61		125	0.47	4320		125	0.47	480	4320

W 75 — 270 Nm

	n_2 min^{-1}	η_s %	η_d %	IEC	n_1 = 1400 min^{-1} Mn_2 Nm	Pn_1 kW	Rn_2 N		n_1 = 1400 min^{-1} Mn_2 Nm	Pn_1 kW	Rn_1 N	Rn_2 N
W 75_7	200	71	90	2D3D-160 — 2G3G-T3	190	4.4	1080	2G3G-T3	190	4.4	750	1080
W 75_10	140	67	88		230	3.8	1960		230	3.8	750	1960
W 75_15	93	60	85	2D3D-130 — 2G3G-T4	250	2.9	2550	2G3G-T4	250	2.9	750	2550
W 75_20	70	56	83		250	2.2	3050		250	2.2	750	3050
W 75_25	56	52	80		250	1.8	3520		250	1.8	750	3520
W 75_30	47	45	77		270	1.7	3680		270	1.7	750	3680
W 75_40	35	40	72		255	1.3	4320		255	1.3	750	4320
W 75_50	28.0	36	68		220	0.95	4930		220	0.95	750	4930
W 75_60	23.3	33	65		200	0.75	5450		200	0.75	750	5450
W 75_80	17.5	28	59		180	0.56	6200		180	0.56	750	6200
W 75_100	14.0	25	55		125	0.33	6200		125	0.33	750	6200

350 Nm W 86



	n_2	η_s	η_d	IEC	n_1 = 1400 min^{-1}				n_1 = 1400 min^{-1}			
					Mn_2	Pn_1	Rn_2		Mn_2	Pn_1	Rn_1	Rn_2
	min^{-1}	%	%		Nm	kW	N		Nm	kW	N	N
W 86_7	200	71	89		250	5.9	3510		250	5.9	850	3510
W 86_10	140	67	88		290	4.8	4160		290	4.8	850	4160
W 86_15	93	60	85	2D3D-130 — 2G3G-T4 / 2D3D-160 — 2G3G-T3	330	3.8	4980	2G3G-T4 / 2G3G-T3	330	3.8	850	4980
W 86_20	70	60	84		320	2.8	5790		320	2.8	850	5790
W 86_23	61	58	82		320	2.5	6190		320	2.5	850	6190
W 86_30	47	45	76		355	2.3	6790		355	2.3	850	6790
W 86_40	35.0	45	75		330	1.6	7000		330	1.6	850	7000
W 86_46	30.4	43	73		340	1.5	7000		340	1.5	850	7000
W 86_56	25.0	39	70		300	1.1	7000		300	1.1	850	7000
W 86_64	21.9	37	68		280	0.94	7000		280	0.94	850	7000
W 86_80	17.5	33	64		255	0.73	7000		255	0.73	850	7000
W 86_100	14.0	29	59		210	0.52	7000		210	0.52	850	7000

670 Nm W 110

	n_2	η_s	η_d	IEC	n_1 = 1400 min^{-1}				n_1 = 1400 min^{-1}			
					Mn_2	Pn_1	Rn_2		Mn_2	Pn_1	Rn_1	Rn_2
	min^{-1}	%	%		Nm	kW	N		Nm	kW	N	N
W 110_7	200	71	89		500	11.8	4440		500	11.8	1200	4440
W 110_10	140	67	87		550	9.3	5540		550	9.3	1200	5540
W 110_15	93	60	84		600	7.0	6840		600	7.0	1200	6840
W 110_20	70	61	84		570	5.0	8000		570	5.0	1200	8000
W 110_23	61	59	83		540	4.1	8000		540	4.1	1200	8000
W 110_30	47	45	77		700	4.4	8000		700	4.4	1200	8000
W 110_40	35	46	76		670	3.2	8000		670	3.2	1200	8000
W 110_46	30	44	74		600	2.6	8000		600	2.6	1200	8000
W 110_56	25.0	41	72		600	2.2	8000		600	2.2	1200	8000
W 110_64	21.9	38	70		530	1.7	8000		530	1.7	1200	8000
W 110_80	17.5	34	66		470	1.3	8000		470	1.3	1200	8000
W 110_100	14.0	30	62		445	1.1	8000		445	1.1	1201	8000

2.8 - MOTOR COMBINATIONS

The following table lists the gear ratios for which the motor/gear unit combinations are technically feasible. The gearmotor must be selected in accordance with the selection procedure given in this catalogue.
In particular, the condition $Mn_2 \geq Mr_2 \times f_s \times f_{tp}$ must always be verified.

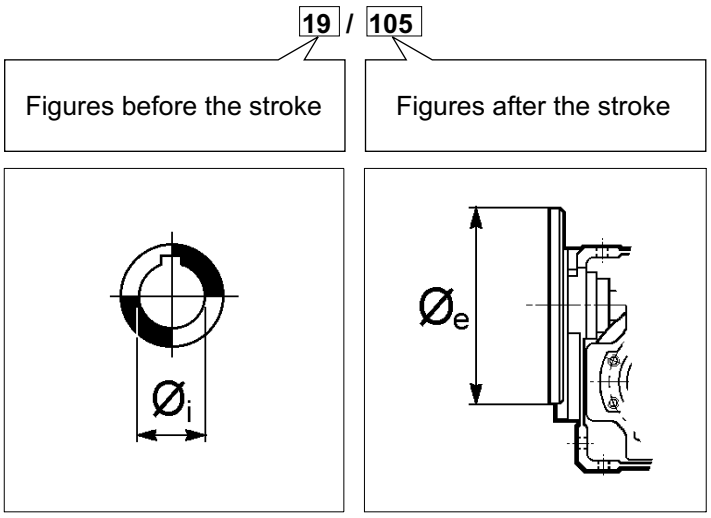
kW		VF 30	VF 44	VF 49	W 63	W 75	W 86	W 110
0.06	**56A 4**	7 ... 70	-	-	-	-	-	-
0.09	**56B 4**	7 ... 20	-	-	-	-	-	-
0.12	**63A 4**	7 ... 15	7 ... 70	7 ... 70	-	-	-	-
0.18	**63B 4**	7 ... 10	7 ... 35	7 ... 70	-	-	-	-
0.25	**71A 4**	-	7 ... 20	7 ... 36	7 ... 64	7 ... 100	7 ... 100	-
0.37	**71B 4**	-	7 ... 14	7 ... 18	7 ... 64	7 ... 80	7 ... 100	-
0.55	**80A 4**	-	-	7 ... 14	7 ... 64	7 ... 80	7 ... 80	7 ... 100
0.75	**80B 4**	-	-	7	7 ... 38	7 ... 60	7 ... 64	7 ... 100
1.1	**90S 4**	-	-	-	7 ... 19	7 ... 40	7 ... 56	7 ... 80
1.5	**90LA 4**	-	-	-	7 ... 15	7 ... 30	7 ... 40	7 ... 64
1.85	**90LB 4**	-	-	-	7 ... 12	7 ... 20	7 ... 30	7 ... 56
2.2	**100LA 4**	-	-	-	-	7 ... 20	7 ... 30	7 ... 46
3	**100LB 4**	-	-	-	-	7 ... 10	7 ... 15	7 ... 40
4	**112M 4**	-	-	-	-	7	7 ... 10	7 ... 30
5.5	**132S 4**	-	-	-	-	-	-	7 ... 15
7.5	**132MA 4**	-	-	-	-	-	-	7 ... 10

Combinations are generally available with both **IM B5** and **IM B14** flanged motors.

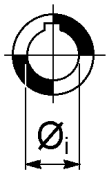
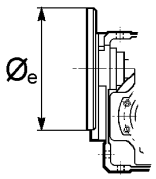
Combinations marked in grey boxes can only be achieved through **IM B5** flanged motors.

2.8.1 - HYBRID IMPUTS

For mounting to non-standardised electric motors, the motor coupling for W series worm gear units can be configured with hybrid input shaft/flange combinations, which do not correspond to IEC standards.
The shaft/flange combination is given in the designation which specifies the diameters as shown in the following example:



The following table gives the gear ratios that hybrid flange/input shaft combinations are available for:

					
		120	**140**	**160**	**200**
W 63	**19**	⛔	7 ≤ i ≤ 64	⛔	
W 75 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		⛔	⛔

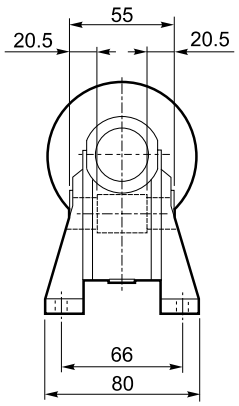
Legend:

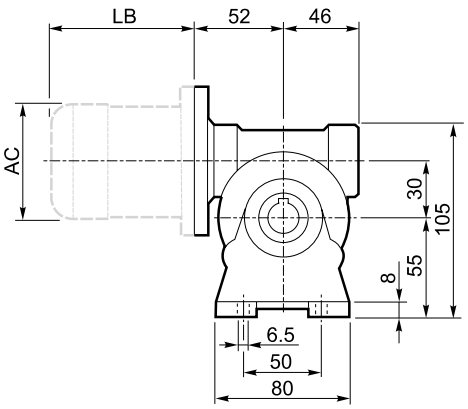
⛔ Combination is not available.

Standard combination.

