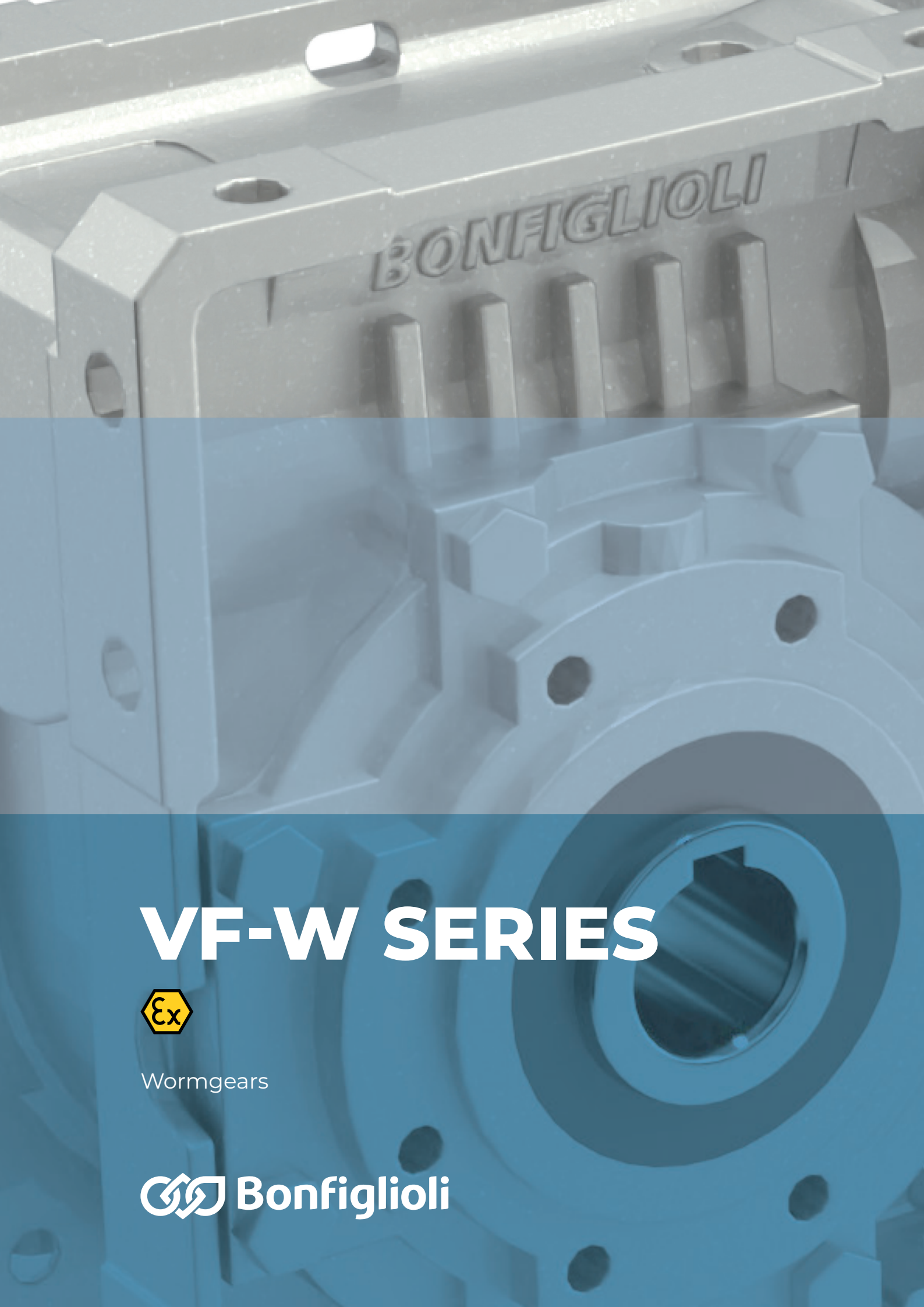


VF-W SERIES

Wormgears

Bonfiglioli

SUMMARY

Chapter		Description	Page
1		**GENERAL INFORMATION**	**2**
1.1		Symbols and units of measure	2
1.2		Introduction to the ATEX directives	4
	1.2.1	Explosive atmosphere	4
	1.2.2	European harmonised ATEX standards	4
	1.2.3	Levels of protection for the various categories of equipment	5
	1.2.4	Definition of groups (EN 1127-1)	5
	1.2.5	Declaration of conformity	6
1.3		Use, installation and maintenance	6
1.4		Selecting the type of equipment	7
	1.4.1	Selection procedure	7
	1.4.2	Selecting a gear unit with IEC motor fitting	7
	1.4.3	Selecting a speed reducer with solid input shaft	8
	1.4.4	Post-selection checks	8
	1.4.5	Operating conditions for ATEX-specified equipment	8
	1.4.6	Service factor	9
2		**WORM GEAR UNITS FOR POTENTIALLY EXPLOSIVE ATMOSPHERES**	**10**
2.1		Construction of ATEX-specified equipment	10
2.2		Versions and mounting positions	11
	2.2.1	VF Series	11
	2.2.2	W Series	12
2.3		Ordering numbers	13
	2.3.1	Options	13
2.4		Lubrication	14
2.5		Admissible overhung loads	15
	2.5.1	Radial loads	16
	2.5.2	Thrust loads	17
2.6		Gearbox rating charts	18
2.7		Motor availability	22
	2.7.1	Motors not to IEC standard	23
2.8		Moment of inertia	24
2.9		Dimensions	28
2.10		Accessories	39
	2.10.1	Plug-in output shaft	39
	2.10.2	VF-interchangeable foot kits KA, KV	39
2.11		Customer’s shaft	40
	2.11.1	Manufacturing instructions	40

Revisions
Refer to page 42 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 2014/34/EU, an explosive atmosphere is defined as a mixture:

a. of **flammable substances**, in the form of gases, vapours, mists or dusts;
b. with **air**;
c. under **atmospheric conditions**;
d. in which, after ignition, the combustion spreads to the entire unburned mixture (it has to be noted that sometimes, mainly with dust, not always the whole quantity of the combustible material is consumed by the 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 2014/34/EU are intended for use only in a potentially explosive atmosphere defined in this way.

1.2.2 EUROPEAN HARMONISED ATEX STANDARDS

Directive ATEX 2014/34/EU 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.

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.

As from 20 april 2016 the ATEX directives 2014/34/EU come into force throughout the entire European Union, and replace existing conflicting national and European laws on explosive atmospheres and the previous directives 94/9/EC. 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 2006/42/EC it should be noted that directive 2014/34/EU 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 2014/34/EU 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					Ex h Gb	Ex h Db	Ex h Gc	Ex h Dc

(1) G = gas D = dust

This catalogue describes BONFIGLIOLI RIDUTTORI gear units , intended for use in potentiallyexplosive 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, is the document which attests to the conformity of the product to Directive 2014/34/EU. 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.
This can be downloaded from www.bonfiglioli.com where the manual is available in PDF format in a number of languages.
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 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

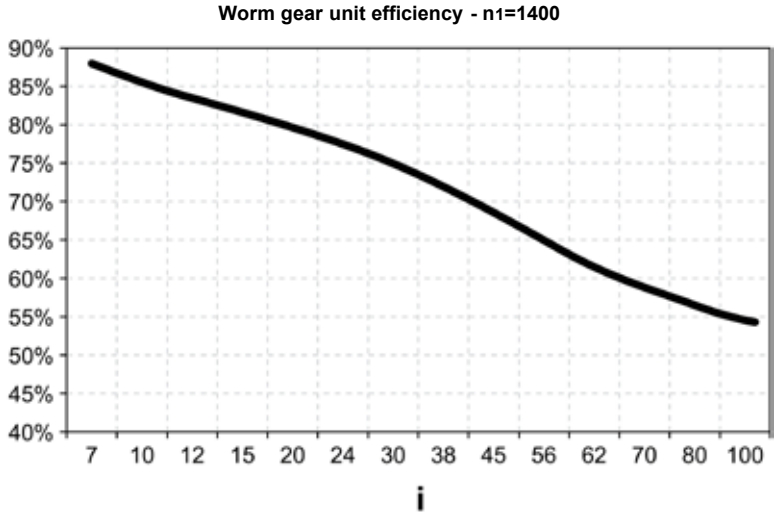
1.4.1 SELECTION PROCEDURE:

Determine the application service factor fs 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 GEAR UNIT WITH IEC MOTOR FITTING

a. Determine service factor **f_s** as formerly specified.

b. 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:

$$Pn_1 \geq Pr_1 \times f_s$$

c. Select an electric motor rated:

$$P_1 \geq Pr_1$$

d. 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:

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

1.4.3 SELECTING A SPEED REDUCER WITH SOLID INPUT SHAFT

- Calculate the value of the computational torque:

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

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:

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

1.4.4 POST-SELECTION CHECKS

Once the gear unit or the gear unit with IEC motor fitting has been selected, we recommend checkin the selection as follows:

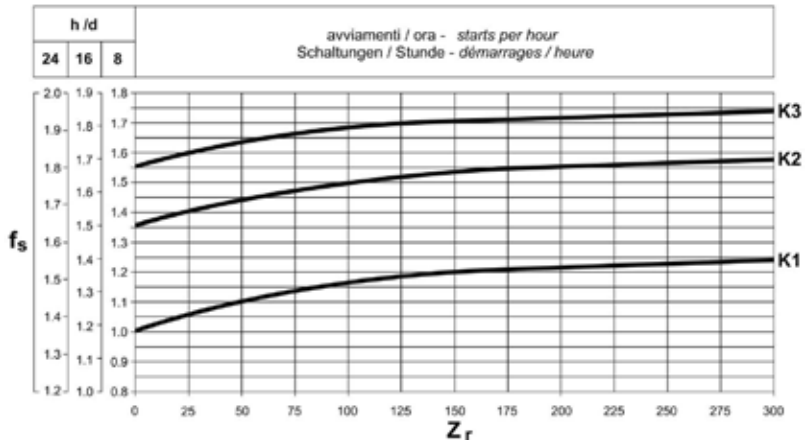
- **Momentary peak torque**
  The momentary peak torque is of the order of 200% of the rated torque Mn_2. Check that the point value of the peak torque satisfies this condition and equip the installation with a torque limiter if necessary.
- **Radial load**
  The catalogue gives the values of the maximum 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.

1.4.5 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 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) regarding installation, use and routine maintenance of the unit must be followed in full.

1.4.6 SERVICE FACTOR - [f_s]

This factor is the numeric value describing reducer service duty. It takes into consideration, with unavoidable approximation, daily operating conditions, load variations and overloads connected with reducer application.
In the graph below, after selecting proper “daily working hours” column, the service factor is given by intersecting the number of starts per hour and one of the K1, K2 or K3 curves.
K_ curves are linked with the service nature (approximately: uniform, medium and heavy) through the acceleration factor of masses K, connected to the ratio between driven masses and motor inertia values.
Regardless 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:

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

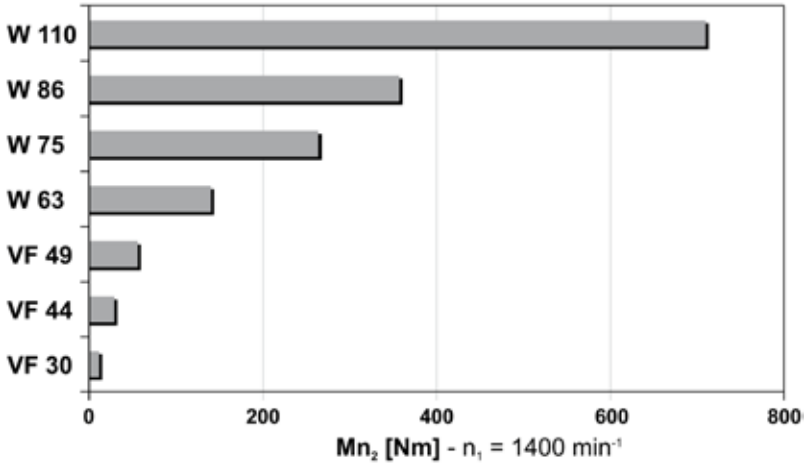
where:

