

Technical Datasheet



Nuclear Qualified Switches

Bellows Operated Pressure Switch

Models: 201, 202 with fixed or limited adjustable deadband



Key Features

- RCC-E K3 Ad qualified
- IEEE 323/344 Class 1E mild environmental not active qualified
- Set point adjustable over whole range against calibrated scale with tamperproof adjuster
- AISI 300 SS weatherproof enclosure, IP66/NEMA 4X
- Best in class Set point repeatability of up to 1% of span
- EPDM seals and gaskets suitable for exposure to radiation
- Ranges available up to 75 bar (7.5 MPa)
- Precise and accurate operation guaranteed by use of hydraulic formed bellows or capsule stack
- Precision stainless steel mechanism for arduous atmospheres and high humidity
- Models for fixed or adjustable switching differential

Series Overview

Designed in the mid-1970s and developed over subsequent years, the Performance Series switch range offers users the broadest range of options, the highest levels of set-point repeatability and the confidence of long term performance that a mature product such as this can provide. For Nuclear applications, in particular, we have exceptional expertise of different conditions and installations.

- The models 201/202 Performance Series pressure switches utilise bellows type sensor that offer a very linear response to pressure change. This sensor, coupled with a precision stainless steel mechanism, designed to minimise friction in the moving parts, helps deliver the market leading performance customers have come to expect from the series.

Other products in the series include:

- Pressure Switches: Model S20
- Differential Pressure Switches: Model 300
- Temperature Switches: Model 700

Product applications

The 201 Performance Series is suitable for a wide range of applications in Nuclear Power Stations:

- Water and waste water
- Steam
- HVAC system
- Hydraulic system

The choice of models available ensures that the 201/2 Performance Series is suitable for use in:

- Corrosive atmospheres
- Resistant to chemical attack
- High ambient radiation

How can we help you?

Delta Mobrey offers fast, efficient and knowledgeable support when and where you need it. Please visit our website at www.delta-mobrey.com to find your local support centre or call us on:

+44 (0) 1252 729140

Performance Series
Models: 201, 202

Technical Specification

Set point repeatability:	1% of span.
Scale accuracy:	± 3% of full scale at reference temperature (20°C +/-5%)
Storage Temperature:	-25 to +80°C / -13 to +176°F
Ambient Temperature:	-25 to +80°C / -13 to +176°F; SPECIAL ENGINEERING –60 to +80°C (-76 to 176 °F)
Maximum Process Temperature:	At the process connection, the component parts withstand temperatures up to +80°C (+176°F). For higher media temperatures, refer to the Operating Instruction for installation practice or contact your local sales office.
Enclosure Classification:	Weatherproof
Ingress Protection:	IP 66 / NEMA 4X
Pollution Degree:	Pollution degree 3 according EN60947-5-1 (For extreme conditions where condensation may readily form, then sealed contacts should be used)
Switch Output:	1 x SPDT
Electrical Rating:	See Table 6
Grounding Connection:	One internal and one external
Electrical Safety Class:	Safety electrical class 1 according IEC 61298-2:2008
Process Connection:	Rc 1/4 (BSP), 1/4-18 NPT-F, 1/2-14 NPT-F & 1/2-14 NPT-M
Electrical Entry:	Harting connector (via non standard code "X"); Souriau or SAIB as per request; M20x1.5 suitable for a lite cable gland
Approximate Weight:	Enclosures: A & O 3.9kg/8.6lb;

Service Conditions

Ambient Temperature:	-25 to +60°C / -13 to +140°F
Humidity:	Up to 100% RH
Operating cycles:	30000
Ambient Radiation:	n.a.
Non Seismic Vibration:	Frequency 10 to 500 Hz Amplitude 75 µm Acceleration 1g
Seismic (OBE):	ZPA 1,45g ; 2 to 80 Hz (not active during the event)
Qualified life:	20years @ T _{amb} =55°C; 30years @ T _{amb} =50°C

DB Conditions

Seismic (SSE):	ZPA 2,9g ; 2 to 80 Hz
Radiation:	up to 25 MRad with Souriau or SAIB connector; 14Mrad with Harting connector; Up to 25 Mrad with lite cable gland (Code 0 on electrical entry)

