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# User's Manual

**Model ISC40G(S)**  
Sensors for Inductive  
Conductivity Measurement

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(BG)

Всички улътвания за продукти от серията ATEX Ex се предлагат на английски език. Ако се нуждаете от улътвания за продукти от серията Ex на родния ви език, се свържете с най-близкия офис или представителство на фирма Yokogawa.

(CZ)

Všechny uživatelské příručky pro výrobky, na něž se vztahuje nevybušné schválení ATEX Ex, jsou dostupné v angličtině. Požadujete-li pokyny týkající se výrobků s nevybušným schválením ve vašem lokálním jazyku, kontaktujte prosím vaši nejbližší reprezentační kancelář Yokogawa.

(D)

Alle Betriebsanleitungen für ATEX Ex bezogene Produkte stehen in den Sprachen Englisch. Sollten Sie die Betriebsanleitungen für Ex-Produkte in Ihrer Landessprache benötigen, setzen Sie sich bitte mit Ihrem örtlichem Yokogawa-Vertreter in Verbindung.

(DK)

Alle brugervejledninger for produkter relateret til CE er tilgængelige på engelsk. Skulle De ønske yderligere oplysninger om håndtering af CE produkter på eget sprog, kan De rette henvendelse herom til den nærmeste Yokogawa afdeling eller forhandler.

(EST)

Kõik ATEX Ex toodete kasutamishendid on esitatud inglise keeles. Ex seadmete muukeelse dokumentatsiooni saamiseks pöörduge lähima lokagava (Yokogawa) kontori või esindaja poole.

(E)

Todos los manuales de instrucciones para los productos antiexplosivos de ATEX están disponibles en inglés. Si desea solicitar las instrucciones de estos artículos antiexplosivos en su idioma local, deberá ponerse en contacto con la oficina o el representante de Yokogawa más cercano.

(F)

Tous les manuels d'instruction des produits ATEX Ex sont disponibles en langue anglaise. Si vous nécessitez des instructions relatives aux produits Ex dans votre langue, veuillez bien contacter votre représentant Yokogawa le plus proche.

(GB)

All instruction manuals for ATEX Ex related products are available in English. Should you require Ex related instructions in your local language, you are to contact your nearest Yokogawa office or representative.

(GR)

Όλα τα εγχειρίδια λειτουργίας των προϊόντων με ATEX Ex διατίθενται στα Αγγλικά. Σε περίπτωση που χρειάζεστε οδηγίες σχετικά με Ex στην τοπική γλώσσα παρακαλούνε επικοινωνήστε με το πλησιέστερο γραφείο της Yokogawa ή αντιπροσωπο της.

(H)

Az ATEX Ex műszerek gépkönyveit angol nyelven adjuk ki. Amennyiben helyi nyelven kérik az Ex eszközök leírásait, kérjük keressék fel a legközelebbi Yokogawa irodát, vagy képviselőt.

(I)

Tutti i manuali operativi di prodotti ATEX contrassegnati con Ex sono disponibili in inglese. Se si desidera ricevere i manuali operativi di prodotti Ex in lingua locale, mettersi in contatto con l'ufficio Yokogawa più vicino o con un rappresentante.

(LV)

Visas ATEX Ex kategorijas izstrādājumu Lietošanas instrukcijas tiek piegādātas angļu valodās. Ja vēlaties saņemt Ex ierīču dokumentāciju citā valodā, Jums ir jāsazinās ar firmas Jokogava (Yokogawa) tuvāko ofisu vai pārstāvi.

(LT)

Visos gaminiø ATEX Ex kategorijos Eksploatavimo instrukcijos teikiami anglø kalbomis. Norëdami gauti priestaisø Ex dokumentacijà kitomis kalbomis susisiekite su artimiausiu bendrovës Yokogawa biuru arba atstovu.

(M)

Il-manwali kollha ta' l-istruzzjonijiet għal prodotti marbuta ma' ATEX Ex huma disponibbli bl-Ingliż. Jekk tkun teħtieġ struzzjonijiet marbuta ma' Ex fil-lingwa lokali tiegħek, għandek tikkuntattja lill-eqreb rappreżentant jew ufficiju ta' Yokogawa.

(NL)

Alle handleidingen voor producten die te maken hebben met ATEX explosie-beveiliging (Ex) zijn verkrijgbaar in het Engels. Neem, indien u aanwijzingen op het gebied van explosiebeveiliging nodig hebt in uw eigen taal, contact op met de dichtstbijzijnde vestiging van Yokogawa of met een vertegenwoordiger.

(P)

Todos os manuais de instruções referentes aos produtos Ex da ATEX estão disponíveis em Inglês. Se necessitar de instruções na sua língua relacionadas com produtos Ex, deverá entrar em contacto com a delegação mais próxima ou com um representante da Yokogawa.

(PL)

Wszystkie instrukcje obsługi dla urządzeń w wykonaniu przeciwwybuchowym Ex, zgodnych z wymaganiami ATEX, dostępne są w języku angielskim. Jeżeli wymagana jest instrukcja obsługi w Państwa lokalnym języku, prosimy o kontakt z najbliższym biurem Yokogawy.

(RO)

Toate manualele de instructiuni pentru produsele ATEX Ex sunt in limba engleza. In cazul in care doriti instructiunile in limba locala, trebuie sa contactati cel mai apropiat birou sau reprezentant Yokogawa.

(S)

Alla instruktionsböcker för ATEX Ex (explosionssäkra) produkter är tillgängliga på engelska. Om Ni behöver instruktioner för dessa explosionssäkra produkter på annat språk, skall Ni kontakta närmaste Yokogawakontor eller representant.

(SF)

Kaikkien ATEX Ex-tyyppisten tuotteiden käyttöohjeet ovat saatavilla englannin-. Mikäli tarvitsette Ex-tyyppisten tuotteiden ohjeita omalla paikallisella kielellänne, ottakaa yhteyttä lähimpään Yokogawa-toimistoon tai -edustajaan.

(SK)

Všetky návody na obsluhu pre prístroje s ATEX Ex sú k dispozícii v jazyku anglickom. V prípade potreby návodu pre Ex-prístroje vo Vašom národnom jazyku, skontaktujte prosím miestnu kanceláriu firmy Yokogawa.

(SLO)

Vsi predpisi in navodila za AEX Ex sorodni pridelki so pri roki v anglišèini. Èe so Ex sorodna navodila potrebna v vašem tukejnem jeziku, kontaktirajte vaš najbliži Yokogawa office ili predstavnika.

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## 1. PREFACE

### 1.1 Introduction

The sensor and fitting program for inductive conductivity measurement (model ISC40) is designed to meet the most common installation requirements in terms of material compatibility, process connections and flow dynamics. The various installation possibilities are described and illustrated in this manual.

The following categories of installation can be recognized:

1. Direct mounting of sensors in tank wall or customer supplied flanges
2. Cost effective installation of sensors using process adapters
3. Maintenance friendly installation of sensors using in-line subassemblies
4. Installation in flow chambers for measurements in sample streams or bypass loops
5. Installation in immersion fittings for measurement in open tanks or channels

Within the wide range of process adapters, subassemblies, flow fittings and immersion fittings it is easy to find the appropriate installation that fits the application (a wide choice of materials), the plant installation practice (a wide choice of process connections) and the maintenance procedures.

### 1.2 Unpacking and Checking

Upon delivery, unpack the sensor carefully and inspect it to ensure it was not damaged during shipment. If damage is found, retain the original packing materials and then immediately notify the carrier and the relevant Yokogawa sales office. Make sure the Model Code and Serial Number on the sensor are the same as on the packing list. Also, check any option(s) that were ordered are included and correct.

For some specific sensor information, the size of the sensor label is not big enough. For that reason, a separate label is delivered which must be connected to the sensor cable.

### 1.3 Warranty and Service

Yokogawa products and parts are guaranteed free from defects in workmanship and material under normal use and service for a period of (typically) 12 months from the date of shipment from the manufacturer. Individual sales organizations can deviate from the typical warranty period, and the conditions of sale relating to the original purchase order should be consulted. Damage caused by wear and tear, inadequate

maintenance, corrosion, or by the effects of chemical processes are excluded from this warranty coverage. In the event of warranty claim, the defective goods should be sent (freight paid) to the Service Department of the relevant sales Organization for repair or replacement (at Yokogawa's discretion).

The following information must be included in the letter accompanying the returned goods:

- Model Code and Serial Number.
- Original Purchase Order and Date.
- Length of time in service and description of the process.
- Description of the fault and circumstances of the failure.
- Process/environmental conditions that may be related to the failure of the sensor.
- Statement as to whether warranty or non-warranty service is requested.
- Complete shipping and billing instructions for return of material, plus the name and phone number of a contact person that can be reached for further information.
- Clean Statement.

