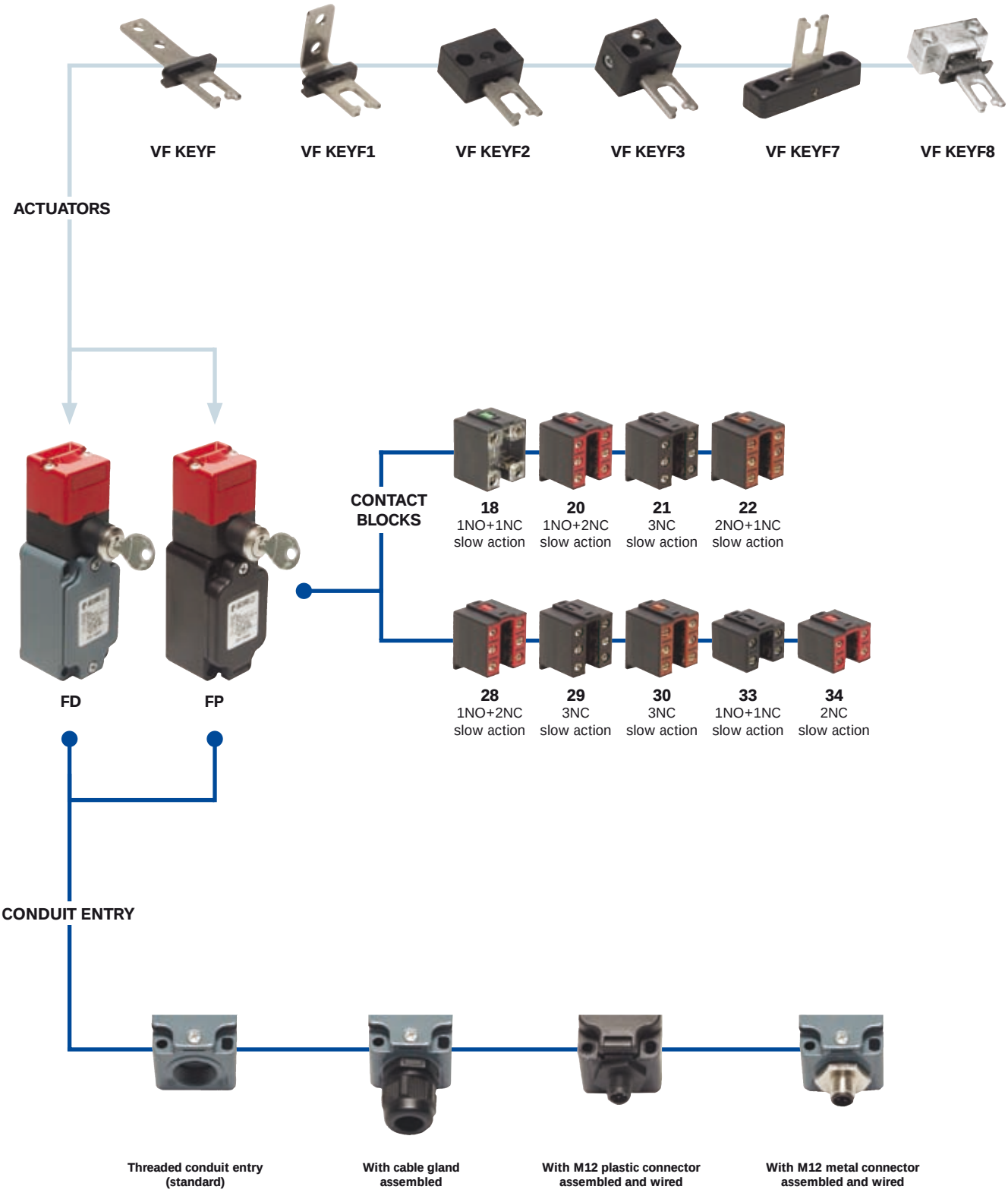
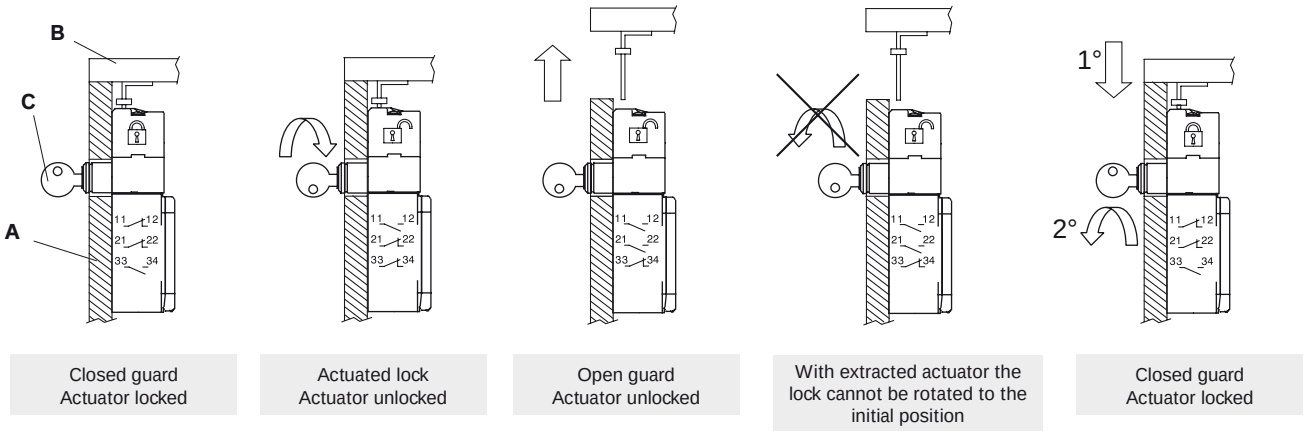
Selection diagram



