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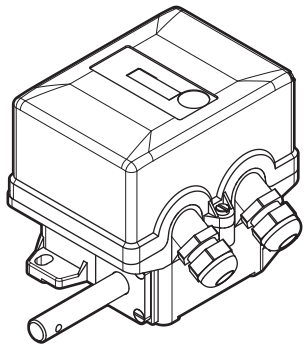
EN
instruction manual



FGR2

ROTARY GEAR LIMIT SWITCH

Before use, read this booklet carefully to acquaint yourself with the features of the product. This booklet is an integral part of the product and therefore must be kept until the product is dismissed.

Giovenzana International B.V. reserves the right to change the features and data shown in this document at any time and without notice. This document cannot therefore be considered a contract with third parties.

Rotary gear limit switches FGR are designed and manufactured according to IEC international standard and EN European regulations.

Any improper installation or any tampering of the device may cause serious personnel injury or property damage, therefore, the installation and maintenance must be performed by specialized and authorized personnel.

The use of this device is not allowed in environment with a potentially explosive atmosphere or in presence of corrosive substances and in salt spray.

They are suitable for use in industrial environment with machinery monitoring and protection purpose.

Available in 2 variations:
- base fixing
- rear shaft

Front fixing with optional flange available.

INTRODUCTION

The FGR rotary gear limit switch is a device used to control the number of turns or the rotation/direction angle of industrial and building machines.
A typical application is the rolling shutter door, overhead cranes or tackles etc. The unit, throught a gear system and cams transmission, controls 2 or more microswitches so, after a determined number of revolutions, it can prepare the motor to start or stop run.
The microswitches have a calibration screw that operates independently on each cam; so it can calibrate the opening and closing of each micro according the functional requirements needed.
The system gear transmission allows you to choose different ratios with the main shaft.

Terms of use

The equipment must be installed only if it is completely intact and unbroken. The product must be installed according to the applicable code of practice, national regulations and laws and / or international standards as well as in compliance with the present instructions.
Do not change anything inside or outside the equipment.

Low mechanical risk
The equipment is suitable for resisting impact energies up to 4 J.
When impacts of energy are likely greater than 4 J, additional mechanical protection is required around the plastic case.

Potential electrostatic risk
The equipment is intended for fixed use and the user must not frequently touch the equipment in service (except for maintenance).
To avoid the potential electrostatic charge, it is necessary to perform the following instructions during the installation and service of the FGR:
- Do not install under direct air or other gas flow. If these requirements cannot be met, additional external direct flow protection is required.
- Install only when the relative humidity of the environment is greater than 30% (stable, always or for a long time) or in an environment with a humidity control system.
- The metal parts of the casing must be connected to the equipotential system in accordance with the instructions in paragraph “Connection of earthing or bonding conductors”.
- Do not rub the plastic cover insistently. If cleaning is required (e.g. to remove dust) only manual operations with wet materials are allowed.

Special conditions for a safe usage

Conditions
- The inner components (cam MFI micros, mounting brackets, etc.) are mounted in order to guarantee the type of protection.
- Any modification is forbidden.
- Do not remove any components or micro even if they are not used.

Types of protection
- Every screw shall be tightened with the tightening torque according to this document, to maintain the degree of protection IP.
- Additional holes and/or entries into enclosure are forbidden, the only entries in the enclosure shall be made by Giovenzana (see the information reported in clause 1 of this document).
- The type of protection and minimum degree of protection (IP code) of the entries into enclosure or cable glands shall be in accordance with the equipment marking.
- Any entry of the enclosure, the mounting of the entries into enclosure or cable glands shall be carried out to maintain the level of protection of the equipment.

Connection of earthing or bonding conductors
The equipment shall be earthed in accordance with the relevant code of practice. The equipment is provided by internal connection terminal for earthing.
If the reference standards applicable for the installation require an external equipotential connection or these become necessary for other reasons, connect the equipotential conductor to the external earth terminal, identified with the earthing symbol.
The conductors used for the earth and equipotential connection must be equipped with an eye lug. Install each conductor according to the following instructions:
- Place the eyelet in contact with the threaded hole of the internal or external earth terminal, positioned on the metal box.
- Place a Grover washer or non-loosening washer between the eye lug and the clamp screw.
- Tighten the ground terminal screw with a tightening torque of 1.7 N×m (15 lb×in). On the internal earth screw add some threadlocker. Tightening the screw ensures electrical continuity.

TECHNICAL CHARACTERISTICS

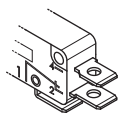
Technical data

Case	- base: die-cast aluminum alloy - cover: self-extinguishing thermoplastic material
Ratio	-
Direct ratio	1:12 - 1:33 - 1:50 - 1:100 - 1:200
Protection class	IP65
Shaft type	- stainless steel mounted on ball bearings - double overhang shaft version available
Fixing type	base
Microswitches	up to 6
Cam block	self-lubricating with transparent support for easier cam viewing
Cable entry	2 × M16
Temperature	- operating: -25 ... +70°C - storage: -30 ... +70°C
Options	- 3 cam shape options - 20 pinion options - front fixing (with optional flange)

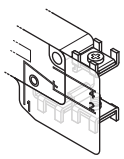
Microswitch technical data

Operating temperature			-25 ... +85°C
Minimum life expectancy	mechanical electrical		one million of cycles half million of cycles
Rated thermal current	Ith		8 A
Rated insulation voltage	Ui		250 V
Rated impulse withstand voltage	Uimp		1500 V
Rated operating current	Ie	resistive load inductive load	8 A - 250 V 3 A - 250 V
Pollution degree			2
Protection against electric shock			class II

Terminals
The microswitches installed can have one of the three types of terminals illustrated below:

