General Specifications

GS 12D07J02-01EN-P

Sensors for Inductive Conductivity Measurement

Model ISC40G(S)

General

With Inductive Conductivity (also called Toroidal), the sensing elements (electrode coils) of an inductive sensor do not come in direct contact with the process. These two matched (identical) coils are encapsulated in PEEK (or Teflon) protecting them from the adverse effects of the process.

The accuracy is 0.5% of reading plus 0.5 microS/cm for any conductivity value, whether measured in rinse water or in concentrated acids. The materials of construction ensure a long life under harsh industrial conditions.

The sensor types ISC40G(S) -GG, -GR and -GS are made from erosion/abrasion resistant PEEK (Poly Ether Ether Ketone), which also features excellent chemical resistance in all solutions except fluoric acid or oxidizing concentrated acids. The sensor type ISC40G(S) -TG is made of the ultimate material in terms of chemical resistance, which is PFA (Teflon) for applications in hydrofluoric acid and oxidizing concentrated acids (nitric-, sulfuric-, hydrochloric acid and even Oleum).

The ISC40 sensor is provided with a rugged Stainless Steel mounting thread, nut and gasket combination for ultimate flexibility in installation using bulkhead installation technique. There is also a wide range of holders and options available for reliable in-line or off-line installation with double O-ring seals for long service life of the sensor. Additional models are available for use in Ball-Valve Insertion applications and in Sanitary Flange installations.

The sensors have a large bore for optimal resistance to fouling processes and when properly installed, the flow will keep the sensor clean preventing measuring errors.

FEATURES

- Wide range of electrodes to suit all process conditions.
- Colored/ numbered coded wires for easy identification of electrodes
- High degree of standardization for mounting in flow- and immersion fittings

1. General Specifications

1.1 Measuring elements

: Toroïds with high permeability magnetic material
Pt1000 temperature element

1.2 Materials

Wetted parts sensor

Body ISC40*-G* : 30% glass filled PEEK, FDA approved

Body ISC40*-T* : PFA
FDA, PIM regulation 10/2011 approved

Non-wetted parts sensor

Sealing gasket : Viton

Thread part : AISI 316 SS

Options for sensor

All options except /TFD : AISI 316 SS and O-ring material as wetted part

/TFD : AISI 316 SS as non-wetted part,
TFM and Kalrez as wetted part

1.3 Functional specifications (at 25 °C)

Temperature element : Pt1000 to IEC 751

Installation factor : 1.88 cm^{-1} nominal for PEEK sensor
3.00 cm^{-1} nominal for PFA sensor

Note: Actual installation can change this factor. If there is less than 25mm spacing between sensor and holder, in-situ calibration is necessary to meet the specified accuracies (see fig. 1).
Note: The ISC40 temperature sensor is designed for cell compensation and for indication.
It is **NOT** designed for process temperature control.

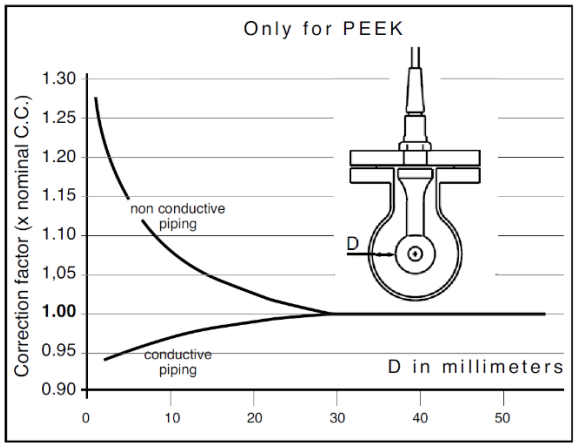


Fig 1: Actual installation factor as a function of spacing around the sensor

1.4 Dynamic specifications

Response time : t_{90} < 10 min. for PEEK sensor
t_{90} < 15 min. for PFA sensor

1.5 Operating range

Conductivity : 0 – 2000 mS/cm at actual process temp.

Note: The sensor has an accuracy of 0.5% ± 0.5 µS/cm for the PEEK model and 0.5% ± 1.0 µS/cm for the PFA model. Please consider during sensor selection.

Temperature : -20°C to 130°C
-4°F to 266°F

Pressure*

Over pressure : 0 to 20 barg (PEEK)
0 to 290 PSIG (PEEK)
0 to 15 barg (PFA)
0 to 217 PSIG (PFA)

Under pressure for suffix -GG, -GR, -TG
: 0 to 0.9 barng
0 to 13.1 PSIG
for suffix -GR
0 to 0.5 barng
0 to 7.3 PSIG

*unit definition
barg = bar gauge, over pressure against atm.
barng = under pressure against atm.

Cable length : max. 50 meter (164 feet), in Combination with WF10 extension cable and BA10 junction box

1.6 Shipping details

	Package size (LxWxH)
ISC40*-**-*-03 (05)	: 350 x 270 x 50 mm 13.8 x10.6 x 2.0 inch
ISC40*-**-*-10 (15, 20)	: 320 x 240 x110 mm 12.6 x 9.5 x 4.3 inch

Package weight (app.)

ISC40*-**-*-03	: 1.0 kg / 2.2 lbs
ISC40*-**-*-05	: 1.3 kg / 2.9 lbs
ISC40*-**-*-10	: 1.6 kg / 3.5 lbs
ISC40*-**-*-15	: 2.1 kg / 4.6 lbs
ISC40*-**-*-20	: 2.5 kg / 5.5 lbs

1.7 Environmental conditions

Storage temperature : -30°C to 50°C
-22°F to 122°F

Water proof : IP67 (conform IEC 60529), also in combination with the preferred Yokogawa process connections

1.8 Process connections

Process connections are made in combination with a variety of adapters and fittings, which are available in AISI 316 SS, PVC, or PVDF (see examples in addendum 1)

1.9 Cable properties

The cable used in our ISC40 sensors is a Multicore shielded cable with two low noise coaxes and four insulated wires. This cable is identical to the WU10-V-D. For detailed cable specifications see IM 12B06W02-02EN-P (IM WU10, WF10, WE10).

1.10 Regulatory compliance

Equipment and systems covered by the intrinsic safety certificates are as follows: Inductive Conductivity Sensors Model ISC40S-..-..-.. for connection to the certified intrinsically safe Yokogawa Inductive Conductivity Transmitter Model FLXA21 series, Model FLXA202 series, or Model ISC202S series.

