



# IECEX Certificate of Conformity

## INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit [www.iecex.com](http://www.iecex.com)

Certificate No.:	<b>IECEX EUT 17.0033X</b>	Page 1 of 4	<u>Certificate history:</u>
Status:	<b>Current</b>	Issue No: 3	Issue 2 (2022-09-09)
Date of Issue:	2023-07-27		Issue 1 (2021-08-25)
Applicant:	<b>Rotork Instruments Italy s.r.l.</b> Via Portico 17 - 24050 Orio al Serio (BG) - Italy <b>Italy</b>		Issue 0 (2017-12-20)
Equipment:	<b>SOLDO™ Limit switch box series SF (SIF), SS (SIS)</b>		
Optional accessory:			
Type of Protection:	<b>Intrinsic safety "i", dust tight enclosure "t"</b>		
Marking:	Ex ia IIC T6...T4 Ga Ex ia IIIC T <sub>200</sub> 45°C...T <sub>200</sub> 118°C Da  or  Ex ib IIC T6...T4 Gb Ex ib IIIC T45°C...T135°C Db  or  Ex tb IIIC T85°C...T120°C Db  <i>See details in the equipment description</i>		

Approved for issue on behalf of the IECEx  
Certification Body:

**Dionisio Bucchieri**

Position:

**Head of IECEx CB**

Signature:  
(for printed version)

Date:  
(for printed version)

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Manufacturer: **Rotork Instruments Italy s.r.l.**  
Via Portico 17 - 24050 Orio al Serio (BG) - Italy  
**Italy**

Manufacturing locations: **Rotork Instruments Italy s.r.l.**  
Via Portico 17 - 24050 Orio al Serio  
(BG) - Italy  
**Italy**

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEX Quality system requirements. This certificate is granted subject to the conditions as set out in IECEX Scheme Rules, IECEX 02 and Operational Documents as amended

## STANDARDS :

The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

[IEC 60079-0:2017](#) Explosive atmospheres - Part 0: Equipment - General requirements  
Edition:7.0

[IEC 60079-11:2011](#) Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"  
Edition:6.0

[IEC 60079-31:2013](#) Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"  
Edition:2

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

## TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Report:

[IT/EUT/ExTR17.0037/02](#)

Quality Assessment Report:

[GB/ITS/QAR09.0004/09](#)



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## **EQUIPMENT:**

Equipment and systems covered by this Certificate are as follows:

The limit switch box series SS with body in stainless steel and SF with body in aluminium alloy material (also referred to SIS and SIF respectively) are electrical devices used to indicate the position, for example in valves and actuators, by means of electrical signal and visual indicator.

*Details related to the equipment are reported in the annexed document.*

## **SPECIFIC CONDITIONS OF USE: YES as shown below:**

Applicable to all versions:

- Potential electrostatic charging hazard, see instruction manual for details.

Applicable only to intrinsically safe version:

- SF enclosures are mainly made of aluminium material and then a proper installation has to be observed when placed in environment classified as Zone 0 and Zone 20 to avoid an ignition hazard due to impact or friction.

- Each switch involved in the equipment has to be powered only by a single channel of certified intrinsic safety barrier. Where changeover contacts are included in switches, only one contact at time can be used and then no common electrical connection of two intrinsic safety barrier can be achieved.



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**DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)**

- Inductive slot sensors have been included in the list of already certified devices that can be mounted inside the limit switch box.

**Annex:**

[Annex to CoC IECEx EUT 17.0033 X Issue N. 3.pdf](#)

**Annex to certificate: IECEX EUT 17.0033 X Issue N. 3****Equipment description**

The limit switch box series SS with body in stainless steel and SF with body in aluminium alloy material (also referred to SIS and SIF respectively) are electrical devices used to indicate the position, for example in valves and actuators, by means of electrical signal and visual indicator. These are mounted on actuator or manual valve with external lever or gear.

The cable entries are machined according metric ISO 965-1 thread (M20x1.5 or M25x1.5), NPT thread ( $\frac{1}{2}$ " or  $\frac{3}{4}$ " ) or alternatively can be plain.