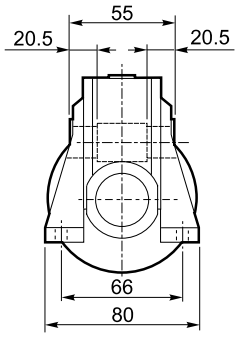
2.9 - DIMENSIONS

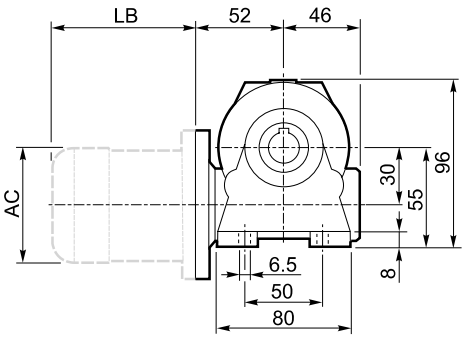
A



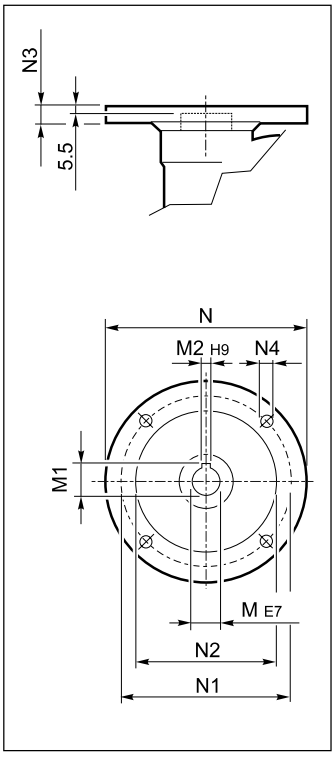


N

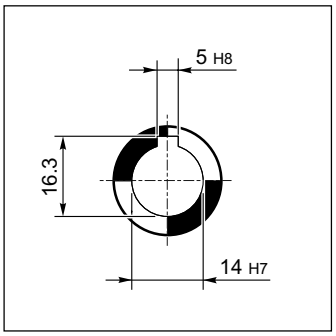




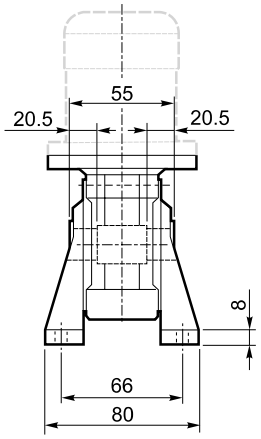
INPUT

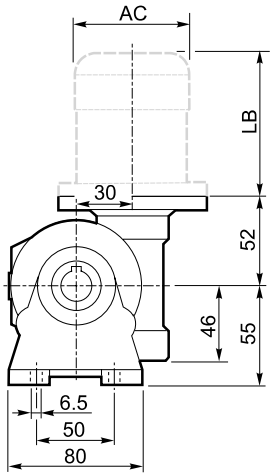


OUTPUT

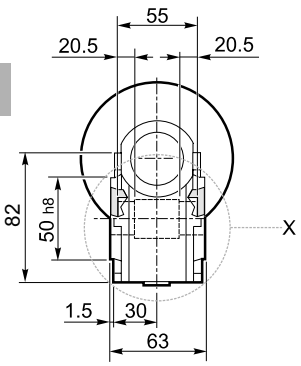


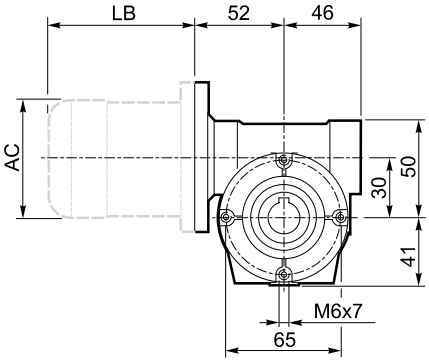
V

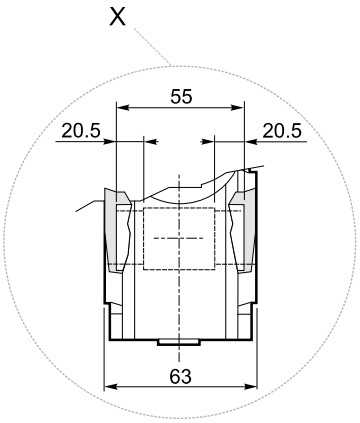




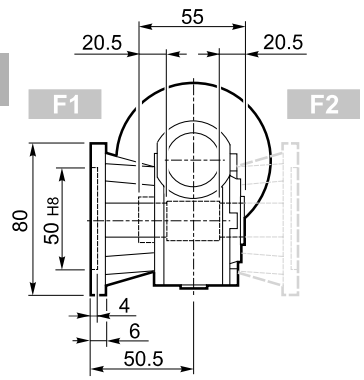
P

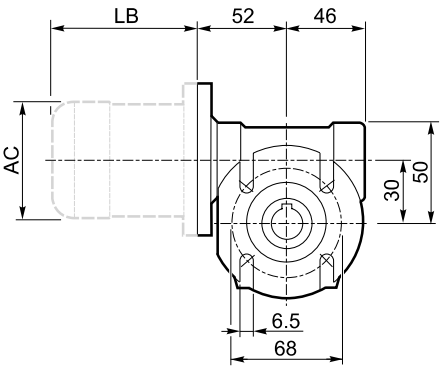




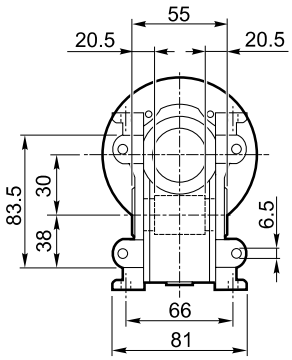


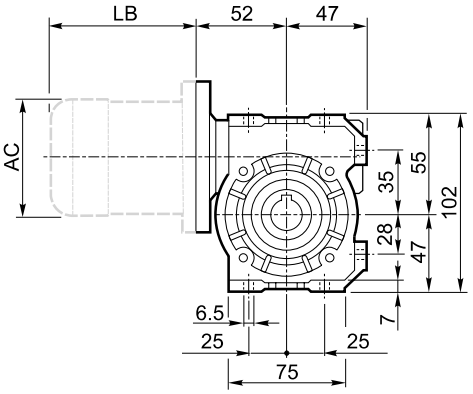
F_



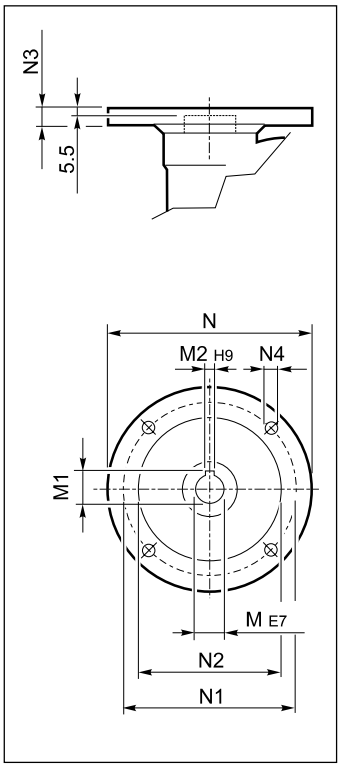


U

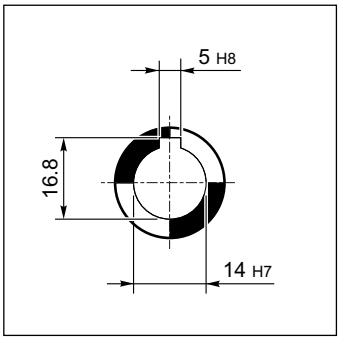




INPUT

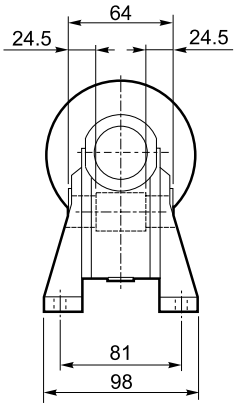


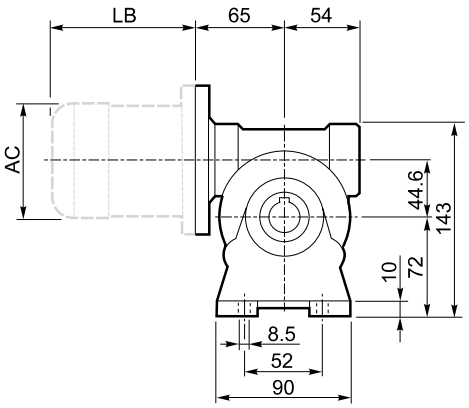
OUTPUT



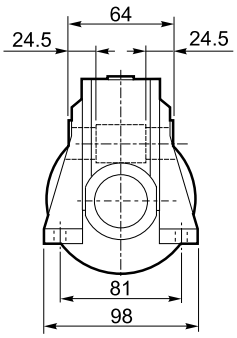
VF 30_												BN	
		M	M1	M2	N	N1	N2	N3	N4	Kg	IEC	LB	AC
VF 30	P63 B5	11	12.8	4	140	115	95	8	9.5	1.1	63	192	121
VF 30	P63 B14	11	12.8	4	90	75	60	6	5.5		63	192	121

