INDUSTRY PROCESS
AND AUTOMATION SOLUTIONS

BONFIGLIOLI
RIDUTTORI

VF
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GB

BONFIGLIOLI

GENERAL INFORMATION

Chapter **Contents**

WORM GEAR UNITS FOR POTENTIALLY EXPLOSIVE ATMOSPHERES

Revisions
Refer to page 36 for the catalogue revision index.
Visit www.bonfiglioli.com to search for catalogues with up-to-date revisions.

1.0 - 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:

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

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.

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:

$$M_{c2} = M_{r2} \times f_s \times f_{tp}$$

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:

$$R_{c1}[N] = \frac{2000 \times M_1 \times K_R}{d\ [mm]} \quad ; \quad R_{c2}[N] = \frac{2000 \times M_2 \times K_R}{d\ [mm]}$$

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:

$$S = \frac{M_{n2}}{M_2} = \frac{P_{n1}}{P_1}$$

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.

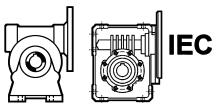
Z_r - **Number** of starts per hour.

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:

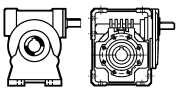
$$\eta_d = \frac{P_2}{P_1}$$

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

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



Gearmotor equipped for coupling to a standard IEC motor.



Gear unit with parallel input shaft.

Danger. May cause slight injury to persons.

2.0 - INTRODUCTION TO THE ATEX DIRECTIVES

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.

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 selected in this catalogue are suitable for installation in zones 1, 21, 2 and 22, as highlighted in grey in the above table.

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, par. 1.5.7).

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.

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)

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.

The areas highlighted in grey indicate the only categories in which BONFIGLIOLI RIDUTTORI products may be used. 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

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

This catalogue describes **series VF and W worm gear units** manufactured by BONFIGLIOLI RIDUTTORI, which are 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).

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.

3.0 - 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.

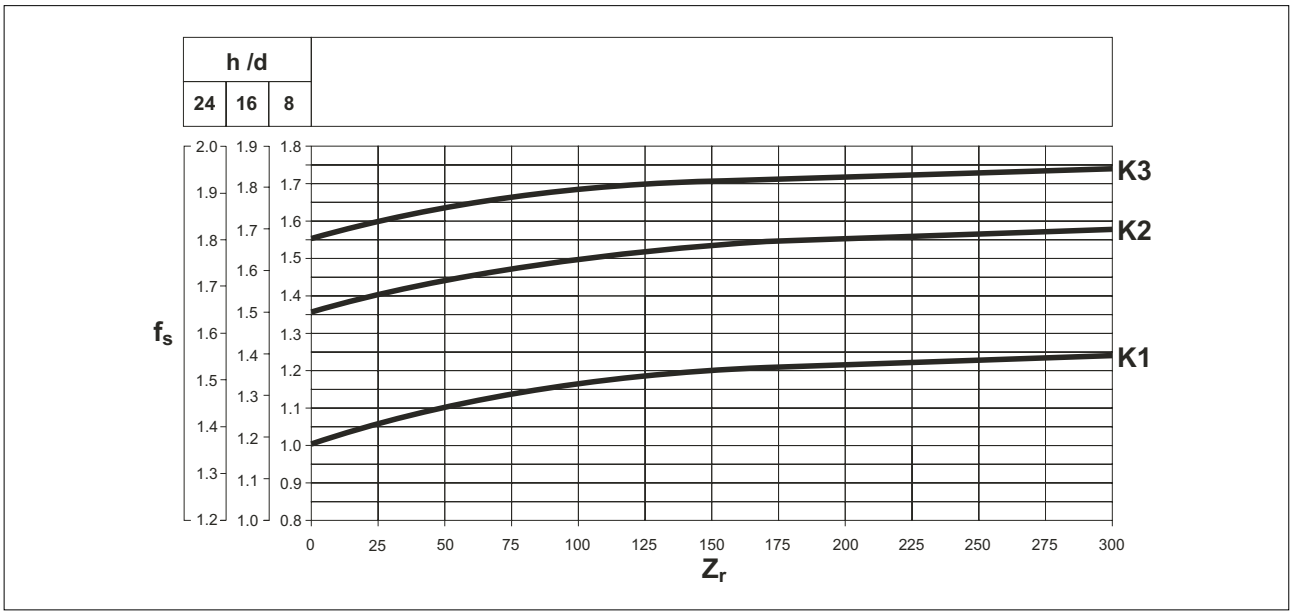
The Manufacturer reserves the right to modify, supplement or improve the Manual, in the interests of the User.

4.0 - SELECTING THE TYPE OF EQUIPMENT

4.1 - Service factor f_s

The service factor is a coefficient which numerically represents the gear unit's intended load, and takes into account although only approximately, the daily work cycle, load variability and any overloads related to the unit's specific application.
The graph below allows the User to obtain the service factor, after selecting the applicable hours of operation per day column, by taking the intersection of the number of starts per hour and one of the curves K1, K2 and K3.
The K_ curves are associated with the type of service (approximately: uniform, medium and heavy duty) by means of the load acceleration factor K, which is a function of the ratio between the inertia of the driven loads and the motor itself.

Independently of the service factor value obtained in this manner, it should be noted that there are applications, such as certain lifting applications, in which failure of one of the gear unit's components, may expose nearby persons to risk of injury.
In case of doubt as to whether the application is characterised by such dangers, please contact the BONFIGLIOLI RIDUTTORI Technical Service.



Z_r = Nr. of starts per hour.

4.2 - Load acceleration factor K

This parameter serves to select the curve for the type of load. The value is given by the ratio:

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

where:

J_c = moment of inertia of the driven load, at the motor shaft

J_m = moment of inertia of the motor

$K \leq 0.25$ – curve **K1** – uniform load

$0.25 < K \leq 3$ – curve **K2** – moderate shock load

$3 < K \leq 10$ – curve **K3** – heavy shock load

For values of $K > 10$ contact BONFIGLIOLI RIDUTTORI Technical Service.

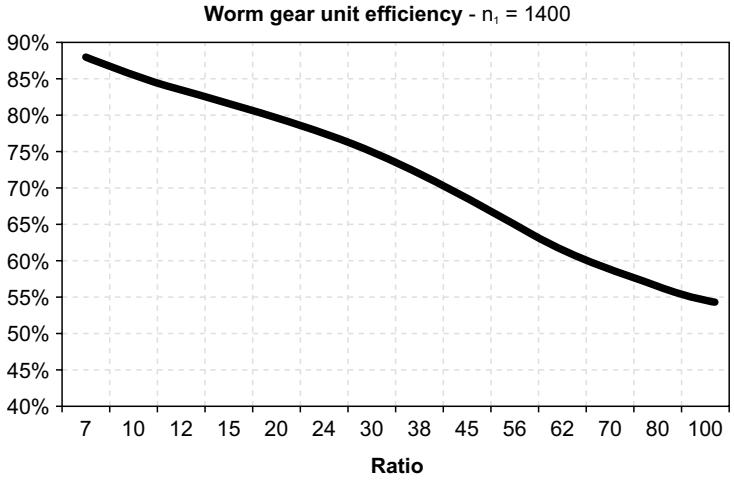
4.3 - Selection procedure:

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:

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

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



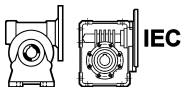
The selection procedure now depends on the type of gear unit, as follows:

a) gear unit equipped with IEC motor fitting

b) gear unit equipped with solid input shaft.

Proceed as follows:

4.3.1 - Gear unit with IEC 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:

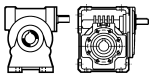
$$Pn_1 \geq Pr_1 \times f_s$$

- 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:

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

4.3.2 - Speed reducer with solid input shaft 

- Calculate the value of the computational torque:

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

where the adjusting factor « f_{tp} » is given in the table below:

f_{tp}				
Helical gear units C, A, F, S	Worm gear units VF, W			
	Type of load	Ambient temperature [°C]		
		20°	**30°**	**40°**
$f_{tp} = 1$	**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:

$$Mn_2 \geq Mc_2$$

4.4 - Post-selection checks

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

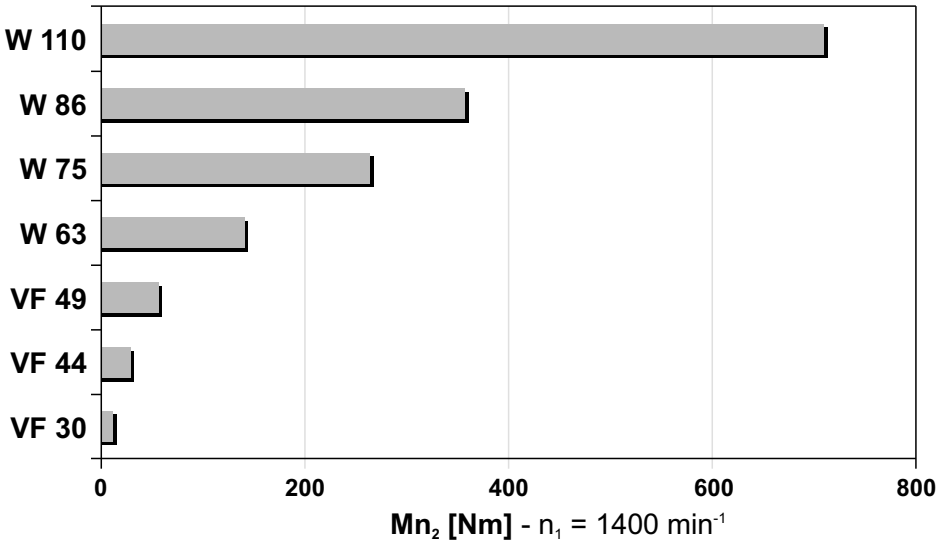
- **Momentary peak torque**
  The momentary peak torque is of the order of 300% of the rated torque Mn_2. Check that the point value of the peak torque satisfies this condition and equip the installation with a torque limiter, if necessary.
- **Radial load**
  The catalogue gives the values of the maximum 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.

4.5 - 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 rpm.
- 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.

