CFSQ-IP69K

Hinges with built-in safety switch

with IP69K protection, SUPER-technopolymer

MATERIAL

Self-extinguish high-rigidity SUPER-technopolymer, black colour, matte finish.

Thanks to its housing made out of SUPER-technopolymer, the CFSQ hinge guarantees the double insulation of the internal circuits, therefore there is no need of grounding connection. Furthermore, the housing protects the electric contacts from shocks, atmospheric agents and accidental penetration of tools.

ROTATING PIN

AISI 303 stainless steel.

STANDARD EXECUTIONS

Assembly by means of pass-through holes for M6 countersunk-head screws UNI 5933, DIN 7991.
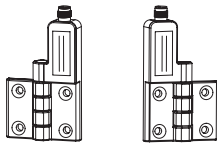
Connector cable M12x1, protection IP69K, starting work angle 0°:
- **C-A-D-IP69K**: axial connector, microswitch on the right.
- **C-A-S-IP69K**: axial connector, microswitch on the left.
- **C-B-D-IP69K**: rear connector, microswitch on the right.
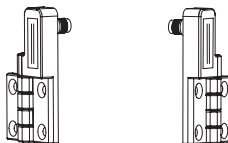- **C-B-S-IP69K**: rear connector, microswitch on the left.

ELESA Original design

CFSQ-C-A-D-IP69K   CFSQ-C-A-S-IP69K

CFSQ-C-B-D-IP69K   CFSQ-C-B-S-IP69K

ROTATION ANGLE (APPROXIMATE VALUE)

Max 190° (-10° and +180° see Fig.1).

0° is the condition where the interconnected surfaces are on the same plane.

See Built-in safety switch functioning and maintenance.

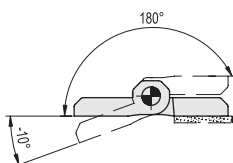The hinge must not be stressed by any negative angle of less than -10°.

ACCESSORIES ON REQUEST

FC.M12x1: extensions with 4 pole M12 female axial connector.

SPECIAL EXECUTIONS ON REQUEST

Operating angle of the hinge other than from 0° to 180°, every 15°, where the system frame/door requires a special execution.

FEATURES AND APPLICATIONS

- The hinge with built-in switch (ELESA patent) is a safety device because in case of accidental opening of doors, machine protections, or safety doors on machines and production equipment, it automatically breaks off the power supply hence protecting the operators.
- Switch equipped with two contacts: one NC contact and one change-over NO contact, form C, see IEC EN 60947-5-1 standard.
- Switch set with positive opening (in compliance with IEC EN 60947-5-1 standard, K attachment): the contacts break off for the direct movement of an actuator, onto which the working force is applied through non elastic elements.
- Quick release switch: the stroke speed of the contact-holder slider does not depend on the working speed.
- Easy to assemble: the built-in safety switch is integrated into a single body with the hinge, thus offering a very easy and fast assembly. This is a great advantage in comparison with some traditional systems which still require to set up separately a hinge and a safety switch connected by a special pin to replace the standard pin of the hinge.
- Universal usage: CFSQ hinges can be assembled on the most common aluminium profiles.