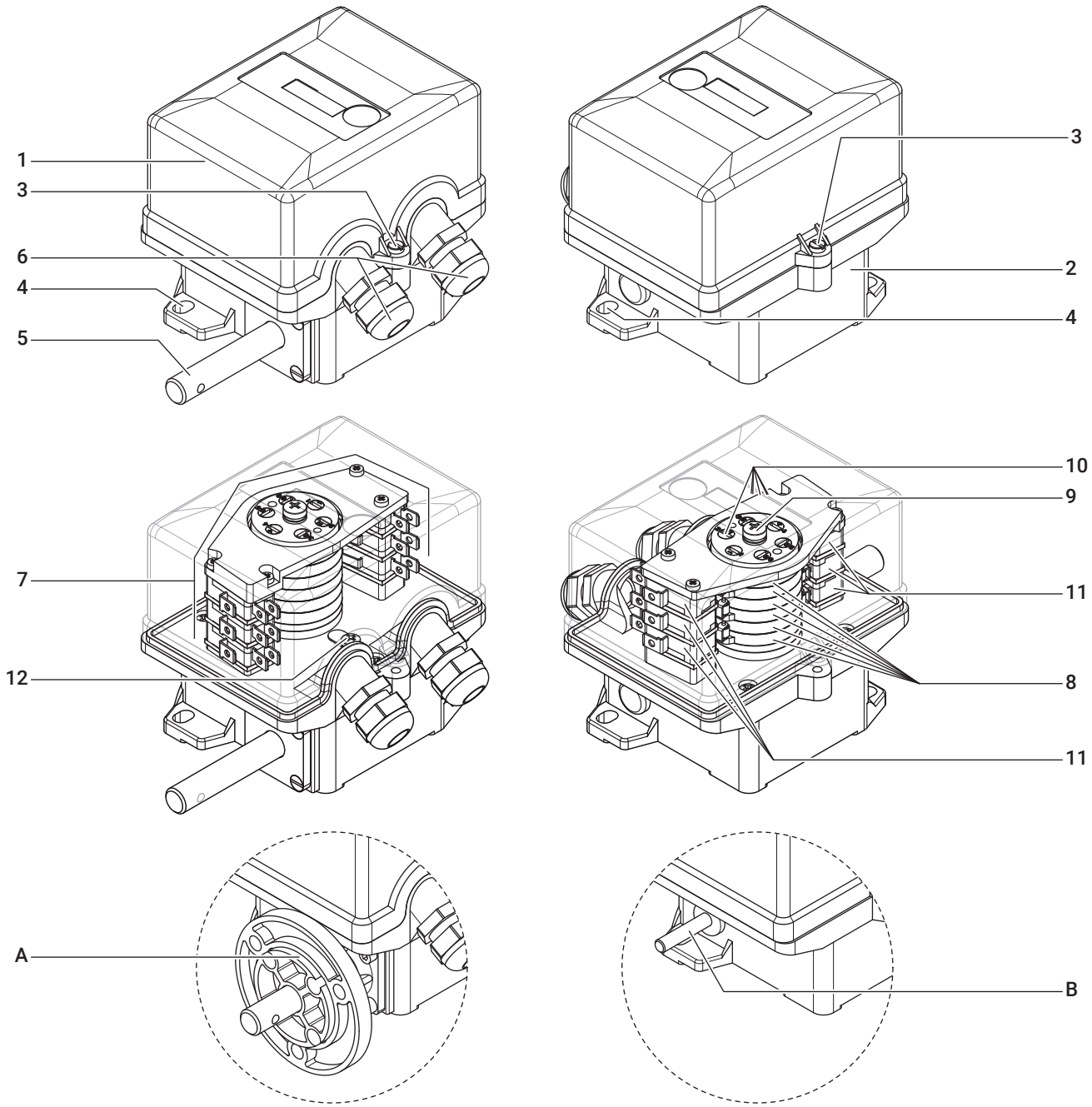


6.3×0.8 faston



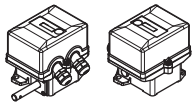
screws M3 for wire 1.5 mm² with plate protection

Main components

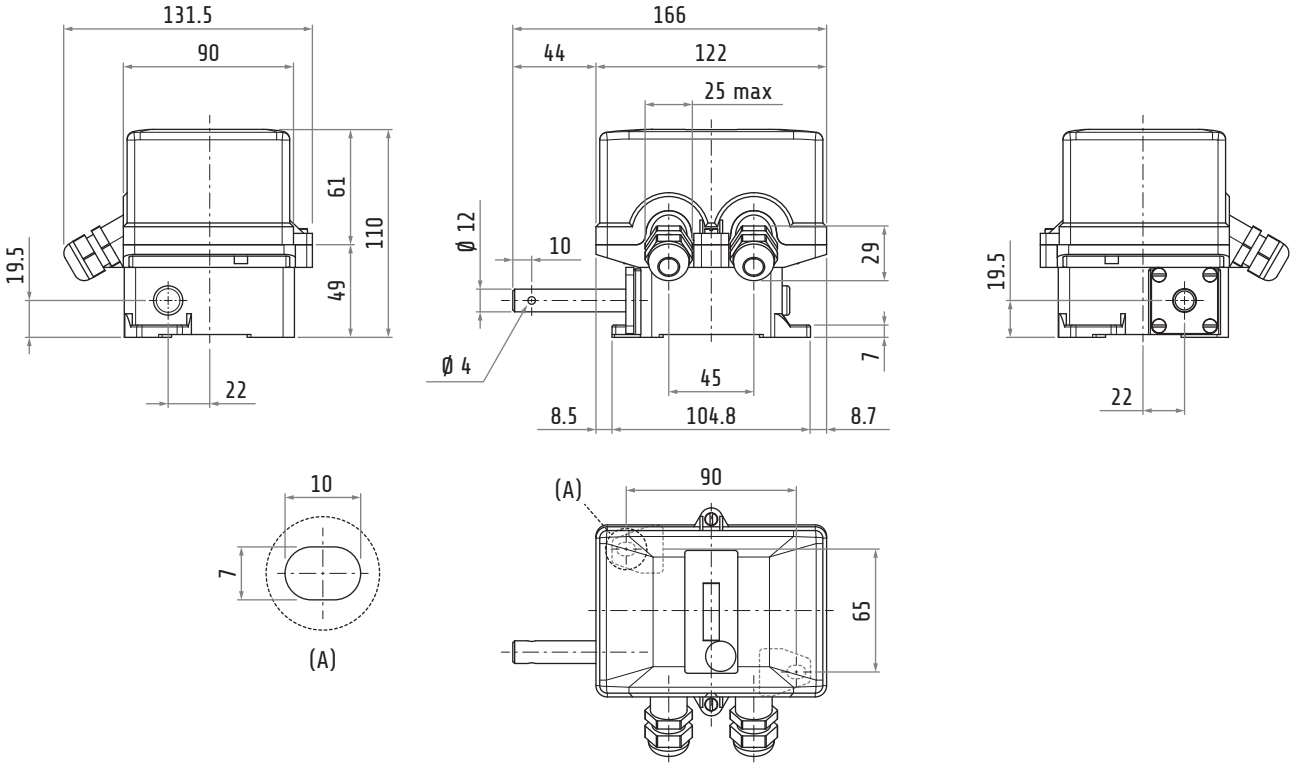


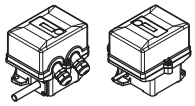
1	Cover
2	Base
3	Cover fixing screws
4	Holes for fixing the limit switch (M6)
5	Front shaft
6	Cable glands M20
7	Switch unit
8	Cams
9	Cam adjustment locking screw
10	Cam adjustment screws
11	Microswitches
12	Screw for earthing connection
A	Flange for front fixing of the limit switch (where provided)
B	Double shaft (where provided)