The limit switch boxes can be configured by the manufacturer according one of the following main configurations:

• Main Configuration 1: Box with simple apparatus switches.

Up to four contacts SPDT (or 2 x DPDT) electromechanical or reed type.

• Main Configuration 2: Box with simple apparatus switches + SMT End of Line monitoring encapsulated resistors

Up to four contacts SPDT (or 2 x DPDT) electromechanical or reed type.

• Main Configuration 3: Box with simple apparatus switches + THT End of Line monitoring (not encapsulated) resistors

Up to four contacts SPDT (or 2 x DPDT) electromechanical or reed type.

• Main Configuration 4: Box with Ex certified inductive proximity switches

Up to four proximity switches.

• Main Configuration 5: Box with Ex certified transmitter and potentiometer.

Up to one position transmitter mechanically connected to the internal camshaft and the potentiometer.

• Main Configuration 6: Box with simple apparatus switches, Ex certified transmitter and potentiometer.

Up to two contacts SPDT (or 1 x DPDT) electromechanical or reed type, and one position transmitter mechanically connected to the internal camshaft and the potentiometer.

• Main Configuration 7: Box with Ex certified inductive proximity switches, Ex certified transmitter and potentiometer.

Up to two proximity switches and one position transmitter mechanically connected to the internal camshaft and the potentiometer.

Configurations with a lower number of switches can be realized. The limit switches are mounted on circuit board or dedicated support plate and are interfaced to the camshaft; this component intervenes mechanically (or electromagnetically) on the switches changing their state.

Some PCBs used in the above mentioned configurations can also include resistors used to draw a small quantity of current from the associated apparatus and then allowing to identify remotely a potential wiring interruption or short circuit (this technique is called End of Line monitoring).

When the equipment is marked according the intrinsically safe requirements it can be powered up only by means of intrinsic safety barriers (associated apparatus).

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In this case each switch has to be connected to an individual channel of intrinsic safety barrier and in case of presence of double throw contact (e.g. SPDT and DPDT switch) only one contact at time can be used and then the common connection of two intrinsically safe barriers is forbidden.

Depending on the ambient temperature range all the above mentioned configurations can be also provided with a maximum number of two surge protectors (up to two independent channels each one) connected in parallel with the limit switches; the reactive safety related electrical parameters  $L_i$  and  $C_i$  of these devices are taken into account by the manufacturer in the final input parameters marked on the Ex equipment.

The limit switch boxes can also be used without their connection to the intrinsically safe apparatus only for use in Zone 21 and in this case the protection type is "tb" and EPL is "Db".

The equipment can be manufactured with different o-rings and gaskets materials, these variants define the extension of the equipment ambient temperature ranges as follows:

EPDM gaskets:  $-50^{\circ}\text{C} \div +80^{\circ}\text{C}$ .

Silicone gaskets:  $-60^{\circ}\text{C} \div +105^{\circ}\text{C}$ .

**Warning list:**

- Do not open in a gas/dust explosive atmosphere
- Due to risk of static hazard the enclosure must be only cleaned with a damp cloth
- Do not open when energized
- For safety instruction refers to IOM

**Electrical parameters:**

Safety related electrical parameters applicable to the intrinsically safe type of protection:

**•Box with simple apparatus switches.**

$U_i$ : 30 V       $I_i$ : 100 mA       $P_i$ : 750 mW       $L_i \approx 0$  uH       $C_i \approx 0$  uF

**• Box with simple apparatus switches + SMT End of Line monitoring encapsulated resistors**

$U_i$ : 30 V       $I_i$ : 100 mA       $P_i$ : 300 mW       $L_i \approx 0$  uH       $C_i \approx 0$  uF

**• Box with simple apparatus switches + THT End of Line monitoring (not encapsulated) resistors**

$U_i$ : 30 V       $I_i$ : 100 mA       $P_i$ : 280 mW       $L_i \approx 0$  uH       $C_i \approx 0$  uF

**•Box with Ex certified inductive proximity switches and/or Box with Ex certified transmitter and potentiometer.**

The safety related electrical parameters correspond to those defined for each individual already certified Ex Equipment internally installed.