product option
accessory sold separately

Working cycle (FP 2899-F1)

The switch is fixed to the machine body (A), while the stainless steel actuator is fastened to the guard (B). Once installed, the switch will firmly lock the actuator. To remove the actuator, it is necessary to unlock the key locking device rotating the key (C). When the actuator is removed, the key cannot be put in the starting position anymore.
In the example is pointed out how it is possible to have contacts moved by the key lock or by the actuator and how it is possible to install the switch inside the machine, keeping externally visible only the release device.



Closed guard Actuator locked	Actuated lock Actuator unlocked	Open guard Actuator unlocked	With extracted actuator the lock cannot be rotated to the initial position	Closed guard Actuator locked

Code structure

Attention! The feasibility of a code number does not mean the effective availability of a product. Please contact our sales office.

article: **FD 1899** — options: **-F1GM2K50**

Housing

FD	metal housing, one conduit entry
FP	polymer housing, one conduit entry

Contact blocks

	Contact activated by the lock	Contact activated by the actuator
18	1NO+1NC	
20	1NO+2NC	
21	3NC	
22	2NC+1NO	
28	1NO+1NC	1NC
29	2NC	1NC
30	1NC	2NC
33	1NO+1NC	
34	2NC	

Actuators

	without actuator (standard)
F	with straight actuator
F1	with right-angled actuator
F2	with jointed actuator
F3	with jointed actuator adjustable in two directions
F7	with jointed actuator adjustable in one direction
F8	with universal actuator

Contacts type

	silver contacts (standard)
G	silver contacts gold plated 1 µm

Threaded conduit entry

	PG 13,5 (standard)
M2	M20x1,5

Preinstalled cable gland or connectors

	no cable gland or connector (standard)
K21	with assembled cable gland suitable for Ø 6 to Ø 12 mm cables range
K40	with M12 metal connector assembled and wired, 8 poles (only for contact blocks 20, 21, 22, 28, 29, 30)
...	.....

For the complete list of all combinations, please contact our technical office.



