



Rotary Limit Switches Driver FRS Series

 **ravioli**TM

Limit Switches

Driver FRS Series

Main Features

Driver rotary limit switch Series FRS is a device which allows you to control the movement of industrial and building machines.

The shaft is connected to the motor, so that, after a precise number of turns, the cams cause the intervention of the internal contacts. The innovative and thorough regulation of the cams allows you to set the microswitches working point linearly and micrometrically.

The limit switch ranges several ratios and you can assemble different kinds of sensors realizing various linear outputs. Contacts are positive-opening (EN 60947-5-1), which improves the workers' safe. This series includes a great number of different accessories, which make easier the use of the limit switch.

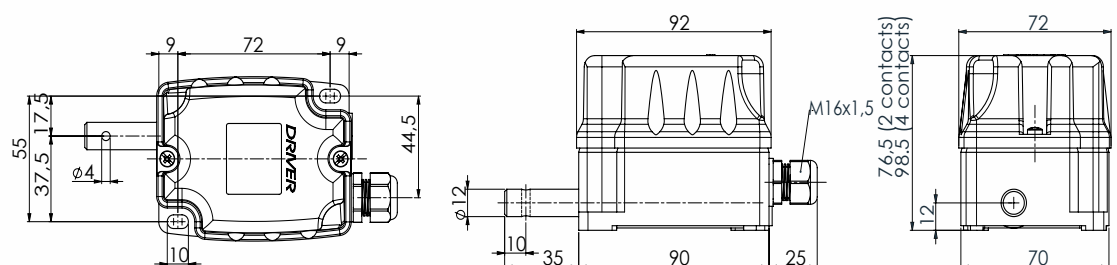
For years Ravioli has been focusing its production on renewable energy. Driver FRS limit switches, which are also used in wind turbines and in solar trackers, are included in our **Green e-motion** Program. They represent a significant step in our project and our participation to sustainability.



Technical features

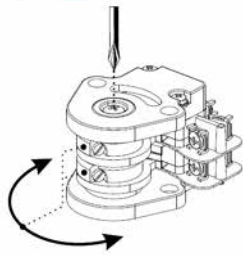
Compliance with EEC Directives	2006/42/CE	2011/65/UE	
Compliance with rules	EN 60947-1	EN 60947-5-1	
	EN 60204-1	EN 60529	EN 60439-1
Insulation voltage	250V~		
Maximum operating voltage	250V~		
Black lower casing	reinforced nylon		
Yellow cover	high mechanical and thermal resistant thermoplastic		
Operating temperature	-20 °C + 60 °C		
	-40 °C + 60 °C (on request)		
Drive	worm screw		
Cable entries	standard: 1 gland M16x1,5		
Protection degree	IP 65		
Protection against contact voltages	double insulation		
Max. rotation speed	500 rpm		
Homologation	CE		
Weight	approximately 300 g. (version with 2 switches)		
Product	made in Italy - covered by a registered design		

Dimensions

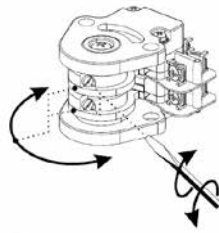


Contacts and regulation cams

Each cam is equipped with its own micrometrical regulation screw. Regulation can be easily carried out through a screwdriver.



1. Optional basic regulation
- loosen the upper screw
 - rotate the cams manually
 - tighten the upper screw (torque 1 Nm)



2. Fine regulation
- rotate the regulation screw of each cam
 - suggested screwdriver 4,0 x 0,8









The particular clutch system ensures regulation rapidity and precision as well as stability, steadiness and reliability.

Contacts features

Microswitch	1NO 1NC rapid positive-opening, self-cleaning contacts R type - white colour (fingerproof) D type - golden contacts (on demand)
Compliance with rules	EN 60947-5-1
Insulation voltage	250V~
Test voltage	2000V~
Category of usage	AC-15, U_e 250V, I_e 3A
Thermal curren I_{th}	10A
Breaking power	according to EN 60947-5-1
Insulation	according to EN 60947-5-1
Mechanical lifetime	$30 \cdot 10^6$ manoeuvres
Terminals	with finger-proof screws
Terminals identification	according to EN 50013
Protection fuse	10 A gG
Lifetime on resistive charge	250V~ 6A: 10^5 cycles
Lifetime on inductive charge	250V~ 3A: $0,3 \cdot 10^5$ cycles
Lifetime in d.c	24V= 20W L/R 40ms: $3 \cdot 10^5$ cycles
Homologations	CE - IMQ CA 02.03310

Standard cams profiles

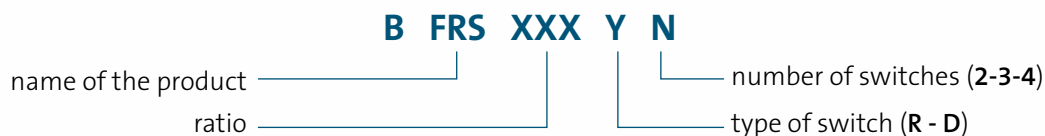
Type				Type			
A	pointed		white	D	semi-turn		white
B	sector		grey	E	circular		white
C	quarter-turn		red	F	10 point		white

