Model SX42

General Specifications

GS 12D07J03-01EN-P

2-electrode Conductivity sensors for high temperature

General

These high temperature conductivity sensors have a stainless-steel body and a ceramic insulation, especially designed to

withstand high temperatures (up to 250°C) and pressures (up to 40 bar). A special treatment of the electrodes ensures optimal resistance against polarization.

The flanged model has an integral connection box, the threaded models are provided with an Amphenol connector to fit the Yokogawa WU40 cable or Variopin connector to fit with Yokogawa WU10/WE10-cable.

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 sensors are certified for hazardous area when connected to a certified intrinsically safe Yokogawa analyzer, model SC202S or FLXA-series or a certified intrinsically safe circuit with defined output parameters.

The combination of the sensor plug and cable is watertight and can handle temperatures up to



Features

- High temperature and pressure ratings
- Built-in temperature resistor: Pt1000
- Fast temperature response
- Plug and cable form a watertight connection to IP67
- Flange model type with integral connection box
- Threaded models equipped with standardized connections 1" NPT or R1
- Compatible with new SENCOM smart adapter SA11 (VarioPin version)
- · Certified for hazardous area
- · Optimal resistance against polarization





Yokogawa Process Analyzers Euroweg 2, 3825HD, Amersfoort, Netherlands GS 12D07J03-01EN-P 2nd edition November 2021

1. General Specifications

1.1 Object of Measurement

Conductivity measurements are used for example for the determination of impurities in water or the concentration measurement of chemicals.

1.2 Principle of Measurement

Conductivity is the measure of a solution's ability to pass or carry an electric current. Conductivity is defined as the reciprocal of the resistance of a solution between two electrodes.

1.3 Measuring elements

: 2-electrode measuring system Pt1000 temperature sensor

1.4 Materials

Wetted parts sensor

Body Electrodes Insulation	: Stainless Steel AISI 316L : Stainless Steel AISI 316L : Ceramic (aluminium oxide)
Connector <i>Amphenol</i> Contacts Plug	: gold plated : Polyamide
<i>Variopin</i> Contacts Material Insulation	: gold plated : Nickel-plated brass : PEEK, UL94-V0

Terminal box flanged models: Housing : Aluminum Insulation : Ceramic

1.5 Functional specifications (at 25 °C)

Temperature element: Pt1000 to IEC 751Nominal Cell Constant (C.C.)SX42-SX24: 0.1 cm^{-1} SX42-SX34: 0.01 cm^{-1}

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

1.6 Dynamic specifications

Response time temp.	
SX42-S.24	: T ₉₀ < 3 min.
SX42-S.34	: T ₉₀ < 3 min.

1.7 Operating range

Conductivity

: 1 µS*C.C.–200mS*C.C. See figure 1



Figure 1: Measurement range SX42 sensors

Temperature Threaded models (-BS, -NS) Threaded models (-BV,-NV) Flanged models	: 0°C to 200°C 32°F to 392°F : 0°C to 125°C 32°F to 257°F : 0°C to 250°C 32°F to 482°F
Pressure @ 25 °C for a	ll models
Over pressure*	: 0 to 40 barg
	0 to 580 PSIG
Under pressure*	: 0 to 0.5 barng
	0 to 7 PSIG
Pressure @ Tmax for m	nodels
-BS, -NS, -BV, -NV, -AF	^F , -DF
Over pressure	: 0 to 40 barG
	0 to 580 PSIG
Under pressure	: 0 to 0.5 barng
	: 0 to 7 PSIG
-EF	
Over pressure	: 0 to 30 barG
	0 to 435 PSIG
Under pressure	: 0 to 0.5 barng
	: 0 to 7 PSIG
* Unit definition:	
barg = bar gauge, over	pressure against

atmosphere. barng = under pressure against atmosphere



Figure 2: Pressure versus process temperature flanges / threaded models SX42

Cable length

Threaded models (BS,-NS)	: Max. 60 m with WU40 cable in combination with WF10 cable and BA10 junction box
Threaded models (-BV	, -NV)
Variopin connector	: max. 60m. with WU10/

