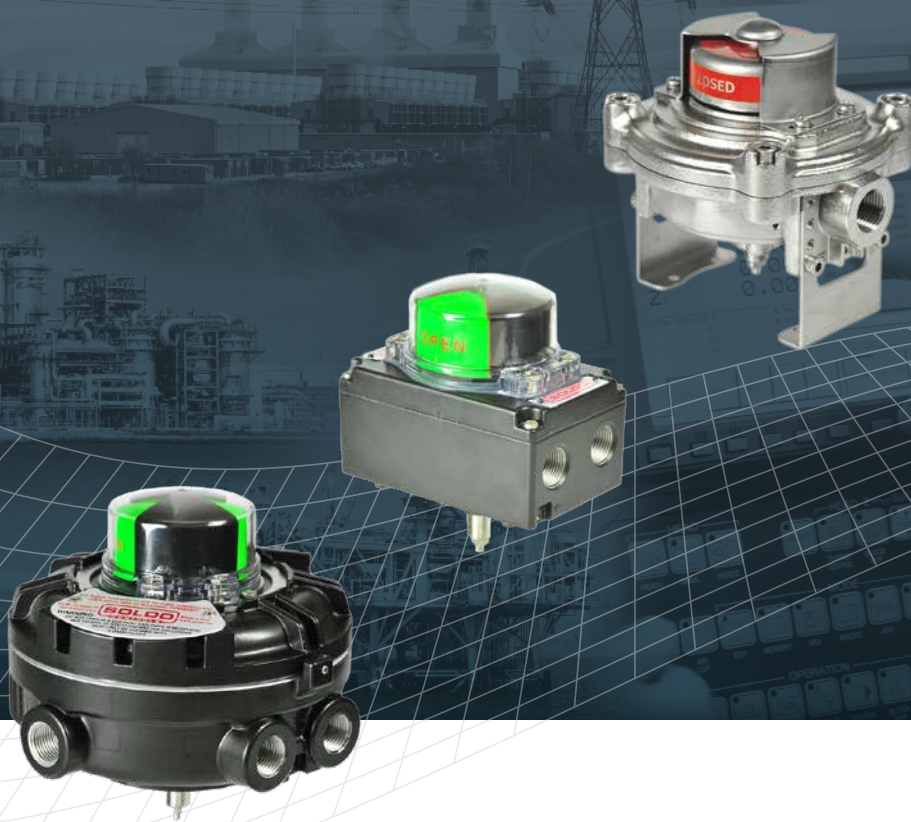


rotork®

Limit Switch Boxes



SOLDO
CONTROLS
A rotork® Brand

Keeping the World Flowing

rotork®

Keeping the World Flowing



**RELIABILITY
IN FLOW CONTROL
CRITICAL
APPLICATIONS**

› **Reliable operation** when it matters

Assured reliability for critical applications and environments. Whether used 24/7 or infrequently, Rotork products will operate reliably and efficiently when called upon.

› **Customer-focused service** worldwide support

Solving customer challenges and developing new solutions. From initial enquiry through to product installation, long-term after-sales care and Client Support Programmes (CSP).

› **Quality-driven** global manufacturing

Products designed with 60 years of industry and application knowledge.

Research and development across all our facilities ensures cutting edge products are available for every application.

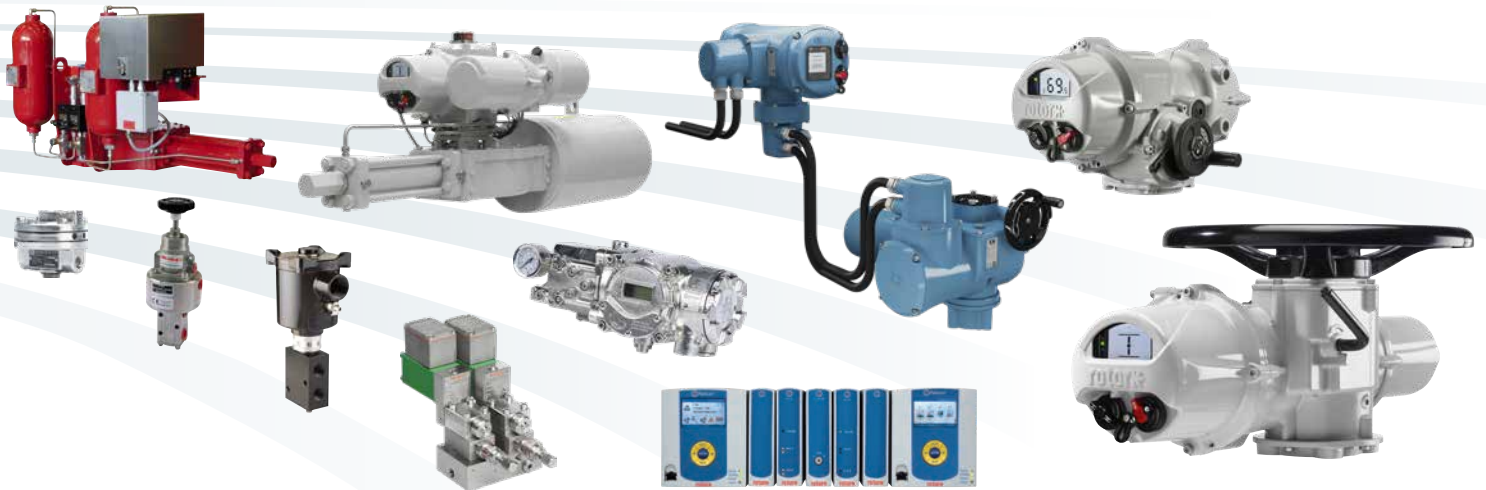
› **Low cost** of ownership

Long-term reliability prolongs service life.

Rotork helps to reduce long term cost of ownership and provides greater efficiency to process and plant.

Limit Switch Boxes

Section	Page	Section	Page
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Comprehensive product range serving multiple industries

Improved efficiency, assured safety and environmental protection.

Rotork products and services are used throughout industry inclusive of Power, Oil & Gas, Water & Wastewater, HVAC, Marine, Mining, Pulp & Paper, Food & Beverage, Pharmaceutical and Chemical industries around the world.

Global presence local service

Global company with local support.

Manufacturing sites, service centres, sales offices and *Centres of Excellence* throughout the world provide unrivalled customer services and fast delivery.

Market leader technical innovator

The recognised market leader for 60 years.

Our customers have relied upon Rotork for innovative solutions to safely manage the flow of liquids, gases and powders.

Corporate social responsibility

A responsible business leads to being the best business.

We are socially, ethically, environmentally responsible and committed to embedding CSR across all our processes and ways of working.

rotork®

Keeping the World Flowing



**GLOBAL
EXPERIENCE
STRATEGIC
INDUSTRIES**

Active in every industry and market sector around the world.

Serving customers and working with partners.

Improving efficiency, assuring safety and protecting the environment.

> Industry knowledge

Our engineering and application knowledge base, built over 60 years, allows us to provide innovative and reliable solutions for all flow control applications.

We work across the globe, servicing a diverse range of markets and critical applications.

Our experience of flow control is second to none.



Oil & Gas

Rotork products are used on upstream, midstream and downstream activities, ranging from offshore production facilities, to refining and processing, to transportation, storage and distribution.

- Onshore and offshore production
- Refining and petrochemicals
- Distribution and storage
- Pipelines
- LNG liquefaction and regasification
- Unconventional oil & gas



Power

Rotork products are found in traditional power stations, including nuclear power stations where its products are certified for use both inside and outside containment. They are also used for renewable energy generation systems such as thermal solar plants, and emission reduction processes such as flue gas desulphurisation.

- Conventional fuels
- Nuclear energy
- Concentrating solar power
- Geothermal and other renewables



Water & Wastewater

Rotork products are used on modern state-of-the-art water treatment and distribution processes, which maximise existing resources such as desalination plants and water re-use projects, together with conventional water and wastewater plants.

- Sludge and sewage treatment
- Water treatment, desalination and re-use
- Environmental control
- Dams, reservoirs and irrigation



Other Industries

- Marine
- Pharmaceutical
- HVAC
- Mining
- Biomedical
- Rail
- Pulp & Paper
- Food & Beverage

rotork[®] Instruments

Rotork Instruments are specialist manufacturers of products for flow control, pressure control, flow measurement and pressure measurement. Our solutions are trusted wherever there is a need for high precision and reliability, including pharmaceutical, biomedical, oil & gas and manufacturing industries.

We have production facilities throughout the world, complemented by a large network of distribution and support centres.

A full listing of our worldwide sales and service network is available on our website at www.rotork.com



Worldwide Industry and Application Experience

With nearly 60 years of extensive knowledge and experience, Rotork has provided products and services worldwide for virtually every industrial actuator application.

Rotork Instruments offers a range of precision control and valve accessory products through our prestigious brands, including Fairchild, YTC, Soldo[®], Midland-ACS[™], Bifold[®], Orange, M&M and Alcon:

Instrument Valves

- Valve actuation accessories
- Solenoid valves
- Piston valves
- Instrument valves
- Medium pressure valves
- Subsea valves and connectors

Controllers

- Valve positioners
- Rail systems
- I/P and E/P converters
- Fire protection

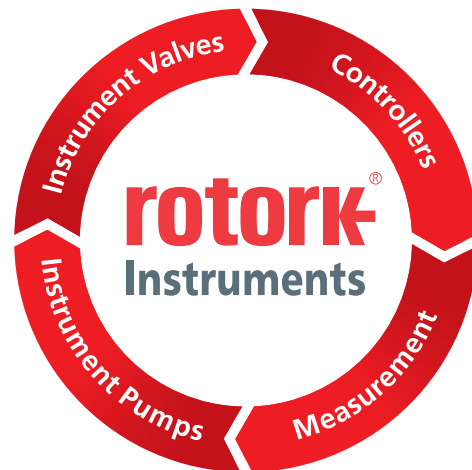
Measurement

- Valve position sensors
- Transmitters and switches

Instrument Pumps

- Pumps
- Intensifiers and accumulators

Rotork Instruments is proud to offer a diverse range of products which serve many different duties in a wide variety of applications. We also offer a factory customisation service to create one-off units to meet specific needs.



Rotork Instruments



The Soldo range of limit switch boxes, proximity sensors, and accessories offers a variety of options. Soldo specialises in the design and manufacture of control accessories for valve automation, providing high quality products and services that guarantee a link between the control room and automated process valves.

Product development programs ensure Soldo is always ready for new markets and applications and able to meet or exceed customer requirements. Soldo products are valued by customers for their advanced design and capabilities including:

Versatility

From cost effective, when price is a concern, to corrosion resistant and explosionproof, when harsh environments are encountered, Soldo products provide the protection and automation that each application demands.

Unique Design Features

Soldo units are a step above the competition with unique split shaft designs. This allows installation where space is a factor and where a low profile limit switch box is not preferred. Soldo limit switches also have easy-set 3 degree cams for independent tool free adjustment.

Simple Installation

Pre-wired PCB switch modules ensure installation is worry free and allows easy installation and wiring directly into terminal strips. The pre-wired boards are conformal coated for environmental protection. Soldo also offers a full line of mounting brackets for all models that do not come with an integral mounting kit.

Italy (manufacturing plant)

tel: +39 035 451161
email: sales.instruments-italy@rotork.com

USA

tel: +1 (336) 659 3400
email: sales@soldousa.com

Full contact details and company information is available online at www.soldo.net



Product Overview Chart



Model		SP	SM	SB	SF	SS	HW	SX	SH
Application	Industry								
	Valve Type	Rotary Valves	Rotary Valves	Rotary Valves	Rotary Valves	Rotary Valves	Rotary Valves	Rotary Valves	Rotary Valves
Material	Housing	Glass reinforced plastic	Nickel plated aluminium	Copper free aluminium	Copper free aluminium	316 stainless steel	Aluminium	Aluminium	Aluminium
	Cover	Polycarbonate	Polycarbonate	Polycarbonate	Aluminium	316 stainless steel	Aluminium	Aluminium	Aluminium
Certification	IP Rating	IP 65	IP 65	IP 67	IP 66 / 67 IP 67M	IP 66 / 67 IP 67M	IP 66 / 67	IP 66 / 67	IP 66 / 67
	SIL Rating up to:	SIL2	SIL2	SIL3	SIL3	SIL3	SIL3	SIL3	SIL3
	ATEX, IECEx option	Exia IIC T6	Exia IIC T6	Exia IIC T6	Exia IIC T6	Exia IIC T6	-	Exd IIB T6	Exd IIB+H2 T6
	cULus option	-	-	Safe area or Class1/2 Div2	Safe area or Class1/2 Div2	Safe area or Class1/2 Div2	Safe area or Class1/2 Div2	Class 1/2 Div 1/2	Class 1/2 Div 1/2
	EAC option	✓	✓	✓	✓	✓	✓	✓	✓
	CCOE option	✓	✓	✓	✓	✓	-	✓	✓
	INMETRO option	-	-	-	-	-	-	✓	✓
Visual Position Indicator	3D	✓	✓	✓	✓	✓	✓	✓	✓
	Flat	✓	✓	✓	✓	✓	✓	✓	✓
	Multi Port Valves	-	-	✓	✓	✓	✓	✓	✓
	None	-	-	-	✓	✓	✓	-	-
Electrical Feedback	Electro-mechanic	✓	✓	✓	✓	✓	✓	✓	✓
	Magnetic	✓	✓	✓	✓	✓	✓	✓	✓
	Inductive	✓	✓	✓	✓	✓	✓	✓	✓
	4-20 mA	-	-	✓	✓	✓	✓	✓	✓
	Communication Protocols	-	-	✓	✓	✓	✓	✓	✓
Features	Twin Shaft Design	-	-	✓	✓	✓	✓	✓	✓
	Temp. Max Range	-20 to +80 °C (-4 to +176 °F)	-20 to +80 °C (-4 to +176 °F)	-30 to +80 °C (-22 to +176 °F)	-60 to +105 °C (-76 to +221 °F)	-60 to +105 °C (-76 to +221 °F)	-60 to +105 °C (-76 to +221 °F)	-20 to +105 °C (-4 to +221 °F)	-20 to +105 °C (-4 to +221 °F)
	Integrated Mounting Kit	✓	✓	-	-	-	✓	-	-