Patent pending

Main data

- Metal housing or polymer housing, one conduit entry
- Protection degree IP67
- 9 contact blocks available
- 6 stainless steel actuators available
- M12 assembled connector versions
- Silver contacts gold plated versions
- Strong actuator locking (1000N)
- Manual actuator unlocking

Markings and quality marks:

Approval IMQ:	EG605 (FD series) EG606 (FP series)
Approval UL:	E131787
Approval CCC:	2007010305230000 (FD series) 2007010305230014 (FP series)
Approval EZU:	1010151

Housing

Housing type FP made of glass-reinforced polymer, self-extinguishing, shock-proof thermoplastic resin and with double insulation ⧈
Housing type FD made of metal, coated with baked epoxy powder.
FD and FP series one conduit entry

Protection degree:	IP67 (electrical contacts)

General data

Ambient temperature:	from -25°C to +80°C

Version for operation in ambient temperature from -40°C to +80° C on request

Max operating frequency:	3600 operations cycles[1]/hour
Mechanical endurance:	500.000 operations cycles[1]
Max actuating speed:	0,5 m/s
Min. actuating speed:	1 mm/s
Max holding force :	1000 N
Actuator extraction force:	30 N

(1) One operation cycle means two movements, one to close and one to open contacts, as foreseen by IEC 947-5-1 standard.

Cross section of the conductors (flexible copper wire)

Contact blocks 20, 21, 22, 28, 29, 30:	min.	1 x 0,34 mm²	(1 x AWG 22)
	max.	2 x 1,5 mm²	(2 x AWG 16)
Contact blocks 18:	min.	1 x 0,5 mm²	(1 x AWG 20)
	max.	2 x 2,5 mm²	(2 x AWG 14)

In conformity with standards:
IEC 60947-5-1, EN 60947-5-1, IEC 60204-1, EN 60204-1, EN 1088, EN ISO 12100-1, EN ISO 12100-2, IEC 529, EN 60529, NFC 63-140, VDE 0660-200, VDE 0113, CENELEC EN 50013, BG-GS-ET-15.
Approvals:
IEC 60947-5-1, UL 508, GB14048.5-2001

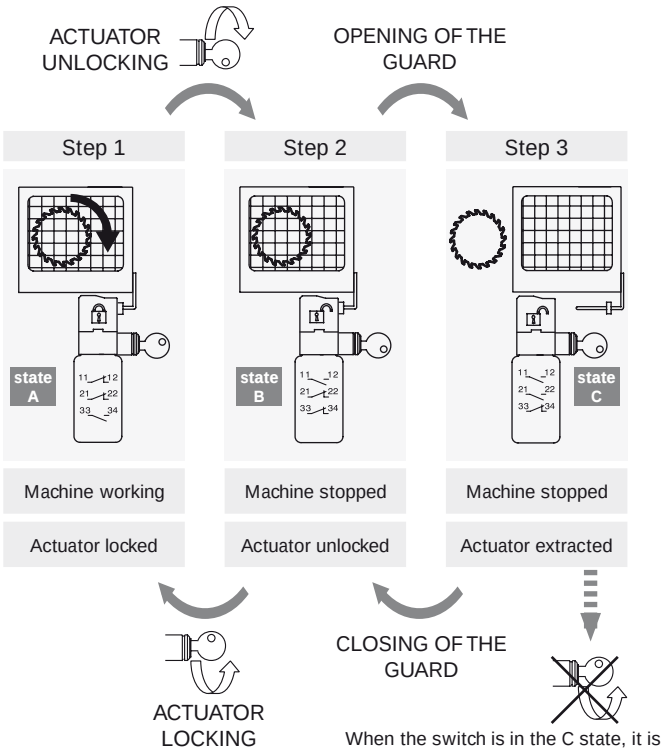
In conformity with requirements requested by:
Low Voltage Directive 2006/95/EC, Machinery Directive 2006/42/EC and Electromagnetic Compatibility 2004/108/EC.
Positive contact opening in conformity with standards:
IEC 60947-5-1, EN 60947-5-1, VDE 0660-206.