5.0 - 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.
- No plastic component parts.
- Nameplate indication of the product category and type of protection.

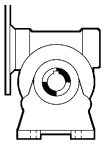
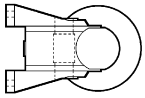
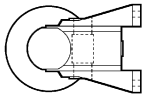
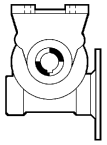
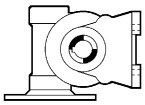
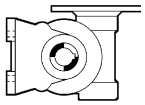


(*) With the exception of gear units: **W110_P(IEC)** in mounting positions **V5** and **V6** and **W110_HS** in position **B3, V5** and **V6**.

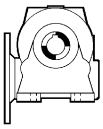
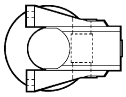
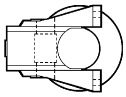
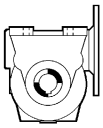
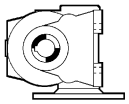
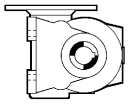
5.1 - Versions and mounting positions

VF Series

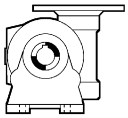
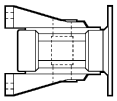
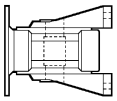
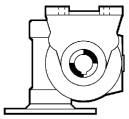
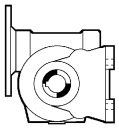
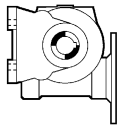
VF□ A

B3	B6	B7	B8	V5	V6
					

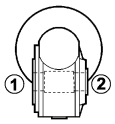
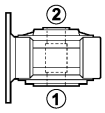
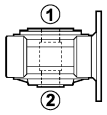
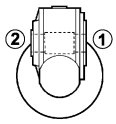
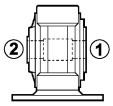
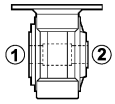
VF□ N

B3	B6	B7	B8	V5	V6
					

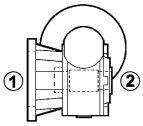
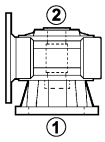
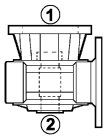
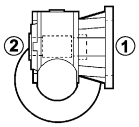
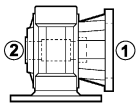
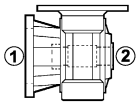
VF□ V

B3	B6	B7	B8	V5	V6
					

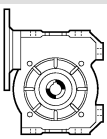
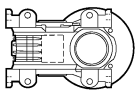
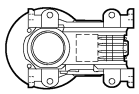
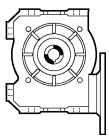
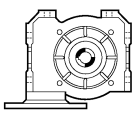
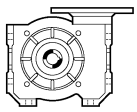
VF□ P

B3	B6	B7	B8	V5	V6
					

VF□ F VF□ FA

B3	B6	B7	B8	V5	V6
					

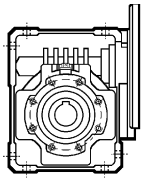
VF□ U

B3	B6	B7	B8	V5	V6
					

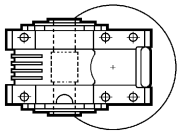
①② Flange location

W□ U

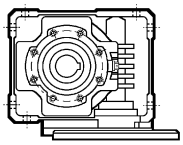
B3



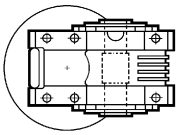
B6



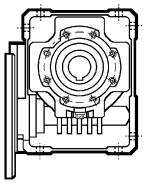
V5



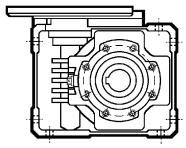
B7



B8

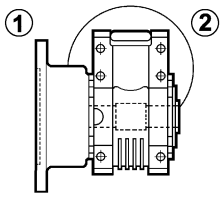


V6

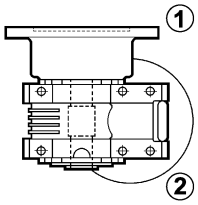


W□ UF W□ UFC W□ FCR

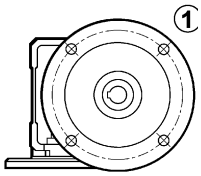
B3



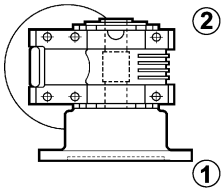
B6



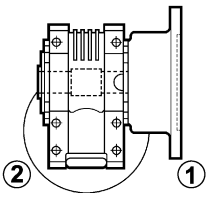
V5



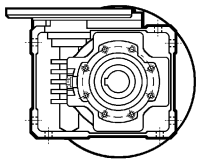
B7



B8



V6



①② Flange location

6.0 - GEAR UNIT DESIGNATION

W 75 U D30 60 P80 B5 B3 2D3D-130

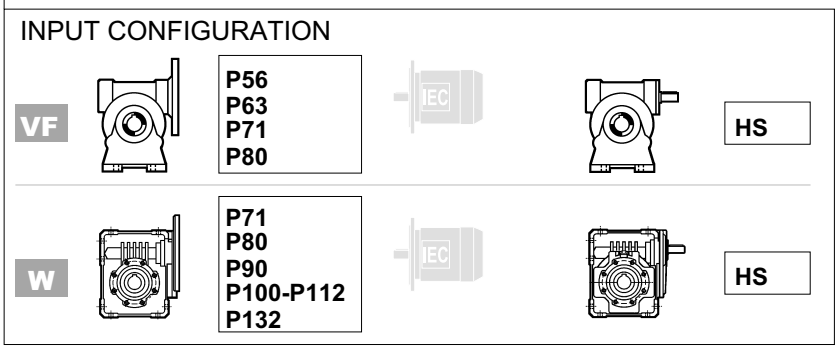
OPTIONS

MOUNTING POSITION
B3 (Default), B6, B7, B8, V5, V6

12

MOTOR MOUNTING
B5, B14

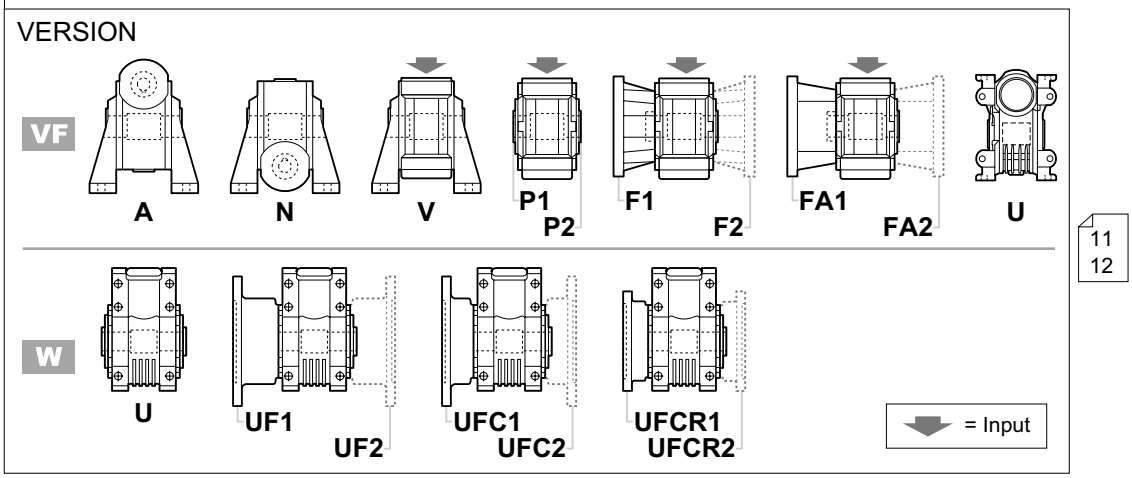
INPUT CONFIGURATION



GEAR RATIO

OUTPUT SHAFT BORE W 75
D30: default ; **D28**: option

VERSION



11
12

GEAR FRAME SIZE
VF: **30, 44, 49** ; W: **63, 75, 86, 110**

PRODUCT SERIES: **VF**; **W** = worm gearbox

6.1 - 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).

7.0 - 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

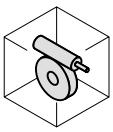
SHELL Tivela oil S 320

Lubricant charge for W gear units

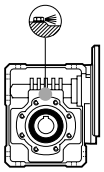
Key:

Filling / breather plug Level plug Drain plug

B3

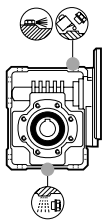


W 63, W 75, W 86



	i	[l]
W 63	7, 10, 12, 15	0.31
	19, 24, 30, 38, 45, 64	0.38
W 75	7, 10, 15	0.48
	30, 40	0.52
	20, 25, 50, 60, 80, 100	0.56
W 86	7, 10, 15	0.64
	30	0.73
	20, 23, 40, 46, 56, 64, 80, 100	0.90

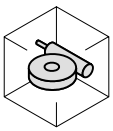
W 110



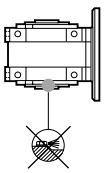
			[l]
	P80...P132		1.50
	HS	7 ≤ i ≤ 15	1.50 (*)
		20 ≤ i ≤ 100	2.70 (*)

(*) Lubricant is not factory filled.