Fig.1

180°

-10°

CFSQ-S-IP69K

CFSQ-D-IP69K

CFMQ
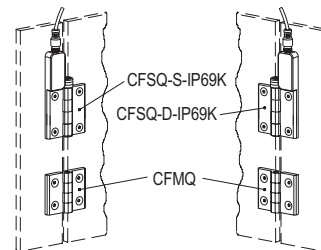
ASSEMBLY INSTRUCTIONS

- Fit the hinge body with the built-in switch on the fixed part (frame) and the other body on the door. The distance between the axis of the hinge pin and the door must be at least 5 mm (see fig.3).
- Leave the least clearance between the holes in the mounting walls and the diameter of the setscrews (Max 0.5 mm). The suggested tightening torque should not be exceeded: 5 Nm.
- The hinge must not be used as a mechanical end-stroke either for door maximum opening or for closed door. For this purpose we recommend using external mechanical stops to prevent the door from opening completely against the hinge body assembled on the frame or exceeding the angle where the two interconnected surfaces are on the same plane.
- The CFSQ hinge must always be assembled with at least a second complementary hinge CFMQ (CFMQ.60-45-SH-6 code 425812). In case of horizontal door opening or in general of a limited weight it is possible to use one hinge only.
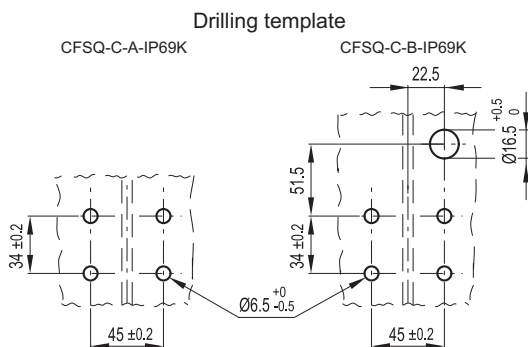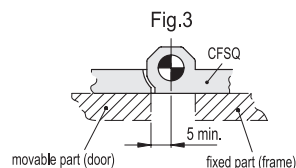- The connection cables must always be protected against mechanical damages.

CABLES

- Cable with M12x1 connector using the following circuit scheme.
- Normally Closed contact NC: for safety applications, according to IEC EN 60947-5-1 standard, only the NC contact (for break off) must be used leaving the NO contact unused.
- Normally Open contact NO: the normally open contact can be used only if the hinge is used as status indicator (signalling) in this case also the NC contact can be used simultaneously always as status indicator (signalling).

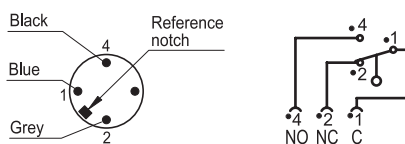## BUILT-IN SAFETY SWITCH FUNCTIONING AND MAINTENANCE

- The angle nominal variation required for switching the microswitch is of 6° (see stroke diagram). In normal conditions of use, when the mechanical life of the device is completed, the nominal variation may increase up to 9°. We suggest to check the proper functioning of the hinge according to UNI EN ISO 13857.
- For applications with safety protection function, the hinge must be able to turn at least by 15°, equivalent to the forced opening (positive opening) of the contacts by the actuator.
- We suggest to check the proper functioning of the CFSQ hinge prior to the start up and afterwards periodically.
- When the protection is opened the machine must immediately stop. When the protection is opened at any degrees, the machine must not be able to start.
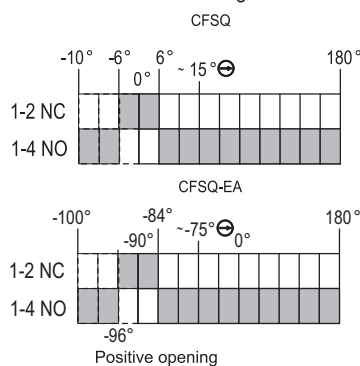
WARNINGS

- The hinge with built-in safety switch must not be used in environments with frequent temperature changes which can cause condensation, in the presence of explosive or flammable gasses.
- The hinge with built-in safety switch must always be protected with a proper fuse (see table).
- The choice and use of the hinge with built-in safety switch is the responsibility of the customer who will check that the relevant application is compliant to the safety standards in force under the actual operating conditions.
- Using CFSQ hinges always implies a full knowledge of and compliance with the safety standards in force, including EN ISO 13849-1, IEC EN 60204-1, UNI EN ISO 14119, EN ISO 12100.
- The hinge must always be assembled and connected by qualified operators who have to check regularly the hinge perfect functioning.