⚠ **If not expressly indicated in this chapter, for the right installation and the correct utilization of all articles see requirements indicated from page 6/1 to page 6/8.**

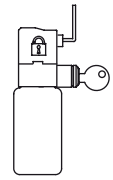
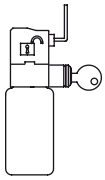
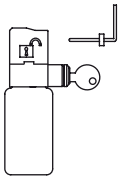
Electrical data			Utilization categories
without connector	Thermal current (Ith):	10 A	Alternate current: AC15 (50...60 Hz)
	Rated insulation voltage (Ui):	500 VAC 600 VDC	Ue (V) 250 400 500
		400 VAC for contact blocks 20, 21, 22,	Ie (A) 6 4 1
	28, 29. 30		Direct current: DC13
	Protection against short circuits:	fuse 10 A 500 V type aM	Ue (V) 24 125 250
	Pollution degree:	3	Ie (A) 6 1,1 0,4
with 4 or 5 poles M12 connector	Thermal current (Ith):	4 A	Alternate current: AC15 (50...60 Hz)
	Rated insulation voltage (Ui):	250 VAC 300 VDC	Ue (V) 24 120 250
	Protection against short circuits:	fuse 4 A 500 V type gG	Ie (A) 4 4 4
	Pollution degree:	3	Direct current: DC13
			Ue (V) 24 125 250
			Ie (A) 4 1,1 0,4
with 8 poles M12 connector	Thermal current (Ith):	2 A	Alternate current: AC15 (50...60 Hz)
	Rated insulation voltage (Ui):	30 VAC 36 VDC	Ue (V) 24
	Protection against short circuits:	fuse 2 A 500 V type gG	Ie (A) 2
	Pollution degree:	3	Direct current: DC13
			Ue (V) 24
			Ie (A) 2

Example of working cycle steps with FD 2899-F1

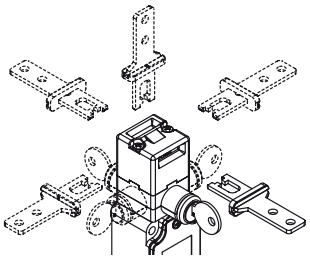
This type of switches **is applied on fences or protections where entrance is allowed to authorized personnel only.They have been studied to control large protected areas where operators may physically enter**. Supplied with a strong lock (up to 1000 N), the actuator can be removed from the head only after a complete rotation (180°) of the locking key. During the key rotation, electrical contacts are switched, and the actuator will be released only after NC contacts are positively opened. Contacts activated by the key locking device set to the initial position only with inserted actuator and with locking key device rotated in locked position. **It is impossible to rotate the key when the key locking device is unlocked and the actuator is removed (C state**). Contacts actuated by key locking or by actuator are available.



When the switch is in the C state, it is impossible to rotate the lock key and unlock the switch.

Operation state		state A	state B	state C
Actuator		Inserted and locked	Inserted and unlocked	Extracted
Lock		Closed	Opened	Opened
Contact blocks				
FD 1899 1NC+1NO controlled by the lock		21-22 13-14	21-22 13-14	21-22 13-14
FD 2099 2NC+1NO controlled by the lock		11-12 21-22 33-34	11-12 21-22 33-34	11-12 21-22 33-34
FD 2199 3NC controlled by the lock		11-12 21-22 31-32	11-12 21-22 31-32	11-12 21-22 31-32
FD 2299 1NC+2NO controlled by the lock		11-12 23-24 33-34	11-12 23-24 33-34	11-12 23-24 33-34
FD 2899 1NO+1NC controlled by the lock 1NC controlled by the actuator		11-12 21-22 33-34	11-12 21-22 33-34	11-12 21-22 33-34
FD 2999 2NC controlled by the lock 1NC controlled by the actuator		11-12 21-22 31-32	11-12 21-22 31-32	11-12 21-22 31-32
FD 3099 1NC controlled by the lock 2NC controlled by the actuator		11-12 21-22 31-32	11-12 21-22 31-32	11-12 21-22 31-32

Rotating head and release device

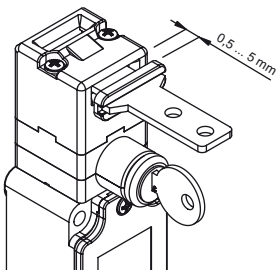


The head can be quickly rotated on each of the 4 sides of the switch by unfastening the two fixing screws. The release device can be rotated in 90° steps as well. This enables the switch to assume 32 different configurations.

Limits of utilization

Do not use where dust and dirt may penetrate in any way into the head and deposit there, in particular where metal dust, concrete or chemicals are spread.
Do not use where explosive or inflammable gas is present.