B6

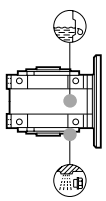


W 63, W 75, W 86



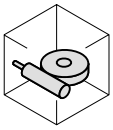
	i	[l]
W 63	7, 10, 12, 15	0.31
	19, 24, 30, 38, 45, 64	0.38
W 75	7, 10, 15	0.48
	30, 40	0.52
	20, 25, 50, 60, 80, 100	0.56
W 86	7, 10, 15	0.64
	30	0.73
	20, 23, 40, 46, 56, 64, 80, 100	0.90

W 110

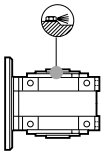


			[l]
	P80...P132		1.65
	HS	7 ≤ i ≤ 15	1.65
		20 ≤ i ≤ 100	1.65

B7

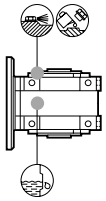


W 63, W 75, W 86



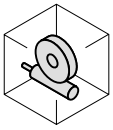
	i	[l]
W 63	7, 10, 12, 15	0.31
	19, 24, 30, 38, 45, 64	0.38
W 75	7, 10, 15	0.48
	30, 40	0.52
	20, 25, 50, 60, 80, 100	0.56
W 86	7, 10, 15	0.64
	30	0.73
	20, 23, 40, 46, 56, 64, 80, 100	0.90

W 110

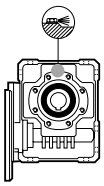


			[l]
	P80...P132		1.65
	HS	7 ≤ i ≤ 15	1.65
		20 ≤ i ≤ 100	1.65

B8

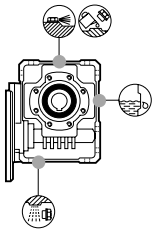


W 63, W 75, W 86



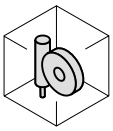
	i	[l]
W 63	7, 10, 12, 15	0.31
	19, 24, 30, 38, 45, 64	0.38
W 75	7, 10, 15	0.48
	30, 40	0.52
	20, 25, 50, 60, 80, 100	0.56
W 86	7, 10, 15	0.64
	30	0.73
	20, 23, 40, 46, 56, 64, 80, 100	0.90

W 110

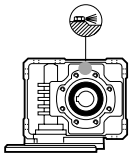


			[l]
	P80...P132		1.90
	HS	7 ≤ i ≤ 15	1.90
		20 ≤ i ≤ 100	1.90

V5

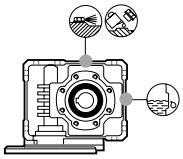


W 63, W 75, W 86



	i	[l]
W 63	7, 10, 12, 15	0.31
	19, 24, 30, 38, 45, 64	0.38
W 75	7, 10, 15	0.48
	30, 40	0.52
	20, 25, 50, 60, 80, 100	0.56
W 86	7, 10, 15	0.64
	30	0.73
	20, 23, 40, 46, 56, 64, 80, 100	0.90

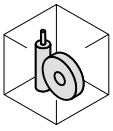
W 110



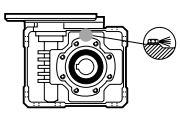
			[l]
	P80...P132		1.70 (*)
	HS	7 ≤ i ≤ 15	1.70 (*)
		20 ≤ i ≤ 100	1.70 (*)

(*) Lubricant is not factory filled.

V6

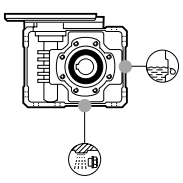


W 63, W 75, W 86



	i	[l]
W 63	7, 10, 12, 15	0.31
	19, 24, 30, 38, 45, 64	0.38
W 75	7, 10, 15	0.48
	30, 40	0.52
	20, 25, 50, 60, 80, 100	0.56
W 86	7, 10, 15	0.64
	30	0.73
	20, 23, 40, 46, 56, 64, 80, 100	0.90

W 110



			[l]
	P80...P132		1.60 (*)
	HS	7 ≤ i ≤ 15	1.60 (*)
		20 ≤ i ≤ 100	1.60 (*)

(*) Lubricant is not factory filled.

8.0 - ADMISSIBLE OVERHUNG LOADS

8.1 - Radial loads

Transmission elements keyed to the input and/or output shafts generate forces whose resultant is perpendicular to the shaft. The value of such forces must be compatible with the ability of the shaft/bearing assembly to withstand them.
In particular, the absolute value of the applied load « **Rc_1** for the input shaft, **Rc_2** for the output shaft » must be less than the admissible value « **Rn_1** for the input shaft, **Rn_2** for the output shaft » indicated in the technical data tables.

The load generated by an external transmission can be calculated, to a good approximation, by the following equations which refer to the input and output shafts respectively:

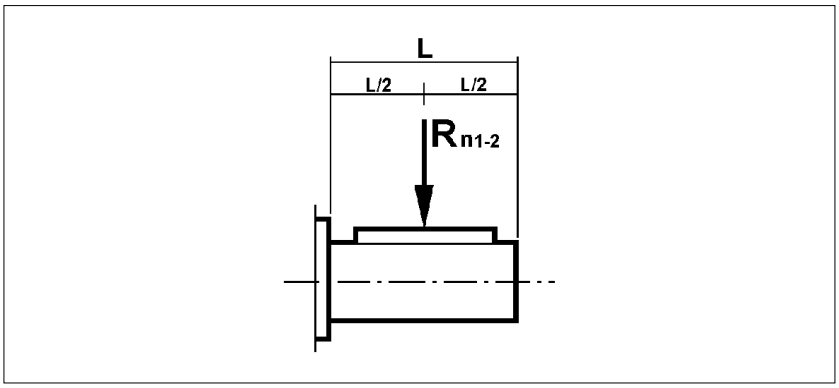
$$R_{c1}[N] = \frac{2000 \times M_1[Nm] \times K_R}{d\ [mm]} \quad ; \quad R_{c2}[N] = \frac{2000 \times M_2[Nm] \times K_R}{d\ [mm]}$$

where:

M [Nm]	torque applied to the shaft
d [mm]	pitch diameter of keyed component
$K_R = 1$	chain transmission
$K_R = 1.25$	gear transmission
$K_R = 1.5\text{-}2.0$	V-belt transmission

The compatibility check will proceed differently depending on the point of application of the load to the shaft, in particular:

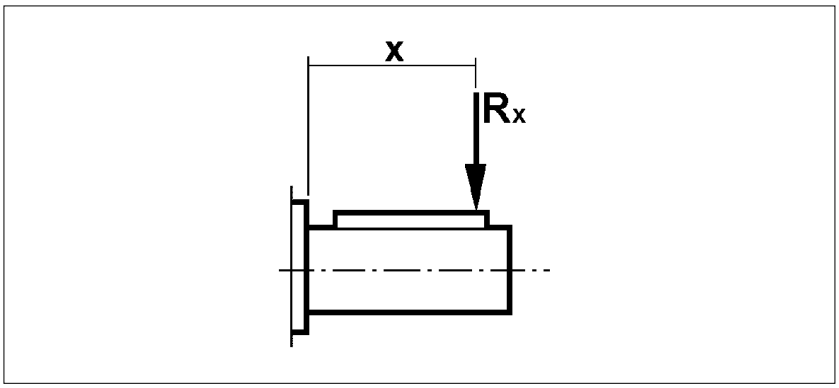
8.1.1 - Midpoint application



The previously calculated load must be compared with the corresponding admissible value given in the catalogue, and the following condition must hold for the loaded shaft:

$$Rc_1 \le Rn_1 \text{ [input shaft]} \quad \text{or} \quad Rc_2 \le Rn_2 \text{ [output shaft]}$$

8.1.2 - Application off the midpoint



When the load is applied at a distance **x** from the shaft shoulder, the admissible value must be adjusted for this distance. The new value is indicated as Rx and can be calculated by the following equation

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

The load location factors **a** and **b** for the gear unit's output shaft are given in the table below:

	a	**b**
VF 30	60	45
VF 44	71	51
VF 49	99	69
W 63	132	102
W 75	139	109
W 86	149	119
W 110	173	136

The following condition must also be verified:

$$R_c \leq R_x$$

8.2 - Thrust loads

The maximum admissible thrust load values for the input shaft « An_1 » and output shaft « An_2 » are obtained from the corresponding admissible radial loads « Rn_1 » and « Rn_2 » respectively, in the ratio given below:

$$A_{n1} = Rn_1 \times 0.2 \quad ; \quad A_{n2} = Rn_2 \times 0.2$$

The admissible thrust loads calculated in this way refer to thrust loads acting at the same time as the rated radial loads.
In the special case that the radial load on the shaft is zero, the admissible thrust load A_n can be taken to be 50% of the corresponding admissible radial load R_n.
If the thrust loads exceed the admissible value, or the thrust loads are far greater than the radial loads, contact the BONFIGLIOLI RIDUTTORI Technical Service for verification.

9.0 - RATING CHARTS

Selection example:

The gear unit can be installed

In zones **21** and **22** with surface temperature limit of **160** °C
In zones **1** and **2** with temperature class limit **T3** (**200** °C)

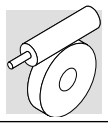
	n_2 min^{-1}	η_s %	η_d %	IEC	n_1 = 1400 min^{-1} Mn_2 Nm	Pn_1 kW	Rn_2 N
VF 44_7	200	71	86	2D3D-160 — 2G3G-T3	29	0.71	1070
VF 44_10	140	66	84		29	0.51	1310
VF 44_14	100	60	81		29	0.37	1540
VF 44_20	70	55	77	2D3D-130 — 2G3G-T4	30	0.29	1760
VF 44_28	50	45	71		30	0.22	2030
VF 44_35	40	42	68		30	0.18	2200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

The gear unit can be installed

In zones **21** and **22** with surface temperature limit of **130** °C
In zones **21** and **22** with surface temperature limit of **160** °C
In zones **1** and **2** with temperature class limit **T4** (**135** °C)
In zones **1** and **2** with temperature class limit **T3** (**200** °C)

	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	2D3D-130 — 2G3G-T4	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		11	0.05	1600				

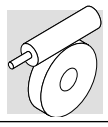
30 Nm VF 44



	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 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 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 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

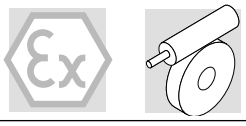
	n_2 min^{-1}	η_s %	η_d %	IEC	n_1 = 1400 min^{-1} Mn_2 Nm	Pn_1 kW	Rn_2 N		n_1 = 1400 min^{-1} Mn_2 Nm	Pn_1 kW	Rn_1 N	Rn_2 N
W 75_7	200	71	90	2D3D-160 — 2G3G-T3	190	4.4	1080	2G3G-T3	190	4.4	750	1080
W 75_10	140	67	88		230	3.8	1960		230	3.8	750	1960
W 75_15	93	60	85	2D3D-130 — 2G3G-T4	250	2.9	2550	2G3G-T4	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 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 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 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 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



10.0 - 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.