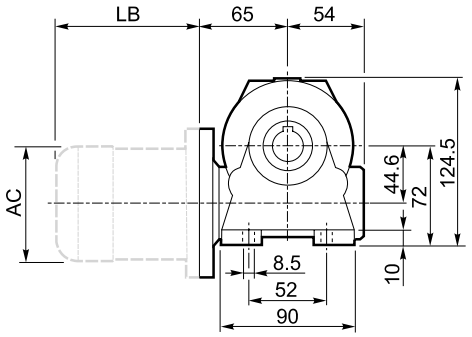
A



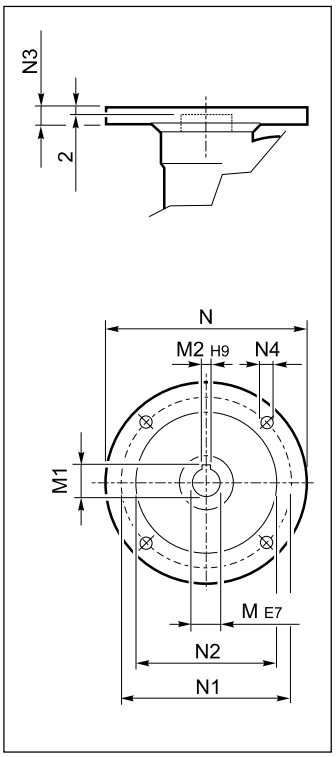


N

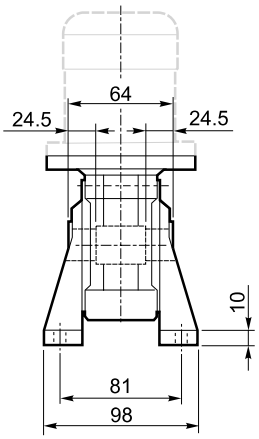


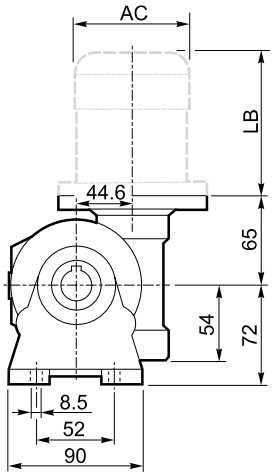


INPUT

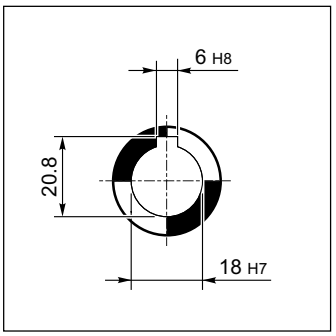


V

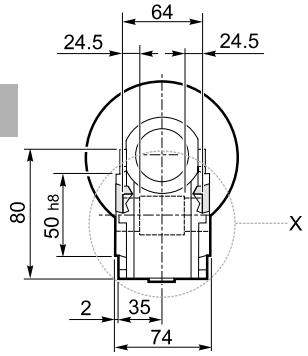


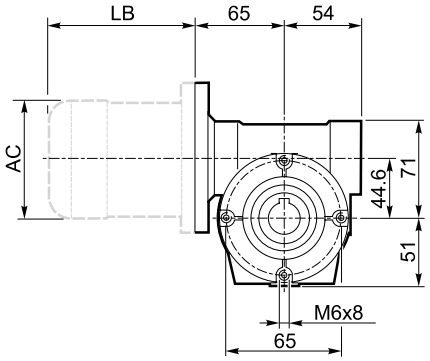


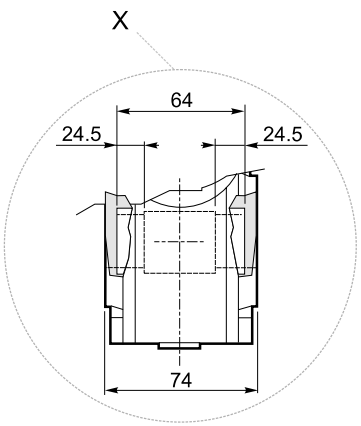
OUTPUT



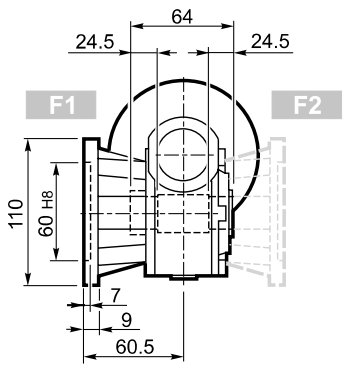
P

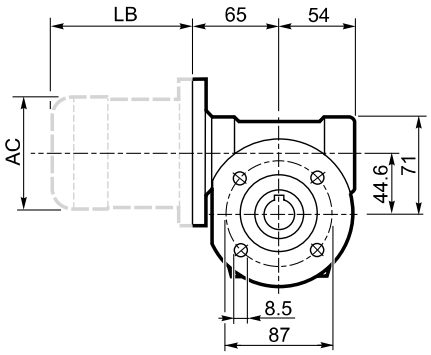




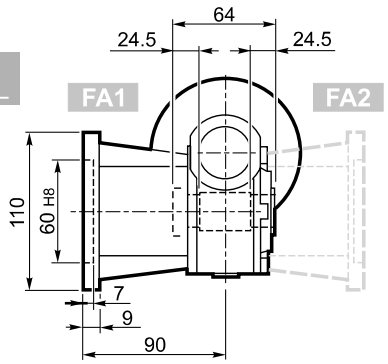


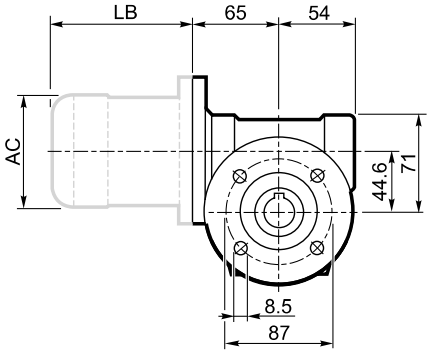
F_



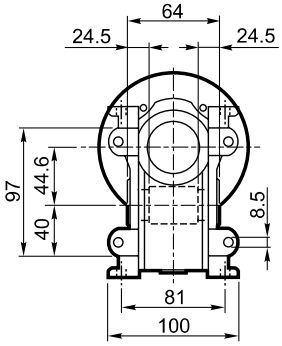


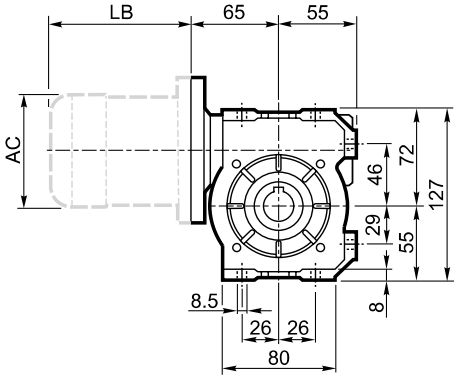
FA_



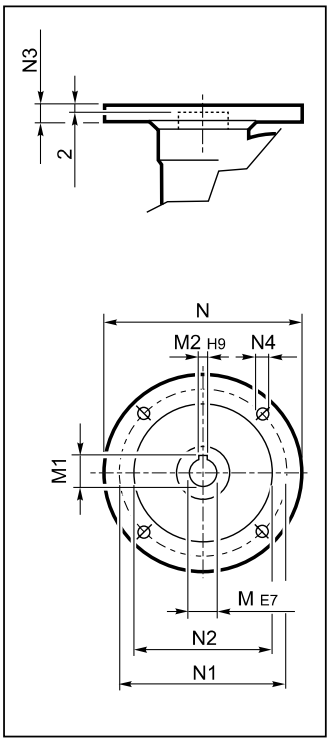


U

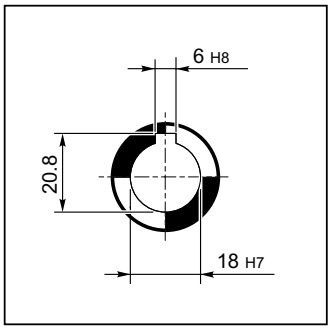




INPUT

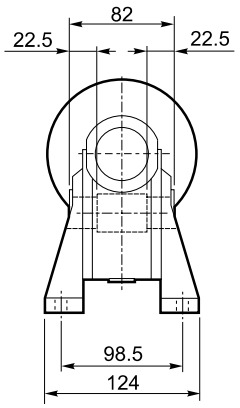


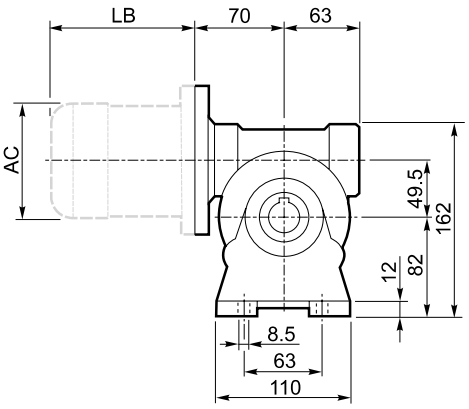
OUTPUT



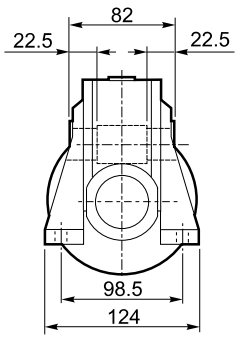
VF 44_												BN_2D	
		M	M1	M2	N	N1	N2	N3	N4	Kg	IEC	LB	AC
VF 44	**P63 B5**	11	12.8	4	140	115	95	10	9.5	2.0	63	184	121
VF 44	**P71 B5**	14	16.3	5	160	130	110	10	9.5		71	219	138
VF 44	**P63 B14**	11	12.8	4	90	75	60	8	5.5		63	184	121
VF 44	**P71 B14**	14	16.3	5	105	85	70	10	7		71	219	138

