

Installation & Operating Manual – 2107116

Rev. 0-0

SK-SQ

NOMENCLATURE

SK-SQ	xx	x	x	x	-	x	x	x	x	x	x	x	x	xx	
Series	Type of Switches	Quantity of switches	Terminals	Painting		Cable entry	Indicator	Approval	Marking	IP	Temp. range	Material and sov	Coil rating	Pneumatic connection	Special execution

READ THIS INSTRUCTION FIRST

To avoid serious or fatal personal injury or major property damage, read and follow all safety instructions in this manual. If you require additional instructions, please contact Rotork YTC Limited.

Ex Safety instructions for hazardous area installation:

Soldo® limit switch box model SK (SQ) are valve position indication devices (indication of valve open or close).

Projected and built according to directive ATEX 2014/34/UE with reference to standard EN IEC 60079-0:2018, EN 60079-1:2014 and EN 60079-31:2014 and related standards IEC 60079-0:2017, IEC 60079-1:2014-06 and IEC 60079-31:2013, GB/T 3836.1-2021, GB/T 3836.2-2021, GB/T 3836.31-2021.

“ATEX” by the French “ATmosphere Explosive”, provides the technical requirements to be applied to equipment intended for use in potentially explosive atmospheres. The scope of directive is to remove technical barriers between Member State of European Community. The SK (SQ) limit switch boxes device must be installed and maintained according to suitable standards for electrical application in potentially explosive atmospheres where there is gas, dust, mist.

Read this first and keep this instruction manual always available.

Model option SK (SQ) _ _ _ _ _ (_ indicates options in housing configuration, switches, switches quantity, terminal strip, colour). This instruction refers to certified limit switch boxes covered by the certificate number: CCCEx and IECEx conformity certificate n°: IECEx SIR 12.0036X.

1. Limit switch box SK (SQ) may be installed in group II where flammable gases, steam and mist exist.

Ex db IIC T4...T6 Gb, Ex tb IIIC T85°C...T135°C Db

It means: **Ex** (European community logo for ATEX applications)
Ex db → Protection mode: flameproof type,
Ex tb → Protection mode: flameproof type.

	Temp. Class for hazardous location due to presence of hazardous gas	Superficial temp. for hazardous location due to presence of hazardous powder
T6	-55°C ≤ T _{amb} ≤ +60°C	85°C
T5	-55°C ≤ T _{amb} ≤ +80°C	100°C
T4	-55°C ≤ T _{amb} ≤ +105°C	135°C

Table 1

2. Suitably trained personnel shall carry out installation according with the applicable code of practice.

3. Cover must be tightening with a torque of at least 10 Nm.

4. For ambient temperature below -10°C and above 70°C use field wiring suitable for both minimum and maximum ambient temperature.

5. The user should provide suitable systems to limit heating coming from valve; maximum ambient temperature is related to Table 1.

6. The electrical devices must be grounded using their grounding connections. The grounding connection must be ATEX certified, suitable for the application required, substances, maximum superficial temperature and ambient temperature.

7. Grounding connection has been designed to be anti-rotation and it is provided with a grower washer to be anti-vibration. Suitable cable lugs have to be used for this connection. For example ring, fork wire terminal in copper or equivalent.

8. Cleaning the limit switch box must be done with a moist cloth to prevent build up of electrostatic charges. The user should guarantee periodic cleaning of the places where dust can accumulate to avoid that dust layer exceeds 50 mm. (Symbol X into certificate).

9. The user should not repair this equipment.

10. The user shall ensure that maintenance does not affect the safety features of the equipment.

11. If the equipment is likely to come in to contact with aggressive substances, it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised. Aggressive substances: example Acids, liquids, gases which can affected metals.

12. ATTENTION: Please refer to the ATEX and IECEx Certificate for special conditions and for safe use.

13. When screws are fully tightened into blind holes in enclosure walls, with no washer fitted, at least one full thread shall remain free at the base of the hole, for indicator cover (12) the max length of the screw under head shall be 7mm, while to fix the box with ISO standard the max length of the screw under head shall be 8mm.