Unless other specifications, the limit switches are supplied with white pointed cams (type A). Other profiles on demand

Executions

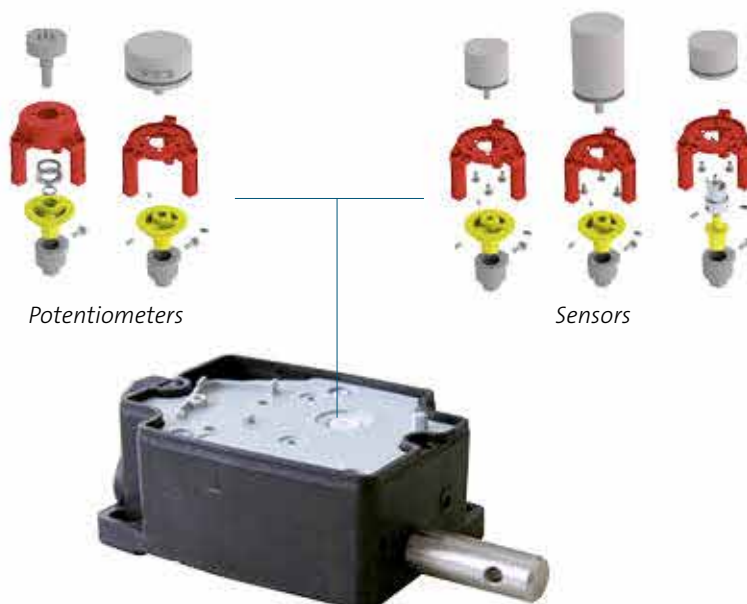
Part numbers

Part number is composed this way:



Unless other specifications, the limit switches are supplied with white pointed cams (type **A**). For other profiles, just add **B/C/D/E/F** at the end of the part number.

Sensors



Our long-term experience with several manufacturers of sensors allows us to create the necessary interfaces to mount various sensors of different marks, according to our customers' exigencies.

Standard ratios

1: 10 - 15 - 25 - 35 - 50 - 75 - 100 - 150 - 175 - 200

Standard executions are with 2 or 4 contacts.

The version with 3 contacts is also available on demand.

Custom-made executions

- shafts of different lengths
- different kinds of switches
- side cable exits
- cams of different profiles
- customized labels
- cover in customized colour



For your safety

Driver FRS limit switches comply with the following Directives and Norms:

2006/42/CE	Machine Directive
2006/95/CE	Low Voltage Directive
2011/65/UE	RoHS Directive
1907/2006	REACH
EN 60947-1	Low-voltage switchgears and control gears
EN 60947-5-1	Control circuit devices
EN 60204-1	Safety of machinery
EN 60529	Protection degrees



Driver FRS limit switches are guaranteed by our EC Certificate of Conformity, available upon request, where it is declared that such product has been created by Ravioli in accordance to defined and acknowledged Safety Regulations, and in compliance with the Quality standards stated in our ISO 9001:2008 Quality System Certificate.

Respect for people and environment

Ravioli is focusing its activity on products in the respect of people, following the standards which are defined in our Code of Ethic Behaviour. Such products have been studied in order to improve the working safety for people who use them. Moreover, Ravioli products are free from any harmful substances, in the respect of environment.

Installation and maintenance requirements

INSTALLATION AND WIRING

The limit switch must be installed by qualified personnel, in compliance with the current safety norms. Before wiring, the machine power supply must compulsorily be interrupted. Correct installation calls for working temperatures from -20°to +60°C. The limit switch must not be used in any areas which turn out to be potentially explosive, corrosive or with high sodium chloride contents. Acid, oil and solvent may cause the device deterioration; the limit switch is lubricated "for life", therefore it is recommended not to use either oil or fat to lubricate any part of it. The wiring installation must be achieved and tested according to the current norms, in conformity with the electrical wiring diagram of the machine. After the installation, it is compulsory to check if both the limit switch and the machine it controls work correctly.

Operations for limit switch installation

- Remove the cover by loosening the retaining screws
- Connect the limit switch shaft to the external drive element by using a flexible joint, the male connection or the cog wheels (page 6), in order to avoid any misalignment between the shafts
- Fix firmly the limit switch by using the baseplates or the optional flange (page 6) to prevent it from anomalous vibrations.

Wiring operations:

- introduce a multipolar cable into the special cable entry
- strip the cable for electrical connection to the microswitches
- tape the initial part of the cable
- lock the cable in the cable entry
- carry out the electrical connections by tightening the microswitch screws to max torque of 0,5 Nm.
- in case a potentiometer as well as any other sensors are present, introduce the multipolar cable in the cable entry, tape and lock the cable in the gland; then, connect properly the wires
- set the position of the cams by adjusting the regulation screws (page 3); in case of great displacements, the whole group can be loosened by operating on the central screw and moving manually the cams. After this approximate regulation, tighten the central screw again and operate on the lateral screws to obtain a fine regulation
- regulate your optional potentiometer or other sensor according to the specific instructions which are enclosed to the product that you can ask us directly for.

