

# Instruction Manual

Model SC41, SC42 and SC49

2/4-electrode

Specific Conductivity Sensors



(BG)

Всички уълтвания за продукти от серията ATEX Ex се предлагат на английски език. Ако се нуждате от уълтвания 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 nevýbušné schválení ATEX Ex, jsou dostupné v angličtině. Požadujete-li pokyny týkající se výrobků s nevýbušným 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 kasutamishuhandid 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 παρακαλούμε 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 ierīšu dokumentāciju citā valodā, Jums ir jāsazinās ar firmas Yokogawa (Yokogawa) tuvāko ofisu vai pārstāvi.

(LT)

Visos gaminio ATEX Ex kategorijos Eksploatavimo instrukcijos teikiami anglo kalbomis. Norėdami gauti prietaisų Ex dokumentaciją kitomis kalbomis susisiekit su artimiausiu bendrovės Yokogawa biuru arba atstovu.

(M)

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

(NL)

Alle handleidingen voor producten die te maken hebben met ATEX explosiebeveiliging (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 angleščini. Če so Ex sorodna navodila potrebna v vašem tujejnem jeziku, kontaktirajte vaš najbliži Yokogawa office ili predstavnika.

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# 1. PREFACE

## 1.1 Introduction

Model SC41, SC42 and SC49 sensor, available in various materials such as Epoxy, Stainless Steel, PTFE and PVDF, is intended to suit most process conditions. The sensor is provided either with an Amphenol connector to fit the Yokogawa WU40 cable or Variopin connector to fit with Yokogawa WU10/WE10-cable. A wide range of flow and immersion fittings makes it possible to install the sensor in a permanent or semi-permanent location. The fittings of stainless steel might be used in sanitary applications. 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. For metal sensors a 3.1 material certificate is included. The SC42 model is certified for hazardous area when connected to a certified intrinsically safe Yokogawa analyzer, model SC202S or FLXA-series or SA11-C1 or to a certified intrinsically safe circuit with defined output parameters.

## 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 and specifically for information related to the intrinsically safety compliance like ATEX, IECEx, FM-United States and FM-Canada, a

separate label is delivered. This label needs to be connected onto the sensor cable close to the sensor.

## 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)s have been exposed.

#### 1.4 Serial number

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

X<sub>1</sub>X<sub>2</sub>                      Production location  
 X<sub>3</sub>X<sub>4</sub>                      Year/Month code  
 X<sub>5</sub>X<sub>6</sub>X<sub>7</sub>X<sub>8</sub>X<sub>9</sub>           Tracking number

Example:                N3X205325

**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

### 2.1 Measuring method

|                   |                                                                               |
|-------------------|-------------------------------------------------------------------------------|
| : 2-electrode for | SC41/SC42 -SP series;<br>SC41/SC42 -EP04 -EP14<br>SC41/SC42 -EP15 -EV15 -EP16 |
| : 4-electrode for | SC42/SC49 -EP08 -EP18<br>SC42/SC49 -FP08 -TP08 -TV08                          |

### 2.2 Measuring element

|                     |             |           |
|---------------------|-------------|-----------|
| Temperature element | : Ni100 for | SC41/SC49 |
|                     | Pt1000 for  | SC42      |

### 2.3 Wetted parts

|             |                                   |                             |
|-------------|-----------------------------------|-----------------------------|
| Sensor Body | : SC41/SC42/SC49-SP/SV            | : Stainless Steel AISI 316L |
|             | SC41/SC42/SC49-EP/EV              | : Epoxy resin               |
|             | SC41/SC42/SC49-FP/FV              | : PVDF, Glass               |
|             | SC41/SC42/SC49-TP/TV              | : Glass filled PTFE, Glass  |
| Electrodes  | : SC41/SC42/SC49-SP/SV            | : Stainless Steel AISI 316L |
|             | SC41/SC42/SC49-EP/EV              | : Graphite                  |
|             | SC41/SC42/SC49-FP/FV              | : Platinum                  |
|             | SC41/SC42/SC49-TP/TV              | : Platinum                  |
| O-ring      | : SC41/SC42/SC49-SP/SV            | : Viton                     |
|             | SC41/SC42/SC49-FP/FV <sup>1</sup> | : Viton                     |
|             | SC41/SC42/SC49-TP/TV <sup>1</sup> | : FFKM                      |

**Note 1** : For the -FP/FV and -TP/TV the supplied O-ring for sealing in the fitting is Viton.

|            |                 |                                                                                        |
|------------|-----------------|----------------------------------------------------------------------------------------|
| Insulation | : Suffix -SP/SV | PEEK 450G, FDA migration tested                                                        |
| Connector  | : Amphenol      | Contacts : gold plated<br>Plug : Polyamide                                             |
|            | : Variopin      | Contacts : gold plated<br>Material : Nickel-plated brass<br>Insulation : PEEK, UL94-V0 |

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

|                                  |                                 |                         |
|----------------------------------|---------------------------------|-------------------------|
| Temperature element <sup>2</sup> | : SC41, SC49                    | : Ni100                 |
| Temperature element <sup>2</sup> | : SC42                          | : Pt1000 to IEC 751     |
| Nominal Cell Constant            | : SC41/SC42/SC49-SP24 -SV24     | : 0.1 cm <sup>-1</sup>  |
|                                  | SC41/SC42/SC49-SP34 -SV34       | : 0.01 cm <sup>-1</sup> |
|                                  | SC41/SC42/SC49-EP04 -EP08       | : 10 cm <sup>-1</sup>   |
|                                  | SC41/SC42/SC49-EP14 -EP18       | : 1 cm <sup>-1</sup>    |
|                                  | SC41/SC42/SC49-EP15 -EV15 -EP16 | : 1 cm <sup>-1</sup>    |
|                                  | SC41/SC42/SC49-FP08 -FV08       | : 10 cm <sup>-1</sup>   |
|                                  | SC41/SC42/SC49-TP08 -TV08       | : 10 cm <sup>-1</sup>   |

**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.

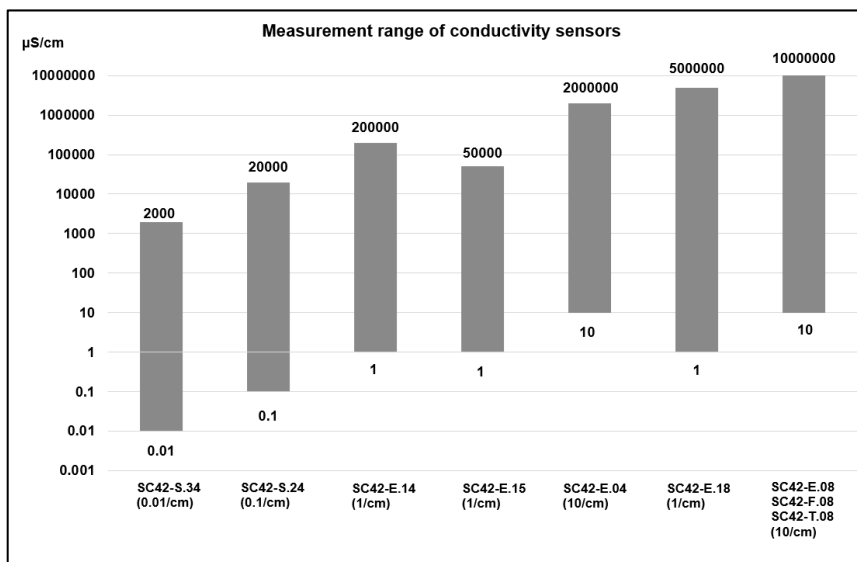
## 2.5 Dynamic specifications

|                                         |                                 |            |
|-----------------------------------------|---------------------------------|------------|
| Response time temperature ( $t_{90}$ ): | SC41/SC42/SC49-SP24 -SV24       | : < 3 min. |
|                                         | SC41/SC42/SC49-SP34 -SV34       | : < 1 min. |
|                                         | SC41/SC42/SC49-EP04 -EP08       | : < 3 min. |
|                                         | SC41/SC42/SC49-EP14 -EP18       | : < 2 min. |
|                                         | SC41/SC42/SC49-EP15 -EV15 -EP16 | : < 3 min. |
|                                         | SC41/SC42/SC49-FP08/FV08        | : < 1 min. |
|                                         | SC41/SC42/SC49-TP08/TV08        | : < 1 min. |

## 2.6 Operating range

Conductivity range<sup>3</sup> at actual process temperature : 1  $\mu\text{S}$  x C.C. – 200 mS x C.C.  
See Fig. 1