Quality System

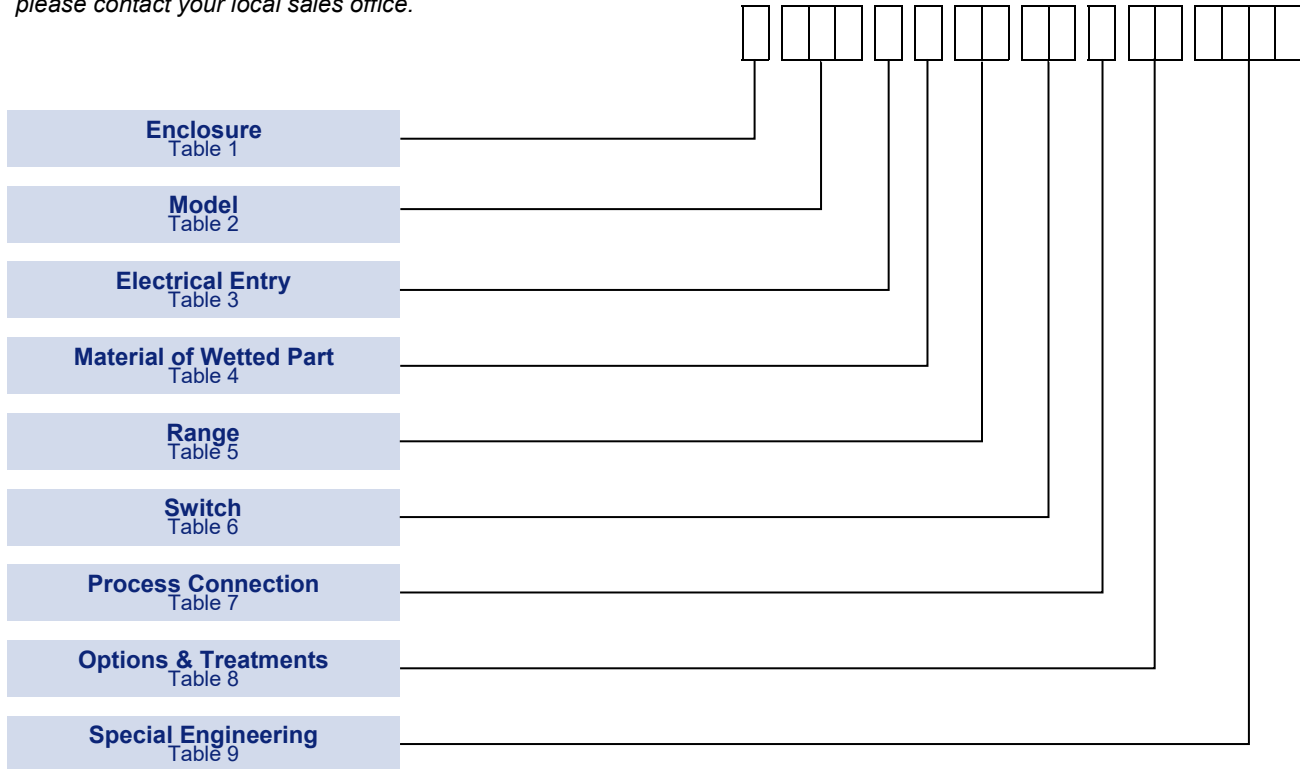
ISO 9001:2015 certified QS

Qualification Test Report

- DCTR-K949-0002
- DMTR-K978-0002, DMTR-K978-0003, DMTR-K978-0004, DMTR-K978-0010, DMTR-K978-0017, DMTR-K978-0018

How to order

Switches can be configured by selecting codes representing the desired features from the tables that follow. The chart below, describes how the model code is built up. For assistance in configuring a switch that best suits your needs, please contact your local sales office.