Fig.3

movable part (door)   5 min.   fixed part (frame)
CFSQ

Drilling template

CFSQ-C-A-IP69K   CFSQ-C-B-IP69K

Cable/connector wiring

Black
Blue
Grey
Reference notch

NO   NC   C

Stroke diagram

CFSQ

-10° -6° 6° ~15° 180°
0°

1-2 NC
1-4 NO

CFSQ-EA

-100° -84° ~-75° 0° 180°
-90°

1-2 NC
1-4 NO

-96°

Positive opening

in compliance with
EN 60947-5-1

CE   c(UL)us LISTED

In compliance with:
IEC EN 60947-5-1:2003+A1:2009
Low voltage control auxiliaries
Approved by UL: E360222
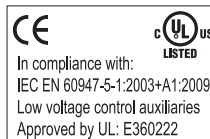
Extension cable wiring
(see accessory on request)

blue   black   white   brown
NO   NC   C
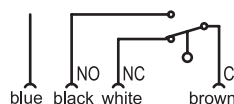
Category of usage		CFSQ-C.. (connector)	CFSQ-F.. (cable)
AC15 standard IEC 60947-5-1 Typical applications: electromagnetic load controls in alternating current	24 V	4 A	4 A
	220 V	4 A	4 A
	440 V	-	3 A
DC13 standard IEC 60947-5-2 Typical applications: electromagnet controls in direct current	24 V	2 A	2 A
	127 V	0.3 A	0.3 A

Mechanical features		Electrical features	
Type of contact: Ag 90 Ni 10		Thermic power Ith	Cable 10 A
			Connector 4 A
Maximum working frequence: 600 cycles/hour *		Short-circuit protection: 6A gl	
Mechanical life-span (test carried in compliance with IEC EN 60947-5-1 regulation): 106		Seal voltage at nominal pulse	4 KV
		Insulation nominal UI voltage	Ui = 250V
Protection class of the housing EN60529: IP69K		Minimum force (torque for positive opening of contact): 0.5 Nm	
Speed of operation minimum 2° / sec., maximum 90° / sec.		Short circuit conditioned current: 1000 A	
		Pollution degree: 3	
		B10d = 2000000	
		Tm = 20 years	

| Description	Electrical Features	Environ-mental rating
CFSQ.60-SH-6-C	4A at 24 Vac/dc (resistive load)	Types 1 and 4X "indoor use only"
Q 300 DC control	B300 pilot duty 4A at 240 Vac (resistive load) 4A at 240 Vdc (resistive load)	
Environmental conditions for assembly: maximum permissible ambient temperature 40°C		

* A cycle of operations is equivalent to one closure and one opening as required by the standard EN60947-5-1.
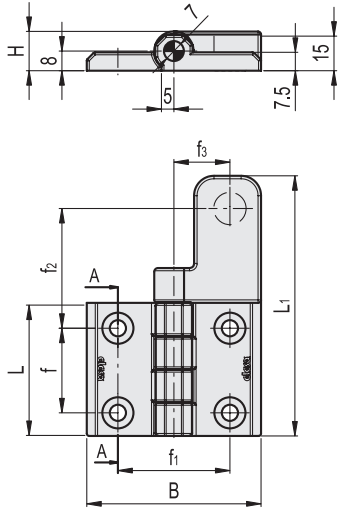
CFSQ-C-A-D-IP69K
CFSQ-C-A-S-IP69K

CFSQ-C-B-D-IP69K
CFSQ-C-B-S-IP69K
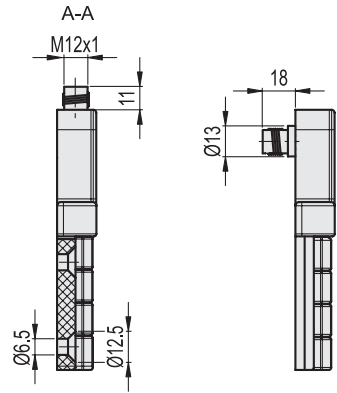
CFSQ-C-A-D-IP69K

Code	Description	L	B	f	f1	H	L1	C# [Nm]	△ △
427011-IP69K	CFSQ.60-SH-6-C-A-D-IP69K	53	70	34	45	16	110	5	96

CFSQ-C-A-S-IP69K

Code	Description	L	B	f	f1	H	L1	C# [Nm]	△ △
427013-IP69K	CFSQ.60-SH-6-C-A-S-IP69K	53	70	34	45	16	110	5	96