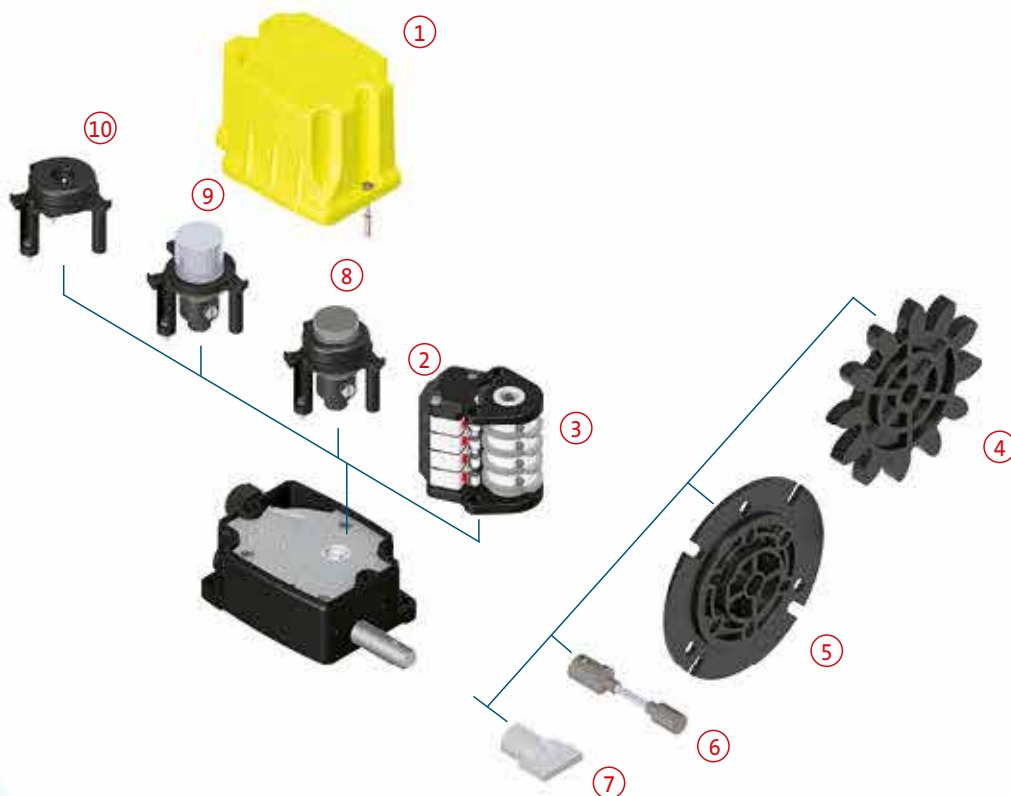
MAINTENANCE

Maintenance operations:

- check if both the screws on the cover and the inner clamps are correctly tightened
- check if the multipolar cable is secured in the cable entry
- check the wiring conditions
- check the integrity of the gasket inside the cover
- check that the drive system is functioning correctly and that the shafts are in alignment
- check that the limit switch is safely assembled
- check the integrity of the case

Ravioli S.p.a. declines any responsibility for damage deriving from incorrect installation or improper use of the product.

Spare parts and Accessories



Spare Parts

Pos.	Code	Description
1	B51529	Cover for 2 microswitches
	B51530	Cover for 3-4 microswitches
2	BR11FR	Contact R 1NO 1NC rapid white (fingerproof)
	BD11FR	Contact D 1NO 1NC golden

Pos.	Code	Description
3	BCAMAFR	Cam A – pointed
	BCAMBFR	Cam B – sector
	BCAMCFR	Cam C – quarter-turn
	BCAMDFR	Cam D – semi-turn
	BCAMEFR	Cam E – circular
	BCAMFFR	Cam F – 10 point

Accessories

Pos.	Code	Description
4	BMOD5FC	Cog wheel M5 Z12
	BMOD6FC	Cog wheel M6 Z11
	BMOD8FC	Cog wheel M8 Z12
	BMOD10FC	Cog wheel M10 Z12
	BMOD12Z10	Cog wheel M12 Z10
	BMOD12Z12	Cog wheel M12 Z12
	BMOD14FC	Cog wheel M14 Z10
	BMOD16Z10	Cog wheel M16 Z10
	BMOD18Z10	Cog wheel M18 Z10
	BMOD18Z11	Cog wheel M18 Z11
	BMOD20Z8	Cog wheel M20 Z8
	BMOD20Z11	Cog wheel M20 Z11

Pos.	Code	Description
5	BFLANFRM	Flange
6	BAFLESFC	Flexible shaft
7	BINNFC	Male connection
8	-	Potentiometers (on demand)
9	-	Other sensors (on demand)
10	-	Support for sensors assembly (on demand)

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