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

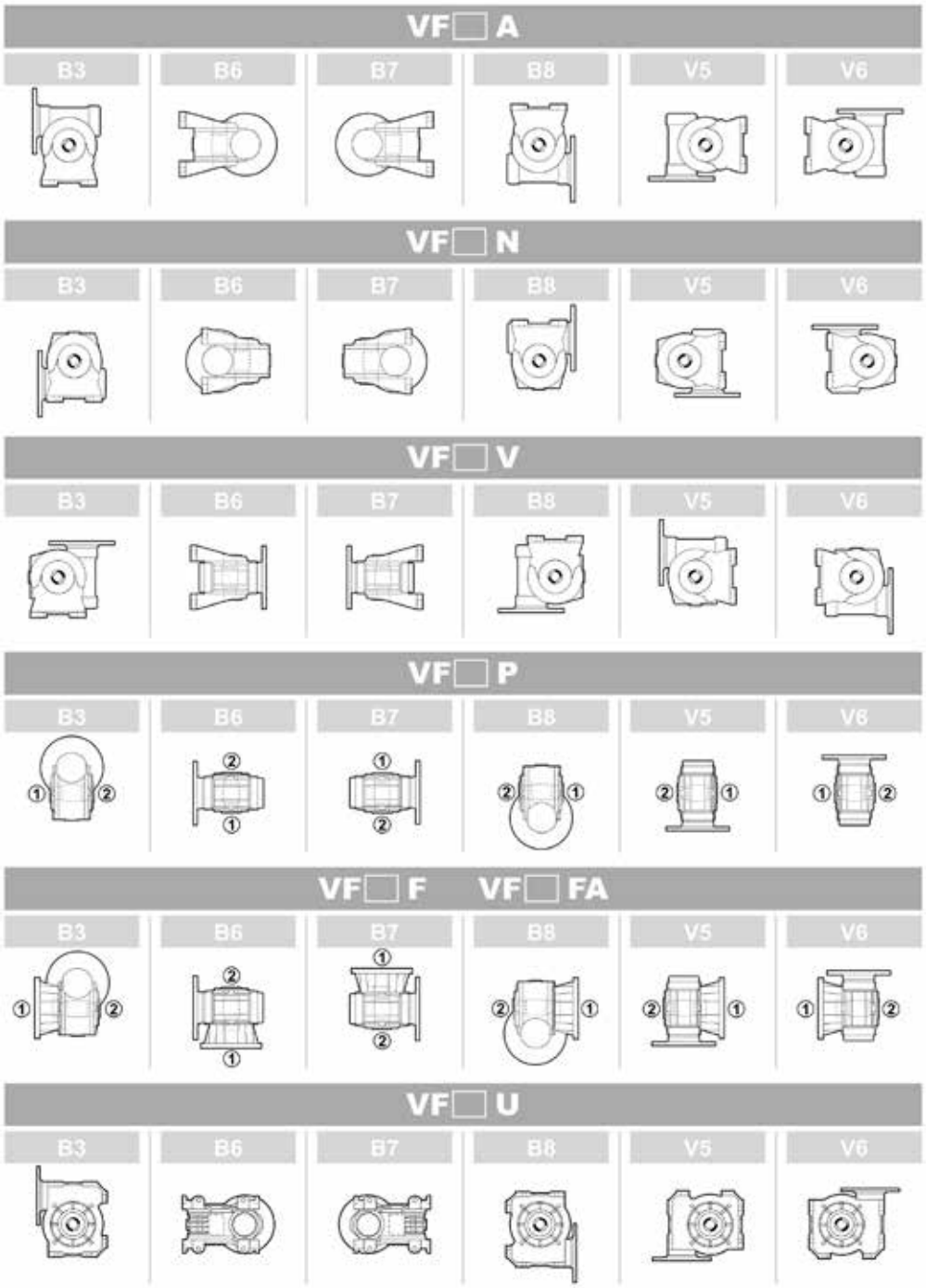
- Equipped with service plugs for periodic lubricant level checks.
- Factory-charged with lubricant, depending on the mounting position specified in the order. (*)
- Fluoro elastomer seal rings as standard.
- No plastic component parts.
- Nameplate indication of the product category and type of protection.



(*) With the exception of gear units **W110**:
- in the mounting positions **V5** and **V6**
- in the version with motor flange type **B14**

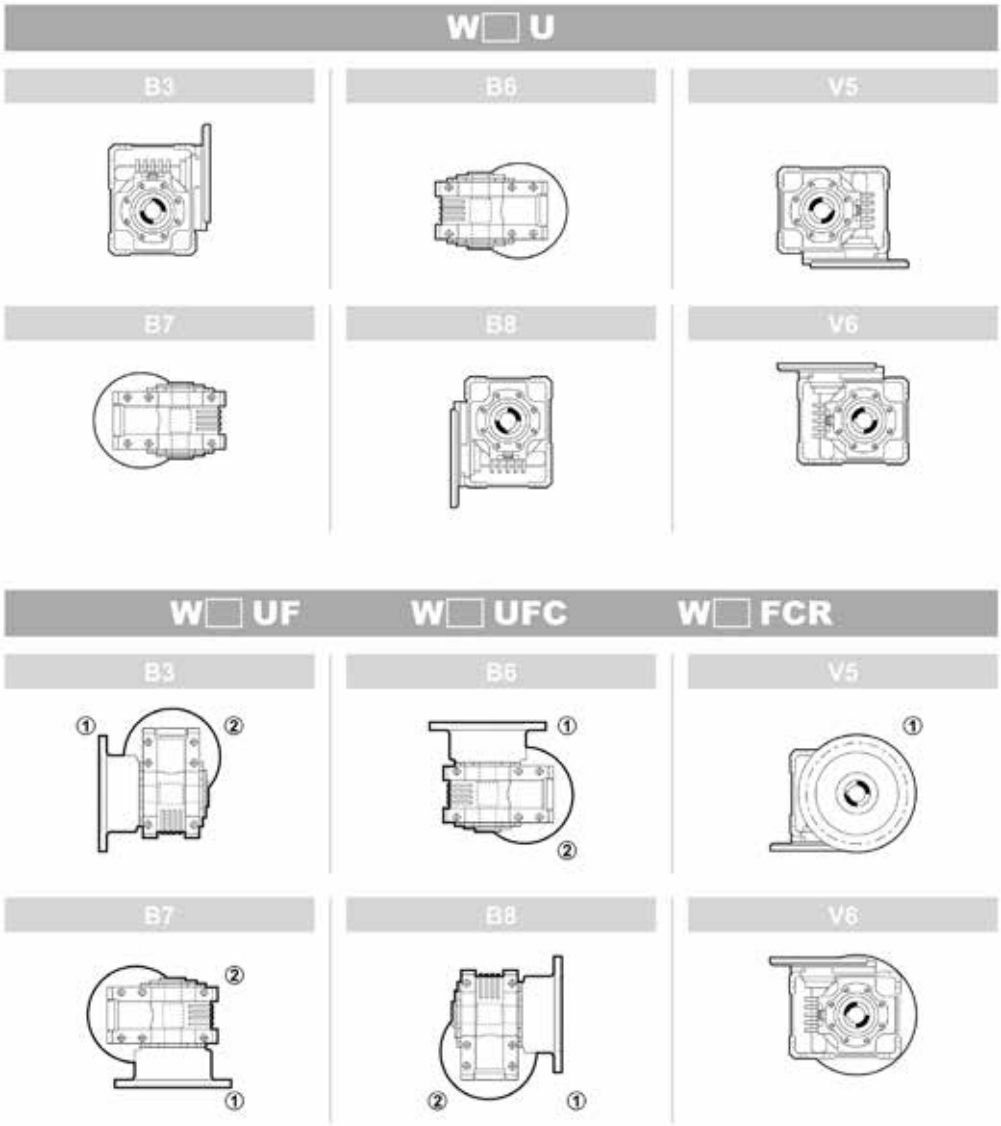
2.2 VERSIONS AND MOUNTING POSITIONS

2.2.1 VF SERIES



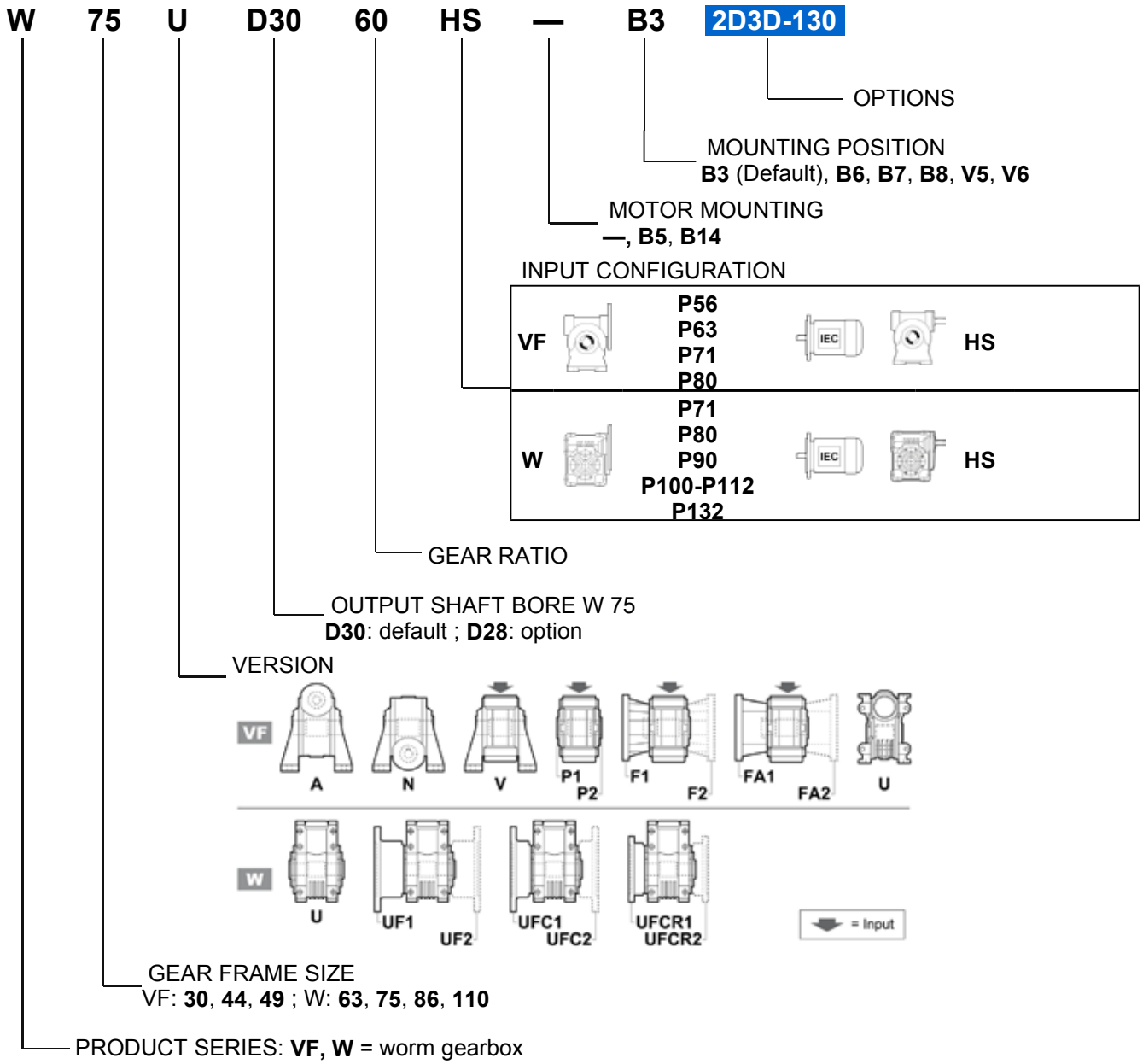
1 - 2 Flange location

2.2.2 W SERIES



1 - 2 Flange location

2.3 ORDERING NUMBERS



2.3.1 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).

2.4 LUBRICATION

With the exception of gear units W110 reported below, 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.

