

General Specifications

GS 12D07J04-01EN-P

Model SC4A Conductivity Sensors and Fittings for 2-electrode Systems

The measurement of specific conductivity in aqueous solutions is becoming increasingly important for the determination of impurities in water. The accuracy of the measurement is strongly influenced by temperature variations, polarization effects at the surface of the contacting electrodes, cable capacitances, etc. Yokogawa has designed a full range of precision sensors and instruments to cope with these measurements, even under extreme conditions.

The SC4A sensors are intended for the low conductivity applications found in the semi-conductor, power, water and pharmaceutical industries; these sensors are in a convenient compact style. There are several mounting possibilities one of which is mounting by a compression gland, giving a simple effective method of direct insertion in process pipework. The sensors are made from a combination of wetted materials approved by FDA. This makes them ideally suited for the monitoring of pure water systems used in the preparation of injectable solutions and the like, for this kind of application, sanitary clamp mountings are used.

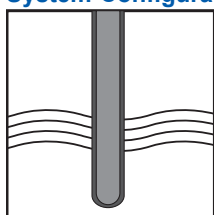
Model SC4A sensors, available in a Stainless Steel or Titanium version with fixed cable or Variopin connector, in combination with WU10/WE10-cable are intended for the low conductivity applications. These sensors are designed in a convenient compact style and can be inserted directly in process pipework using available fittings or adapters. There are several mounting possibilities, including a compression gland, giving a simple effective method of direct insertion in process pipework. The sensors are made from a combination of wetted materials approved by FDA. This makes them ideally suited for the monitoring of pure water systems used in the preparation of injectable solutions. For this kind of application, sanitary clamp mountings are most often used.

All sensors have a pre-calibrated cell constant and a built-in temperature element for automatic temperature compensation. Sensors with the Variopin connector are equipped with an ID-chip in which calibration information is stored for easy setup when connected to a SENCOM Smart Adapter model SA11-C1. The Variopin connector can also be used without the SA11-C1 adapter. Not using the SA11 will not give you the benefits of digital sensor use. For metal sensors, a 3.1 material certificate is included. The sensors are certified for hazardous area when connected to a certified intrinsically safe Yokogawa analyzer, model SC202S or FLXA-series or a certified intrinsically safe circuit with defined output parameters.

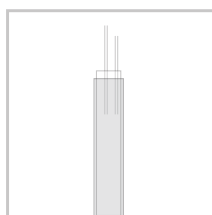
FEATURES

- Compact style sensor
- Built-in temperature resistor: Pt1000
- Fast temperature response
- Plug and cable form a water tight connection to IP67
- Selection of two cell constant 0.02 cm-1 or 0.10 cm-1
- Sensor with 8 pin Variopin with ID chip for SENCOM SA11-C1 use
- Certified for hazardous area
- Direct process insertion
- Wide range of mountings
- Compatible with PR10 retractable assembly
- The sensor is polished to meet pharmaceutical requirements
- Standard quality inspection certificate with delivery of sensor
- Peek and O-rings according to FDA standard

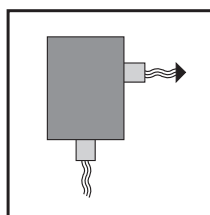
System Configuration



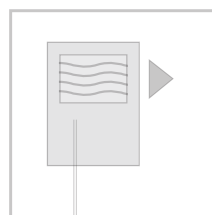
Sensors



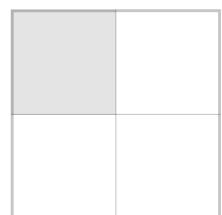
Cables



Fittings



Transmitters



Accessories



1. SPECIFICATIONS

General Specifications

- **1.1 Measuring method** : 2-electrode
- **1.2 Measuring element** : Pt1000 temperature sensor
- **1.3 Wetted parts**

Sensor Body and electrodes	: SC4A-T-AD SC4A-S-AD SC4A-E-SA (SB, SC) SC4A-T-PR SC4A-S-PR	: Titanium grade 2 or 3 Stainless Steel AISI 316L Stainless Steel AISI 316L Titanium grade 2 or 3 Stainless Steel AISI 316L
O-ring	: SC4A-*AD SC4A-E-SA (SB, SC) SC4A-*PR	: Viton EPDM FDA approved Viton
Insulation	: All models	: PEEK 450G, FDA migration tested
Connector Variopin	: Contacts Material Insulation	: gold plated Nickel-plated brass PEEK, UL94-V0
Wetted parts adapters/fitting	: /PS, /FF for SC4A-*AD /PF for SC4A-*AD /SA1(2), /SB1(2), /SC1 for SC4A-E-SA (SB, SC)	: Stainless Steel AISI 316L PVDF Stainless Steel AISI 316L
Cable ¹	: Conductors Outside shield Insulator	: tinned copper 0.6 mm2 braid, tinned copper, 85% coverage Polyester for conductor*

* for colors see Section 5.1, TPE-O for outer jacket, color black

Note 1 : Cable is not considered as wetted part

- **1.4 Functional specifications (at 25 °C)**

Temperature element ²	: Pt1000 to IEC 751
Nominal Cell Constant	: 0.02 cm-1 or 0.01 cm-1

Note 2: The temperature sensor included in the sensor is designed for process compensation and for indication.
It is NOT designed for process temperature control.

- **1.5 Dynamic specifications**

Response time temperature (t_{90})	: < 1 min.
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- **1.6 Operating range**

Conductivity range* at actual process temperature	: 1 μ S x C.C. – 200 mS x C.C. (See Fig. 1)
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* measurement range dependent on input range analyzer.

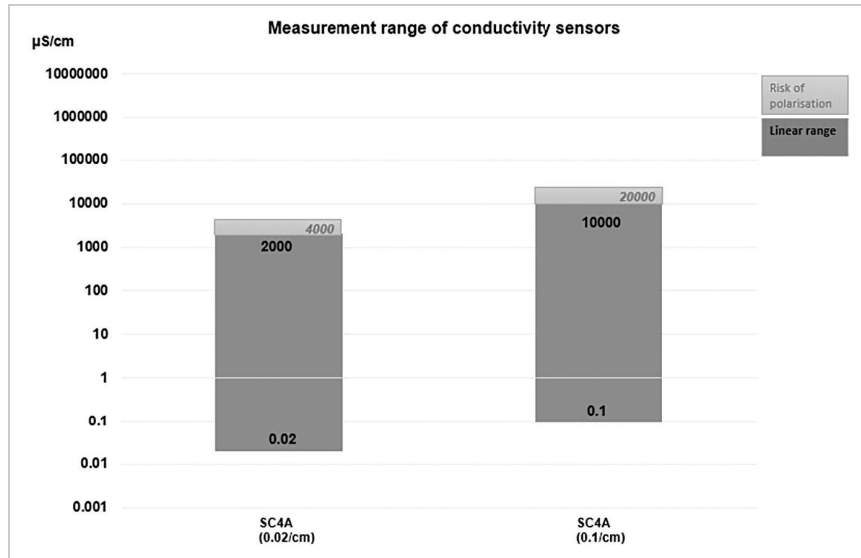


Figure 1. Measuring range of conductivity sensors section

Temperature @ 100 KPa (1 Bar, 14.5 PSI) : 0 °C ... 125 °C (32 °F to 257 °F) - For VarioPin type sensors
 0 °C ... 100 °C (32 °F to 212 °F) - For fixed cable type sensors

Remark:

For all types 135°C (275 °F) max. for a short period of time during sterilization.
 In combination with a fitting or option, the specification of the most critical part is leading.

Pressure @ 25 °C : Stainless Steel & Titanium type
 Over pressure 0 to 10 barg (7 to 142 PSIG)*
 Under pressure 0 to 0.5 barg (0 to 7 PSIG)*

* Unit definition: barg = bar gauge, over pressure against atmosphere.
 barg = under pressure against atmosphere

Process Pressure in combination with PVDF fitting: (See Fig. 2)

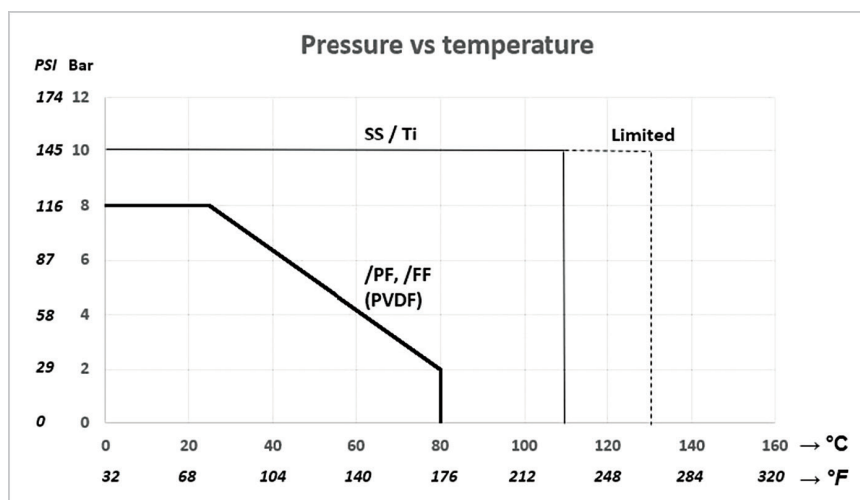


Figure 2. Process pressure in combination with fitting

● 1.7 Shipping details

Package size (LxWxH) : 220 x 220 x 90 mm (8.7 x 8.7 x 3.6 inch) - Fixed cable version
 300 x 100 x 75 mm (11.8 x 3.9 x 3.0 inch) - VarioPin type version

