CAM LIMIT SWITCH
FRM SERIES

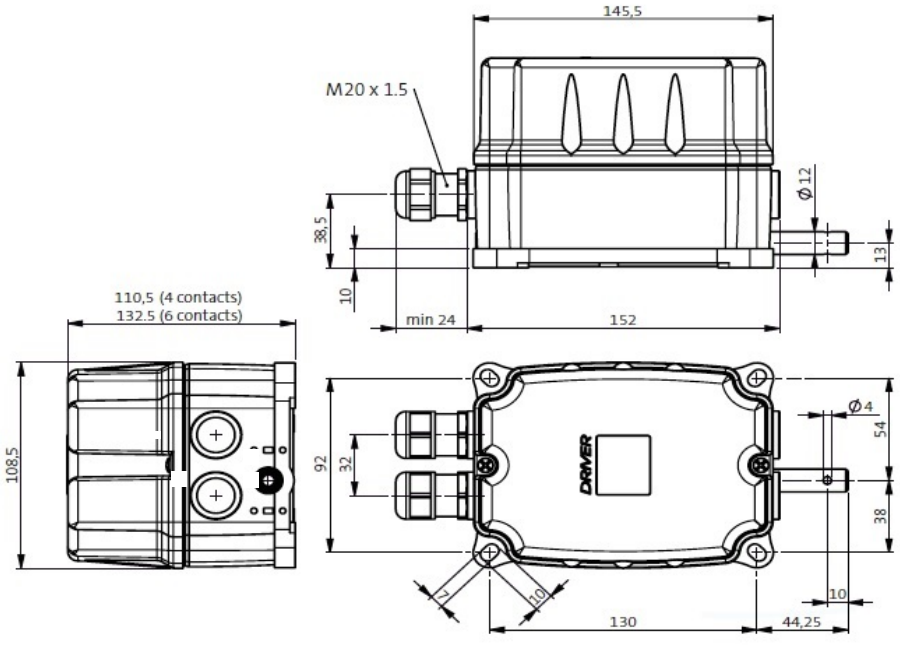
General Features

The rotary limit switch 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 certain number of turns, the cams make the switches work, and then they can carry out their pre-set manoeuvre. 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 varios linear outputs. Contacts are positive-opening, which improves the workers' safe. This series includes a great number of different accessories, which make easier the use of the limit switch.

Technical features

- **Compliance** with EEC Directives 2006/42/CE 2006/95/CE ROHS
- **Compliance** with rules CEI EN 60947-1 CEI EN 60947-5-1 CEI EN 60204-1 CEI EN 60529 UL508
- **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
- **Drive worm screw**
- **Cable entries** standard: 2 glands M20x1,5 (option more glands)
- **Protection degree IP** 66 - EN 60529
- **Protection** against contact voltages double insulation EN 60439-1
- **Weight** 460 g (approx.)

Dimensions



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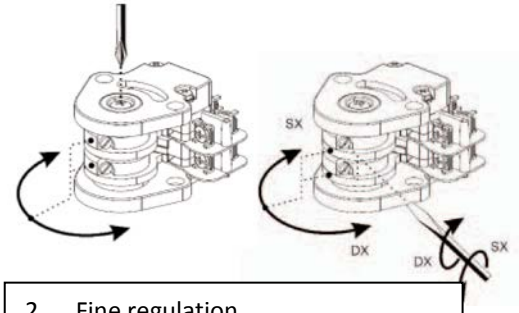
Contacts and regulation cams

Each cam is equipped with its own micrometrical regulation screw. Regulation can be easily carried out through a screwdriver. A particular clutch system ensures regulation rapidity and precision as well as stability, steadiness and reliability.