**Note 3** : measurement range dependent on input range analyzer.



**Fig. 1** Measuring range of conductivity sensors section

Temperature @ 1 Bar (14.5 PSIG) : SC41/SC42/SC49  
 -SP : 0 °C to 150 °C (32 °F to 302 °F)  
 -SV : 0 °C to 125 °C (32 °F to 257 °F)  
 -EP/EV : 0 °C to 110 °C (32 °F to 230 °F)  
 -FP/FV : 0 °C to 110 °C (32 °F to 230 °F)  
 -TP/TV : 0 °C to 110 °C (32 °F to 230 °F)

Pressure @ 25 °C : SC41/SC42/SC49  
 -SP/SV : 0 to 10 bar (0 to 142 PSIG)  
 -EP/EV : 0 to 10 bar (0 to 142 PSIG)  
 -FP/FV : 0 to 10 bar (0 to 142 PSIG)<sup>4</sup>  
 -TP/TV : 0 to 2 bar (0 to 28 PSIG)

**Note 4** : Pressure range for FP/FV is temperature dependent, see Figure 2

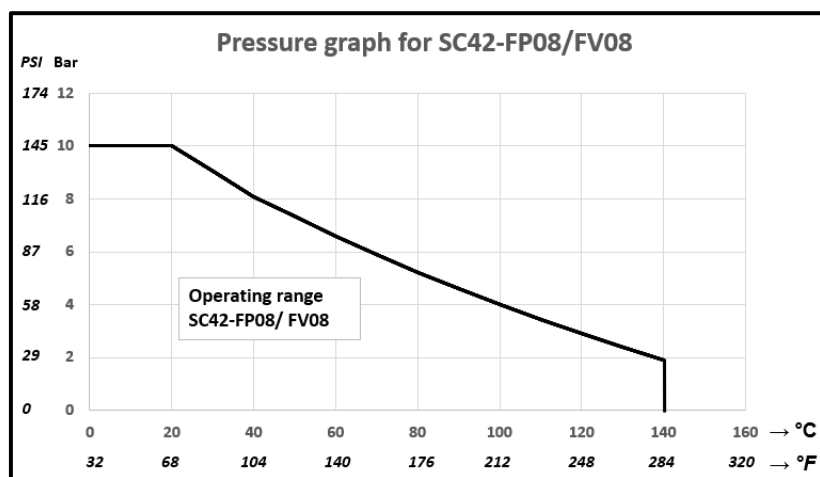


Figure 2: Pressure vs Temperature

## 2.7 Shipping details

|                       |                                              |                                   |                               |                               |                                |
|-----------------------|----------------------------------------------|-----------------------------------|-------------------------------|-------------------------------|--------------------------------|
| Package size (LxWxH)  | 300 x 100 x 75 mm<br>(11.8 x 3.9 x 3.0 inch) |                                   |                               |                               |                                |
| Package weight (max.) | -EP.4<br>0.50 kg<br>(1.1 lbs)                | -EP(V)15<br>0.30 kg<br>(0.66 lbs) | -FP08<br>0.45 kg<br>(1.0 lbs) | -SP24<br>0.80 kg<br>(1.8 lbs) | -SP34<br>0.65 kg<br>(1.43 lbs) |

## 2.8 Environmental conditions

|                                            |                                        |
|--------------------------------------------|----------------------------------------|
| Storage temperature                        | : -30 °C to +50 °C (-22 °F to +122 °F) |
| Ingress Protection Type Amphenol connector | : IP65 (conform IEC 60529)             |
| Ingress Protection Type VarioPin           | : IP67 (conform IEC 60529)             |

## 2.9 Regulatory standards

### Equipment ratings:

| Item                                                                                                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Values                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Electrical parameters                                                                                 | Max. input voltage<br>Max. input current<br>Max. input power<br>Max. internal capacitance<br>Max. internal inductance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | $U_i = 14.4 \text{ VDC}$<br>$I_i = 116.5 \text{ mA}$<br>$P_i = 342.4 \text{ mW}$<br>$C_i = 0.0 \text{ nF}$ for connector types without ID-chip<br>$\quad = 0.4 \text{ nF}$ for connector types with ID-chip<br>$L_i = 0.0 \text{ mH}$ for connector types<br>$L_i = 0.1 \text{ mH}$ for permanent cable types            |
| Temperature class                                                                                     | T6<br>T5<br>T4<br>T3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | $-30^\circ\text{C} \leq T_a \leq +40^\circ\text{C}$<br>$-30^\circ\text{C} \leq T_a \leq +95^\circ\text{C}$<br>$-30^\circ\text{C} \leq T_a \leq +130^\circ\text{C}^{5)}$<br>$-30^\circ\text{C} \leq T_a \leq +165^\circ\text{C}^{5)}$<br><b>Note 5 :</b> Connector types with ID-chip are limited to $+125^\circ\text{C}$ |
| Specific conditions of use                                                                            | <p>Potential electrostatic charging hazard:<br/>Contact 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.<br/>Use a damp cloth for cleaning the equipment.</p> <p>Potential ignition hazard:<br/>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.</p> |                                                                                                                                                                                                                                                                                                                          |
| <br><b>WARNING</b>   | Electrostatic charges of the sensor enclosure parts 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.                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                          |
| <br><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                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                          |

Models without ID-chip (-\*P\*\* type):

I/O signals are from/to an associated intrinsically safe certified SC transmitter (e.g. Yokogawa transmitter Model FLX21/FLX202 series or Yokogawa transmitter Model SC202S series).

Models with ID-chip (-\*V\*\* type):

I/O signals are from/to an associated intrinsically safe certified SC transmitter, Yokogawa Smart Adapter Model SA11-C1.

**Regulatory compliances:**

| Item               | Description, Approval, Certification                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LVD <sup>6,7</sup> | ANSI/ISA 61010-1<br>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>6</sup>   | EU Directive 2011/68/EU applying Article 4.3: Sound Engineering Practice.                                                                                                                                                                                                                                                                                                                                                  |
| WEEE               | EU directive 2012/19/EU<br>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.<br>The sensor should be disposed in accordance with applicable national legislations/regulations respectively. |
| ATEX (EU)          | EU Directive 2014/34/EU<br>ATEX approval: DEKRA 14ATEX0074 X*<br><b>CE</b> <sub>0344</sub><br>SC42:  II 1 G Ex ia IIC T3...T6 Ga<br>Applied standards:<br><ul style="list-style-type: none"> <li>• EN IEC 60079-0</li> <li>• EN 60079-11</li> </ul>                                                                                       |
| IECEX              | IECEX approval: IECEX DEK 14.0032X*<br>SC42: Ex ia IIC T3...T6 Ga<br>Applied standards:<br><ul style="list-style-type: none"> <li>• IEC 60079-0</li> <li>• IEC 60079-11</li> </ul>                                                                                                                                                                                                                                         |

\* See: Specific conditions of use

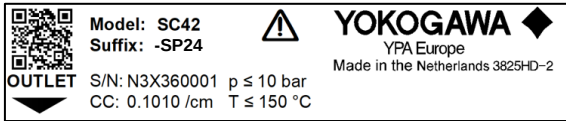
**Note 6** : Damaging the screw thread or process connection (e.g. flange) of the sensor might influence the maximum process pressure.

**Note 7** : Sensor SC42-F\*\*\* and SC42-T\*\*\* contains glass parts which if broken can cause cutting injuries.

| Item                  | Description, Approval, Certification                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FM<br>(Canada)        | FM approval Canada: FM20CA0062X<br>SC42: IS SI CL I, DIV1, GPABCD, T3...T6; CL I, ZN0, Ex ia IIC, T3...T6 Ga<br>Control Drawing: D&E 2020-024-A51<br>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>                                                                                                                |
| FM<br>(United States) | FM approval United States: FM20US0123X<br>SC42: IS CL I, DIV1, GPABCD, T3...T6; CL I, ZN0, AEx ia IIC, T3...T6 Ga<br>Control Drawing: D&E 2020-024-A50<br>Applied standards: <ul style="list-style-type: none"> <li>• FM Class 3600</li> <li>• FM Class 3610</li> <li>• ANSI/ISA 60079-0</li> <li>• ANSI/ISA 60079-11</li> <li>• ANSI/ISA 61010-1</li> </ul>                                                                                    |
| NEPSI<br>(China)      | NEPSI approval: GYJ21.2892X<br>SC42: Ex ia IIC T3...T6 Ga<br>Applied standards: <ul style="list-style-type: none"> <li>• GB 3836.1</li> <li>• GB 3836.4</li> <li>• GB 3836.20</li> </ul>                                                                                                                                                                                                                                                        |
| PESO<br>(India)       | PESO approval: PESO approval is based on ATEX approval<br>DEKRA 141ATEX0074 X, iss. 2 – 29.11.2019<br>Equipment reference numbers: P512759/1<br>Applied standards: <ul style="list-style-type: none"> <li>• EN IEC 60079-0</li> <li>• EN 60079-11</li> </ul>                                                                                                                                                                                    |
| TS<br>(Taiwan)        | TS approval: TS Safety Label is based on IECEx approval IECEx DEK 14.0032X<br>Identification Number: TD04000C<br>Applied standards: <ul style="list-style-type: none"> <li>• IEC 60079-0</li> <li>• IEC 60079-11</li> </ul>                                                                                                                                                                                                                     |
| KCs<br>(Korea)        | Korea Ex certificates: Korea Ex certificate is based on IECEx approval IECEx DEK 11.0064X, iss. 1 and applicable for the following models:<br>SC42-*G**: 21-KA4BO-0419X<br>SC42-*K**: 21-KA4BO-0420X<br>Applied standards: <ul style="list-style-type: none"> <li>• IEC 60079-0</li> <li>• IEC 60079-11</li> <li>• KS C IEC 60079-14</li> </ul> For specific conditions of use see certificate<br>Note: Models with ID-chip, Ta is up to +125°C |
| EAC Ex<br>(Russia)    | EAC Ex certificate: RU C-NL.AA87.B.00754<br>SC42: 0Ex ia IIC T6...T3 Ga X<br>Applied standards: <ul style="list-style-type: none"> <li>• GOST 31610.0 (IEC 60079-0)</li> <li>• GOST 31610.11 (IEC 60079-11)</li> <li>• GOST IEC 60079-14</li> </ul>                                                                                                                                                                                             |

