



# Driver Series FRD

Rotary Limit Switch



# Driver Series FRD Rotary Limit Switch

## Main Features

The rotary limit switch Driver series FRD is a device used to safely control the motion of construction and industrial machinery.

Thanks to its small dimensions and longitudinal or horizontal configurations also, this limit switch is particularly suitable for use in limited spaces and areas with difficult access.

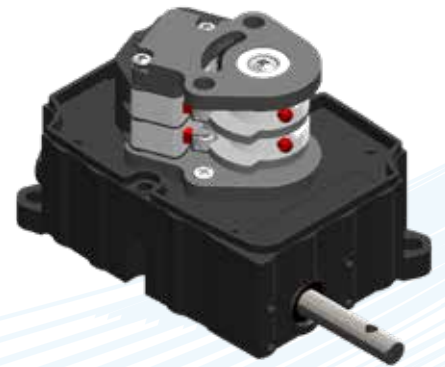
It is connected through its shaft to a gear motor or a rotary winch that, after a pre-set number of turns, causes the adjustable cams to trigger the internal safety contacts.

The cam adjustment allows for a precise setting of the micro switch activation point.

The contacts are EN 60947-5-1 positive-opening; alternatively, an angular rotation sensor can be fitted to allow linear position control.

This product was devised to highly simplify the wiring, reduce assembly timings and labour costs.

Several designed accessories are also available to facilitate its coupling with gear motors or rotary winches.

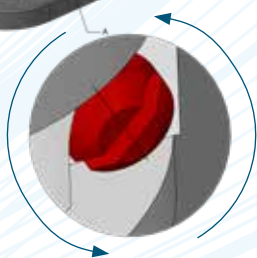


## Technical specifications

Insulation voltage	250 V~
Maximum operating voltage	250 V~
Insulation category	Class II
Operating temperature	-20°C ÷ +60°C
Storage temperature	-20°C ÷ +60°C
Protection degree	IP 42 or IP 65
Maximum rotation speed	500 RPM
Cable entry	M20x1,5 ø 5/9mm cable gland
Shaft material	Stainless steel
Plastic casing	Technopolymer with high mechanical and thermal resistance
Weight	500 g
Origin	Made in Italy - patent pending -
Product marking	CE

# Contacts and cams adjustment

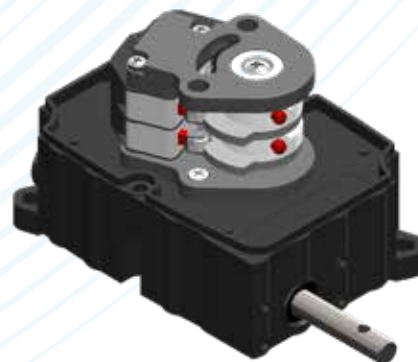
A special clutch system ensures quick and precise adjustment and guarantees stability, consistency and reliability over time.



Cams fine adjustment:

- Position the machine where you wish to activate the limit switch contact
- Adjust the cam with a screwdriver until the contact activates
- Repeat the operation for each contact

(recommended screwdriver is 4.0 x 0,8)



## Standard cam profiles

Type

**A**

white



pointed

Type

**B**

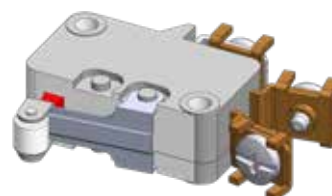
gray



sector

## Contact specifications

Microswitch	Type R SPDT 1NO+1NC rapid positive opening
Connection type	Fingerproof screw terminal
Usage category	AC-15 according to EN 60947-5-1
Terminal tightening torque	0.6 Nm
Operating current $I_e$	3A
Operating voltage	250V~
Thermal current $I_{th}$	10A
Insulation voltage	250V~
Mechanical lifetime	10•10 <sup>6</sup> operations
Markings and approvals	CE - IMQ - UL