Note:  $C_i$  and  $L_i$  parameters related to the channels where switches are wired are higher respect to those above mentioned if surge protectors are involved; in this case the parameters of the surge protector are summed to the parameters of the switch to which it is wired.

**Dust-tight type of protection (Ex tb):**

$U$ : 250 Vac;  $I$ : 1A;  $P$ : 2.47W

Note: Surge protectors are not allowed in this version.

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**Routine tests**

None

**Relationships between materials, ambient temperature range, temperature limits and electrical parameters**

• Box with simple apparatus switches.

Material	Extended ambient temperature range (°C)	Marking (EPLs Ga and/or Da)	Marking (EPLs Gb and/or Db)	Electrical parameters	Surge Protector allowed
Al / SS	-50°C ≤ Ta ≤ +40°C for EPDM gasket -60°C ≤ Ta ≤ +40°C for silicone gasket	Ex ia IIC T6 Ga Ex ia IIIC T <sub>200</sub> 45°C Da	Ex ib IIC T6 Gb Ex ib IIIC T45°C Db	Ui: 30 V; li: 100 mA; Pi: 750 mW; Li ≈ 0 uH; Ci ≈ 0 uH	Y but upper Ta is limited as follow: Ta +40°C @ T6/T85°C Ta +55°C @ T5/T100°C Ta +75°C @ T4/T135°C
	-50°C ≤ Ta ≤ +55°C for EPDM gasket -60°C ≤ Ta ≤ +55°C for silicone gasket	Ex ia IIC T5 Ga Ex ia IIIC T <sub>200</sub> 60°C Da	Ex ib IIC T5 Gb Ex ib IIIC T60°C Db	Ui: 30 V; li: 100 mA; Pi: 750 mW; Li ≈ 0 uH; Ci ≈ 0 uH	
	-50°C ≤ Ta ≤ +80°C for EPDM gasket	Ex ia IIC T4 Ga Ex ia IIIC T <sub>200</sub> 85°C Da	Ex ib IIC T4 Gb Ex ib IIIC T85°C Db	Ui: 30 V; li: 100 mA; Pi: 750 mW; Li ≈ 0 uH; Ci ≈ 0 uH	Lower Ta is limited to -40°C, for Dust marking the EPL is restricted to Db
	-60°C ≤ Ta ≤ +105°C for silicone gasket	Ex ia IIC T4 Ga Ex ia IIIC T <sub>200</sub> 110°C Da	Ex ib IIC T4 Gb Ex ib IIIC T110°C Db	Ui: 30 V; li: 100 mA; Pi: 750 mW; Li ≈ 0 uH; Ci ≈ 0 uH	

• Box with simple apparatus switches + SMT End of Line monitoring potted resistors

Material	Extended ambient temperature range (°C)	Marking (EPLs Ga and/or Da)	Marking (EPLs Gb and/or Db)	Electrical parameters	Surge Protector allowed
Al / SS	-40°C ≤ Ta ≤ +40°C for EPDM gasket -40°C ≤ Ta ≤ +40°C for silicone gasket	Ex ia IIC T6 Ga Ex ia IIIC T <sub>200</sub> 55°C Da	Ex ib IIC T6 Gb Ex ib IIIC T55°C Db	Ui: 30 V; li: 100 mA; Pi: 300 mW; Li ≈ 0 uH; Ci ≈ 0 uH	N
	-40°C ≤ Ta ≤ +55°C for EPDM gasket -40°C ≤ Ta ≤ +55°C for silicone gasket	Ex ia IIC T5 Ga Ex ia IIIC T <sub>200</sub> 70°C Da	Ex ib IIC T5 Gb Ex ib IIIC T70°C Db	Ui: 30 V; li: 100 mA; Pi: 300 mW; Li ≈ 0 uH; Ci ≈ 0 uH	N
	-40°C ≤ Ta ≤ +70°C for EPDM gasket	Ex ia IIC T4 Ga Ex ia IIIC T <sub>200</sub> 85°C Da	Ex ib IIC T4 Gb Ex ib IIIC T85°C Db	Ui: 30 V; li: 100 mA; Pi: 300 mW; Li ≈ 0 uH; Ci ≈ 0 uH	N
	-40°C ≤ Ta ≤ +100°C for silicone gasket	Ex ia IIC T4 Ga Ex ia IIIC T <sub>200</sub> 115°C Da	Ex ib IIC T4 Gb Ex ib IIIC T115°C Db	Ui: 30 V; li: 100 mA; Pi: 300 mW; Li ≈ 0 uH; Ci ≈ 0 uH	N