### 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 3.



**Figure 3: Sensor product label**

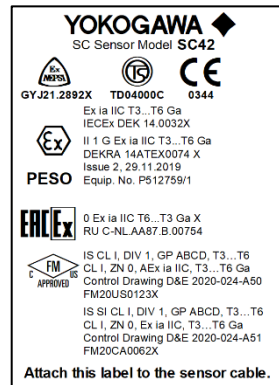
### Remarks:

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.

For sensors with Intrinsic Safety or other certification (like SC42) a separate plastic label card is provided. (For example, see figure 4)

This label contains information on IS for:

- ATEX
- IECEx
- FM-United States
- FM-Canada
- EACEx
- PESO
- TS
- CE
- NEPSI



**Figure 4: Product label certifications**

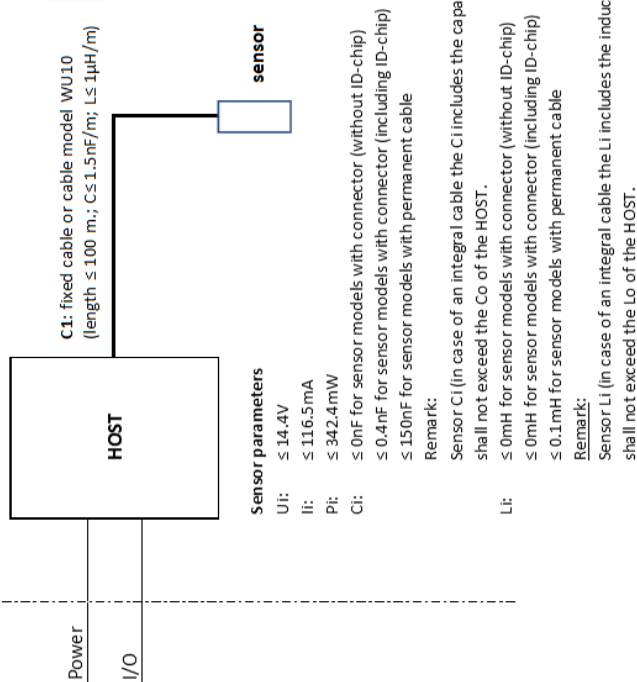
Hazardous Location

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

CL I, ZN O, 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



## 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:  $U_o = 14.4\text{ V}$ ,  $I_o = 116.5\text{ mA}$ ,  $P_o = 342.4\text{ mW}$ .
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:

**Table 3:**

| Model | Suffix Codes                 | Option Codes                                                                                                                      |
|-------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| SC42  | -abcd                        | /e                                                                                                                                |
| a     | Material:                    | E Epoxy<br>S Stainless Steel<br>F PVDF<br>T PTFE                                                                                  |
| b     | Connection type<br>+ Region: | P Connector without ID-chip,<br>IS for ATEX/IECEX, FM-US, FM-CAN<br>V Connector with ID-chip,<br>IS for ATEX/IECEX, FM-US, FM-CAN |
| c     | Cell Constant:               | One alphanumeric characters<br>(A to Z, 0 to 9 or a hyphen)                                                                       |
| d     | Measuring type:              | One alphanumeric characters<br>(A to Z, 0 to 9 or a hyphen)                                                                       |
| e     | Option code:                 | Up to ten alphanumeric characters<br>(A to Z, 0 to 9 or hyphen)                                                                   |

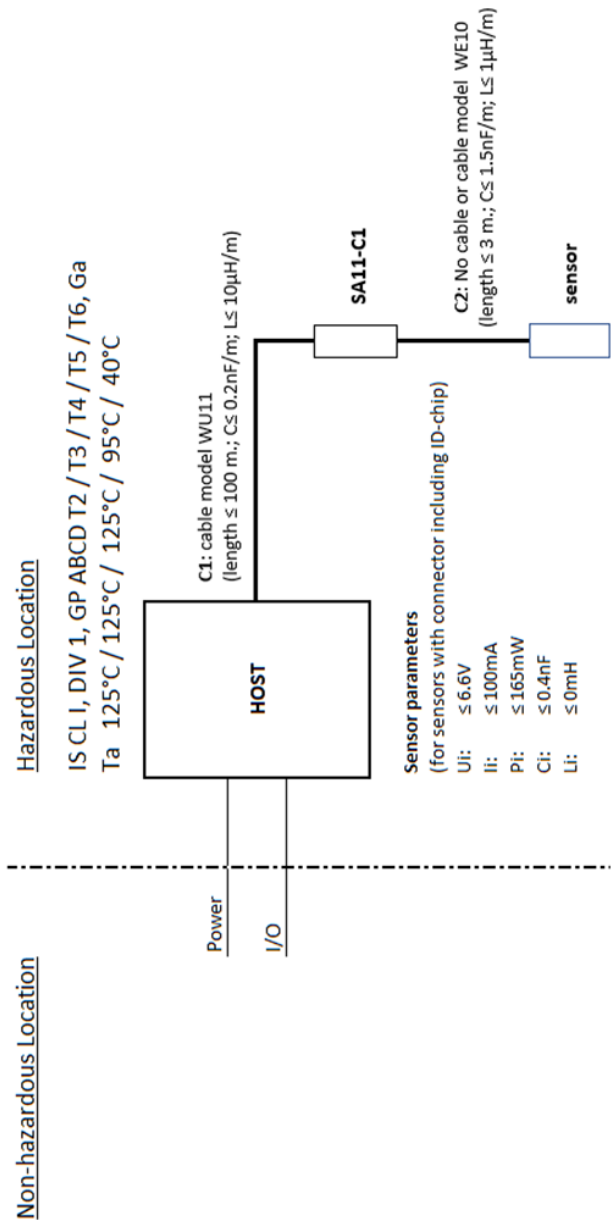
6. **WARNING—POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS**

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.

FM-US Control drawing: D&E 2020-024-A50 (part 2)



## 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:

**Table 4**

| Model | Suffix Codes                 | Option Codes                                                    |
|-------|------------------------------|-----------------------------------------------------------------|
| SC42  | -abcd                        | /e                                                              |
| a     | Material:                    | E Epoxy<br>S Stainless Steel<br>F PVDF<br>T PTFE                |
| b     | Connection type<br>+ Region: | V Connector with ID-chip,<br>IS for ATEX/IECEx, FM-US, FM-CAN   |
| c     | Cell Constant:               | One alphanumeric characters<br>(A to Z, 0 to 9 or a hyphen)     |
| d     | Measuring type:              | One alphanumeric characters<br>(A to Z, 0 to 9 or a hyphen)     |
| e     | Option code:                 | Up to ten alphanumeric characters<br>(A to Z, 0 to 9 or hyphen) |

6. **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.