Item	Description	Values
Electrical parameters [4)]	Max. input voltage Max. input current Max. input power Max. internal capacitance Max. internal inductance	Ui = 14.4 VDC Ii = 88 mA Pi = 320 mW Ci = 150 nF Li = 0.1 mH **Note:** For EACEx other electrical parameters apply, see details specific certificate
Temperature class	T6 T5 T4	-30°C ≤ Ta ≤ +40°C -30°C ≤ Ta ≤ +95°C -30°C ≤ Ta ≤ +130°C **Note:** For FM-US and FM-CAN lower Ta values apply, see regulatory compliance.
Specific conditions of use	Potentional electrostatic charging hazard: Inductive Conductivity 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. Use a damp cloth for cleaning the equipment.	
⚠ WARNING	Electrostatic charges of the sensor enclosure part, and label shall be avoided, especially in the case that the process medium is non-conductive. Use a damp cloth for cleaning the equipment. From the safety point of view the circuits shall be assumed to be connected to the earth.	
⚠ 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	

Item	Description, Approval, Certification
CE	Decision 768/2008/EC, By applying: EN-ISO 9001
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 the equipment that is excluded from the WEEE directive, such as large-scale stationary industrial tools, a large-scale fixed installations,etc., and therefore it is in principle fully compliant with WEEE directive. The sensor should be disposed of in accordance with applicable national legislation/regulations, respectively.
ATEX	EU Directive 2014/34/EU

Note 1: Damaging the screw thread or process connection (e.g., flange) of the sensor might influence the maximum process pressure.

Certificates:

Item	Description, Approval, Certification
ATEX (EU)	ATEX approval: DEKRA 11ATEX0063X CE 0344 ISC40S: Ex II 1 G Ex ia IIC T4…T6 Ga Applied standards: • EN IEC 60079-0 • EN 60079-11 For specific conditions of use see certificate
IECEx	IECEx approval: IECEx DEK 11.0028X ISC40S: Ex ia IIC T4…T6 Ga Applied standards: • IEC 60079-0 • IEC 60079-11 For specific conditions of use see certificate
FM (Canada)	FM approval Canada: FM22CA0012X IS CL I, DIV1, GP ABCD, T4/T5/T6; CL I, ZN0, Ex ia IIC, T4/T5/T6 Ga Ta = -30 to 85°C/85°C/40°C Control Drawing: FF1-K1244QY Applied standards: • CAN/CSA-C22.2 No. 60079-0 • CAN/CSA-C22.2 No. 60079-11 • CAN/CSA-C22.2 No. 61010-1 For specific conditions of use see certificate Note: When T4 and Ta = 85°C, Process Temperature = 130°C maximum. When T5 and Ta = 85°C, Process Temperature = 95°C maximum.
FM (United States)	FM approval United States: FM21US0083X IS CL I, DIV1, GP ABCD, T4/T5/T6; CL I, ZN0, AEx ia IIC, T4/T5/T6 Ga Ta = -30 to 85°C/85°C/40°C Control Drawing: FF1-K1244QX Applied standards: • FM Class 3600 • FM Class 3610 • FM Class 3810 • ANSI/ISA 60079-0 • ANSI/ISA 60079-11 • ANSI/ISA 61010-1 For specific conditions of use see certificate Note: When T4 and Ta = 85°C, Process Temperature = 130°C maximum. When T5 and Ta = 85°C, Process Temperature = 95°C maximum.
- EACEx	RU C-JP.AA87.B.00229/19 0Ex ia IIC T6…T4 Ga X Applicable standards: • GOST 31610.0-2011 • GOST 31610.11-2011 For specific conditions of use see certificate Note: For electrical parameters see certificate for details

2. Model and Suffix code

Model	Suffix Code	Option code	Description	
ISC40G			General purpose inductive conductivity sensor	
ISC40S			Intrinsically safe inductive conductivity sensor	
Sensor type	-GG		Glass filled PEEK, general model	
	-GR		Glass filled PEEK, retractable model	
	-GS		Glass filled PEEK, shaft model	
	-TG		PFA, general model	
Temperature sensor	-T1		Pt1000	
Cable length	-03		03 meter	
	-05		05 meter	
	-10		10 meter	
	-15		15 meter	
	-20		20 meter	
Options for Sensor Flange adapters -GG, -TG			**Material**	**Process connection**
		/SFA	AISI 316 SS	2” ANSI 150 lbs
		/SFD	AISI 316 SS	DN50 PN40
		/STW	AISI 316 SS	3” tri-clamp
		/S2W	AISI 316 SS	2” tri-clamp
		/TFD	TFM, AISI 316 SS	DN65-PN10
		/TFN	TFM	For DN65-PN10
Flange adapters for -GS		/SFT	AISI 316 SS	Sanitary Tuchenhagen
		/STC1	AISI 316 SS	Sanitary 2” tri clamp
		/STC2	AISI 316 SS	Tri-clamp complete
Protection Hose for -TG or -GG		/PH□□	03m /05m /10m /15m /20m Same length as the cable	
Certificates		/M	Material certificate	Only for metal parts of flange adapters, except /TFD and /TFN

Note: A quality certificate (QIC) is standard included with the product

Note: All available models are mentioned in appendix 2

3. Spare parts

Part no.	Description	Quantity
K1542FE	2” tri-clover weld-in piece	1
K1542FH	3” tri-clover weld-in piece	1
K1500AW	Flexible conduit, 5 meters	1
K1500AX	Flexible conduit, 10 meters	1
K1500AY	Connection parts conduit	1
K1500CJ	Option /PH05 for immersion fitting	1
K1500DN	/PH03 cable protection ISC40-TG/GG	1
K1500DP	/PH05 cable protection ISC40-TG/GG	1
K1500DQ	/PH10 cable protection ISC40-TG/GG	1
K1500DR	/PH15 cable protection ISC40-TG/GG	1
K1500DS	/PH20 cable protection ISC40-TG/GG	1
K1500DT	O-ring set Viton ISC40 /PH..	5
K1500BP	Clamp seal ring 2” EPDM	1
K1500AM	Gasket Viton	5
K1500AL	Mounting nut AISI 316 SS	3

Options ISC40 sensor, Flange adapters				
Part no.	Description	Process connection	Material	O-ring(s)
K1541ZR	/SFA	2” ANSI 150 lbs	AISI 316 SS	Viton
K1541ZQ	/SFD	DN50	AISI 316 SS	Viton
K1541KB	/STW	3” ANSI tri-clamp	AISI 316 SS	EPDM
K1541KC	/S2W	2” ANSI tri-clamp	AISI 316 SS	EPDM
K1541XF	/TFD	DN65 PN10	AISI 316 SS, TFM	Kalrez
K1541XG	/TFN	used with DN65 PN10	TFM	Kalrez
K1541ZP	/SFT	Sanitary Tuchenhagen	AISI 316 SS	EPDM
K1541ZG	/STC1	Sanitary 2” tri-clamp	AISI 316 SS	EPDM
K1541ZF	/STC2	Tri-clamp complete	AISI 316 SS	EPDM
K1500HG		T-piece, DN80 flange	DN80 PN10	
K1500HF		T-piece, DN100 flange	DN100 PN10	