Returned goods that have been in contact with process fluids must be decontaminated and disinfected prior to shipment. Goods should carry a certificate to this effect, for the health and safety of our employees. Material Safety Data sheets must be included for all components of the process to which the sensor(option) have been exposed.

### 1.4 Serial number

The Serial number is defined by nine (9) alphanumeric characters:

$X_1X_2$  Production location

$X_3X_4$  Year/Month code

$X_5X_6X_7X_8X_9$  Tracking number

Example: N3Y409521

**Table 1:** Production Year code

Year	Year code	Year	Year code
2014	P	2026	3
2015	R	2027	4
2016	S	2028	5
2017	T	2029	6
2018	U	2030	7
2019	V	2031	8
2020	W	2032	9
2021	X	2033	A
2022	Y	2034	B
2023	Z	2035	C
2024	1	2036	D
2025	2	2037	E

**Table 2:** Production Month code

Month	Month code
January	1
February	2
March	3
April	4
May	5
June	6
July	7
August	8
September	9
October	A
November	B
December	C

## 2. GENERAL SPECIFICATIONS

The ISC40 inductive conductivity sensor is suitable for use with the Yokogawa inductive conductivity analyzers.

### 2.1 Measuring elements

Sensing element : Toroids with high permeability magnetic material  
 Temperature element <sup>1)</sup> : Pt1000 (T1)

### 2.2 Materials

#### Wetted parts sensor

Body ISC40\*-G\* : 30% glass filled PEEK, FDA approved  
 Body ISC40\*-T\* : PFA, FDA approved, PIM regulation 10/2011 approved

#### Non-wetted parts sensor

Thread part : AISI 316 SS  
 O-ring : FKM

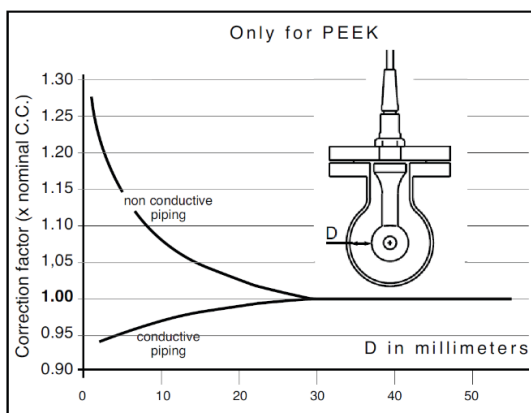
#### Options for sensor

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

### 2.3 Functional specifications (at 25 °C)

Temperature element : Pt1000 to IEC 751

Installation factor : 1.88 cm<sup>-1</sup> nominal for PEEK sensor  
 3.00 cm<sup>-1</sup> nominal for PFA sensor  
 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).



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

**Note 1:** The ISC40 temperature sensor is designed for cell compensation and for indication. It is **NOT** designed for process temperature control.

## 2.4 Dynamic specifications

Temperature response time :  $t_{90} < 10$  min. for PEEK sensor  
 $t_{90} < 15$  min. for PFA sensor

## 2.5 Operating range

Conductivity : 0 – 2000 mS/cm at actual process temperature <sup>2)</sup>.

Temperature @ 100 KPa : -20°C to 130°C (-4°F to 266°F)

Pressure\* @ 25°C

Over pressure : 0 to 20 barg (0 to 290 PSIG) for PEEK sensor

0 to 15 barg (0 to 217 PSIG) for PFA sensor

Under pressure : 0 to 0.9 barg (0 to 13.1 PSIG) for suffix -GG, -GS, -TG

0 to 0.5 barg (0 to 7.30 PSIG) for suffix -GR

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

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

## 2.6 Shipping details

Package size (LxWxH)

ISC40\*-\*\*-\*\* : 305 x 220 x 100 mm (12.0 x 8.6 x 3.9 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)

## 2.7 Environmental conditions

Storage temperature : -10°C to 50°C (14°F to 122°F)

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

## 2.8 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 relevant sections in this manual).

## 2.9 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).



## 2.10 Regulatory standards and Declaration certificates



### Equipment

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.

**Remark:** The ATEX, IECEx, FM and EACEx specifications are for model ISC40S only.

### Equipment ratings

Item	Description	Values
Electrical parameters <sup>3)</sup>	Max. input voltage Max. input current Max. input power Max. internal capacitance Max. internal inductance Dielectric strength	$U_i = 14.4 \text{ VDC}$ $I_i = 88 \text{ mA}$ $P_i = 320 \text{ mW}$ $C_i = 150 \text{ nF}$ for permanent cable types  $L_i = 0.1 \text{ mH}$ for permanent cable types  500 Vac against input  <b>Note 3:</b> For EACEx other electrical parameters apply, see details specific certificate.
Temperature class	T6 T5 T4	$-30^\circ\text{C} \leq T_a \leq +40^\circ\text{C}$ $-30^\circ\text{C} \leq T_a \leq +95^\circ\text{C}$ <sup>4)</sup> $-30^\circ\text{C} \leq T_a \leq +130^\circ\text{C}$ <sup>4)</sup> <b>Note 4:</b> For FM-US and FM-CAN lower $T_a$ values apply, see regulatory compliance.
Specific conditions of use	Potential 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.	
 <b>WARNING</b>	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 earth.	
 <b>WARNING</b>	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	

## Label information

All statutory required label information is written on a metallized product label. This includes MS-code, serial number, and process operating specifications. Example of a product label see figure 2 and 3.



Fig 2: Sensor label for cable type

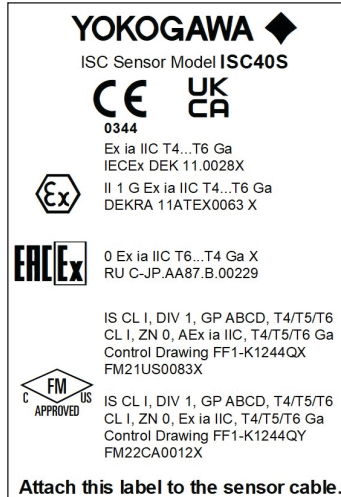


Fig 3: Product label certifications

For sensors with Intrinsic Safety or other certification a separate plastic label card is provided, see figure 3.

### Remarks:



1. Position of text/logos can deviate from the figure as shown
2. Number of non-intrinsically safe related text/logos can deviate from the figure as shown
3. Specific Ex marking depends on certification region
4. If product is too small to fit a label with necessary text, this text will be on a Brady B-435 Thermal Transfer Printable Gloss Metallized Polyester label printed with Brady Series R6000 ribbon, to be placed on a plastic carrier for affixing adjacent to the product.

**Regulatory compliances:**

Item	Description, Approval, Certification
CE	Decision 768/2008/EC, By applying: EN-ISO 9001
UKCA	The UKCA mark has been affixed on the product in 2022 for the first time.
LVD <sup>5)</sup>	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 <sup>5)</sup>	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 Directive 2014/34/EU

**Note 5:** 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  ISC40S:  II 1 G Ex ia IIC T4...T6 Ga Applied standards: <ul style="list-style-type: none"> <li>• EN IEC 60079-0</li> <li>• EN 60079-11</li> </ul> For specific conditions of use see certificate.
IECEX	IECEX approval: IECEX DEK 11.0028X ISC40S: Ex ia IIC T4...T6 Ga Applied standards: <ul style="list-style-type: none"> <li>• IEC 60079-0</li> <li>• IEC 60079-11</li> </ul> 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: <ul style="list-style-type: none"> <li>• CAN/CSA-C22.2 No. 60079-0</li> <li>• CAN/CSA-C22.2 No. 60079-11</li> <li>• CAN/CSA-C22.2 No. 61010-1</li> </ul> For specific conditions of use see certificate Note: When T5 for $-30^{\circ}\text{C} \leq \text{Ta} \leq +85^{\circ}\text{C}$ (process temperature is $130^{\circ}\text{C}$ max.). When T4 for $-30^{\circ}\text{C} \leq \text{Ta} \leq +85^{\circ}\text{C}$ (process temperature is $95^{\circ}\text{C}$ max.)
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: <ul style="list-style-type: none"> <li>• FM Class 3600</li> <li>• FM Class 3610</li> <li>• FM Class 3810</li> <li>• ANSI/ISA 60079-0</li> <li>• ANSI/ISA 60079-11</li> <li>• ANSI/ISA 61010-1</li> </ul> For specific conditions of use see certificate Note: When T5 for $-30^{\circ}\text{C} \leq \text{Ta} \leq +85^{\circ}\text{C}$ (process temperature is $130^{\circ}\text{C}$ max.). When T4 for $-30^{\circ}\text{C} \leq \text{Ta} \leq +85^{\circ}\text{C}$ (process temperature is $95^{\circ}\text{C}$ max.)