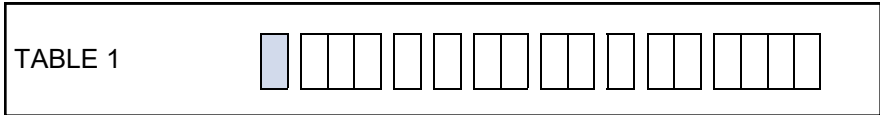


Note :

Model and configuration covered by Qualification by Test are evidenced in light blue.

Model and configuration already qualified by similarity are evidenced in light grey.

Enclosure

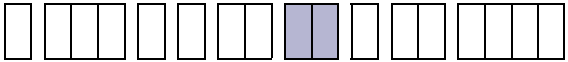


NOTE 1 : Enclosure code O available only with Hermetically sealed microswitches.

ENCLOSURE TYPES:	Code
WEATHERPROOF ENCLOSURES	
Aggressive Atmospheres Investment cast enclosure in austenitic stainless steel with ingress protection IP66, NEMA 4X + 13.	A
TYPE OF PROTECTION: INCREASED SAFETY ENCLOSURE Self assessed for use in Zone 2 hazardous locations Ex ec nC IIC T6/T4 Gc, Ex tc IIIC T85/T135°C Dc The temperature class is related to the ambient temperature range see Approvals section for more information	
Aggressive Atmospheres Investment cast enclosure in austenitic stainless steel with ingress protection IP66, NEMA 4X + 13. Limited switch options (see Tab.6).	O

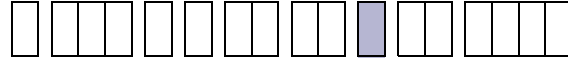
Performance Series
Models: 201, 202

Switch Options

TABLE 6 

Model 201								
UL/CSA RATING (RESISTIVE) § see note	IEC947-5-1 / EN 60947-5-1 RATING						Contact	Code
	Designation & Utilizations Category	Rated operational current I_e (A) at rated operational voltage U_e	U_i	U_{imp}	VA Rating			
					Make	Break		
5 A; 250V AC, 2 A; 30V DC Hermetically sealed. Gold plated silver contacts fitted with radiation resistant wiring. Passed RCC-E and IEEE testing	AC14 D300 DC13 R300	0.6/0.3A, 120/240 V AC 0.22/0.1A, 125/250V DC	250V	0.5kV	432 28	72 28	SPDT	H9
Model 202 (not for enclosure "O")								
5 A; 110/250V AC 2 A; 30 V DC Silver contacts adjustable dead band fitted with radiation resistant wiring.	AC14 D300 DC13 R300	0.6/0.3A, 120/240 V AC 0.22/0.1A, 125/250V DC	250V	0.8kV	432 28	72 28	SPDT	0D **
** See Note 1 on TABLE 1 for limitation on use.								

Process Connection

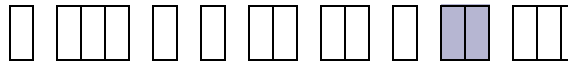
TABLE 7 

Adaptors are available for applications where their use is permitted.

The process connection to the pressure switch was qualified with compression fitting. Process tubing installation must prevent any added mechanical stress on the pressure switch under seismic disturbances. This may be done by using stress-relief loop in the process tubing or by separately supporting the process tubing near the instrument

	Code
Rc—1/4"	A
1/4 - 18 NPT F	F
G 1/2B M	K
1/2 - 14 NPT M	J

Options & Treatments

TABLE 8 

Combinations available, apply for details.

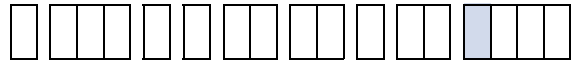
	Code
Topicalizations High humidity atmospheres	01
Stainless Steel permanently fixed stamped tags, Tropicalization and offshore marine application	2A
Stainless Steel permanently fixed stamped tags	20
Applies when - no option is required and selection is made from special engineering	00

Performance Series
Models: 201, 202

Special Engineering

Last 4 digits of the model code is only used when special engineering is required.