Package weight (max.)	SC4A-*** connection type:	-03/VS	-05	-10	-15	-20	
		0.63	0.78	1.13	1.48	1.83	kg
		1.4	1.7	2.5	3.0	4.0	lbs

● 1.8 Environmental conditions

Storage temperature : -30 °C to +50 °C (-22 °F to +122 °F)
 Ingress Protection fixed cable type : IP65 (conform IEC 60529)
 Ingress Protection VarioPin type : IP67 (conform IEC 60529)

● 1.9 Mechanical specifications

Surface roughness	SC4A-*-AD	: max. 0.8 µm
	SC4A-E-SA/SB/SC	: max. 0.5 µm
	SC4A-*-PR	: max. 0.8 µm

● 1.10 Regulatory compliances:

Item	Description, Approval, Certification
LVD	ANSI/ISA 61010-1 CAN/CSA C22.2 No. 61010-1
RoHS	EU Directive 2011/65/EU and Commission Delegated Directive (EU) 2015/863 amending Annex II, per EN-IEC 63000
PED	EU Directive 2011/68/EU applying Article 4.3: Sound Engineering Practice.
WEEE	EU directive 2012/19/EU This sensor is intended to be sold and used only as a part of equipment which is excluded from the WEEE directive, such as large-scale stationary industrial tools, a large-scale fixed installation etc., and therefore it is in principle fully compliant with WEEE directive. The sensor should be disposed in accordance with applicable national legislations/regulations respectively.
ATEX (EU)	EU Directive 2014/34/EU ATEX approval: DEKRA 14ATEX0074 X 0344 SC4A: II 1 G Ex ia IIC T4...T6 Ga SC42: II 1 G Ex ia IIC T3...T6 Ga SX42: II 1 G Ex ia IIC T2...T6 Ga Applied standards: EN IEC 60079-0, EN 60079-11
IECEX	IECEX approval: IECEX DEK 14.0032X SC4A: Ex ia IIC T4...T6 Ga SC42: Ex ia IIC T3...T6 Ga SX42: Ex ia IIC T2...T6 Ga Applied standards: IEC 60079-0, IEC 60079-11
FM (Canada)	FM approval Canada: FM20CA0062X SC4A: IS SI CL I, DIV 1, GP ABCD, T4...T6; CL I, ZN 0, Ex ia IIC, T4...T6 Ga SC42: IS SI CL I, DIV 1, GP ABCD, T3...T6; CL I, ZN 0, Ex ia IIC, T3...T6 Ga SX42: IS SI CL I, DIV 1, GP ABCD, T2...T6; CL I, ZN 0, Ex ia IIC, T2...T6 Ga Control Drawing: D&E 2020-024-A51 Applied standards: CAN/CSA-C22.2 No. 60079-0, CAN/CSA-C22.2 No. 60079-11, CAN/CSA-C22.2 No. 61010-1
FM (United States)	FM approval United States: FM20US0123X SC4A: IS CL I, DIV 1, GP ABCD, T4...T6; CL I, ZN 0, AEx ia IIC, T4...T6 Ga SC42: IS CL I, DIV 1, GP ABCD, T3...T6; CL I, ZN 0, AEx ia IIC, T3...T6 Ga SX42: IS CL I, DIV 1, GP ABCD, T2...T6; CL I, ZN 0, AEx ia IIC, T2...T6 Ga Control Drawing: D&E 2020-024-A50 Applied standards: FM Class 3600, FM Class 3610, ANSI/ISA 60079-0, ANSI/ISA 60079-11, ANSI/ISA 61010-1
NEPSI (China)	NEPSI approval: GYJ21.2892X SC4A: Ex ia IIC T4...T6 Ga SC42: Ex ia IIC T3...T6 Ga SX42: Ex ia IIC T2...T6 Ga Applied standards: GB 3836.1, GB 3836.4, GB 3836.20

● 1.10 Regulatory compliances:

Item	Description, Approval, Certification
PESO (India)	PESO approval: PESO approval is based on ATEX approval DEKRA 141ATEX0074 X, iss. 2 – 29.11.2019 Equipment reference numbers: P512759/1 Applied standards: EN IEC 60079-0, EN 60079-11
TS (Taiwan)	TS approval: TS Safety Label is based on IECEx approval IECEx DEK 14.0032X Identification Number: TD04000C Applied standards: IEC 60079-0, IEC 60079-11
EAC Ex (Russia)	EAC Ex certificate: RU C-NL.AA87.B.00754 SC4A: 0Ex ia IIC T6...T4 Ga X SC42: 0Ex ia IIC T6...T3 Ga X SX42: 0Ex ia IIC T6...T2 Ga X Applied standards: GOST 31610.0 (IEC 60079-0), GOST 31610.11 (IEC 60079-11), GOST IEC 60079-14

2. SPECIFICATIONS SC4A-AD

General Specifications

2.1 Materials Wetted Parts

Body & electrodes	: Stainless steel AISI 316L or Titanium grade 2 or 3
O-ring	: Viton
Mounting adapter	: PVDF or Stainless steel AISI 316L
Insulation	: PEEK (Polyether Ether Ketone) FDA migration tested CFR 177 .2415 FDA migration tested 21 CFR 177.2415 +, PIM and USP class VI
Surface Roughness	: 0.8µm (R432)

2.2 Operating Specifications (Sensor)

See *paragraph 1.6*

2.3 Model and Suffix codes

Model SC4A-AD

Model	Suffix Code	Option code	Description
SC4A			19 mm conductivity sensor
Material	-T -S		Titanium Grade 2 or 3 Stainless steel AISI 316L (SS)
Fitting-type	-AD		For adapter mounting
Sensor-length	-09 -15		9 cm ¹⁾ 15 cm
Cell constant	-002 -010		0.02/cm 0.1/cm
Connection type	-03 -05 -10 -15 -20 -VS		Fixed cable with wirepins, 3 m Fixed cable with wirepins, 5 m Fixed cable with wirepins, 10 m Fixed cable with wirepins, 15 m Fixed cable with wirepins, 20 m No Cable; Variopin connector with SENCOM ID-chip
Temperature element	-T1		Pt1000, IS for ATEX/IECEx/FM-US/FM-CAN
	/PS /PF /FF		3/4" stainless steel adapter 3/4" PVDF adapter Flow fitting stainless steel AISI 316L ²⁾

¹⁾ Suffix -AD-09 not available with -VS.

²⁾ With option /FF: option /PS is mandatory.

2.4 Spare parts SC4A-AD

Adapters SC4A*-AD sensor

Part no.	Description	Process conn.	Material	Quantity
K1542DF	/PS	3/4" NPT adapter	Stainless Steel	1
K1542CW	/PF	3/4" NPT adapter	PVDF	1
K1598AC	/FF	Flow fitting	Stainless Steel	

Note 1 : For /FF is needed to have /PSz or PF.