Note: Other O-ring materials are available as a spare part

O-rings ISC40 sensor, Flange adapters				
Part no.	Description	Dimensions	Material	Quantity
O-rings /SFA, /SFD				
K1500CA	O-ring set	40.64 x 5.33; 26.57 x 3.53	EPDM	5 sets
K1500CB	O-ring set	40.64 x 5.33; 26.57 x 3.53	Viton	5 sets
K1500CC	O-ring set	40.64 x 5.33; 26.57 x 3.53	Silicon	5 sets
K1500CD	O-ring	40.64 x 5.33	Kalrez	1
K1500CH	O-ring	26.57 x 3.53	Kalrez	1
O-rings /STW				
K1541ZK	O-ring set	40.87 x 3.53; 26.65 x 2.62; 3” seal-clamp	EPDM	2 sets
O-rings /S2W				
K1541ZH	O-ring set	40.87 x 3.53; 26.65 x 2.62; 2” seal-clamp	EPDM	2 sets
K1500DJ	O-ring set	40.87 x 3.53; 26.65 x 2.62; 2” seal-clamp	Viton	2 sets
K1500DK	O-ring set	40.87 x 3.53; 26.65 x 2.62; 2” seal-clamp	Silicon	2 sets
O-rings /TFD, /TFN				
K1500AH	O-ring	29.74 x 3.53	Kalrez	1
O-rings /SFT				
K1500CM	O-ring set	18.72 x 2.62; 60 x 3	EPDM	5 sets
O-rings /STC1				
K1500CQ	O-ring	18.72 x 2.62	EPDM	5
K1500CP	O-ring	18.72 x 2.62	Viton	5
K1500CR	O-ring	18.72 x 2.62	Silicon	5
O-rings /STC2				
K1500CT	O-ring set	18.72 x 2.72; 2” seal-clamp	EPDM	5 sets
K1500CS	O-ring set	18.72 x 2.72; 2” seal-clamp	Viton	5 sets
K1500CU	O-ring set	18.72 x 2.72; 2” seal-clamp	Silicon	5 sets

4. Dimensional drawings

Dimensions in mm [inches]