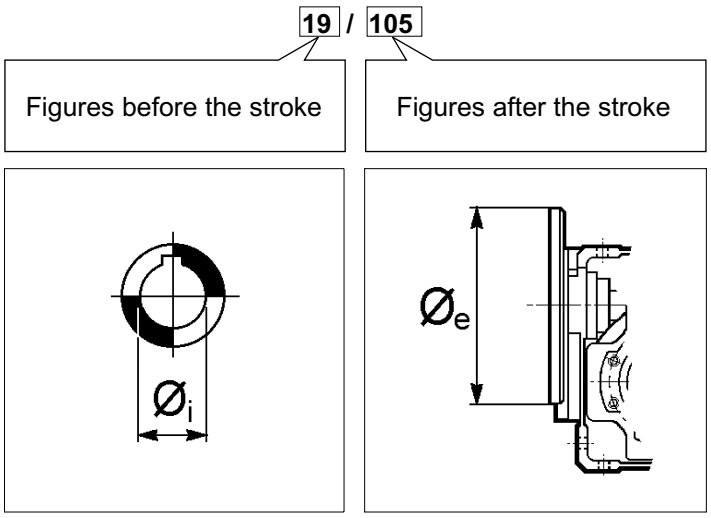
kW		VF 30	VF 44	VF 49	W 63	W 75	W 86	W 110
0.06	**56A 4**	7 ... 70	-	-	-	-	-	-
0.09	**56B 4**	7 ... 20	-	-	-	-	-	-
0.12	**63A 4**	7 ... 15	7 ... 70	7 ... 70	-	-	-	-
0.18	**63B 4**	7 ... 10	7 ... 35	7 ... 70	-	-	-	-
0.25	**71A 4**	-	7 ... 20	7 ... 36	7 ... 64	7 ... 100	7 ... 100	-
0.37	**71B 4**	-	7 ... 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.

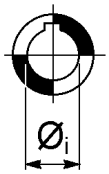
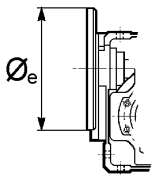
Combinations marked in grey boxes can only be achieved through **IM B5** flanged motors.

10.1 - Hybrid inputs

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		⛔	⛔

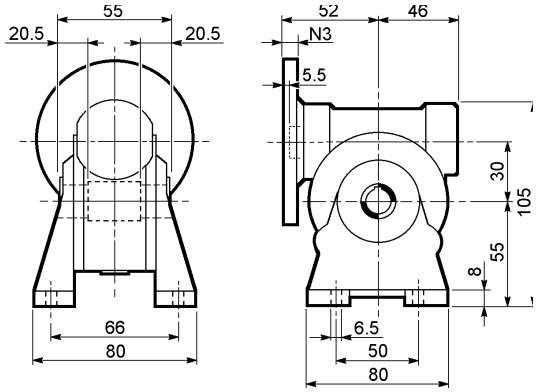
Legend:

⛔ Combination is not available.

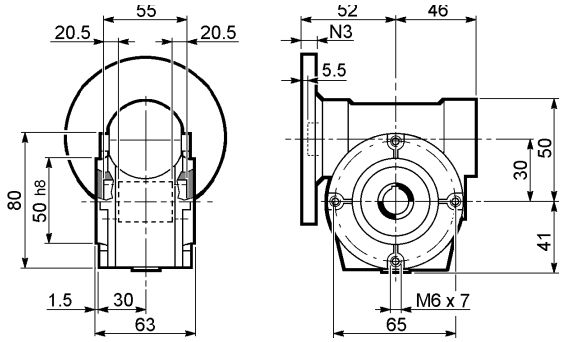
Standard combination.

11.0 - DIMENSIONS

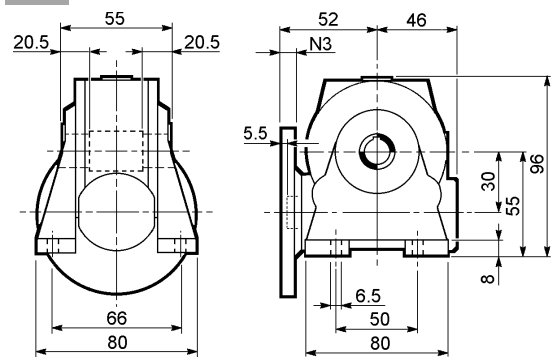
A



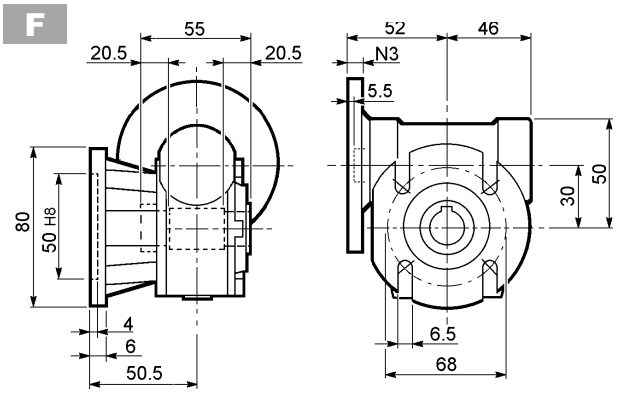
P



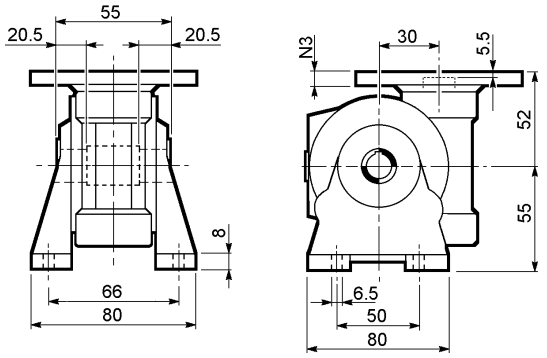
N



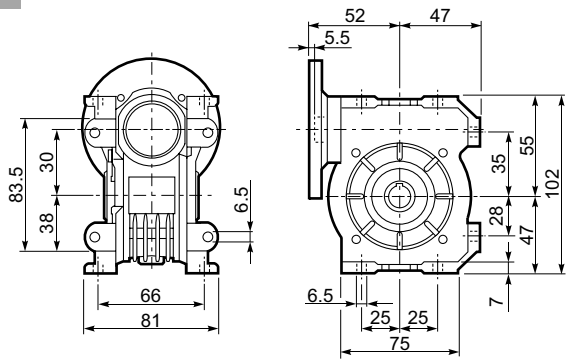
F



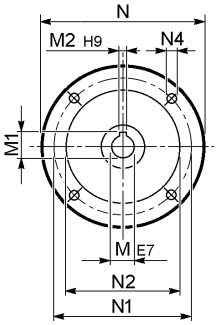
V



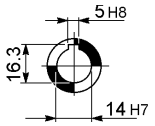
U



INPUT

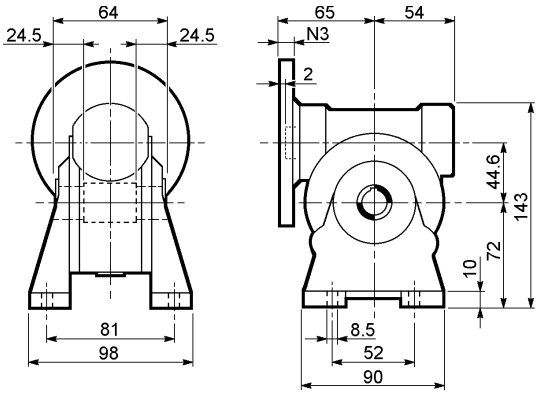


OUTPUT

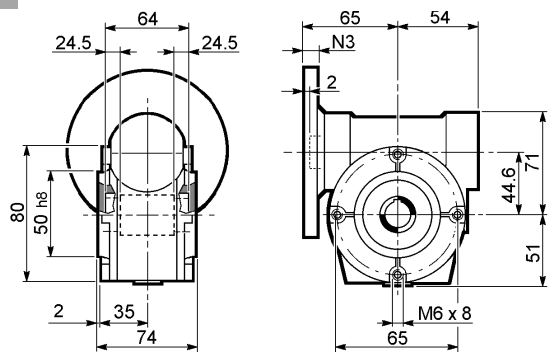


VF 30									
	M	M1	M2	N	N1	N2	N3	N4	Kg
VF 30_P56 B5	9	10.4	3	120	100	80	7	7	1.1
VF 30_P63 B5	11	12.8	4	140	115	95	8	9.5	
VF 30_P56 B14	9	10.4	3	80	65	50	7	5.5	
VF 30_P63 B14	11	12.8	4	90	75	60	6	5.5	