TABLE 9



Code	
1st digit of ES code identify the installation area	
Conventional Island	C - - -
Nuclear Island	N - - -
2nd, 3rd and 4th digit of ES code identify special construction	
Nuclear Qualified / Class 1E mild environmental - RCC-E K3 Ad product for use in classified areas of Nuclear Power plants zones with seismic and/or radiation requirements.	N006
Nuclear Qualified / Class 1E mild environmental - RCC-E K3 Ad product for use in classified areas of Nuclear Power plants zones with seismic and/or radiation requirements Electrical entry - Harting Han 7D Socket.	N017
Nuclear Qualified / Class 1E mild environmental - RCC-E K3 Ad product for use in classified areas of Nuclear Power plants zones with seismic and/or radiation requirements Electrical entry - Harting Han 7D Plug & Socket.	N065
Nuclear Qualified / Class 1E mild environmental - RCC-E K3 Ad product for use in classified areas of Nuclear Power plants zones with seismic and/or radiation requirements Static Magnetic Field (SMF) tested up to 160mT and Harting Han LOCA qualified connectors. Assembled with halogen-free wetted parts.	N086

Performance Data

TABLE 10

Bar Units

MODELS 201 TABLE 10A

Range Code	Range <i>mbar</i> /bar	Wetted parts code	SPDT (mbar)
			H9
A0	-1000 to 0	2	150
C6	3 to 25	2	13
E1	5 to 120	2	8
E8	50 to 350	2	9
G1	0.2 to 1.0	2	28
J0	0.2 to 4	2	420
M1	0.2 to 7	2	500
P6	0.3 to 15	2	500
Q2	6 to 25	2	2300
S7	15 to 75	2	3060

MODEL 202 TABLE 10B

Range Code	Range <i>mbar</i> /bar	Wetted parts code	SPDT (mbar)	
			OD	
			Min	Max
A0	-1000 to 0	2	80	185
C6	3 to 25	2	n.a.	n.a.
E1	5 to 120	2	n.a.	n.a.
E8	50 to 350	2	11	23
G1	0.2 to 1.0	2	n.a.	n.a.
J0	0.2 to 4	2	65	183
M1	0.2 to 7	2	68	189
P6	0.3 to 15	2	143	338
Q2	6 to 25	2	294	796
S7	15 to 75	2	1900	4500

KPa Units

MODELS 201 TABLE 10C

Range Code	Range kPa	Wetted parts code	SPDT OPTIONS (kPa)
			H9
AA	-100 to 0	2	15
CN	0.3 to 2.5	2	1.3
E2	0.5 to 12	2	0.8
E5	5 to 35	2	0.9
GE	20 to 100	2	2.8
J1	20 to 400	2	42
M3	20 to 700	2	50
PA	30 to 1500	2	50
QA	600 to 2500	2	230
SA	1.5 to 7.5 MPa	2	306

MODEL 202 TABLE 10D

Range Code	Range kPa	Wetted parts code	SPDT (kPa)	
			OD	
			Min	Max
AA	-100 to 0	2	8	18.5
CN	0.3 to 2.5	2	n.a.	n.a.
E2	0.5 to 12	2	n.a.	n.a.
E5	5 to 35	2	1.1	2.3
GE	20 to 100	2	n.a.	n.a.
J1	20 to 400	2	6.5	18.3
M3	20 to 700	2	6.8	18.9
PA	30 to 1500	2	14.3	33.8
QA	600 to 2500	2	29.4	79.6
SA	1.5 to 7.5 MPa	2	190.0	450

Electrical Connections

Dielectric Strength

The electrical assembly is capable of withstanding *2kV between live parts and earth/ground and 500V between open contacts.

* 1.2kV rms for micro switch Codes H9. Refer to Table 6.

Electrical Isolation

These products are not suitable for electrical isolation. Always isolate circuit separately to carry out any electrical work.