1. Optional basic regulation
- Loosen the upper screw
- Rotate the cams manually
- Tighten the upper screw (torque 1Nm)

2. Fine regulation
- Rotate the regulation screw for each cam
- Suggested screwdriver 4,0x0,8

Contacts features

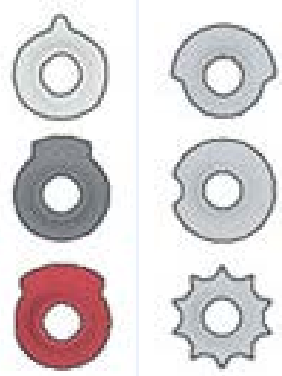
Microswitch	1NO 1NC rapid positive opening, self cleaning contacts T type – blue colour (UL certified) R type – white colour (standard fingerproof) D type – golden contacts (on demand)
Insulation voltage	250 V ~
Test voltage	2000 V ~
Termal current	10A
Breaking power	according to EN 60947-5-1
Mechanical lifetime	$2x10^6$man
Terminals	with screws – with fingerproof screw (on demand)

Standard cams profiles

Type **A** pointed white

Type **B** sector grey

Type **C** quarter turn red



Type **D** semi-turn white

Type **E** circular white

Type **F** 10 point white

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

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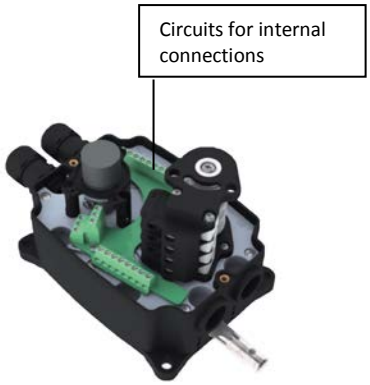
Standard Executions

FRM limit switch is equipped with 3 internal rotation axes, named:

- OUT 1 output for different ratios 1:n
- OUT 2 output for different ratios 1:n or 1:k
- OUT 3 output for direct ratio 1:1

It's possible to use just 2 internal rotary axes simultaneously: OUT 1 is always available, while either OUT 2 or OUT 3 can be used (they cannot be used at the same time).
The fourth rotation axis OUT L is available for the application of a speed reader. Some printed, pre-wired circuits, provided with terminal blocks, can be inserted, on demand, to help the connections between the internal components.



Standard Ratios:
1:1 direct ratio OUT 3 for sensors
1: 1-5-15-25-50-75-100-150-200-300 up to 900 for either OUT 1 or OUT 2.
Several ratios are available on demand and according to the requestes quantity. Standard executions are with 2,4,6 contacts; executions with 3,8,10,12 contacts are availabe in consideration of the quantity.

Purchase codes for standard limit switches

B	FRM	xxx	y	NN	z
Group	Series	Ratio	Type of contact	Number of contacts	Type of cam

Customized executions

- Shaft of different lenghts
- Twin-shaft executions
- Different kind of contacts
- Front or lateral gland
- Cams with various profiles
- Customized labels

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For Your Safety

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 compulsory be interrupted. Correct installation calls for working temperatures from -20°C to +60° (optionally from -40°C to +60°). 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 lubrificated "for life", therefore it is reccomended not to use either oil or fat to lubrificate 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. In case the limit switch is supplied in a version with internal wiring, do not modify any of them, unless warranty validity. After the installation, it is compulsory to check if both the limit switch and the machine controls works 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, in order to avoid any misalignment between the shafts
- fix firmly the limit switch by using the baseplates or the optional flange to prevent it from anoumalous vibrations.

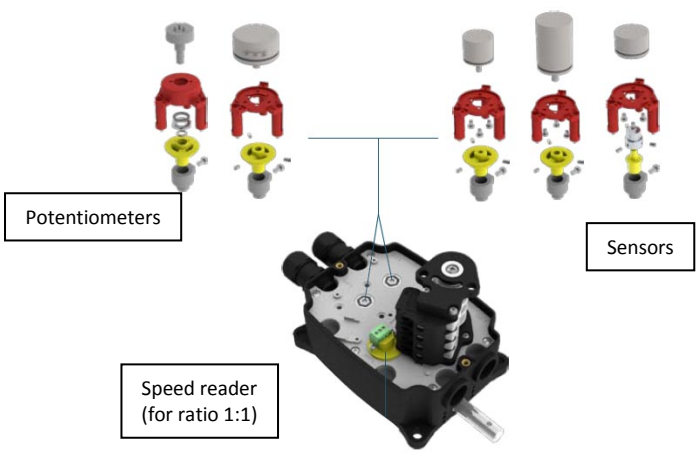
Wiring operations:

- 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 another multipolar cable in the second cable entry, tape and lock the cable in the gland; then, connect properly the wires to their preset clamps (max torques: 0,5 Nm)
- set the position of the cams by adjusting the regulation screws (page 2); in case of great desplacements, the whole group can be loosened by operating on the central screw and moving manually the cams. After this approximate regulation, tighten the central crew 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 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 condition
- 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

Accessories



The series ranges several accessories, which make easier the use of the limit switches, and meet some particular needs. A number of cog wheels, the male shaft and the flexible shaft have been studied to convey easily the motion from the shaft of the motor to the shaft of the limit switch. The application of encoders, potentiometers or some other sensors, in addition to the groups of microswitches, produces in the same device an analogic or digital ouput, which can be properly read.