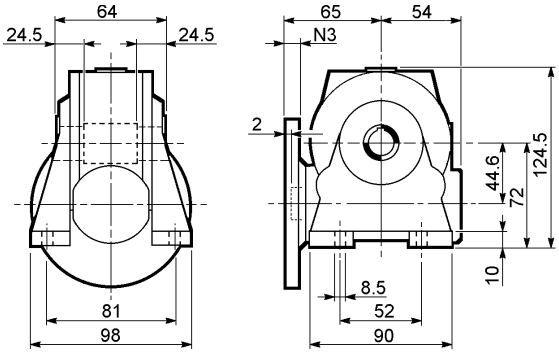
A



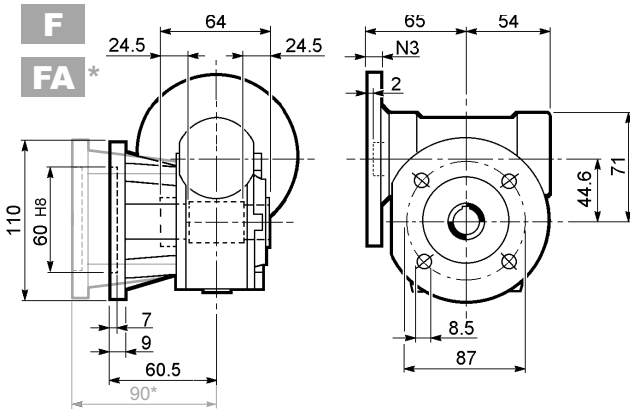
P



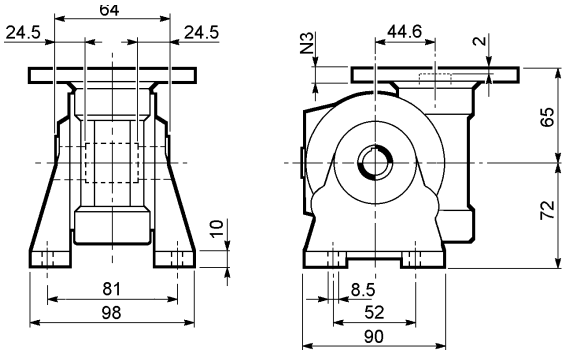
N



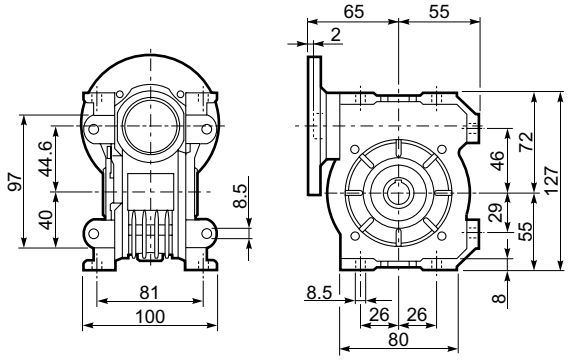
F
FA *



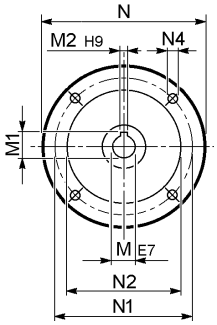
V



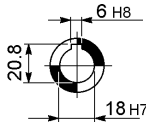
U



INPUT

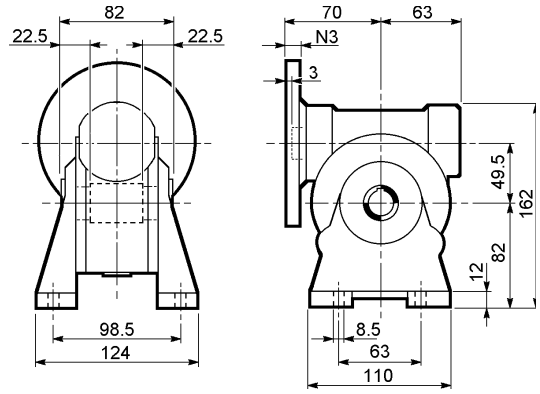


OUTPUT

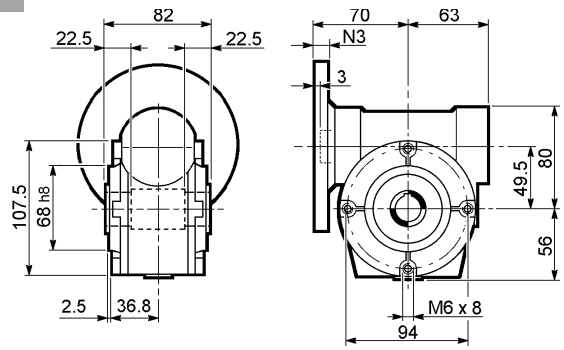


VF 44									
	M	M1	M2	N	N1	N2	N3	N4	Kg
VF 44_P63 B5	11	12.8	4	140	115	95	10	9.5	2.0
VF 44_P71 B5	14	16.3	5	160	130	110	10	9.5	
VF 44_P63 B14	11	12.8	4	90	75	60	8	5.5	
VF 44_P71 B14	14	16.3	5	105	85	70	10	7	

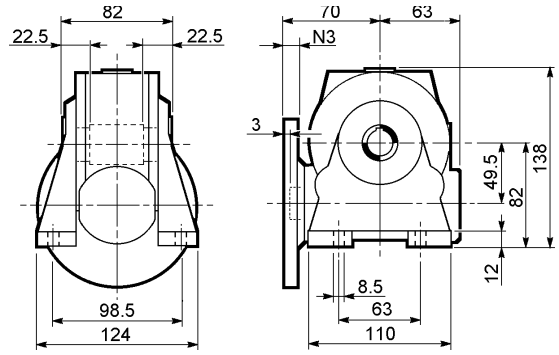
A



P

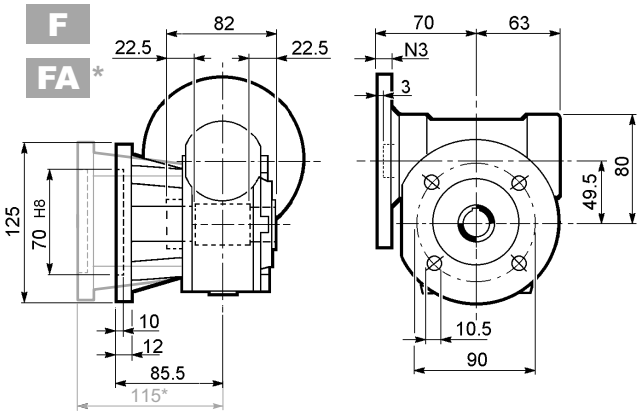


N

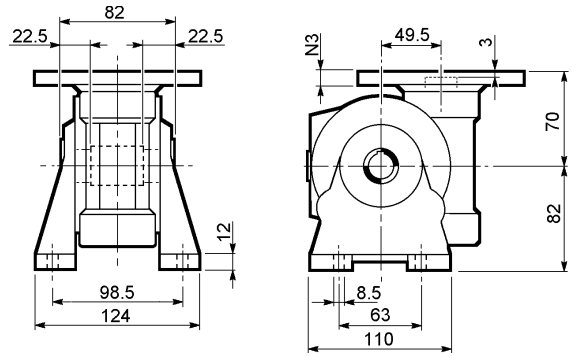


F

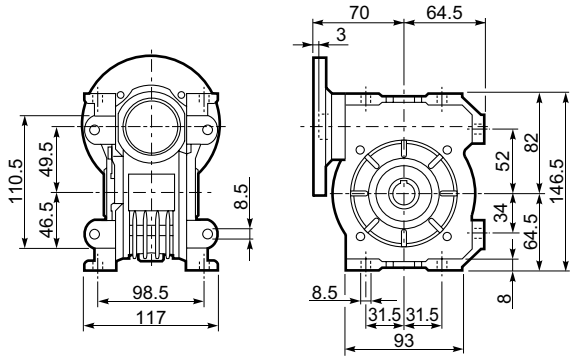
FA *



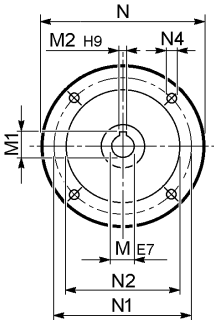
V



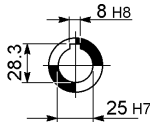
U



INPUT

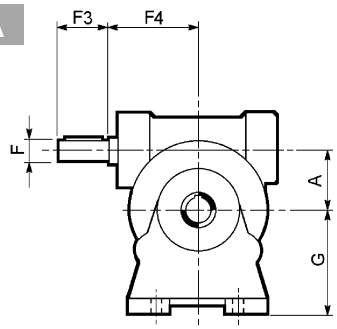


OUTPUT

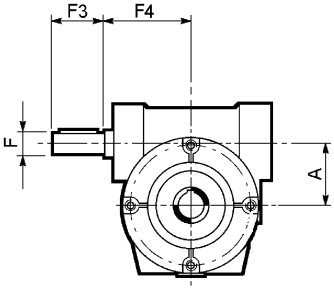


VF 49									
	M	M1	M2	N	N1	N2	N3	N4	Kg
VF 49_P63 B5	11	12.8	4	140	115	95	10.5	9.5	3.0
VF 49_P71 B5	14	16.3	5	160	130	110	10.5	9.5	
VF 49_P80 B5	19	21.8	6	200	165	130	10	11.5	
VF 49_P63 B14	11	12.8	4	90	75	60	7	6	
VF 49_P71 B14	14	16.3	5	105	85	70	10.5	6.5	
VF 49_P80 B14	19	21.8	6	120	100	80	10	7	

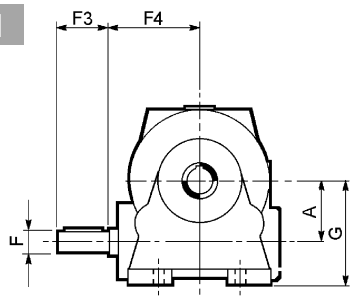
A



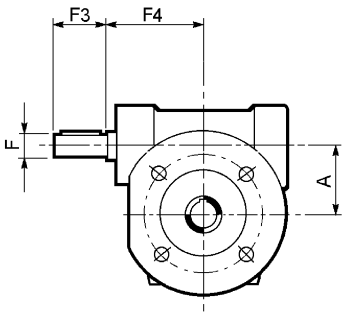
P



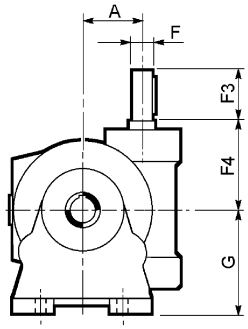
N



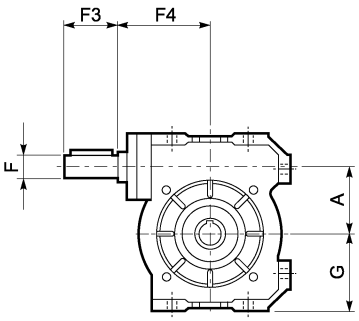
F
FA



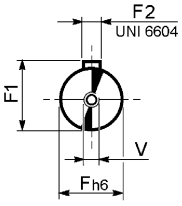
V



U

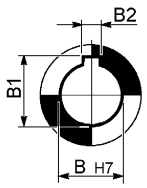


INPUT



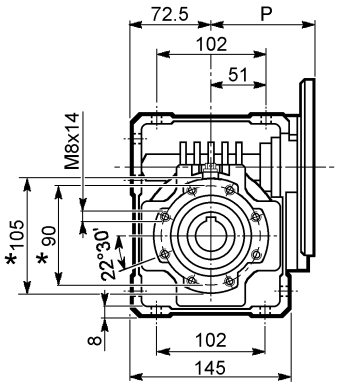
	A	B	B1	B2	F	F1	F2	F3	F4	G	V	kg
VF 44_HS	44.6	18	20.8	6	11	12.5	4	30	54	72	—	2.0
VF 49_HS	49.5	25	28.3	8	16	18	5	40	65	82	M6x16	3.0