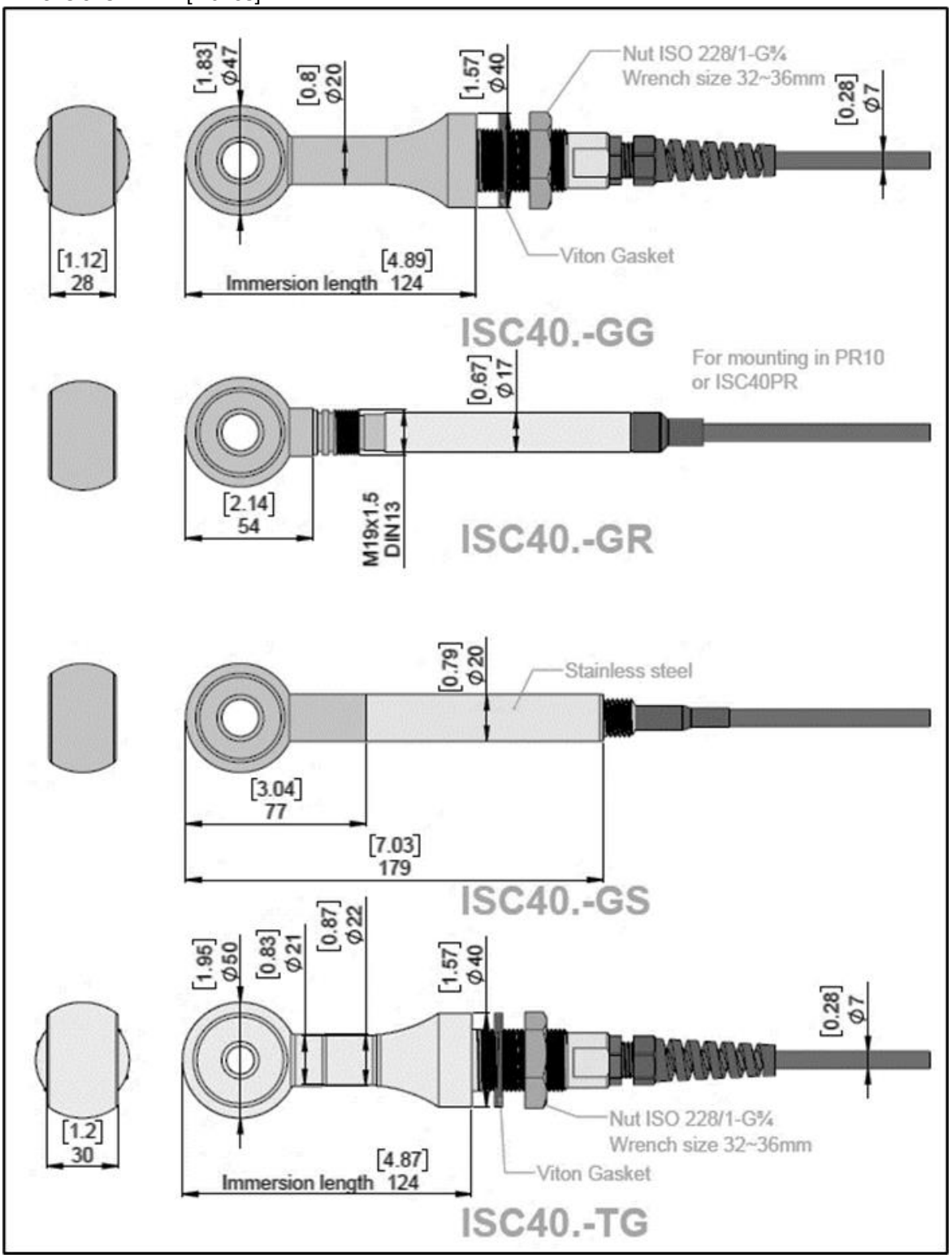


Figure 1: Dimensional drawing ISC40G(S)-GG -GR -GS -TG

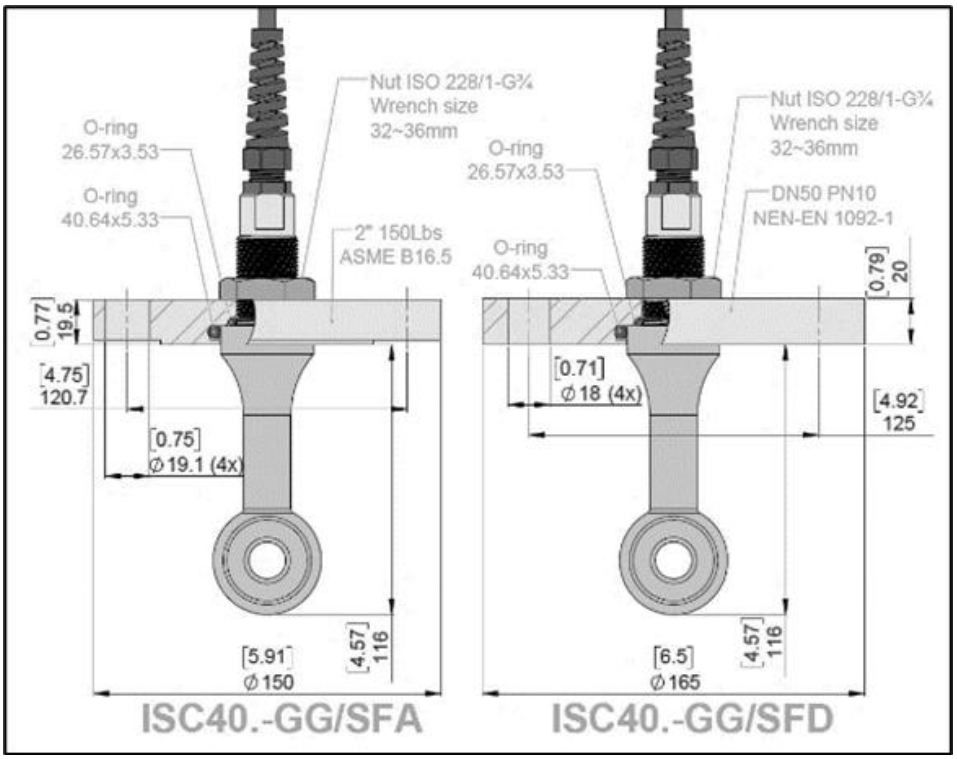


Figure 2: Option /SFA, /SFD, /STW, /S2W (in mm and [inches])

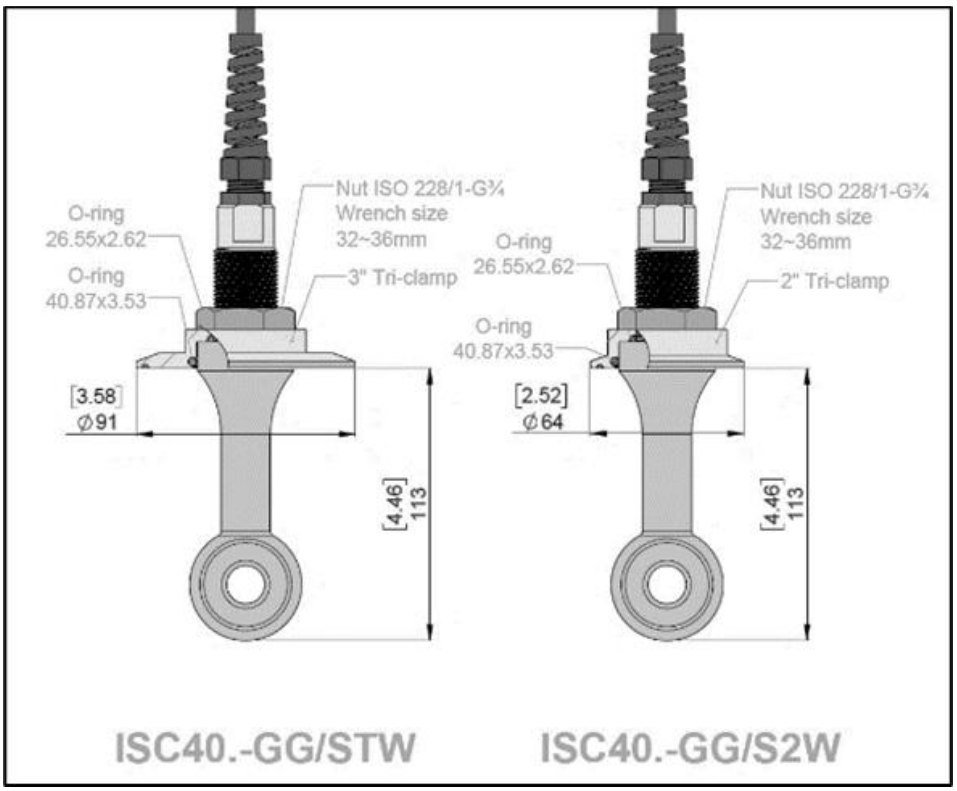


Figure 3: Option /STW, /S2W (in mm and [inches])

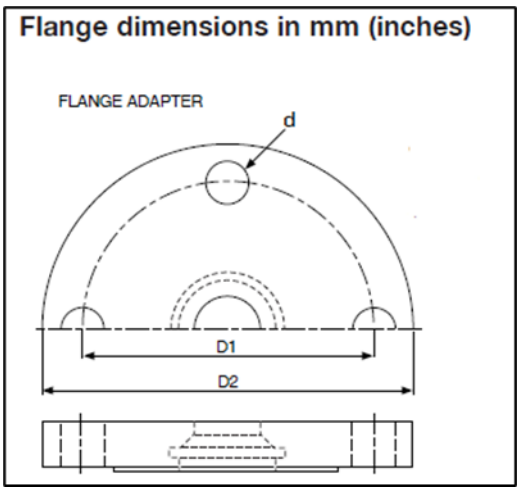


Figure 4: Flange dimensions options /SFA, /SFD

Table 1: Overview flange dimensions options /SFA, / SFD

Option	d	D1	D2
/SFA	Ø19 (0.75)	121 (4.76)	152 (6.0)
/SFD	Ø18 (0.71)	125 (4.92)	165 (6.5)
/TFD	Ø18 (0.71)	145 (5.71)	185 (7.3)