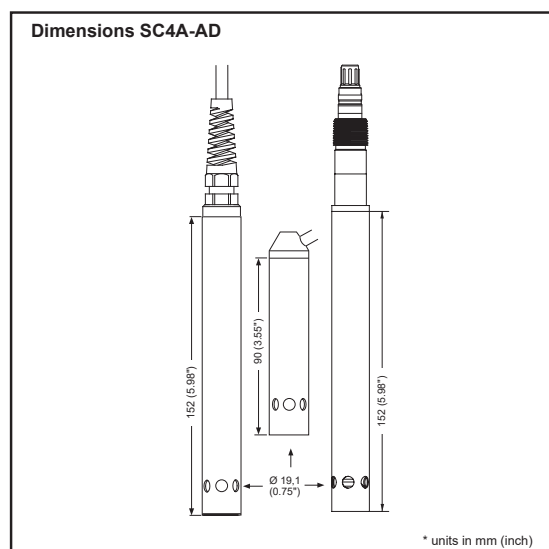


Figure 3. SC4A-AD-15 / SC4A-AD-09

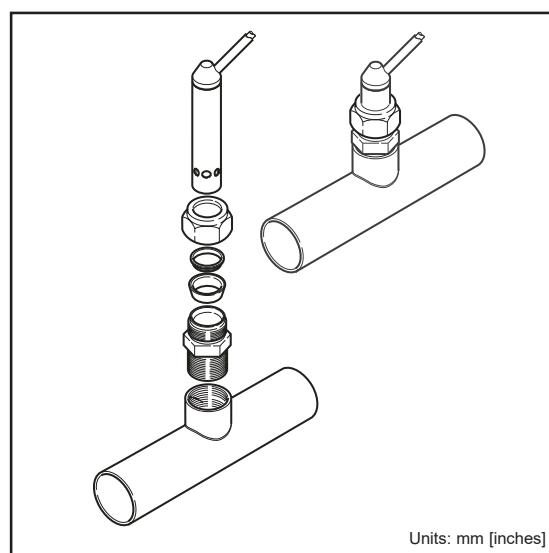


Figure 4. - Mounted sensor with the option / PF and /PS

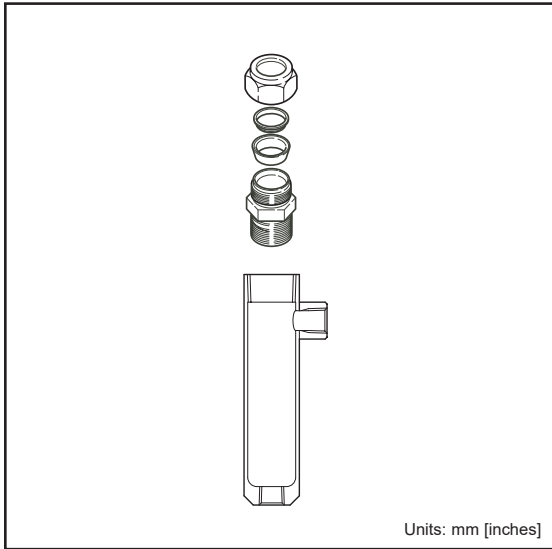


Figure 5.1. Dimensional drawing /FF with the option /PS

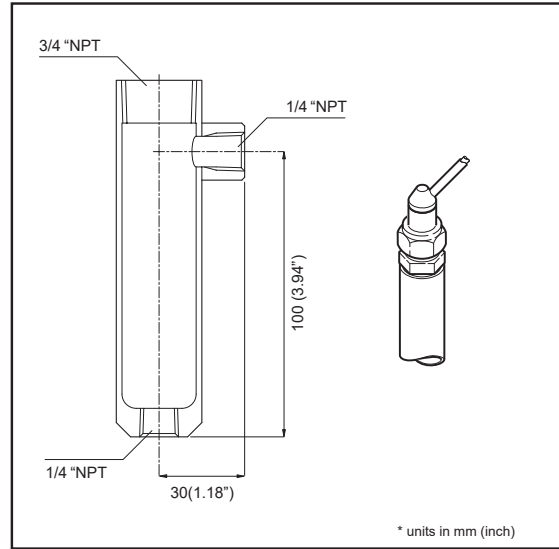


Figure 5. Dimensional drawing /FF with the option /PS

3. SPECIFICATIONS SC4A-SA/SB/SC

General Specifications

The SC4A-E is a conductivity sensor made of below materials with full traceability and supporting documents.

- EPDM O-ring (21 CFR 177.2600)
- SS is 1.4435
- Double O-ring construction (EPDM 21 CFR 177.2450)
- Virgin PEEK isolator (21 CFR 177.2415)
- Surface roughness Ra < 0.5µm (R416)
- Tested for sterilizability against EHEDG procedure
- 5% accuracy for the Cell constant

3.1 Materials Wetted Parts

- Body & electrodes : Stainless steel AISI 316L (1.4435)
- O-ring : EPDM, FDA migration tested 21 CFR 177.2600
- Mounting adapter : Stainless steel AISI 316L Tri-clamp according to ISO 2852-1993
- Insulation : PEEK (Polyether Ether Ketone) FDA migration tested 21 CFR 177.2415 + FDA, PIM European Directive 10/2011/EC 1935/2004 and USP class VI
- Surface Roughness : 0.5µm

3.2 Operating Specifications (Sensor)

(See paragraph 1.6)

3.3 Model and Suffix codes

Model	Suffix Code	Option code	Description
SC4A			19 mm conductivity sensor
Material	-E		Stainless steel AISI 316L (SS) with EPDM FDA sealing
Fitting-type	-SA -SB -SC		25 mm port, for sanitary purposes 1-1½" tri-clamp 2" tri-clamp
Cell constant	-002 -010		0.02/cm 0.1/cm
Connection type	-03 -05 -10 -15 -20 -VS		Fixed cable with wirepins, 3 m Fixed cable with wirepins, 5 m Fixed cable with wirepins, 10 m Fixed cable with wirepins, 15 m Fixed cable with wirepins, 20 m No Cable; Variopin connector with SENCOM ID-chip
Temperature element	-T1		Pt1000, IS for ATEX/IECEx/FM-US/FM-CAN
	/PS /PF /FF		3/4" stainless steel adapter 3/4" PVDF adapter Flow fitting stainless steel AISI 316L ¹⁾

¹⁾ With option /FF: option /PS is mandatory.

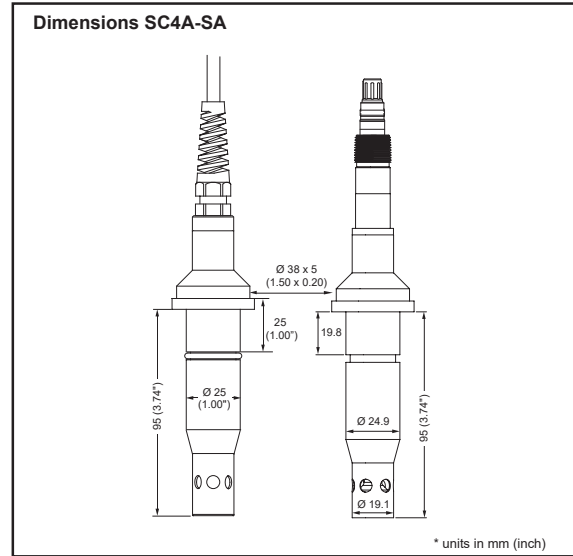


Figure 6. Sensor SC4A-SA

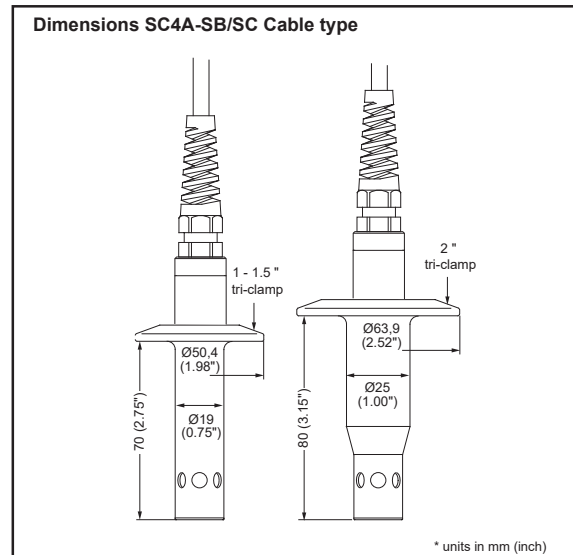


Figure 7. Sensor SC4A-SB/SC

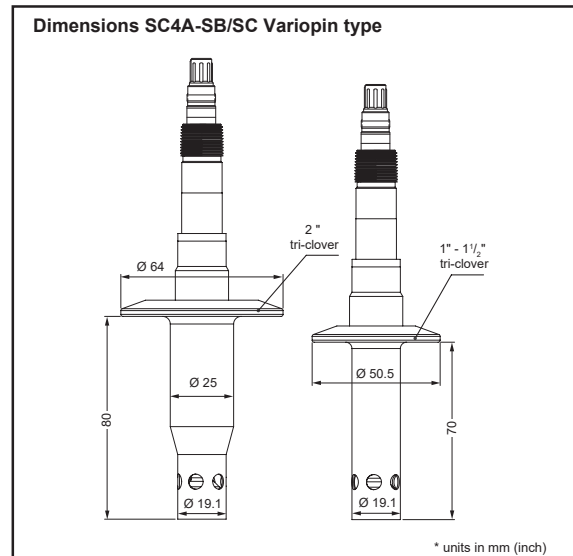


Figure 8. Sensor SC4A-SB/SC - VS Type

● 3.4 Installation SC4A-SA/SB/SC

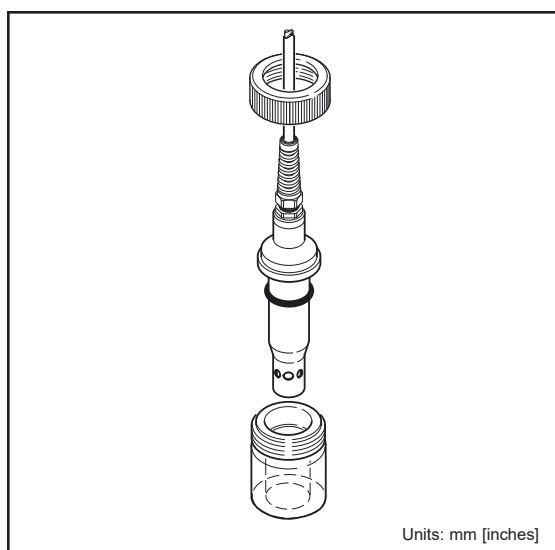


Figure 9. Mounted Sensor SC4A -SA

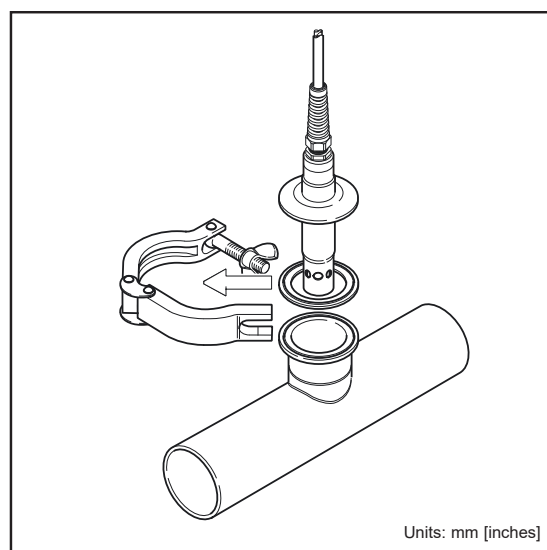


Figure 10. Mounting example

● 3.5 Adapters SC4A-E-SA sensor

Part number	Description	Max Temp	Max pressure	Process connection	Material	Quantity
K1542FA	/SA1	135°C	10 bar(142 PSIG)	Straight welding socket	Stainless steel	1
K1542FB	/SA2	135°C	10 bar(142 PSIG)	Angled welding socket	Stainless steel	1