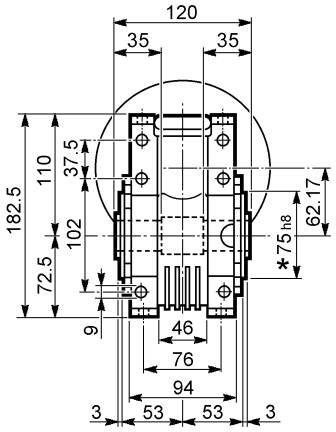
OUTPUT



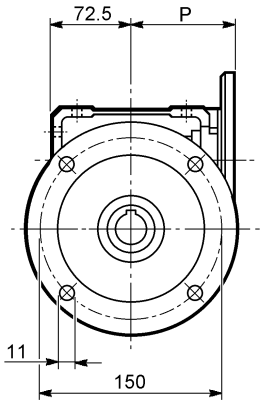
Dimensions common to the other configurations can be found from page 24 to 26.

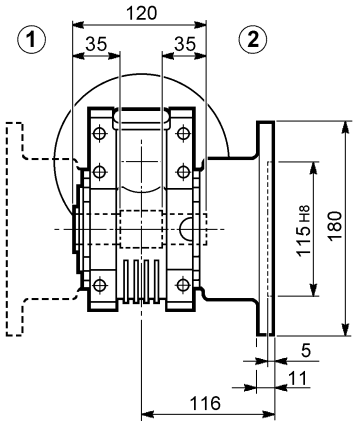
U



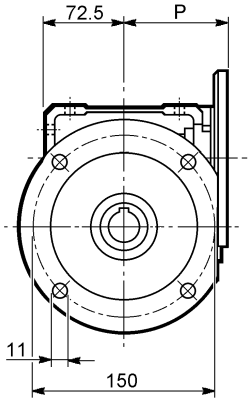


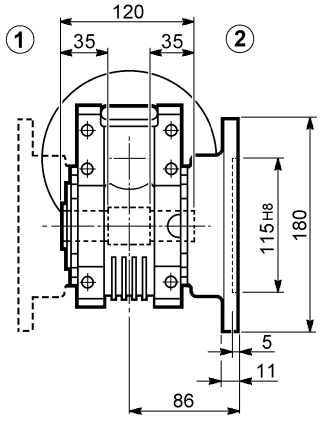
UF



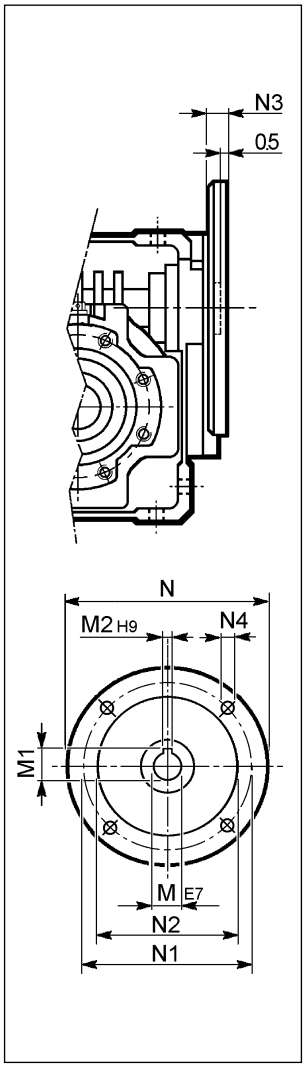


UFC

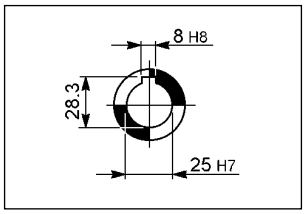




INPUT



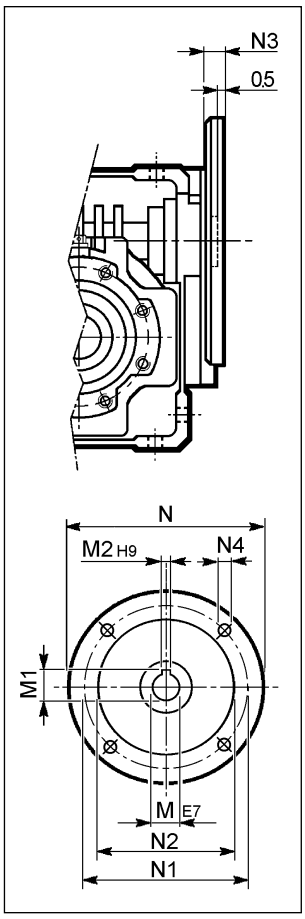
OUTPUT

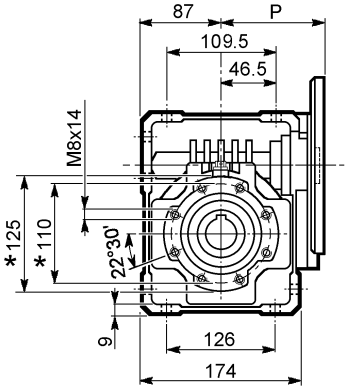


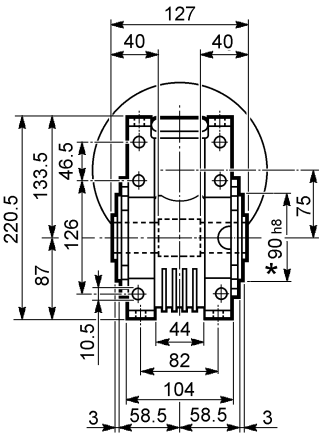
* On both sides

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

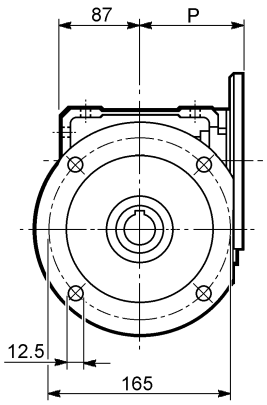
INPUT

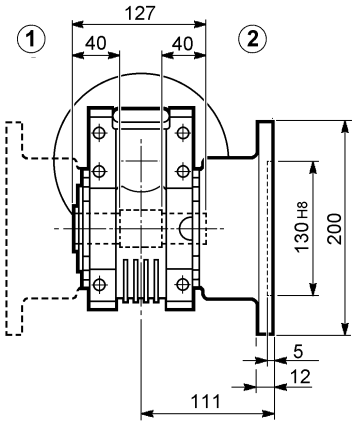






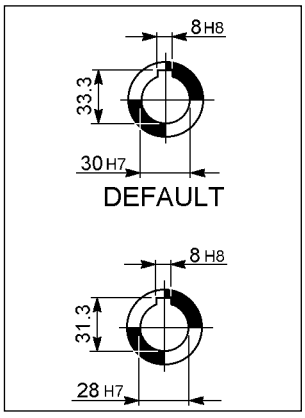
U

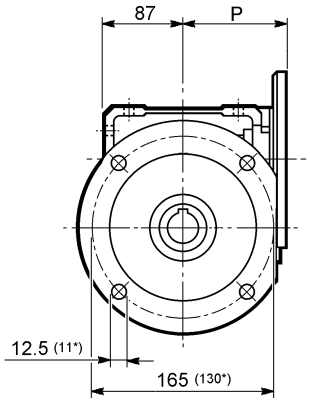


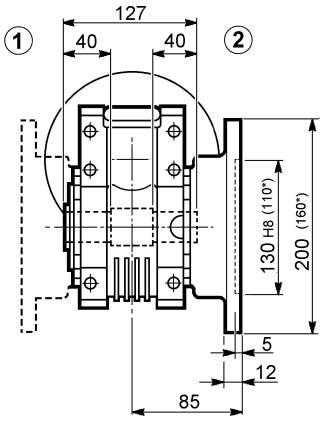


UF

OUTPUT







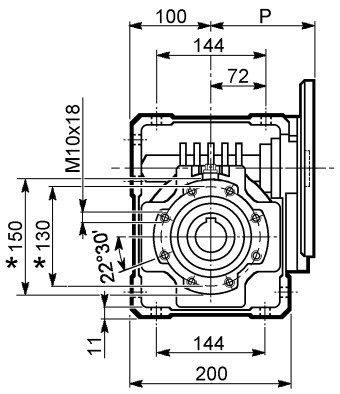
UFC

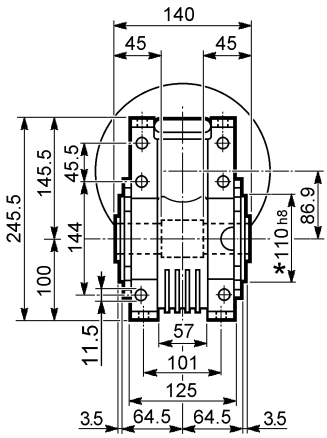
UFCR (*)

* On both sides

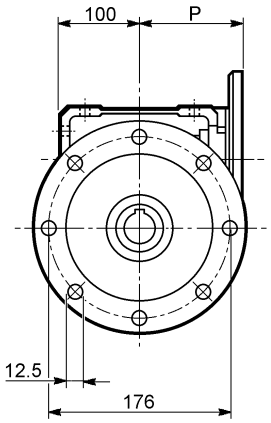
W 75											
		M	M1	M2	N	N1	N2	N3	N4	P	Kg
W 75	**P71 B5**	14	16.3	5	160	130	110	11	9	112	9.5
W 75	**P80 B5**	19	21.8	6	200	165	130	12	11.5	112	9.7
W 75	**P90 B5**	24	27.3	8	200	165	130	12	11.5	112	9.6
W 75	**P100 B5**	28	31.3	8	250	215	180	13	12.5	120	9.7
W 75	**P112 B5**	28	31.3	8	250	215	180	13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