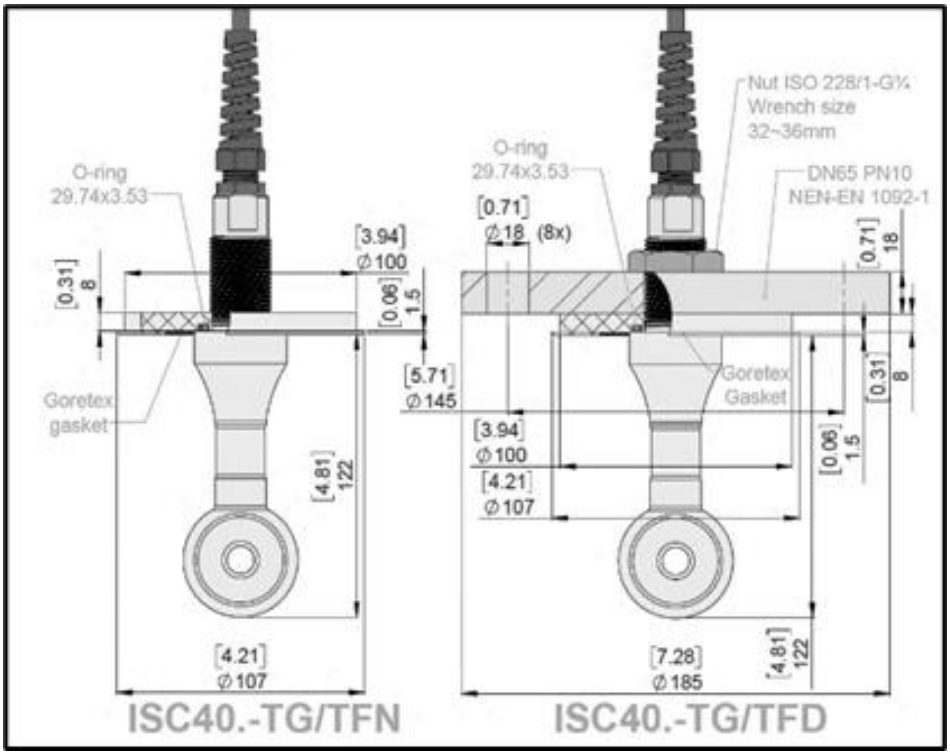


Figure 5: Flange adapters option /TFD, /TFN

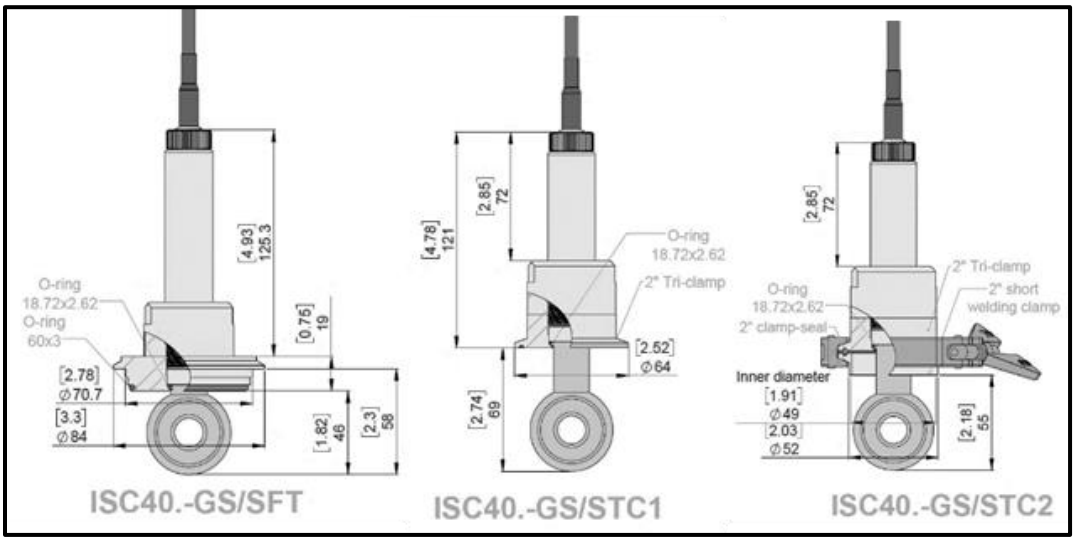


Figure 6:Option /SFT, /STC1, /STC2

Table 2: ISC40 T-piece part numbers

Part no.	Flanges	Description
K1500HG	DN80 PN10	T-piece, DN80 flange
K1500HF	DN100 PN10	T-piece, DN100 flange