Product Overview Chart



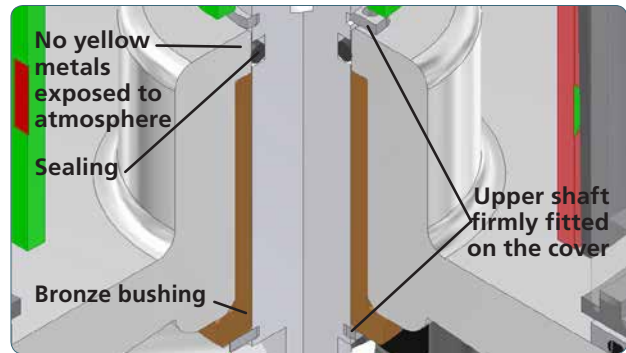
Model		SK	SQ	SY	SW	SE	ES	BM	TB
Application	Industry								
	Valve Type	Rotary Valves	Rotary Valves	Rotary Valves	Rotary Valves	Linear Valves	Manual Valves	External Switches General Purpose	External Switches General Purpose
Material	Housing	Aluminium	316L stainless steel	Copper free aluminium	316 stainless steel	Copper free aluminium or 316 stainless steel	Copper free aluminium or 316 stainless steel	316 stainless steel	316 stainless steel or aluminium
	Cover	Aluminium	316L stainless steel	Copper free aluminium	316 stainless steel	Copper free aluminium or 316 stainless steel	Copper free aluminium or 316 stainless steel	316 stainless steel	316 stainless steel or aluminium
Certification	IP Rating	IP 66 / 67 optional IP68	IP 66 / 67 optional IP68	IP 66 / 68	IP 66 / 68	IP67 IP 67M	IP 68	IP 68 subsea option available	IP 68
	SIL Rating up to:	SIL3	SIL3	SIL3	SIL3	SIL3	SIL3	SIL3	SIL3
	ATEX, IECEx option	Exd IIC T6	Exd IIC T6	Exd IIC T6	Exd IIC T6	-	Exd IIC T6	Exd IIC T6 Exia IIC T4	Exd IIC T6
	cULus option	Class 1/2 Div 1/2	-	Class 1/2 Div 1/2	Class 1/2 Div 1/2	-	Class 1/2 Div 1/2	Class 1/2 Div 1/2	
	EAC option	✓	✓	✓	✓	✓	✓	✓	✓
	CCOE option	✓	✓	✓	✓	-	-	-	-
	INMETRO option	✓	✓	✓	✓	-	✓	-	-
Visual Position Indicator	NEPSI option	-	-	✓	✓	-	-	-	-
	3D	✓	✓	✓	✓	-	-	-	-
	Flat	✓	✓	✓	✓	-	-	-	-
	Multi Port Valves	✓	✓	✓	✓	-	-	-	-
Electrical Feedback	None	-	-	-	-	✓	✓	✓	✓
	Electro mechanical	✓	✓	✓	✓	-	-	-	-
	Magnetic	✓	✓	✓	✓	✓	✓	✓	✓
	Inductive	✓	✓	✓	✓	✓	-	-	-
	4-20 mA	-	-	✓	✓	-	-	-	-
Features	Communication Protocols	-	-	✓	✓	-	-	-	-
	Twin Shaft Design	✓	✓	✓	✓	-	-	-	-
	Temp. Max Range	-55 to +105 °C (-67 to +221 °F)	-55 to +105 °C (-67 to +221 °F)	-60 to +105 °C (-76 to +221 °F)	-60 to +105 °C (-76 to +221 °F)	-50 to +105 °C (-58 to +221 °F)	-65 to +150 °C (-85 to +302 °F)	-40 to +105 °C (-40 to +221 °F)	-40 to +105 °C (-40 to +221 °F)
Integrated Mounting Kit	Optional	Optional	-	-	-	-	-	-	

Twin Shaft Design

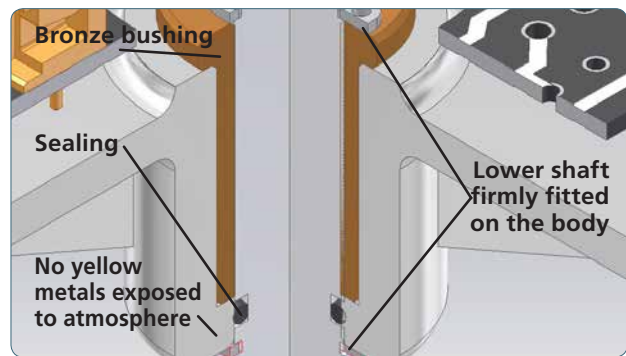
The innovative twin shaft design provides user friendly installation, replacement, calibration and operation. Splitting the limit switch box into two halves improves the sealing arrangement to extend operating life in harsh or severe environments whilst reducing the possibility of failure.

Features:

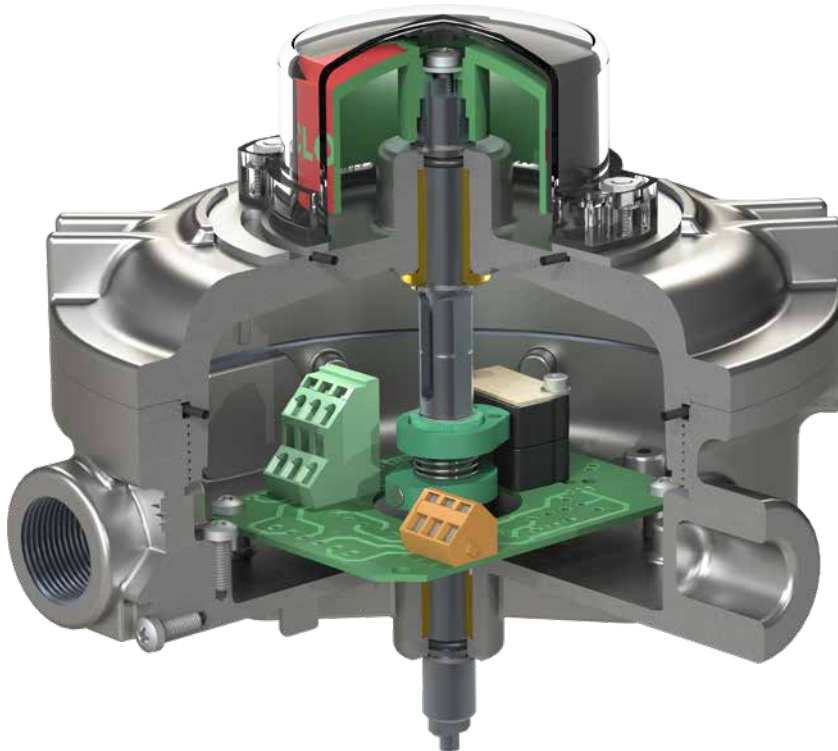
- Shaft sections mate together with a simple and reliable mechanical linkage
- Each half of the switch box mechanically retains the shaft, preventing loss of components during disassembly
- The shaft is completely sealed from the external atmosphere, avoiding contamination of the lubricating grease
- The switch position indicator is permanently fixed to the top shaft to guarantee alignment during reassembly
- Electrical components are completely sealed once both halves of the switch box are reassembled



Upper shaft



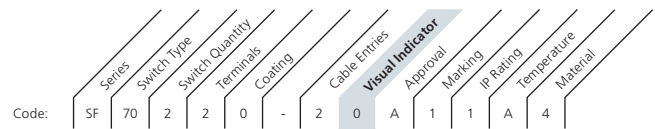
Lower shaft



Visual Indication

Ever increasing market requirements push Rotork to develop innovative solutions for position indication.

Code selection guide



Code	Description		
1	No visual position indicator	-	-
0	3D 90° red and green visual position indicator		
Y	3D 90° yellow-black (open-close) visual position indicator		
3	3D 180° visual position indicator		
A	3D indicator for 3 way "L" 90° port valve		
B	3D indicator for 3 way "T" 90° port valve		
C	3D indicator for 3 way "L" 120° port valve		
2	3D indicator for 3 way "T" 180° centre port blocked		
D	3D visual position indicator with single flux direction		
F	3D visual position indicator for 60° rotation		
T	316 stainless steel 3D visual position indicator		
U	Flexible indicator extension of 500 mm with red and green 90° 3D visual position indicator		
V	Stainless steel rigid indicator extension with red and green 90° 3D visual position indicator		
X	316 stainless steel compact disk indicator		
E	Aluminium disk indicator		

Visual Indicator code selection guide for SP-SM series

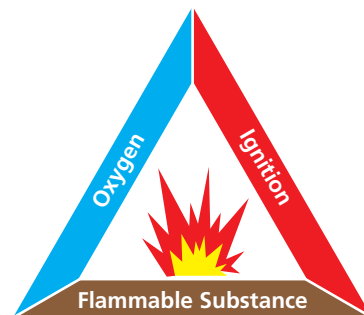
Code	Description	
H	3D black and yellow flux indicator	
Z	Flat yellow flux indicator	

Approvals and Marking

Electrical components require a specific protection method in explosive atmospheres due to the presence of gas or dust. Different geographical regions are subject to local standards and certification to guarantee safety against explosion risks. Rotork offers a complete range of certifications, covering worldwide requirements.

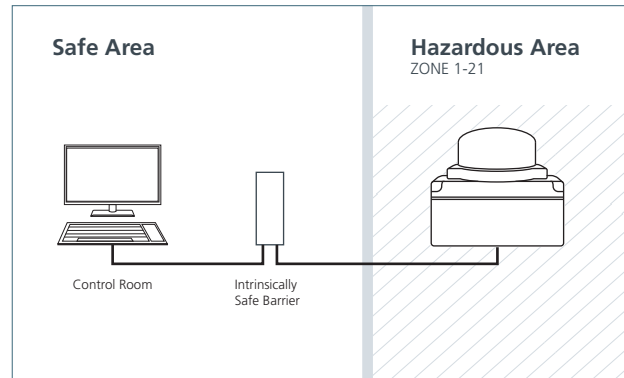
Hazardous Areas and Ignition

Explosions in hazardous areas occur when flammable liquids, vapours, gases or combustible dusts are mixed with oxygen and an ignition source, causing a fire or explosion. Limiting oxygen or gas is difficult, therefore the solution is to control the ignition source or safely contain the explosion.



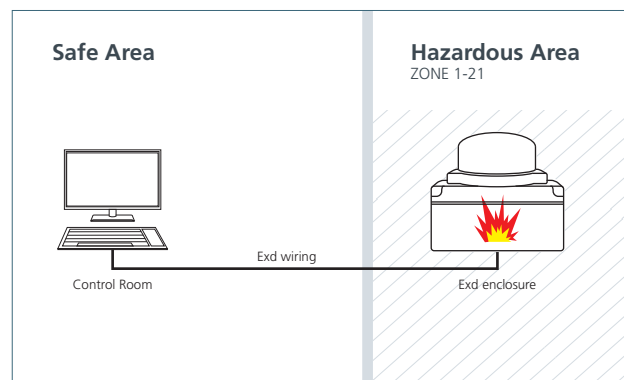
Intrinsically Safe Protection Method

The intrinsically safe protection method works by reducing the power supplied into the hazardous area with an Ex'ia' barrier. The power reaching the hazardous area and the device is insufficient to generate a spark thus avoiding ignition.



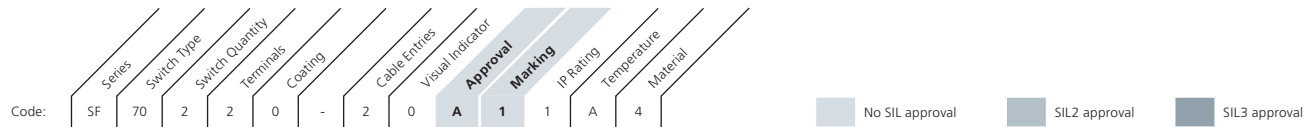
Explosionproof Protection Method

The explosionproof protection method guarantees that in case an explosion should happen, it will be contained inside the enclosure. All mechanical joints of the device, such as the lid to body connection, cable entries and shaft assembly have flame paths, designed and certified to ensure an explosion is contained.



Approvals and Marking

Code selection guide



		Weather proof			ATEX			ATEX / IECEx			UL/CSA			EAC			CCOE			INMETRO			NEPSI		
		W0	Z0	Y0																					
SP/SM	Safe area																								
	Intrinsically safe				A1	B1	C1							G0	F0	H0									
	Non-incendive (3GD Exn)																								
SB	Safe area																								
	Intrinsically safe				A1	B1	C1							G0	F0	H0									
	Non-incendive (3GD Exn)				A6	B6	C6				U9	S9	T9	G6	F6	H6									
SF/SS	Safe area																								
	Intrinsically safe				A1	B1	C1	X1	D1	E1				G0	F0	H0									
	Non-incendive (3GD Exn)				A6	B6	C6							G0	F0	H0									
	Non-incendive (2D Extb)							XD	DD	ED															
	Non-incendive (3D Extc)				A5	B5	C5							G5	F5	H5									
HW	Safe area																								
	Non-incendive (3GD Exn)				A6	B6	C6							G6	F6	H6									
	Non-incendive (3D Extc)				A5	B5	C5																		
SK/SQ SY/SW	Safe area																								
	Explosion / flame proof (Exd IIC)							X2	D2	E2	U7*	S7*	T7*	G2	F2	H2	J2	L2	M2	I2	O2	P2	N2**	Q2**	R2**
	Non-incendive (Exd enclosure)										U8*	S8*	T8*												
SX	Safe area																								
	Explosionproof / flameproof (Exd IIB)							X3	D3	E3	U7	S7	T7	G3	F3	H3	J3	L3	M3	I3	O3	P3			
	Non-incendive (Exd enclosure)										U8	S8	T8												
SH	Safe area																								
	Explosionproof / flameproof (Exd IIB+H2)							X4	D4	E4	U7	S7	T7	G4	F4	H4	J4	L4	M4	I4	O4	P4			
	Non-incendive (Exd enclosure)										U8	S8	T8												
BM/TB	Safe area																								
	Intrinsically safe							X1	D1	E1															
	Explosionproof / flameproof (Exd IIC)				A2	B2	C2				U7*	S7*	T7*	G2	F2	H2									
	Non-incendive (Exd enclosure)										U8*	S8*	T8*												
ES	Safe area																								
	Explosionproof / flameproof (Exd IIC)							X2	D2	E2	U7	S7	T7	G2	F2	H2					I2	O2	P2		
	Non-incendive (Exd enclosure)										U8	S8	T8												

* Excluding SQ and TB series
 ** SY SW series only

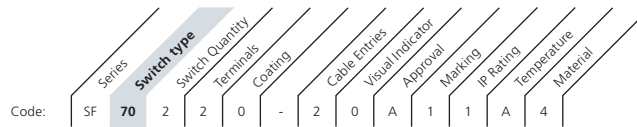
Switch and Sensors

Rotork Instruments offers one of the widest ranges of switch in the market. Rotork always provides the best switch or sensor solution for your specific application.