• Box with simple apparatus switches + THT End of Line monitoring resistors (not potted)

Material	Extended ambient temperature range (°C)	Marking (EPLs Ga and/or Da)	Marking (EPLs Gb and/or Db)	Electrical parameters	Surge Protector allowed
Al / SS	-50°C ≤ Ta ≤ +40°C for EPDM gasket -60°C ≤ Ta ≤ +40°C for silicone gasket	Ex ia IIC T6 Ga Ex ia IIIC T <sub>200</sub> 56°C Da	Ex ib IIC T6 Gb Ex ib IIIC T56°C Db	Ui: 30 V; li: 100 mA; Pi: 280 mW; Li ≈ 0 uH; Ci ≈ 0 uH	N
	-50°C ≤ Ta ≤ +55°C for EPDM gasket -60°C ≤ Ta ≤ +55°C for silicone gasket	Ex ia IIC T5 Ga Ex ia IIIC T <sub>200</sub> 71°C Da	Ex ib IIC T5 Gb Ex ib IIIC T71°C Db	Ui: 30 V; li: 100 mA; Pi: 280 mW; Li ≈ 0 uH; Ci ≈ 0 uH	N
	-50°C ≤ Ta ≤ +70°C for EPDM gasket	Ex ia IIC T4 Ga Ex ia IIIC T <sub>200</sub> 86°C Da	Ex ib IIC T4 Gb Ex ib IIIC T86°C Db	Ui: 30 V; li: 100 mA; Pi: 280 mW; Li ≈ 0 uH; Ci ≈ 0 uH	N
	-60°C ≤ Ta ≤ +100°C for silicone gasket	Ex ia IIC T4 Ga Ex ia IIIC T <sub>200</sub> 116°C Da	Ex ib IIC T4 Gb Ex ib IIIC T116°C Db	Ui: 30 V; li: 100 mA; Pi: 280 mW; Li ≈ 0 uH; Ci ≈ 0 uH	N

• Box with certified inductive switches					
Material	Extended ambient temperature range (°C)	Marking (EPLs Ga and/or Da)	Marking (EPLs Gb and/or Db)	Electrical parameters	Surge Protector allowed
Al / SS	-50°C ≤ Ta ≤ +76°C for EPDM gasket -60°C ≤ Ta ≤ +104°C for silicone gasket	Ex ia IIC T6...T4 Ga Ex ia IIIC T <sub>200</sub> (Ta+14)°C Da	-	Input parameters are based on components certificates.	Y but upper Ta is limited as follow: Ta +54°C @ T6/T85°C Ta +69°C @ T5/T100°C Ta +75°C @ T4/T135°C  Lower Ta is limited to -40°C, for Dust marking the EPL is restricted to Db
Al	-50°C ≤ Ta ≤ +80°C for EPDM gasket -60°C ≤ Ta ≤ +105°C for silicone gasket	-	Ex ib IIC T6...T4 Gb Ex ib IIIC T(Ta+7)°C Db		
SS	-50°C ≤ Ta ≤ +80°C for EPDM gasket -60°C ≤ Ta ≤ +105°C for silicone gasket	-	Ex ib IIC T6...T4 Gb Ex ib IIIC T(Ta+7)°C Db		

• Box with certified inductive switches (Inductive slot sensors type)					
Material	Extended ambient temperature range (°C)	Marking (EPLs Ga and/or Da)	Marking (EPLs Gb and/or Db)	Electrical parameters	Surge Protector allowed
Al / SS	-50°C ≤ Ta ≤ +76°C for EPDM gasket -60°C ≤ Ta ≤ +104°C for silicone gasket	Ex ia IIC T6...T4 Ga Ex ia IIIC T <sub>200</sub> (Ta+14)°C Da	-	Input parameters are based on components certificates.	N
	-50°C ≤ Ta ≤ +80°C for EPDM gasket -60°C ≤ Ta ≤ +105°C for silicone gasket	-	Ex ib IIC T6...T4 Gb Ex ib IIIC T(Ta+7)°C Db		