14. ATTENTION: Remove plastic plugs or plastic stickers supplied with enclosure before installation, these components aren't certified. All cable entry devices and blanking elements shall be certified as explosion protection flameproof type. “db” and “tb” are suitable for use in ATEX areas when correctly installed.

Precautions for the use of NEPSI products:

15. The total power dissipation of the internal components of the switch box must not exceed 10W.

16. The installation, use and maintenance of the product strictly abide by the principles of “It is strictly forbidden to open the cover when the power is on” and “The cover shall not be opened in the presence of combustible dust”.

17. When the explosionproof mark of the product is Ex db IIC T4...T6 Gb, the cable entry port (thread specification is NPT1/2” or M20x1.5) must be equipped with explosionproof inspection and approved, in line with GB/T 3836.1-2021 and GB/T 3836.2-2021 standard, explosionproof grade Ex db IIC Gb cable entry device or plugging, after installation, the enclosure protection level shall not be lower than the IP67 specified in GB/T4208-2017. Redundant cable entries should be blocked with plugging devices.

18. When the explosionproof mark of the product is Ex tb IIIC T85°C...T135°C Db, the cable entry port (thread specification is NPT1/2” or M20x1.5) must be equipped with an explosionproof inspection approved and comply with GB/T 3836.1-2021 and GB/T 3836.31-2021 standard, explosionproof grade Ex tb IIIC IP68 cable entry device or plugging, after installation, the enclosure protection grade shall not be lower than the IP68 specified in GB/T4208-2017. Redundant cable inlets should be blocked with plugs.

19. The installation, use and maintenance of the product should also comply with the product manual, GB/T 3836.13-2021 “Explosive Atmosphere Part 13: Equipment Repair, Overhaul, Repair and Modification”, GB/T3836.15-2017 “Explosive Atmosphere Part 15 Part: Design, Selection and Installation of Electrical Devices”, GB/T3836.16-2017 “Explosive Environment Part 16: Inspection and Maintenance of Electrical Devices, GB15577-2018 “Dust Explosion Safety Regulations” and GB 50257-2014 “Electrical The relevant provisions of the “Code for Construction and Acceptance of Electrical Installations in Explosive and Fire Hazardous Environments for Installation Engineering”.

Equipment or protection system used in potentially explosive atmospheres are in conformity with national implementing legislation and that appropriate harmonized standards have been applied:

IEC 60079-0:2017, IEC 60079-1:2014-06, IEC 60079-31:2013
GB/T 3836.1-2021, GB/T 3836.2-2021, GB/T 3836.31-2021
EN 61326-1:2013
Directive 2014/35/UE Low Voltage
EN 60529:1991/A2:2013
EN 60730-1:2011

IECEx- Type examination certificate IECEx SIR 12.0036X
Production quality assurance notification:
IECEx: GB/ITS/QAR09.0004

Soldo limit switch boxes models SK (SQ) are also available, on request, with the following certifications:

EAC
CCOE
ECAS-Ex

⚠ WARNING! Warns of hazard that MAY cause serious personal injury, death or major property damage. HAZARDOUS VOLTAGE. Disconnect all power before servicing equipment. DO NOT REMOVE COVER WHEN ENERGISED. DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT.

⚠ CAUTION:
Do not exceed the limit switch performance limitation. Exceeding the limitation may cause damage to the limit switch, actuator and valve. The conduit plug supplied with the switch boxes are for transit purposes only. IP66-67 and IP66-68 10m protection depends on cable gland and cabling methods used. Limit switchbox for quarter-turn valve device (90° rotation). Maximum shaft angular velocity 250 rpm. Risk of damage if you don't respect this caution.
Follow switch adjustment & indicator setting before servicing the limit switch box.

1 INSTALLATION

1.1 Attach proper mounting bracket (1) to the box (4) housing using four M6x8 bolts (2).

1.2 Align shaft (5) to actuator shaft and engage it.

1.3 Attach bracket to actuator using hardware provided (3).

2 SWITCH ADJUSTMENT

2.1 Loosen the screws (15) to remove cover (7).

2.2 Follow instructions in “Cams setting”.

2.3 Box with 3-4 switches, set the actuator in the required signal position and set cams according to instructions in “Cams setting”.