## Protection of Environment Certificate for ISC40G and ISC40S (Use in China)

This document is valid only in China.

### 产品中有害物质的名称及含量

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯 醚 (PBDE)
传感器	×	○	○	○	○	○
电缆	×	○	○	○	○	○

○：表示该有害物质在该部件中所有均质材料中的含量都在GB/T26572所规定的限量要求以下。

×：表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T26572所规定的限量要求。

环保使用期限：这个标志是基于SJ/T11364，在中国（不包括台湾，香港，澳门）販售的电子电器产品所适用的环保使用期限。



只要遵守产品上关于安全及使用上的注意事项，从制造之日起计算在该年限内，不会发生制品内的有害物质外泄，突然变异，对环境或人体以及财产产生重大影响的情况。

（注） 该年限是《环境保护使用期限》，不是产品的保质期限。  
另外，关于替换部件的推荐替换周期，请阅读使用说明书。

### Production date

关于生产日期

生产日期在产品铭牌上9位数的序列号中，用以下形式表示生产日期。

从左数第3位数：生产年份

R: 2015, S: 2016, T: 2017, U: 2018, V: 2019, W: 2020, X: 2021, Y: 2022, Z: 2023,  
1: 2024, 2: 2025, 3: 2026, ...

从左数第4位数：生产月份

1: 1月, 2: 2月, 3: 3月, ..., 9: 9月, A: 10月, B: 11月, C: 12月  
(示例) N3S700001: 2016年7月

Subject to change without notice

## Declaration of Conformity for ISC40G and ISC40S



### EU DECLARATION OF CONFORMITY

We: **Yokogawa Process Analyzers Europe B.V.**  
**Euroweg 2, 3825 HD Amersfoort**  
**The Netherlands**

Herewith declare under our sole responsibility that the products, model: **ISC40G** and **ISC40S** further specified with model suffix- and option codes: **As listed in Annex-1 in this document**, are manufactured in accordance with the requirements for CE-marking of products as stated in EC Decision:

**768/2008/EC on a common framework for the marketing of products**

by applying the following standards:

**EN-ISO 9001: 2015** Quality management systems - Requirements

Model ISC40G and ISC40S are:

- Produced according to appropriate quality control procedures.
- In compliance with the essential requirements of the specific product legislation:
  - **Pressure Equipment** **Directive 2014/68/EU**  
by applying Article 4.3: Sound Engineering Practice
  - **RoHS** **Directive 2011/65/EU**  
Commission Delegated Directive (EU) 2015/863 amending Annex II as regards the list of restricted substances, by applying the following standards:  
**EN-IEC 63000: 2018** Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

Model ISC40S is:

- In compliance with the essential requirements of the specific product legislation:
  - **Potentially explosive atmospheres** **Directive 2014/34/EU (ATEX)**  
by applying the following standards:  
**EN IEC 60079-0: 2018** Explosive atmospheres – Part 0: Equipment – General requirements  
**EN 60079-11: 2012** Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i"

The provisions fulfilled are:  II 1 G Ex ia IIC T4...T6 Ga

Number of the EU-type Examination Certificate: **DEKRA 11ATEX0063 X, Issue 2**

Name of the notified body: DEKRA Certification B.V., Identification number of the notified body that issued the EU Quality Assurance Notification: 0344

Address of the notified body: Meander 1051, 6825 MJ Arnhem, The Netherlands

The CE-mark has been affixed on the product in 2000 for the first time.

If applicable, the product is checked against the latest official released revision of the standards mentioned above; differences do not affect the certified product identified on this declaration.

Amersfoort – July 01, 2024

**M. de Bruijn**  
**General Manager**  
**Yokogawa Process Analyzers Europe B.V.**



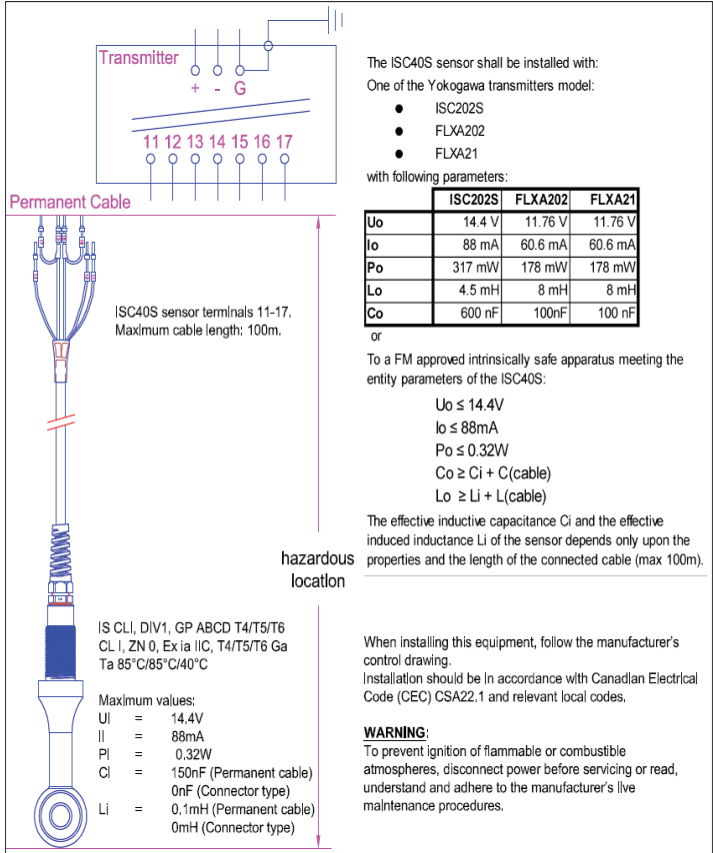
## Annex-1

Model Code	Suffix Code		Option	Description
ISC40G				General purpose inductive conductivity sensor
Type	- GG - GR - GS - TG			Glass filled PEEK, general model Glass filled PEEK, retractable model Glass filled PEEK, shaft model PFA, general model
Temperature sensor	- T1 - T3			Pt1000 30k thermistor, for IC200/ISC200 select only T3
Cable length		- 03 - 05 - 10 - 15 - 20 - ZZ		03 meter 05 meter 10 meter 15 meter 20 meter Tokuchu
Flange adapters - GG, - TG			/SFA /SFD /STW /S2W /TFD /TFN	AISI316 SS, 2" ANSI 150 lbs AISI316 SS, DN50-PN40 AISI316 SS, 3" tri-clamp AISI316 SS, 2" tri-clamp TFM/AISI316 SS, DN65-PN10 / PN16 TFM, for DN65-PN10 / PN16
Flange adapters - GS			/SFT /STC1 /STC2	AISI316 SS, Sanitary Tuohenhagen AISI316 SS, Sanitary 2" tri-clamp AISI316 SS, Tri-clamp complete
Protection Hose for - TG, - GG			/PH□□  /ZZ□□	□□ indicating length in meter (same as cable length): 03, 05, 10, 15, 20 Tokuchu □□ indicating length in meter (same as cable length)
Certificates			/M	Material certificate. Only for metal parts of flange adapters, except /TFD and /TFN
Tokuchu			/Z	Tokuchu

Model Code	Suffix Code		Option	Description
ISC40S				Intrinsically safe inductive conductivity sensor
Type	- GG - GR - GS - TG			Glass filled PEEK, general model Glass filled PEEK, retractable model Glass filled PEEK, shaft model PFA, general model
Temperature sensor	- T1			Pt1000
Cable length		- 03 - 05 - 10 - 15 - 20		03 meter 05 meter 10 meter 15 meter 20 meter
Flange adapters - GG, - TG			/SFA /SFD /STW /S2W /TFD /TFN	AISI316 SS, 2" ANSI 150 lbs AISI316 SS, DN50-PN40 AISI316 SS, 3" tri-clamp AISI316 SS, 2" tri-clamp TFM/AISI316 SS, DN65-PN10 / PN16 TFM, for DN65-PN10 / PN16
Flange adapters - GS			/SFT /STC1 /STC2	AISI316 SS, Sanitary Tuohenhagen AISI316 SS, Sanitary 2" tri-clamp AISI316 SS, Tri-clamp complete
Protection Hose for - TG, - GG			/PH□□	□□ indicating length in meter (same as cable length): 03, 05, 10, 15, 20
Certificates			/M	Material certificate. Only for metal parts of flange adapters, except /TFD and /TFN