# Version with KST absolute angle sensor

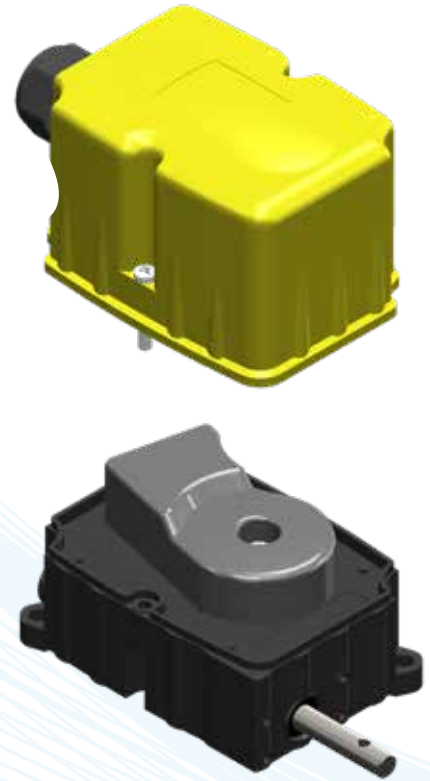
## Main features

With years of experience in the manufacturing of safety rotary limit switches, Ravioli has now developed a product that harmonizes the mechanical precision of the FRD limit switch with the KST Kostal Generation 2 absolute sensor most advanced electronics.

The FRD limit switch is connected through the external shaft and allows the sensor to reduce the movement to a single turn, protecting it from weather agents and shocks, through a simple mechanical connection.

The KST - Kostal Generation 2 sensor mechanically interfaces with the FRD limit switch and detects the value of the angular position, identifying the rotation direction.

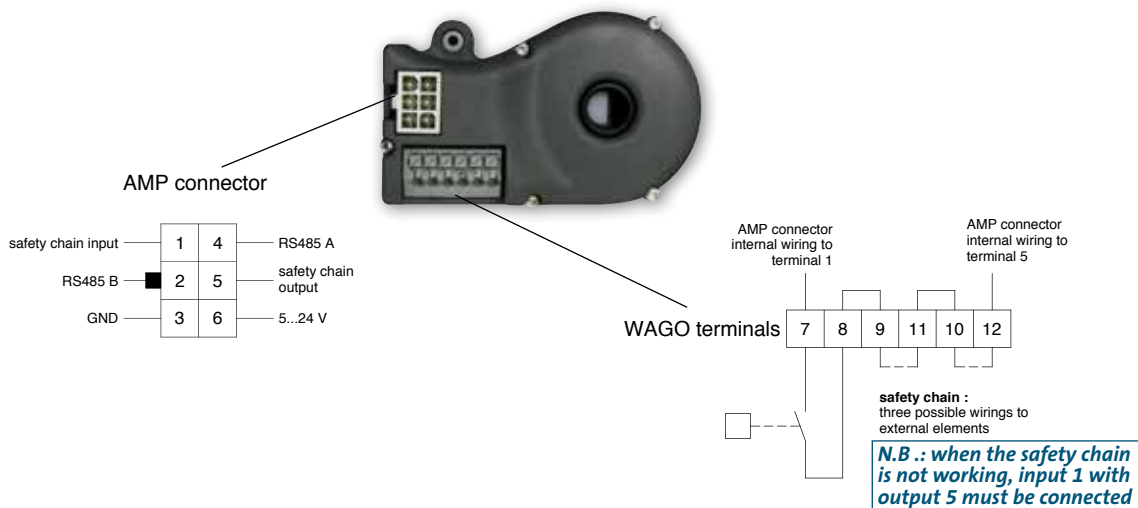
High resolution, reliability and repeatability are guaranteed even under extreme conditions.