Soldo limit switch boxes can include mechanical, magnetic or inductive proximity switches to fulfil your plant feedback requirements. With over 20 years experience in valve automation feedback, Soldo offers a complete selection of magnetic limit switches

to meet the most critical and demanding requirements. Inert gas hermetical sealing, high power loops, different contact forms and alternative materials are all satisfied with high quality Soldo switches.

Electro mech. switches



- Suitable for fire fighting applications
- Suitable in arctic application
- Suitable in Exia application
- Hermetically sealed

SPDT switches

Code 01

- SPDT silver plated snap action switch
- High power loop: rating up to 5A @ 250 VAC – 0,6A @ 125 VDC
- Temperature range: -40 to +125 °C (-40 to +257 °F)



Code 03

- SPDT gold plated snap action switch
- Rating up to 3A @ 250 VAC – 1mA @ 24 VDC
- Temperature range: -40 to +125 °C (-40 to +257 °F)



Code 5P

- SPDT silver plated snap acting switch
- High power loop: rating up to 5A @ 250 VAC
- Temperature range: -50 to +204 °C (-58 to 399 °F)
- Short time temperature range: Maximum 250 °C (482 °F) for 2 hours Maximum 300 °C (572 °F) for 70 minutes



DPDT switches

Code 1F

- DPDT silver plated snap action switch
- High power loop: rating up to 5A @ 250 VAC, 0.1A @ 80 VDC
- Temperature range: -40 to +120 °C (-40 to +248 °F)



Code 06

- DPDT gold plated snap action switch
- Rating up to 0.1A @ 250 VAC, 0.1A @ 80 VDC
- Temperature range: -40 to +120 °C (-40 to +248 °F)



Magnetic switches

SPDT switches

CODE N1

- NOVA V3™ SPDT hermetically sealed snap action proximity switch
- High power loop: rating up to 5A @ 250 VAC - 5A @ 28 VDC
- Temperature range: -50 to +95 °C (-58 to +203 °F)



CODE N3

- NOVA V3™ SPDT hermetically sealed snap action proximity switch
- High power loop: rating up to 1A @ 250 VAC - 1A @ 30 VDC
- Temperature range: -50 to +95 °C (-58 to +203 °F)



CODE C4

- SPDT hermetically sealed proximity reed switch
- Inert gas contact chamber
- Rating up to 1A @ 24 VDC
- Temperature range: -60 to +100 °C (-76 to +212 °F)



DPDT switches

CODE N4

- NOVA V3™ DPDT hermetically sealed snap action proximity switch
- High power loop: rating up to 5A @ 250 VAC - 5A @ 28 VDC
- Temperature range: -20 to +95 °C (-4 to +203 °F)



CODE C8

- DPDT hermetically sealed proximity reed switch
- Inert gas contact chamber
- Rating up to 1A @ 24 VDC
- Temperature range: -60 to +100 °C (-76 to +212 °F)



Inductive sensors

Amplified sensors

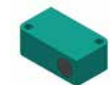
Code 32

- 2 wires NO
- LED indicator
- Operating voltage 5-60 VDC
- Operating current 2-100 mA
- Temperature range: -25 to +70 °C (-13 to +158 °F)



Code 73

- 3 wires PNP NO
- LED indicator
- Operating voltage 10-30 VDC
- Operating current 0-100 mA
- Temperature range: -25 to +70 °C (-13 to +158 °F)



Code 75

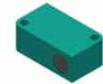
- 2 wires NO/NC programmable
- Operating voltage 5-36 VDC
- Operating current 200 mA
- Temperature range: -25 to +80 °C (-13 to +176 °F)



NAMUR Exia sensors

Code 70

- Nominal voltage 8 VDC
- Current consumption: 1mA (target detected) 3mA (target not detected)
- Temperature range: -25 to +100 °C (-13 to +212 °F)



Code 62

- Nominal voltage 8 VDC
- Current consumption: 1mA (target detected) 3mA (target not detected)
- Temperature range: -50 to +100 °C (-58 to +212 °F)



Position Transmitters

If discrete feedback information is not enough, Rotork can offer a complete range of analogue position transmitter options embedded within the switch


box enclosure for both safe and hazardous areas.

Analogue 4 - 20 mA current loops are commonly used for electronic signalling in industrial process control. 4 & 20 mA

represents 0–100% of the measurement range. With the introduction of SMART devices, HART provides digital communication overlaid on the analogue 4-20 mA signal.

4-20 mA

Code:	SF	70	2	2	0	-	2	0	A	1	1	A	4
	Series	Switch Type	Switch Quantity	Terminals	Coating		Cable Entries	Visual Indicator	Approval	Marking	IP Rating	Temperature	Material

 Suitable for Exia application

Code T0

- 4-20 mA analog output
- Supply voltage 13-30 VDC
- Linearity ± 0,5% on full scale
- Direct or Reverse action
- Temperature range: -40 to +80 °C (-40 to +176 °F)

Code T4

- 4-20 mA analog output
- Additional magnetic reed switches
- Supply voltage 13-30 VDC
- Linearity ± 0,5% on full scale
- Direct or Reverse action
- Temperature range: -40 to +80 °C (-40 to +176 °F)

Code T1

- 4-20 mA analog output
- Additional silver plated mech. switches
- Supply voltage 13-30 VDC
- Linearity ± 0,5% on full scale
- Direct or Reverse action
- Temperature range: -40 to +80 °C (-40 to +176 °F)

Code T7

- 4-20 mA analog output
- Additional inductive NAMUR sensors
- Supply voltage 13-30 VDC
- Linearity ± 0,5% on full scale
- Direct or Reverse action
- Temperature range: -25 to +80 °C (-13 to +176 °F)



4-20 mA HART

Code H0

- 4-20 mA HART Transmitter
- ATEX EEx ia IIC T6 / T4 certified
- Update time 120 ms
- Temperature range: -40 to +80 °C (-40 to +176 °F)

Code H4

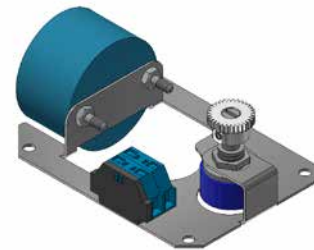
- 4-20 mA HART Transmitter
- Additional magnetic reed switches
- ATEX EEx ia IIC T6 / T4 certified
- Update time 120 ms
- Temperature range: -40 to +80 °C (-40 to +176 °F)

Code H1

- 4-20 mA HART Transmitter
- Additional silver plated mech. switches
- ATEX EEx ia IIC T6 / T4 certified
- Update time 120 ms
- Temperature range: -40 to +80 °C (-40 to +176 °F)

Code H7

- 4-20 mA HART Transmitter
- Additional inductive NAMUR sensors
- ATEX EEx ia IIC T6 / T4 certified
- Update time 120 ms
- Temperature range: -25 to +80 °C (-13 to +176 °F)



Foundation Fieldbus / Profibus PA

Code F0

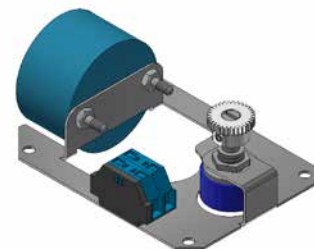
- Foundation Fieldbus / Profibus PA position Transmitter
- ATEX EEx ia IIC T6 / T4 certified
- Update time 400 ms
- Temperature range: -40 to +80 °C (-40 to +176 °F)

Code F4

- Foundation Fieldbus / Profibus PA position Transmitter
- Additional inductive NAMUR sensors
- ATEX EEx ia IIC T6 / T4 certified
- Update time 400 ms
- Temperature range: -25 to +80 °C (-13 to +176 °F)

Code F1

- Foundation Fieldbus / Profibus PA position Transmitter
- Additional silver plated mech. switches
- ATEX EEx ia IIC T6 / T4 certified
- Update time 400 ms
- Temperature range: -40 to +80 °C (-40 to +176 °F)



More options available on request.

Special Options

Rotork offer a wide range of options for specific field applications.

Partial Stroke Test device

Series	Switch Type	Switch Quantity	Terminals	Coating	Cable Entries	Visual Indicator	Approval	Marking	IP Rating	Temperature	Material	
SF	70	2	2	0	-	2	0	A	1	1	A	4

Code P0

The Partial Stroke Test (PST) device is a simple and reliable electro-mechanical system. A magnetic key initiates the test while an internal electro-mechanical system drives the actuator back to the opening position after the last position has been reached. Includes:

Code P4

Magnetic reed SPDT switches

Code P7

Exia inductive NAMUR sensors



Surge protector devices

Code S6

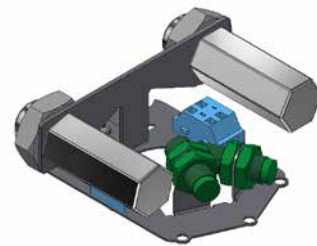
Surge protectors guard the device and all inner electrical components from external power overloads. Certification is available for Exia or Exd, with components in 316 stainless steel for harsh environments protection. Includes:

Code S7

Exia inductive NAMUR sensors

Code SC

Exia inductive NAMUR sensors tamper proof magnetic reed SPDT switches



End Of Line monitoring system

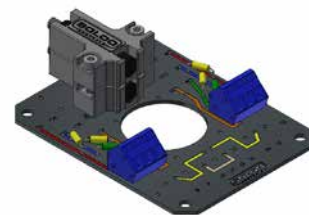
Series	Switch Type	Switch Quantity	Terminals	Coating	Cable Entries	Visual Indicator	Approval	Marking	IP Rating	Temperature	Material	Special Execution			
SF	70	2	2	0	-	2	0	A	1	1	A	4	0	0	28

Code 28

End of line monitoring system to perform diagnostics on switches and wiring integrity. The DCS will detect feedback information as well as fault detection.

Applicable to electro-mechanical and magnetic switches, with reduced max rating capabilities.

- NAMUR simulated output
- Arctic capabilities down to -60°C (-76°F)
- SIL3 approved option



More options available on request.

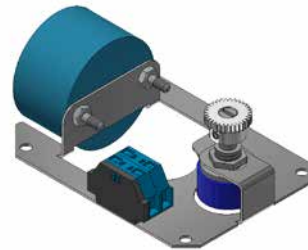
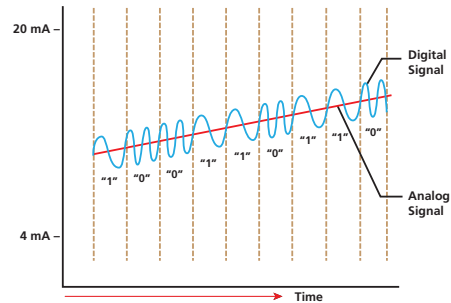
HART Communication

The HART Communication Protocol (Highway Addressable Remote Transducer) is a hybrid, analogue and digital, industrial automation protocol.

HART provides two simultaneous communication channels: the 4-20 mA analogue signal and a digital signal. The 4-20 mA signal communicates the primary measured value. Additional device information is communicated using a superimposed digital signal on the analogue one.

Rotork can offer a complete range of 4-20 mA HART position transmitters with or without additional switches.

Refer to the Position Sensor section for a wider list of options and code selection guide.

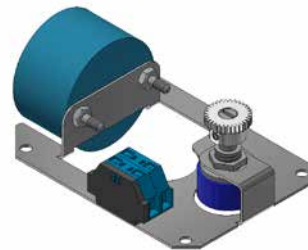


Foundation Fieldbus Communication

Rotork offers a complete range of Foundation Fieldbus position transmitters with or without additional digital feedback.

The communication head is suitable for use in an Intrinsically Safe Ex'ia' loop and provides full compatibility with the plant communication software.

Refer to the Position Sensor section for a wider list of options and code selection guide.



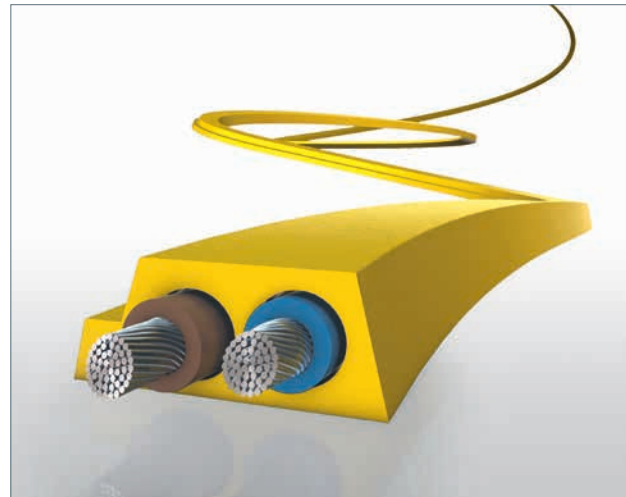
AS-i Communication

Superior productivity is one of the keys factors to successful business in the process automation sector. The secret to modern manufacturing is flexibility.