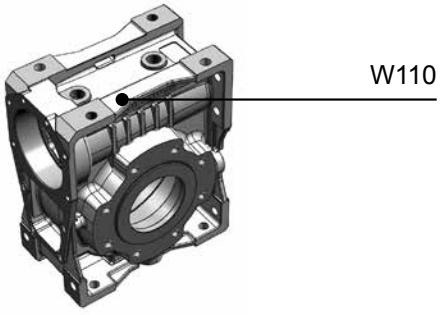
Lubricant charge [litres] for VF gear units:						
	B3	**B6**	**B7**	**B8**	**V5**	**V6**
VF 30	0.045	0.045	0.045	0.045	0.045	0.045
VF 44	0.075	0.075	0.075	0.075	0.075	0.075
VF 49	0.12	0.12	0.12	0.12	0.12	0.12

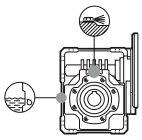
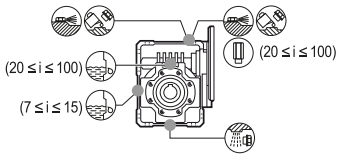
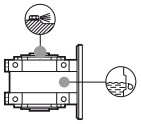
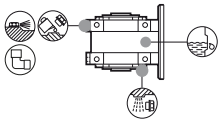
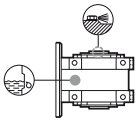
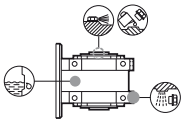
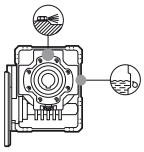
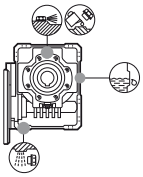
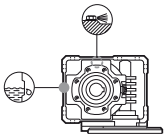
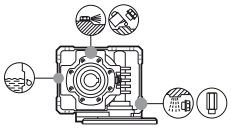
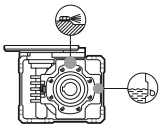
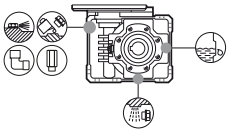
Shell SHELL OMALA S4 WE 320

Lubricant charge [litres] for W gear units:							
	i =	B3	B6	B7	B8	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
W110*	**7, 10, 15**	1.3	1.7	1.7	1.9	1.9	1.8
	20, 23, 30, 40, 46, 56, 64, 80, 100	2.2	1.7	1.7	1.9	1.9	1.8

* Worm gears type **W110** will be supplied unlubricated:
- in the mounting positions **V5** and **V6**
- in the version with motor flange type **B14**

Shell SHELL OMALA S4 WE 320



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

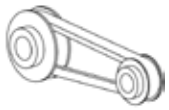
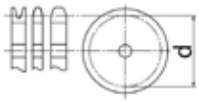
2.5 ADMISSIBLE OVERHUNG LOADS

2.5.1 RADIAL LOADS

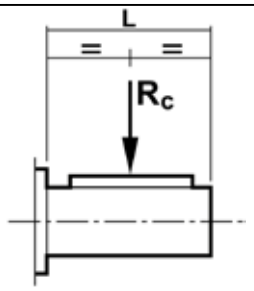
2.5.1.1 CALCULATING THE RESULTING OVERHUNG LOAD

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:

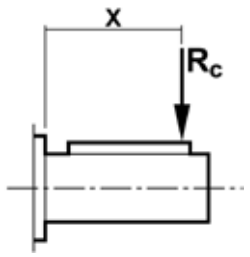
$$R_c = \frac{2000 \times M \times K_r}{d}$$

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

2.5.1.2 OVERHUNG LOADING VERIFICATION



$R_c \leq R_n$



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

$R_c \leq R_x$

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 GEARBOX RATING CHARTS

Selection example

W 63 — **125 Nm**

	n_2	η_s	η_d	IEC	n_1 = 1400 min^{-1}				n_1 = 1400 min^{-1}				
					M_{n2}	P_{n1}	R_{n2}		M_{n2}	P_{n1}	R_{n1}	R_{n2}	
	min^{-1}	%	%		Nm	kW	N		Nm	kW	N	N	
W 63_7	200	70	88		115	2.7	1380		115	2.7	480	1380	
W 63_10 ①	140	66	86		120	2.0	1780		120	2.0	480	1780	
W 63_12	117	63	85	2D3D-160—2G3G-T3	120	1.7	1990	2G3G-T3	120	1.7	480	1990	
W 63_15	93	59	83		120	1.4	2260		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 ②	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	21.6			2D3D-130—2G3G-T4			4320	2G3G-T4					

① 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)

② The gear unit can be installed

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

VF 30 — 11 Nm

	n_2	η_s	η_d	IEC		n_1 = 1400 min^{-1}				n_1 = 1400 min^{-1}				
						M_{n2}	P_{n1}	R_{n2}		M_{n2}	P_{n1}	R_{n1}	R_{n2}	
	min^{-1}	%	%			Nm	kW	N		Nm	kW	N	N	
VF 30_7	200	69	84		2D3D-160—2G3G-T3	10	0.25	630						34
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						

VF 44 — 30 Nm

	n_2	η_s	η_d	IEC		n_1 = 1400 min^{-1}				n_1 = 1400 min^{-1}				
						M_{n2}	P_{n1}	R_{n2}		M_{n2}	P_{n1}	R_{n1}	R_{n2}	
	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	34
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	

VF 49 — 48 Nm

	n_2	η_s	η_d	IEC		n_1 = 1400 min^{-1}				n_1 = 1400 min^{-1}				
						M_{n2}	P_{n1}	R_{n2}		M_{n2}	P_{n1}	R_{n1}	R_{n2}	
	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	34
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	η_s	η_d	IEC		n_1 = 1400 min^{-1}				n_1 = 1400 min^{-1}				
						M_{n2}	P_{n1}	R_{n2}		M_{n2}	P_{n1}	R_{n1}	R_{n2}	
	min^{-1}	%	%			Nm	kW	N		Nm	kW	N	N	
W 63_7	200	70	88		2D3D-160—2G3G-T3	115	2.7	1380		2G3G-T3	115	2.7	480	1380	34
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 63_80	17.5	27	56			95	0.31	4870			95	0.31	480	4870	
W 63_100	14.0	23	51			55	0.16	5000			55	0.16	480	5000	

W 75 — 270 Nm

	n_2	η_s	η_d	IEC		n_1 = 1400 min^{-1}				n_1 = 1400 min^{-1}				
						M_{n2}	P_{n1}	R_{n2}		M_{n2}	P_{n1}	R_{n1}	R_{n2}	
	min^{-1}	%	%			Nm	kW	N		Nm	kW	N	N	
W 75_7	200	71	90		2D3D-160—2G3G-T3	190	4.4	1080		2G3G-T3	190	4.4	750	1080	34
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	

W 86 — 350 Nm

	n_2	η_s	η_d	IEC		n_1 = 1400 min^{-1}				n_1 = 1400 min^{-1}				
						M_{n2}	P_{n1}	R_{n2}		M_{n2}	P_{n1}	R_{n1}	R_{n2}	
	min^{-1}	%	%			Nm	kW	N		Nm	kW	N	N	
W 86_7	200	71	89		2D3D-160—2G3G-T3	250	5.9	3510		2G3G-T3	250	5.9	850	3510	34
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		330	3.8	4980	2G3G-T4		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	

W 110 — 670 Nm

	n_2	η_s	η_d	IEC	n_1 = 1400 min^{-1}				n_1 = 1400 min^{-1}				
					M_{n2}	P_{n1}	R_{n2}		M_{n2}	P_{n1}	R_{n1}	R_{n2}	
	min^{-1}	%	%		Nm	kW	N		Nm	kW	N	N	
W 110_7	200	71	89	2D3D-160—2G3G-T3	500	11.8	4440	2G3G-T3	500	11.8	1200	4440	34
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	

2.7 MOTOR AVAILABILITY

Please be aware that motor-gearbox availability resulting from chart below are purely based on geometrical compatibility.

When selecting a gearbox with IEC motor adapter, refer to procedure specified at chapter 1.4.

		IEC (IM B5) (IM B14) - n_1 = 1400 min^{-1}							
	P_{n1} (*)	0.09 kW	0.25 kW	0.55 kW	1.1 kW	1.85 kW	3 kW	4 kW	9.2 kW
		P56	P63	P71	P80	P90	P100	P112	P132
VF 30		7_70	7_60						
VF 44			7_70	7_35					
VF 49			7_70	7_60	7_28				
W 63	i =			7_64	7_64	7_30			
W 75				7_100	7_100	7_100	7_100	7_100	
W 86				7_100	7_100	7_100	7_100	7_100	
W 110					7_100	7_100	7_100	7_100	7_100

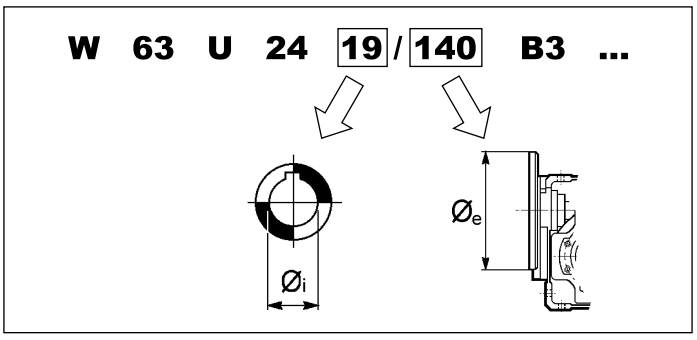
*(*) P_{n1} = maximum installable power on the input P_*

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

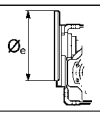
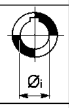
*Combinations marked in greyboxes can onlybe achieved through **IM B5** flanged motors.*

2.7.1 MOTORS NOT TO IEC STANDARD

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



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

								
		**80**	**90**	**105**	**120**	**140**	**160**	**200**
VF 30	**9**		7 ≤ i ≤ 70	⛔		7 ≤ i ≤ 70	⛔	⛔
	11	7 ≤ i ≤ 60		⛔	7 ≤ i ≤ 60		⛔	⛔
VF 44	**HS**	⛔	7 ≤ i ≤ 70	7 ≤ i ≤ 70	⛔	7 ≤ i ≤ 70	7 ≤ i ≤ 70	⛔
	11	⛔		7 ≤ i ≤ 70	⛔		7 ≤ i ≤ 70	⛔
	14	⛔	7 ≤ i ≤ 35		⛔	7 ≤ i ≤ 35		⛔
VF 49	**HS**	⛔	7 ≤ i ≤ 70	7 ≤ i ≤ 70	7 ≤ i ≤ 70	7 ≤ i ≤ 70	7 ≤ i ≤ 70	7 ≤ i ≤ 70
	11	⛔		7 ≤ i ≤ 70	7 ≤ i ≤ 70		7 ≤ i ≤ 70	7 ≤ i ≤ 70
	14	⛔	7 ≤ i ≤ 60		7 ≤ i ≤ 60	7 ≤ i ≤ 60		7 ≤ i ≤ 60
	19	⛔	7 ≤ i ≤ 28	7 ≤ i ≤ 28		7 ≤ i ≤ 28	7 ≤ i ≤ 28	
W 63	**19**	⛔	⛔	⛔	⛔	7 ≤ i ≤ 64	⛔	
W 75	**14**	⛔	⛔	⛔	⛔	⛔		7 ≤ i ≤ 100
	19	⛔	⛔	⛔		7 ≤ i ≤ 100	7 ≤ i ≤ 100	
	24	⛔	⛔	⛔	7 ≤ i ≤ 100		7 ≤ i ≤ 100	
W 86	**14**	⛔	⛔	⛔	⛔	⛔		7 ≤ i ≤ 100
	19	⛔	⛔	⛔		7 ≤ i ≤ 100	7 ≤ i ≤ 100	
	24	⛔	⛔	⛔	7 ≤ i ≤ 100		7 ≤ i ≤ 100	
W 110	**19**	⛔	⛔	⛔		7 ≤ i ≤ 100	⛔	⛔
	24	⛔	⛔	⛔	7 ≤ i ≤ 100		⛔	⛔

Standard arrangement

The table above report possible configurations strictly based on geometric criteria. To determine the compatibility of a motor-gear unit assembly in terms of mechanical factors, double-check the selected configuration against the rating charts for power/speed.
Be sure to avoid those combinations that yield a safety factor S < 0.9.

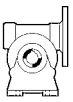
2.8 MOMENT OF INERTIA

The following charts indicate moment of inertia values J_r [kgm^2] referred to the gear unit high speed shaft.
A key to the symbols used follows:

Values under this symbol refer to gearboxes with IEC motor adaptor (IEC size...).

This symbol refers to gearbox values.