Actuator regulation zone



This switch has a wide backlash of the actuator into the head (4,5 mm) for an easier installation.
With closed door, check that the actuator doesn't knock straight against the head of the switch; it must be in the adjustment zone (0,5…5 mm)

Data type approved by IMQ, CCC and EZU

Rated insulation voltage (Ui): 500 VAC
400 VAC for contact blocks 20, 21, 22, 28, 29, 30
Thermal current (Ith): 10 A
Protection against short circuits: fuse 10 A 500 V type aM
Protection degree: IP67
MV terminals (screw clamps)
Pollution degree 3
Utilization category: AC15
Operation voltage (Ue): 400 VAC (50 Hz)
Operation current (Ie): 3 A
Forms of the contact element: Zb, Y+Y, Y+Y+X, Y+Y+Y, Y+X+X
Positive opening of contacts on contact block 18, 20, 21, 22, 28, 29, 30
In conformity with standards: EN60947-1, EN 60947-5-1 and subsequent modifications and completions, fundamental requirements of the Low Voltage Directive 73/23 EEC and subsequent modifications and completions.
Please contact our technical service for the list of type approved products.

Data type approved by UL

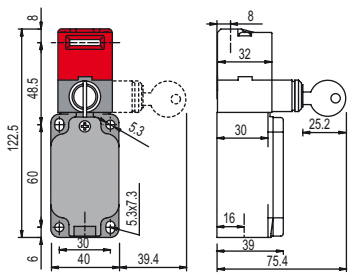
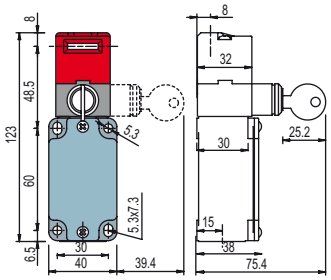
Utilization categories Q300 (69 VA, 125-250 VDC)
A600 (720 VA, 120-600 VAC)
Data of the housing type 1, 4X (indoor use only), 12, 13
In conformity with standard: UL 508
For all contact blocks use 60 or 75 °C copper (Cu) conductor and wire size No. 12-14 AWG. Terminal tightening torque of 7,1 Lb-In.

Please contact our technical service for the list of type approved products.

Dimensional drawings

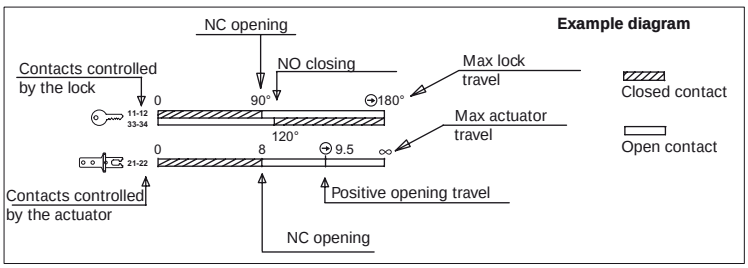
Contacts type:

L = slow action

Contact blocks	polymer housing Switch without actuator supplied with two keys	metal housing Switch without actuator supplied with two keys
		
18 L	FP 1899 1NO+1NC	FD 1899 1NO+1NC
20 L	FP 2099 1NO+2NC	FD 2099 1NO+2NC
21 L	FP 2199 3NC	FD 2199 3NC
22 L	FP 2299 2NO+1NC	FD 2299 2NO+1NC
28 L	FP 2899 1NO+2NC	FD 2899 1NO+2NC
29 L	FP 2999 3NC	FD 2999 3NC
30 L	FP 3099 3NC	FD 3099 3NC
33 L	FP 3399 1NO+1NC	FD 3399 1NO+1NC
34 L	FP 3499 2NC	FD 3499 2NC
Min. force	30 N (40 N ⊖)	30 N (40 N ⊖)

How to read travel diagrams

All measures in the diagrams are in mm or in degrees



IMPORTANT:
NC contacts (⊶) has to be considered with inserted and blocked actuator in the key lock. **In safety applications** it is necessary to activate the switch **at least up to the positive opening point** indicated in the diagrams with the symbol ⊖. Operate the switch **at least with the positive opening force**, indicated between brackets, below each article, next the value of minimum force.