Dimensions

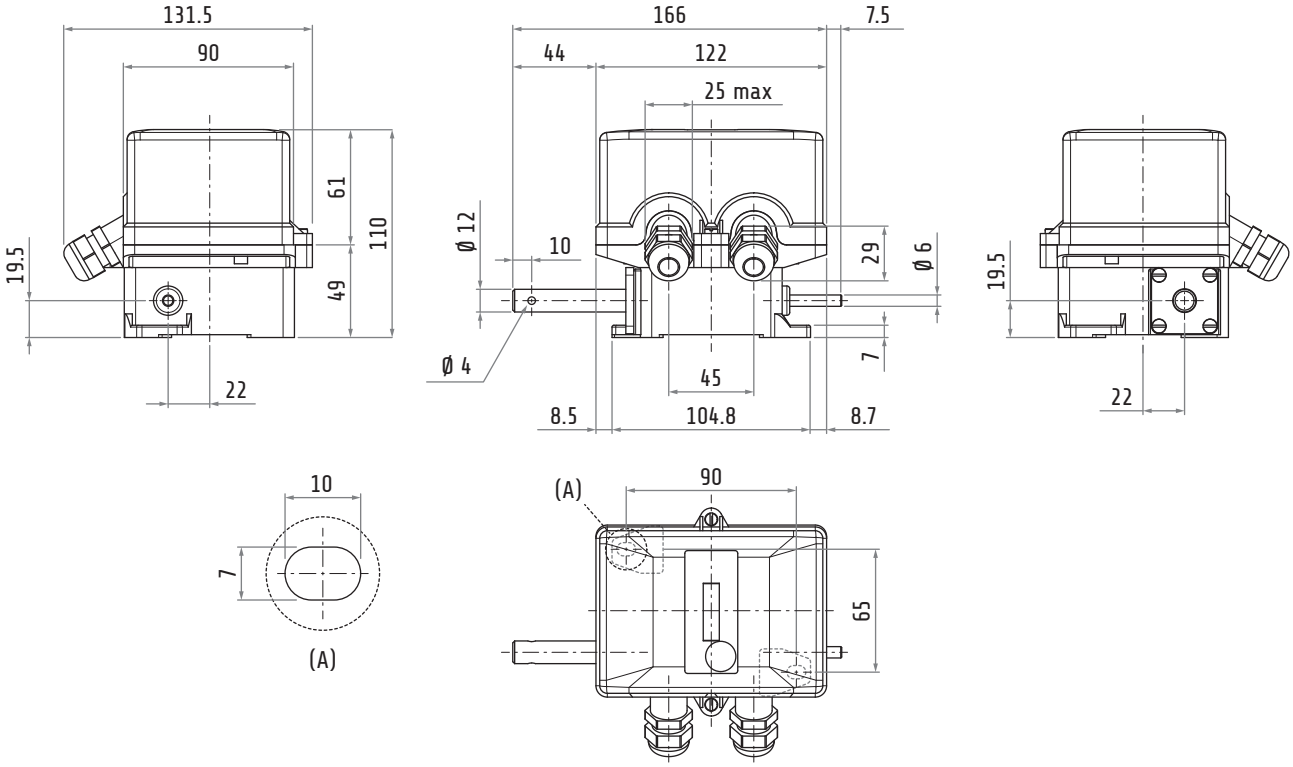


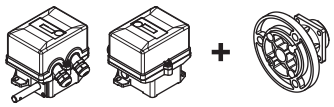
Base fixing



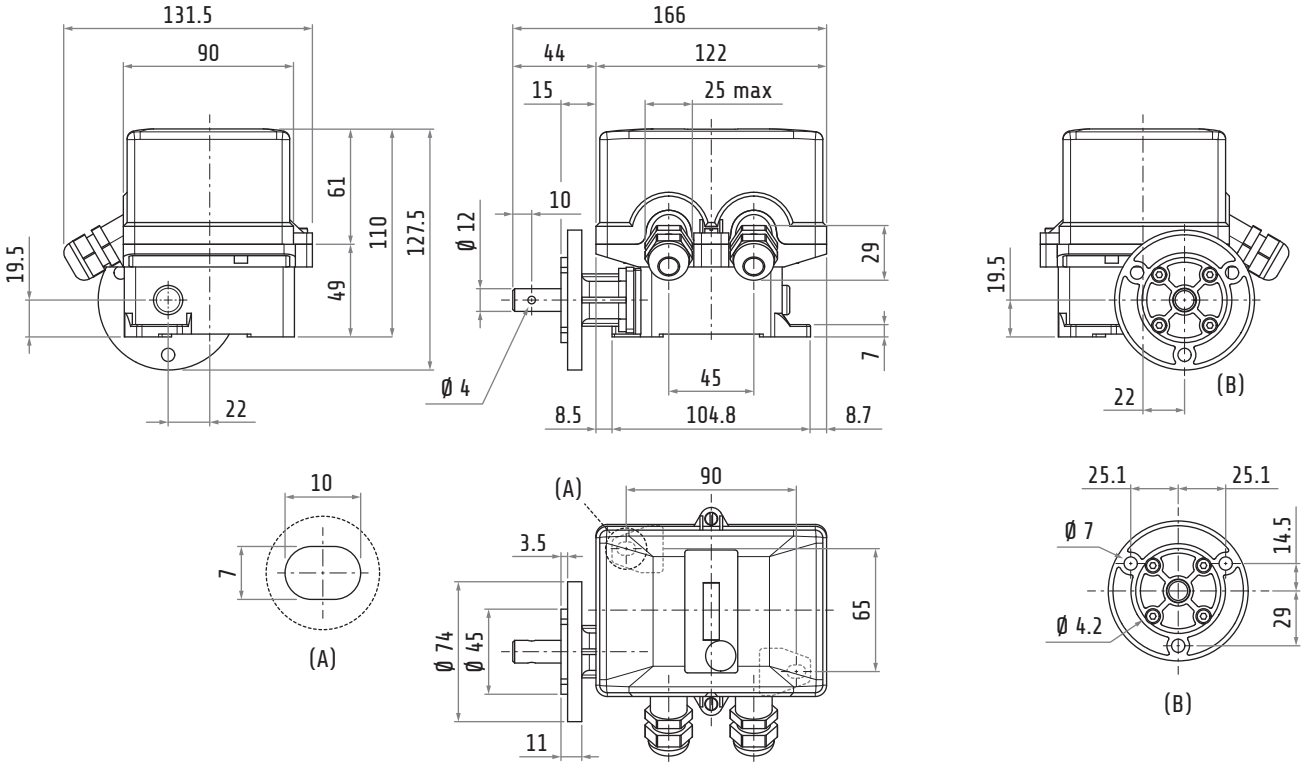


Rear shaft





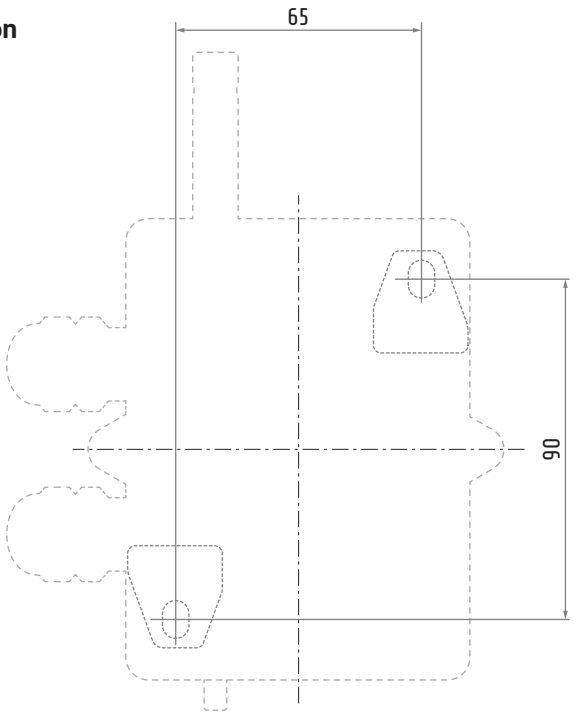
Front fixing with optional flange



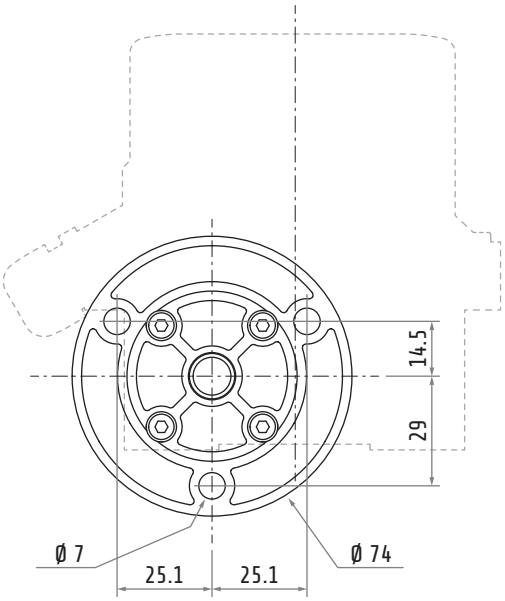
INSTALLATION

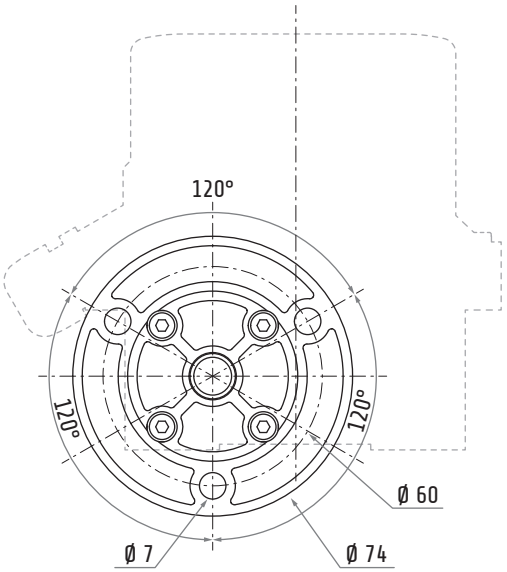
Limit switch installation

Fixing points for basic configuration

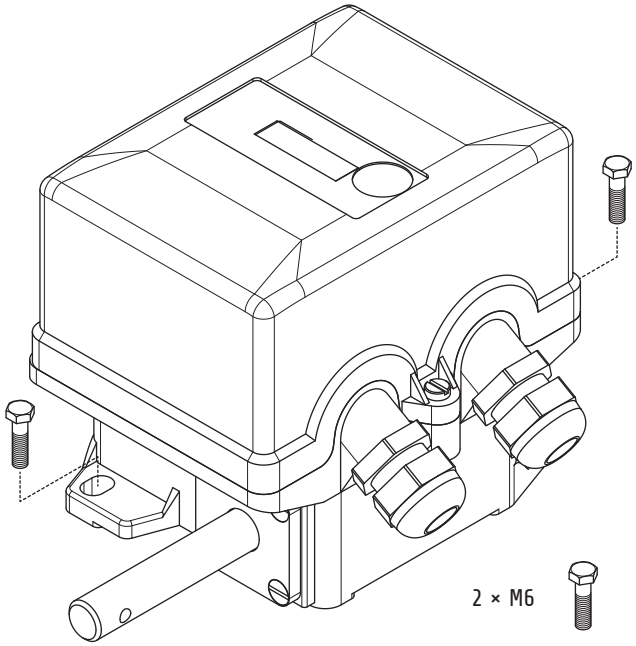


Fixing points for flanged configuration with optional flange

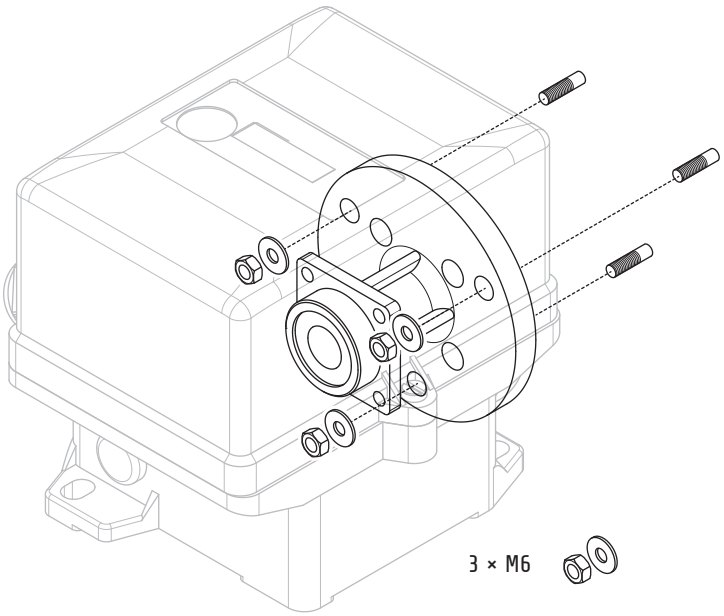




Base configuration fixing



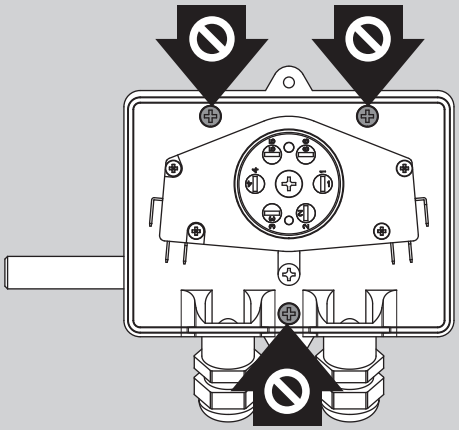
Flanged configuration fixing with optional flange



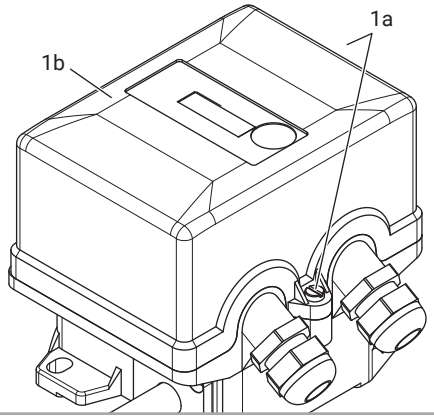
ATTENTION
TO CARRY OUT THE FOLLOWING OPERATIONS, THE LIMIT SWITCH COVER MUST BE REMOVED. ON THE COVER ARE PLACED VERY IMPORTANT INFORMATION CONCERNING THE LIMIT SWITCH YOU ARE INSTALLING. THE COVER MUST BE REASSEMBLED ON THE CORRESPONDING BODY. REASSEMBLING THE COVER ON A NON-CORRESPONDING BODY CAN LEAD TO AN INCORRECT INTERPRETATION OF THE LIMIT SWITCH OPERATION AND THEREFORE CAUSING SERIOUS DAMAGE TO THINGS AND PEOPLE DURING USE.

ATTENTION
The following procedures show an FGR limit switch with 6 microwsitches but remain valid for any other configuration.

ATTENTION
It is strictly forbidden to unscrew the screws indicated in the figure. Their removal can compromise the operation of the limit switch and therefore cause serious damages to things and people during use.