VF 30

		i	J (· 10^{-4}) [Kgm^2]					
								
			P56	**P63**				**HS**
VF 30	**VF 30_7**	7	0.08	0.07	—	—	—	0.04
	VF 30_10	10	0.07	0.06	—	—	—	0.03
	VF 30_15	15	0.07	0.06	—	—	—	0.03
	VF 30_20	20	0.06	0.06	—	—	—	0.03
	VF 30_30	30	0.06	0.06	—	—	—	0.03
	VF 30_40	40	0.06	0.06	—	—	—	0.03
	VF 30_60	60	0.06	0.05	—	—	—	0.02
	VF 30_70	70	0.06	—	—	—	—	0.02

VF 44

		i	J (• 10^{-4}) [Kgm^2]				
			P63	P71			HS
VF 44	VF 44_7	7	0.29	0.27	—	—	0.18
	VF 44_10	10	0.24	0.22	—	—	0.14
	VF 44_14	14	0.23	0.21	—	—	0.12
	VF 44_20	20	0.19	0.18	—	—	0.09
	VF 44_28	28	0.21	0.19	—	—	0.11
	VF 44_35	35	0.19	0.18	—	—	0.09
	VF 44_46	46	0.18	—	—	—	0.08
	VF 44_60	60	0.17	—	—	—	0.07
	VF 44_70	70	0.17	—	—	—	0.07
	VF 44_100	100	0.17	—	—	—	0.07

VF 49

		i	J (• 10^{-4}) [Kgm^2]					
			P63	P71	P80			HS
VF 49	VF 49_7	7	0.69	0.67	0.61	—	—	0.42
	VF 49_10	10	0.61	0.60	0.53	—	—	0.34
	VF 49_14	14	0.58	0.57	0.5	—	—	0.31
	VF 49_18	18	0.54	0.53	0.46	—	—	0.27
	VF 49_24	24	0.52	0.5	0.44	—	—	0.24
	VF 49_28	28	0.56	0.54	0.48	—	—	0.28
	VF 49_36	36	0.53	0.51	—	—	—	0.25
	VF 49_45	45	0.51	0.49	—	—	—	0.24
	VF 49_60	60	0.50	0.48	—	—	—	0.23
	VF 49_70	70	0.50	—	—	—	—	0.22
	VF 49_80	80	0.49	—	—	—	—	0.22
	VF 49_100	100	0.49	—	—	—	—	0.22

W 63

		i	J (• 10^{-4}) [Kgm^2]						
			P63	P71	P80	P90			HS
W 63	W 63_7	7	—	3.5	3.5	3.5	—	—	3.6
	W 63_10	10	—	3.2	3.3	3.2	—	—	3.3
	W 63_12	12	—	3.1	3.2	3.1	—	—	3.3
	W 63_15	15	—	3.0	3.1	3.0	—	—	3.2
	W 63_19	19	—	2.9	3.0	2.9	—	—	3.1
	W 63_24	24	—	2.9	3.0	2.9	—	—	3.0
	W 63_30	30	—	2.9	3.0	2.9	—	—	3.1
	W 63_38	38	—	2.9	3.0	2.9	—	—	3.0
	W 63_45	45	—	2.9	2.9	2.9	—	—	3.0
	W 63_64	64	—	2.8	2.9	2.8	—	—	3.0
	W 63_80	80	—	2.8	2.9	2.8	—	—	3.0
	W 63_100	100	—	2.8	2.9	2.8	—	—	2.9

W 75

		i	J (• 10^{-4}) [Kgm^2]						
			P63	P71	P80	P90	P100	P112	HS
W 75	W 75 _7	7	—	6.9	7.0	6.9	6.9	6.9	7.3
	W 75_10	10	—	6.4	6.4	6.3	5.7	5.7	6.8
	W 75_15	15	—	6.1	6.1	6.0	5.3	5.3	6.5
	W 75_20	20	—	5.9	5.9	5.9	5.2	5.2	6.3
	W 75_25	25	—	6.0	6.0	5.9	5.2	5.2	6.3
	W 75_30	30	—	5.9	5.9	5.9	5.2	5.2	6.3
	W 75_40	40	—	5.9	5.9	5.8	5.2	5.2	6.3
	W 75_50	50	—	5.9	5.9	5.8	5.1	5.1	6.2
	W 75_60	60	—	5.8	5.9	5.8	5.1	5.1	6.2
	W 75_80	80	—	5.8	5.8	5.8	5.1	5.1	6.2
	W 75_100	100	—	5.8	5.8	5.7	5.0	5.0	6.2

W 86

		i	J (• 10^{-4}) [Kgm^2]						
			P63	P71	P80	P90	P100	P112	HS
W 86	W 86_7	7	—	9.7	9.7	9.6	9.6	9.6	10
	W 86_10	10	—	8.4	8.4	8.3	7.7	7.7	8.9
	W 86_15	15	—	7.7	7.7	7.7	7.0	7.0	8.2
	W 86_20	20	—	6.9	7.0	6.9	6.2	6.2	7.4
	W 86_23	23	—	6.8	6.9	6.8	6.1	6.1	7.3
	W 86_30	30	—	7.3	7.3	7.3	6.6	6.6	7.8
	W 86_40	40	—	6.7	6.7	6.6	6.0	6.0	7.2
	W 86_46	46	—	6.7	6.7	6.6	5.9	5.9	7.1
	W 86_56	56	—	6.6	6.7	6.6	5.9	5.9	7.1
	W 86_64	64	—	6.6	6.6	6.5	5.9	5.9	7.1
	W 86_80	80	—	6.6	6.6	6.5	5.9	5.9	7.1
	W 86_100	100	—	6.4	6.5	6.4	5.7	5.7	6.9

W 110

		i	J (• 10^{-4}) [Kgm^2]							
			P63	P71	P80	P90	P100	P112	P132	HS
W 110	W 110_7	7	—	—	23	23	23	23	28	23
	W 110_10	10	—	—	19	19	24	24	24	20
	W 110_15	15	—	—	17	17	22	22	22	17
	W 110_20	20	—	—	14	14	19	19	19	15
	W 110_23	23	—	—	14	14	19	19	19	15
	W 110_30	30	—	—	16	16	20	20	20	16
	W 110_40	40	—	—	14	14	19	19	19	14
	W 110_46	46	—	—	13	13	18	18	18	14
	W 110_56	56	—	—	13	13	18	18	18	14
	W 110_64	64	—	—	13	13	18	18	18	14
	W 110_80	80	—	—	13	13	18	18	18	14
	W 110_100	100	—	—	13	13	18	18	18	14

2.9 DIMENSIONS

VF 30...P(IEC)

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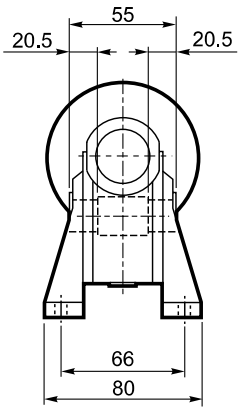

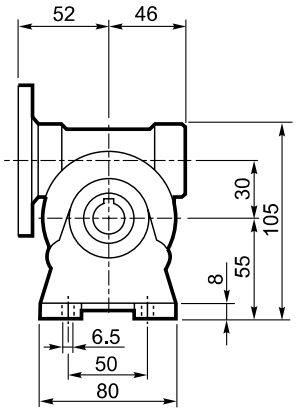

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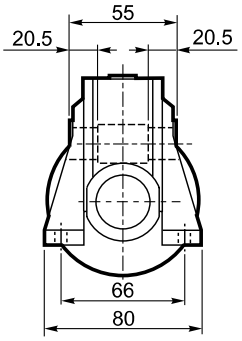

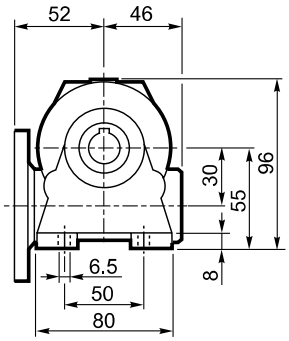

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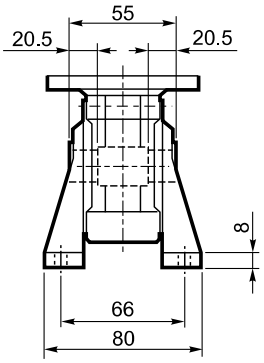

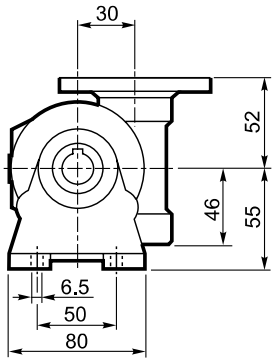

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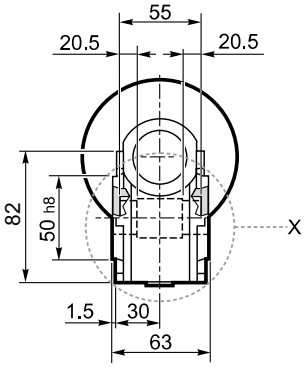

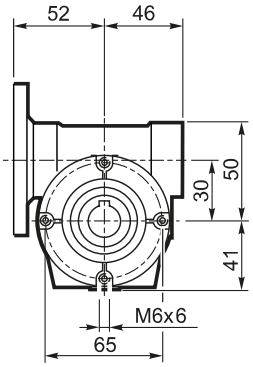

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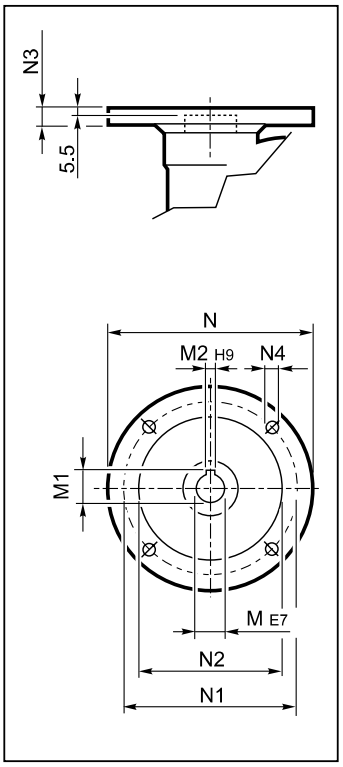

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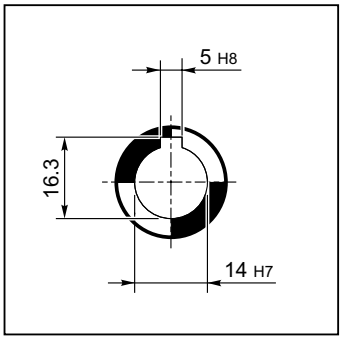

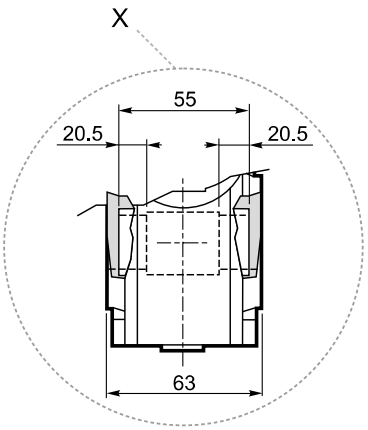

VF 30...P(IEC)

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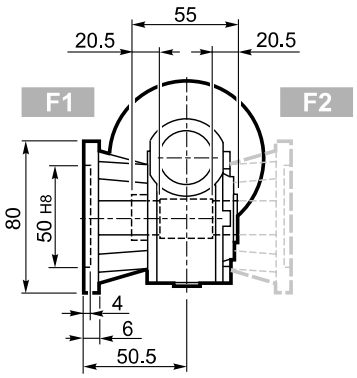

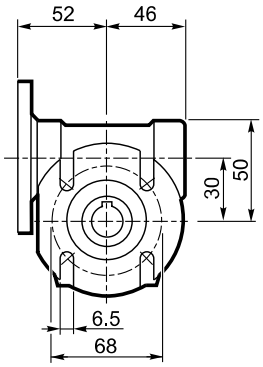

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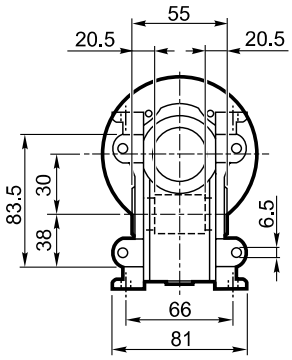