Approvals



EUROPEAN DIRECTIVE

Low Voltage Directive (LVD) 2014/35/EU

Compliant to LVD

Pressure Equipment Directive (PED) 2014/68/EU

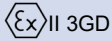
Compliant to PED according process accessory

Restriction of hazardous substances (RoHS 2) 2011/65/EU

Compliant to RoHS

ATEX Directive 2014/34/EU

INCREASED SAFETY



- Ex ec nC IIC T6 Gc (-25°C≤Ta≤+40°C)
- Ex ec nC IIC T4 Gc (-25°C≤Ta≤+80°C)
- Ex tc IIIC T85°C Dc IP66 (-25°C≤Ta≤+40°C)
- Ex tc IIIC T135°C Dc IP66 (-25°C≤Ta≤+80°C)



UK REGULATION

Electrical Equipment (Safety) Regulations 2016

Conform to UK SI 2016 No 1101 regulation

Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Conform to UK SI 2012 No. 3032

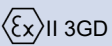
Pressure Equipment (Safety) Regulations 2016

Conform to UK SI 2016 No 1105 regulation

Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016

Conform to UK SI 2016 No 1107 regulation

INCREASED SAFETY



- Ex ec nC IIC T6 Gc (-25°C≤Ta≤+40°C)
- Ex ec nC IIC T4 Gc (-25°C≤Ta≤+80°C)
- Ex tc IIIC T85°C Dc IP66 (-25°C≤Ta≤+40°C)
- Ex tc IIIC T135°C Dc IP66 (-25°C≤Ta≤+80°C)

Optional

Optional electric plugs

Instruments are supplied without a plug. If necessary plugs can be supplied as spares. Please refer to the table below for the correct type and code also in relation to the table 9 (Special Engineering)

Electrical entry code TABLE 3		Optional Plug		
Code	Description	DML Part Number	Description	Supplier Part Number
I	7 pin SAIB receptacle	3400459	K2 SAIB NU25 Size 2-7, Female Plug 7 cts with shielding continuity (washer and Raykem heat shrink tube code wcsf-300-28/8-75N)	254-207-400-K2 + 25-44-01
		3400461	SAIB NU25 Size 2-7, Female Plug 7 cts , with shielding continuity (washer and Raykem heat shrink tube code wcsf-300-28/8-75N)	254-207-400 + 25-44-01
P	3 pin SAIB receptacle	3400460	K2 SAIB NU25 Size 1-3, Female Plug 3 cts, with shielding continuity (washer and Raykem heat shrink tube code wcsf-200-18/5-75N-CS411)	254-103-400-K2 + 25-44-00
		3400462	SAIB NU25 Size 1-3, Female Plug 3 cts, with shielding continuity (washer and Raykem heat shrink tube code wcsf-200-18/5-75N-CS411)	254-103-400 + 25-44-00
Y	7 pin SOURIAU receptacle	3400353	Souriau 8N45S, Female Plug 7 cts, K2 Mild environment	8N45S218571K2
		3400269	Souriau 8N45S, Female Plug 7 cts	8N45S218572
Z	3 pin SOURIAU receptacle	3400367	Souriau 8N45S, Female Plug 3 cts, K2 Mild environment	8N45S118532K2
		3400365	Souriau 8N45S, Female Plug 7 cts	8N45S118532

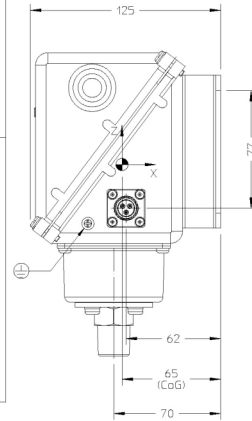
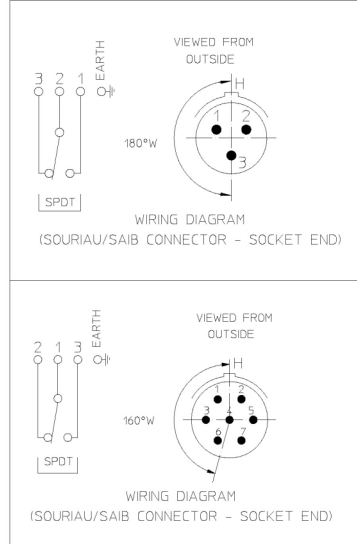
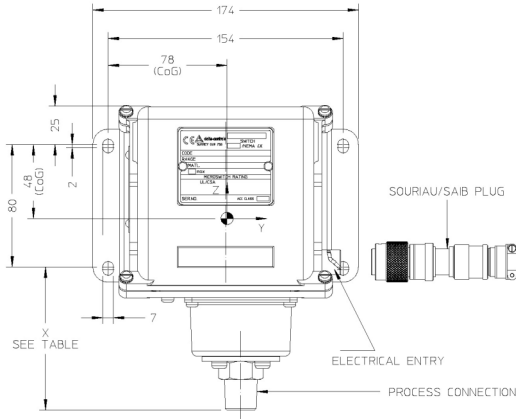
Dimension