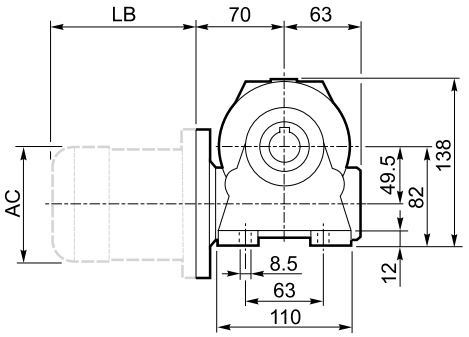
A



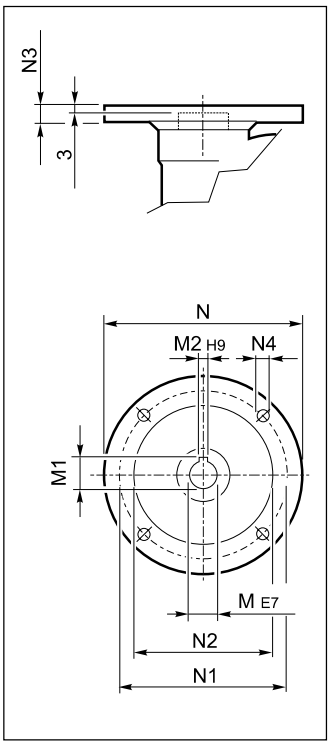


N

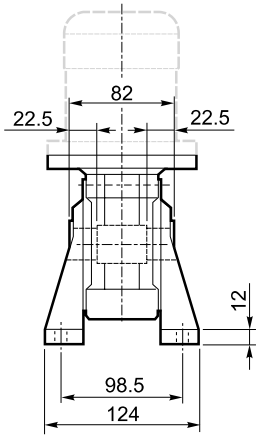


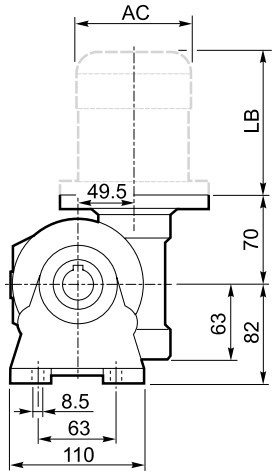


INPUT

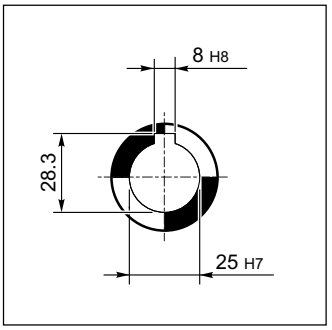


V

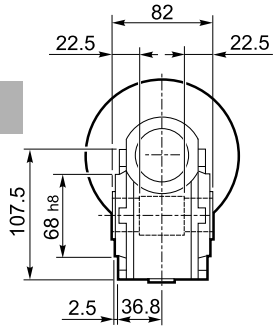


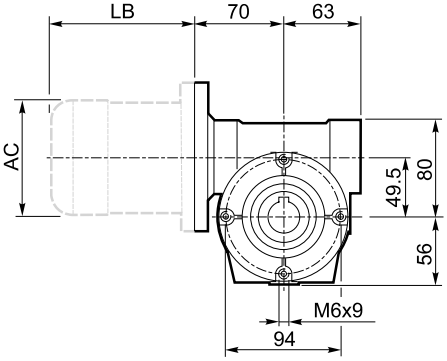


OUTPUT

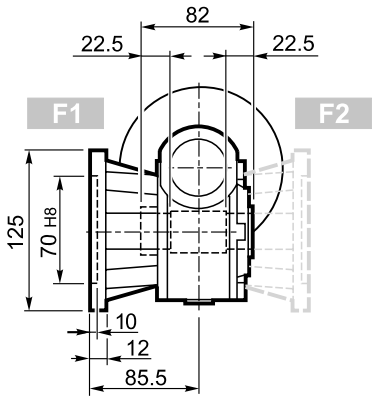


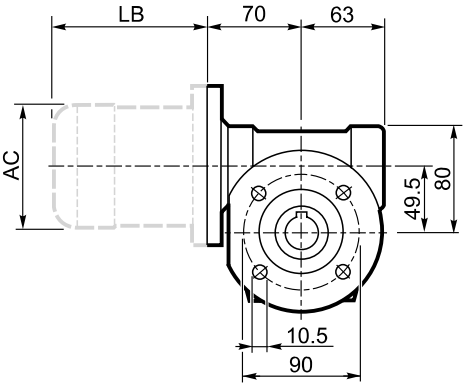
P



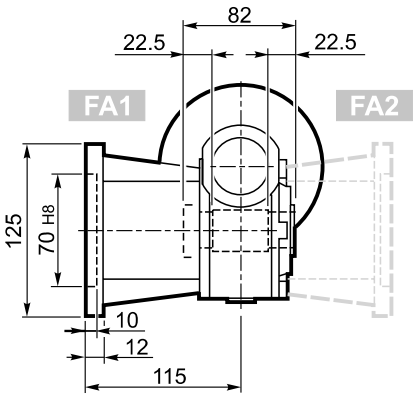


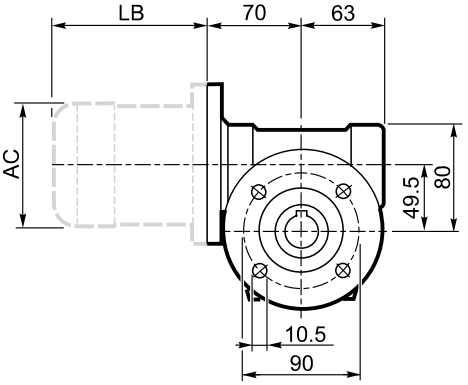
F_



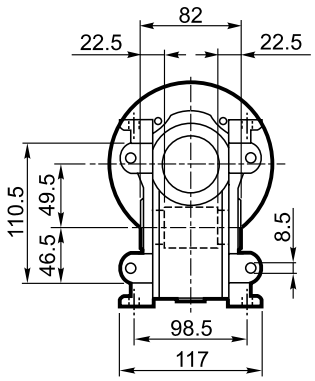


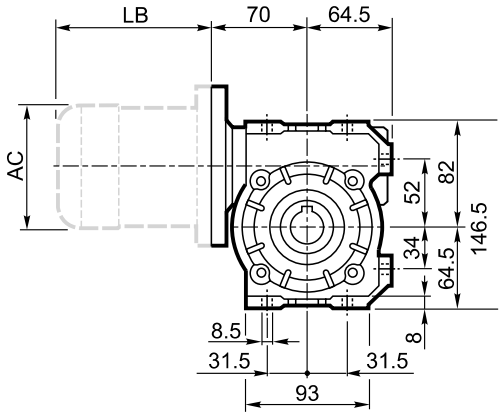
FA_





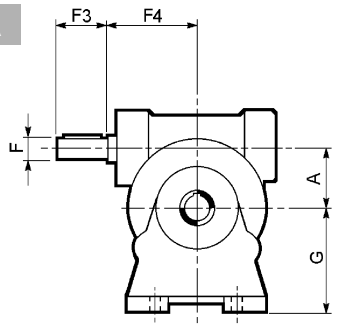
U



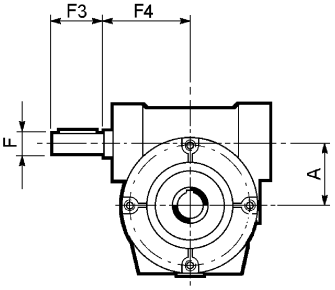


VF 49_												BN_2D	
		M	M1	M2	N	N1	N2	N3	N4	Kg	IEC	LB	AC
VF 49	P63 B5	11	12.8	4	140	115	95	10.5	9.5	3.0	63	184	121
VF 49	P71 B5	14	16.3	5	160	130	110	10.5	9.5		71	219	138
VF 49	P80 B5	19	21.8	6	200	165	130	10	11.5		80	234	156
VF 49	P63 B14	11	12.8	4	90	75	60	7	6		63	184	121
VF 49	P71 B14	14	16.3	5	105	85	70	10.5	6.5		71	219	138
VF 49	P80 B14	19	21.8	6	120	100	80	10	7		80	234	156

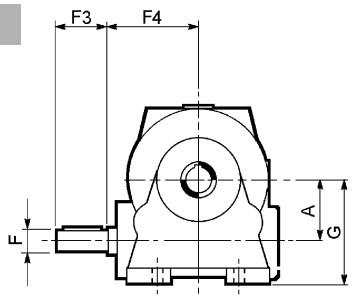
A



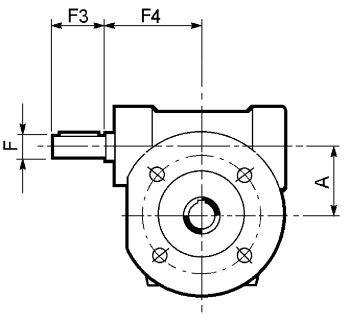
P



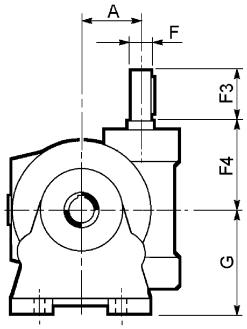
N



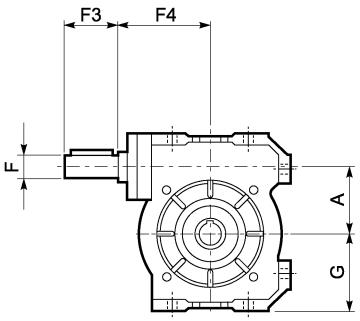
F
FA



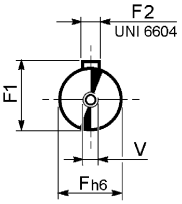
V



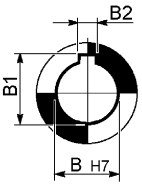
U



INPUT

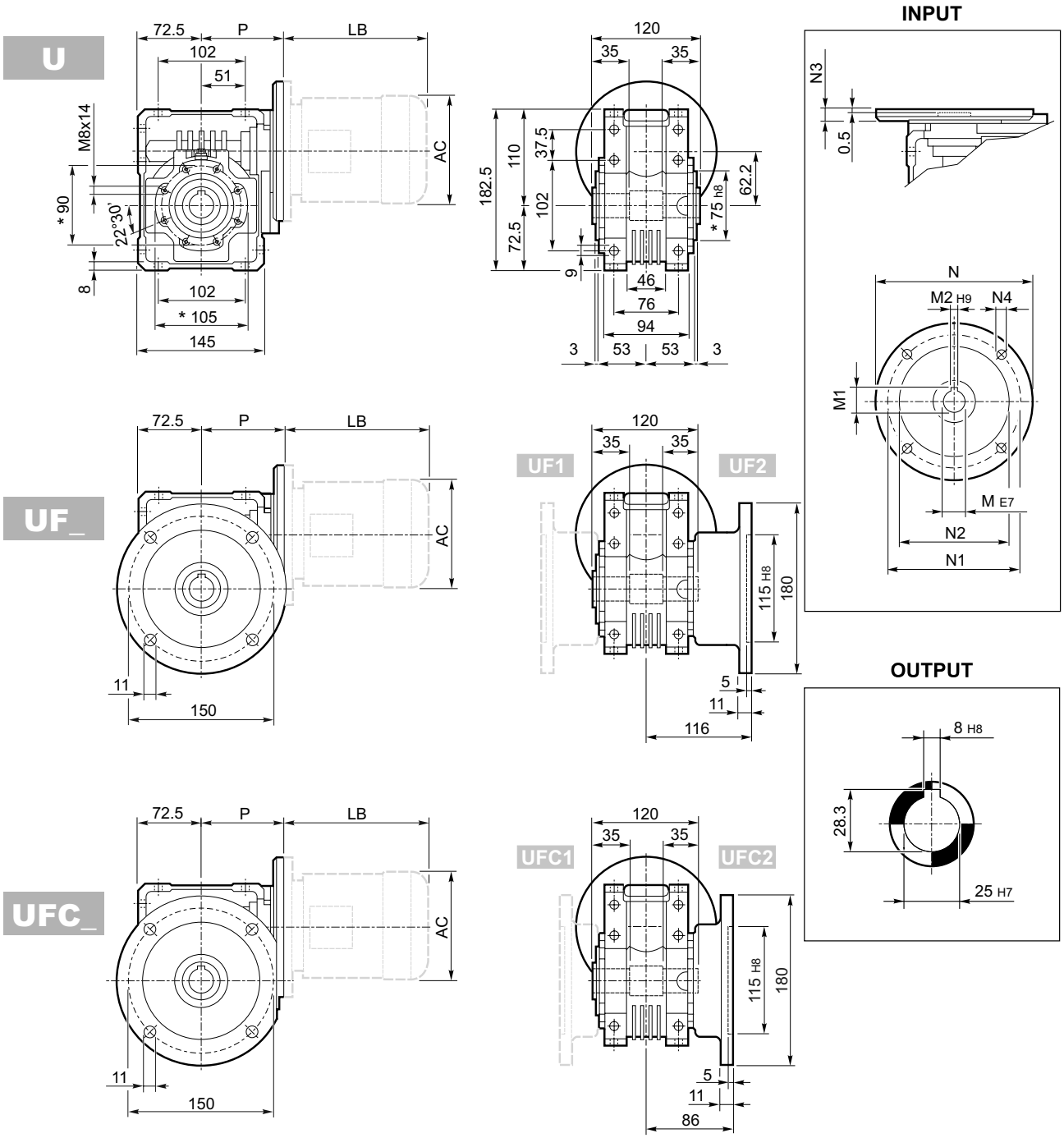


OUTPUT



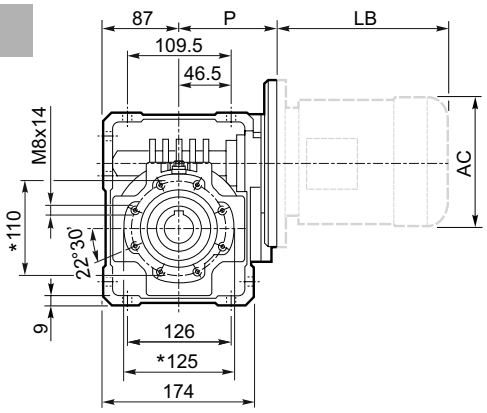
	A	B	B1	B2	F	F1	F2	F3	F4	G	V	Kg
VF 44_HS	44.6	18	20.8	6	11	12.5	4	30	54	72	—	2.0
VF 49_HS	49.5	25	28.3	8	16	18	5	40	65	82	M6x16	3.0

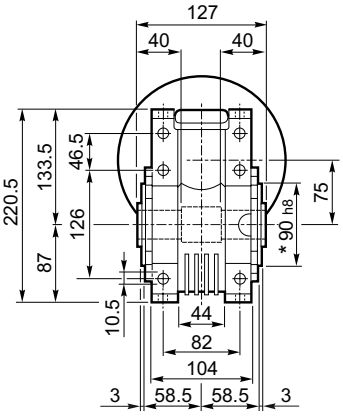
Dimensions common to the other configurations can be found from page 32 to 37.



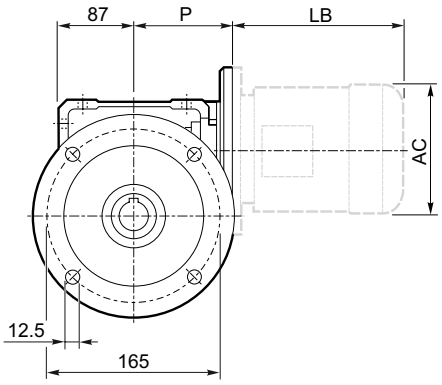
W 63												BN_2D		
		M	M1	M2	N	N1	N2	N3	N4	kg	IEC		LB	AC
W 63	**P71 B5**	14	16.3	5	160	130	110	11	9	95	6.3	BN 71	219	138
W 63	**P80 B5**	19	21.8	6	200	165	130	12	11.5	102	6.5	BN 80	234	156
W 63	**P90 B5**	24	27.3	8	200	165	130	12	11.5	102	6.4	BN 90	276	176
W 63	**P71 B14**	14	16.3	5	105	85	70	11	6.5	95	6.1	BN 71	219	138
W 63	**P80 B14**	19	21.8	6	120	100	80	11	6.5	102	6.3	BN 80	234	156
W 63	**P90 B14**	24	27.3	8	140	115	95	11	8.5	102	6.3	BN 90	276	176