• Box with certified position transmitter					
Material	Extended ambient temperature range (°C)	Marking (EPLs Ga and/or Da)	Marking (EPLs Gb and/or Db)	Electrical parameters	Surge Protector allowed
Al / SS	-50°C ≤ Ta ≤ +80°C for EPDM gasket -50°C ≤ Ta ≤ +85°C for silicone gasket	Ex ia IIC T6...T4 Ga Ex ib IIIC T(Ta+7)°C Db <i>Note: When position transmitter is involved EPL Da is not allowed</i>	-	Input parameters are based on components certificates.	N

• Box with certified position transmitter and simple apparatus switches					
Material	Extended ambient temperature range (°C)	Marking (EPLs Ga and/or Da)	Marking (EPLs Gb and/or Db)	Electrical parameters	Surge Protector allowed
Al / SS	-50°C ≤ Ta ≤ +75°C for EPDM gasket -50°C ≤ Ta ≤ +85°C for silicone gasket	Ex ia IIC T4 Ga Ex ib IIIC T(Ta+20)°C Db <i>Note: When position transmitter is involved EPL Da is not allowed</i>	-	Input parameters are based on components certificates.	N

• Box with certified inductive switches and position transmitter					
Material	Extended ambient temperature range (°C)	Marking (EPLs Ga and/or Da)	Marking (EPLs Gb and/or Db)	Electrical parameters	Surge Protector allowed
Al / SS	-50°C ≤ Ta ≤ +64°C for EPDM gasket -50°C ≤ Ta ≤ +85°C for silicone gasket	Ex ia IIC T6...T4 Ga Ex ib IIIC T(Ta+20)°C Db <i>Note: When position transmitter is involved EPL Da is not allowed</i>	-	Input parameters are based on components certificates.	Y but upper Ta is limited as follow: Ta +42°C @ T6/T85°C Ta +57°C @ T5/T100°C Ta +75°C @ T4/T135°C  Lower Ta is limited to -40°C, for Dust marking the EPL is restricted to Db



• Box having type of protection Ex tb					
Material	Extended ambient temperature range (°C)	Marking (EPLs Ga and/or Da)	Marking (EPLs Gb and/or Db)	Electrical parameters	Surge Protector allowed
Al / SS	-50°C ≤ Ta ≤ +70°C for EPDM gasket -60°C ≤ Ta ≤ +70°C for silicone gasket	-	Ex tb IIIC T85°C Db	The equipment can be used within the rated parameters of the internal components without ever exceeding the following values: U: 250 Vac I: 1 A Pd: 2.47W	N
	-50°C ≤ Ta ≤ +80°C for EPDM gasket -60°C ≤ Ta ≤ +85°C for silicone gasket	-	Ex tb IIIC T100°C Db		N
	-60°C ≤ Ta ≤ +105°C for silicone gasket	-	Ex tb IIIC T120°C Db		N

Notes:

Note 1 - The equipment temperature range is delimited by the worst component ambient temperature range.

*Example: Box with certified position transmitter and certified inductive switches.*

*Transmitter ambient temperature range: -40°C ÷ +85°C*

*Inductive switches ambient temperature range: -60°C ÷ +100°C*

*The equipment temperature range in this case is -40°C ÷ +85°C (the version with silicone gasket has to be selected).*

Note 2 - When the surge protector is installed the safety related input electrical parameters marked on the limit switch box include the reactances parameter Ci and Li as given by the surge protector certificate (summed to those of the inductive switches when present).

Note 3 - When the equipment contains switches, these have to be of the same type.

Note 4 - When already certified proximity switches/transmitters are involved in the equipment, the marked temperature class is related to the maximum ambient temperature as described by the certificate of these devices.

Furthermore, when more than one already certified proximity (with eventually one transmitter) are included, the marked ambient temperature values for each temperature class/maximum surface temperature and group of supply parameters are reduced to take into consideration the local ambient temperature inside the limit switch box.