AS-Interface (AS-i) is the simplest of the industrial networking protocols used in PLC, DCS and PC-based automation systems. It is designed for connecting binary (ON/OFF) devices such as actuators and sensors in discrete manufacturing and process applications using a single cable.

Features

- Highly efficient alternative to hard wiring of field devices
- Excellent partner to Profibus, DeviceNet, Interbus and Industrial Ethernet network systems
- Proven in hundreds of thousands of applications
- Cut-down AS-i SW version available for ultra-simple devices
- Provides the ideal basis for Functional Safety in machinery safety/emergency stop applications



AS-I Communication Board

Code A1

AS-I communication board 4 In – 3 Out.

Up to 4 electro-mechanical switches and 3 solenoid valve connection.

Available on SB, SF, SS, HW, SY, SW series.

Code:	Series	Switch Type	Switch Quantity	Terminals	Coating	Cable Entries	Visual Indicator	Approval	Marking	IP Rating	Temperature	Material	
	SF	70	2	2	0	-	2	0	A	1	1	A	4

Profibus Communication

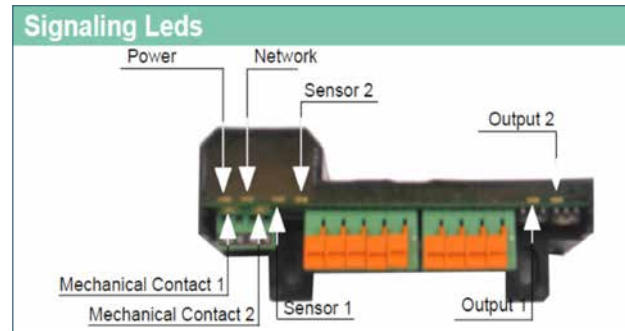
Profibus® Option

We introduced the Profibus communication bus into our HW series to provide a complete control unit, facing all demanding field applications.



Features and Benefits

- Weatherproof enclosure
- 3D red and green visual position indicator
- 2½" NPT cable entries
- 1¾" NPT cable entry
- Profibus communication board
- Two digital inputs for valve position detection
- Two extra dry contact inputs available
- Two digital outputs for solenoid valve connection
- Adjustable metal cams
- Integrated mounting legs for NAMUR actuators
- Integrated sov, 5/2 or 5/3 way configuration



Profibus Control Unit

Code PF

Profibus DP control unit.
Two digital feedback and two digital output for solenoid valves.

Code PG

Profibus DP feedback unit.
Two digital feedback and two digital output for solenoid valves.
Additional two mechanical switches 5A 250 VAC.
Both options available on HW series.

Series	Switch Type	Switch Quantity	Terminals	Coating	Cable Entries	Visual Indicator	Approval	Marking	IP Rating	Temperature	Material	
SF	70	2	2	0	-	2	0	A	1	1	A	4

SP - SM limit switch box series

Compact limit switch box for industrial, water treatment and light duty applications.

Features

- Integrated mounting kit for NAMUR pattern
- Corrosion free glass reinforced plastic enclosure on SP series
- Nickel plated aluminium body on SM series
- 1 cable entry (SP) or 2 cable entries (SM) either metric or imperial
- Multiple indicator options
- Easy wiring through the terminal PCB board

Approvals

ATEX, EAC, CCOE:

Ex II 2GD Ex ia IIC T4/T5/T6
Ex ia IIIB T44 °C.....T108 °C Db IP6*
Ta: -20 °C ≤ Ta ≤ 80 °C

SIL certificate: Up to SIL 2 certified by TÜV

Protection rating: IP 65
IP 67 on request
Nema 4 4X on request

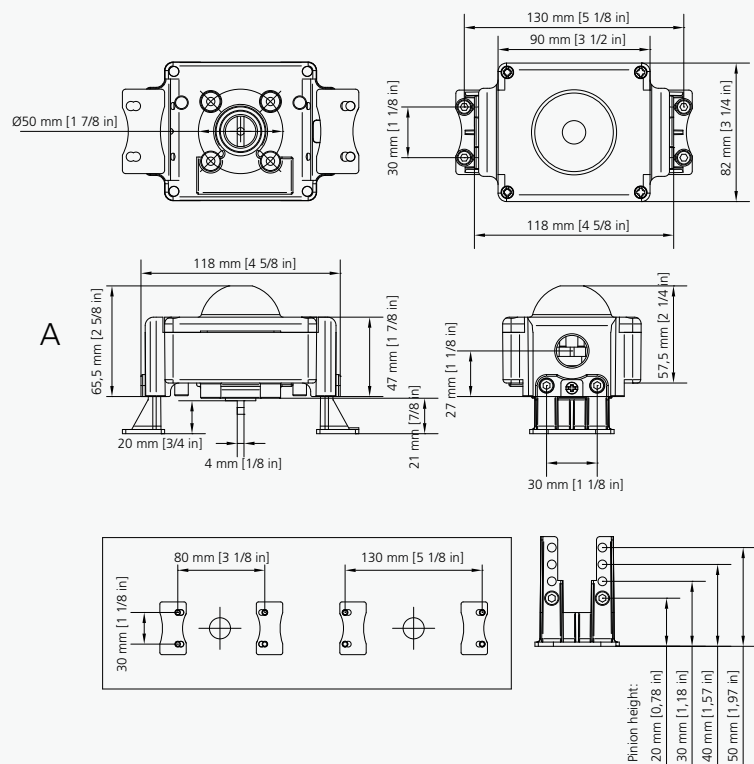
Temperature:
-20 to +80 °C (-4 to +176 °F) standard temperature range



SP limit switch box



SM limit switch box



SP - SM limit switch box series

Nomenclature

SP N1 2 H 0 - D H W 0 0 R 1

Box

SP = Glass reinforced plastic body with polycarbonate cover
SM = Aluminium body with polycarbonate cover

Switch

01 = SPDT el.mech. switch silver plated contacts
03 = SPDT el.mech. switch gold plated contacts (for Ex'ia')
1F = DPDT el.mech. switch silver plated contacts
C4 = SPDT magnetic hermetically sealed reed switch (for Ex'ia' low temperature)
N1 = SPDT magnetic hermetically sealed silver plated snap acting contacts
N3 = SPDT magnetic hermetically sealed gold plated snap acting contacts (for Ex'ia')
70 = Inductive proximity NAMUR sensor NJ2-V3-N 2 wire NC logic (for Ex'ia')
73 = Inductive proximity sensor model NBB2-V3-E2, 3 wire PNP NO

See additional information and options on pages 14-19

Switch Quantity

2 = 2 switches

Terminals

A = Screw type terminals
4 = Blue screw terminals (for Ex'ia')
0 = Screw terminals with sov connection
2 = Blue screw terminals with sov connection (for Ex'ia')

Coating

0 = Black plastic enclosure (on SP series)
N = Nickel plated aluminium body (on SM series)

Cable Entries

D = 1 cable entry 1/2" NPT
E = 1 cable entry M20 x 1.5
1 = 2 cable entries 1/2" NPT (SM series only)
2 = 2 cable entries M20 x 1.5 (SM series only)

Visual Position Indicator

H = 3D visual position indicator black and yellow
Z = Flat visual position indicator black and yellow

See additional information and options on page 11

Approval

W = Weather proof
A = ATEX certified
G = EAC certification for Russian market

See additional information and options on page 13

Marking

0 = Standard location
1 = Intrinsically safe certification

See additional information and options on page 13

IP Protection rating

0 = Weather proof IP65
7 = Nema 4 and 4X
2 = Weather proof IP67

Temperature

A = Ambient temperature range: -20 to +80 °C (-4 to +176 °F)
B = Ambient temperature range: -20 to +70 °C (-4 to +158 °F) for sensor option 73

Material

1 = Glass reinforced plastic body and polycarbonate cover (on SP series)
2 = Nickel plated aluminium body and polycarbonate cover (on SM series)

SF - SS - SB limit switch box series

Multi purpose limit switch box for safe area or Intrinsically Safe applications.

Features

- Twin shaft design
- Self lubricating bushings
- Copper free aluminium or 316 stainless steel housing option for maximum corrosion protection
- 2 cable entries either metric or imperial
- Multiple indicator options
- Easy wiring through the terminal PCB board
- Position transmitter board optional
- Suitable for arctic environments

Approvals

ATEX, IECEx, EAC, CCOE:

SF-SS series (ATEX & IECEx)
 Ex II 1GD Ex ia IIC T4...T6 Ga
 Ex ia IIIC T95°C...T120°C Da
 -60°C < Ta < +105°C

SB series (ATEX only)
 Ex II 2GD Ex ia IIC T6...T4 Gb
 Ex ia IIIB T44°C...T108°

UL: Class I Division 2 Groups A, B, C, D
 Class II Division 2 Groups F, G

SIL certificate: Up to SIL 3 certified by TÜV

Protection rating: IP 66 / 67
 Nema 4 X on request

Temperature:
 -20 to +80 °C (-4 to +176 °F) standard temperature range
 -60 to +105 °C (-76 to +221 °F) available on request



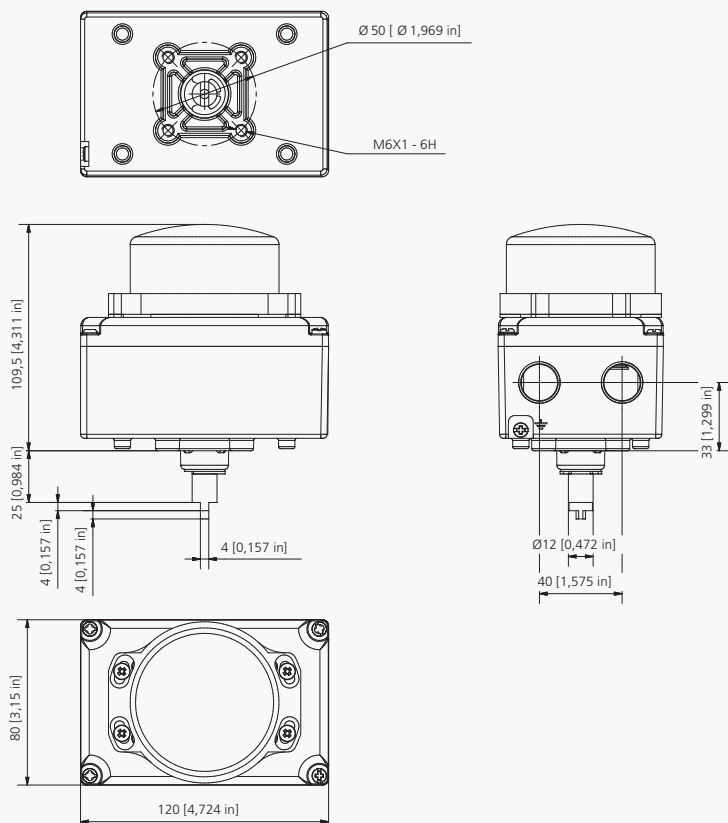
SF limit switch box



SS limit switch box



SB limit switch box



SF - SS - SB limit switch box series

Nomenclature

SB N1 2 0 0 - 1 1 X 1 1 A 4

Box

- SB = Aluminium body with polycarbonate cover
- SF = Aluminium enclosure
- SS = 316 stainless steel enclosure

Switch

- 01 = SPDT el.mech. switch silver plated contacts
- 03 = SPDT el.mech. switch gold plated contacts (for Ex'ia')
- 1F = DPDT el.mech. switch silver plated contacts
- C4 = SPDT magnetic hermetically sealed reed switch (for Ex'ia' low temperature)
- C8 = DPDT magnetic hermetically sealed reed switch (for Ex'ia' low temperature)
- N1 = SPDT magnetic hermetically sealed silver plated snap acting contacts
- N3 = SPDT magnetic hermetically sealed gold plated snap acting contacts
- N4 = DPDT magnetic hermetically sealed silver plated snap acting contacts
- 62 = Inductive proximity NAMUR sensor SJ3,5-SN 2 wire NC logic (for Ex'ia' low temperature safety function)
- 70 = Inductive proximity NAMUR sensor NJ2-V3-N 2 wire NC logic (for Ex'ia')
- 73 = Inductive proximity sensor model NBB2-V3-E2, 3 wire PNP NO, 10-30 VDC, 0-100 mA
- 86 = Inductive proximity NAMUR sensor model NJ4-12GK-SN 2 wire NC logic (for Ex'ia' safety function)
- T0 = 4-20 mA position transmitter
- H0 = 4-20 mA HART position transmitter Atex Ex ia IIC T6 / T4 certified

See additional information and options on pages 14-19

Switch Quantity

- 2 = 2 switches
- 3 = 3 switches

Terminals

- 0 = Screw terminals with extra poles for solenoid valve connection
- 2 = Blue screw type terminals with extra poles for sov connection (for Ex'ia')
- A = Screw terminal strip
- 8 = Blue cage clamp terminals (for low temperature and switch codes 62, 63, H0)
- E = Cage clamp terminals (for low temperature)

Coating

- 0 = Black powder coating
- 1 = Blue powder coating
- E = Electro polished finishing (on SS series)

Cable Entries

- 1 = 2 cable entries 1/2" NPT
- 2 = 2 cable entries M20 x 1.5p

Visual Position Indicator

- 0 = 3D plastic visual position indicator red and green
- 1 = No visual position indicator
- T = 3D stainless steel position indicator

See additional information and options on page 11

Approval

- W = Weather proof
- X = ATEX and IECEx certified box
- A = ATEX certified box
- B = ATEX certified box and SIL2 approval
- C = ATEX certified box and SIL3 approval
- G = EAC certification for Russian market
- J = CCOE certification for Indian market
- U = UL certified box

* SIL2 / SIL3 options available on request

See additional information and options on page 13

Marking

- 0 = Standard location
- 1 = Intrinsically safe certification
- 9 = cULus Class 1/2 Div 2 (with switches code: C4, C8, N1, N3)

See additional information and options on page 13

IP Protection rating

- 1 = Weather proof IP66 / IP67
- 7 = NEMA 4 and 4X

Temperature

- A = Ambient temperature range: -20 to +80 °C (-4 to +176 °F)
- L = Ambient temperature range: -40 to +80 °C (-40 to +176 °F)
- P = Ambient temperature range: -60 to +80 °C (-76 to +176 °F) for switch code C4
- U = Ambient temperature range: -20 to +40 °C (-4 to +104 °F)
- B = Ambient temperature range: -20 to +70 °C (-4 to +158 °F)

Material

- 2 = Die-cast aluminium heavy duty body and polycarbonate cover (on SB series)
- 4 = Copper free aluminium (on SF series)
- 6 = 316 stainless steel heavy duty enclosure (on SS series)

HW limit switch box series

Control unit that combines a limit switch box and solenoid valve into a single device. Maximum efficiency with minimum customer effort.