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Cog Wheels

A number of cog wheels, the male shaft and the flexible shaft have been studied to convey easily the motion from the shaft of the motor to the shaft of the limit switch.

Available modules:

- 5 module with 12 tooth
- 6 module with 11 tooth
- 8 module with 12 tooth
- 10 module with 12 tooth
- 14 module with 10 tooth
- 16 module with 10 tooth
- 18 module with 10 tooth
- 18 module with 11 tooth
- 20 module with 8 tooth
- 20 module with 11 tooth

Male connection

The male connection helps the joining to motors or reducing gears.

Flexible Shaft

The flexible shaft allows you to couple the shafts that are not perfectly aligned.

Attachment Flange

The flange interface allows the limit switch to be fixed without the special fixing plate

Speed Reader

Connection board

Golden Contacts
Finger-proof contacts
-40°C Version
UL Version

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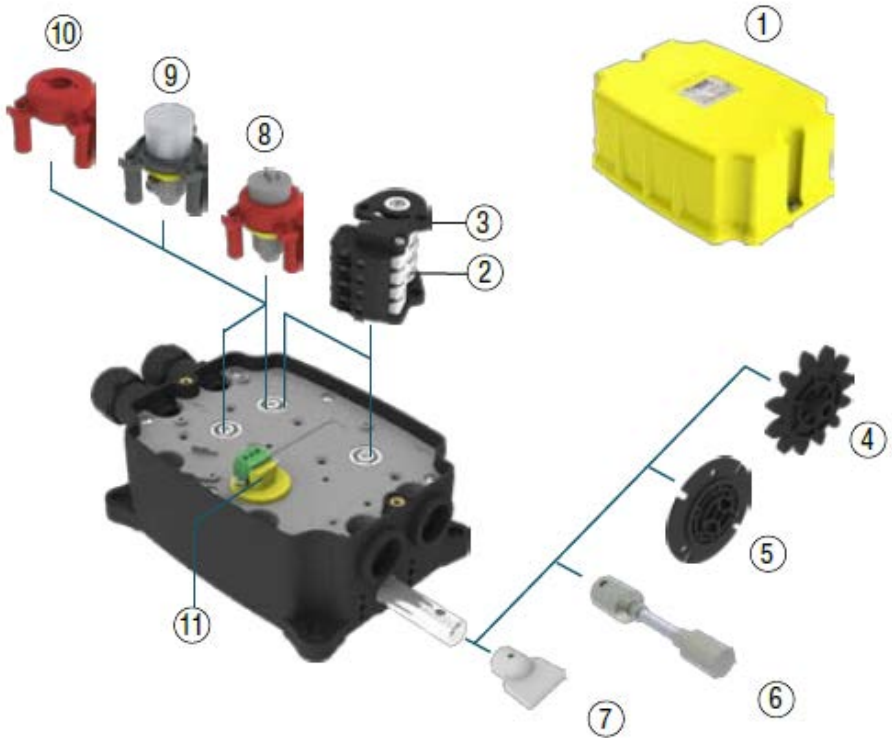
Spare parts



Spare Parts

Pos.	Code	Description
1	B51792	Cover up to 4 microswitches
	B51793	Cover for 5-6 microswitches
2	BT11FR	Contact T - 1NO 1NC rapid blue (standard)
	BR11FR	Contact R - 1NO 1NC rapid white (fingeroroof)
	BD11FR	Contact D - 1NO 1NC golden (on demand)

Pos.	Code	Description
3	BCAMAFR	Cam A - pointed
	BCAMBFR	Cam B - sector
	BCAMCFR	Cam C - semi-turn
	BCAMDFR	Cam D - quarter-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	-	Encoder (on demand) Other sensors (on demand)
10	-	supports for sensors assembly (on demand)
11	-	speed reader (on demand)

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