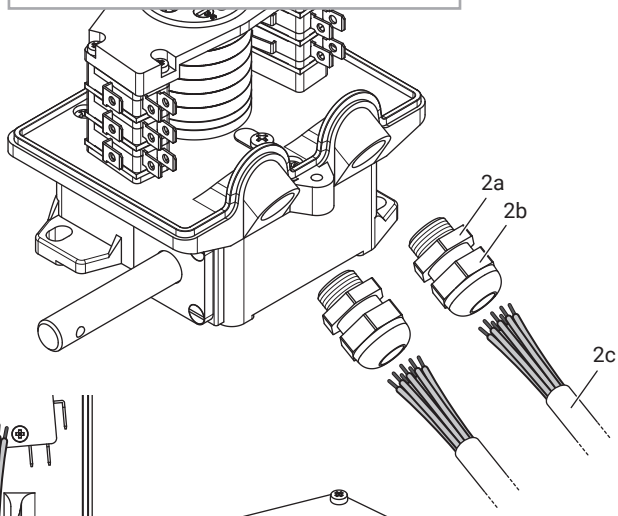


Limit switch wiring

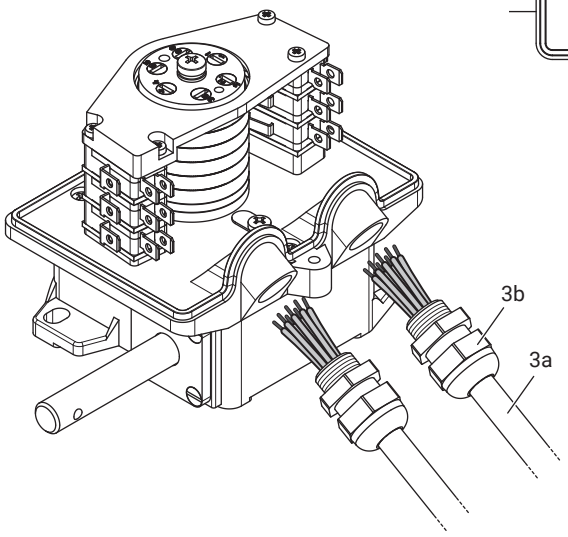


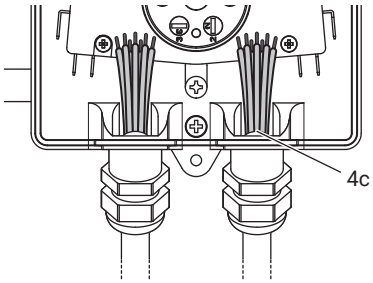
1 Unscrew the 2 screws (a) and remove the cover (b).

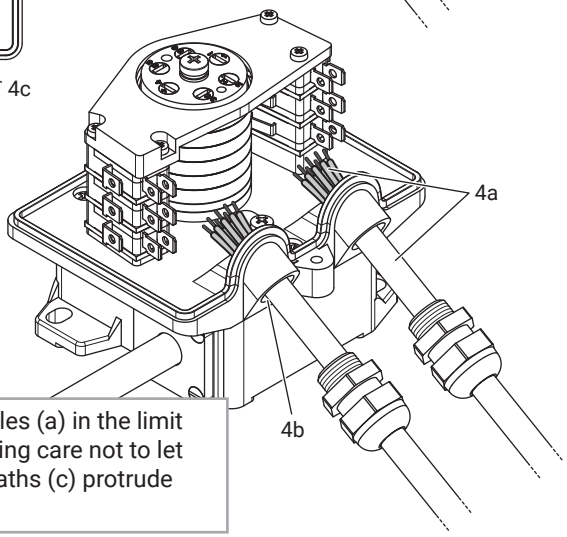
2 Remove the cable glands (a) and loosen the sealing nuts (b) to facilitate the insertion of the cables (c).



3 Insert the cables (a) into the cable glands (b).

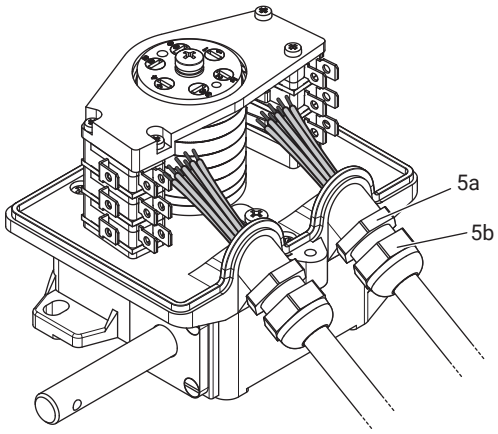






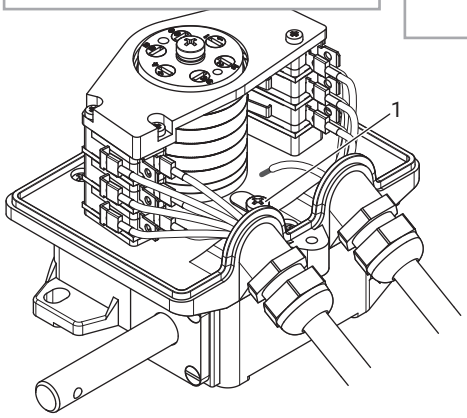
4 Insert the cables (a) in the limit switch (b) taking care not to let the cable sheaths (c) protrude too much.

5 Fix the cable glands (a) and then tighten the sealing nuts (b).

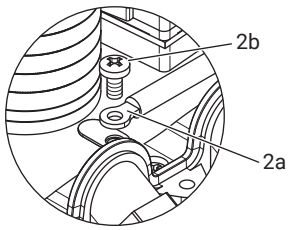


Ground wiring

1 Remove the ground fixing screw.



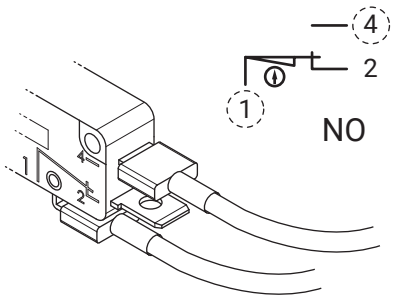
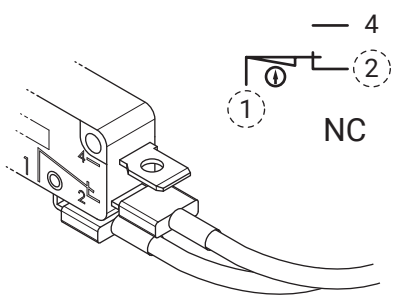
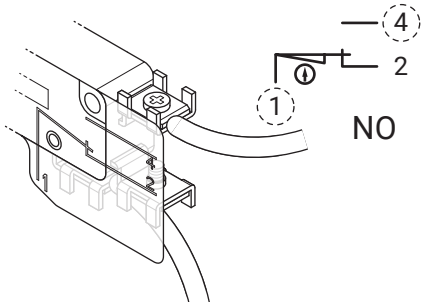
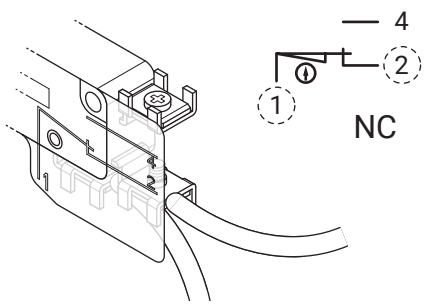
2 Finish the ground cable with a cable lug (a) and fix everything with the ground screw (b).



TIGHTENING TORQUE
1.7 N×m / 15 lb×in

Microswitches wiring

The FGR rotary gear limit switch can be equipped with 2 or more microswitches among those shown below.
The wiring of the microswitches can be carried out to obtain an NO contact, an NC contact or both.