CFSQ-C-B-D-IP69K

Code	Description	L	B	f	f1	f2	f3	H	L1	C# [Nm]	△ △
427015-IP69K	CFSQ.60-SH-6-C-B-D-IP69K	53	70	34	45	51.5	22.5	16	110	5	96

CFSQ-C-B-S-IP69K

Code	Description	L	B	f	f1	f2	f3	H	L1	C# [Nm]	△ △
427017-IP69K	CFSQ.60-SH-6-C-B-S-IP69K	53	70	34	45	51.5	22.5	16	110	5	96

Suggested tightening torque for assembly screws.

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| Resistance tests	Axial Stress	Radial Stress	90° Angled Stress
Description	Max limit static load Sa [N]	Max limit static load Sr [N]	Max limit static load S90 [N]
CFSQ-IP69K	2100	2800	1300

For CFSQ. hinges with built-in safety switch, the reference value supplied is the max limit static load (Sa, Sr, S90), since these hinges can be used as safety devices. Above this value, the material may break, thus prejudicing the hinge functionality. Obviously a suitable factor, according to the importance and safety level of the specific application, must be applied to this value.The load values shown in the tables of the different hinges are the result of tests carried out in our laboratories under controlled temperature and humidity (23°C-50% R.H.), under given conditions of use and for a limited period of time.

Example of suitability check

P = weight of the door [N]
P_1 = additional extra load [N]
W = width of the door
D = distance [metres] between the centre of gravity of the door and the hinge axis. In normal conditions D = W/2
D_1 = distance [metres] between the hinge axis and the additional extra load application point
N = number of hinges
k = safety factor
$d_1 ... d_n$ = distances (metres) of all the hinges from the hinge of reference
$d_T = d_1 + d_2 + ... + d_n$ in case of only two hinges assembled, d_T is simply the distance between them

Conditions to be checked in order to ensure a correct functioning with two or more hinges.

$$\frac{(P+P1)}{N} \cdot k < Sa$$

$$\frac{[(P \cdot D)+(P1 \cdot D1)]}{d_T} \cdot k < Sr$$

$$\frac{[(P \cdot D)+(P1 \cdot D1)]}{d_T} \cdot k < S90$$
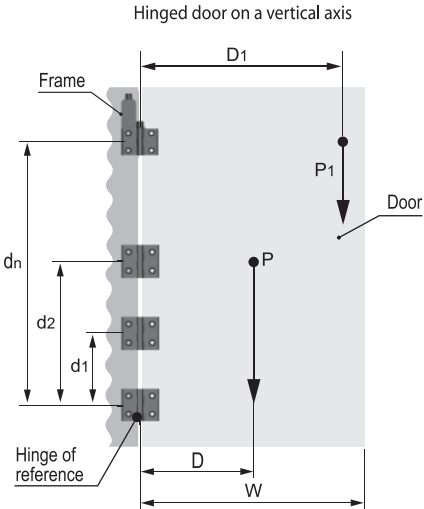
The technical designer must use suitable safety factors (k) according to the type of application and function of the CFSQ. hinge.

Example hinge CFSQ.60-SH-6

P = 294 N (30 Kg)   D = 0,4 m   N = 3
d_T = 1,5 m d_2 = 1 m d_1 = 0,5 m
P_1 = 196 N (20 Kg) D_1 = 1,2 m

$$\frac{490}{3} = 163 \cdot k < 2100$$

$$\frac{[(294 \cdot 0,4)+(196 \cdot 1,2)]}{1,5} = 235,2 \cdot k < 2800$$

$$\frac{[(294 \cdot 0,4)+(196 \cdot 1,2)]}{1,5} = 235,2 \cdot k < 1300$$

Hinged door on a vertical axis

The examples shown here must be considered only as explanatory, since they are not applicable to all the different applications, conditions of use, ways of assembly which can actually take place. In practice, the technical designer, after applying a suitable safety factor (k) must also test the chosen product to check its suitability.
For further general technical information, refer to the guidelines.

elesa+Ganter

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