● 3.6 Spare parts for adapters SC4A-E-SA sensor

Part number	Description	Quantity
K1520EJ	Straight weld-in adapter without mounting nut, Stainless Steel	1
K1520EK	Angled weld-in adapter without mounting nut, Stainless Steel	1

● 3.7 Spare parts for SC4A-E-SA sensor

Part number	Description	Quantity
K1542DL	O-ring set, EPDM FDA, 20.3 x 2.62	3
K1542DK	O-ring set, Viton, 20.3 x 2.62	3

● 3.8 Adapters SC4A-E-SA sensor

Part number	Description	Max Temp	Max pressure	Process connection	Material	Quantity
K1542FC	/SB1	135°C	10 bar(142 PSIG)	Tri-clamp 1"	Stainless steel	1
K1542FF	/SB2	135°C	10 bar(142 PSIG)	Tri-clamp 1½"	Stainless steel	1

● 3.9 Spare parts for SC4A-E-SA sensor

Part number	Description	Quantity
K1500BN	Clamp seal ring, EPDM FDA, 1" ~ 1½"	1
K1542DG	Clamp seal ring, Viton, 1"	3
K1542DH	Clamp seal ring, Viton, 1½"	3

● 3.10 Adapters SC4A-E-SA sensor

Part number	Description	Max Temp	Max pressure	Process connection	Material	Quantity
K1542FE	/SC1	135°C	10 bar(142 PSIG)	Tri-clamp 2"	Stainless steel	1

● 3.11 Spare parts for SC4A-E-SA sensor

Part number	Description	Quantity
K1500BP	Clamp seal ring, EPDM FDA, 2"	1
K1542DJ	Clamp seal ring, Viton, 2"	3

4. SPECIFICATIONS SC4A-PR

General Specifications

4.1 Materials Wetted Parts

Body & electrodes	: Stainless steel AISI 316L or Titanium grade 2 or 3
O-ring	: Viton
Mounting adapter	: Retractable fitting
Insulation	: PEEK (Polyether Ether Ketone)

4.2 Operating Specifications (Sensor)

See paragraph 1.6

4.3 Installation SC4A-*-PR

The installation of the SC4A-*-PR sensor is done using the Model PR10 retractable fitting. The mounting procedure of the sensor is explained in the Instruction Manual of this fitting.

Part no.	Description	Quantity
K1500BE	O-ring set, Viton, 15.6 x 1.78	10
K1500ED	O-ring set, Kalrez, 15.6 x 1.78	1

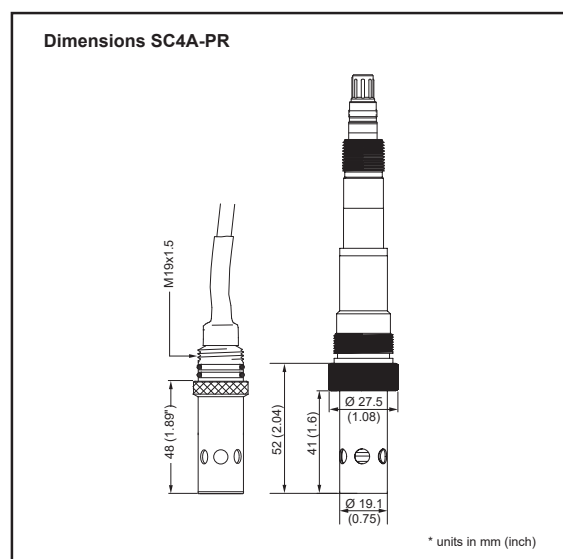


Figure 11. SC4A -PR

4.4 Model and Suffix codes

Model	Suffix Code	Option code	Description
SC4A			19 mm conductivity sensor
Material	-T		Titanium Grade 2 or 3
	-S		Stainless steel AISI 316L (SS)
Fitting-type	-PR		For retractable mounting
Sensor-length	-NN		Fixed length
Cell constant	-002		0.02/cm
	-010		0.1/cm
Connection type	-03		Fixed cable with wirepins, 3 m
	-05		Fixed cable with wirepins, 5 m
	-10		Fixed cable with wirepins, 10 m
	-15		Fixed cable with wirepins, 15 m
	-20		Fixed cable with wirepins, 20 m
	-VS		No Cable; Variopin connector with SENCOM ID-chip
Temperature element	-T1		Pt1000, IS for ATEX/IECEX/FM-US/FM-CAN

5. ADDENDUM 1: Typical Installations

For optimum measurement results, the SC4A sensor should be installed in a location that offers an acceptable representation of the process composition and DOES NOT exceed the specifications of the sensor.

5.1 Typical installation SC4A-*-AD with standard options

The SC4A-*-AD sensor can be installed in the process using optional 3/4" NPT adapters. These adapters are available in Stainless Steel (/PS) and in PVDF (/PF); **see Figure 12** for the mounting sequence. The sensor can also be installed in an optional Stainless-Steel flow fitting (/FF) using option /PS, **see Figure 13** for details.

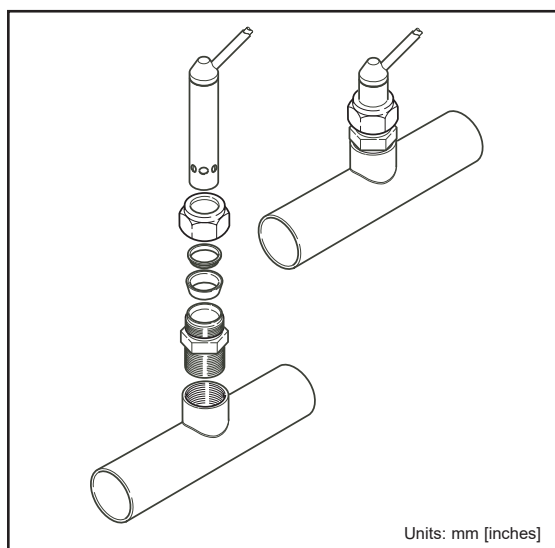


Figure 12. Mounted sensor with option /PF and /PS

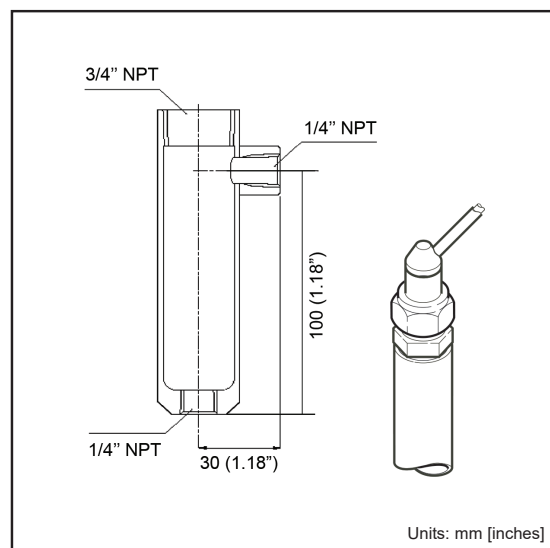


Figure 13. Dimensional drawing /FF with option /PS

5.2 Typical installation SC4A-E-SA (SB, SC) with standard options / spare parts

The typical installation of the SC4A-E-SA sensor is done by using a standardized 25 mm port. Stainless Steel welding sockets are available as straight version (spare part /SA1) or 15° angled version (spare part /SA2). Both versions are delivered with mounting nut.

In Figure 14 an example is shown how to install the sensor using spare part /SA1. Sensors SC4A-E-SB and SC4A-E-SC are installed by tri-clamp method, **see Figure 15**. For the SB version two Stainless Steel tri-clamps are available, in a 1" size (spare part /SB1) or in a 1½" size (spare part /SB2). The SC version has just one Stainless Steel tri-clamp in a 2" size (spare part /SC1).