### Non-hazardous Location

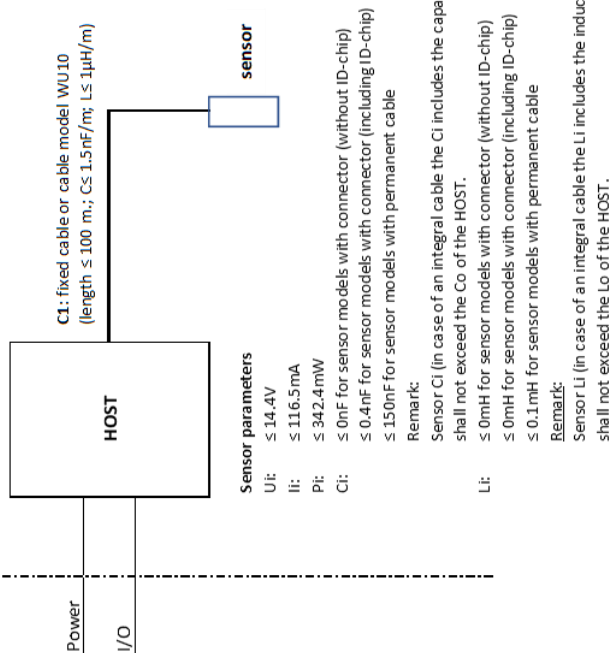
### Hazardous Location

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

CLI, ZNO, Exia 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



## 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:  $U_o = 14.4 \text{ V}$ ,  $I_o = 116.5 \text{ mA}$ ,  $P_o = 342.4 \text{ mW}$ .
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:

**Table 5**

| Model | Suffix Codes                 | Option Codes                                                                                                                      |
|-------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| SC42  | -abcd                        | /e                                                                                                                                |
| a     | Material:                    | E Epoxy<br>S Stainless Steel<br>F PVDF<br>T PTFE                                                                                  |
| b     | Connection type<br>+ Region: | P Connector without ID-chip,<br>IS for ATEX/IECEX, FM-US, FM-CAN<br>V Connector with ID-chip,<br>IS for ATEX/IECEX, FM-US, FM-CAN |
| c     | Cell Constant:               | One alphanumeric characters<br>(A to Z, 0 to 9 or a hyphen)                                                                       |
| d     | Measuring type:              | One alphanumeric characters<br>(A to Z, 0 to 9 or a hyphen)                                                                       |
| e     | Option code:                 | Up to ten alphanumeric characters<br>(A to Z, 0 to 9 or hyphen)                                                                   |

6. **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.

**AVERTISSEMENT – DANGER POTENTIEL DE CHARGES ÉLECTROSTATIQUES – VOIR LES INSTRUCTIONS**

Les sondes de conductivité de contact contenant des pièces en plastique accessibles et / ou des pièces conductrices externes doivent être installées et utilisées de manière à éviter tout risque d'inflammation dû à des charges électrostatiques dangereuses, en particulier dans le cas où le fluide de procédé n'est pas conducteur.

**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.

**AVERTISSEMENT – RISQUE POTENTIEL D'ALLUMAGE – VOIR LES INSTRUCTIONS**

Les capteurs de conductivité de contact contenant des métaux légers doivent être installés et utilisés de telle sorte que, même en cas d'incidents rares, les sources d'allumage dues aux chocs et aux étincelles de friction soient exclues.

IS CL I, DIV 1, GP ABCD T2 / T3 / T4 / T5 / T6, Ga  
Ta 125°C / 125°C / 125°C / 95°C / 40°C



0/1

**C1:** cable model WU11  
(length  $\leq 100$  m.;  $C \leq 0.2$  nF/m;  $L \leq 10$   $\mu$ H/m)

SA11-C1

**Sensor parameters**  
(for sensors with connector including ID-chip)

Ui:  $\leq 6.6V$

- ii:  $\leq 100\text{mA}$

Pi:  $\leq 165\text{mW}$

Ci:  $\leq 0.4\text{nF}$ 
$$\text{Li:} \quad \text{Hw0} \geq$$

C2: No cable or cable model WE10  
(length  $\leq 3$  m.;  $C \leq 1.5$  nF/m;  $L \leq 1$   $\mu$ H/m)

**sensor**

## 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:

**Table 6:**

| Model | Suffix Codes                 | Option Codes                                                    |
|-------|------------------------------|-----------------------------------------------------------------|
| SC42  | -abcd                        | /e                                                              |
| a     | Material:                    | E Epoxy<br>S Stainless Steel<br>F PVDF<br>T PTFE                |
| b     | Connection type<br>+ Region: | V Connector with ID-chip,<br>IS for ATEX/IECEx, FM-US, FM-CAN   |
| c     | Cell Constant:               | One alphanumeric characters<br>(A to Z, 0 to 9 or a hyphen)     |
| d     | Measuring type:              | One alphanumeric characters<br>(A to Z, 0 to 9 or a hyphen)     |
| e     | Option code:                 | Up to ten alphanumeric characters<br>(A to Z, 0 to 9 or hyphen) |

6. 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.

**AVERTISSEMENT – DANGER POTENTIEL DE CHARGES ÉLECTROSTATIQUES – VOIR LES INSTRUCTIONS**

Les sondes de conductivité de contact contenant des pièces en plastique accessibles et / ou des pièces conductrices externes doivent être installées et utilisées de manière à éviter tout risque d'inflammation dû à des charges électrostatiques dangereuses, en particulier dans le cas où le fluide de procédé n'est pas conducteur.

**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.

**AVERTISSEMENT – RISQUE POTENTIEL D'ALLUMAGE – VOIR LES INSTRUCTIONS**

Les capteurs de conductivité de contact contenant des métaux légers doivent être installés et utilisés de telle sorte que, même en cas d'incidents rares, les sources d'allumage dues aux chocs et aux étincelles de friction soient exclues.

### 3. INSTALLATION OF SC41/SC42/SC49 sensors

To install the SC41/SC42/SC49 conductivity sensors in a permanent or semi-permanent location, Yokogawa can supply a range of flow and immersion fittings. These fittings and sub-assemblies are available in different materials to give the best solution for any process considering chemical resistance, pressure and temperature specifications. Flow fittings are available with optional flange adapters. When installing the SC41/SC42/SC49 sensor in a fitting, an O-ring is necessary. This O-ring is available in different materials to improve chemical resistance (see Section 8 for ordering information).

If the SC41/SC42/SC49 sensor is supplied with an O-ring, the O-ring in the fitting must be removed.

#### 3.1 Typical installation of SC41/SC42/SC49 sensor in FD40 Immersion fitting

The immersion fittings are for installing the SC41/SC42/SC49 sensor in tanks, open vessels or drains. If the fitting is mounted in a tank with agitator or if it is placed in a fast-flowing process, care must be taken that the fitting is adequately supported. For this reason, mounting several flanges can be ordered. For more detailed information see GS and IM of Immersion fitting, Flow fittings and sub-assemblies for series FF40, FS40 FD40.

#### 3.2 Typical installation in FF40 Flow fittings/ FS40 Flow fitting assemblies

From a practical point of view, the best mounting place for a conductivity sensor is in a bypass with a sample valve. For these applications the following Flow fittings/Flow fitting subassemblies are ideal

- : Model FF40; Flow fitting
- : Model FS40: Flow fitting subassembly

When using the sensor in combination with a Flow fitting or Flow fitting subassembly, the process flow must be considered when mounting the sensor. For an example see figure 5.

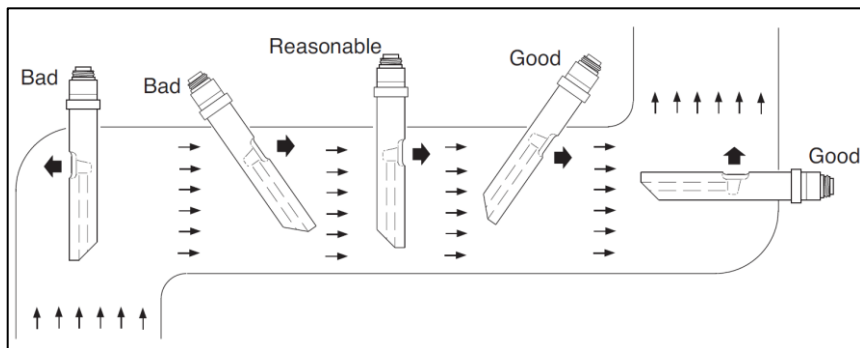
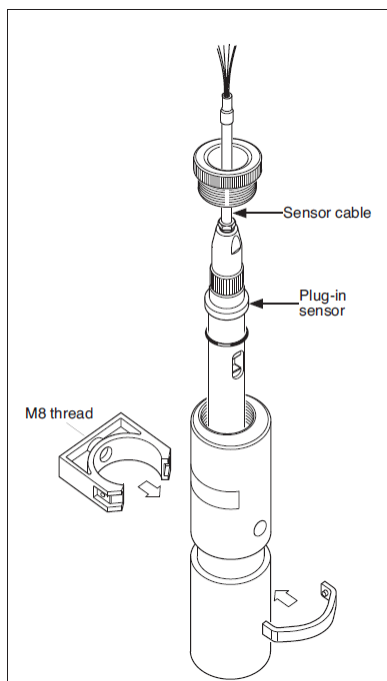
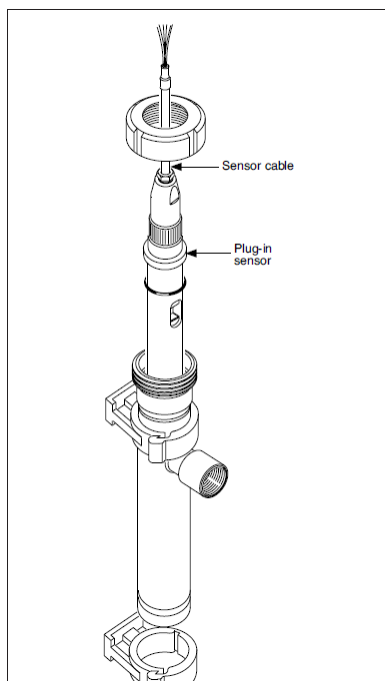