Further specifications can be found in General Specification Sheet GS 12D07J02-01EN-P

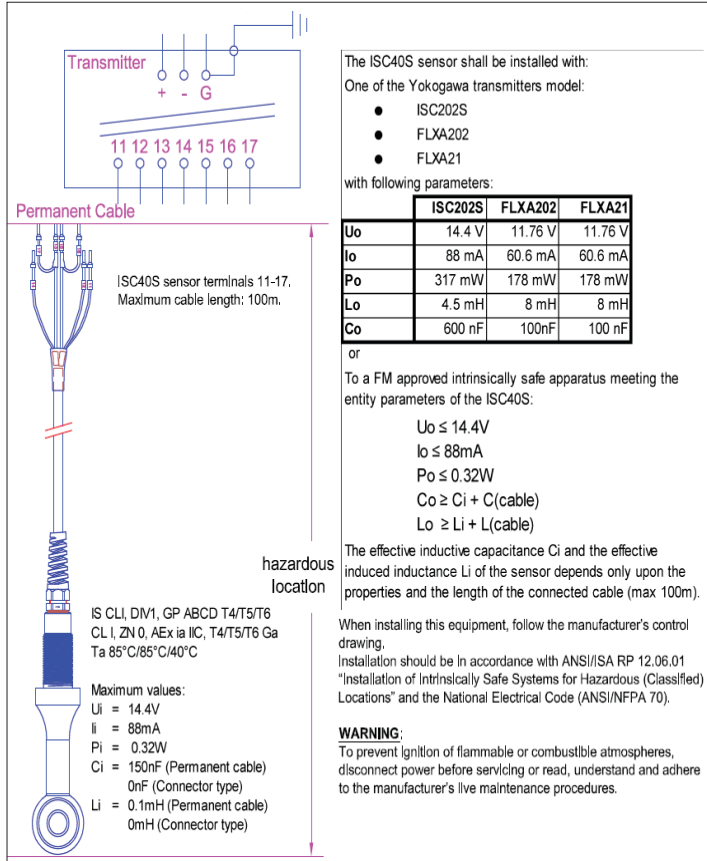
Control Drawing FM-Canada



- 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



### 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
$U_o$	14.4 V	11.76 V	11.76 V
$I_o$	88 mA	60.6 mA	60.6 mA
$P_o$	317 mW	178 mW	178 mW
$L_o$	4.5 mH	8 mH	8 mH
$C_o$	600 nF	100nF	100 nF

or

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

- $U_o \leq 14.4V$
- $I_o \leq 88mA$
- $P_o \leq 0.32W$
- $C_o \geq C_i + C(\text{cable})$
- $L_o \geq L_i + L(\text{cable})$

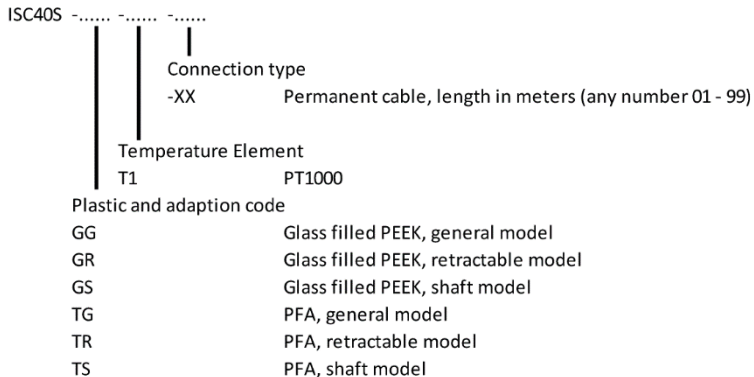
The effective inductive capacitance  $C_i$  and the effective induced inductance  $L_i$  of the sensor depends only upon the properties and the length of the connected cable (max 100m).

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.



### 3. INSTALLATIONS OF SENSOR WITH STANDARD OPTIONS

#### 3.1 Typical installation

For optimum measurement results, the ISC40 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.

It is important that the process flow is directed through the hole in the donut of the sensor.

For this reason, the flats on the sensor top part must be installed perpendicular on the process flow (see fig. 4).

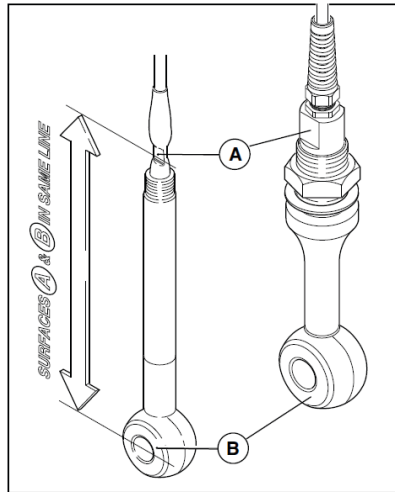
The inductive conductivity measurement technique requires a process fluid surrounding the donut of the sensor. The installation factor mentioned on the QIC, IM, GS will assure accurate conductivity measurement under the condition that the donut is surrounded by 25 mm (1") process fluid. If this condition cannot be met, the measurement loop (Analyzer in combination with sensor) must be calibrated. Consult the instruction manuals of the analyzer for details.

The mounting of the sensor in the process adapters is described in section 3.2. The mounting of the process adapters in the end-user's application requires compatibility of materials and process connections.

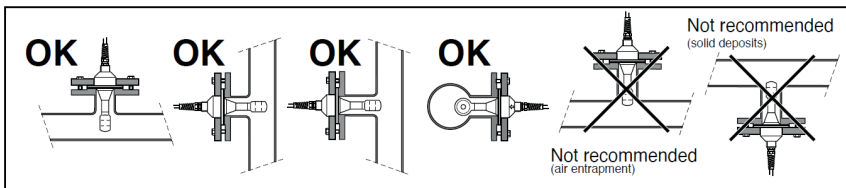
#### 3.2 Installation of ISC40G(S)-GG (TG) with flange adapters

The ISC40G(S)-GG (TG) sensor should be ordered with a flat Viton sealing gasket (K1500AM) for compatibility with existing installations. However, the flat Viton gasket is not needed when using the sensor in combination with the new fittings, which are improved by the addition of O-ring seals (see Figures 7 and 8).

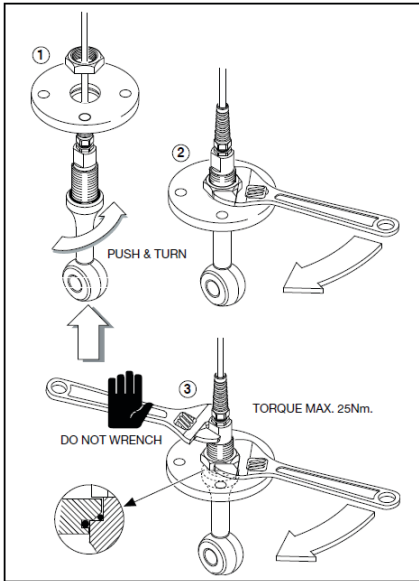
It is important that the access port has a diameter of at least 50 mm (2") to allow insertion of the donut shaped end of the sensor. For more detailed dimensions of the sensors see paragraph 4.