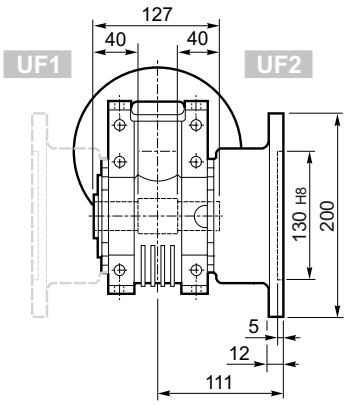
U



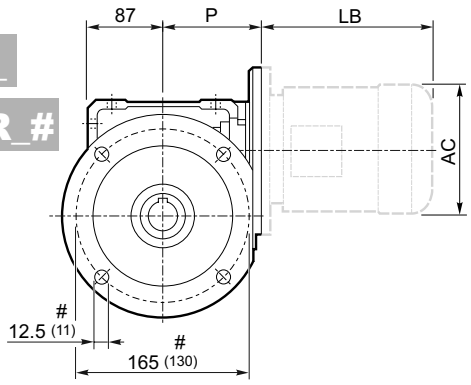


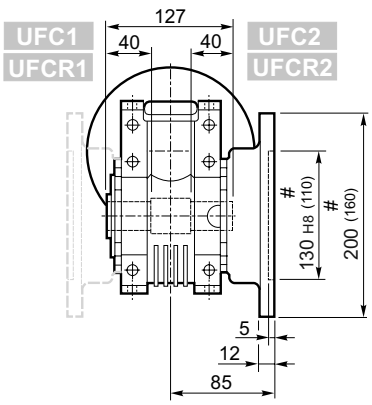
UF_



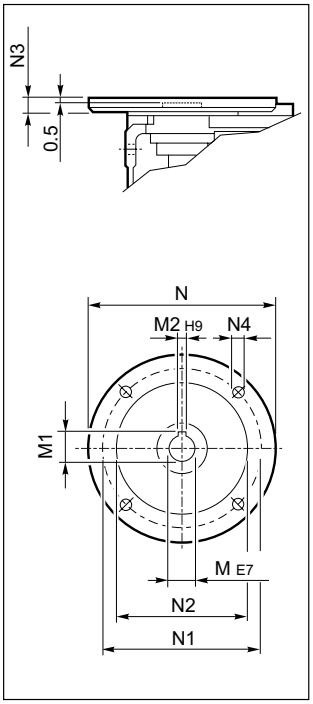


UFC_
UFCR_#

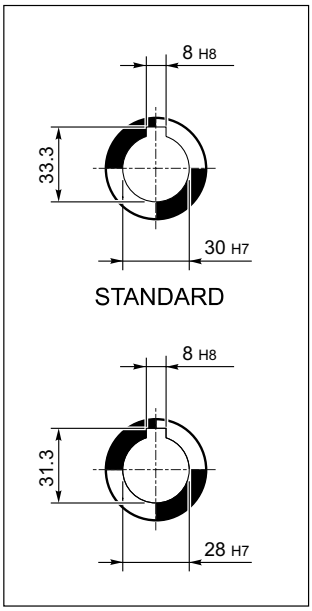




INPUT

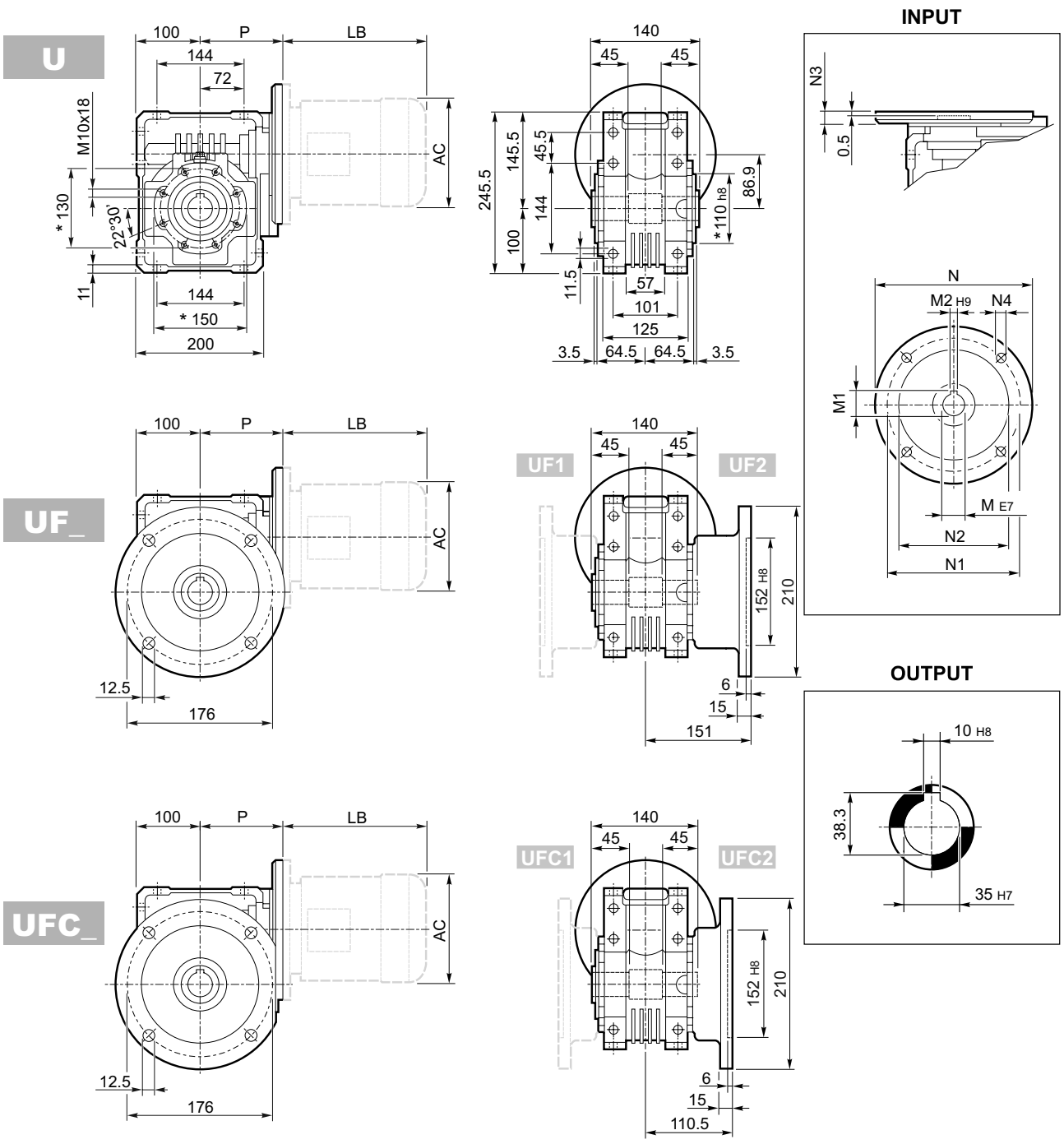


OUTPUT



W 75_													BN_2D	
		M	M1	M2	N	N1	N2	N3	N4	P	Kg	IEC	LB	AC
W 75	**P71 B5**	14	16.3	5	160	130	110	11	9	112	9.5	BN 71	219	138
W 75	**P80 B5**	19	21.8	6	200	165	130	12	11.5	112	9.7	BN 80	234	156
W 75	**P90 B5**	24	27.3	8	200	165	130	12	11.5	112	9.6	BN 90	276	176
W 75	**P100 B5**	28	31.3	8	250	215	180	13	12.5	120	9.7	BN 100	307	195
W 75	**P80 B14**	19	21.8	6	120	100	80	7.5	6.5	112	9.4	BN 80	234	156
W 75	**P90 B14**	24	27.3	8	140	115	95	7.5	8.5	112	9.4	BN 90	276	176
W 75	**P100 B14**	28	31.3	8	160	130	110	10	8.5	120	9.5	BN 100	307	195

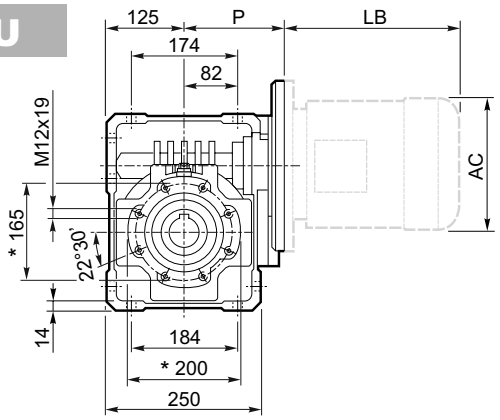
⋆ On both sides # Reduced flange

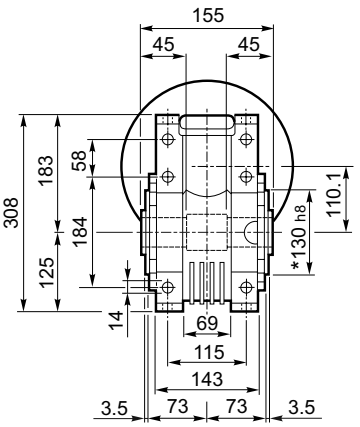


W 86_												BN_2D	
		M	M1	M2	N	N1	N2	N3	N4	P	Kg	IEC	LB	AC
W 86	**P71 B5**	14	16.3	5	160	13 0	110	11	9	128	13.6	BN 71	219	138
W 86	**P80 B5**	19	21.8	6	200	165	130	12	11.5	128	13.8	BN 80	234	156
W 86	**P90 B5**	24	27.3	8	200	165	130	12	11.5	128	13.7	BN 90	276	176
W 86	**P100 B5**	28	31.3	8	250	215	180	13	12.5	136	13.8	BN 100	307	195
W 86	**P80 B14**	19	21.8	6	120	100	80	7.5	6.5	128	13.5	BN 80	234	156
W 86	**P90 B14**	24	27.3	8	140	115	95	7.5	8.5	128	13.5	BN 90	276	176
W 86	**P100 B14**	28	31.3	8	160	130	110	10	8.5	136	13.6	BN 100	307	195

* On both sides

U





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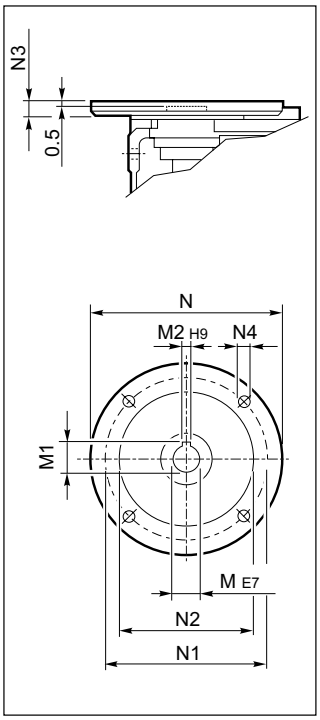

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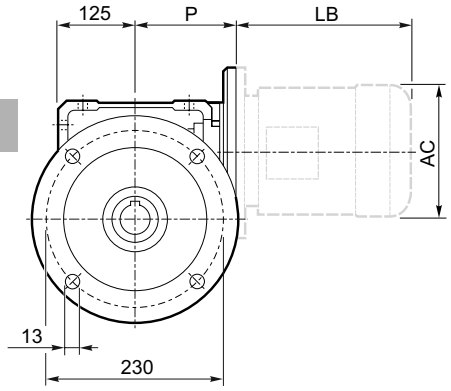

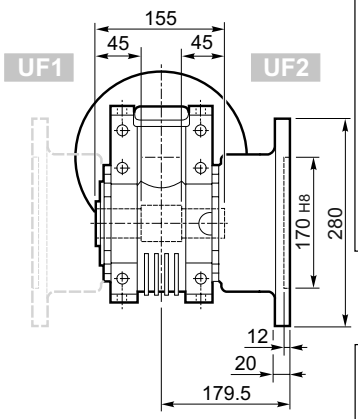

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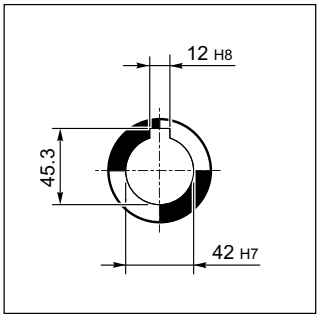