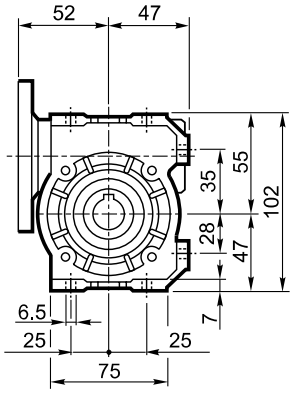

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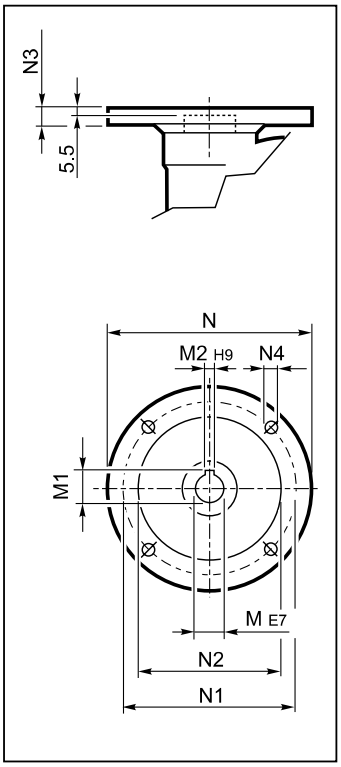

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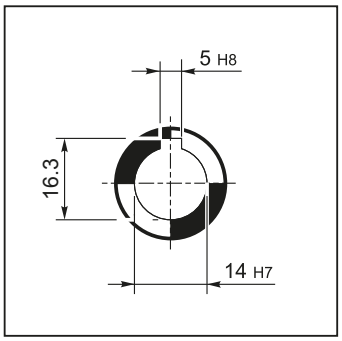

VF 30										
		M	M1	M2	N	N1	N2	N3	N4	Kg
VF 30	P56 B5	9	10.4	3	120	100	80	7	7	1.1
VF 30	P56 B14	9	10.4	3	80	65	50	7	5.5	
VF 30	P63 B5	11	12.8	4	140	115	95	8	9.5	
VF 30	P63 B14	11	12.8	4	90	75	60	6	5.5	

VF 44...P(IEC)

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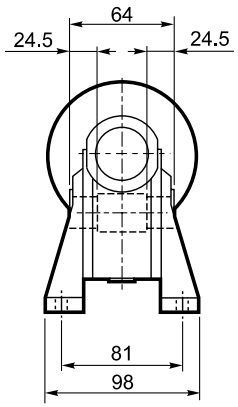

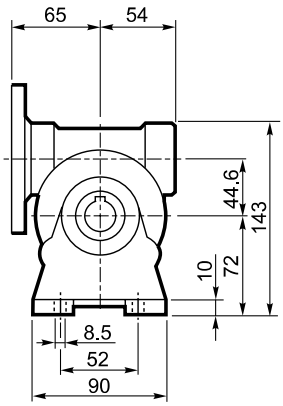

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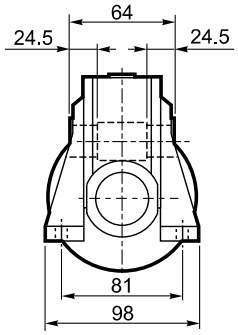

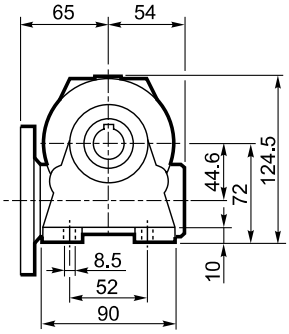

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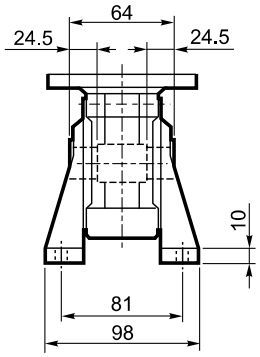

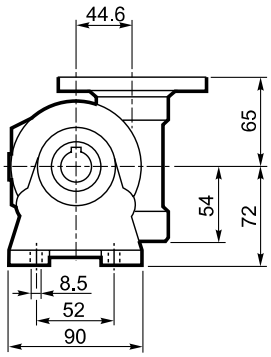

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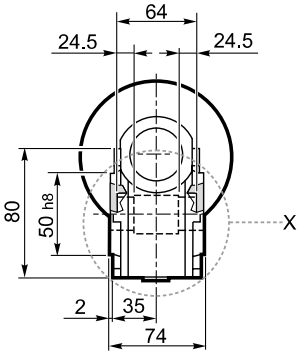

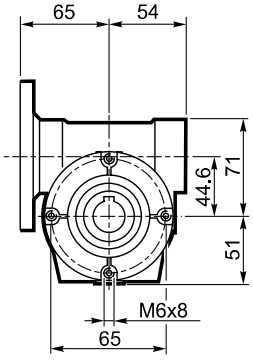

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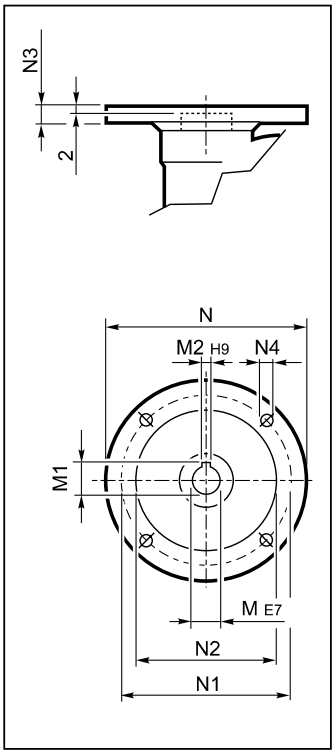

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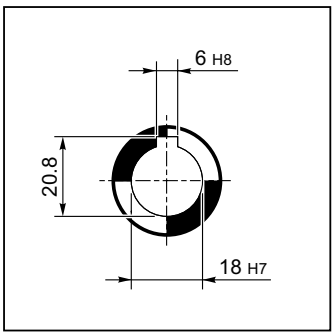

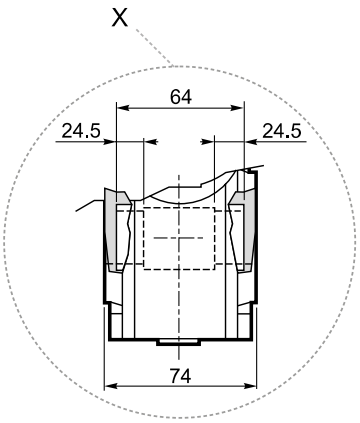

VF 44...P(IEC)

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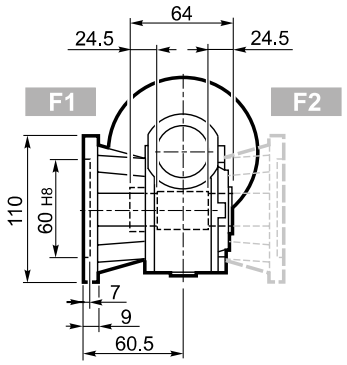

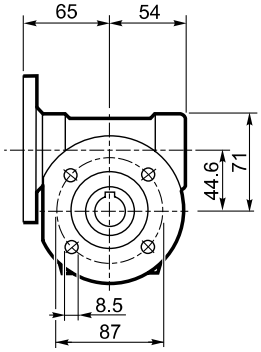

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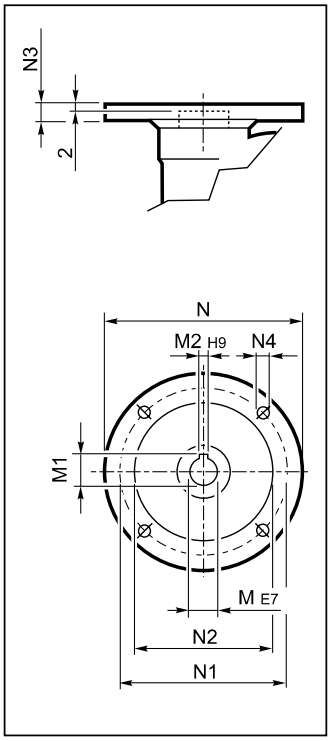

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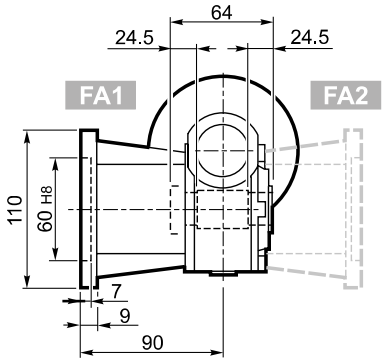

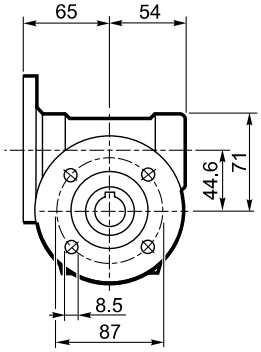

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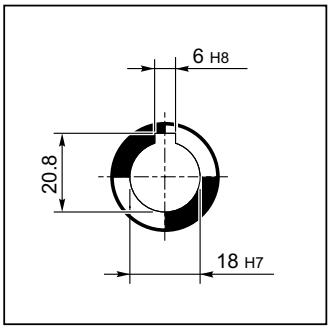

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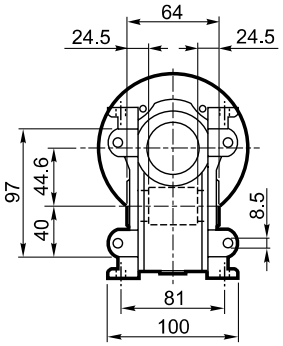
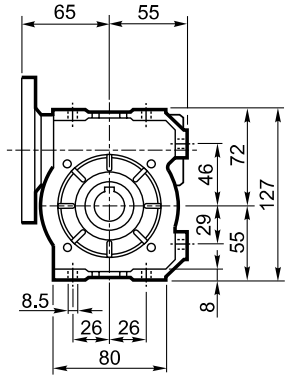
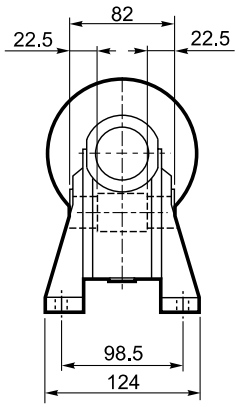


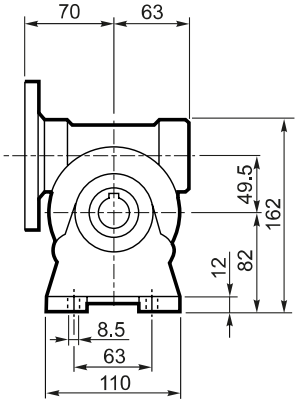


VF 44										
		M	M1	M2	N	N1	N2	N3	N4	Kg
VF 44	P63 B5	11	12.8	4	140	115	95	10	9.5	2.0
VF 44	P71 B5	14	16.3	5	160	130	110	10	9.5	
VF 44	P63 B14	11	12.8	4	90	75	60	8	5.5	
VF 44	P71 B14	14	16.3	5	105	85	70	10	7	

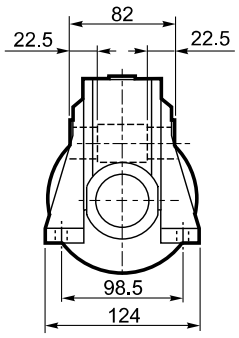
VF 49...P(IEC)