**Fig 4:** Aligning of sensor donut (B) and flats (A)



**Fig 5:** Installation examples

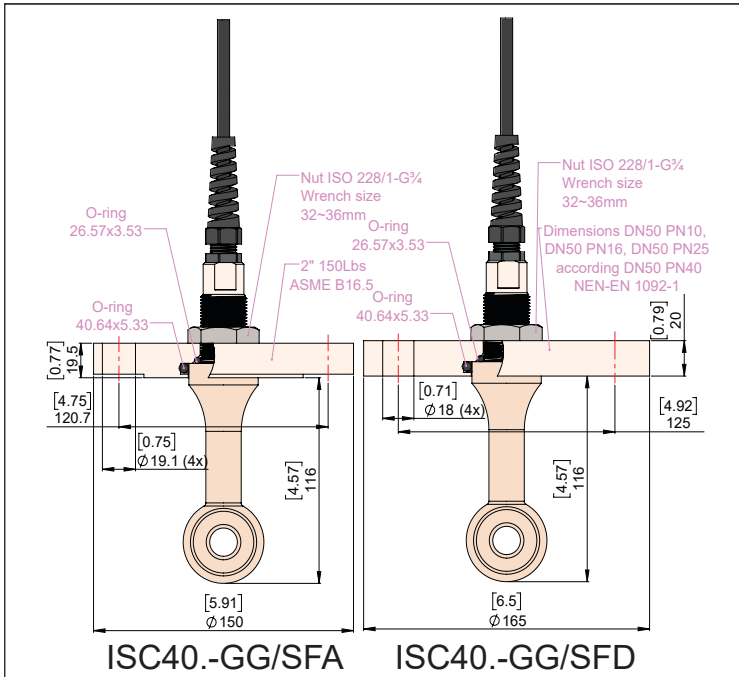


**Note 6:** When a torque of more than 25 Nm is applied, the top part of the body of the PFA sensor will be damaged (TG model)

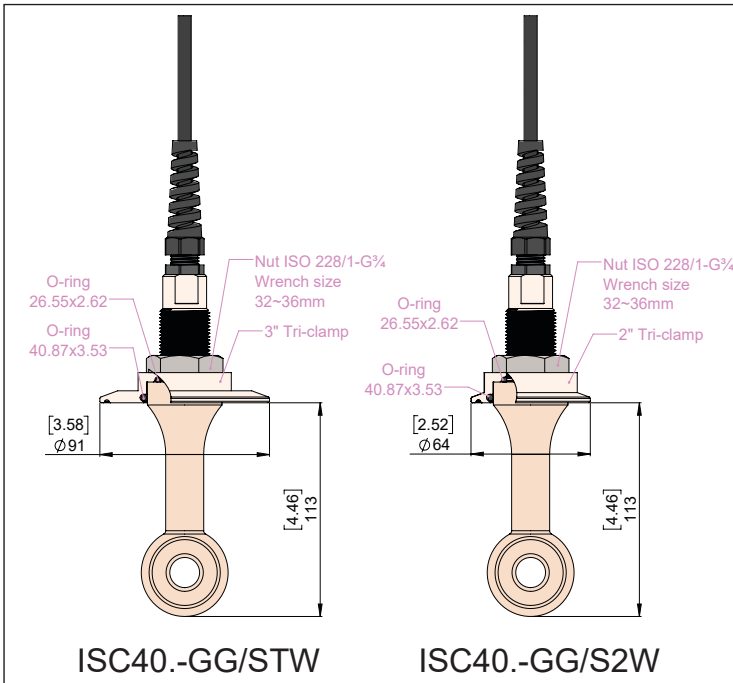
**Note 7:** Retighten after 24 hours

The sensor cable and mounting thread are pulled through the hole of the flange, and the sensor is sealed on the process by tightening the mounting nut. Turning of the sensor by the torque forces can be avoided by using a wrench on the flats on top of the sensor (see fig. 6). Sensor is installed correctly if the flats are aligned perpendicular on the process flow (see fig. 5).

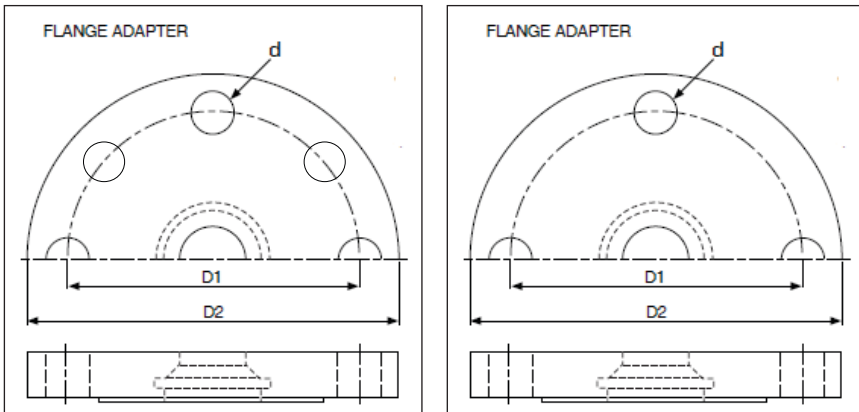
**Fig 6:** Mounting Procedure ISC40G(S)-GG (TG) with flange adapters



**Fig 7:** Option /SFA, /SFD



**Fig 8: Option /STW, /S2W**



**Fig 9: Flange adapter dimensions Option /TFD /SFA, /SFD**

**Table 3: Flange dimensions**

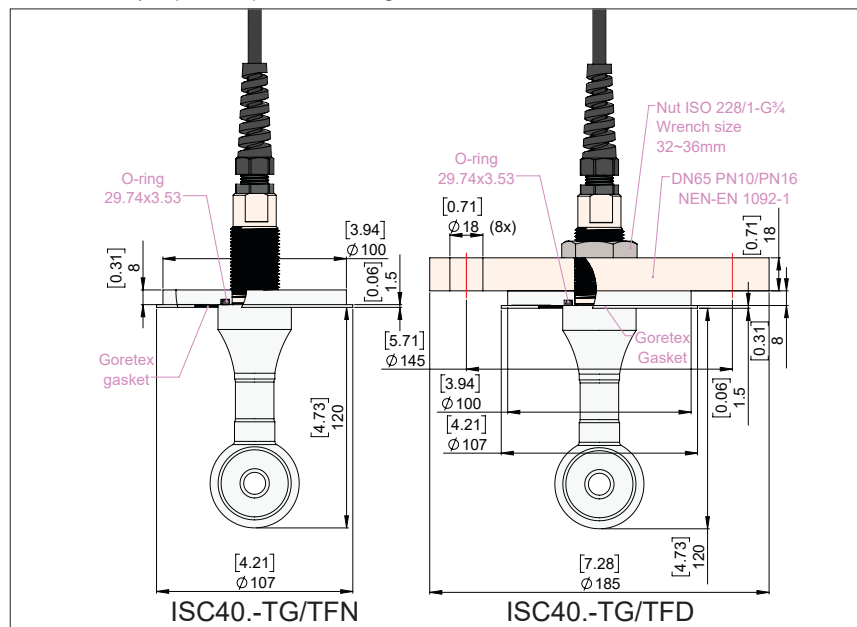
Option	d	D1	D2	Hole(d) no.
/SFA	ø19 [0.75]	121 [4.76]	152 [6.0]	4
/SFD	ø18 [0.71]	125 [4.92]	165 [6.5]	4
/TFD	ø18 [0.71]	145 [5.71]	185 [7.3]	8*8

**Note 8:** According to EN1092-2 (Cast iron flanges) and EN1092-3 (Copper alloy flanges), the flanges in the DN65 PN10 and DN65 PN16 are supplied 8 holes.

### 3.3 Installation of ISC40G(S)-TG with T-piece

The ISC40G(S)-TG sensor is a PFA sensor which can be used in combination with a T-piece of which the inner side is lined with PFA. This can be done using option /TFD (sealing material with stainless steel DN65 PN10 flange), or by option /TFN (sealing material) if the stainless-steel flange DN65 PN10 is already available. Both options are available as spare part.

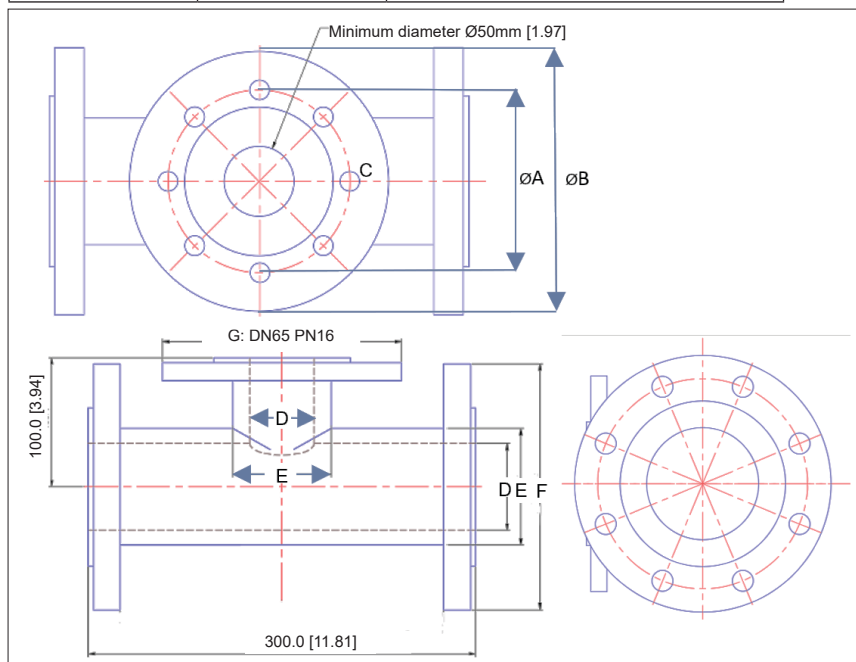
**Note 9:** When replacing the sensor, we advise to also replace the sealing material (part no. K1541XG) to prevent process leakage.