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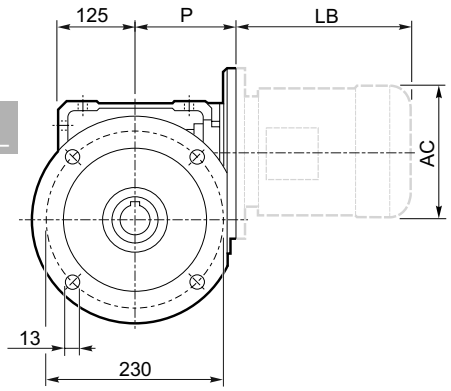
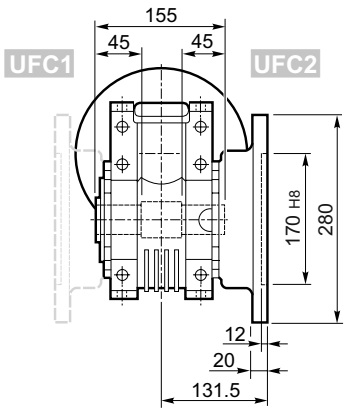
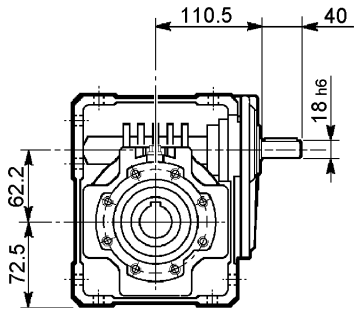


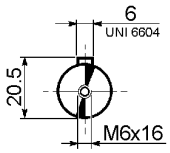


W 110_													BN_2D	
		M	M1	M2	N	N1	N2	N3	N4	P	Kg	IEC	LB	AC
W 110	**P80 B5**	19	21.8	6	200	165	130	—	M10x12	143	38	BN 80	234	156
W 110	**P90 B5**	24	27.3	8	200	165	130	—	M10x12	143	38	BN 90	276	176
W 110	**P100 B5**	28	31.3	8	250	215	180	13	13	151	39	BN 100	307	195
W 110	**P80 B14**	19	21.8	6	120	100	80	7.5	7	143	38	BN 80	234	156
W 110	**P90 B14**	24	27.3	8	140	115	95	6.5	9	143	38	BN 90	276	176
W 110	**P100 B14**	28	31.3	8	160	130	110	13	9	151	38	BN 100	307	195

⋆ On both sides

W63





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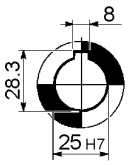
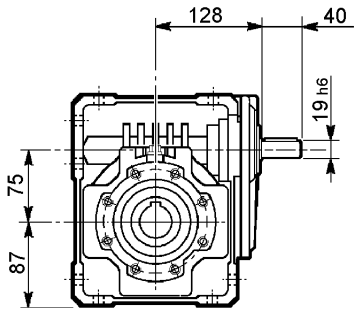
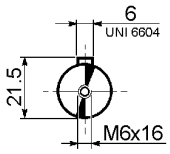


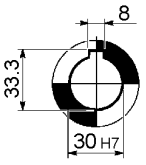
OUTPUT

W75

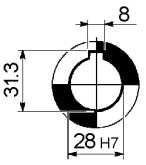




INPUT



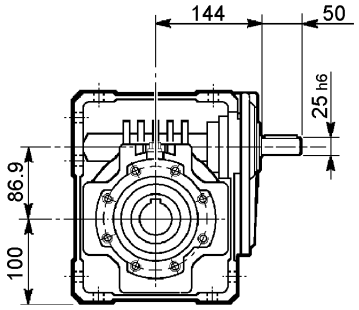
D30

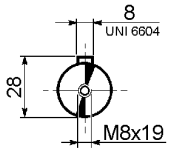


D28

OUTPUT

W86





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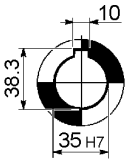
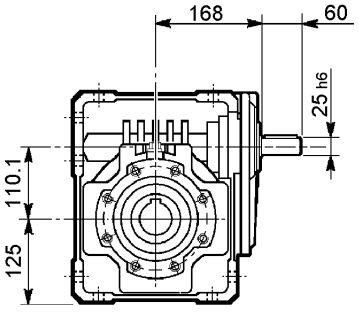
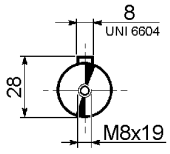


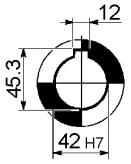
OUTPUT

W110





INPUT



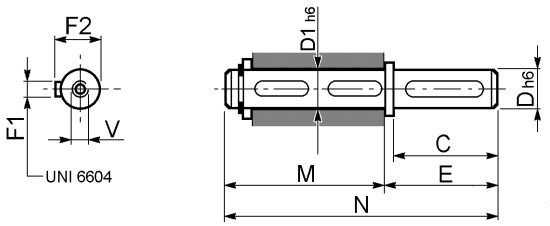
OUTPUT

Dimensions common to the other configurations can be found from page 39 to 46.

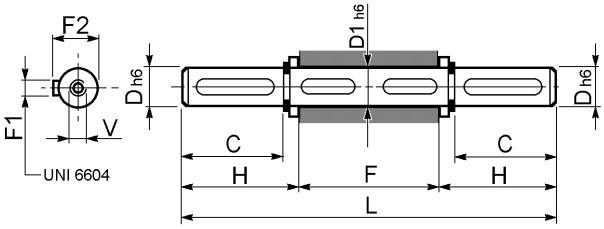
2.10 - ACCESSORIES

Plug-in solid output shaft

Single output shaft

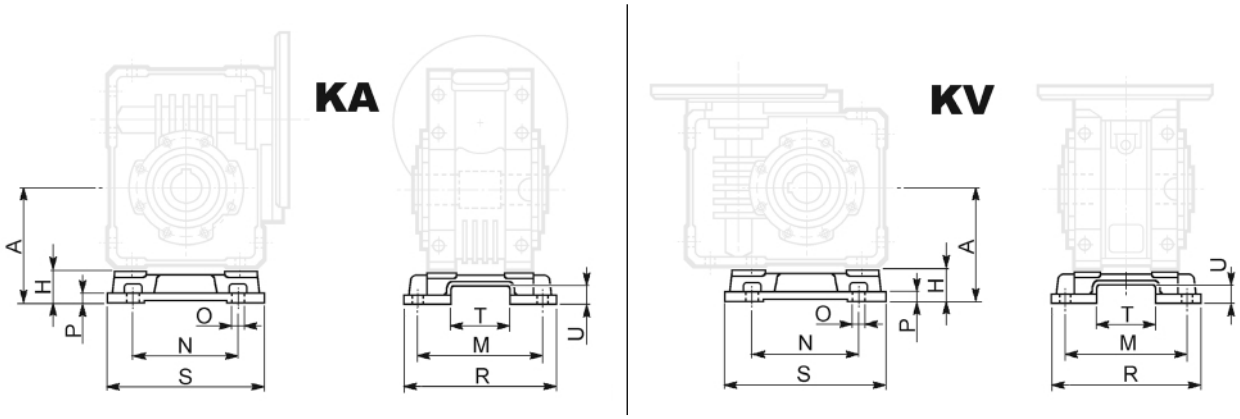


Double output shaft



	C	D	D1	E	H	L	M	N	F1	F2	V
VF 30	30	14	14	35	32.5	120.0	61	96	5	16.0	M5x13
VF 44	40	18	18	45	42.7	149.4	70	115	6	20.5	M6x16
VF 49	60	25	25	65	63.2	208.4	89	154	8	28.0	M8x20
W 63	60	25	25	65	63.2	246.4	127	192	8	28.0	M8x19
W 75	60	28	30	65	64.0	255.0	134	199	8	31.0	M8x20
W 75	60	30	30	65	64.0	255.0	134	199	8	33.0	M10x22
W 86	60	35	35	65	64.0	268.0	149	214	10	38.0	M10x22
W 110	75	42	42	80	79.3	313.5	164	244	12	45.0	M12x28

Interchangeable foot kit for VF gear units



	A	H	M	N	O	P	R	S	T	U
W 63	100	27.5	111	95	11	8	135	145	56.5	15.5
W 75	115	28.0	115	120	11	9	139	174	56.5	15.5
W 86	142	42.0	146	140	11	11	170	200	69.0	20
W 110	170	45.0	181	200	13	14	210	250	69.0	20

2.11 DECLARATION OF CONFORMITY

BONFIGLIOLI RIDUTTORI S.p.A.
Via Giovanni XXIII, 7/a
40012 Lippo di Calderara di Reno
Bologna (Italy)
Tel. +39 051 6473111
Fax +39 051 6473126
bonfiglioli@bonfiglioli.com
www.bonfiglioli.com
Company Certified UNI EN ISO 9001:2000

CERTIFICATE OF COMPLIANCE (according to EC Directive 94I9/CE Annex VIII)

BONFIGLIOLI RIDUTTORI S.p.A.
declares under its own responsibility that the following products:
- helical-bevel gear units type **A**
- helical in-fine gear units type **C**
- worm gear units type **VF** and **W**
- helical shaft-mounted units type **F**

in category **2G** and **2D** to which this certificate refers, are in compliance with the requirements of the following Directive:

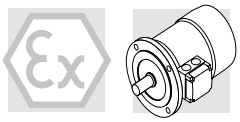
94/9/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL of 23 March 1994
Conformity with the provisions of this Directive is proven by complete compliance to the following Standards:

EN 1127-1, EN 13463-1, prEN 13463-5, prEN 13463-8

BONFIGLIOLI RIDUTTORI filed the documents according to 94/9IEC Annex VIII, with the following notified body:
TÜV PRODUCT SERVICE GmbH- Identification number 0123

Lippo di Calderara di Reno, 27/11/2003
Place and date

Ing. Enzo Cognigni
R&D Manager



3 ATEX MOTORS

3.1 SYMBOLS AND UNITS OF MEASUREMENT

cosφ	-	Power factor
η	-	Efficiency
I_N	[A]	Rated current
I_S	[A]	Locked rotor current
J_M	[Kgm^2]	Moment of inertia
M_A	[Nm]	Mean breakaway torque
M_N	[Nm]	Rated torque
M_S	[Nm]	Starting torque
n	[min^{-1}]	Rated speed
P_n	[kW]	Motor rated power
T_a	[°C]	Ambient temperature

3.2 GENERAL CHARACTERISTICS

3.2.1 PRODUCTION RANGE

Motors described in this catalogue are designed and manufactured for use in industrial applications andare suitable for installation in ambients with the presence of potentially explosive dusty atmospheres, according to EN 50281 with type of protection Ex II 2D 125 °C (combustible dust).
The electrical construction complies with the harmonizedNorms EN 50014 andEN 50281-1-1 as well as with the requirements of Directive 94/9/EC.
Motors are three-phase, asynchronous type, with cage rotor and are available in the base versions IMB5, IMB14 and their derivatives. The present catalogue also describes the features and ratings of compact motors **Series M**, designed for direct combination with the speed reducers.

Catalogue ratings refer to motors operating in the following conditions:

- Service S1
- Power supply
- Degree of protection IP65
- Insulation class F
- Ambient temperature: min. -20, max +40 °C
- Altitude $\leqslant$ 1000 m a.s.l.

3.2.2 DIRECTIVES 73/23/EEC (LVD) and 89/336/EEC (EMC)

BN motors comply with the requirements of Directives 73/23/EEC (Low Voltage Directive) and 89/336/EEC (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 Sect. 12, EN 50081, EN50082.
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.