Figure 5: Mounting position SC41/SC42/SC49 sensor

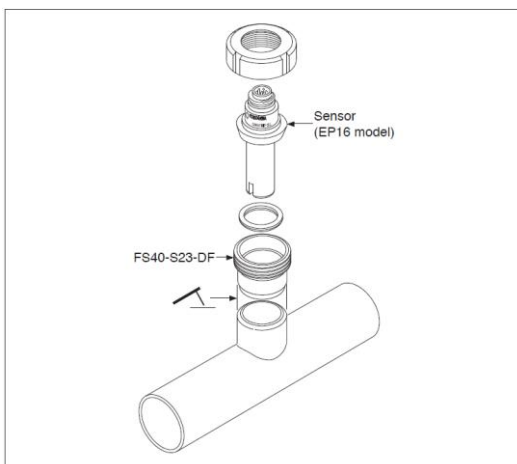


**Fig. 6 Installation SC41/SC42/SC49 in FF40-P22/FF40-V22 \*)**



**Fig. 7 Installation SC41/SC42/SC49 in FF40-S22 \*)**

\* Not possible for sensors with suffix code -EP16



**Fig. 8 Installation example of the SC41/SC42-EP16 sensor with a FS40-S23-DF subassembly**

4. DIMENSIONS

Dimensions in mm (inches)

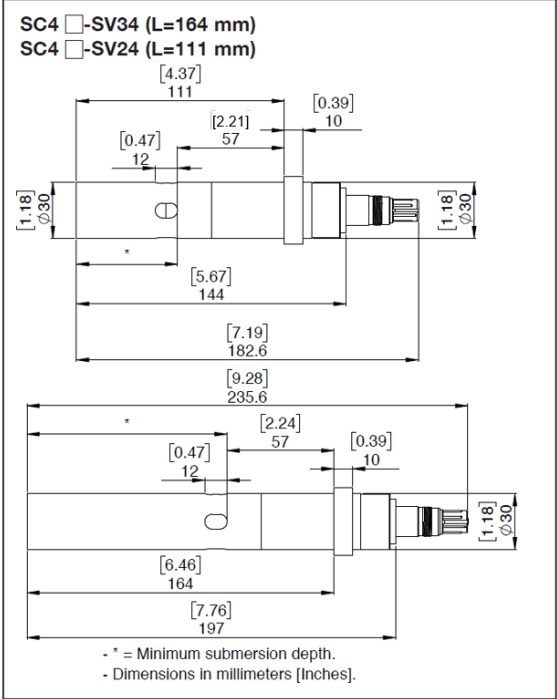
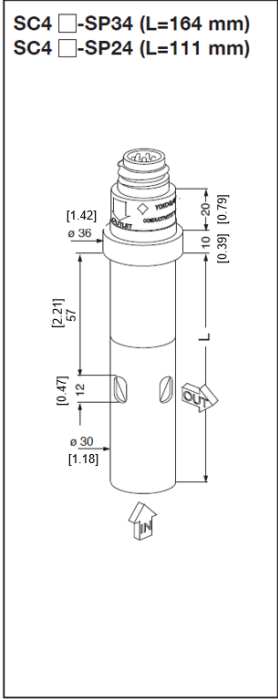


Fig. 9 Dimensions SC4□-SP

Fig. 10 Dimensions SC4□-SV

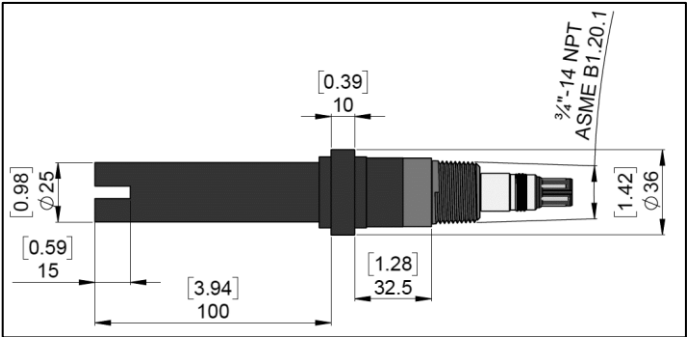


Fig. 11 Dimensions SC42-EV15

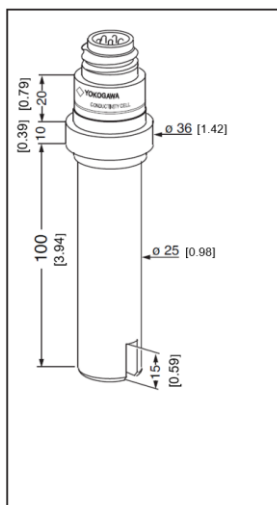


Fig. 12 SC41/SC42-EP15

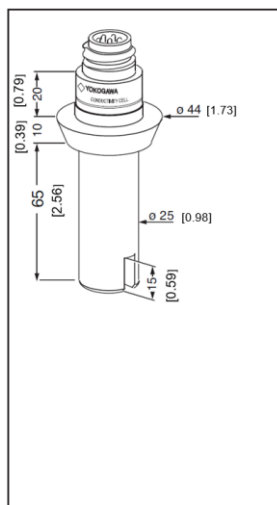


Fig. 13 SC41/SC42-EP16

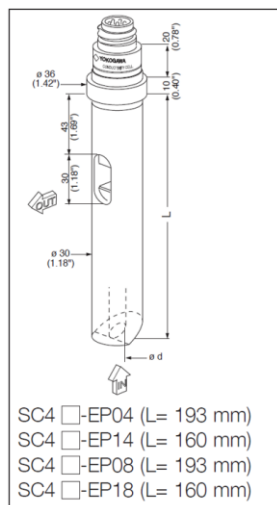
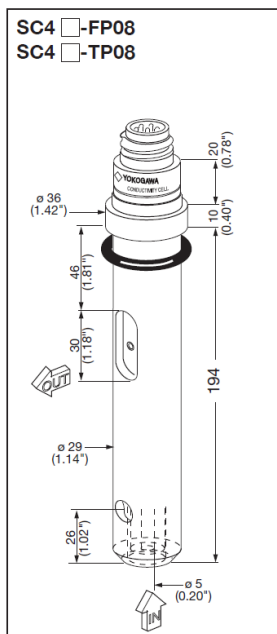
Fig. 14 SC4□-EP14 (EP18)  
SC4□-EP04 (EP08)

Fig. 15 Dimensions SC4□-FP/TP

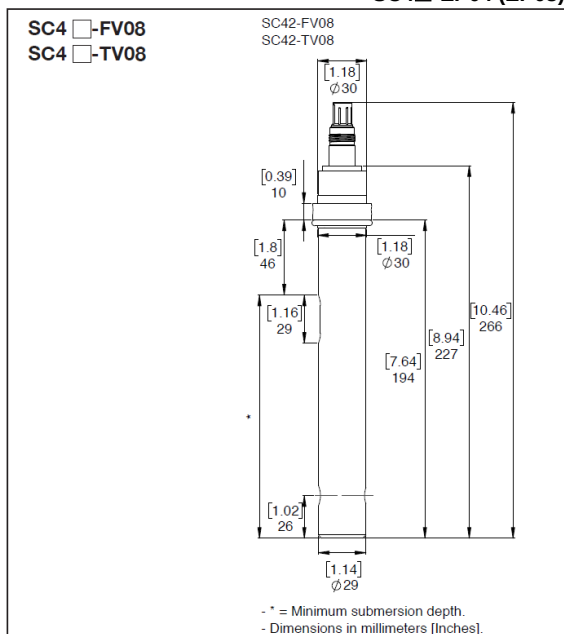


Fig. 16 Dimensions SC4□-FV-TV

## 5. WIRING

The SC41, SC42 and SC49 sensors are provided with two type of fixed connectors. The standard cable used to connect the sensor with Amphenol connector to the analyzer is the WU40. These cables are available up to 25 meters.

The standard cable used to connect the sensor with VP connector to the analyzer is the WU10 or WE10. These cables are available up to 20 meters.