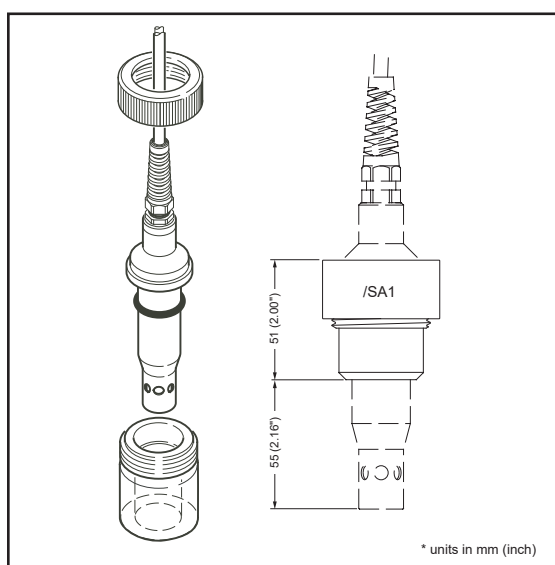


Figure 14. Mounted SC4A-E-SA sensor with spare part /SA1

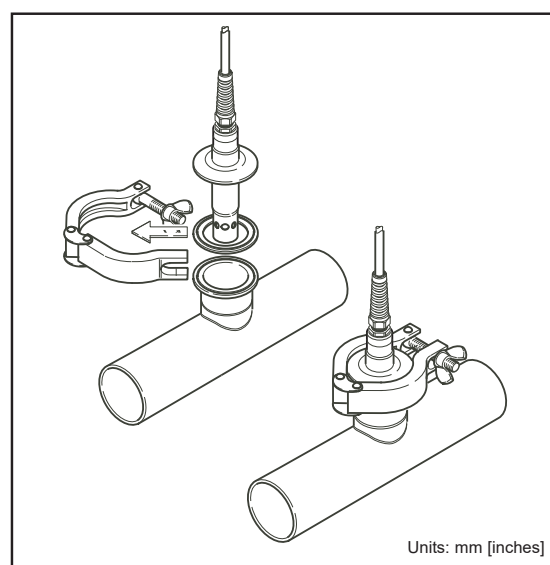


Figure 15. Mounted SC4A-E-SB(-SC) sensor

● 5.3 Typical installation SC4A*-PR

The installation of the SC4A*-PR sensor is done using the Model PR10 retractable fitting.