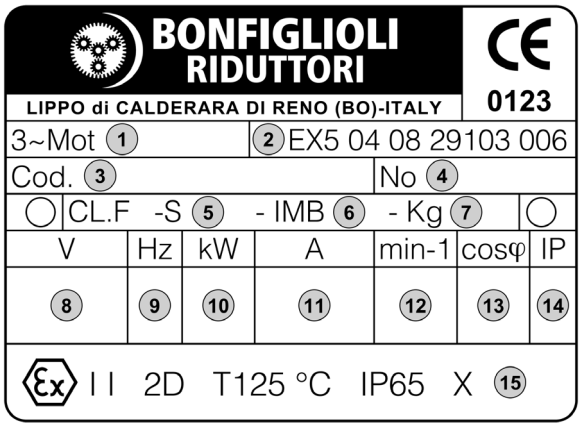
3.2.3 STANDARDS

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

Title	EN
General requirements for rotating electrical machines	EN 60034-1
Electrical apparatus for potentially explosive atmospheres – General requirements	EN 50014
Electrical apparatus for use in the presence of combustible dust Part 1-1: Electrical apparatus protected by enclosures – Construction and testing	EN 50281-1-1
Electrical apparatus for use in the presence of combustible dust Part 1-2: Electrical apparatus protected by enclosures – Selection, installation and maintenance	EN 50281-1-2
Terminal markings and direction of rotation of rotating machines	EN 60034-8
Methods of cooling for electrical machines	EN 60034-6
Dimensions and output ratings for rotating electrical machines	EN 50347
Classification of degree of protection provided by enclosures for rotating machines	EN 60034-5
Noise limits	EN 60034-9
Classification of type of construction and mounting arrangements	EN 60034-7
Vibration level of electrical machines	EN 60034-14

3.2.4 PRODUCT IDENTIFICATION

The name plate shown here under is fitted on the electric motor. The name plate carries the necessary information for the correct use of the motor.



1) Type of motor
2) n° of the ATEX certificate
3) Product code number and production batch
4) Year of production and serial number
5) Type of duty
6) Mounting (barring motors series M)
7) Weight of motor
8) Rated voltage and relevant wiring
9) Rated frequency
10) kW rating
11) Rated current
12) Rated speed
13) Power factor
14) Degree of protection
15) Specific ATEX marking

CE
0123 CE marking certifying the conformity of the product to the applicable European Directives. The number listed underneath identifies the nominated authority TÜV Produkt Service GmbH.

Marking designating the applicable explosion protection.

II 2D Group II, category 2, for potentially explosive dusty atmosphere.

T 125 °C Maximum surface temperature 125 °C.

IP65 Degree of protection for the enclosure.

3.2.5 TOLERANCES

The following tolerances are permitted according to CEI EN 60034-1:

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

(*) ± 30% for motors with Pn < 1kW

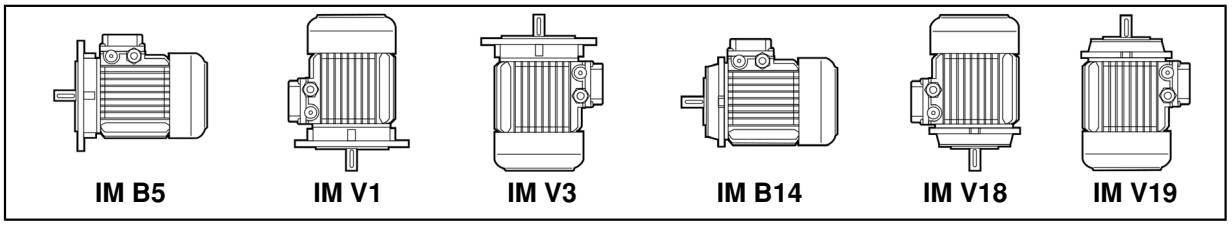
3.3 MECHANICAL FEATURES

3.3.1 MOTOR MOUNTING

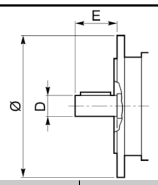
IEC-normalised BN motors are available in the design versions indicated in table (A30) as per Standards CEI
EN 60034-14.

Mounting versions are:
IM B5 (basic)
IM V1, IM V3 (derived)
IM B14 (basic)
IM V18, IMV19 (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.



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



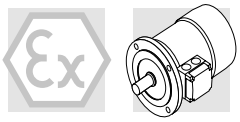
	BN 71	BN 80	BN 90	BN 100
	D x E - Ø			
B5R (1)	11 x 23 - Ø 140	14 x 30 - Ø 160	19 x 40 - Ø 200	24 x 50 - Ø 200
B14R (2)	11 x 23 - Ø 90	14 x 30 - Ø 105	19 x 40 - Ø 120	24 x 50 - Ø 140

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

3.3.2 DEGREE OF PROTECTION

In their execution Ex II 2D 125 °C BN and M motors feature, as standard, the IP65 degree of protection. 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**).

		IP65	IP55
BN - Ex II 2D 125°C	**M - Ex II 2D 125°C**	default	⊖



3.3.3 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 installation must ensure a minimum clearance of 50 mm between fan cowl and the nearest wall, in order to provide for an unobstructed air flow and permitting removal of the motor, should the circumstance be required.

3.3.4 DIRECTION OF ROTATION

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

3.3.5 NOISE LEVEL

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

3.3.6 VIBRATIONS AND BALANCING

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

Vibration class	Angular velocity n [min^{-1}]	Limits of the vibration velocity [mm/s] **BN 63...BN 100 M05...M3**
N	$600 \leqslant n \leqslant 3600$	1.8
R	$600 \leqslant n \leqslant 1800$	0.71

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

3.3.7 TERMINAL BOX

Terminal board features 6 studs for eyelet terminal connection. A ground terminal is supplied for earthing or equipotential bonding of the connection facilities. A second terminal for earthing or bonding of the protective conductor is fitted externally to the motor (section of conductor $\geqslant$ 4 mm^2). Number and type of terminals are shown in the following table.
Wiring instructions are provided either in the box or in the user manual.

		No. of terminals	Terminals threads	Wire cross section area [mm^2]
BN 63...BN 71	**M05, M1**	6	M4	2.5
BN 80, BN 90	**M2**	6	M4	2.5
BN 100	**M3**	6	M5	6

3.3.8 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.

		Cable entry
BN 63	**M05**	2 x M20 x 1.5
BN 71	**M1**	2 x M25 x 1.5
BN 80, BN 90	**M2**	2 x M25 x 1.5
BN 100	**M3**	2 x M32 x 1.5
		2 x M25 x 1.5

As standard, motors are supplied without cable glands and with cable entries closed by blank plugs compliant with Norm EN 50014. On installing the motors ATEX-compliant cable glands must be used. These must feature the same degree of protection of the motor, or greater.

3.3.9 BEARINGS

Life lubricated preloaded radial ball bearings are used, types are shown in the chart here under.
L10h lifetime of bearings, calculated according to Norm ISO 281, is.

- **serie BN**: in excess of 40000 hours in the absence of loads applying radially on the shaft
- **serie M**: in excess of 5000 hours, based on the maximum loading generated by the gearing when matched to the correspondent gear unit (refer to sales catalogues of BONFIGLIOLI gearmotors).

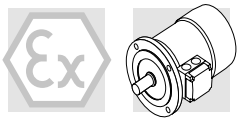
DE = drive end
NDE = non drive end

	**DE**	**NDE**		**DE**	**NDE**
M05	6004 2Z C3	6201 2RS C3	**BN 63**	6201 2RZ C3	6201 2RS C3
M1	6004 2Z C3	6202 2RS C3	**BN 71**	6202 2RZ C3	6202 2RS C3
M2	6007 2Z C3	6204 2RS C3	**BN 80**	6204 2RZ C3	6204 2RS C3
M3	6207 2Z C3	6206 2RS C3	**BN 90**	6205 2RZ C3	6205 2RS C3
			BN 100	6206 2RZ C3	6206 2RS C3

3.4 ELECTRICAL CHARACTERISTICS

3.4.1 VOLTAGE / FREQUENCY

Motors are designed for direct mains supply and, in their standard execution, to be connected 230V Δ / 400V Y, 50Hz with a ± 10% tolerance applying to voltage. In addition to nominal voltage-frequency values the name plate also shows voltage ranges the motor can operate under:
220 - 240V Δ
380 - 415V Y / 50 Hz.
As per Norms CEI EN 60034-1 on above voltage values the ±5% tolerance applies.
Other executions with max. input voltage 600V may be available on request.



3.4.2 ISULATION CLASS

CLF

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

CLH

Motors manufactured in insulation class H are available at request.
In standard motors, stator windings over temperature normally stays below the 80 K limit corresponding to class B over temperature.
A careful selection of insulating components makes the motors compatible with tropical climates and normal vibration.
For applications involving the presence of aggressive chemicals or high humidity, contact Bonfiglioli Engineering for assistance with product selection.

3.4.3 TYPE OF DUTY

Motors described in this catalogue are rated for continuous duty S1, with mains supply and operating conditions as specified by the Norm EN 60034-1.

3.5 MODIFICATIONS

3.5.1 VIBRATIONS AND BALANCING

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

RV

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

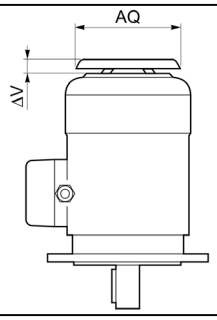
Vibration class	Synchronous speed	Limits of the vibration velocity (mm/s)	
		63 < H ⩽ 132	**132 < H ⩽ 200**
N	600 < n < 3600	1.8	2.8
R	600 < n < 1800	0.71	1.12
	1800 < n < 3600	1.12	1.8

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

3.5.2 DRIP COVER

RC

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

		**AQ**	**∆V**	
BN 63	**M05**	118	24	
BN 71	**M1**	134	27	
BN 80	**M2**	134	25	
BN 90	**-**	168	30	
BN 100	**M3**	168	28	

3.5.3 SECOND SHAFT EXTENSION

PS

Motors carrying this modification cannot be fitted with the drip cover (option RC).
As a consequence, the IM V1 vertical mounting (shaft pointing downwards) is not permitted for motors featuring the second shaft extension.

3.6 MOTOR RATING CHARTS

3.6.1 BN - Ex II 2D 125°C (1500 min^{-1})

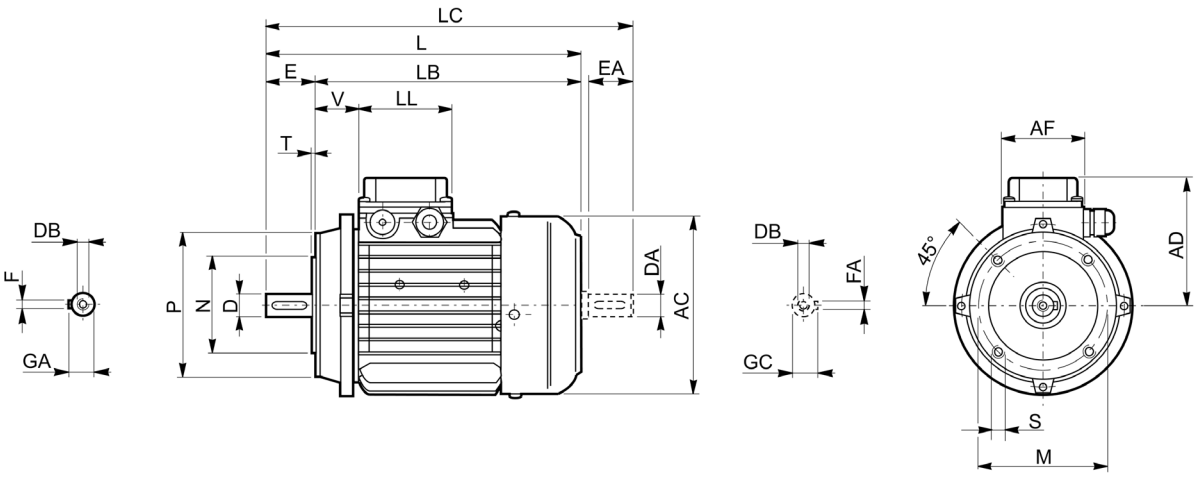
Pn kW		n min^{-1}	Mn Nm	η %	cosφ	In A (400V)	Is/In	Ms/Mn	Ma/Mn	Jm x10^{-4} kgm^2	IMB5 Kg
0.12	**BN63A 4**	1310	0.88	51	0.68	0.5	2.6	1.9	1.8	2	3.5
0.18	**BN63B 4**	1320	1.3	53	0.68	0.72	2.6	2.2	2	2.3	3.9
0.25	**BN63C 4**	1320	1.81	60	0.69	0.87	2.7	2.1	1.9	3.3	5.1
0.25	**BN71A 4**	1375	1.74	62	0.77	0.76	3.3	1.9	1.7	5.8	5.1
0.37	**BN71B 4**	1370	2.6	65	0.77	1.07	3.7	2	1.9	6.9	5.9
0.55	**BN71C 4**	1380	3.8	69	0.74	1.55	4.1	2.3	2.3	9.1	7.3
0.55	**BN80A 4**	1390	3.8	72	0.77	1.43	4.1	2.3	2	15	8.2
0.75	**BN80B 4**	1400	5.1	75	0.78	1.85	4.9	2.7	2.5	20	9.9
1.1	**BN80C 4**	1400	7.5	75	0.79	2.68	5.1	2.8	2.5	25	11.3
1.1	**BN90S 4**	1400	7.5	73	0.77	2.82	4.6	2.6	2.2	21	12.2
1.5	**BN90LA 4**	1410	10.2	77	0.77	3.7	5.3	2.8	2.4	28	13.6
1.85	**BN90LB 4**	1400	12.6	77	0.78	4.4	5.2	2.8	2.6	30	15.1
2.2	**BN100LA 4**	1410	14.9	78	0.76	5.4	4.5	2.2	2	40	18.3
3	**BN100LB 4**	1410	20	80	0.78	6.9	5	2.3	2.2	54	22