When a longer cable run is necessary (maximum cable run is 60 meter for the analog sensor setup), this can be done by using the WF10/WE10 extension cable in combination with the BA10 connection box.

The connection of the WU40 cable (+ BA10 connection box with WE10/WF10 cable) to the Yokogawa Contact Conductivity analyzer are given in table 7.

When even longer cable runs are required, we recommend to use the digital SENCOM concept where cables runs up to 200 meter are possible.

This can be done using the Vario Pin sensor types in combination with a SA11 Smart adapter, WU11 digital connection cables and BA11 Active Junction Box.

For a complete overview of products and possibilities for connecting multiple sensors to a host using the digital SENCOM concept: Please see: SA11 GS12A06S01-00EN

### 5.1 Connecting conductivity sensor to analog host system

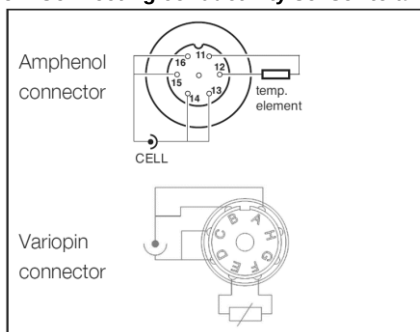


Fig. 17 Top view 2-electrode system

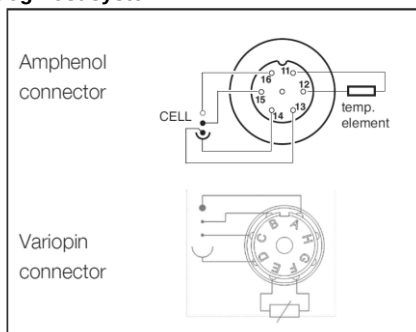


Fig. 18 Top view 4- electrode system

Table 7: Definition WU40 (+ BA10 with WF10/WE10) and analyzer

| Cable wire color WU40 | Cable wire color WF10 / WE10 | Terminal / wire # | Signal Description   |
|-----------------------|------------------------------|-------------------|----------------------|
| White                 | Red                          | 11                | Temperature          |
| Brown                 | Blue                         | 12                | Temperature          |
| Green                 | White (Core of coax)         | 13                | Uo (outer electrode) |
| Yellow                | White (Shield of core)       | 14                | Io (outer electrode) |
| Black                 | Brown (Core of coax)         | 15                | Ui (inner electrode) |
| Pink                  | Brown (Shield of core)       | 16                | li (inner electrode) |

**Table 8: Definition VP sensor cable, WU10/WE10 with analyzers**

| VP connector | Cable wire color<br>WU10-V-D <sup>8/9</sup> / WE10-H-D 8 | Terminal<br>/ wire # | Signal Description   |
|--------------|----------------------------------------------------------|----------------------|----------------------|
| A            | Brown (Core of coax)                                     | 15                   | Ui (inner electrode) |
| B            | Brown (Shield of core)                                   | 16                   | li (inner electrode) |
| C            | White (Core of coax)                                     | 16                   | Uo (outer electrode) |
| D            | White (Shield of core)                                   | 14                   | lo (outer electrode) |
| E            | Red                                                      | 11                   | Temperature          |
| F            | Blue                                                     | 12                   | Temperature          |
| G            | Yellow                                                   | ///                  | VCC ID chip          |
| H            | Green                                                    | ///                  | Data ID chip         |
| Drain wire   | Black                                                    | 63 / Gnd             | Overall shield       |

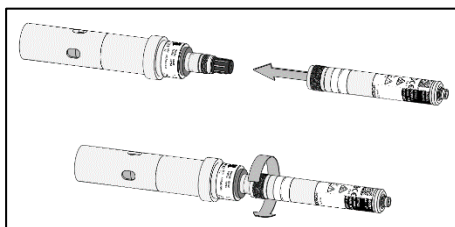
**Note 8** : WF10 and WU10 have the same color definition, therefore connection to a BA10 can be done connecting corresponding colors.

**Note 9** : Preferred connection cable is Yokogawa Model WU10-V-D or Model WE10

## 5.2 Connecting conductivity sensor to the digital SENCOM smart adapter SA11

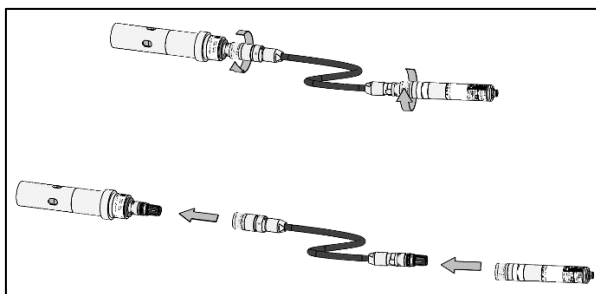
### Direct mounting of the sensor to SA11

The SA11 can be installed directly on top of the Yokogawa labelled sensor by means of the Variopin connection system. In this case the temperature limit of the device is determined by the process temperature, limited from -30 °C to +125 °C.

**Fig. 19 Sensor + SA11 Smart adapter**

### Cable mounting

When there is less room to install the SA11 on top of the Yokogawa labelled sensor or when the process conditions are higher than +125 °C, an alternative mounting method is to install the SA11 using the optional wall/pipe mounting hardware. The SA11 in this case is connected to the sensor using the dedicated extension cable model WE10 with a fixed length of 2.99 meter. The ambient temperature limit of the device must be within -30 °C to +55 °C.

**Fig. 20 Example of cable mounting of Sensor to SA11**

Use the correct Variopin cable. For correct measurement without loss of specification the SA11-C1 must be used with WE10-H-D-003-V2.

## 6. GENERAL CALIBRATION & MAINTENANCE PROCEDURE

### 6.1 Calibration of the sensor

The conductivity sensors are factory calibrated traceable to NIST standards. The cell constant values are indicated on the sensor or on the integral cable of the sensor. The cell constant value can be entered directly in the Yokogawa analyzer. The procedure is explained in the Instruction Manual of the analyzer<sup>10</sup>. If the sensor has been subject to abrasion (erosion or coating) in the process, re-calibration of the sensor may be necessary. Refer to the Instruction Manual of the analyzer for a detailed description.

**Note 10 :** During calibration the temperature compensation is still active. This means that the display reading refers to the default reference temperature (25 °C). Calculations for calibrations (CC, TC, or temp) make use of the uncompensated raw measurement data.

Calibration is normally carried out by measuring a solution with a known conductivity value at a known temperature. These solutions are commercially available. You can make your own solution by dissolving an amount of salt in water. Table 9 and 10 show some typical conductivity values for Sodium Chloride (NaCl) and Potassium Chloride (KCl) solutions which can be made, preferably in a laboratory. The tables are derived from the standards laid down in 'International Recommendation No. 56 of the Organisation Internationale de Métrologie Legale'.

### 6.2 Periodic maintenance of the sensor

In general conductivity sensors do not need much periodic maintenance. In case the sensor has become fouled, an insulating layer may be formed on the surface of the electrodes, and consequently giving a measuring error. Cleaning the sensor will solve this

problem. Effective cleaning methods are given below<sup>11</sup>:

1. Normal applications: hot water with some commercially available washing-up liquid.
2. Lime, hydroxides or similar applications: 5 % solution of hydrochloride acid.
3. Organic (e.g. oils, fats) applications: alcohol or iso-propanol.
4. Algae, bacteria or fungus: solution of commercially available bleach (hypochlorite).