**Fig 10:** Flange adapters (opt. /TFD, /TFN) for -TG sensor in combination with T-piece

**Table 4:** T-piece model codes

Part no.	Flanges	Description
K1500HG	DN80 PN16	T-piece set DN80, PFA lined
K1500HF	DN100 PN16	T-piece set DN100, PFA lined

**Fig 11:** T-piece dimension

- Mounting flange and bolts are included
- Innerside of T-piece is lined with PFA
- Thickness : min 3.5 mm [0.14]
- Flange material : SS316

**Table 5:** T-piece dimension

A	B	C	D	E	F	G
200	160	8 X Ø18	67	90	DN80 PN16	DN65 PN16
220	180	8 X Ø18	85	114.2	DN100 PN16	DN65 PN16

### 3.4 Installation of ISC40G(S)-GS with flange adapters

The ISC40G(S)-GS sensor is designed for sanitary applications. For these applications special process connections are necessary.

Mounting procedure:

- Screw the tube completely in the stainless-steel nut.
- Thread the sensor cable through the flange adapter parts in the right sequence.
- Screw the tube hand tight into the flange, a mechanical stop will be felt.
- Tighten the plastic nut onto the sensor; screw the plastic nut completely tight.
- Tighten the stainless-steel nut for locking the sensor.

Sensor is installed correctly if the flats on the sensor are aligned perpendicular on the process flow.

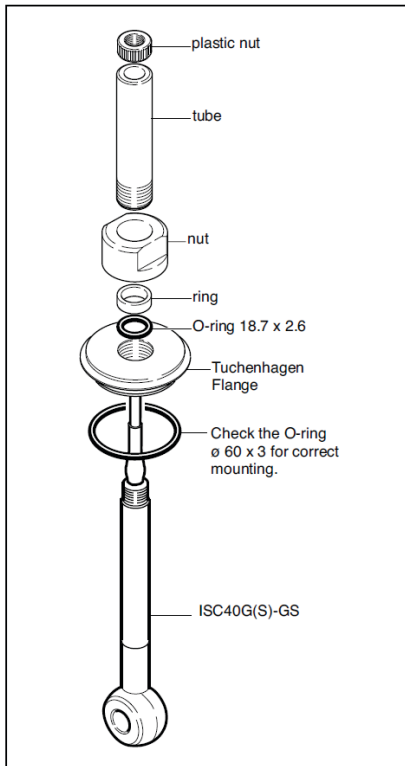


Fig 12: Installation /SFT

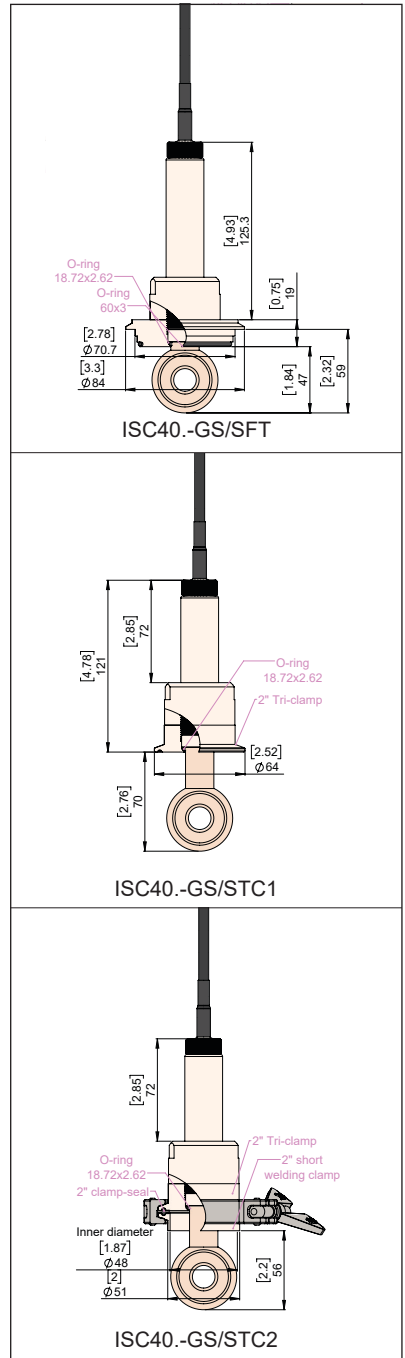
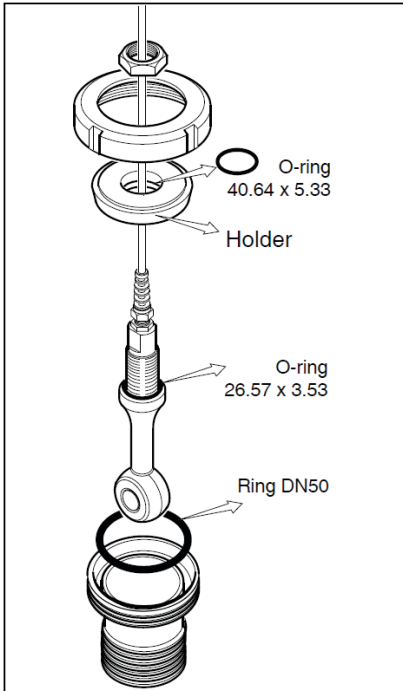


Fig 13: Option /SFT, /STC1, /STC2

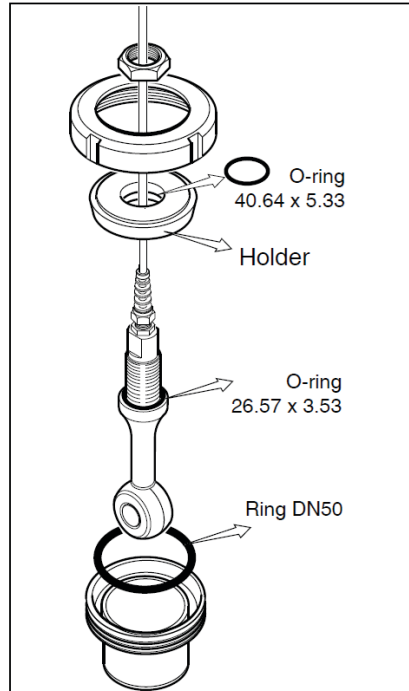
### 3.5 Installation of ISC40 sensor in ISC40FS

The key difference between a sensor adapter and a subassembly is, that with subassembly installation the sensor can be removed from the process installation without removing the subassembly first.

This allows easier access to the sensor for maintenance activities. Generally, the subassembly consists of three parts of which one part is fitted permanently to the process installation (welded or threaded); the second part is fitted to the sensor and the third part holds the earlier parts together. In addition to these parts there are elastomeric seals were appropriate. Standard O-ring material is Viton, other O-ring materials are available as **spare part** (see Figs 14 and 15).



**Fig 14:** ISC40 sensor in screw-in subassembly ISC40FS-SCSA



**Fig 15:** ISC40 sensor in weld-in subassembly ISC40FS-SCWN



### 3.6 Installation of ISC40 sensor in ISC40FF

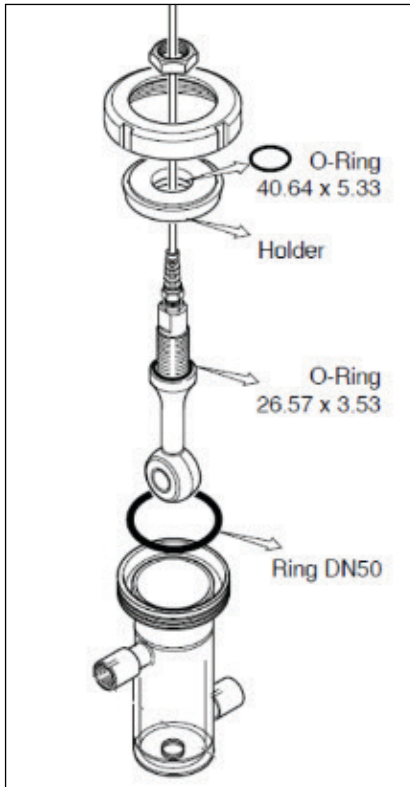
Installation of the flow fittings involves two steps (see Fig 16):

- Installation of the sensor

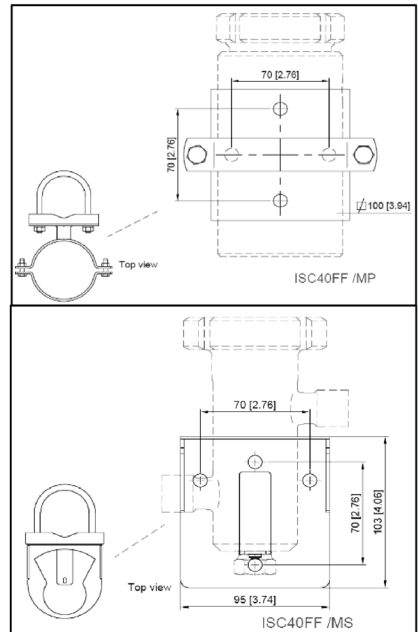
The sensor has to be mounted in the flow fitting. It is important that the position of the sensor in the fitting allows easy flow through the hole of the sensor donut. Generally good flow is assured if the flats of the sensor are oriented perpendicular to the outlet piping. It is also important that the sample piping is oriented in such a way that the direction of the flow is upwards to assure complete filling of the flow chamber.