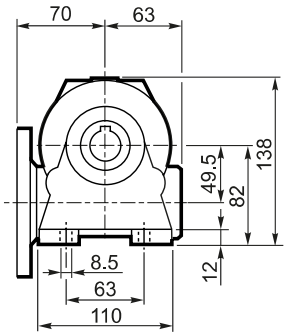
A



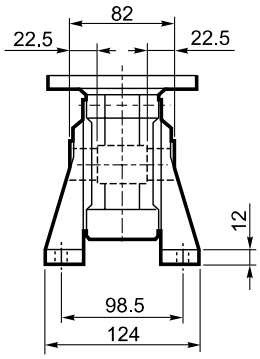


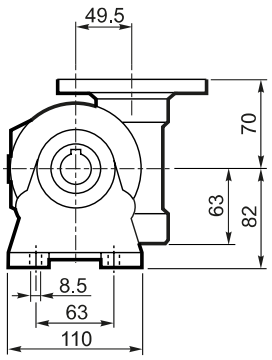
N



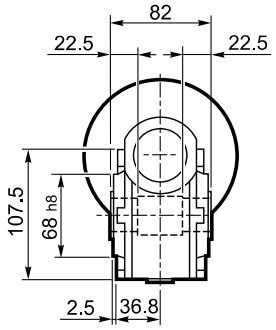


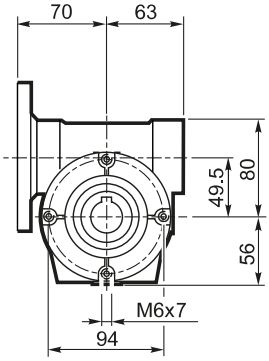
V





P





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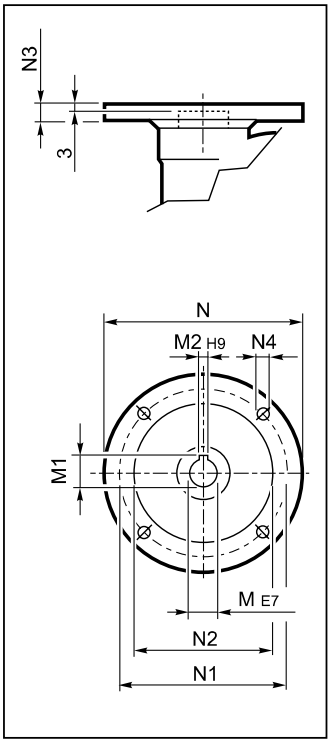
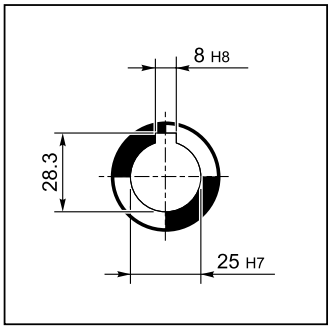
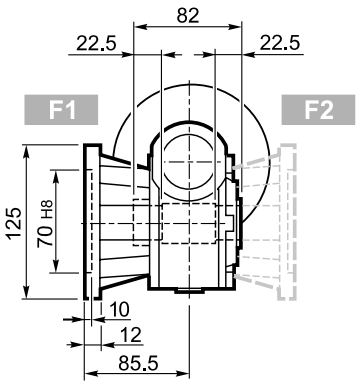


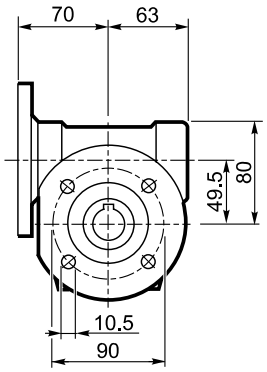
OUTPUT



VF 49...P(IEC)

F_





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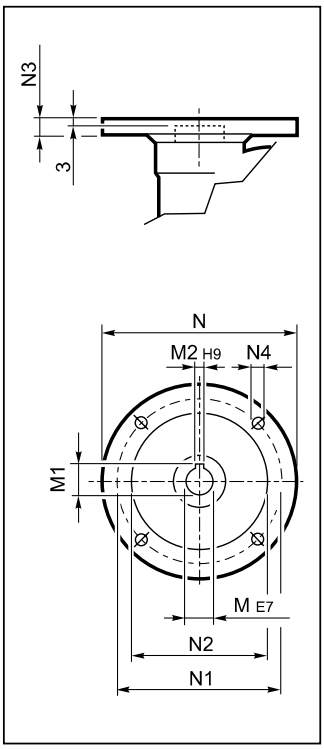
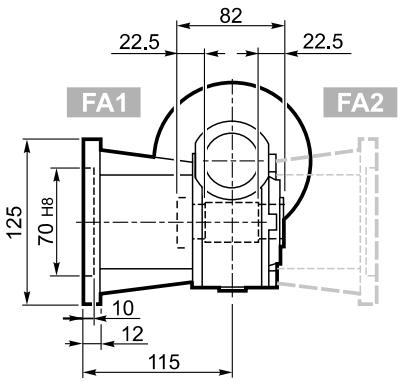
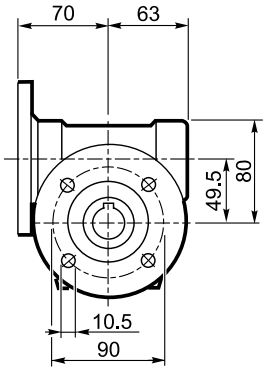
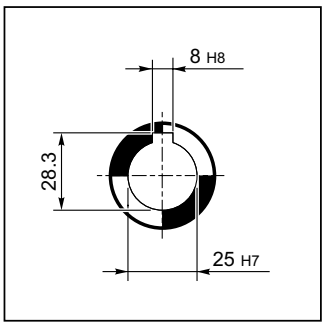


FA_

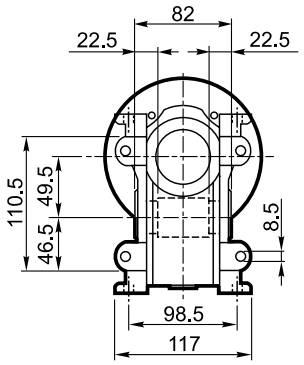


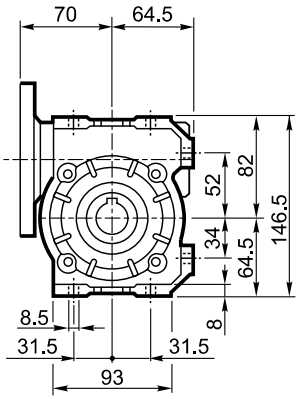


OUTPUT



U

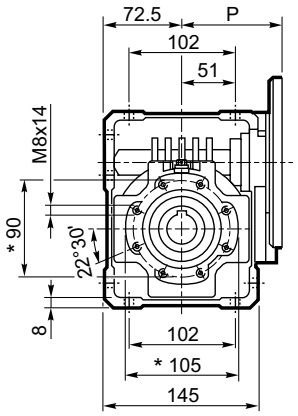


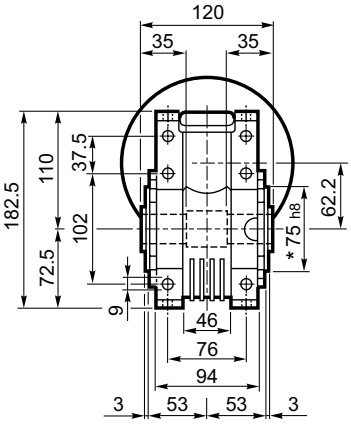


VF 49										
		M	M1	M2	N	N1	N2	N3	N4	Kg
VF 49	P63 B5	11	12.8	4	140	115	95	10.5	9.5	3.0
VF 49	P71 B5	14	16.3	5	160	130	110	10.5	9.5	
VF 49	P80 B5	19	21.8	6	200	165	130	10	11.5	
VF 49	P63 B14	11	12.8	4	90	75	60	7	6	
VF 49	P71 B14	14	16.3	5	105	85	70	10.5	6.5	
VF 49	P80 B14	19	21.8	6	120	100	80	10	7	

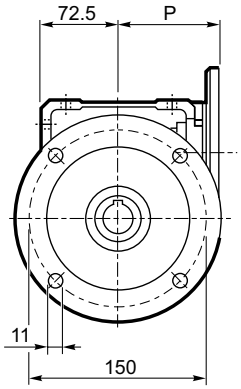
W 63...P(IEC)

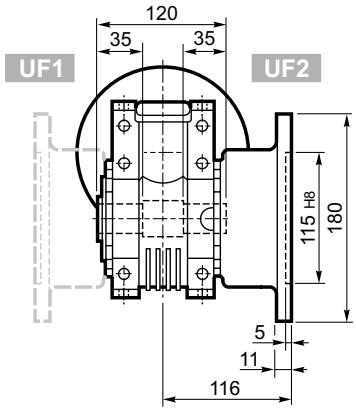
U



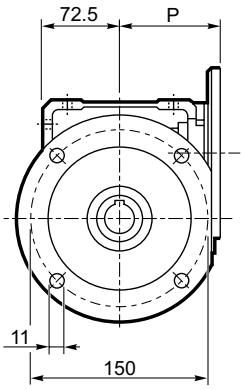


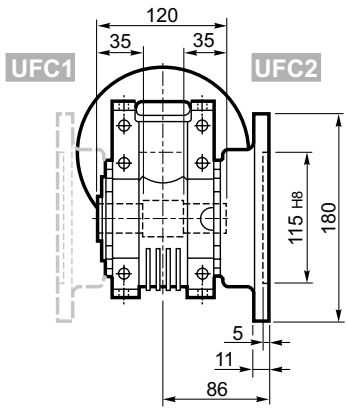
UF_



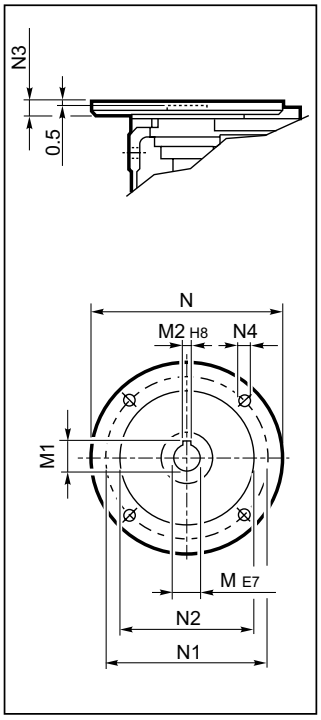


UFC_

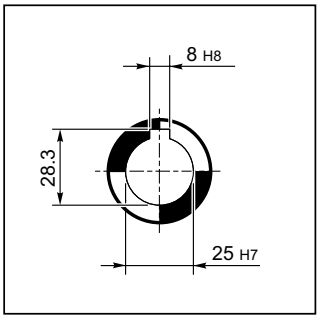




INPUT



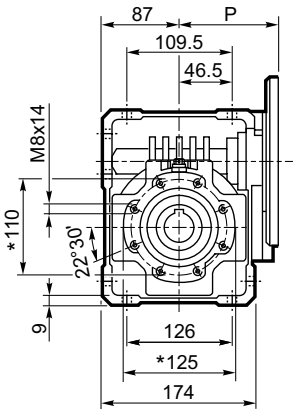
OUTPUT

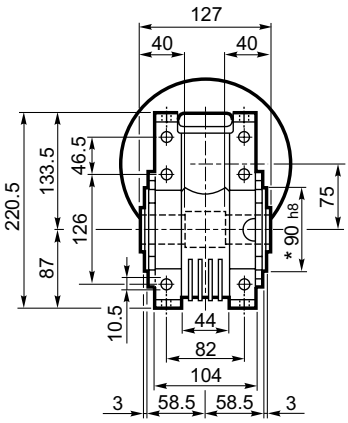


W 63											
		M	M1	M2	N	N1	N2	N3	N4	P	Kg
W 63	P71 B5	14	16.3	5	160	130	110	11	9	95	6.3
W 63	P80 B5	19	21.8	6	200	165	130	12	11.5	102	6.5
W 63	P90 B5	24	27.3	8	200	165	130	12	11.5	102	6.4
W 63	P71 B14	14	16.3	5	105	85	70	11	6.5	95	6.1
W 63	P80 B14	19	21.8	6	120	100	80	11	6.5	102	6.3
W 63	P90 B14	24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

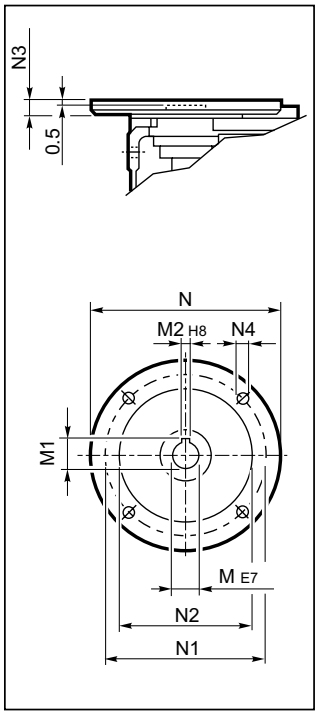
W 75...P(IEC)