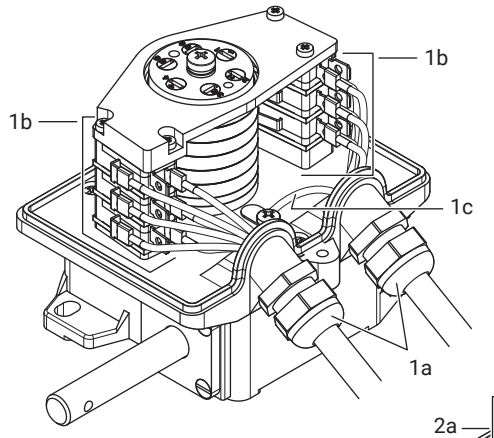
	NO	NC
To wire the microswitches it is necessary to use fastons suitable for a 6.3×0.8 mm contact.		
To wire the microswitches it is necessary to strip the end of the cable (1.5 mm²) and screw it into the terminal (M3 screws).		

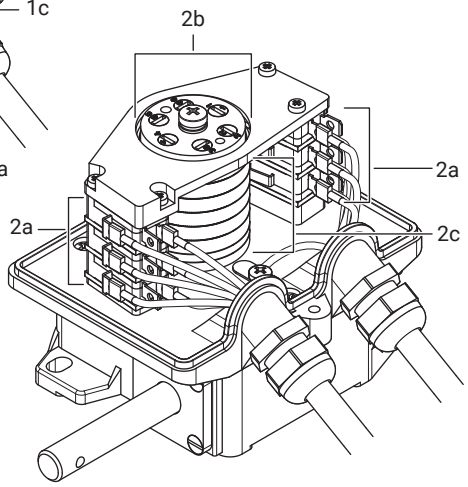
Cams adjustment

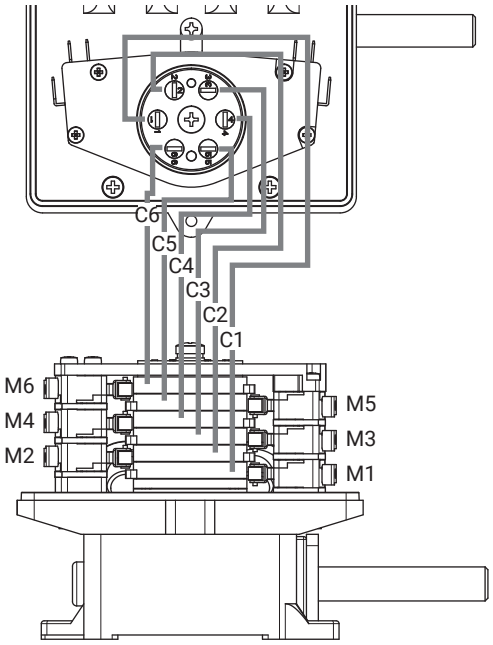
1 After having wired the limit switch (a) and connected the cables to the microswitches (b) and to the ground contact (c), proceed to adjust the cams as follows.

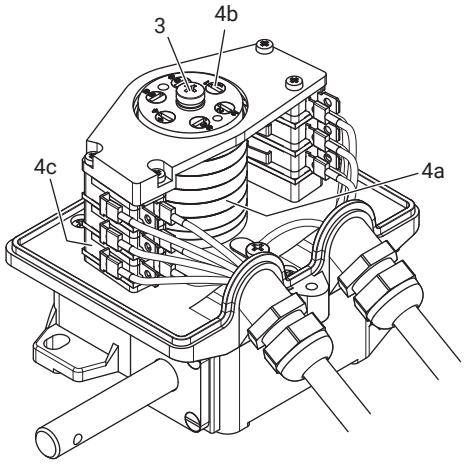
ATTENTION
The procedure implies that the FGR has already been coupled to the gearmotor of the system to be monitored.

2 The cam pack shown in this procedure is equipped with 6 microswitches (a). The correspondence between calibration screws (b), cams (c) and microswitches (a) is shown in the diagram.





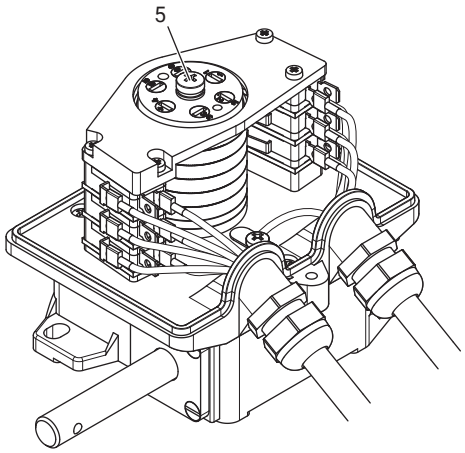




3 Loosen the main screw to release the calibration mechanism.

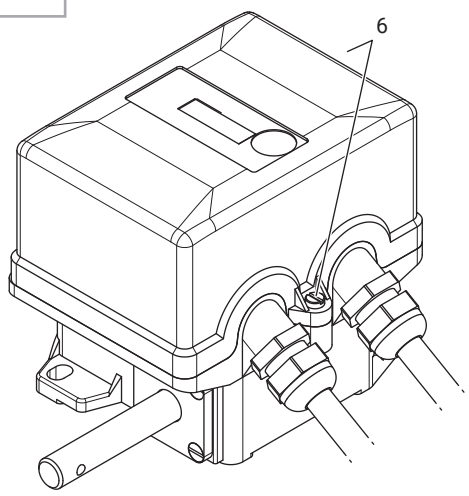
ATTENTION
The direction of rotation of the calibration screw corresponds to direction of rotation of the cam.

4 Adjust each cam (a) with the calibration screws (b). The cam must rotate until the microswitch trips (c).



5 At the end of the operation, tighten the main screw to lock the calibration mechanism.

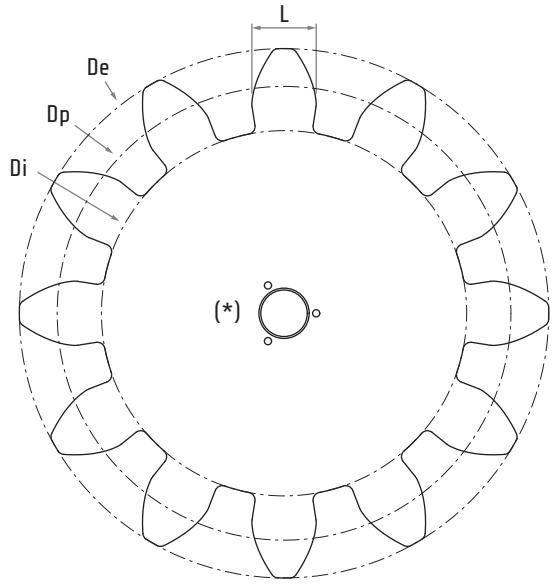
TIGHTENING TORQUE
1.5-1.8 N×m
13.3-15.9 lb×in

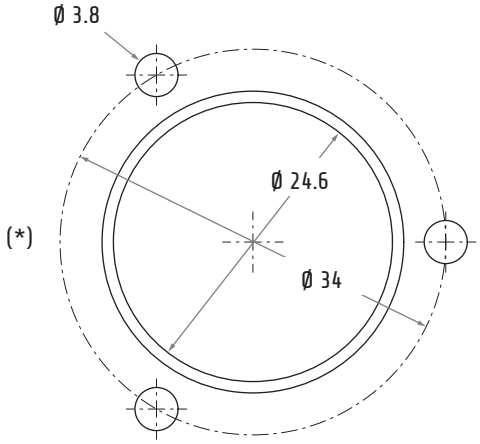


6 Close the limit switch cover by tightening the screws.

TIGHTENING TORQUE
1.6-1.8 N×m
14.2-15.9 lb×in

Pinions (PA66 - water cutting)