- Installation of the fitting on wall, railing or stanchion

For this purpose, the flow fitting has an optional pipe/wall mounting kit /MS or /MP (see Fig 17 for details). This kit consists of a clamp ring with bolts and nuts which clamps around the flow chamber. Therefore, the flow chamber can be turned in the mounting assembly allowing more flexibility in installation. The mounting plate can be mounted on a wall or panel with 2-4 anchor bolts with a diameter of 10 mm (3/8") max. For those installations where pipe mounting is requested (2" nominal pipe), either horizontal or vertical, a saddle and U-bolt have to be used.



**Fig 16:** Installation of ISC40 sensor in flow fitting



**Fig 17:** Pipe/wall mounting kit ISC40 / MS or /MP See IM 12D07K04-01EN-P (ISC40FF) for details

### 3.7 Installation of ISC40 sensor in ISC40FD

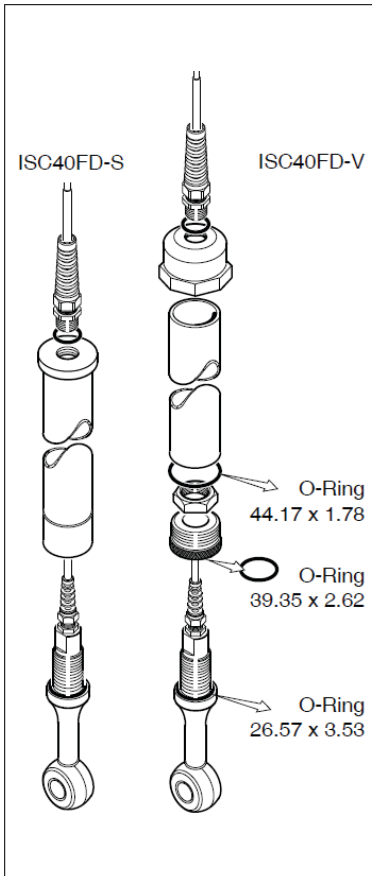
Installation of the immersion fittings involves two steps:

1. Installation of the sensor
- The sensor has to be mounted in the immersion fitting (see Fig 18).
2. Installation in the application
- On a railing or stanchion

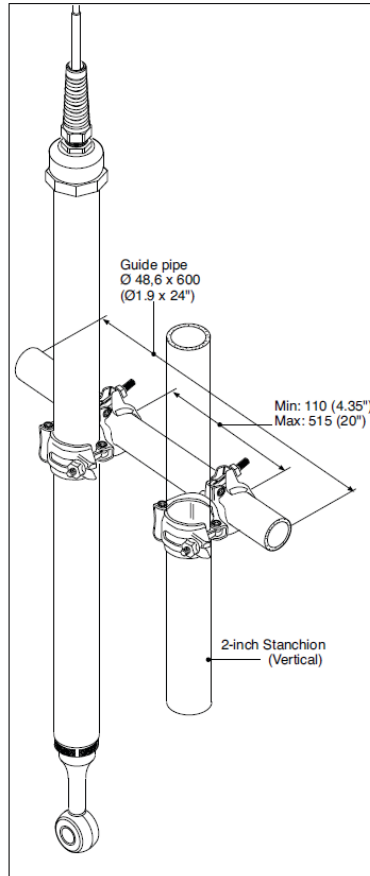
For this purpose, the immersion fitting has an optional rail mounting kit /MS1. This kit consists of a piece of guide pipe and two pipe clamps. The guide pipe is mounted horizontally to the stanchion using one pipe clamp. The second pipe clamp connects the guide pipe to the immersion fitting. The distance between the pipe clamps determines the distance between the stanchion and immersion fitting (see Fig 19).

- With flange

For this purpose, a stainless-steel immersion fitting can be ordered as type - SFD (DN50) or type -SFA (2"). The PVC immersion fitting has an optional depth adjustable mounting flange /FA (with DN50 and ANSI 2" 150 lbs hole pattern). You must assure that the mating flange has the same hole pattern as the supplied flange.



**Fig 18:** Installation of ISC40 sensor in immersion fitting



**Fig 19:** Installation on stanchion with / MS1

#### 4. DIMENSIONS ISC40 SENSOR

Dimensions in mm [inches].