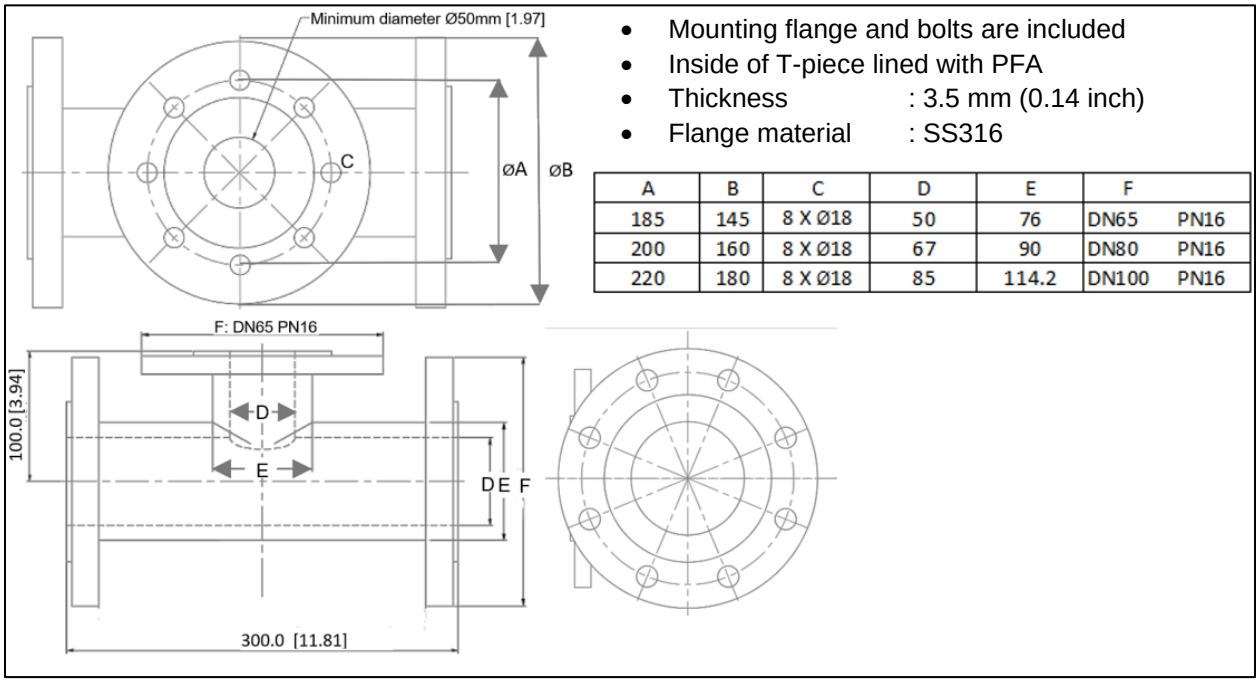


Figure 7: T-piece dimensions

Addendum 1: Installation examples

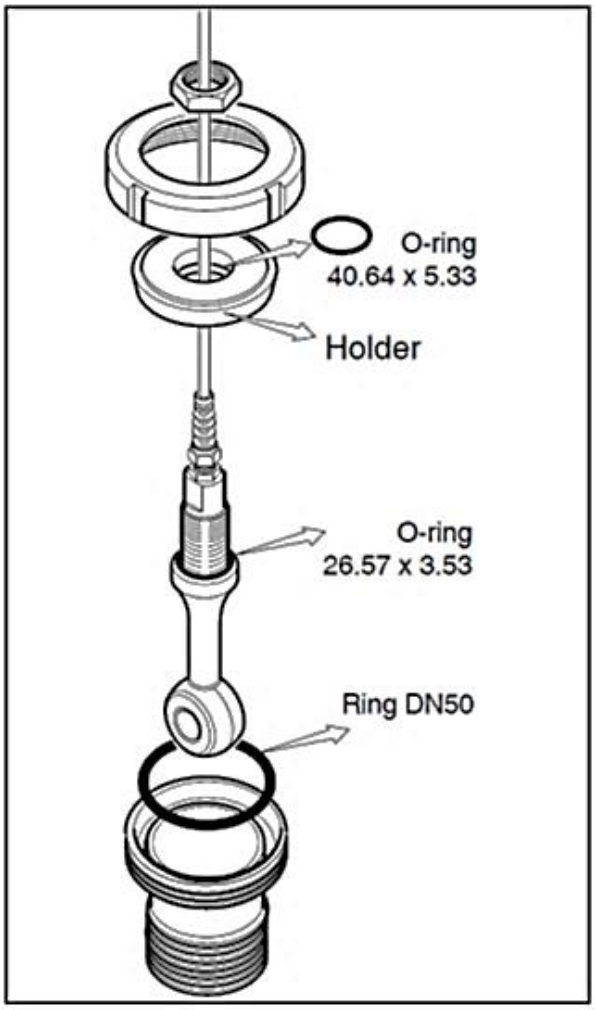


Figure 8: ISC40G(S) in screw-in subassembly ISC40FS-SCSA

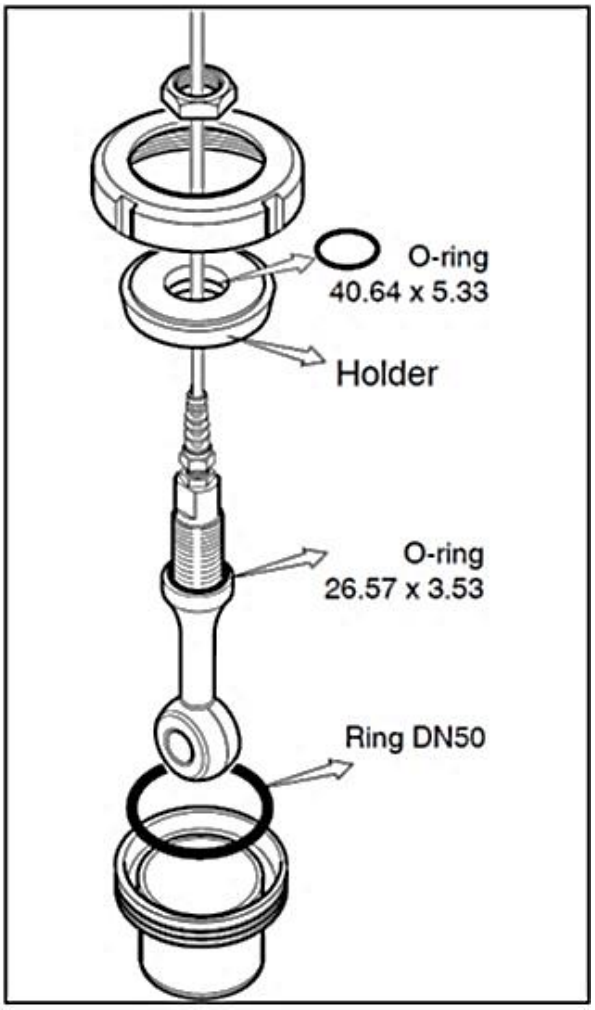


Figure 9: ISC40G(S) in weld-in subassembly ISC40FS-SCWN

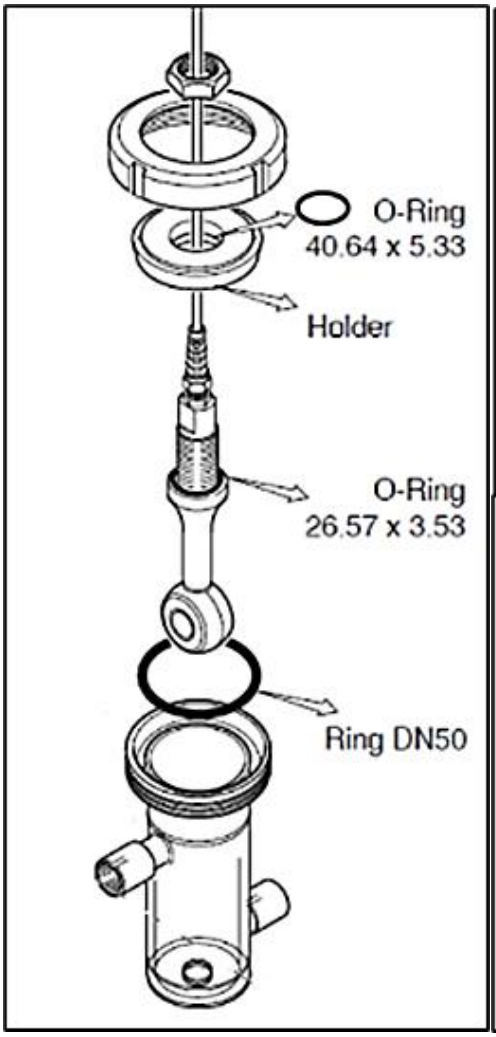


Figure 9: Installation ISC40 sensor in flow fitting

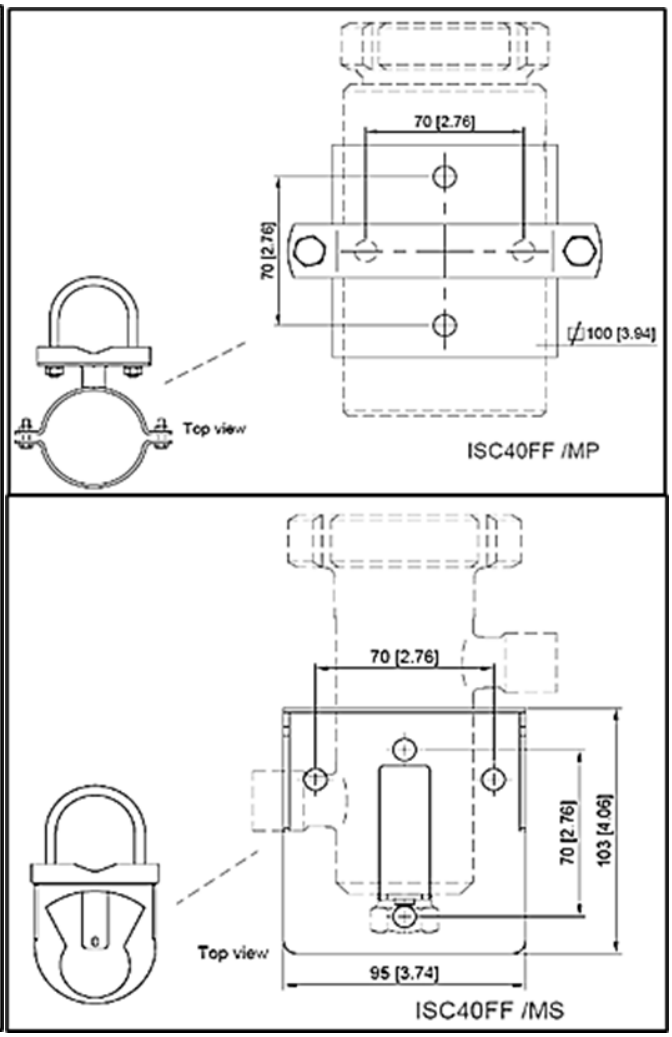


Figure 10: Pipe/wall mounting kit ISC40 /MS or /MP
See IM 12D07K04-01EN-P (ISC40FF) for details