## KST sensor technical specifications

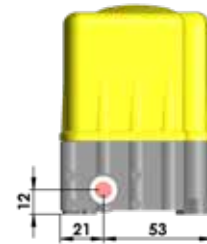
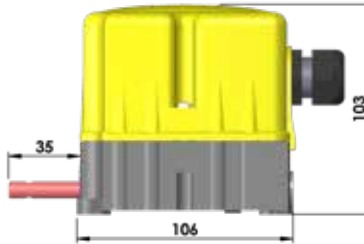
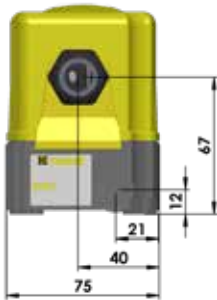
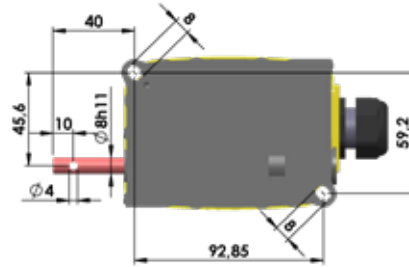
Operating voltage	5...24 V
Operating current	50mA
Operating temperature	-20° ÷ +70°C
Interface	RS485; asynchronous; half duplex
Transfer rate	9,600 / 19,200 / 38,400 / 57,600 bps
Angle detection range	360°, single turn
Resolution	0,0879°/ step (12 bit = 4096 steps over 360°)
Accuracy	+/- 0,2° +/- 4 bits over 8192 per 360°
Protection degree	IP 20
Interference reception	EN 61326-1
Interference emission	Group 1 Class B EN 61326-1 / EN 55011:2016
Max rotation speed	160°/s

## Electrical connection diagram of the sensor

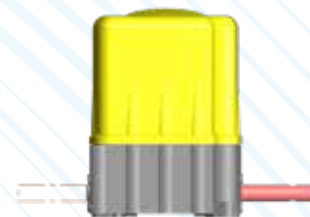
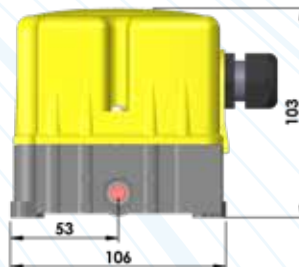
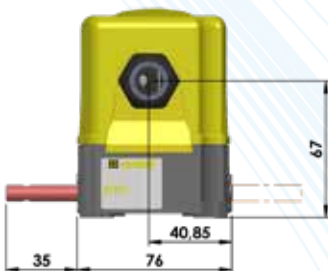
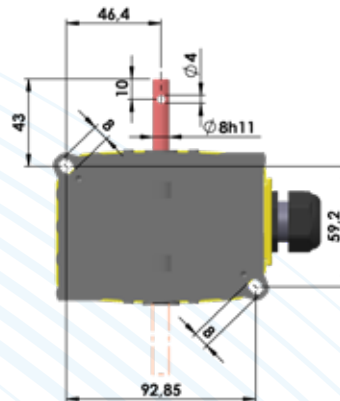


# Dimensions

Version with longitudinal shaft



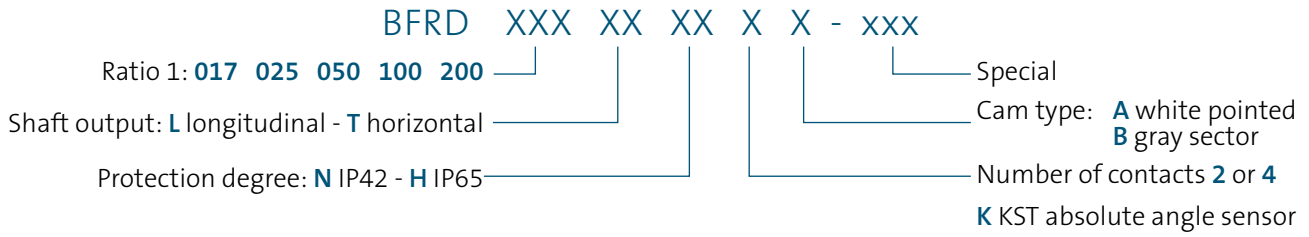
Version with horizontal shaft



# Product encoding procedure

## Standard Limit Switch

The standard product code is supplied as follows:



## Innovations

Cable-gland on removable entry



Horizontal execution, right or left



Plug-in execution



Wired execution



8 to 12mm adapter



Absolute angle sensor



Double degree of protection  
IP42 and IP65



# For your safety

The FRD rotary limit switches comply with the following Directives and Norms:

2014/35/UE	Low voltage Directive
2014/35/UE	Machine Directive
2011/65/UE	RoHS Directive
CEI EN 60947-1	Low-voltage switchgears and control gears
CEI EN 60947-5-1	Control circuit devices
CEI EN 60204-1	Safety of machinery
CEI EN 60529	Protection degrees



FRD limit switch drivers are guaranteed by our EC Certificate of Conformity, available on request, stating that such product was created by RAVIOLI in accordance to defined and recognized Safety Regulations and in line with the Quality standards of our ISO 9001:2015 Quality System Certificate.