ALL DIMENSIONS mm

A ENCLOSURE SOURIAU/SAIB CONNECTOR

DIMENSION 'X'			
RANGE	A (Rc1/4)/(1/2"14-NPTM)	F (1/4"18NPTF)	K (G1/2B)
J0 J1 J3 J4 J5	83	83	94
M1 M3 M4 M5 M6	83	83	94
P6 PA PB PC PD	89	89	93
Q2 QA QB QC QD	89	89	93
S7 SA SB SC SD	89	89	93

NOTES:
RECOMMENDED SCREWS FOR
INSTALLATION ARE M6 GRADE 8.8



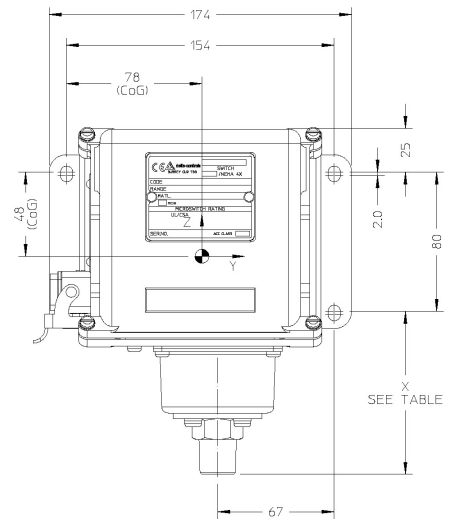
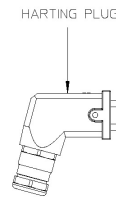
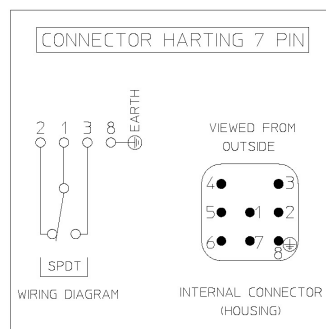
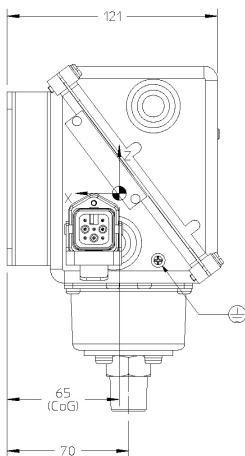
DS_21350

Process connection Rc 1/4" and 1/2"-14NPTM are dimensionally identical

A ENCLOSURE HARTING CONNECTOR

DIMENSION 'X'			
RANGE	A (Rc1/4)/(1/2"14-NPTM)	F (1/4"18NPTF)	K (G1/2B)
J0 J1 J3 J4 J5	83	83	94
M1 M3 M4 M5 M6	83	83	94
P6 PA PB PC PD	89	89	93
Q2 QA QB QC QD	89	89	93
S7 SA SB SC SD	89	89	93

NOTES:
RECOMMENDED SCREWS FOR
INSTALLATION ARE M6 GRADE 8.8



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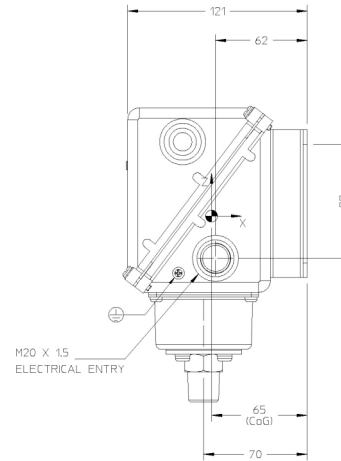
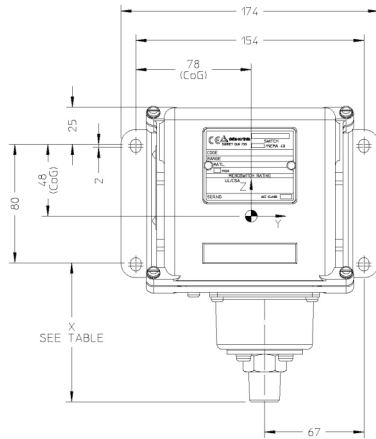
Dimension