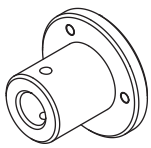


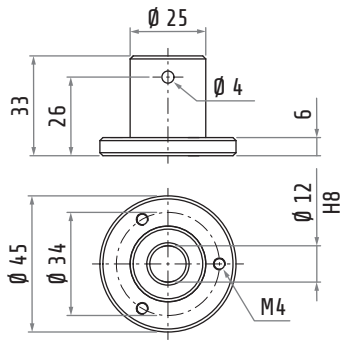
Pinions thickness: 10 mm

	Z	M	Dp	De	Di	a	d	L	α
16020051	12	20	240	280	193.2	20	23.4	31.42	20°
16020052	17	14	238	266	205.24	14	16.38	21.99	20°
16020053	10	22	220	264	168.52	22	25.74	34.56	20°
16020054	12	18	216	252	173.88	18	21.06	28.27	20°
16020055	13	16	208	240	170.56	16	18.72	25.13	20°
16020056	17	10	170	190	146.6	10	11.7	15.71	20°
16020057	13	6	78	90	63.96	6	7.02	9.42	20°
16020070	16	19	304	336	266.56	16	18.72	25.13	20°

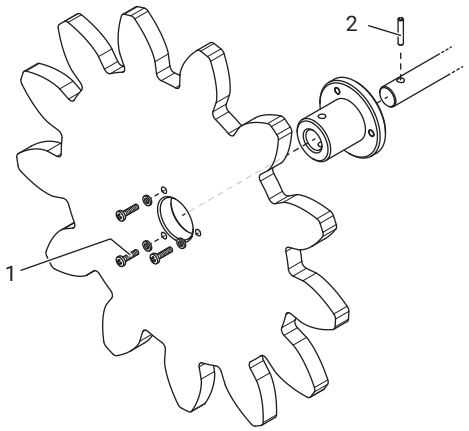
Z	Number of teeth	De	External diameter	d	Dedendum
M	Diametral pitch	Di	Internal diameter	L	Tooth width
Dp	Pitch circle diameter	a	Addendum	α	Pressure angle

For the installation of the water-cut pinions, the wheel coupling sleeve is required (code 16020050).

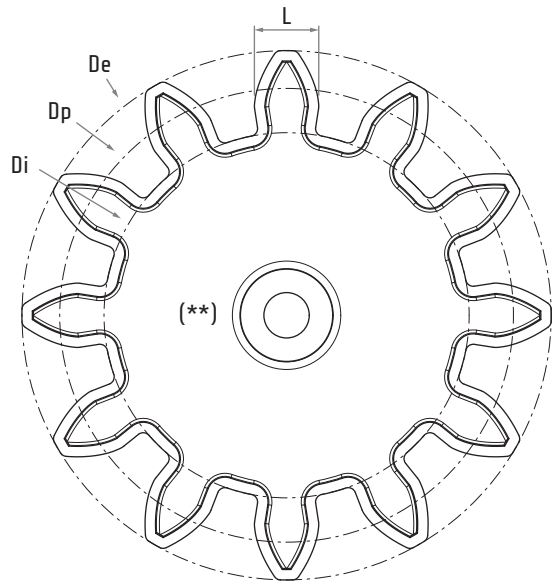


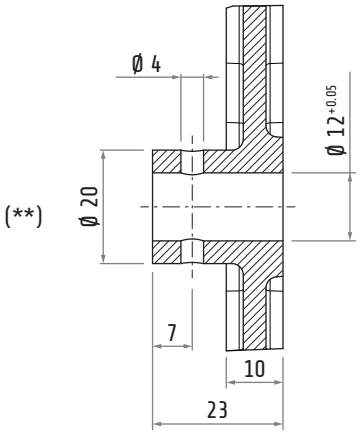


1. Screw M6×16 + lock washer Ø 4 mm
2. Elastic pin 4×24



Pinions (PA66 - molded)



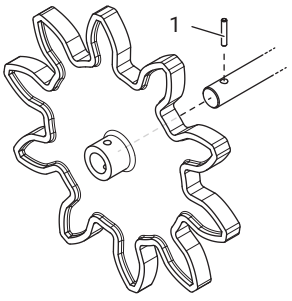


	Z	M	Dp	De	Di	a	d	L	α
16020058	8	20	160	200	113.2	20	23.4	31.42	20°
16020059	10	13	130	156	122.56	16	18.72	25.13	20°
16020060	12	12	144	168	121.716	12	14.04	18.85	20°
16020061	10	14	140	168	107.24	14	16.38	21.99	20°
16020062	10	12	120	144	91.92	12	14.04	18.85	20°
16020063	12	10	120	140	96.6	10	11.7	15.71	20°
16020064	12	8	96	112	77.28	8	9.36	12.57	20°
16020065	11	6	66	78	51.96	6	7.02	9.42	20°
16020066	12	5	60	70	48.3	5	5.85	7.85	20°

Z	Number of teeth	De	External diameter	d	Dedendum
M	Diametral pitch	Di	Internal diameter	L	Tooth width
Dp	Pitch circle diameter	a	Addendum	α	Pressure angle

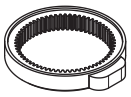
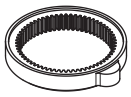
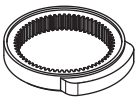
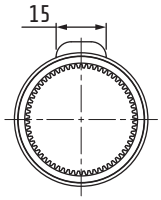
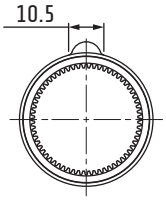
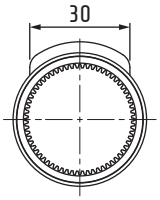
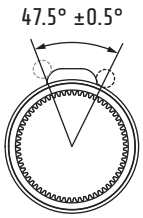
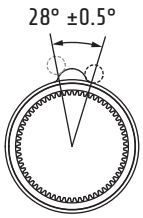
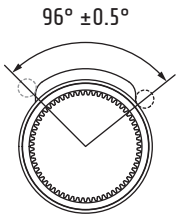
No other accessories are required for the installation of the molded pinions.

1. Elastic pin 4×24

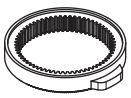
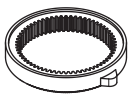
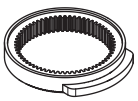
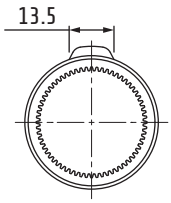
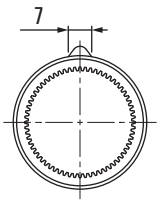
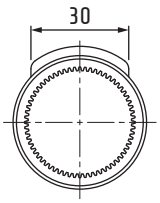
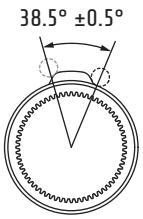
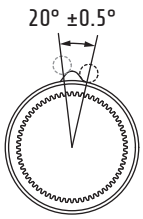
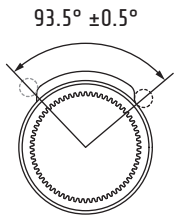


Camshapes

Material PA66

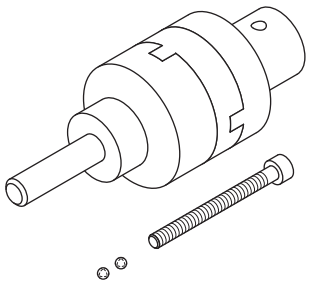
Standard “A” (30°)	“B” (15°)	“C” (90°)
11703015	11703019	11703013
		