Features

- Twin shaft design
- Self lubricating bushings
- Optional integrated solenoid valve for maximum efficiency and compactness
- 3 or 5 way pneumatic valve with single or double coil configurations
- Aluminium enclosure with thick powder coat paint and integrated NAMUR mounting kit
- Up to 3 cable entries either metric or imperial
- Multiple indicator options

- Easy wiring through the terminal PCB board
- Optional position transmitter boards
- Optional Profibus communication board for complete process handling

Approvals

EAC, UL general purpose

SIL certificate: Up to SIL 2 approval on request

Protection rating: IP66 / 67

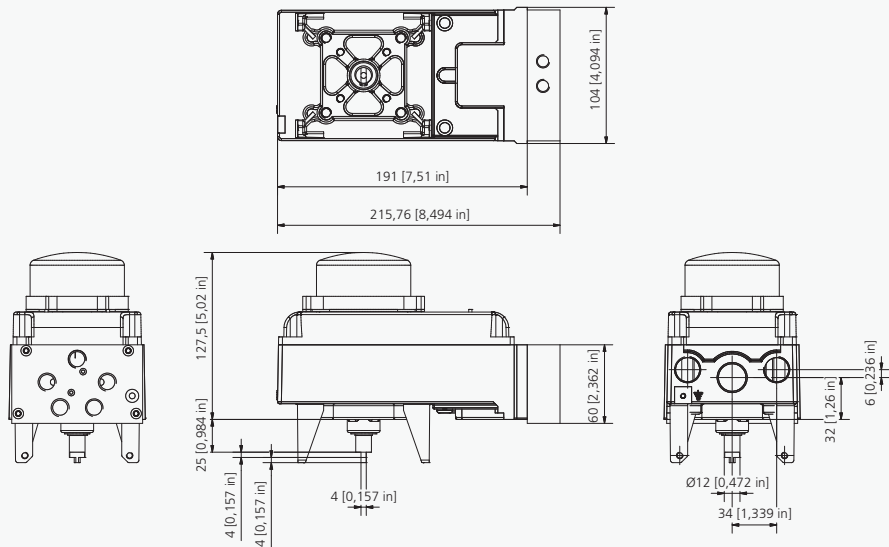
Nema 4 4X on request

Temperature:

-60 to +105 °C (-76 to +221 °F) standard temperature range



HW limit switch box



HW limit switch box series

Nomenclature

HW N1 2 2 2 - 3 T W 9 7 P 3 0 A

Box

HW = Aluminium control unit enclosure

Switch

01 = SPDT electromechanical switches, silver plated contacts
 03 = SPDT electromechanical switches, gold plated contacts
 1F = DPDT electromechanical switches silver plated contacts
 70 = NAMUR inductive proximity sensor P+F type NJ2-V3-N, NAMUR NC 2 wire (for Ex'ia')
 73 = Inductive proximity P+F NBB2-V3-E2, 3 wire PNP NO
 C4 = Magnetic SPDT hermetically sealed switch (suitable for Ex'ia')
 C8 = Magnetic DPDT hermetically sealed switch (suitable for Ex'ia')
 N1 = Magnetic proximity SPDT hermetically sealed switch, silver plated snap acting contacts
 N3 = Magnetic proximity SPDT hermetically sealed switch, gold plated snap acting contacts
 N4 = Magnetic proximity DPDT hermetically sealed switch, silver plated snap acting contacts
 DB = 3 position control system for single acting actuators, 5/3 way, double coil sov
 DA = 3 position control system for double acting actuators, 5/3 way, double coil sov
 A1 = Asi board with 2 SPDT switches and solenoid valve control
 T0 = 4-20 mA analog position transmitter
 H0 = 4-20 mA HART transmitter Exia IIC certified
 PG = Profibus communication board

See additional information and options on pages 14-19

Switch Quantity

0 = No switches for digital limit position feedback
 1 = 1 switch or sensor (for DB, DA switch options)
 2 = 2 switches or sensors
 3 = 3 switches or sensors
 4 = 4 switches or sensors

Terminals

0 = Screw type terminals with sov connection
 2 = Blue screw type terminals with sov connection

Coating

0 = Black polyester powder coating (only for aluminium)

Cable Entries

1 = 2 cable entries 1/2" NPT
 2 = 2 cable entries M20x1.5
 3 = 2 x 1/2" NPT + 1 x 3/4" NPT cable entries
 4 = 2 x M20 x 1.5p + 1 x M25 x 1.5p cable entries

Visual Position Indicator

0 = Red and green visual position indicator

See additional information and options on page 11

Approval

W = Weather proof limit switch box
 G = EAC certified box for Russian market, with RTN permit
 U = UL certified box

See additional information and options on page 13

Marking

0 = Ordinary location
 A = CULUS normally location

See additional information and options on page 13

IP Protection rating

1 = Weather proof IP66/IP67
 7 = Nema 4 4X

Temperature

S = Ambient temperature range: -10 to +50 °C (+14 to +122 °F)
 7 = Ambient temperature range: -10 to +40 °C (+14 to +104 °F)
 5 = Ambient temperature range: -5 to +50 °C (+23 to +122 °F)
 A = Ambient temperature range: -20 to +80 °C (-4 to +176 °F) without solenoid valve

Material and solenoid valve selection

3 = Aluminium heavy duty body and cover
 A = Aluminium heavy duty body and cover die-cromated, 5/2 way aluminium solenoid valve, single coil
 B = Aluminium heavy duty body and cover die-cromated, 5/2 way aluminium solenoid valve, double coil
 C = Aluminium heavy duty body and cover die-cromated, 5/3 way aluminium solenoid valve, blocked centre, double coil (DB switch option)
 D = Aluminium heavy duty body and cover die-cromated, 5/3 way aluminium solenoid valve, exhaust centre, double coil (DA switch option)

Coil Rating

0 = No solenoid valve available
 2 = Coil rating: 12 VDC 2, 3 W
 3 = Coil rating: 24 VDC 2, 3 W
 4 = Coil rating: 24 VAC 2, 8 VA
 5 = Coil rating: 110 VAC 2, 8 VA
 6 = Coil rating: 230 VAC 2, 8 VA
 1 = Ex'ia' certified pilot valve coil rating: 6 VDC
 7 = Ex'ia' certified pilot valve coil rating: 12 VDC
 8 = Ex'ia' certified pilot valve coil rating: 24 VDC
 9 = Ex'n' certified pilot valve coil rating: 24 VDC
 A = Ex'n' certified pilot valve coil rating: 110 VAC

Pneumatical Connection

0 = No pneumatic connections
 A = 1/4" NPT/F pneumatic connections

SK - SQ limit switch box series

Compact limit switch box for hazardous areas, with explosionproof protection method.

Features

- Twin shaft design
- Metallic self lubricant bushings
- Aluminium or 316L stainless steel housing option for maximum corrosion protection
- 2 cable entries either metric or imperial
- Adjustable mounting kit for NAMUR actuators available on request
- Easy wiring through the terminal PCB board
- Suitable for arctic environments

Approvals

ATEX, IECEx, EAC, CCOE, INMETROL:

Ex II 2GD Ex db IIC T4/T5/T6 Gb
 Ex tb IIIC T135/T100/T85°C Db
 Ta: -55 °C ≤ Ta ≤ 105 °C / 80 °C / 60 °C

UL (available on Sk series only):

Class I Division 1 Groups A, B, C, D Division 2 Groups A, B, C, D
 Class II Division 1 Groups E, F, G Division 2 Groups F, G

SIL certificate: Up to SIL 3 certified by TÜV

Protection rating: IP 66 / 67

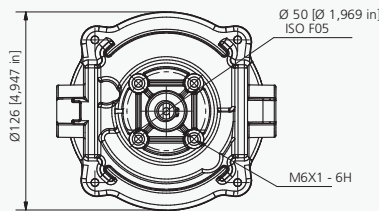
IP 66 / 68 15 m for 100 hours
 Nema 4 4X on request

Temperature:

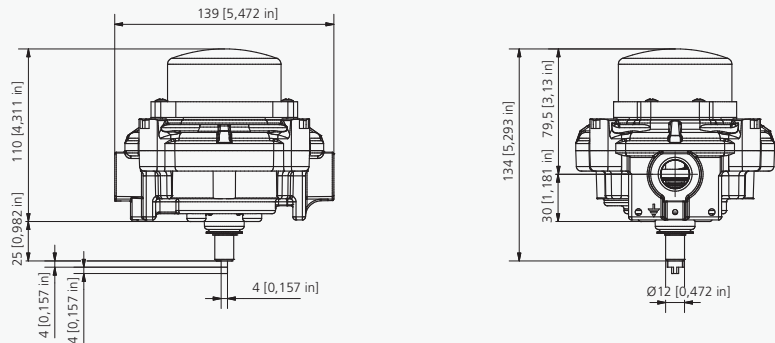
-20 to +80 °C (-4 to +176 °F) standard temperature range
 -55 to +105 °C (67 to +221 °F) available on request



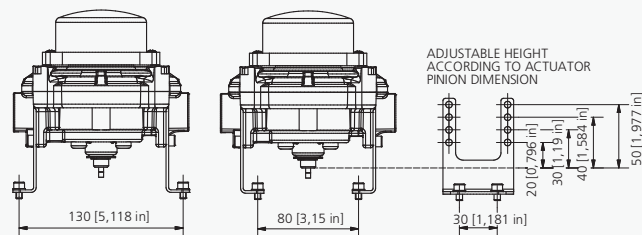
SK limit switch box



SQ limit switch box



Optional adjustable mounting kit for NAMUR actuators



SK - SQ limit switch box series

Nomenclature

SK N1 2 0 0 - 1 1 X 2 1 A 3

Box

SK = Die-cast aluminium enclosure
SQ = 316L stainless steel enclosure

Switch

01 = SPDT el.mech. switch silver plated contacts
03 = SPDT el.mech. switch gold plated contacts
1F = DPDT el.mech. switch silver plated contacts
C4 = SPDT magnetic hermetically sealed reed switch
N1 = SPDT magnetic hermetically sealed silver plated snap acting contacts
N3 = SPDT magnetic hermetically sealed gold plated snap acting contacts
73 = Inductive proximity sensor model NBB2-V3-E2, 3 wire PNP NO

See additional information and options on pages 14-19

Switch Quantity

2 = 2 switches

Terminals

0 = Screw type terminals with sov connection
E = Cage clamp terminals with sov connection (for low temp.)

Coating

0 = Black powder coating (SK Series) Aluminium
E = Electro polish finishing (SQ Series) Stainless Steel

Cable Entries

1 = 2 cable entries 1/2" NPT
2 = 2 cable entries M20 x 1.5

Visual Position Indicator

0 = 3D plastic visual position indicator red and green
T = 3D stainless steel position indicator

See additional information and options on page 11

Approval

X = ATEX and IECEx certified box
D = ATEX and IECEx certified box with SIL2 approval
E = ATEX and IECEx certified box with SIL3 approval
G = EAC certification for Russian market
I = INMETRO certification for Brazilian market
N = NEPSI certification for Chinese market
J = CCOE certification for Indian market
U = UL certified box (only for SK series)
W = Weather proof
* SIL2 / SIL3 options available on request

See additional information and options on page 13

Marking

0 = Standard location
2 = Certification marking: Ex II 2GD Exd IIC
7 = cULus Class 1/2 Div1 (only for SK series)
8 = cULus Class 1/2 Div 1/2 with switches code: C4, N1, N3. (Only for SK series)

See additional information and options on page 13

IP Protection rating

1 = Weather proof IP66/IP67
3 = Weather proof IP66/IP68
7 = Nema 4 and 4X

Temperature

A = Ambient temperature range: -20 to +80 °C (-4 to +176 °F)
L = Ambient temperature range: -40 to +80 °C (-40 to +176 °F)
N = Ambient temperature range: -55 to +80 °C (-67 to +176 °F) for switch code C4

Material

3 = Die-cast aluminium heavy duty body and cover (on SK series)
7 = 316L Stainless steel heavy duty enclosure (on SQ series)

Note: Optional mounting kit for NAMUR actuators ordering code: KN07

SY - SW limit switch box series

Limit switch box for heavy duty explosionproof applications in the oil & gas and petrochemical industries, both on-shore and off-shore.