U

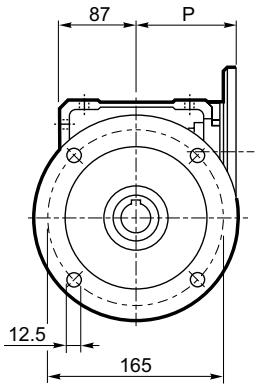


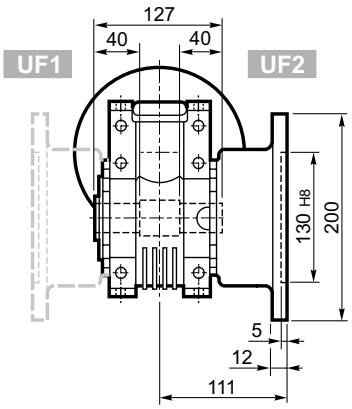


INPUT

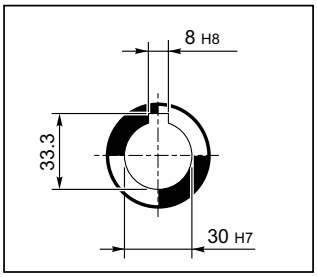


UF_



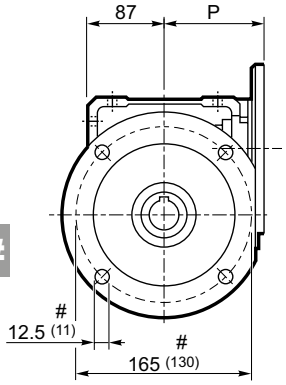


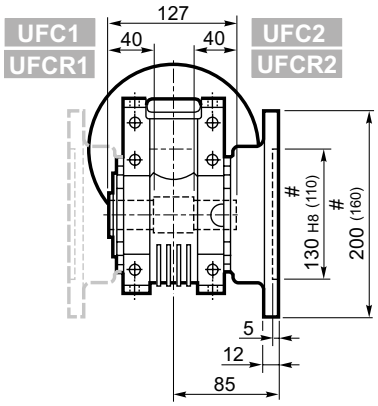
STANDARD OUTPUT



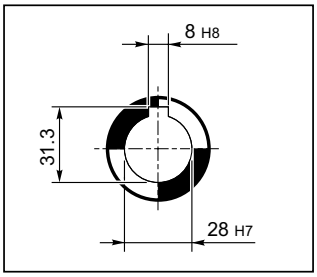
UFC_

UFCR_#





ON REQUEST OUTPUT

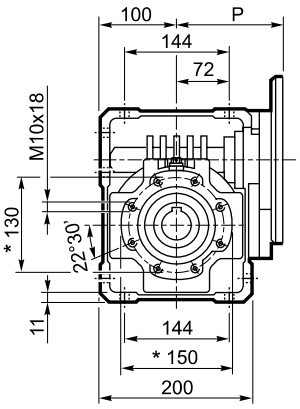


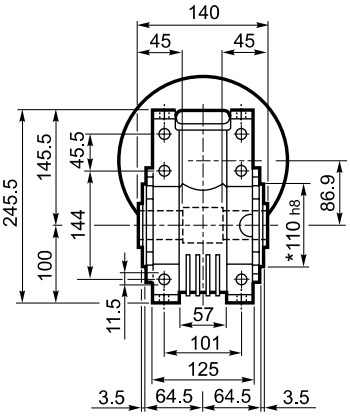
W 75											
		M	M1	M2	N	N1	N2	N3	N4	P	Kg
W 75	P71 B5	14	16.3	5	160	130	110	11	9	112	9.5
W 75	P80 B5	19	21.8	6	200	165	130	12	11.5	112	9.7
W 75	P90 B5	24	27.3	8	200	165	130	12	11.5	112	9.6
W 75	P100 B5	28	31.3	8	250	215	180	13	12.5	120	9.7
W 75	P112 B5	28	31.3	8	250	215	180	13	12.5	120	9.7
W 75	P80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

* On bothsides # Reduced flange

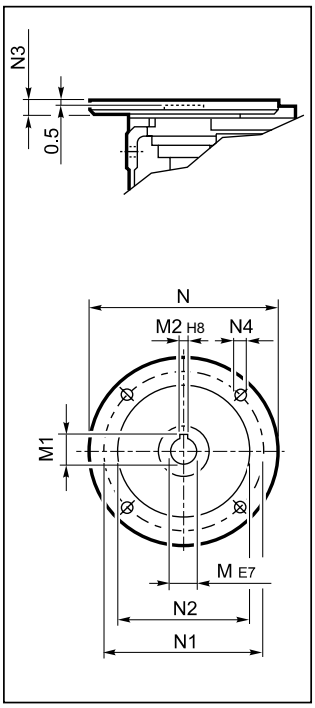
W 86...P(IEC)

U

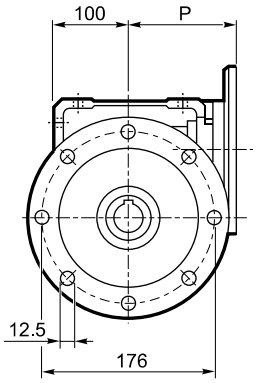


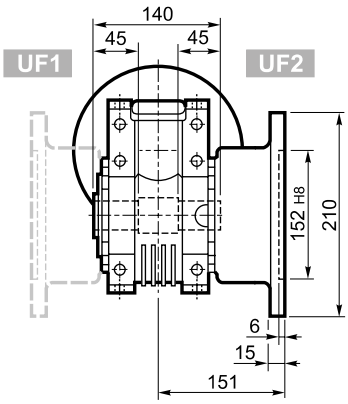


INPUT

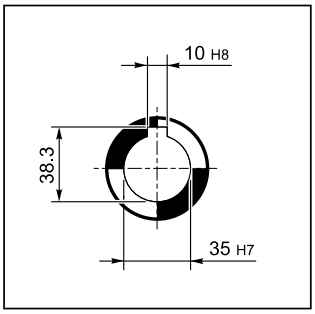


UF_

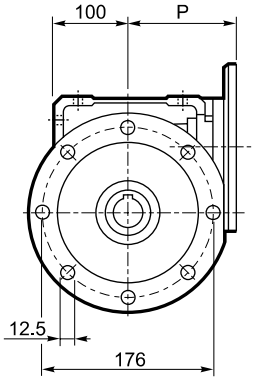


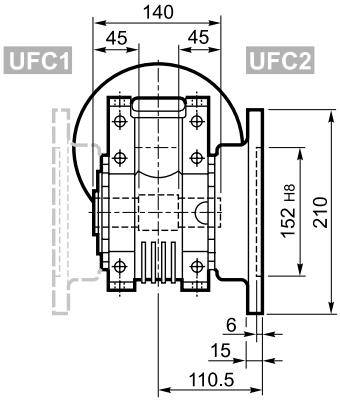


OUTPUT



UFC_



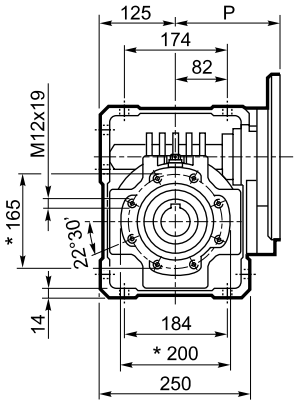


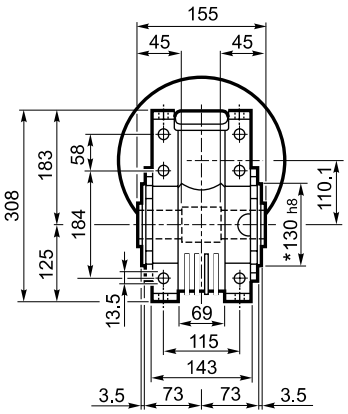
W 86											
		M	M1	M2	N	N1	N2	N3	N4	P	Kg
W 86	**P71 B5**	14	16.3	5	160	130	110	11	9	128	13.6
W 86	**P80 B5**	19	21.8	6	200	165	130	12	11.5	128	13.8
W 86	**P90 B5**	24	27.3	8	200	165	130	12	11.5	128	13.7
W 86	**P100 B5**	28	31.3	8	250	215	180	13	12.5	136	13.8
W 86	**P112 B5**	28	31.3	8	250	215	180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

* On bothsides

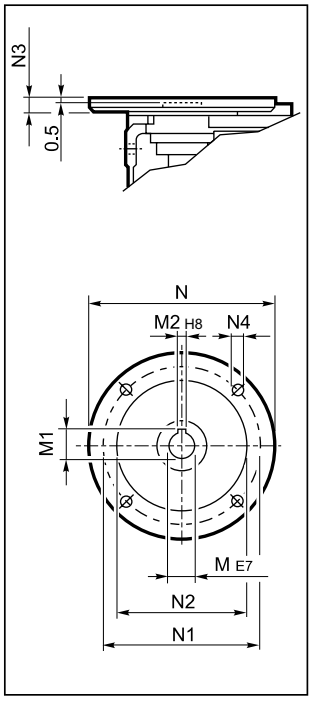
W 110...P(IEC)

U





INPUT



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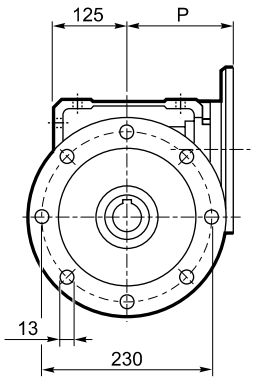

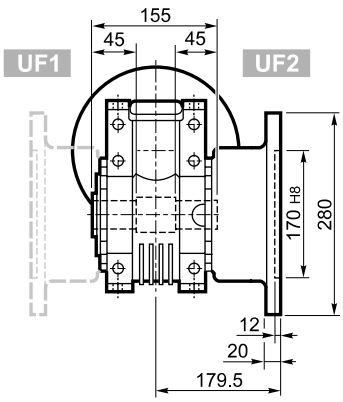

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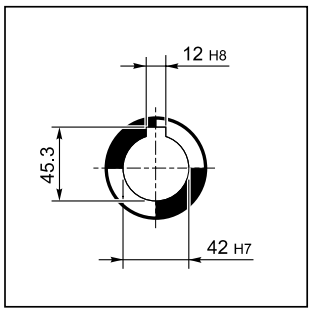

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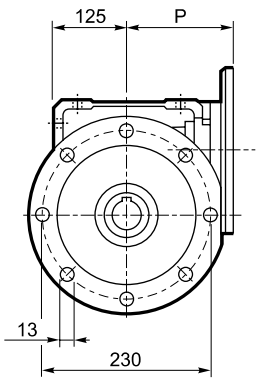
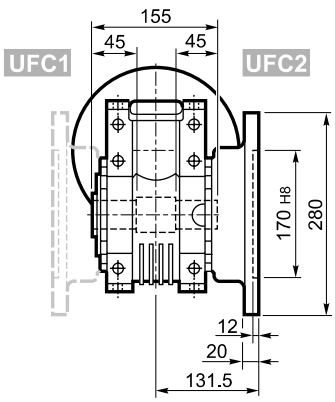


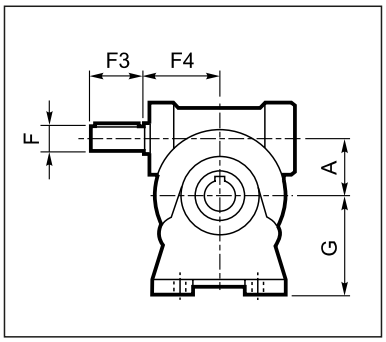


W 110											
		M	M1	M2	N	N1	N2	N3	N4	P	Kg
W 110	**P80 B5**	19	21.8	6	200	165	130	—	M10x12	143	28
W 110	**P90 B5**	24	27.3	8	200	165	130	—	M10x12	143	28
W 110	**P100 B5**	28	31.3	8	250	215	180	13	13	151	29
W 110	**P112 B5**	28	31.3	8	250	215	180	13	13	151	29
W 110	**P132 B5**	38	41.3	10	300	265	230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