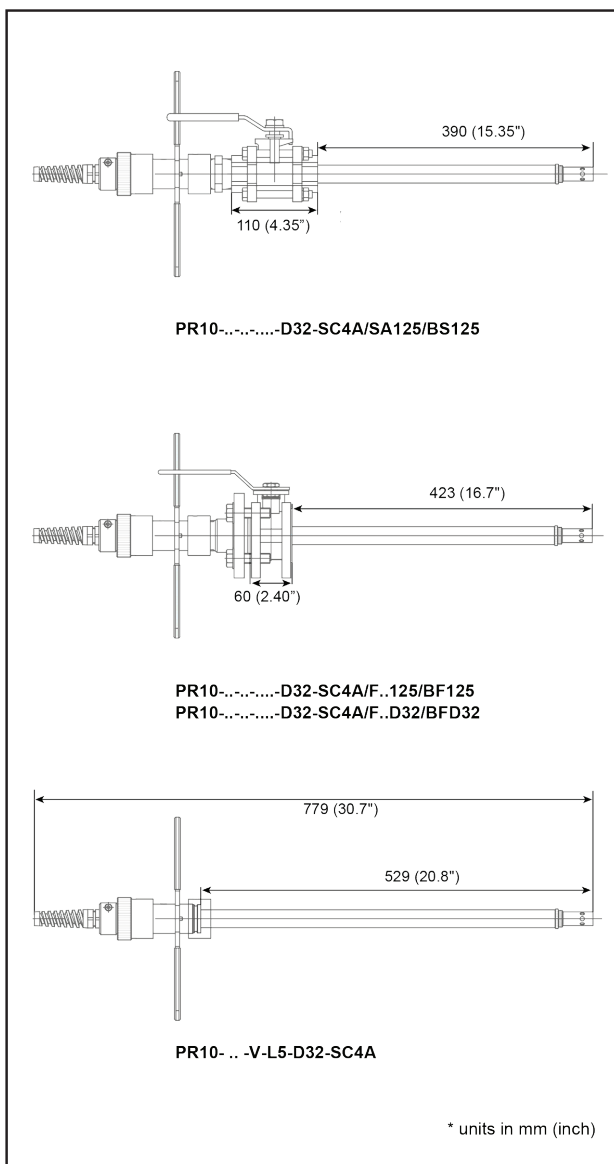


Figure 16. Dimensional drawing PR10...-D32 with mounted SC4A sensor

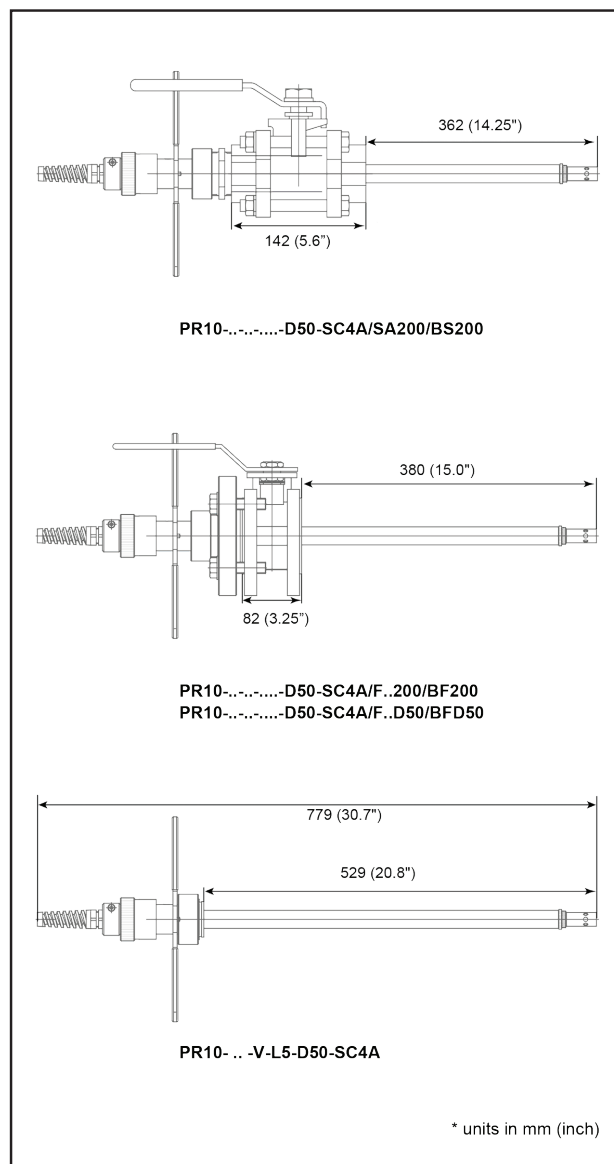


Figure 17. Dimensional drawing PR10...-D50 with mounted SC4A sensor

■ 6. ADDENDUM 2: Available model codes

SC4A-S-AD-09-002-03-T1	SC4A-T-AD-09-002-03-T1	SC4A-E-SB-NN-002-03-T1	SC4A-T-AD-15-002-VS-T1
SC4A-S-AD-09-002-05-T1	SC4A-T-AD-09-002-05-T1	SC4A-E-SB-NN-002-05-T1	SC4A-T-AD-15-010-VS-T1
SC4A-S-AD-09-002-10-T1	SC4A-T-AD-09-002-10-T1	SC4A-E-SB-NN-002-10-T1	
SC4A-S-AD-09-002-15-T1	SC4A-T-AD-09-002-15-T1	SC4A-E-SB-NN-002-15-T1	SC4A-S-AD-15-002-VS-T1
SC4A-S-AD-09-002-20-T1	SC4A-T-AD-09-002-20-T1	SC4A-E-SB-NN-002-20-T1	SC4A-S-AD-15-010-VS-T1
SC4A-S-AD-09-010-03-T1	SC4A-T-AD-09-010-03-T1	SC4A-E-SB-NN-010-03-T1	
SC4A-S-AD-09-010-05-T1	SC4A-T-AD-09-010-05-T1	SC4A-E-SB-NN-010-05-T1	SC4A-E-SC-NN-002-VS-T1
SC4A-S-AD-09-010-10-T1	SC4A-T-AD-09-010-10-T1	SC4A-E-SB-NN-010-10-T1	SC4A-E-SC-NN-010-VS-T1
SC4A-S-AD-09-010-15-T1	SC4A-T-AD-09-010-15-T1	SC4A-E-SB-NN-010-15-T1	
SC4A-S-AD-09-010-20-T1	SC4A-T-AD-09-010-20-T1	SC4A-E-SB-NN-010-20-T1	SC4A-E-SB-NN-002-VS-T1
			SC4A-E-SB-NN-010-VS-T1
SC4A-S-AD-15-002-03-T1	SC4A-S-PR-NN-002-03-T1	SC4A-E-SC-NN-002-03-T1	
SC4A-S-AD-15-002-05-T1	SC4A-S-PR-NN-002-05-T1	SC4A-E-SC-NN-002-05-T1	SC4A-E-SA-NN-002-VS-T1
SC4A-S-AD-15-002-10-T1	SC4A-S-PR-NN-002-10-T1	SC4A-E-SC-NN-002-10-T1	SC4A-E-SA-NN-010-VS-T1
SC4A-S-AD-15-002-15-T1	SC4A-S-PR-NN-002-15-T1	SC4A-E-SC-NN-002-15-T1	
SC4A-S-AD-15-002-20-T1	SC4A-S-PR-NN-002-20-T1	SC4A-E-SC-NN-002-20-T1	SC4A-T-PR-NN-002-VS-T1
SC4A-S-AD-15-010-03-T1	SC4A-S-PR-NN-010-03-T1	SC4A-E-SC-NN-010-03-T1	SC4A-T-PR-NN-010-VS-T1
SC4A-S-AD-15-010-05-T1	SC4A-S-PR-NN-010-05-T1	SC4A-E-SC-NN-010-05-T1	
SC4A-S-AD-15-010-10-T1	SC4A-S-PR-NN-010-10-T1	SC4A-E-SC-NN-010-10-T1	SC4A-S-PR-NN-002-VS-T1
SC4A-S-AD-15-010-15-T1	SC4A-S-PR-NN-010-15-T1	SC4A-E-SC-NN-010-15-T1	SC4A-S-PR-NN-010-VS-T1
SC4A-S-AD-15-010-20-T1	SC4A-S-PR-NN-010-20-T1	SC4A-E-SC-NN-010-20-T1	
SC4A-T-AD-15-002-03-T1	SC4A-E-SA-NN-002-03-T1	SC4A-T-PR-NN-002-03-T1	
SC4A-T-AD-15-002-05-T1	SC4A-E-SA-NN-002-05-T1	SC4A-T-PR-NN-002-05-T1	
SC4A-T-AD-15-002-10-T1	SC4A-E-SA-NN-002-10-T1	SC4A-T-PR-NN-002-10-T1	
SC4A-T-AD-15-002-15-T1	SC4A-E-SA-NN-002-15-T1	SC4A-T-PR-NN-002-15-T1	
SC4A-T-AD-15-002-20-T1	SC4A-E-SA-NN-002-20-T1	SC4A-T-PR-NN-002-20-T1	
SC4A-T-AD-15-010-03-T1	SC4A-E-SA-NN-010-03-T1	SC4A-T-PR-NN-010-03-T1	
SC4A-T-AD-15-010-05-T1	SC4A-E-SA-NN-010-05-T1	SC4A-T-PR-NN-010-05-T1	
SC4A-T-AD-15-010-10-T1	SC4A-E-SA-NN-010-10-T1	SC4A-T-PR-NN-010-10-T1	
SC4A-T-AD-15-010-15-T1	SC4A-E-SA-NN-010-15-T1	SC4A-T-PR-NN-010-15-T1	
SC4A-T-AD-15-010-20-T1	SC4A-E-SA-NN-010-20-T1	SC4A-T-PR-NN-010-20-T1	

■ 7. ADDENDUM 3: Control drawings

● 7.10 FM-United States

Applying standards	: FM Class 3600 FM Class 3610 FM Class 3810 ANSI/ISA 60079-0 ANSI/ISA 60079-11
Certificate no.*	: FM20US0123X IS CL I, DIV 1, GP ABCD, T4...T6 CL I, ZN 0, AEx ia IIC, T4...T6 Ga Control Drawing: D&E 2020-024-A50
Electrical data	: (See Note)
Specific conditions of use	: See Control Drawing D&E 2020-024-A50. Temperature classes for SC4A models are defined T4...T6 (See Note) .

Note: Intrinsically safe, entity, for Class I, Division 1, Groups A, B, C and D; Class I, Zone 0, AEx ia IIC, Ga (entity) for hazardous (classified) locations when installed per control drawing D&E 2020-024-A50.

Maximum sensor input parameters:

Ui= 14.4 V; li= 116.5 mA; Pi= 0.3424 W
Li= 0.1 mH (models with fixed cable) or Li= 0 mH (VS type)
Ci= 150 nF (models with fixed cable) or Ci= 0.4 nF (VS type)

Ambient temperature:

-30°C to +40°C for temperature class T6,
-30°C to +95°C for temperature class T5,
-30°C to +125°C for temperature class T4 (VS type),
-30°C to +130°C for temperature class T4 (models with fixed cable).



When the sensor has been connected to non intrinsically safe equipment which exceeds the restrictions regarding the sensor input circuits, the sensor is not suitable anymore for intrinsically safe use.

* Certification is subject to change, due to new regulations or changes in the product itself. When a certificate is updated the certificate is released under the same number with a new date. (FM-United States: FM20US0123X, effective from 03-2021)

● 7.2 Control drawing: D&E 2020-024-A50 (part 1)

Non-hazardous Location

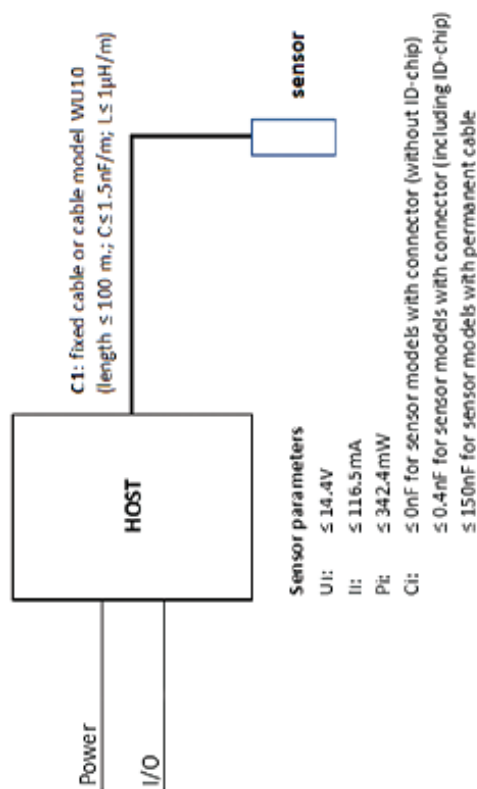
Hazardous Location

IS CL I, DIV 1, GP ABCD T2 / T3 / T4 / T5 / T6

CL I, ZN 0, AEx ia IIC, T2... T6 Ga

Ta 275°C / 165°C / 130°C / 95°C / 40°C

Remark: For sensors with connector (including ID-chip) Ta is limited to 125°C for T2, T3 and T4



Sensor parameters

U_I: ≤ 14.4 V

I_I: ≤ 116.5 mA

P_I: ≤ 342.4 mW

C_I: ≤ 0 nF for sensor models with connector (without ID-chip)
 ≤ 0.4 nF for sensor models with connector (including ID-chip)
 ≤ 150 nF for sensor models with permanent cable

Remark:

Sensor C_I (in case of an integral cable the C_I includes the capacitance of the cable) shall not exceed the C_o of the HOST.

L_I: ≤ 0 mH for sensor models with connector (without ID-chip)
 ≤ 0 mH for sensor models with connector (including ID-chip)
 ≤ 0.1 mH for sensor models with permanent cable

Remark:

Sensor L_I (in case of an integral cable the L_I includes the inductance of the cable) shall not exceed the L_o of the HOST.

● **7.3 Remarks:**

1. No revision to this drawing without prior approval of FM.
2. Installation must be in accordance with the National Electrical Code (ANSI/NFPA 70), ANSI/ISA-RP12.06.01, and relevant local codes.
3. The sensor shall be installed to a certified intrinsically safe HOST with the following maximum values: $U_o = 14.4$ V, $I_o = 116.5$ mA, $P_o = 342.4$ mW.
4. The sensor does not provide isolation from earth. Installers shall take necessary measures to prevent the possibility of sparking resulting from differing earth potentials between the sensors and interconnecting equipment. This can be realized for example by selecting interconnecting equipment which provides input-to-output and input-to-earth isolation up to 500 V rms.
5. Sensor Model code:

● **7.4 Model and Suffix codes**

Model	Suffix Code	Option Code
SC4A	-a-bc-de-fgh-ij-kl	/m
a	Material	T - Titanium
		S - Stainless Steel, Viton sealing
		E - Stainless Steel, EPDM sealing
bc	Fitting type	Two alphanumeric characters (A to Z, 0 to 9 or a hyphen)
de	Sensor length	Two alphanumeric characters (A to Z, 0 to 9 or a hyphen)
efg	Cell Constant	Three alphanumeric characters (A to Z, 0 to 9 or a hyphen)
ij	Connection type	VS - Connector with ID-chip. Two alphanumeric characters identifying the length of the permanent cable, each character from 0 to 9
kl	Temp. sensor + Region	T1 Pt1000, IS for ATEX/IECEX, FM-US, FM-CAN
m	Option code	Up to ten alphanumeric characters (A to Z, 0 to 9 or hyphen)