		
		

For rotary gear limit switches with code FGR2... only

Standard “A” (25°)	“B” (6°)	“C” (90°)
11703030	11703031	11703032
		
		
		

For rotary gear limit switches with code FGR2**N**... only

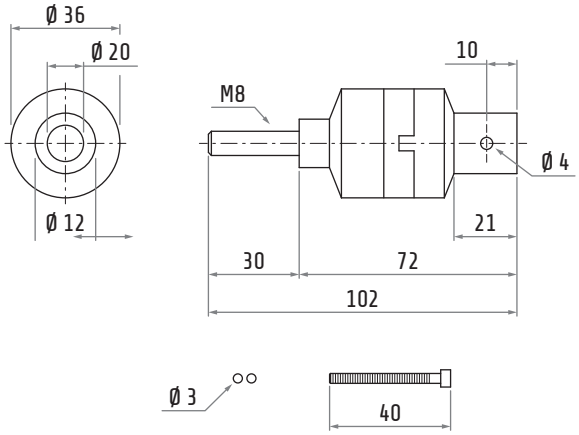
Oldham coupling

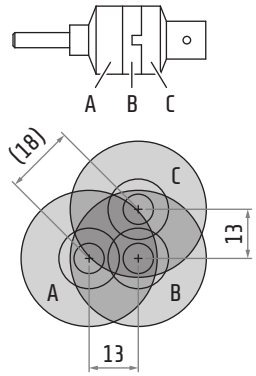


Part number: FGH

- Oldham coupling
- Locking screw 4×40
- Spheres Ø 3 mm

* The hole on the coupling may not be present

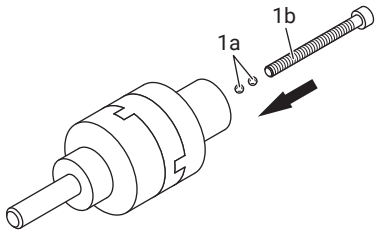




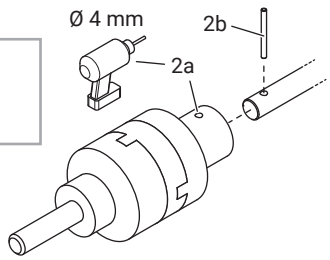
Maximum axial disalignment obtained without locking screw

Assembly with locking screw

1 Position the two spheres (a) and the screw (b) through the central hole and close with an Allen key.

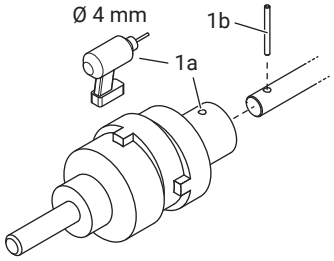


2 Make a hole (a), if not present, and fasten with the elastic pin (b).

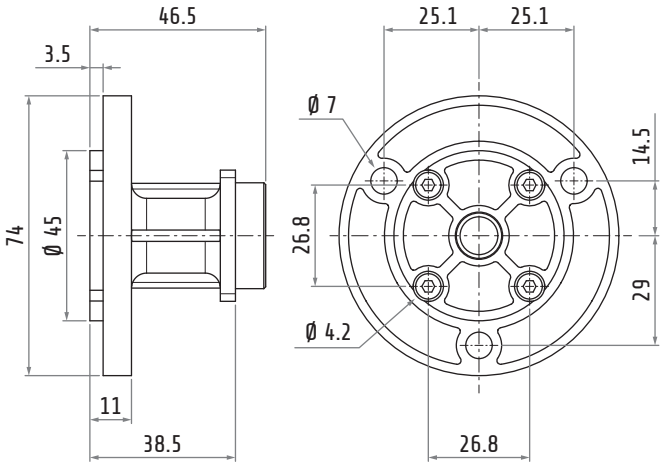


Assembly without locking screw

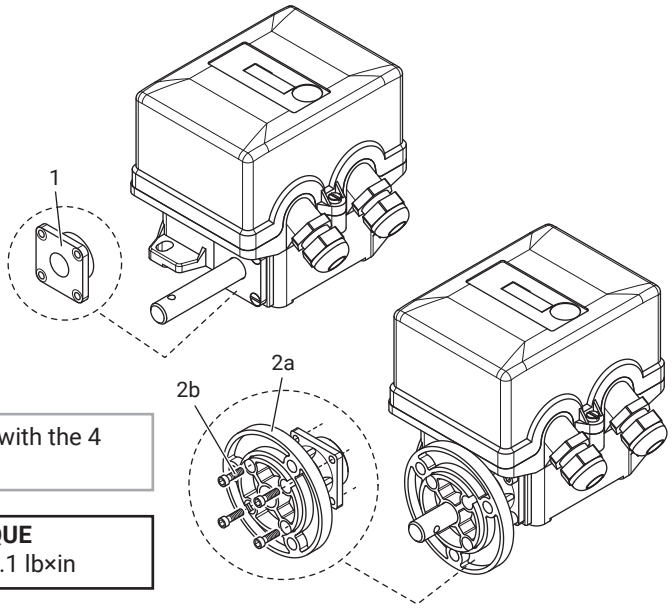
1 Make a hole (a), if not present, and fasten with the elastic pin (b).



Optional flange installation



1 Remove the cap by unscrewing the 4 tightening screws.



2 Install the flange (a) with the 4 Allen screws (b).

TIGHTENING TORQUE
0.7-0.8 N×m / 6.2-7.1 lb×in

MAINTENANCE AND REPAIR TERMS AND CONDITIONS

Maintenance

Maintenance is required to guarantee the level of protection provided by the types of protection of this equipment. Periodical verifications are required. The following operations shall be carried out with the frequency indicated in the table.

Operation required	Frequency	Action
Check that the screws are in place, free of corrosion.	Each time the enclosure is opened and then closed	In case of fault contact manufacturer for substitution
Check that the screws are tightened with a correct torque.	Annually and each time the enclosure is opened and then closed	Tight with the torque according to this document.
Check the condition of the enclosure: (enclosure is not damaged).	- Each time the enclosure is opened and then closed. - Annually. - In case of impact.	In case of fault contact manufacturer for substitution.
Check that the gaskets - are not damaged. - are placed correctly. - the thickness is not compromised by compression.	Each time the enclosure is opened and then closed.	In case of fault contact manufacturer for substitution.
Check if a dust layer is present on upper and plane surfaces.	Depending on the frequency of dust deposits.	Clean the surfaces periodically and remove the dust layer. In case of frequent deposit limiting the thickness of the layer less than 5 mm.
Control the correct work of mircos.	Annually if the usage is not continuous (quarterly under continuous use conditions h24).	To verify that the ratio of the rotations set originally during installation are maintained.

CERTIFICATIONS

Worm screw limit switches FGR series are in conformity with the following standards or other normative documents:

EN 60947-1	2007/A1 : 2011/A2 : 2017
EN 60947-5-1	2004/A1 : 2009/AC : 2004/AC : 2005
EN 60204-1	2006/A1 : 2009
EN 60529	1991/A1 : 2000/A2 : 2013
EN 50581	2012
IEC 63000	2016

and therefore follow the provision of the Directives:

2014/35/UE
2014/33/UE
2011/65/UE
2015/863/UE

Markings: CE, CCC, EAC, UKCA