Features

- Twin shaft design
- Metallic self lubricating bushings
- Copper free aluminium or 316 stainless steel housing option for maximum corrosion protection
- Up to 4 cable entries either metric or imperial
- Multiple indicator options
- Easy wiring through the terminal PCB board
- High volume for the maximum wiring comfort
- Optional position transmitter board
- Suitable for arctic environments

Approvals

ATEX, IECEx, EAC, CCOE, INMETRO, NEPSI:

Ex II 2GD Ex db IIC T4/T5/T6 Gb
 Ex tb IIIC T140/T110/T110°C Db
 Ta: -60 °C ≤ Ta ≤ 105 °C / 80 °C / 60 °C

UL:

Class I Division 1 Groups B,C,D Division 2 Groups A, B, C, D
 Class II Division 1 Groups E,F,G Division 2 Groups F, G

SIL certificate: Up to SIL 3 certified by TÜV

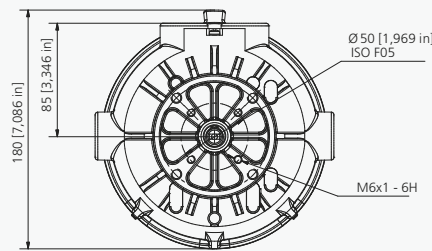
Protection rating: IP 66 / 68 10 m for 48 hours
 Nema 4 4X on request

Temperature:

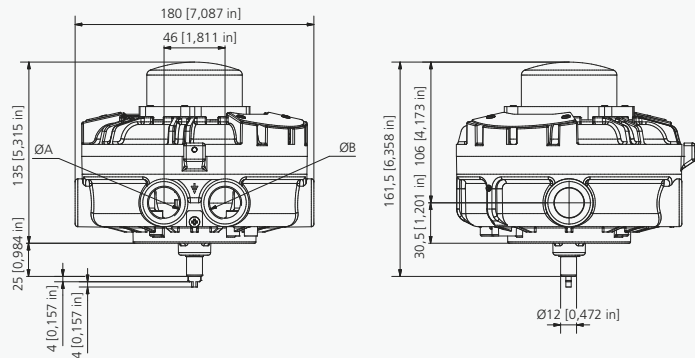
-20 to +80 °C (-4 to +176 °F) as standard temperature range
 -60 to +105 °C (-76 to +221 °F) available on request



SY limit switch box



SW limit switch box



SY - SW limit switch box series

Nomenclature

SY N1 2 0 0 - 1 0 X 2 3 A 4

Box

SY = Copper free aluminium enclosure
SW = Stainless steel 316 enclosure

Switch

01 = SPDT electro-mechanical switch silver plated contacts
1F = DPDT electro-mechanical switch silver plated contacts
C4 = SPDT magnetic hermetically sealed reed switch
C8 = DPDT magnetic hermetically sealed reed switch
N1 = SPDT magnetic hermetically sealed silver plated snap acting contacts
N4 = DPDT magnetic hermetically sealed silver plated snap acting contacts
32 = Inductive proximity sensor model NBN4-12GM40-Z0 2 wire
73 = Inductive proximity sensor model NBB2-V3-E2, 3 wire PNP NO
T0 = 4-20 mA position transmitter
H0 = 4-20 mA HART position transmitter Atex EEx ia IIC T6 / T4 certified
P0 = Partial Stroke Test device with either remote or local magnetic key activation

See additional information and options on pages 14-19

Switch Quantity

2 = 2 switches
4 = 4 switches
6 = 6 switches

Terminals

0 = Screw type terminals with sov connection
A = Screw type terminals
E = Cage clamp terminals with sov connection (for low temperature)
D = Cage clamp terminals (for low temperature)

Coating

0 = Black powder coating (SY Series)
E = Electro polish finishing (SW Series)

Cable Entries

1 = 2 cable entries 1/2" NPT
2 = 2 cable entries M20 x 1.5p
T = 4 cable entries 1/2" NPT
U = 4 cable entries M20 x 1.5p

Visual Position Indicator

0 = 3D plastic visual position indicator red and green
2 = 3-position indicator (T-port 180 deg. Blocked centre)
A = 3-position indicator (L-port)
B = 3-position indicator (T-port 180 deg.)
T = 3D stainless steel position indicator

See additional information and options on page 11

Approval

X = ATEX and IECEx certified box
D = ATEX and IECEx certified box with SIL2 approval
E = ATEX and IECEx certified box with SIL3 approval
G = EAC certification for Russian market
I = INMETRO certification for Brazilian market
N = NEPSI certification for Chinese market
J = CCOE certification for Indian market
U = UL certified box
W = Weather proof
* SIL2 / SIL3 options available on request

See additional information and options on page 13

Marking

0 = Standard location
2 = Certification marking: Ex II 2GD Exd IIC
7 = cULus Class 1/2 Div1
8 = cULus Class 1/2 Div 1/2 with (with switches code: C4,C8,N1,N3)

See additional information and options on page 13

IP Protection rating

3 = Weather proof IP66 / IP68
7 = Nema 4 and 4X

Temperature

A = Ambient temperature range: -20 to +80 °C (-4 to +176 °F)
L = Ambient temperature range: -40 to +80 °C (-40 to +176 °F)
P = Ambient temperature range: -60 to +80 °C (-76 to +176 °F) for switch codes C4 and C8

Material

4 = Copper free aluminium heavy duty body and cover (SY series)
6 = 316 stainless steel heavy duty enclosure (SW series)

SX - SH limit switch box series

Limit switch box designed for explosionproof applications.

Features

- Twin shaft design
- Metallic self lubricating bushings
- Aluminium enclosure with thick protective powder coating
- Up to 3 cable entries either metric or imperial
- Multiple indicator options
- Easy wiring through the terminal PCB board

Approvals

ATEX, IECEx, EAC, CCOE, INMETRO:

Ex II 2GD Ex db IIB T4/T5/T6 Gb (SX series)
 Ex II 2GD Ex db IIB + H2 T4/T5/T6 Gb (SH series)
 Ex tb IIIC T135/T100/T85°C Db
 Ta: -20 °C ≤ Ta ≤ 105 °C / 75 °C / 60 °C

UL:

Class I Division 1 Groups C, D Division 2 Groups A, B, C, D
 Class II Division 1 Groups E, F, G Division 2 Groups F, G

SIL certificate: Up to SIL 3 certified by TÜV

Protection rating: IP 66 / 67

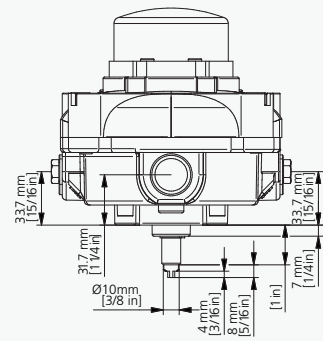
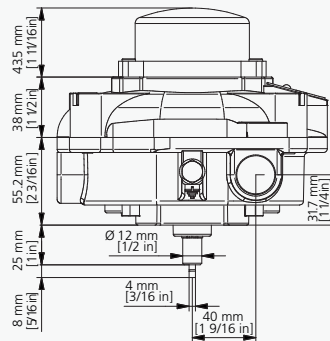
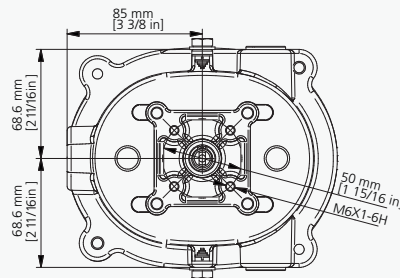
Nema 4 X on request

Temperature:

-20 to +80 °C (-4 to +176 °F) standard temperature range



SX limit switch box



SX - SH limit switch box series

Nomenclature

SX N1 2 0 0 - 1 0 X 3 2 A 4

Box

SX = Exd IIB applications
SH = Exd IIB+H2 applications

Switch

01 = SPDT elec.mech. switch silver plated contacts
1F = DPDT elec.mech. switch silver plated contacts
C4 = SPDT magnetic hermetically sealed reed switch
C8 = DPDT magnetic hermetically sealed reed switch
N1 = SPDT magnetic hermetically sealed silver plated snap acting contacts
N4 = DPDT magnetic hermetically sealed silver plated snap acting contacts
32 = Inductive proximity sensor model NBN4-12GM40-Z0 2 wire
73 = Inductive proximity sensor model NBB2-V3-E2, 3 wire PNP NO
T0 = 4-20 mA position transmitter
H0 = 4-20 mA HART position transmitter Atex EEx ia IIC T6 / T4 certified
P0 = Partial Stroke Test device with magnetic key

See additional information and options on pages 14-19

Switch Quantity

2 = 2 switches
4 = 4 switches (on Exd IIB certification)

Terminals

0 = Screw type terminals with sov connection
A = Screw type terminals
E = Cage clamp terminals with sov connection (for low temperature)
D = Cage clamp terminals (for low temperature)

Coating

0 = Black powder coating

Cable Entries

1 = 2 cable entries 1/2" NPT
2 = 2 cable entries M20x1.5
3 = 2 x 1/2" NPT + 1 x 3/4" NPT cable entries

Visual Position Indicator

0 = 3D plastic visual position indicator red and green
2 = 3-position indicator (T-port 180 deg. Blocked centre)
A = 3-position indicator (L-port)
B = 3-position indicator (T-port 180 deg.)
T = 3D stainless steel position indicator

See additional information and options on page 11

Approval

X = ATEX and IECEx certified box
D = ATEX and IECEx certified box with SIL2 approval
E = ATEX and IECEx certified box with SIL3 approval
G = EAC certification for Russian market
I = INMETRO certification for Brazilian market
N = NEPSI certification for Chinese market
J = CCOE certification for Indian market
U = UL certified box
W = Weather proof
* SIL2 / SIL3 options available on request

See additional information and options on page 13

Marking

0 = Standard location
3 = Certification marking: Ex II 2GD Exd IIB
4 = Certification marking: Ex II 2GD Exd IIB + H2
7 = cULus Class1/2 Div 1
8 = cULusClass 1/2 Div 1/2 (with switches code: C4, C8, N1, N3)

See additional information and options on page 13

IP Protection rating

1 = Weather proof IP 66/67
7 = Nema 4 and 4X

Temperature

A = Ambient temperature -20 to +80 °C (-4 to +176 °F)
E = -25 to +80°C (-13 to +176 °F) UL approval only

Material

3 = Die cromated aluminium heavy duty body and cover

BM - TB limit switch box series

Limit switches for hazardous areas with Exd or Exia protection methods. Designed for linear valves and general purpose applications.

Features

- AISI 316 stainless steel rugged BM series enclosure
- Standard 450 mm flying leads
- Stainless steel or aluminium materials for optional junction box with TB series
- Magnetic or ferrous sensing capabilities
- Subsea application on request, tested up to 300 bar
- Optional subsea cable and connector for underwater link

Approvals

ATEX, EAC, INMETRO:

Ex II 2GD Ex d IIC T6/T5/T4 Gb
 Ex tb IIIC T80°C/T95°C/T115°C Db
 ATEX, IECEx Ex II 1GD Exia IIC T4 Ga Exia IIIC T135°C Da
 Ta = -40 °C ≤ Ta ≤ 90 °C

UL: only available on BMC4

Class I, Division 1 and 2, Groups A, B, C and D
 Class II, Division 1 Groups E, F and G
 Class II Division 2, Groups F and G

SIL certificate: Up to SIL 3 approval on request

Protection rating: BM: IP66 / 68

TB: IP67 / 68

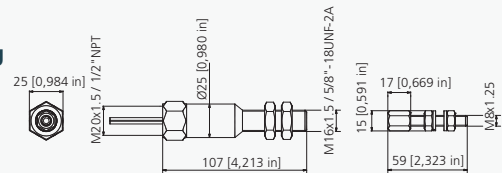
Nema 4 4X on request



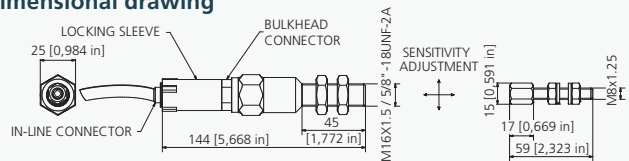
BM limit switch box



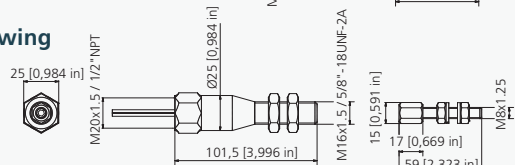
BM dimensional drawing



BM Subsea dimensional drawing



BM UL dimensional drawing

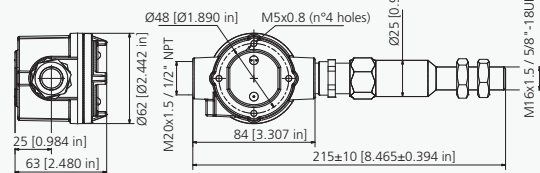


TB limit switch box

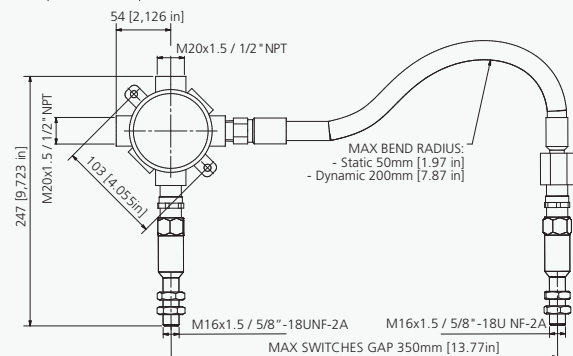


TB dimensional drawing

Option 1



Option 2



BM - TB limit switch box series

Nomenclature

BM N1 1 1 E - E 1 A 2 3 A 6

Box

BM = Proximity bolt switch
TB = Proximity bolt switch with integrated junction box

Switch

C4 = Magnetic SPDT hermetically sealed switch (suitable for Ex'ia')
N1 = Magnetic proximity SPDT hermetically sealed switch, silver plated snap acting contacts

Switch Quantity

1 = 1 switch or sensor
2 = 2 switches (for TB series only)

Terminals

A = Screw type terminals (for TB series)
1 = Flying leads (for BM series)

Coating

0 = Black polyester powder coating (for aluminium TB series)
E = Stainless steel finishing

Cable Entries

1 = 2 x 1/2" NPT cable entries (for TB series with 2 switches)
2 = 2 x M20 x 1.5p cable entries (for TB series with 2 switches)
E = 1 x M20 x 1.5p cable entry
D = 1 x 1/2" NPT cable entry

Visual Position Indicator

1 = No visual position indicator
6 = LED Indicator (available for UL approval only)

Approval*

W = Weather proof limit switch box
A = ATEX certified box
G = EAC certified box for Russian market, with RTN permit
U = UL certified box (available on BMC4 option)
X = ATEX IECEx certification