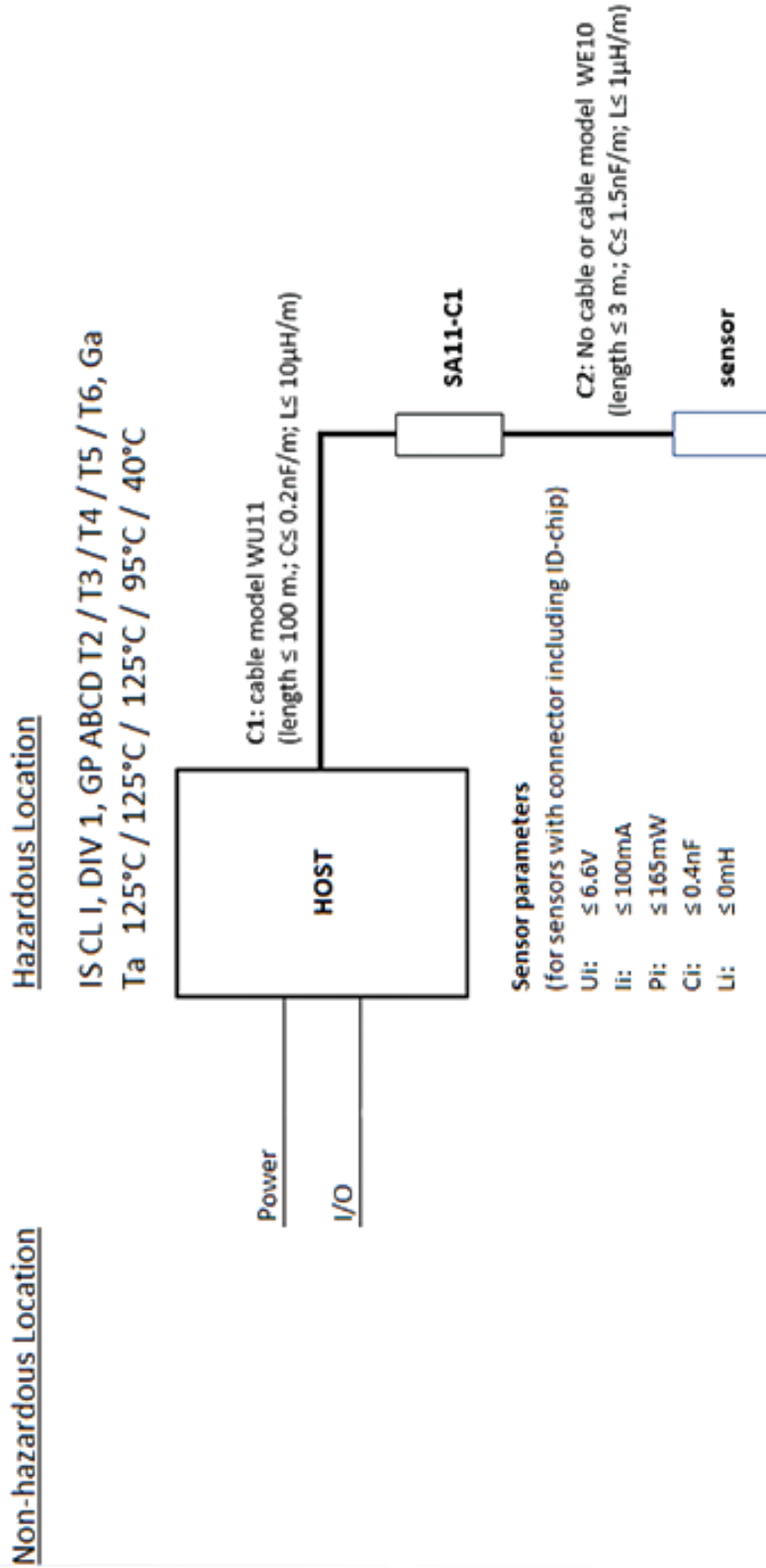
● **7.5 WARNING - POTENTIAL ELECTROSTATIC CHARGING HAZARD (see instructions)**

pH sensors containing accessible plastic parts and/or external conductive parts, must be installed and used in such a way, that dangers of ignition due to hazardous electrostatic charges cannot occur, especially in the case that the process medium is non-conductive.

WARNING - POTENTIAL IGNITION HAZARD (see instructions)

Contact Conductivity sensors containing light metals, must be installed, and used in such a way that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.

● 7.6 Control drawing: D&E 2020-024-A50 (part 2)



● **7.7 Remarks:**

1. No revision to this drawing without prior approval of FM.
2. Installation must be in accordance with the National Electrical Code (ANSI/NFPA 70), ANSI/ISA-RP12.06.01, and relevant local codes.
3. The sensor shall be installed to a certified intrinsically safe Smart Adapter, model SA11-C1, with the following maximum values: $U_o = 6.6 \text{ V}$, $I_o = 100 \text{ mA}$, $P_o = 165 \text{ mW}$.
4. The Installers shall take necessary measures to prevent the possibility of sparking resulting from differing earth potentials between the sensors and interconnecting equipment. The sensor itself does not provide 500 V rms isolation from earth, the interconnecting equipment Model SA11-C1 Smart Adapter however provides this required isolation.
5. Sensor Model code:

● **7.8 Model and Suffix codes**

Model	Suffix Code	Option Code
SC4A	-a-bc-de-fgh-ij-kl	/m
a	Material	T - Titanium
		S - Stainless Steel, Viton sealing
		E - Stainless Steel, EPDM sealing
bc	Fitting type	Two alphanumeric characters (A to Z, 0 to 9 or a hyphen)
de	Sensor length	Two alphanumeric characters (A to Z, 0 to 9 or a hyphen)
egh	Cell Constant	Three alphanumeric characters (A to Z, 0 to 9 or a hyphen)
ij	Connection type	VS - Connector with ID-chip.
kl	Temp. sensor + Region	T1 Pt1000, IS for ATEX/IECEX, FM-US, FM-CAN
m	Option code	Up to ten alphanumeric characters (A to Z, 0 to 9 or hyphen)

● **7.9 WARNING - POTENTIAL ELECTROSTATIC CHARGING HAZARD (see instructions)**

pH sensors containing accessible plastic parts and/or external conductive parts, must be installed and used in such a way, that dangers of ignition due to hazardous electrostatic charges cannot occur, especially in the case that the process medium is non-conductive.

WARNING - POTENTIAL IGNITION HAZARD (see instructions)

Contact Conductivity sensors containing light metals, must be installed, and used in such a way that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.

● 7.10 FM-Canada

Applying standards	: CAN/CSA-C22.2 No. 60079-0 CAN/CSA-C22.2 No. 60079-11
Certificate no.*	: FM20CA0062X S CL I, DIV 1, GP ABCD, T4...T6 CL I, ZN 0, Ex ia IIC, T4...T6 Ga Control Drawing: D&E 2020-024-A51
Electrical data	: (See Note 1)
Specific conditions of use	: See Control Drawing D&E 2020-024-A51. Temperature classes for SC4A models are defined T4...T6 (See Note 1) .

Note 1 : Intrinsically safe, entity, for Class I, Division 1, Groups A, B, C and D; Class I, Zone 0, Ex ia IIC, Ga (entity) for hazardous (classified) locations When installed per control drawing D&E 2020-024-A51.

Maximum sensor input parameters:

Ui= 14.4 V; Ii= 116.5 mA; Pi= 0.3424 W;

Li= 0.1 mH (models with fixed cable) or Li= 0 mH (VS type);

Ci= 150 nF (models with fixed cable) or Ci= 0.4 nF (VS type)

Ambient temperature:

- 30°C to +40°C for temperature class T6,

- 30°C to +95°C for temperature class T5,

- 30°C to +125°C for temperature class T4 (VS type),

- 30°C to +130°C for temperature class T4 (models with fixed cable).



WARNING

When the sensor has been connected to non intrinsically safe equipment which exceeds the restrictions regarding the sensor input circuits, the sensor is not suitable anymore for intrinsically safe use.