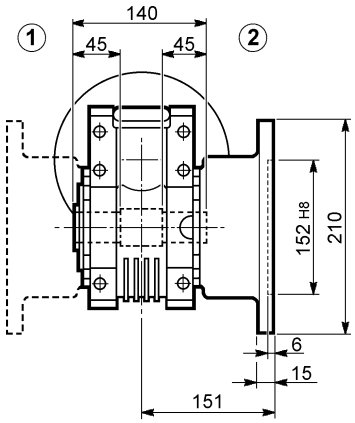
U



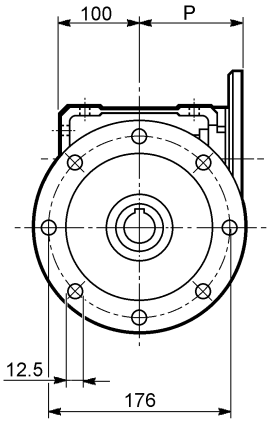


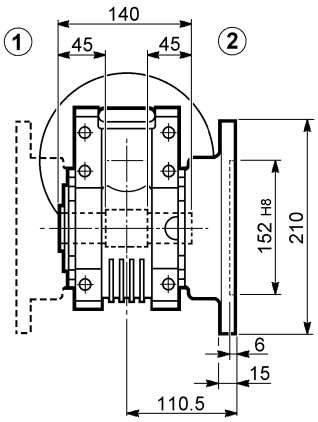
UF



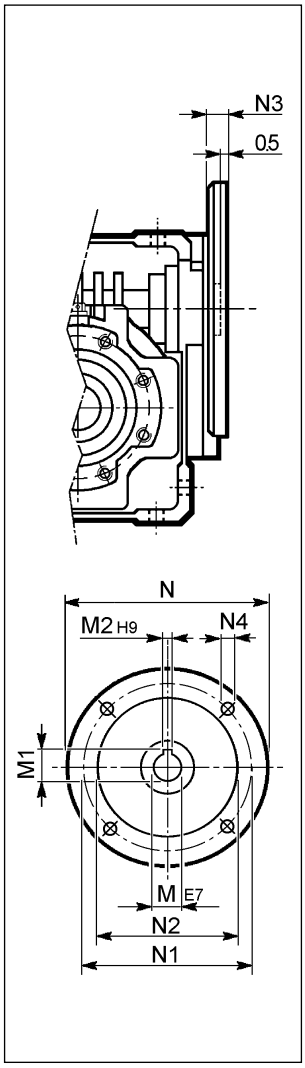


UFC

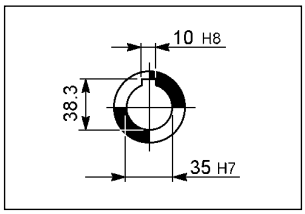




INPUT



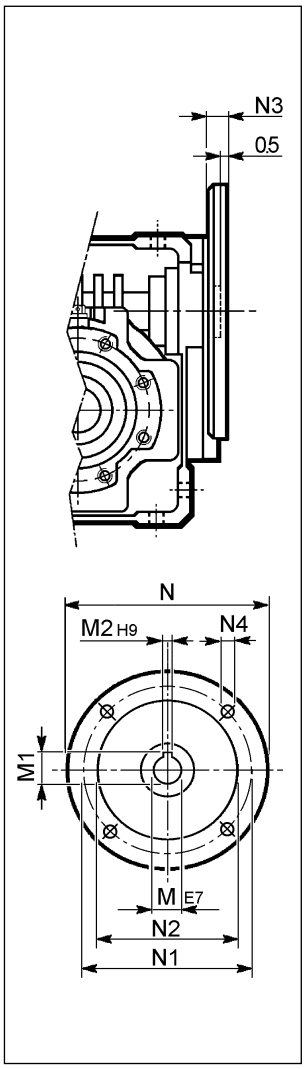
OUTPUT



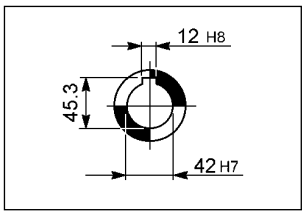
* On both sides

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

INPUT



OUTPUT



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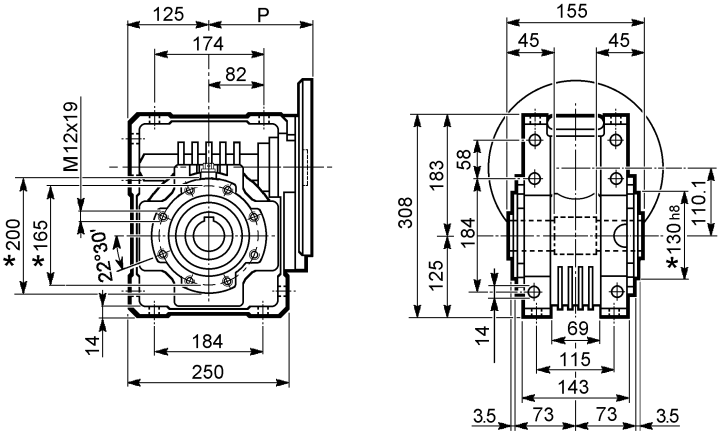

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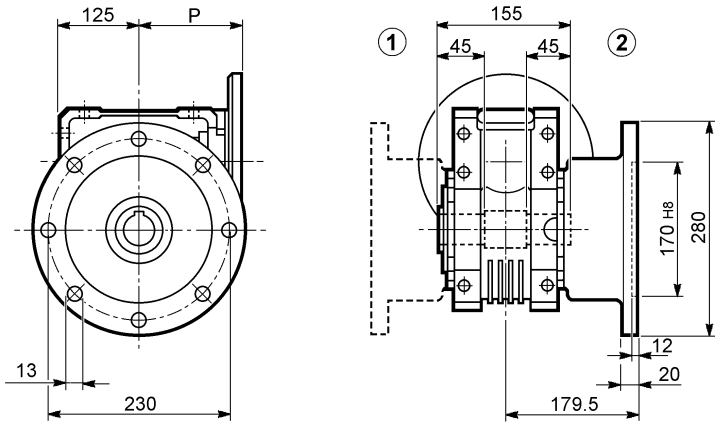

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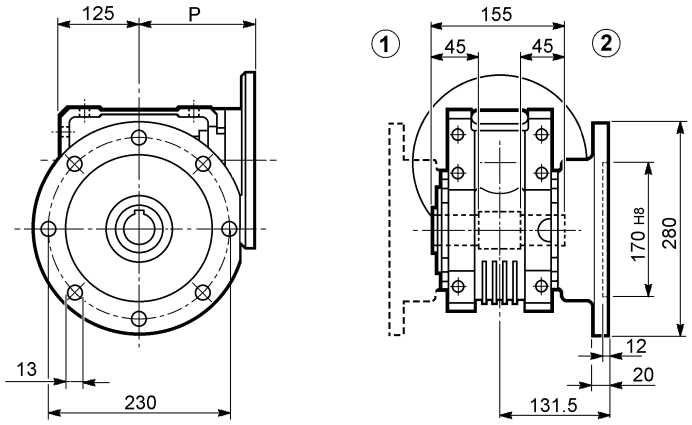
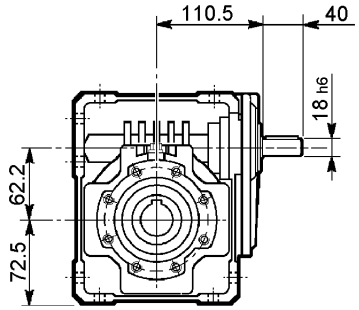
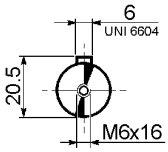


* On both sides

W 110											
		M	M1	M2	N	N1	N2	N3	N4	P	Kg
W 110	**P80 B5**	19	21.8	6	200	165	130	—	M10x12	143	38
W 110	**P90 B5**	24	27.3	8	200	165	130	—	M10x12	143	38
W 110	**P100 B5**	28	31.3	8	250	215	180	13	13	151	39
W 110	**P112 B5**	28	31.3	8	250	215	180	13	13	151	39
W 110	**P132 B5**	38	41.3	10	300	265	230	16	13	226	41
W 110	**P80 B14**	19	21.8	6	120	100	80	7.5	7	143	38
W 110	**P90 B14**	24	27.3	8	140	115	95	6.5	9	143	38
W 110	**P100 B14**	28	31.3	8	160	130	110	13	9	151	38
W 110	**P112 B14**	28	31.3	8	160	130	110	13	9	151	38

W63





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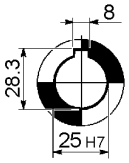
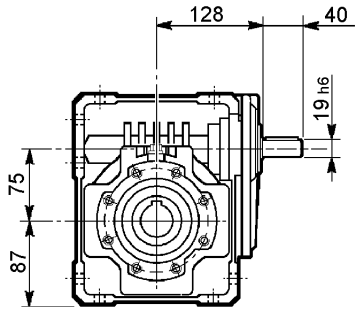
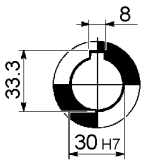


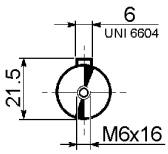
OUTPUT

W75





D30



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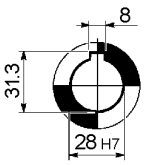
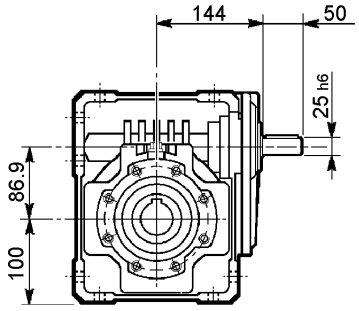
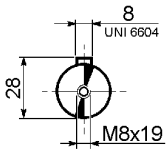


D28

OUTPUT

W86





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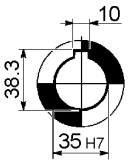
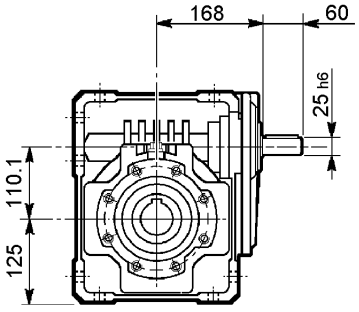
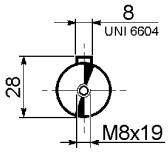


OUTPUT

W110





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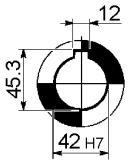


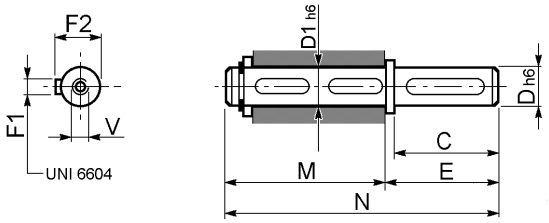
OUTPUT

Dimensions common to the other configurations can be found from page 28 to 31.