See additional information and options on page 13

Marking

0 = Standard location
1 = Certification marking: Ex II 2 GD Exia IIC (available for C4 switch option)
2 = Certification marking: Ex II 2GD Exd IIC
7 = CULUS Class1/2 Div1 (available on BMC4 option)
8 = CULUS Class1/2 Div 1/2 (available on BMC4 option)

See additional information and options on page 13

IP Protection rating

2 = Weather Proof 67 (available on TB series)
3 = Weather Proof IP66/68 (available on BM series)
6 = Subsea application up to -40 meters (available on BM series)**
7 = Nema 4 4X (available on BMC4 option)

Temperature

A = Ambient temperature range: -20 to +80 °C (-4 to +176 °F)
L = Ambient temperature range: -40 to +80 °C (-40 to +176 °F)

Material

6 = 316 stainless steel heavy duty enclosure
8 = 316 stainless steel with aluminium junction box (only for TB series)
3 = Aluminium (available for UL approval only)

* SIL2 and SIL3 available on request

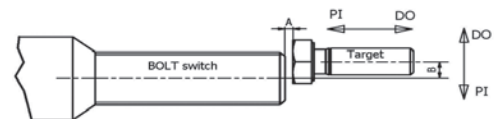
** Subsea cable with fast connector with standard length as follow: 5, 20, 40 mt

Sensing Distance Chart

Sensing Distance	Switch	Direction A [Values in mm]		Direction B [Values in mm]			
		Target distance: 2 mm		Target distance: 2 mm		Target distance: 1 mm	
	BMN1	PI : Max 2	DO : 6	PI : 3	DO : 12	PI : 7	DO : 12
	BMC4	PI : 3,6	DO : 6	PI : 4	DO : 5	PI : 4,5	DO : 7
Frequency Range	BMN1	Max 30 Hz					
	BMC4	Max 100 Hz					
Response Time	BMN1	Single operation < 2ms		Operation in frequency (10÷30 Hz) < 1 ms			
	BMC4	2 ms					

Notes:

PI: Is the point where the switch first operates.
DO: Is the point where the switch is released.
PI & DO values refers to the distance between the Z axis of BOLT switch and target.
Target distance refers to the distance between the 2 opposite faces of BOLT switch and target.
For BMN1 switch the maximum operating distance is 2 mm using a properly size ferrous target.
This distance may be increased using a magnetic target (optional).
BMC4 switch is supplied with its standard magnetic target.
Optional magnetic target to increase the sensing range of the switch are available. For any kind of request please contact SOLD0.



ES Easy limit switch box

Limit switch box created and engineered for manual valve application in explosionproof environments.

Features

- Proximity non-contact design
- Easy to install and simple to maintain
- Copper free aluminium or 316 stainless steel housing option for maximum corrosion protection
- Single or double cable entries options either metric or imperial
- Easy wiring through terminal PCB board
- Suitable for artic environments

Approvals

ATEX, IECEx, EAC, INMETRO:

Ex II 2GD
 Ex db IIC T6/T5/T4 Gb
 Ex tb IIIC T85/T100/T120 °C Db
 Ta = -65 °C ≤ Ta ≤ 105 °C

UL:

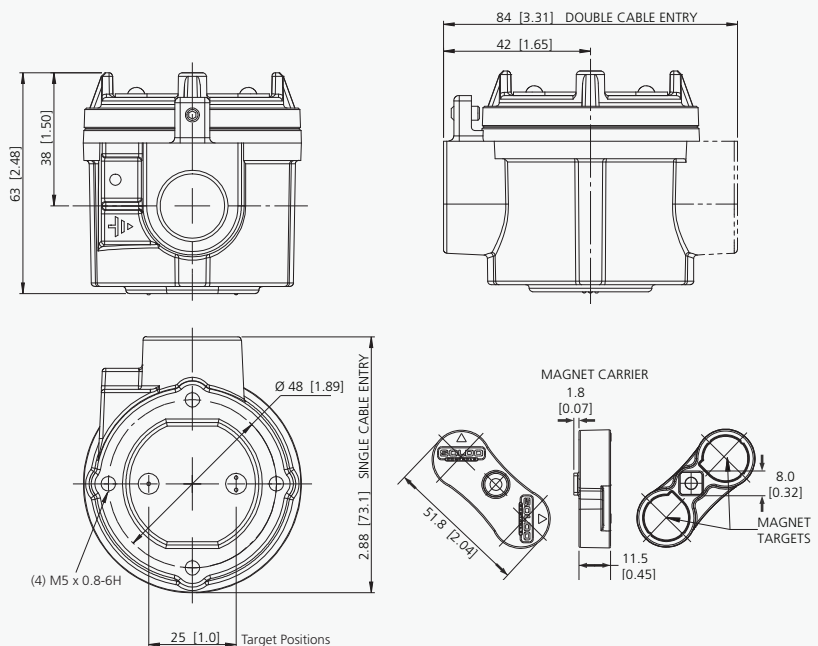
Class I, Division 1 and 2, Groups A, B, C and D
 Class II, Division 1 Groups E, F and G
 Class II Division 2, Groups F and G

SIL certificate: Up to SIL 2 approval on request

Protection rating: IP66 / 67
 IP66 / 68 15 m for 70 hours
 Nema 4 4X on request



ES Easy limit switch box



ES Easy limit switch box

Nomenclature

ES N1 2 0 0 - 1 1 X 2 1 A 4

Box

ES = Manual valve magnetic switch box

Switch

N1 = Snap acting, hermetically sealed, silver contacts SPDT switch, rating max
 N3 = Snap acting, hermetically sealed, gold contacts SPDT switch, rating max
 C4 = Inert gas hermetically sealed, rhodium contacts SPDT switch, rating max
See additional information and options on pages 14-19

Switch Quantity

2 = Quantity of switch

Terminals

0 = Screw Terminal Strips

Coating

0 = Black powder coating
 E = Electro polish finishing

Cable Entries

1 = 2 x 1/2" NPT cable entries
 2 = 2 x M20 x 1.5p cable entries
 D = 1 x 1/2" NPT cable entry (standard option)
 E = 1 x M20 x 1.5p cable entry

Visual Position Indicator

1 = No Visual Position Indicator

Approval

U = UL certification
 S = UL certification with SIL2 approval
 X = ATEX and IECEx certification
 D = ATEX and IECEx certification with SIL2 approval
See additional information and options on page 13

Marking

2 = Certification marking: Ex II 2GD Exd IIC

See additional information and options on page 13

IP Protection rating

1 = IP66 / 67 (standard option)
 2 = IP66 / 68 15 m for 70 hours

Temperature

A = Ambient temperature range: -20 to +80 °C (-4 to +176 °F) standard
 L = Ambient temperature range: -40 to +80 °C (-40 to +176 °F)
 P = Ambient temperature range: -60 to +80 °C (-76 to +176 °F) for switch code C4



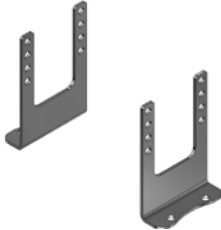
Material

4 = Copper free aluminium body and cover
 6 = 316 stainless steel body and cover

Mounting Kits

The Rotork Instruments KN and KNC mounting kit series have been designed to mount almost any device on a NAMUR pattern actuator.

KN and KNC mounting kits are made from AISI 304 stainless steel to provide a reliable solution to install your ISO F05 drilled device to complete the automated valve package.

NAMUR pattern VDI / VDE 3845	KN	KNC	KN07
30 x 80 pinion height 20 mm	01	01	OK
30 x 130 pinion height 30 mm	02	02	OK
30 x 80 pinion height 30 mm	03	03	OK
30 x 130 pinion height 50 mm	04	04	OK
30 x 80 pinion height 40 mm	05	—	OK
30 x 130 pinion height 40 mm	—	05	OK
25 x 50 pinion height 20 mm	—	32	—
Mounting kit dedicated to all Soldo limit switch box series (excluding SP, SM series)			—
Adjustable mounting kit dedicated to SK and SQ series only	—	—	

Mounting Kits

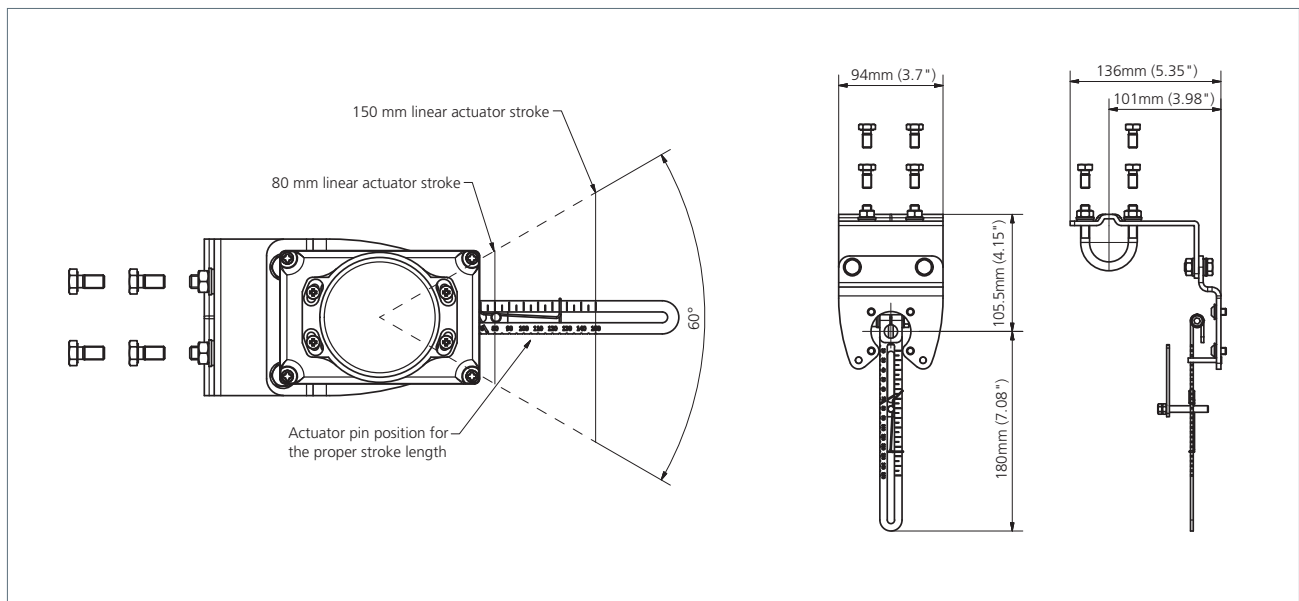
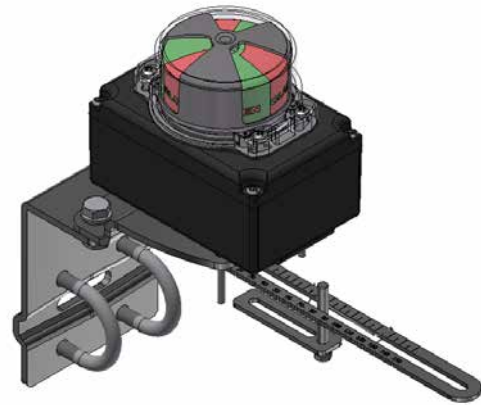
Linear Mounting Kit

Linear diaphragm and piston actuators have always been problematic to mount, often requiring external switches to indicate position, therefore losing the flexibility and benefits of a limit switch box.

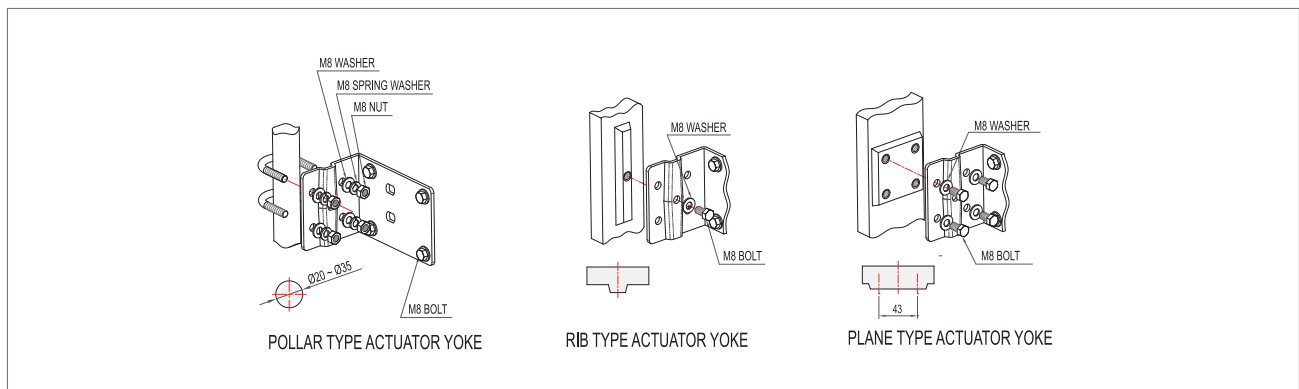
With the new linear universal mounting kit, Rotork Instruments provides a proven system to fit every limit switch box in our range to a linear valve from 20 up to 250 mm stroke with two different kit layouts: 20-150 mm stroke; 100-250 mm stroke.

The mounting kit includes a specific position dome indicator, perfectly showing the open/close position status.

The graduated lever system, combined with the remote pin connection, offers great flexibility to fit a huge variety of systems and offers precise adjustment on the go.