ALL DIMENSIONS mm

A ENCLOSURE WITH ELECTRICAL ENTRY M20x1.5 SUITABLE FOR LITE CABLE GLAND

RANGE	DIMENSION 'X'		
	A(Rc1/4)/(1/2"14-NPTM)	F (1/4"18NPTF)	K (G1/2B)
J0 J1 J3 J4 J5	83	83	94
M1 M3 M4 M5 M6	83	83	94
P6 PA PB PC PD	89	89	93
Q2 QA QB QC QD	89	89	93
S7 SA SB SC SD	89	89	93

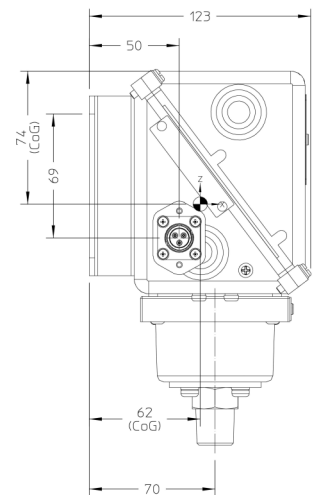
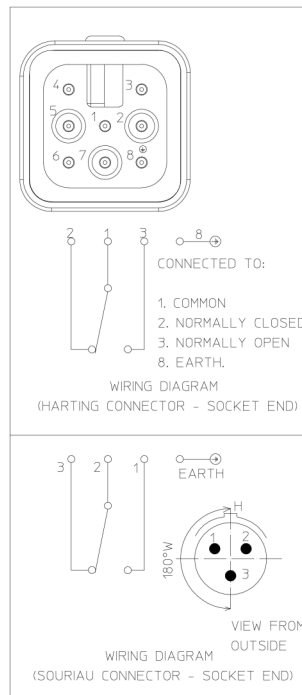
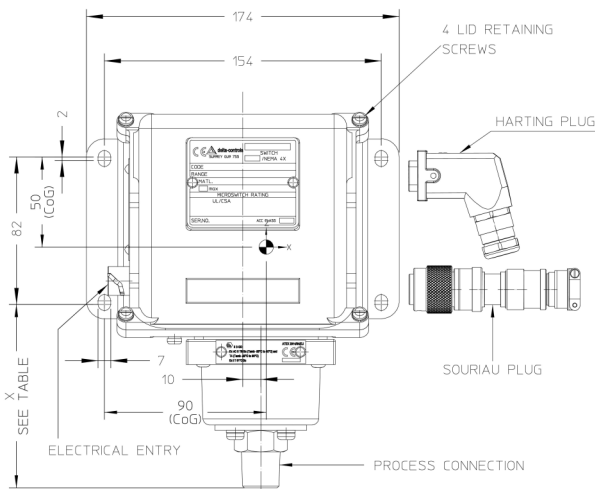
NOTES:
RECOMMENDED SCREWS FOR
INSTALLATION ARE M6 GRADE 8.8



DS_21350

Process connection Rc 1/4" and 1/2"-14NPTM are dimensionally identical

O ENCLOSURES



DS_21379

NOTES:
RECOMMENDED SCREWS FOR INSTALLATION ARE M6 GRADE 8.8

RANGE	DIMENSION 'X'		
	A(Rc1/4)/(1/2"14-NPTM)	F(1/4"18NPTF)	K (G1/2B)
J0 J1 J3 J4 J5	97	97	108
M1 M3 M4 M5 M6	97	97	108
P6 PA PB PC PD	103	103	107
Q2 QA QB QC QD	103	103	107
S7 SA SB SC SD	103	103	107

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