## Respect for people and environment

Ravioli frames its activity on products that respect people, according to the standards of our Code of Ethical Behaviour. Our products were devised to improve the working safety of people handling them. Moreover, Ravioli products are free from harmful substances, for the preservation of the environment.

## Installation and maintenance requirements

### INSTALLATION AND WIRING

The limit switch must be installed by qualified personnel, sticking to the current safety regulations.

Before wiring, the equipment power supply must be mandatorily turned off.

Correct installation requires working temperatures ranging from -20° to +60°C.

The limit switch must not be used in potentially explosive, corrosive or high sodium chloride concentration areas.

Acid, oil and solvents may cause the device impairment and is therefore not recommended to use oils or greases to lubricate any part of it. The wiring installation must be performed and finally tested according to the ruling norms, in conformity with the electrical wiring diagram provided with the equipment. Once the installation is over, it is mandatory to check both the limit switch and the connected equipment for correct operation.

Limit switch installation procedures:

- Remove the cover (1) by loosening the fixing screws;
- Connect the limit switch shaft to the external drive element by using a flexible joint (6), the male connection (4) or the cog wheels (5). These actions should be undertaken in case of misalignment between the shaft and the equipment;
- Fix firmly the limit switch by using the baseplates or the optional flange (7) to prevent abnormal vibrations.

Wiring operations:

- a) remove the cover and the cable-gland entry;
- b) place the multipolar cable into the special cable entry;
- c) strip the cable for electrical connection to the microswitches;
- d) set the electrical connections by tightening the microswitch screws to 0,5 Nm max torque;
- e) tighten the cable in the cable-gland, checking its tightness;
- f) reposition the cable-gland entry in its place;
- g) in case a KST position sensor is adopted, introduce the multipolar cable in the cable gland, then properly connect the wires and check their tightness. After that, tape and lock the cable in the cable-gland.
- h) set the position of the cams by adjusting the regulation screws for fine adjustment;
- i) close the cover and tighten the screws at 1 Nm max torque

### MAINTENANCE

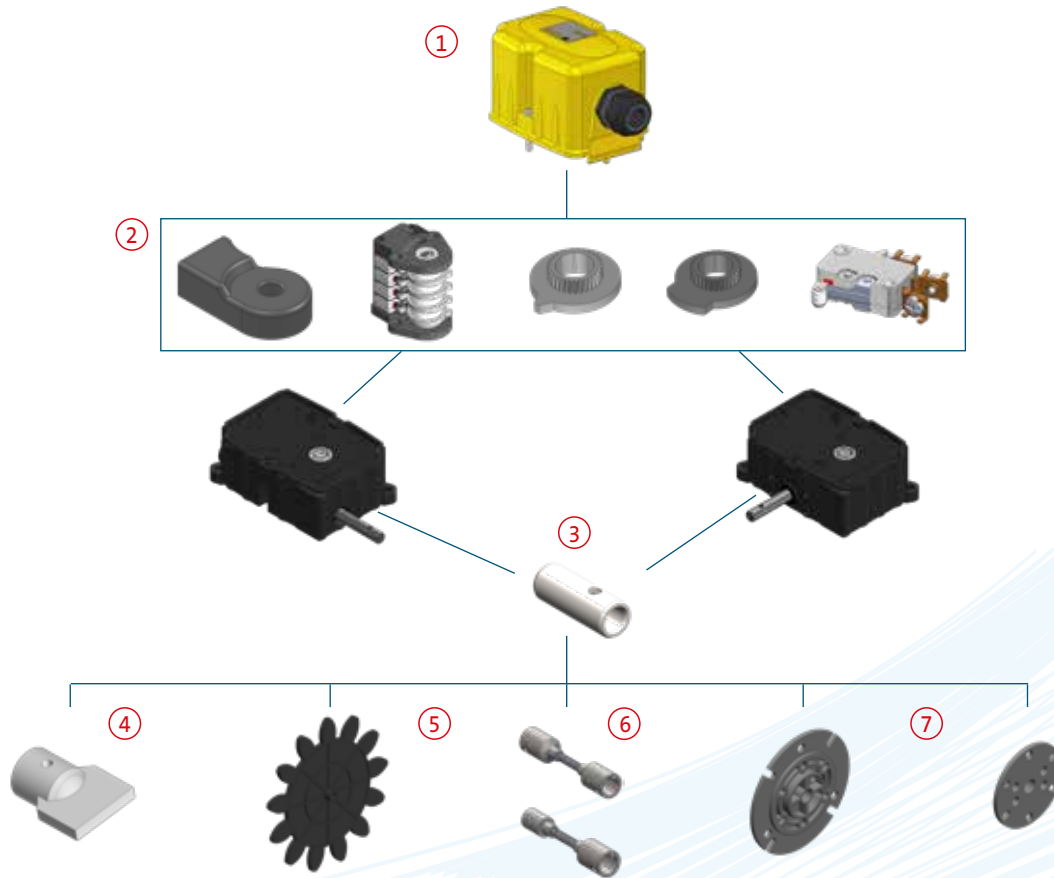
Maintenance procedures:

- check the cover screws tightness (1);
- check the multipolar cable stability in the cable-gland;
- check the wiring conditions;
- check the inner seal integrity inside the cover, if any;
- check the driving system and alignment integrity.
- check the limit-switch tightness;
- check the case integrity.

**RAVIOLI S.p.a.** declines all liabilities for any claimed damages originating from unprofessional installation or improper use of the product



# Spare Parts and Accessories



## Spare Parts

Pos.	Code	Description
1	B52055	Complete cover
	BKST	KST absolute angle sensor
	B52038	Group with 2 contacts and cam type A
	B52037	Group with 2 contacts and cam type B
	B52016	Group with 4 contacts and cam type A
2	B52017	Group with 4 contacts and cam type B
	BCAMAFR	Cam white pointed
	BCAMBFR	Cam gray sector
	BR11FR	Microswitch type R SPDT 1NO+1NC rapid positive opening

## Accessories

Pos.	Code	Description
	BMOD5Z12FRD	Cog wheel M5 Z12 hole $\varnothing$ 8 mm
	BMOD6Z11FRD	Cog wheel M6 Z11 hole $\varnothing$ 8 mm
	BMOD8Z12FRD	Cog wheel M8 Z12 hole $\varnothing$ 8 mm
	BMOD10Z12FRD	Cog wheel M10 Z12 hole $\varnothing$ 8 mm
	BMOD12Z10FRD	Cog wheel M12 Z10 hole $\varnothing$ 8 mm
	*BMOD12Z12	Cog wheel M12 Z12 hole $\varnothing$ 12 mm
5	BMOD14Z10FRD	Cog wheel M14 Z10 hole $\varnothing$ 8 mm
	BMOD16Z10FRD	Cog wheel M16 Z10 hole $\varnothing$ 8 mm
	*BMOD18Z10	Cog wheel M18 Z10 hole $\varnothing$ 12 mm
	*BMOD18Z11	Cog wheel M18 Z11 hole $\varnothing$ 12 mm
	BMOD20Z8FRD	Cog wheel M20 Z8 hole $\varnothing$ 8 mm
	*BMOD20Z11	Cog wheel M20 Z11 hole $\varnothing$ 12 mm
6	*BAFLESFC	Female/male flexible shaft
	*BAFLESFCFF	Female / female flexible shaft
	BFLANFRS	Attachment flange 51635
7	BFLANFRS656	Attachment flange 51635.656
	BFLANFRM	Attachment flange 51720

## Accessories

Pos.	Code	Description
3	B52039	8 to 12mm adapter
4	*BINNFC	Male connection

\* Requiring adapter code number B52039

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