**Note 11 :** Read the instructions on the package of the cleaning agents for safe use.

**Table 9: Conductivity values of KCl at 25 °C (OIML)**

| Weight % | Molal (m) | mg of KCl / kg of sol. | Conduct. in mS/cm |
|----------|-----------|------------------------|-------------------|
| 0.3      | 0.001     | 74.66                  | 0.1469            |
| 0.5      | 0.002     | 149.32                 | 0.2916            |
| 1        | 0.005     | 373.29                 | 0.7182            |
| 3        | 0.01      | 745.263                | 1.4083            |
| 5        | 0.1       | 7419.13                | 12.852            |
| 10       | 1.0       | 71135.2                | 111.31            |

**Table 10: NaCl values @ 25 °C (IEC 746-1)**

| Weight % | mg/kg  | Conductivity |
|----------|--------|--------------|
| 0.001    | 10     | 21.4 µS/cm   |
| 0.003    | 30     | 64.0 µS/cm   |
| 0.005    | 50     | 106 µS/cm    |
| 0.01     | 100    | 210 µS/cm    |
| 0.03     | 300    | 617 µS/cm    |
| 0.05     | 500    | 1.03 mS/cm   |
| 0.1      | 1000   | 1.99 mS/cm   |
| 0.3      | 3000   | 5.69 mS/cm   |
| 0.5      | 5000   | 9.48 mS/cm   |
| 1        | 10000  | 17.6 mS/cm   |
| 3        | 30000  | 48.6 mS/cm   |
| 5        | 50000  | 81.0 mS/cm   |
| 10       | 100000 | 140 mS/cm    |

## 7. MODEL CODES

**Table 10:**

| Model Code     | Suffix code                                  | Description                                                                                                                                                                                                                                                                                                                         |
|----------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SC41<br>(SC49) |                                              | Conductivity Sensor 2- or 4- electrodes + Ni100                                                                                                                                                                                                                                                                                     |
| SC42           |                                              | Conductivity Sensor 2- or 4- electrodes + Pt1000                                                                                                                                                                                                                                                                                    |
| Materials      | -E<br>-S<br>-F<br>-T                         | Epoxy / graphite<br>Stainless steel AISI 316L / PEEK<br>PVDF / Glass / Platinum<br>PTFE / Glass / Platinum                                                                                                                                                                                                                          |
| Mounting       | G <sup>12</sup><br>K<br>P<br>V <sup>12</sup> | Plug-in type, Vario Pin connector with SENCOM ID-chip; IS for KCs<br>Plug-in type, plug-socket connector; IS for KCs<br>Plug-in type, plug-socket connector; IS for ATEX/IECEX/FM-US/FM-CAN /NEPSI /PESO /TS /EACEx<br>Plug-in type, Vario Pin connector with SENCOM ID-chip; IS for ATEX/IECEX/FM-US/FM-CAN /NEPSI /PESO/TS/EACEx. |
| Cell constant  | 0<br>1<br>2<br>3                             | CC = 10 cm-1<br>CC = 1 cm-1<br>CC = 0.1 cm-1<br>CC = 0.01 cm-1                                                                                                                                                                                                                                                                      |
| Type           | 4<br>5<br>6<br>8                             | 2-electrode, flow cell<br>2-electrode, insertion cell<br>2-electrode, insertion cell with DN25 collar<br>4-electrode, flow cell                                                                                                                                                                                                     |
| Options        |                                              | N/A                                                                                                                                                                                                                                                                                                                                 |

**Note 12** : Suffix G and V not in combination with suffix -E (Epoxy), except -EG15 and -EV15.

## 8. SPARE PARTS

**Table 11:**

| Spare part |         | Description                   |
|------------|---------|-------------------------------|
| K1500AG    | O-rings | O-rings Viton 29.74x3.53 (5)  |
| K1500AH    |         | O-ring FFKM 29.74x3.53        |
| K1500AK    |         | O-rings EPDM 29.74x3.53 (5)   |
| K1500FX    |         | O-rings Sil 70 29.74x3.53 (5) |
| K1500HE    |         | O-ring set silicon, FS40-S23  |
| K1522PS    | Fitting | Protection Sleeve 3/4" NPT    |

## 9. CHEMICAL COMPATIBILITY CHART

Table12:

|                 |                      |         | Material |          |  |        |    |     |      |    |     |                |    |     |    |    |     |    |           |   |   |   |   |
|-----------------|----------------------|---------|----------|----------|--|--------|----|-----|------|----|-----|----------------|----|-----|----|----|-----|----|-----------|---|---|---|---|
|                 |                      |         | Viton    |          |  | Kalrez |    |     | EPDM |    |     | Silicon Rubber |    |     |    |    |     |    |           |   |   |   |   |
|                 |                      |         | Conc. %  | Temp. °C |  | 20     | 60 | 100 | 20   | 60 | 100 | 20             | 60 | 100 | 20 | 60 | 100 | Ti | SS 316(l) |   |   |   |   |
| Inorganic acid  | Sulfuric acid        | 10      |          |          |  | O      | O  | O   | O    | O  | O   | O              | O  | O   | O  | O  | O   | -  | -         | - | X | X | X |
|                 |                      | 50      |          |          |  | O      | O  | O   | O    | O  | O   | X              | -  | -   | -  | -  | -   | -  | -         | X | X | X |   |
|                 |                      | 95      |          |          |  | O      | O  | O   | O    | O  | X   | -              | -  | -   | -  | -  | -   | -  | -         | X | X | X |   |
|                 |                      | fuming  |          |          |  | O      | O  | O   | O    | O  | O   | -              | -  | -   | -  | -  | -   | -  | -         | - | - | - |   |
|                 | Hydrochloric acid    | 10      |          |          |  | O      | O  | O   | O    | O  | X   | O              | O  | O   | X  | -  | -   | -  | -         | - | - | - |   |
|                 |                      | sat.    |          |          |  | O      | O  | O   | O    | O  | X   | X              | X  | X   | X  | -  | -   | -  | -         | - | - | - |   |
|                 | Nitric acid          | 25      |          |          |  | O      | O  | X   | O    | O  | O   | O              | O  | X   | -  | O  | O   | X  | O         | O | X | X | X |
|                 |                      | 50      |          |          |  | -      | -  | -   | O    | O  | O   | -              | -  | -   | X  | -  | -   | O  | O         | O | X | X | X |
|                 |                      | 95      |          |          |  | -      | -  | -   | O    | O  | X   | -              | -  | -   | -  | -  | -   | O  | O         | O | O | O | O |
|                 |                      | fuming  |          |          |  | -      | -  | -   | O    | O  | X   | -              | -  | -   | -  | -  | -   | -  | -         | - | O | O | O |
|                 | Phosphoric acid      | 25      |          |          |  | O      | O  | O   | O    | O  | O   | O              | O  | O   | O  | O  | X   | X  | X         | - | - | - | - |
|                 |                      | 50      |          |          |  | O      | O  | O   | O    | O  | O   | O              | O  | O   | O  | O  | X   | X  | -         | - | X | X | X |
|                 |                      | 95      |          |          |  | X      | X  | -   | O    | O  | O   | O              | O  | O   | X  | X  | X   | -  | -         | O | O | X | O |
|                 | Hydrofluoric acid    | 40      |          |          |  | O      | O  | O   | O    | O  | X   | -              | -  | -   | -  | -  | -   | -  | -         | - | - | - | - |
|                 |                      | 75      |          |          |  | O      | O  | X   | O    | O  | X   | -              | -  | -   | -  | -  | -   | -  | -         | - | - | - | - |
| Organic acid    | Acetic acid          | 10      |          |          |  | -      | -  | -   | O    | O  | O   | O              | O  | O   | O  | O  | O   | O  | O         | O | O | X |   |
|                 |                      | glacial |          |          |  | -      | -  | -   | O    | O  | O   | X              | X  | X   | O  | O  | O   | O  | O         | O | O | X |   |
|                 | Formic acid          | 80      |          |          |  | -      | -  | -   | O    | O  | X   | O              | O  | X   | O  | O  | O   | X  | X         | - | X | X | X |
|                 | Citric acid          | 50      |          |          |  | O      | O  | O   | O    | O  | O   | O              | O  | O   | O  | O  | O   | X  | X         | X | O | O | O |
| Alkali          | Calcium hydroxide    | sat.    |          |          |  | O      | O  | O   | O    | O  | O   | O              | O  | O   | O  | O  | O   | O  | O         | O | O | O |   |
|                 | Potassium hydroxide  | 50      |          |          |  | O      | O  | O   | O    | O  | O   | X              | -  | O   | O  | O  | X   | -  | O         | O | O | O |   |
|                 | Sodium hydroxide     | 40      |          |          |  | X      | X  | X   | O    | O  | O   | O              | X  | -   | O  | O  | O   | X  | X         | - | O | O | O |
| Acid salt       | Ammonia in water     | 30      |          |          |  | X      | X  | X   | O    | O  | O   | O              | O  | O   | O  | O  | X   | X  | -         | O | O | O |   |
|                 | Ammonium chloride    | sat.    |          |          |  | O      | O  | O   | O    | O  | O   | O              | O  | O   | O  | O  | O   | O  | O         | X | X | X |   |
|                 | Zinc chloride        | 50      |          |          |  | O      | O  | O   | O    | O  | O   | O              | O  | O   | O  | O  | O   | O  | O         | X | X | X |   |
| Basic salt      | Iron(III) chloride   | 50      |          |          |  | 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 | O | O |   |
|                 | Sodium carbonate     | sat.    |          |          |  | O      | O  | 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   | X  | X         | X | X | X |   |
|                 | Sodium sulfate       | sat.    |          |          |  | O      | O  | 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         | X | X | X |   |
| Neutral salt    | Sodium chloride      | sat.    |          |          |  | O      | O  | O   | O    | O  | O   | O              | O  | O   | O  | O  | O   | O  | O         | X | X | X |   |
|                 | Sodium nitrate       | 50      |          |          |  | O      | O  | O   | O    | O  | O   | O              | O  | O   | O  | O  | O   | O  | O         | X | X | X |   |
|                 | Aluminium chloride   | sat.    |          |          |  | O      | O  | O   | O    | O  | O   | O              | O  | O   | O  | O  | O   | X  | -         | - | - | - |   |
| Oxidizing agent | Hydrogen peroxide    | 30      |          |          |  | O      | O  | O   | O    | O  | O   | O              | O  | X   | X  | X  | X   | O  | O         | O | O | O |   |
|                 | Sodium Hypochloride  | 50      |          |          |  | O      | O  | X   | O    | O  | O   | O              | O  | O   | O  | O  | O   | X  | -         | - | X | X | X |
|                 | Potassium dichromate | sat.    |          |          |  | O      | O  | O   | O    | O  | O   | O              | O  | O   | O  | O  | O   | O  | O         | O | O | O |   |
|                 | Chlorinated lime     |         |          |          |  |        |    |     |      | X  | -   | -              |    |     | O  | O  | O   |    |           | X | X | X |   |
| Organic solvent | Ethanol              | 80      |          |          |  | X      | -  | -   | O    | O  | O   | O              | O  | O   | O  | O  | O   | O  | O         | O | O | O |   |
|                 | Cyclohexane          |         |          |          |  | O      | O  | O   | O    | O  | O   | -              | -  | -   | -  | -  | -   | O  | O         | O | O | O |   |
|                 | Toluene              |         |          |          |  | -      | -  | -   | O    | O  | O   | -              | -  | -   | -  | -  | -   | O  | O         | O | O | O |   |
|                 | Trichloroethane      |         |          |          |  | X      | X  | X   | X    | -  | -   | -              | -  | -   | -  | -  | -   | O  | O         | O | O | X |   |
|                 | Water                |         |          |          |  | O      | O  | O   | O    | O  | X   | O              | O  | O   | O  | O  | O   | O  | O         | O | O | O |   |