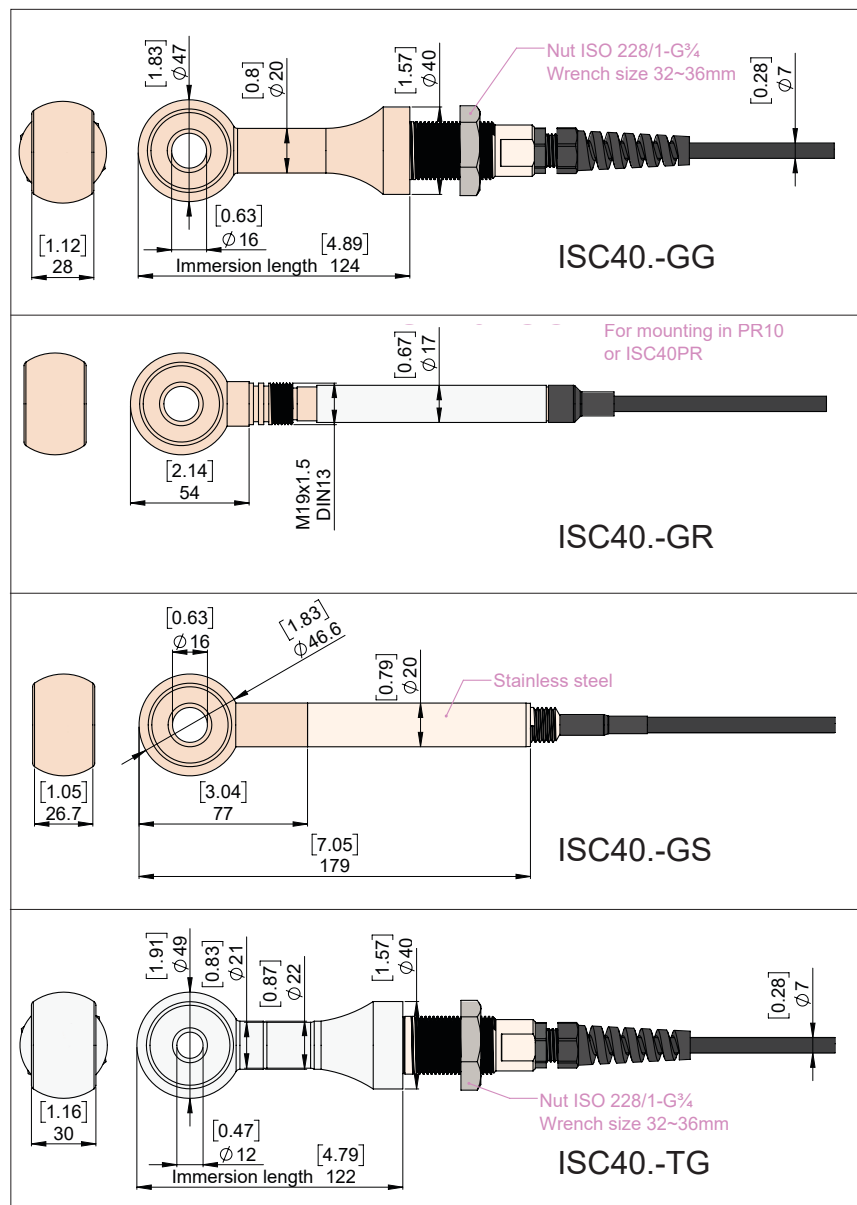


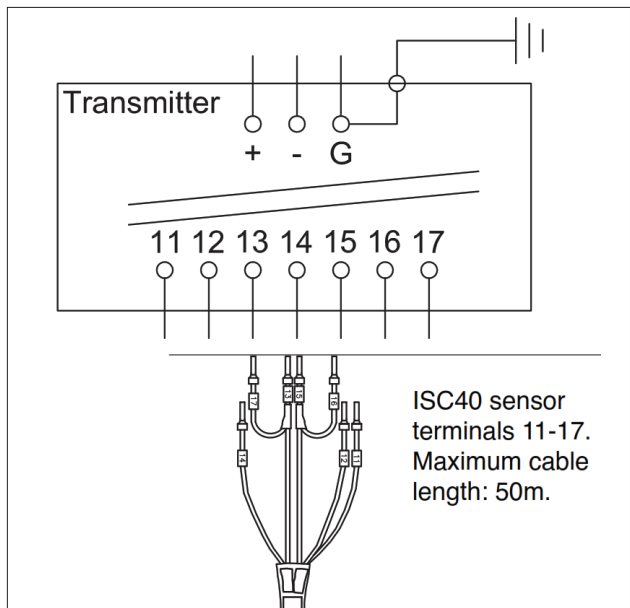
Fig 20: ISC40G(S)-GG -GR -GS -TG

### 5. WIRING ISC40 SENSOR

The ISC40 sensor is provided with a fixed cable. The connections of this dual coax cable and the Yokogawa Inductive Conductivity analyzer are given in table 6.

**Table 6:** Definition cable and analyzer

Cable Wire color	ISC analyzer terminal #	Signal description
Red	11	Temperature
Blue	12	Temperature
Yellow	14	Shield
White	15	Primary coil
White (Shield)	16	Primary coil
Brown	13	Secondary coil
Brown (Shield)	17	Secondary coil



**Fig 22:** ISC40G(S) connection to Yokogawa conductivity analyzers

**Note 10:** For details please follow the instruction manual of respective analyzer

## 6. MODEL CODE ISC40 SENSOR

**Table 7:** Model and suffix codes

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	-T1		Pt1000		
Cable length		-3	03 meter		
		-5	05 meter		
		-10	10 meter		
		-15	15 meter		
		-20	20 meter		
Options for Sensor Flange adapters -GG, -TG		/SFA	AISI 316 SS	2" ANSI 150 lbs	K1541ZR
		/SFD	AISI 316 SS	DN50 PN40	K1541ZQ
		/STW	AISI 316 SS	3" tri-clamp	K1541KB
		/S2W	AISI 316 SS	2" tri-clamp	K1541KC
		/TFD	TFM, AISI 316 SS	DN65-PN10 / PN16	K1541XF
		/TFN	TFM	For DN65-PN10 / PN16	K1541XG
Flange adapters for -GS		/SFT	AISI 316 SS	Sanitary Tuchenhagen	K1541ZP
		/STC1	AISI 316 SS	Sanitary 2" tri clamp	K1541ZG
		/STC2	AISI 316 SS	Tri-clamp complete	K1541ZF
Protection Hose for -TG, -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 12:** A quality certificate (QIC) is standard included with the product

## 7. SPARE PARTS ISC40 SENSOR

**Table 8:** ISC40 spare parts and options

<b>Parts ISC40 sensor</b>				
Part no.	Description	Material	Quantity	
K1500AM	Gasket	Viton	5	
K1500AL	Mounting nut	AISI 316 SS	3	

<b>Options ISC40 sensor, Flange adapters</b>				
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 / PN16	AISI 316 SS, TFM	FFKM
K1541XG	/TFN	used with DN65 PN10 / PN16	TFM	FFKM
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 set DN80, PFA lined	DN80 PN16	
K1500HF		T-piece set DN100, PFA lined	DN100 PN16	

**Note 11:** Other O-ring materials are available as a spare part

<b>O-rings ISC40 sensor, Flange adapters</b>				
Part no.	Description	Dimensions	Material	Quantity
<b>O-rings /SFA, /SFD</b>				
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	FFKM	1
K1500CH	O-ring	26.57 x 3.53	FFKM	1
<b>O-rings /STW</b>				
K1541ZK	O-ring set	40.87 x 3.53; 26.65 x 2.62; 3" seal-clamp	EPDM	2 sets
<b>O-rings /S2W</b>				
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
<b>O-rings /TFD, /TFN</b>				
K1500AH	O-ring	29.74 x 3.53	FFKM	1
<b>O-rings /SFT</b>				
K1500CM	O-ring set	18.72 x 2.62; 60 x 3	EPDM	5 sets
<b>O-rings /STC1</b>				
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
<b>O-rings /STC2</b>				
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

## 8. CHEMICAL COMPATIBILITY CHART

Table 9: Material compatibility table

		Material																
		Viton			PTFE (Teflon)			PVDF (Kynar)			PPS (Ryton)			Glass				
		Temp. °C		Conc. %	Temp. °C		Conc. %	Temp. °C		Conc. %	Temp. °C		Conc. %	Temp. °C		Conc. %		
20	60	100	20		60	100		20	60		100	20		60	100		20	60
Inorganic acid	Sulfuric acid	10	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
		50	o	o	o	o	o	o	o	o	o	x	x	x	o	o	o	
		95	o	o	o	o	o	o	o	x	-	x	x	-	o	o	o	
		fuming	o	o	o	o	o	o	-	-	-				o	o	o	
	Hydrochloric acid	10	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
		sat.	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	Nitric acid	25	o	o	x	o	o	o	o	o	x	o	o	o	o	o	o	o
		50	-	-	-	o	o	o	o	o	x	x	x	x	o	o	o	o
		95	-	-	-	o	o	o	o	x	-	-	-	-	o	o	o	o
		fuming	-	-	-	o	o	o	-	-	-				o	o	o	o
	Phosphoric acid	25	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
		50	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
95		x	x	-	o	o	o	o	o	o	o	o	o	o	o	o	o	
Hydrofluoric acid	40	o	o	o	o	o	o	o	o	o	x	x	x	x	x	x	x	
	75	o	o	x	o	o	o	o	o	o	-	-	-	-	-	-	-	
Organic acid	Acetic acid	10	-	-	-	o	o	o	o	o	o	o	o	o	o	o	o	
		glacial	-	-	-	o	o	o	o	x	-	o			o	o	o	
	Formic acid	80	-	-	-	o	o	o	o	o	o	o	o		o	o	o	
Citric acid	50	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
Alkali	Calcium hydroxide	sat.	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
	Potassium hydroxide	50	o	o	o	o	o	o	o	x	o	o	o	o	o	o	x	
	Sodium hydroxide	40	x	x	x	o	o	o	o	x	o	o	o	o	o	o	x	
	Ammonia in water	30	x	x	x	o	o	o	o	o	o	o	o	o	o	o	x	
Acid salt	Ammonium chloride	sat.	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
	Zinc chloride	50	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
	Iron(III) chloride	50	o	o	o	o	o	o	o	o	o			o	o	o		
	Sodium sulfite	sat.	-	-	-	o	o	o	o	o	o	o	o	o	o	o	o	
Basic salt	Sodium carbonate	sat.	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
	Potassium chloride	sat.	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
	Sodium sulfate	sat.	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
	Calcium chloride	sat.	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
Neutral salt	Sodium chloride	sat.	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
	Sodium nitrate	50	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
	Aluminium chloride	sat.	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
Oxidizing agent	Hydrogen peroxide	30	o	o	o	o	o	o	o	o	x	-	-	o	o	o	o	
	Sodium Hypochloride	50	o	o	x	o	o	o	o	o	x			o	o	o	o	
	Potassium dichromate	sat.	o	o	o	o	o	o	o	x	-	x		o	o	o	o	
	Chlorinated lime					o	o	o	o	o				o	o	o	o	
Organic solvent	Ethanol	80	x	-	-	o	o	o	o	o	x	o	o	o	o	o	o	
	Cyclohexane		o	o	o	o	o	o	o	x	o	o	o	o	o	o	o	
	Toluene		-	-	-	o	o	o	o	o	o	o	o	o	o	o	o	
	Trichloroethane		x	x	x	o	o	o	x	x	x	o	o		o	o	o	
	Water		o	o	o	o	o	x	o	o	o	o	o	o	o	o	o	

o = can be used x = shortens useful life - = cannot be used Blank = no data currently available

Note : Information in this list is based on our general experience and literature data and given in good faith. However Yokogawa is unable to accept responsibility for claims related to this information.

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