3.6.2 M - Ex II 2D 125°C (1500 min^{-1})

Pn kW		n min^{-1}	Mn Nm	η %	cosφ	In A (400V)	Is/In	Ms/Mn	Ma/Mn	Jm x10^{-4} kgm^2	IMB5 Kg
0.12	**M05A 4**	1310	0.88	51	0.68	0.5	2.6	1.9	1.8	2	3.2
0.18	**M05B 4**	1320	1.3	53	0.68	0.72	2.6	2.2	2	2.3	3.6
0.25	**M05C 4**	1320	1.81	60	0.69	0.87	2.7	2.1	1.9	3.3	4.8
0.37	**M1SD 4**	1370	2.6	65	0.77	1.07	3.7	2	1.9	6.9	5.5
0.55	**M1LA 4**	1380	3.8	69	0.74	1.55	4.1	2.3	2.3	9.1	6.9
0.75	**M2SA 4**	1400	5.1	75	0.78	1.85	4.9	2.7	2.5	20	9.2
1.1	**M2SB 4**	1400	7.5	75	0.79	2.68	5.1	2.8	2.5	25	10.6
1.5	**M3SA 4**	1410	10.2	78	0.77	3.6	4.6	2.1	2.1	34	15.5
2.2	**M3LA 4**	1410	14.9	78	0.76	5.4	4.5	2.2	2	40	17
3	**M3LB 4**	1410	20	80	0.78	6.9	5	2.3	2.2	54	21

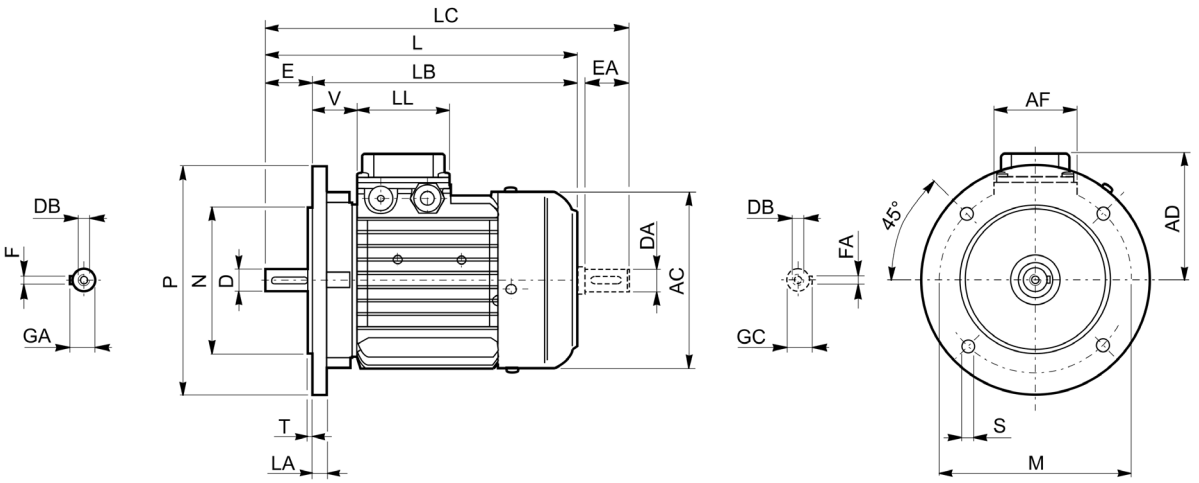
3.7 MOTORS DIMENSIONS

3.7.1 BN - IMB14



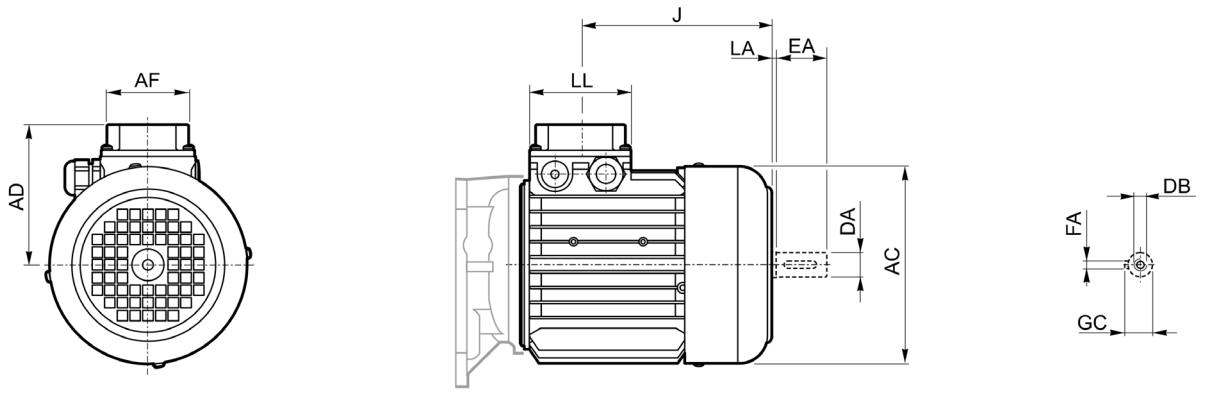
	Shaft					Flange					Motor							
	D DA	**E EA**	**DB**	**GA GC**	**F FA**	**M**	**N**	**P**	**S**	**T**	**AC**	**L**	**LB**	**LC**	**AD**	**AF**	**LL**	**V**
BN63_2D	11	23	M4	12.5	4	75	60	90	M5	2.5	121	215	192	240	95	74	80	26
BN71_2D	14	30	M5	16	5	85	70	105	M6	2.5	138	254	224	286	108	74	80	37
BN80_2D	19	40	M6	21.5	6	100	80	120	M6	3	156	276	236	318	119	74	80	38
BN90_2D	24	50	M8	27	8	115	95	140	M8	3	176	326	276	378	133	98	98	44
BN100_2D	28	60	M10	31	8	130	110	160	M8	3.5	195	370	310	472	142	98	98	50

3.7.2 BN - IMB5



	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**
BN63_2D	11	23	M4	12.5	4	115	95	140	9.5	3	10	121	207	184	240	95	74	80	26
BN71_2D	14	30	M5	16	5	130	110	160	9.5	3	10	138	249	219	286	108	74	80	37
BN80_2D	19	40	M6	21.5	6	165	130	200	11.5	3.5	11.5	156	274	234	318	119	74	80	38
BN90_2D	24	50	M8	27	8	165	130	200	11.5	3.5	11.5	176	326	276	378	133	98	98	44
BN100_2D	28	60	M10	31	8	215	180	250	14	4	14	195	367	307	432	142	98	98	50

3.7.3 M



	AC	AD	AF	LL	J	DA	EA	LA	DB	GC	FA
M05_2D	121	95	74	80	117	11	23	3	M4	12.5	4
M1S_2D	138	108	74	80	118	14	30	2	M5	16	5
M1L_2D	138	108	74	80	142	14	30	2	M5	16	5
M2S_2D	156	119	74	80	152	19	40	3	M6	21.5	6
M3S_2D	195	142	98	98	176.5	28	60	3	M10	31	8
M3L_2D	195	142	98	98	208.5	28	60	3	M10	31	8

3.8 DECLARATION OF CONFORMITY

BONFIGLIOLI RIDUTTORI S.p.A.
Via Giovanni XXIII, 7/a
40012 Lippo di Calderara di Reno
Bologna (Italy)
Tel. +39 051 6473111
Fax +39 051 6473126
bonfiglioli@bonfiglioli.com
www.bonfiglioli.com
Company Certified UNI EN ISO 9001:2000

CERTIFICATE OF COMPLIANCE (according to EC Directive 94I9/CE)

BONFIGLIOLI RIDUTTORI S.p.A.
declares under its own responsibility that the 3-phase electric motors:
- **BN** series, sizes 63 - 100 (4 pole)
- **M** series, sizes M05 - M3 (4 pole)

Group **II**, category **2D**, maximum surface temperature **T 125°C** (TÜV PRODUCT SERVICE 0123 -N° EX5 04 08 29103 006) to which this declaration refers, are in conformity with the requirements of the following Directive:

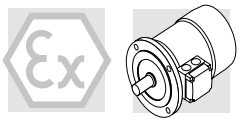
94/9/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL of 23 March 1994
Conformity with the provisions of this Directive is proven by complete compliance to the following Standards:

EN 60034-1, EN 50281-1-1, EN 50014

BONFIGLIOLI RIDUTTORI S.p.A. keeps at the disposal of the national authorise the documents according to Directive 94/9/EC.

Lippo di Calderara di Reno, 27/11/2003
Place and date

Ing. Enzo Cognigni
R&D Manager



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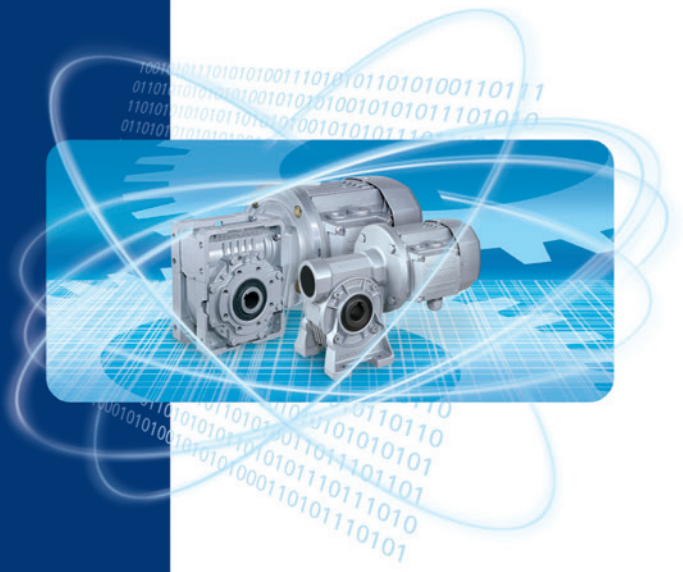

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