**Note 13 :** 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

|                 |                      |         | PTFE<br>(teflon) |   |   | PEEK |   |   | PVDF<br>(Kynar) |   |   | PP  |   |   | Epoxy |   |   | Glass |   |   |   |
|-----------------|----------------------|---------|------------------|---|---|------|---|---|-----------------|---|---|-----|---|---|-------|---|---|-------|---|---|---|
|                 |                      |         | 20               |   |   | 20   |   |   | 20              |   |   | 20  |   |   | 20    |   |   | 20    |   |   |   |
|                 |                      |         | 80               |   |   | 80   |   |   | 80              |   |   | 80  |   |   | 80    |   |   | 80    |   |   |   |
|                 |                      |         | 100              |   |   | 100  |   |   | 100             |   |   | 100 |   |   | 100   |   |   | 100   |   |   |   |
|                 |                      | Conc. % | Temp. °C         |   |   |      |   |   |                 |   |   |     |   |   |       |   |   |       |   |   |   |
|                 |                      |         |                  |   |   |      |   |   |                 |   |   |     |   |   |       |   |   |       |   |   |   |
| Inorganic acid  | Sulfuric acid        | 10      | O                | O | O | O    | O | O | O               | O | O | O   | O | O | X     | X | O | O     | O | O |   |
|                 |                      | 50      | O                | O | O | O    | O | O | O               | O | O | O   | O | X | X     | X | O | O     | O | O |   |
|                 |                      | 95      | O                | O | O | -    | - | - | O               | X | - | X   | - | - | -     | - | O | O     | O | O |   |
|                 |                      | fuming  | O                | O | O | -    | - | - | -               | - | - | -   | - | - | -     | - | O | O     | O | O |   |
|                 | Hydrochloric acid    | 10      | O                | O | O | O    | O | X | O               | O | O | O   | O | O | X     | - | O | O     | O | O |   |
|                 |                      | sat.    | O                | O | O | O    | O | X | O               | O | O | O   | O | O | X     | - | O | O     | O | O |   |
|                 | Nitric acid          | 25      | O                | O | O | O    | O | O | O               | O | X | O   | O | X | -     | O | X | -     | O | O | O |
|                 |                      | 50      | O                | O | O | X    | X | X | O               | O | 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     | X | - | O     | O | O | O |
|                 |                      | 50      | O                | O | O | O    | O | O | O               | O | O | O   | O | O | O     | X | - | O     | O | O | O |
|                 |                      | 95      | O                | O | O | O    | O | O | O               | O | O | O   | O | O | O     | X | - | O     | O | O | O |
|                 | Hydrofluoric acid    | 40      | O                | O | O | -    | - | - | O               | O | O | O   | O | O | X     | X | - | X     | X | X | X |
|                 |                      | 75      | O                | O | O | -    | - | - | O               | O | O | O   | O | X | X     | - | - | -     | - | - | - |
|                 |                      | O       | O                | O | O | O    | O | O | O               | O | O | O   | O | O | X     | - | - | -     | - | - |   |
| Organic acid    | Acetic acid          | 10      | O                | O | O | O    | O | O | O               | O | O | O   | O | O | O     | X | - | O     | O | O | O |
|                 |                      | glacial | O                | O | O | O    | O | X | O               | X | - | O   | X | X | -     | - | O | O     | O | O |   |
|                 | Formic acid          | 80      | O                | O | O | X    | X | X | O               | O | O | O   | O | X | -     | - | O | O     | O | O |   |
| Alkali          | Citric acid          | 50      | O                | O | O | O    | O | O | O               | O | O | O   | O | X | -     | - | O | O     | O | O |   |
|                 | Calcium hydroxide    | sat.    | O                | O | O | 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               | O | X | O   | O | O | X     | - | O | O     | X | X |   |
| Acid salt       | Sodium hydroxide     | 40      | O                | O | O | O    | O | O | O               | O | X | O   | O | O | X     | - | O | O     | X | X |   |
|                 | Ammonia in water     | 30      | O                | O | O | O    | O | O | O               | O | O | O   | O | O | O     | O | O | O     | X | X |   |
|                 | Ammonium chloride    | sat.    | O                | O | O | O    | O | O | O               | O | O | O   | O | O | X     | X | O | O     | O | O |   |
|                 | Zinc chloride        | 50      | O                | O | O | O    | O | O | O               | O | O | O   | O | O | O     | X | - | O     | O | O |   |
| Basic salt      | Iron(III) chloride   | 50      | O                | O | O | O    | O | O | O               | O | O | O   | O | O | X     | - | O | O     | O | O |   |
|                 | Sodium sulfite       | sat.    | O                | O | O | O    | O | O | O               | O | O | O   | O | O | O     | O | O | O     | O | O |   |
|                 | Sodium carbonate     | sat.    | O                | O | O | O    | O | O | O               | O | O | O   | O | O | O     | X | - | O     | O | O |   |
|                 | Potassium chloride   | sat.    | O                | O | O | O    | O | O | O               | O | O | O   | O | O | O     | O | O | O     | O | O |   |
| Neutral salt    | Sodium sulfate       | sat.    | O                | O | O | 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 | O     | O | O |   |
|                 | Sodium chloride      | sat.    | O                | O | O | 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 | O     | O | O |   |
| Oxidizing agent | Aluminium chloride   | sat.    | O                | O | O | O    | O | O | O               | O | O | O   | O | O | O     | O | O | O     | O | O |   |
|                 | Hydrogen peroxide    | 30      | O                | O | O | O    | O | O | O               | O | O | O   | O | O | O     | X | - | O     | O | O |   |
|                 | Sodium Hypochloride  | 50      | O                | O | O | O    | O | O | O               | O | O | X   | X | O | X     | X | O | O     | O | O |   |
|                 | Potassium dichromate | sat.    | O                | O | O | O    | O | O | O               | X | - | O   | O | X | X     | O | O | O     | O | O |   |
| Organic solvent | Chlorinated lime     |         | O                | O | O | X    | X | X | O               | O | O | -   | - | O | X     | X | O | O     | O | O |   |
|                 | Ethanol              | 80      | O                | O | O | O    | O | O | O               | X | O | O   | O | O | X     | - | O | O     | O | O |   |
|                 | Cyclohexane          |         | O                | O | O | O    | O | O | O               | X | - | -   | O | O | X     | - | O | O     | O | O |   |
|                 | Toluene              |         | O                | O | O | O    | O | O | O               | O | O | X   | - | O | O     | X | - | O     | O | O |   |
|                 | Trichloroethane      |         | O                | O | O | O    | O | X | X               | X | - | -   | X | - | -     | - | O | O     | O | O |   |
|                 | Water                |         | O                | O | X | O    | O | O | O               | O | O | O   | O | O | X     | O | O | X     | O | O |   |

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|                                                                                                                                                                                                          |                                                                                                                                                                                                               |                                                                                                                                                                                                                   |
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