2.4 Replace box cover (7) paying attention that the body shaft (5) properly fits in the cover shaft. To verify properly positioning of shafts, body and cover must overlie without clearance before tightening screws. Try to rotate body shaft, if cover shaft rotates at the same time, they are properly positioned. Take care to ensure that cover gasket seal (6) is properly located in seal groove. Tighten screws in a cross pattern, using a torque of at list 10Nm.
WARNING: check seal is properly fitted in groove.

Optional 3D stainless steel indicator

Grounding kit

3 3D INDICATOR SETTING

3.1 When the limit switch box cover (7) is secured to the body, loosen the two screws (12) and remove the 3D plastic or stainless steel indicator cover (13).

3.2 Loosen screw (14) and rotate 3D indicator (10) until the indication position matches the valve position. Rotation can be clockwise or counter clockwise.

3.3 Replace the indicator cover (13) and fix it on the switch box (7) by tightening the four screws (14). Do not exceed 0,8Nm when tightening the screws.

4 ELECTRICAL WIRING

4.1 Remove cover (7) as described in point 2.1.

4.2 Remove protection plugs from cable entries and substitute them with cable glands or plugs suitable for type of protection required. Maintenance: at the specified maintenance intervals it is recommended to check the compression fittings and tighten as necessary.

4.3 Connect terminal strip (8) according to the wiring diagram on the label on the limit switch box.

4.4 Reassemble cover (7) as described in point 2.4.

4.5 Tighten terminal strip's screws using a torque value of between 0,45÷0,6Nm.

4.6 The device must be grounded using a grounding kit. Two screws (3) and anti-vibration washers (1) are provided. There are two earth connections, one inside and one outside the box.

5 PRODUCT'S STORAGE

5.1 Keep the boxes away from UV rays and atmospheric agents, in an environment with an ambient temperature of between 0°C and 40°C.

Cams setting / Cams type				
A	B	C	D	E
1. Turn actuator pinion clockwise.	1. Turn actuator pinion clockwise.	1. Turn actuator pinion clockwise.	1. Turn actuator pinion clockwise.	1. Disengage cams from splined retainer to position 45°.
2. Disengage cam from splined retainer.	2. Disengage cam from splined retainer.	2. Loosen (using a 19 wrench) top nut.	2. Loosen (using a 19 wrench) top nut.	2. Engage into splined retainer and turn actuator pinion clockwise.
3. Turn, until switch is activated, then engage into splined retainer.	3. Turn, until switch is activated, then engage into splined retainer. Adjust the sensitivity by regulating the distance between the cam and the inductive sensor.	3. Rotate cam and fit in front of sensor.	3. Rotate cam and fit in front of sensor.	3. Disengage cams from splined retainer. 4. Rotate cam and fit in front of sensor then engage into splined retainer.
4. Turn actuator pinion counterclockwise.	4. Turn actuator pinion counterclockwise.	4. Turn actuator pinion counterclockwise.	4. Turn actuator pinion counterclockwise.	5. Turn actuator pinion counterclockwise.
5. Disengage cam from splined retainer.	5. Disengage cam from splined retainer.	5. Rotate cam and fit in front of sensor.	5. Rotate cam and fit in front of sensor.	6. Disengage cam from splined retainer and rotate cam and fit in front of sensor then engage into splined retainer then engage.
6. Turn, in the way shown, until switch is activated, then engage into retainer.	6. Turn, in the way shown, until switch is activated, then engage into retainer. Adjust the sensitivity by regulating the distance between the cam and the inductive sensor.	6. Fasten (using a 19 wrench) top shaft nut.	6. Fasten (using a 19 wrench) top shaft nut.	7. CAUTION: Make sure that the cams do not come in contact with the sensor possible breakage.

Cover Positioning	
Place cover on switch box paying attention that body shaft properly fit in cover shaft.	
Verify that cover and body are completely in contact.	
As in FIG. 4, if there is clearance between cover and body, rotate body shaft until they properly fit in and cover and body are completely in contact, as shown in FIG. 3.	

FIG. 1 Right positioning for shafts joint

FIG. 2 Wrong positioning for shafts joint

FIG. 3 Correct closure

FIG. 4 Incorrect closure

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