Accessories See page 5/1

Items with code on the **green** background are available in stock

All measures in the drawings are in mm

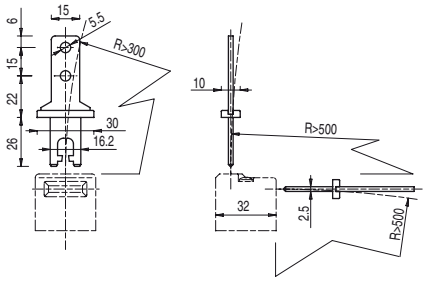
Stainless steel actuators

10 pcs packs

IMPORTANT: These actuators must be used with FD, FP, FL, FC or FS series only (e.g. FD 693)

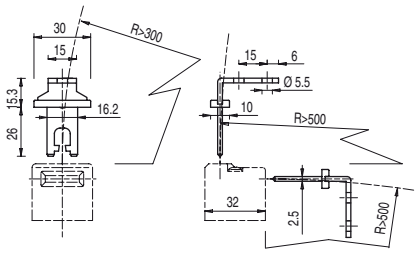
Article	Description
VF KEYF	Straight actuator





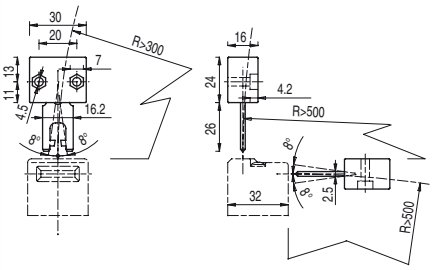
Article	Description
VF KEYF1	Right-angled actuator





Article	Description
VF KEYF2	Jointed actuator

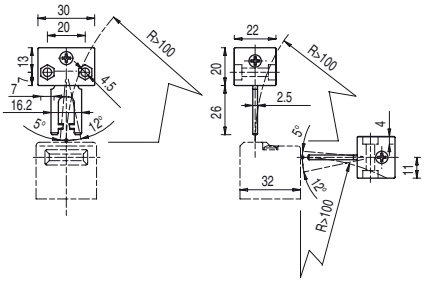




The actuator can flex in four directions for applications where the door alignment is not precise

Article	Description
VF KEYF3	Jointed actuator adjustable in two directions

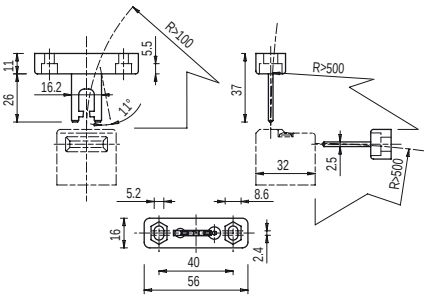




Actuator adjustable in two directions for doors with reduced dimensions.

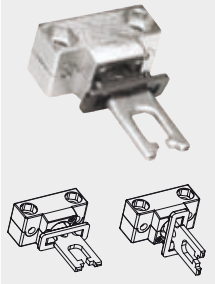
Article	Description
VF KEYF7	Jointed actuator adjustable in one direction

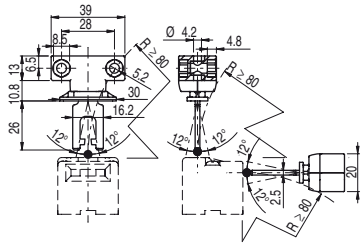




Actuator adjustable in one direction for doors with reduced dimensions.

Article	Description
VF KEYF8	Universal actuator





Joined and two directions adjustable actuator for doors with reduced dimensions. The actuator has two couples of fixing holes and it is possible to rotate the actuator-working plan (see picture).

Accessories

Article	Description
VF KB1	Actuator entry locking device



Padlockable device to lock the actuator entry in order to prevent from the accidental closing of the door behind operators while they are inside the machine. To be used only with FD, FL, FC and FS series with metal heads.



Article	Description
VF KLA371	Set of 2 locking keys



Extra copy of the locking keys to be purchased if further keys are needed (standard supply 2 units). All switches keys have the same code. Other codes on request.

Accessories See page 5/1

Items with code on the **green** background are available in stock