* Certification is subject to change, due to new regulations or changes in the product itself. When a certificate is updated the certificate is released under the same number with a new date. - FM-Canada: FM20CA0062X (effective from 03-2021)

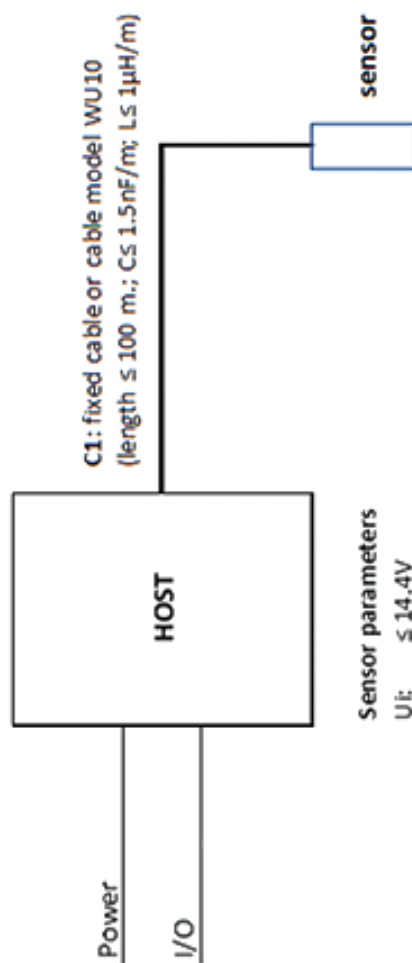
● 7.11 Control drawing: D&E 2020-024-A51 (part 1)

Hazardous Location

Hazardous Location

IS, SI, CL I, DIV 1, GP ABCD T2 / T3 / T4 / T5 / T6
 CL I, ZN 0, Ex ia IIC, T2...T6 Ga
 Ta 275°C / 165°C / 130°C / 95°C / 40°C

Remark: For sensors with connector (including ID-chip) Ta is limited to 125°C for T2, T3 a



Sensor parameters

Ui: ≤ 14.4V
 Ii: ≤ 116.5mA
 Pi: ≤ 342.4mW
 Ci: ≤ 0nF for sensor models with connector (without ID-chip)
 ≤ 0.4nF for sensor models with connector (including ID-chip)
 ≤ 150nF for sensor models with permanent cable

Remark:

Sensor Ci (in case of an integral cable the Ci includes the capacitance of the cable) shall not exceed the Co of the HOST.

Li: ≤ 0mH for sensor models with connector (without ID-chip)
 ≤ 0mH for sensor models with connector (including ID-chip)
 ≤ 0.1mH for sensor models with permanent cable

Remark:

Sensor Li (in case of an integral cable the Li includes the inductance of the cable) shall not exceed the Lo of the HOST.

● **7.12 Remarks:**

1. No revision to this drawing without prior approval of FM.
2. Installation must be in accordance with the National Electrical Code (CEC) CSA22.1 and relevant local codes.
3. The sensor shall be installed to a certified intrinsically safe HOST with the following maximum values: $U_o = 14.4$ V, $I_o = 116.5$ mA, $P_o = 342.4$ mW.
4. The sensor does not provide isolation from earth. Installers shall take necessary measures to prevent the possibility of sparking resulting from differing earth potentials between the sensors and interconnecting equipment. This can be realized for example by selecting interconnecting equipment which provides input-to-output and input-to-earth isolation up to 500 V rms.
5. Sensor Model code:

● **7.13 Model and Suffix codes**

Model	Suffix Code	Option Code
SC4A	-a-bc-de-fgh-ij-kl	/m
a	Material	T - Titanium
		S - Stainless Steel, Viton sealing
		E - Stainless Steel, EPDM sealing
bc	Fitting type	Two alphanumeric characters (A to Z, 0 to 9 or a hyphen)
de	Sensor length	Two alphanumeric characters (A to Z, 0 to 9 or a hyphen)
egh	Cell Constant	Three alphanumeric characters (A to Z, 0 to 9 or a hyphen)
ij	Connection type	VS - Connector with ID-chip Two alphanumeric characters identifying the length of the permanent cable, each character from 0 to 9.
kl	Temp. sensor + Region	T1 Pt1000, IS for ATEX/IECEx, FM-US, FM-CAN
m	Option code	Up to ten alphanumeric characters (A to Z, 0 to 9 or hyphen)

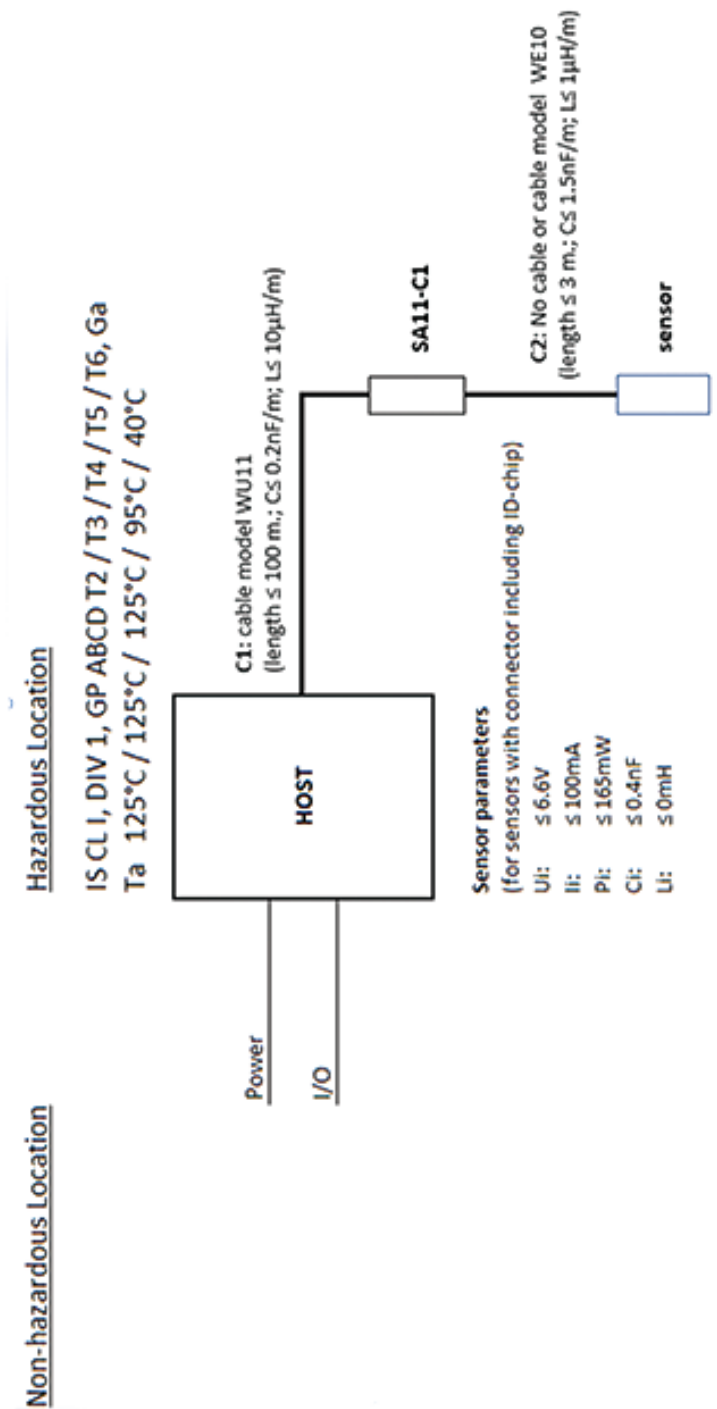
● **7.14 WARNING - POTENTIAL ELECTROSTATIC CHARGING HAZARD (see instructions)**

pH sensors containing accessible plastic parts and/or external conductive parts, must be installed and used in such a way, that dangers of ignition due to hazardous electrostatic charges cannot occur, especially in the case that the process medium is non-conductive.

WARNING - POTENTIAL IGNITION HAZARD (see instructions)

Contact Conductivity sensors containing light metals, must be installed, and used in such a way that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.

● 7.15 Control drawing: D&E 2020-024-A51 (part 2)



● **7.16 Remarks:**

1. No revision to this drawing without prior approval of FM.
2. Installation must be in accordance with the National Electrical Code (CEC) CSA22.1 and relevant local codes.
3. The sensor shall be installed to a certified intrinsically safe Smart Adapter, model SA11-C1, with the following maximum values: $U_o = 6.6 \text{ V}$, $I_o = 100 \text{ mA}$, $P_o = 165 \text{ mW}$.
4. The Installers shall take necessary measures to prevent the possibility of sparking resulting from differing earth potentials between the sensors and interconnecting equipment. The sensor itself does not provide 500 V rms isolation from earth, the interconnecting equipment Model SA11-C1 Smart Adapter however provides this required isolation.
5. Sensor Model code:

● **7.17 Model and Suffix codes**

Model	Suffix Code	Option Code
SC4A	-a-bc-de-fgh-ij-kl	/m
a	Material	T - Titanium
		S - Stainless Steel, Viton sealing
		E - Stainless Steel, EPDM sealing
bc	Fitting type	Two alphanumeric characters (A to Z, 0 to 9 or a hyphen)
de	Sensor length	Two alphanumeric characters (A to Z, 0 to 9 or a hyphen)
egh	Cell Constant	Three alphanumeric characters (A to Z, 0 to 9 or a hyphen)
ij	Connection type	VS - Connector with ID-chip
kl	Temp. sensor + Region	T1 Pt1000, IS for ATEX/IECEX, FM-US, FM-CAN
m	Option code	Up to ten alphanumeric characters (A to Z, 0 to 9 or hyphen)

● **7.18 WARNING - POTENTIAL ELECTROSTATIC CHARGING HAZARD (see instructions)**

pH sensors containing accessible plastic parts and/or external conductive parts, must be installed and used in such a way, that dangers of ignition due to hazardous electrostatic charges cannot occur, especially in the case that the process medium is non-conductive.

WARNING - POTENTIAL IGNITION HAZARD (see instructions)

Contact Conductivity sensors containing light metals, must be installed, and used in such a way that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.

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