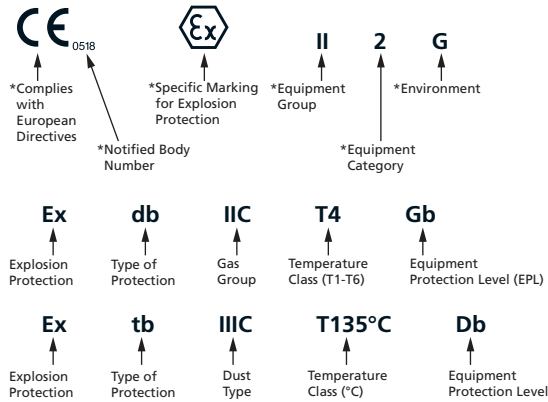
Actuator Mount Patterns Compatibility



Appendix A: Equipment Certification Requirements for Hazardous Locations

ATEX & IECEx

Typical ATEX & IECEx Marking [*ATEX only]



Protection Concepts

Type of Protection	Symbol	Typical IEC EPL	Typical Zone(s)	IEC Standard	Basic Concept of Protection
Electrical Equipment for Gases, Vapours and Mists (G)					
General Requirements	-	-	-	IEC 60079-0	-
Optical Radiation	Op pr Op sh Op is	Gb Ga Ga	1, 2 0, 1, 2 0, 1, 2	IEC 60079-28	Protection against ignitions from optical radiation
Increased Safety	eb ec	Gb Gc	1, 2 2	IEC 60079-7	No arcs, sparks or hot surfaces. Enclosure IP54 or better
Type 'n' (non-sparking)	nA	Gc	2	IEC 60079-15	-
Flameproof	da db dc	Ga Gb Gc	0, 1, 2 1, 2 2	IEC 60079-1	Contain the explosion, quench the flame
Type 'n' (enclosed break)	nC	Gc	2	IEC 60079-15	-
Quartz / Sand Filled	q	Gb	1, 2	IEC 60079-5	Quench the flame
Intrinsic Safety	ia ib ic	Ga Gb Gc	0, 1, 2 1, 2 2	IEC 60079-11	Limit the energy of sparks and surface temperatures
Type 'n' (sealing & hermetic sealing)	nC	Gc	2	IEC 60079-15	-
Type 'n' (restricted breathing)	nR	Gc	2	IEC 60079-15	Keep the flammable gas out
Encapsulation	ma mb mc	Ga Gb Gc	0, 1, 2 1, 2 2	IEC 60079-18	-
Electrical Equipment for Combustible Dusts (D)					
General Requirements	-	-	-	IEC 60079-0	-
Optical Radiation	Op pr Op sh Op is	Db Da Da	21, 22 20, 21, 22 20, 21, 22	IEC 60079-28	Protection against ignitions from optical radiation
Enclosure	ta tb tc	Da Db Dc	20, 21, 22 21, 22 22	IEC 60079-31	Standard protection for dusts, rugged tight enclosure
Intrinsic Safety	ia ib ic	Da Db Dc	20, 21, 22 21, 22 22	IEC 60079-11	Limit the energy of sparks and surface temperatures
Encapsulation	ma mb mc	Da Db Dc	20, 21, 22 21, 22 22	IEC 60079-18	Protection by encapsulation of incandive parts
Electrical Equipment for Combustible Dusts (D)					
General Requirements	-	-	-	EN 13463-1	-
Flow Restricted Enclosure	fr	Ga, Gb, Gc Da, Db, Dc	0, 1, 2 20, 21, 22	IEC 80079-36	Low potential energy
Flameproof Enclosure	d	-	-	EN 13463-3	Relies on tight seals, closely matched joints and tough enclosures to restrict the breathing of the enclosure
Constructional Safety	c	-	0, 1, 2 20, 21, 22	EN 13463-5	Ignition hazards eliminated by good engineering methods
	h	Ga, Gb, Gc Da, Db, Dc	0, 1, 2 20, 21, 22	IEC 80079-37	-
Control of Ignition Source	b	-	-	EN 13463-6	Control equipment fitted to detect malfunctions
	h	Ga, Gb, Gc Da, Db, Dc	0, 1, 2 20, 21, 22	IEC 80079-37	-

cCS Aus

Typical North American Marking (CSA)

Class I, Division 1, Groups A,B,C,D T4



Class II, Division 1, Groups E,F,G



Class I, Zone 0, AEx ia IIC T4

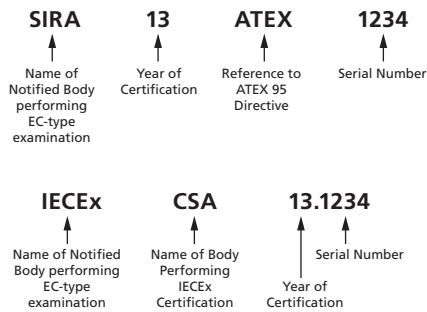


Protection Concepts

Type of Protection	Code	Country	Class	Division / Zone	Standard	Basic Concept of Protection
Electrical Equipment for Flammable Gas, Vapors and Mists - Class I						
General Requirements	AEx Ex	US CA	Class I Class I	Division 1 & 2 Zone 1 & 2	FM 3600 - ISA 60079-0 CSA 60079-0	-
Increased Safety	AEx e Ex e	US CA	Class I Class I	Zone 1	ISA 60079-7 CSA C22.2 No. 60079-7	-
Non-Incandive	(NI) (NI)	US CA	Class I Class I	Division 2	ISA 12.12.01 / FM 3611 C22.2 No. 213	No arcs, sparks or hot surfaces
Non-Sparking	AEx nA Ex nA	US CA	Class I Class I	Zone 2	ISA 60079-15 CSA C22.2 No. 60079-15	-
Explosion Proof	(XP) (XP)	US CA	Class I Class I	Division 1	UL 1203 / FM 3615 C22.2 No. 30	-
Flameproof	AEx d AEx d Ex d	US US CA	Class I Class I Class I	Zone 1 Zone 1 Zone 1	ISA 60079-1 UL 1203 / FM 3615 CSA 60079-1	Contain the explosion and extinguish the flame
Enclosed Break	AEx nC Ex nC	US CA	Class I Class I	Zone 2 Zone 2	ISA 60079-15 CSA C22.2 No. 60079-15	-
Intrinsic Safety	(IS) (IS)	US CA	Class I Class I	Division 1 Division 1	UL 913 / FM 3610 C22.2 No. 157	-
	AEx ia AEx ia Ex ia	US US CA	Class I Class I Class I	Zone 0 Zone 1 Zone 0	ISA 60079-11 / FM 3610 ISA 60079-11 / FM 3610 CSA C22.2 No. 60079-11	Limit energy of sparks and surface temperature
	AEx nC Ex nC	US CA	Class I Class I	Zone 2 Zone 2	ISA 60079-15 CSA C22.2 No. 60079-15	-
	AEx nR Ex nR	US CA	Class I Class I	Zone 2 Zone 2	ISA 60079-15 CSA C22.2 No. 60079-15	-
Restricted Breathing	AEx nR Ex nR	US CA	Class I Class I	Zone 2 Zone 2	ISA 60079-15 CSA C22.2 No. 60079-15	Keep flammable gas out
Encapsulated	AEx ma AEx m Ex m AEx mb	US US CA US	Class I Class I Class I Class I	Zone 0 Zone 1 Zone 1 Zone 1	ISA 60079-18 ISA 60079-18 CSA C22.2 No. 60079-18 ISA 60079-18	Keep flammable gas out
Electrical Equipment for Flammable Gas, Vapors and Mists - Class I						
General Requirements	Ex	US CA US US	Class II Class II Class III Class III	Division 1 & 2 Division 1 & 2 Division 1 & 2 Zone 20, 21, 22	FM 3600 CSA C22.2 No.0 FM 3600 CSA C22.2 No.0 ISA 60079-0	-
Dust Ignition Proof	-	US CA	Class II Class II	Division 1 Division 1	UL 1203 / FM 3616 CSA C22.2 No. 25	-
Dust Protected	-	US CA	Class II Class II	Division 2 Division 2	ISA 12.12.01 / FM 3611 CSA C22.2 No. 25	-
Protection by Enclosure	AEx ta AEx tb AEx tc	US US US	Class II Class II Class II	Zone 20 Zone 21 Zone 22	ISA 60079-31 ISA 60079-31 ISA 60079-31	Keep combustible dust out
	Ex ta Ex tb Ex tc	US CA CA	Class II Class II Class II	Zone 20 Zone 21 Zone 22	CSA C22.2 No. 60079-31 CSA C22.2 No. 60079-31 CSA C22.2 No. 60079-31	
	AEx maD AEx mbD	US US	- -	Zone 20 Zone 21	ISA 60079-18 ISA 60079-18	
	(IS) (IS)	US CA	Class II Class II	Division 1 Division 1	UL 913 / FM 3610 CSA C22.2 No. 157	
Intrinsic Safety	AEx iaD AEx ibD (IS)	US US US	- - Class III	Zone 20 Zone 21 Division 1	ISA 60079-11 ISA 60079-11 UL 913 / FM 3610	Limit energy of sparks and surface temperature
	(IS)	US CA	Class III Class III	Division 1 Division 1	CSA C22.2 No. 157	

Appendix A: Equipment Certification Requirements for Hazardous Locations

ATEX & IECEx Certificate Number



Suffixes: U – component certification
X – special conditions for safe use apply

Apparatus Groups [ATEX and IECEx]

Group	Environment	Location	Typical Substance
I		Coal Mining	Methane (Fire damp)
IIA	Gases, Vapours	Surface and other locations	Acetic acid, Acetone, Ammonia, Butane, Cyclohexane, Gasoline (petrol), Kerosene, Methane (natural gas) (non-mining), Methanol (methyl alcohol), Propane, Propan-2-ol (iso-propyl alcohol), Toluene, Xylene
IIB			Di-ethyl ether, Ethylene, Methyl ethyl ketone (MEK), Propan-1-ol (n-propyl alcohol), Ethanol (ethyl alcohol)
IIC			Acetylene, Hydrogen, Carbon disulphide
IIIA	Combustible Dusts	Surface and other locations	Combustible flyings
IIIB			Non-conductive
IIIC			Conductive

Apparatus Groups (US / CAN)

Substance	Hazard Class	NEC 500	NEC 505
Acetylene	Class I Flammable Gases	Group A	IIC
Hydrogen		Group B	IIC
Ethylene		Group C	IIB
Propane		Group D	IIA
Methane (mining)		Group D	-
Combustible Metal Dusts	Class II Combustible Dusts	Group E	-
Combustible Carbonaceous Dusts		Group F	-
Combustible Dusts not in Group E or F (Flour, Grain, Wood, Plastics, Chemicals)		Group G	-
Combustible Fibers and Flyings		-	-
	Class III Fibers and Flyings	-	-

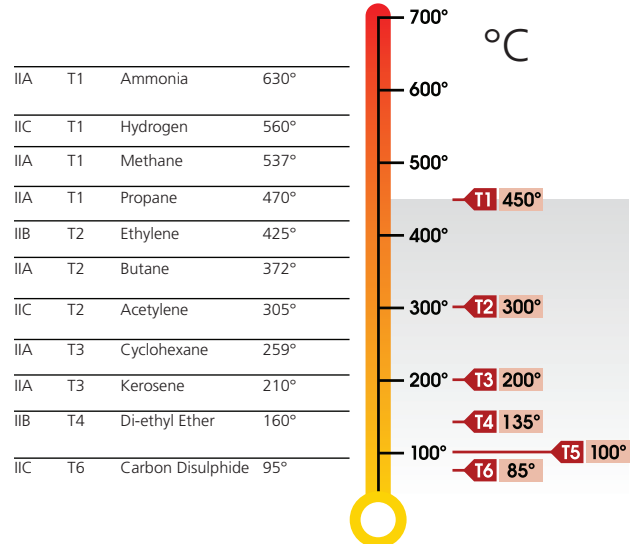
Classification of Divisions and Zones

Type of Area	NEC and CEC*	ATEX and IEC	Definitions
Continuous hazard	Division 1	Zone 0 / Zone 20 Cat 1	A place in which an explosive atmosphere is continuously present
Intermittent hazard	Division 1	Zone 1 / Zone 21 Cat 2	A place in which an explosive atmosphere is likely to occur in normal operation
Hazard under abnormal conditions	Division 2	Zone 2 / Zone 22 Cat 3	A place in which an explosive atmosphere is not likely to occur in normal operation, but may occur for short periods

* On occasion the ATEX and IEC Zones may be used in the corresponding NEC and CEC system

Temperature Classification

Classification of maximum surface temperatures for Group II Electronic Equipment (T Class).



Dusts Typical Ignition Temperatures

Dusts	Cloud	Layer
Aluminium	590 °C (1,094 °F)	>450 °C (842 °F)
Coal dust (lignite)	380 °C (716 °F)	225 °C (437 °F)
Flour	490 °C (914 °F)	340 °C (644 °F)
Grain dust	510 °C (950 °F)	300 °C (572 °F)
Methyl cellulose	420 °C (788 °F)	320 °C (608 °F)
Phenolic resin	530 °C (986 °F)	>450 °C (842 °F)
Polythene	420 °C (788 °F)	(melts) °C
PVC	700 °C (1,292 °F)	>450 °C (842 °F)
Soot	810 °C (1,490 °F)	570 °C (1,058 °F)
Starch	460 °C (860 °F)	435 °C (815 °F)
Sugar	490 °C (914 °F)	460 °C (860 °F)

Ingress Protection Codes

First Number (protect from solid bodies)		Second Number (protect from water)	
0	No protection	0	No protection
1	Objects > 50mm	1	Vertical drip
2	Objects > 12.5mm	2	Angled drip
3	Objects > 2.5mm	3	Spraying
4	Objects > 1.0mm	4	Splashing
5	Dust-protected	5	Jetting
6	Dust-tight	6	Powerful jetting
		7	Temporary immersion
		8	Continuous immersion

Enclosure Type Ratings (NEMA / CSA / UL)

Type	Area	Brief Definition
1	Indoor	General purpose
2	Indoor	Protection against angled dripping water
3, 3R, 3S	Indoor / Outdoor	Protection against rain, snow
4, 4X	Indoor / Outdoor	Protection against rain, snow, hose directed water
5	Indoor	Protection against angled dripping water, dust, fibers, flyings
6	Indoor / Outdoor	Protection against temporary submersion
6P	Indoor / Outdoor	Protection against prolonged submersion
12, 12K	Indoor	Protection against circulating dust, fibers, flyings
13	Indoor	Protection against circulating dust, fibers, flyings, seepage

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