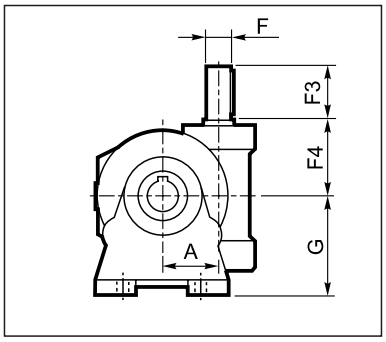
* On bothsides

VF...HS - W...HS

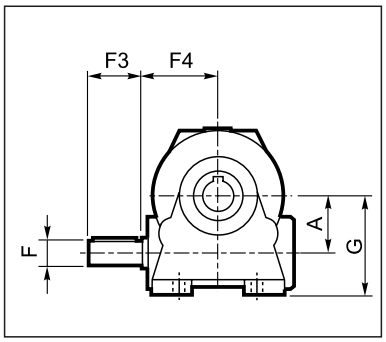
VF_A...HS



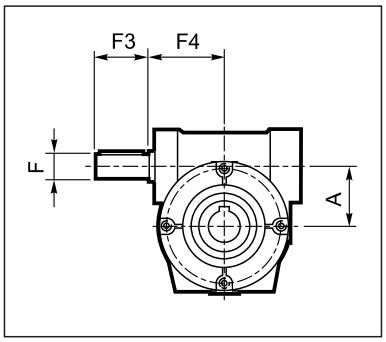
VF_V...HS



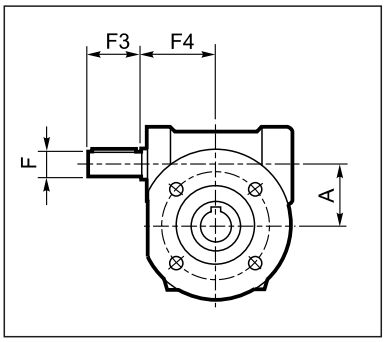
VF_N...HS



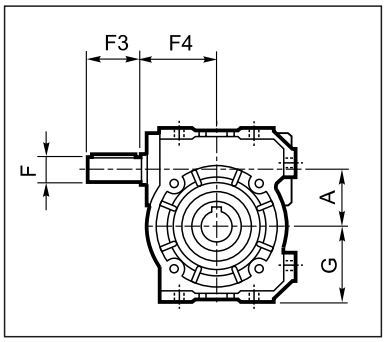
VF_P...HS



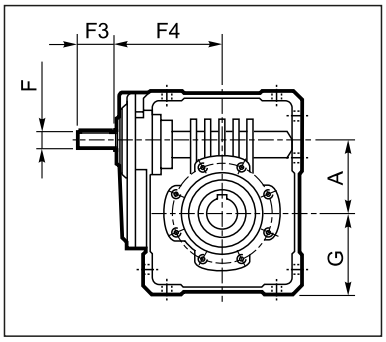
VF_F/FA...HS



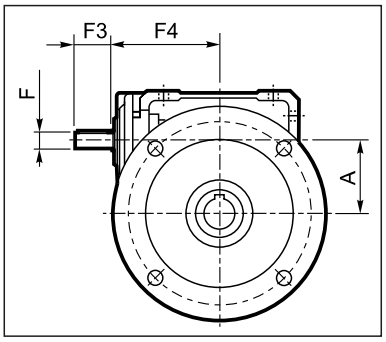
VF_U...HS

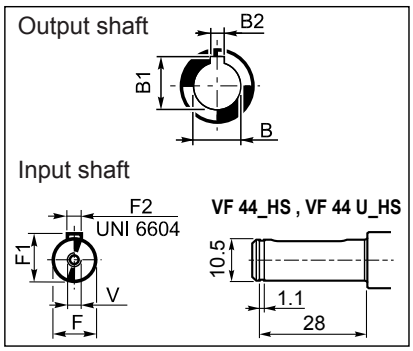


W_U...HS



W_UF/UFC/UFCR...HS



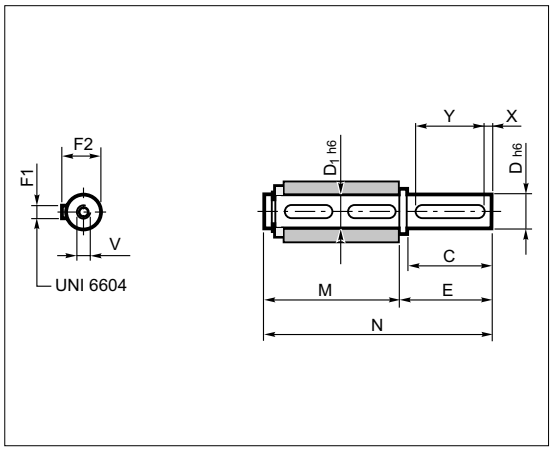


	A	B	B1	B2	F	F1	F2	F3	F4	G	V	Kg
VF 44_HS	44.6	18 H7	20.8	6 H8	11 h6	12.5	4	30	54	72	—	2.0
VF 44 U HS										55		
VF 49_HS	49.5	25 H7	28.3	8 H8	16 h6	18	5	40	65	82	M6x16	3.0
VF 49 U HS										64.5		
W 63_HS	62.17	25 H7	28.3	8 H8	18 h6	20.5	6	40	110.5	72.5	M6x16	6.4
W 75_HS	75	30(28) H7	33.3(31.3)	8 H8	19 h6	21.5	6	40	128	87	M6x16	10.0
W 86_HS	86.9	35 H7	38.3	10 H8	25 h6	28	8	50	144	100	M8x19	14.1
W 110_HS	110.1	42 H7	45.3	12 H8	25 h6	28	8	60	168	125	M8x19	27

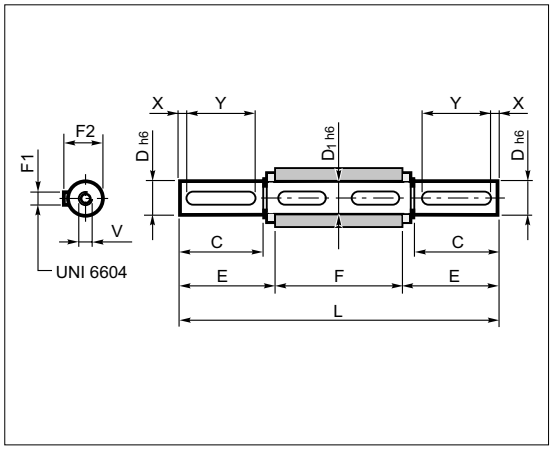
Dimensions common to the other configurations can be found from page 28 to 37

2.10 ACCESSORIES

2.10.1 Plug-in output shaft

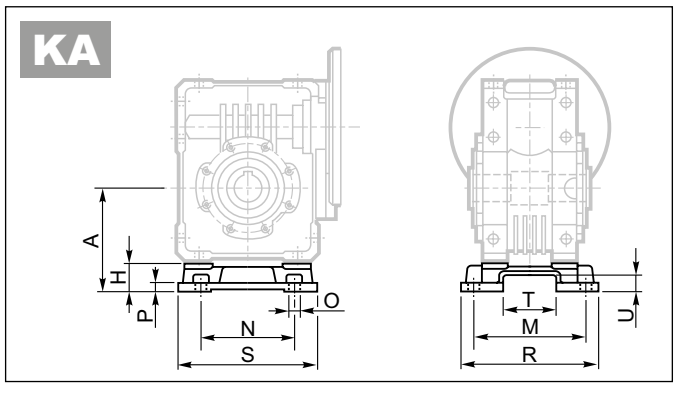


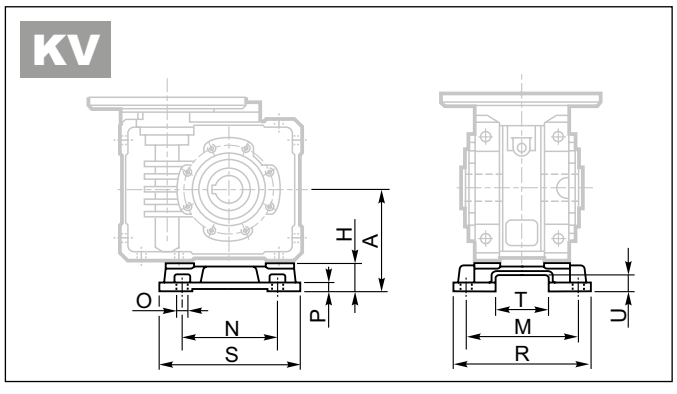
		C	D	D1	E	F1	F2	M	N	V	X	Y
VF	30	30	14	14	35	5	16	61	96	M5x13	5	20
	44	40	18	18	45	6	20.5	70	115	M6x16	5	30
	49	60	25	25	65	8	28	89	154	M8x19	5	50
W	63	60	25	25	65	8	28	127	192	M8x19	5	50
	75_D28	60	28	30	65	8	31	134	199	M8x20	5	50
	75_D30	60	30	30	65	8	33	134	199	M10x22	5	50
	86	60	35	35	65	10	38	149	214	M10x22	5	50
	110	75	42	42	80	12	45	164	244	M12x28	7.5	60



		C	D	D1	E	F	F1	F2	L	V	X	Y
VF	30	30	14	14	32.5	55	5	16	120	M5x13	5	20
	44	40	18	18	42.7	64	6	20.5	149.4	M6x16	5	30
	49	60	25	25	63.2	82	8	28	208.4	M8x19	5	50
W	63	60	25	25	63.2	120	8	28	246.4	M8x19	5	50
	75_D28	60	28	30	64	127	8	31	255	M8x20	5	50
	75_D30	60	30	30	64	127	8	33	255	M10x22	5	50
	86	60	35	35	64	140	10	38	268	M10x22	5	50
	110	75	42	42	79.3	155	12	45	313.5	M12x28	7.5	60

2.10.2 VF-interchangeable foot kits KA, KV



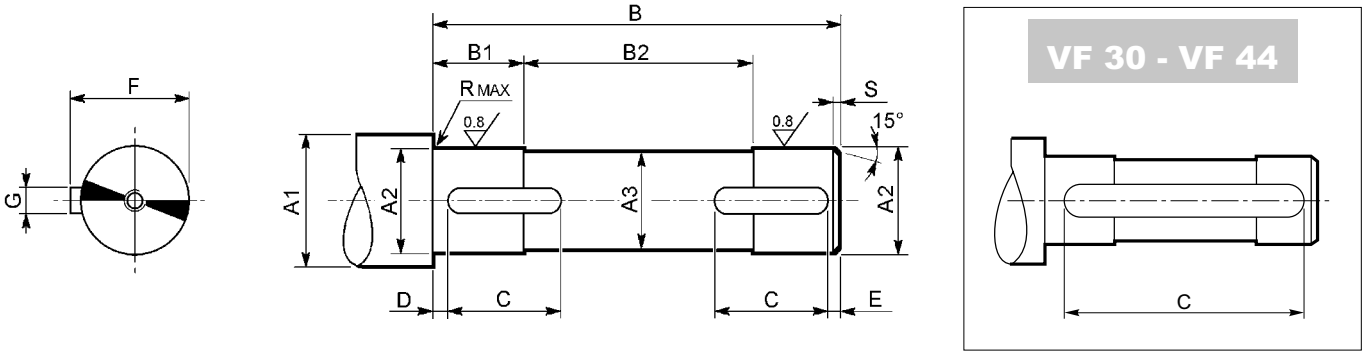


	A	H	M	N	O	P	R	S	T	U
W 63	100	27.5	111	95	11	8	135	145	56.5	15.5
W 75	115	28	115	120	11	9	139	174	56.5	15.5
W 86	142	42	146	140	11	11	170	200	69	20
W 110	170	45	181	200	13	14	210	250	69	20

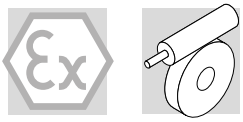
2.11 CUSTOMER'S SHAFT

2.11.1 Manufacturing instructions

Pivot of driven equipment should be made from high grade alloy steel. Table below shows recommended dimensions for the Customer to consider when designing mating shaft.
A device retaining the shaft axially is also recommended (not shown). The number and size of relative tapped holes at shaft end depend on application requirements.



	A1	A2	A3	B	B1	B2	C	D	E	F	G	R	S	UNI 6604
VF 30	≥ 19	14 f7	13	53	18.5	16	40	6.5	6.5	16	5 h9	0.5	1.5	5x5x40 A
VF 44	≥ 23	18 f7	17	62	22.5	17	50	6	6	20.5	6 h9	0.5	1.5	6x6x50 A
VF 49	≥ 30	25 f7	24	80	20.5	39	20	2	2	28	8 h9	1	1.5	8x7x20 A
W 63	≥ 30	25 f7	24	118	38	42	35	2	2	28	8 h9	1	1.5	8x7x35 A
W 75	≥ 35	28 f7	27	125	38	49	40	2	2	31	8 h9	1	1.5	8x7x40 A
	≥ 35	30 f7	29	125	38	49	40	2	2	33	8 h9	1	1.5	8x7x40 A
W 86	≥ 42	35 f7	34	138	43	52	40	2	2	38	10 h9	1.5	1.5	10x8x40 A
W 110	≥ 48	42 f7	41	153	43	67	50	2	2	45	12 h9	1.5	2	12x8x50 A



INDEX OF REVISIONS (R)

BR_CAT_VF-W_ATX_ENG_R01_2	
	Description
14	“Lubrication” chapter updated.

2024 10 09

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