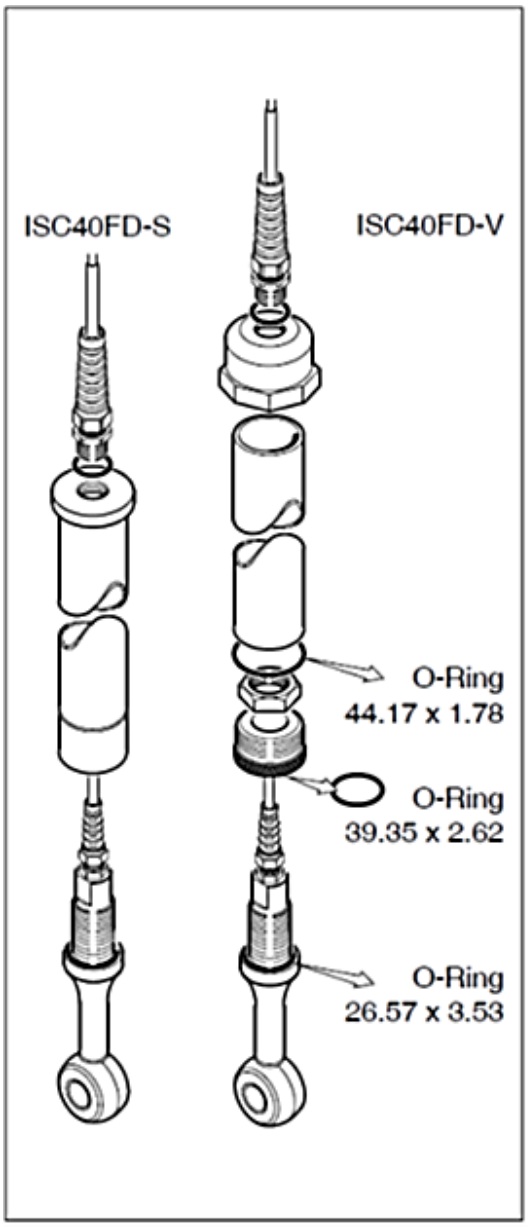


Figure 11: Installation ISC40 sensor in immersion fitting

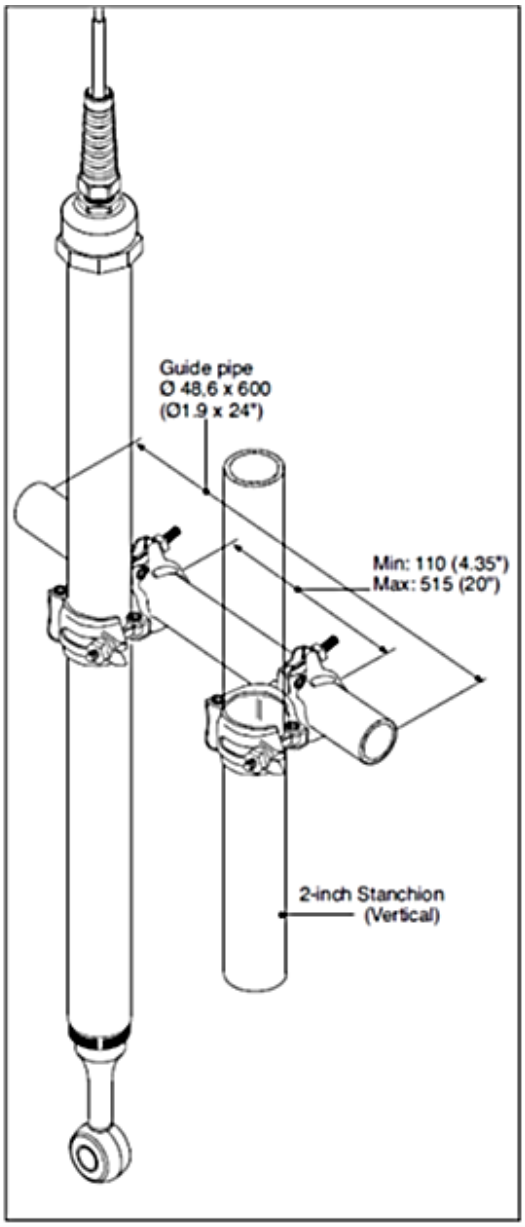


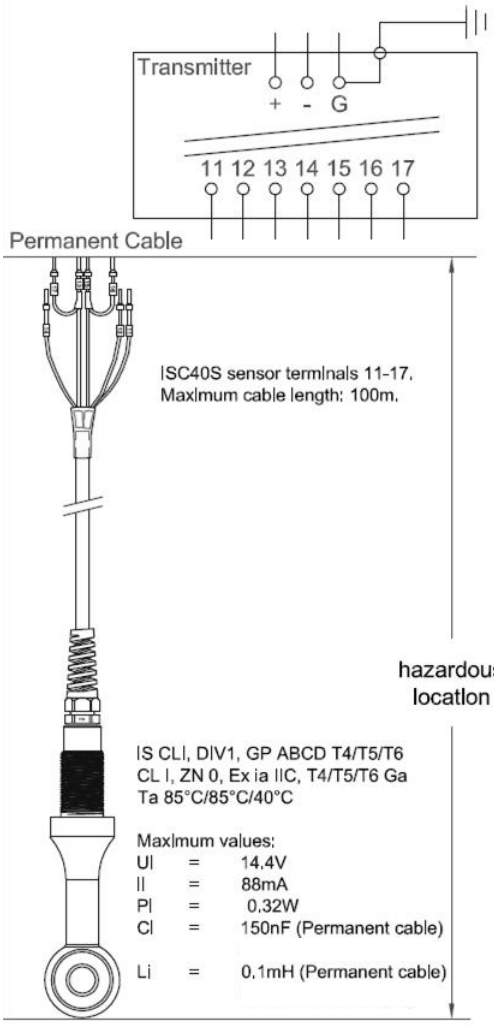
Figure 12: Installation on stanchion with /MS1