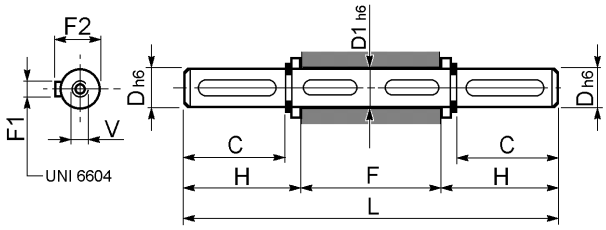
12.0 - ACCESSORIES

Plug-in solid output shaft

Single output shaft

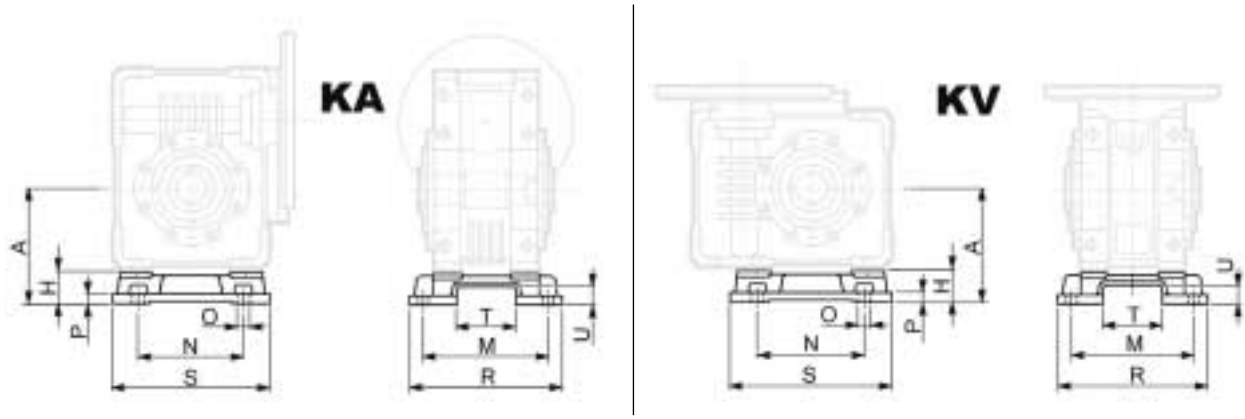


Double output shaft



	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

13.0 - 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 94/9/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-line 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:

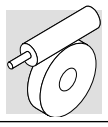
EN 1127-1, EN 13463-1, prEN 13463-5, prEN 13463-8

BONFIGLIOLI RIDUTTORI filed the documents according to 94/9/EC Annex VIII, with the following notified body:

TÜV PRODUCT SERVICE GmbH- Identification number 0123

Lippo di Calderara di Reno, 27/10/2003
Place and date

Ing. Enzo Cognigni
R&D Manager



INDEX OF REVISIONS (R)

R1	
20 21	Corrected Pn_1 values in the nominal rating charts W series gearunits.

AUSTRALIA
BONFIGLIOLI TRANSMISSION (Aust) Pty Ltd.
48-50 Adderly St. (East) - Auburn (Sydney) N.S.W. 2144
Tel. (+61) 2 9748 8955 - Fax (+61) 2 9748 8740
P.o. Box 6705 Silverwater NSW 2128
www.bonfiglioli.com.au - bta1@bonfiglioli.com.au

BELGIUM BEST
N.V. ESCO TRANSMISSION S.A.
Culliganlaan 3 - 1831 Machelem Diegem
Tel. 0032 2 7204880 - Fax 0032 2 7212827
Tlx 21930 Escopo B
www.escotrans.be - info@escotrans.be

CANADA
BONFIGLIOLI CANADA INC.
2-7941 Jane Street - Concord, ONTARIO L4K 4L6
Tel. (+1) 905 7384466 - Fax (+1) 905 7389833
www.bonfigliolicanada.com - sales@bonfigliolicanada.com

FRANCE
BONFIGLIOLI TRANSMISSIONS S.A.
14 Rue Eugène Pottier BP 19
Zone Industrielle de Moimont II - 95670 Marly la Ville
Tel. (+33) 1 34474510 - Fax (+33) 1 34688800
www.bonfiglioli.fr - btf@bonfiglioli.fr

GERMANY
BONFIGLIOLI GETRIEBE GmbH
Hamburger Straße 18 - 41540 Dormagen
Tel. (+49) 2133 50260 - Fax (+49) 2133 502610
www.bonfiglioli.de - bonfiglioli.getriebe@bonfiglioli.de

VECTRON Elektronik GmbH
Europark Fichtenhain A 6 47807 Krefeld
Tel. (+49) 2151 83960 - Fax (+49) 2151 839699
www.vectron.net - info@vectron.net

GREAT BRITAIN
BONFIGLIOLI UK Ltd
Unit 3 Colemeadow Road - North Moons Moat
Redditch. Worcestershire B98 9PB
Tel. (+44) 1527 65022 - Fax (+44) 1527 61995
www.bonfiglioli.co.uk - amarjit.marwaha@bonfiglioliuk.co.uk

GREECE
BONFIGLIOLI HELLAS S.A.
O.T. 48A T.O. 230 - C.P. 570 22, Industrial Area - Thessaloniki
Tel. (+30) 2310 796456 - Fax (+30) 2310 795903
www.bonfiglioli.gr - bonfigr@otenet.gr

HOLLAND BEST
ELSTO AANDRIJFTECHNIEK
Loosterweg, 7 - 2215 TL Voorhout
Tel. (+31) 252 219 123 - Fax (+31) 252 231 660
www.elsto.nl - imfo@elsto.nl

HUNGARY BEST
AGISYS AGITATORS & TRANSMISSIONS Ltd
Fehérvari u. 98 - 1116 Budapest
Tel. 0036 1 2061 477 - Fax 0036 1 2061 486
www.agisys.hu - info@agisys.hu

INDIA
BONFIGLIOLI TRANSMISSIONS PVT Ltd.
PLOT AC7-AC11 Sidco Industrial Estate
Thirumudivakkam - Chennai 600 044
Tel. +91(0)44 24781035 / 24781036 / 24781037
Fax +91(0)44 24780091 / 24781904
www.bonfiglioli.co.in - bonfig@vsnl.com

NEW ZEALAND BEST
SAECO BEARINGS TRANSMISSION
36 Hastie Avenue, Mangere
Po Box 22256, Otahuhu - Auckland
Tel. +64 9 634 7540 - Fax +64 9 634 7552
mark@saeco.co.nz

POLAND BEST
POLPACK Sp. z o.o. - Ul. Chrobrego 135/137 - 87100 Torun
Tel. 0048.56.6559235 - 6559236 - Fax 0048.56.6559238
www.polpack.com.pl - polpack@polpack.com.pl

SPAIN
TECNOTRANS SABRE S.A.
Pol. Ind. Zona Franca sector C, calle F, n°6 08040 Barcelona
Tel. (+34) 93 4478400 - Fax (+34) 93 3360402
www.tecnotrans.com - tecnotrans@tecnotrans.com

SOUTH AFRICA
BONFIGLIOLI POWER TRANSMISSION Pty Ltd.
55 Galaxy Avenue, Linbro Business Park - Sandton
Tel. (+27) 11 608 2030 OR - Fax (+27) 11 608 2631
www.bonfiglioli.co.za - bonfigsales@bonfiglioli.co.za

SWEDEN
BONFIGLIOLI SKANDINAVIEN AB
Kontorsgatan - 234 34 Lomma
Tel. (+46) 40 412545 - Fax (+46) 40 414508
www.bonfiglioli.se - info@bonfiglioli.se

THAILAND BEST
K.P.T MACHINERY (1993) CO.LTD.
259/83 Soi Phiboonves,
Sukhumvit 71 Rd. Phrakanong-nur,
Wattana, Bangkok 10110
Tel. 0066.2.3913030/7111998
Fax: 0066.2.7112852/3811308/3814905
www.kpt-group.com - sales@kpt-group.com

USA
BONFIGLIOLI USA INC
1000 Worldwide Boulevard - Hebron, KY 41048
Tel.: (+1) 859 334 3333 - Fax: (+1) 859 334 8888
www.bonfiglioliusa.com
industrialsales@bonfiglioliusa.com
mobilesales@bonfiglioliusa.com

VENEZUELA BEST
MAQUINARIA Y ACCESSORIOS IND.-C.A.
Calle 3B - Edif. Comindu - Planta Baja - Local B
La Urbina - Caracas 1070
Tel. 0058.212.2413570 / 2425268 / 2418263
Fax: 0058.212.2424552 - Tlx: 24780 Maica V
www.maica-ve.com - maica@telcel.net.ve

HEADQUARTERS
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
www.bonfiglioli.com
bonfiglioli@bonfiglioli.com

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