Addendum 2: Available models

MS-code -GG-	MS-code – GS -	MS-code – GR -	MS-code – TG-
ISC40G-GG-T3-03	ISC40G-GS-T3-03	ISC40G-GR-T3-03	ISC40G-TG-T3-03
ISC40G-GG-T3-05	ISC40G-GS-T3-05	ISC40G-GR-T3-05	ISC40G-TG-T3-05
ISC40G-GG-T3-10	ISC40G-GS-T3-10	ISC40G-GR-T3-10	ISC40G-TG-T3-10
ISC40G-GG-T3-15	ISC40G-GS-T3-15	ISC40G-GR-T3-15	ISC40G-TG-T3-15
ISC40G-GG-T3-20	ISC40G-GS-T3-20	ISC40G-GR-T3-20	ISC40G-TG-T3-20
ISC40G-GG-T1-03	ISC40G-GS-T1-03	ISC40G-GR-T1-03	ISC40G-TG-T1-03
ISC40G-GG-T1-05	ISC40G-GS-T1-05	ISC40G-GR-T1-05	ISC40G-TG-T1-05
ISC40G-GG-T1-10	ISC40G-GS-T1-10	ISC40G-GR-T1-10	ISC40G-TG-T1-10
ISC40G-GG-T1-15	ISC40G-GS-T1-15	ISC40G-GR-T1-15	ISC40G-TG-T1-15
ISC40G-GG-T1-20	ISC40G-GS-T1-20	ISC40G-GR-T1-20	ISC40G-TG-T1-20
ISC40S-GG-T1-03	ISC40S-GS-T1-03	ISC40S-GR-T1-03	ISC40S-TG-T1-03
ISC40S-GG-T1-05	ISC40S-GS-T1-05	ISC40S-GR-T1-05	ISC40S-TG-T1-05
ISC40S-GG-T1-10	ISC40S-GS-T1-10	ISC40S-GR-T1-10	ISC40S-TG-T1-10
ISC40S-GG-T1-15	ISC40S-GS-T1-15	ISC40S-GR-T1-15	ISC40S-TG-T1-15
ISC40S-GG-T1-20	ISC40S-GS-T1-20	ISC40S-GR-T1-20	ISC40S-TG-T1-20
/SFD	/STC1	/M	/SFD
/SFA	/STC2		/SFA
/STW	/SFT		/STW
/S2W			/S2W
/PH03			/TFD
/PH05			/TFN
/PH10			/PH03
/PH15			/PH05
/PH20			/PH10
			/PH15
			/PH20

Addendum 3: Control drawings

Control Drawing FM-Canada



The ISC40S sensor shall be installed with:
One of the Yokogawa transmitters model:

- ISC202S
- FLXA202
- FLXA21

with following parameters:

	ISC202S	FLXA202	FLXA21
Uo	14.4 V	11.76 V	11.76 V
Io	88 mA	60.6 mA	60.6 mA
Po	317 mW	178 mW	178 mW
Lo	4.5 mH	8 mH	8 mH
Co	600 nF	100nF	100 nF

or

To a FM approved intrinsically safe apparatus meeting the entity parameters of the ISC40S:

Uo ≤ 14.4V
Io ≤ 88mA
Po ≤ 0.32W
Co ≥ Ci
Lo ≥ Li

The effective inductive capacitance Ci and the effective induced inductance Li of the sensor depends only upon the properties and the length of the connected cable (max 100m).

When installing this equipment, follow the manufacturer's control drawing.
Installation should be in accordance with Canadian Electrical Code (CEC) CSA22.1 and relevant local codes.

WARNING:
To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing or read, understand and adhere to the manufacturer's live maintenance procedures.

ISC40S -..... -..... -.....

Connection type

ole, length in meters (any number 01 - 99)

-VP Variopin Connector

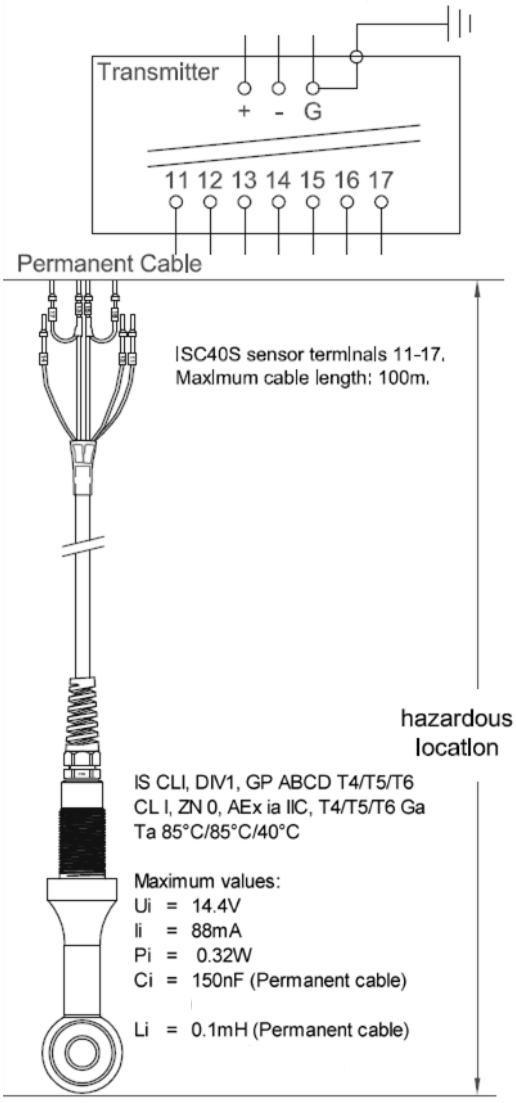
Temperature Element

T1 PT1000

Plastic and adaption code

GG	Glass filled PEEK, general model
GR	Glass filled PEEK, retractable model
GS	Glass filled PEEK, shaft model
TG	PFA, general model
TR	PFA, retractable model
TS	PFA, shaft model

Control Drawing FM-United States



The ISC40S sensor shall be installed with:
One of the Yokogawa transmitters model:

- ISC202S
- FLXA202
- FLXA21

with following parameters:

	ISC202S	FLXA202	FLXA21
Uo	14.4 V	11.76 V	11.76 V
Io	88 mA	60.6 mA	60.6 mA
Po	317 mW	178 mW	178 mW
Lo	4.5 mH	8 mH	8 mH
Co	600 nF	100nF	100 nF

or

To a FM approved intrinsically safe apparatus meeting the entity parameters of the ISC40S:

$Uo \leq 14.4V$
$Io \leq 88mA$
$Po \leq 0.32W$
$Co \geq Ci$
$Lo \geq Li$

The effective inductive capacitance Ci and the effective induced inductance Li of the sensor depends only upon the properties and the length of the connected cable (max 100m).

When installing this equipment, follow the manufacturer's control drawing.
Installation should be in accordance with ANSI/ISA RP 12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electrical Code (ANSI/NFPA 70).

WARNING:
To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing or read, understand and adhere to the manufacturer's live maintenance procedures.

ISC40S -..... -..... -.....

Connection type

-XX	Permanent cable, length in meters (any number 01 - 99)
-VP	Variopin Connector

Temperature Element

T1	Pt1000

Plastic and adaption code

GG	Glass filled PEEK, general model
GR	Glass filled PEEK, retractable model
GS	Glass filled PEEK, shaft model
TG	PFA, general model
TR	PFA, retractable model
TS	PFA, shaft model

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Printed in The Netherlands 01-2205

GS 12D07J02-01EN-P
1st edition May 23, 2022