- directly connected WE10 (Possible in combination with WF10 cable and BA10 junction box)
- For sensors with : 3 m WE10 cable (as Suffix -BV/NV option) combined with Combined with SA11 Smart Adapter SA11 Smart adapter directly connected to the analyzer using a WU11 cable up to 100m or Connected to a BA11 connection box using WU11 cable up to 100 m. The BA11 connection box is connected to the analyzer using a WU11 cable up to 100m. Flanged models : max. 60m with customer
 - anged models : max. 60m with custome specified high temp. cable

1.8 Shipping details

: 300 x 100 x 75 mm
11.8 x 3.9 x 3.0 inch
: 480 x 275 x 235mm
18.9 x 10.8 x 9.3 inch
: 0.5 to 0.7 kg
1.1 to 1.5 lbs
: 5.7 to 6.0 kg
12.6 to 13.2 lbs
nditions
: -30°C to 50°C
-22°F to 122°F
nector
: IP65

Variopin connector : IP67 conform IEC 60529

1.10 Regulatory compliance

Item	Description, Approval, Certification
LVD	ANSI/ISA 61010-1
	 CAN/CSA C22.2 No. 61010-1
RoHS	EU Directive 2011/65/EU and Commission Delegated Directive (EU) 2015/863 amending
	Annex II, per
	EN-IEC 63000
PED	EU Directive 2011/68/EU applying Article 4.3: Sound Engineering Practice.
WEEE	EU directive 2012/19/EU
	This sensor is intended to be sold and used only as a part of equipment which is excluded
	from the WEEE directive, such as large-scale stationary industrial tools, a large-scale fixed
	installation etc., and therefore it is in principle fully compliant with WEEE directive.
	The sensor should be disposed in accordance with applicable national
	legislations/regulations respectively.
AIEX	
(EU)	ATEX approval: DEKRA 14ATEX0074 X
	SX42: (2) II 1 G Ex Ia IIC 1216 Ga
	Applied standards:
	■ EN IEC 60079-0
	■ EN 60079-11
IECEx	IECEx approval: IECEx DEK 14.0032X
	SX42: Ex ia IIC T2T6 Ga
	Applied standards:
	 IEC 60079-0
	 IEC 60079-11

Item	Description, Approval, Certification			
FM	FM approval Canada: FM20CA0062X			
(Canada)	SX42: IS SI CL I, DIV 1, GP ABCD, T2T6; CL I, ZN 0, Ex ia IIC, T2T6 Ga			
	Control Drawing: D&E 2020-024-A51			
	Applied standards:			
	 CAN/CSA-C22.2 No. 60079-0 			
	 CAN/CSA-C22.2 No. 60079-11 			
	 CAN/CSA-C22.2 No. 61010-1 			
FM	FM approval United States: FM20US0123X			
(United States)	SX42: IS CL I, DIV 1, GP ABCD, T2T6; CL I, ZN 0, AEx ia IIC, T2T6 Ga			
	Control Drawing: D&E 2020-024-A50			
	Applied standards:			
	 FM Class 3600 			
	 FM Class 3610 			
	 ANSI/ISA 60079-0 			
	 ANSI/ISA 60079-11 			
	ANSI/ISA 61010-1			
NEPSI	NEPSI approval: GYJ21.2892X			
(China)	SX42: Ex ia IIC 1216 Ga			
	Applied standards:			
	• GB 3836.1			
	• GB 3836.4			
	• GB 3836.20			
PESO	PESO approval: PESO approval is based on ATEX approval			
(India)	DEKRA 141A1EX0074 X, iss. 2 – 29.11.2019			
	Equipment reference numbers: P512759/1			

	Applied standards:
	EN IEC 60079-0
	EN 60079-11
TS	TS approval: TS Safety Label is based on IECEx approval IECEx DEK 14.0032X
(Taiwan)	Identification Number: TD04000C
	Applied standards:
	IEC 60079-0
	IEC 60079-11
EAC Ex	EAC Ex certificate: RU C-NL.AA87.B.00754
(Russia)	SX42: 0Ex ia IIC T6T2 Ga X
	Applied standards:
	 GOST 31610.0 (IEC 60079-0)
	 GOST 31610.11 (IEC 60079-11)
	 GOST IEC 60079-14

2. Model and Suffix code

Model	Suffix Code		Option code	Description	
SX42*					High temperature conductivity sensor with Pt1000 sensor; IS for ATEX/IECEx/FM-US/FM-CAN/ NEPSI/PESO/TS/EACEx
Cell Constant	-SX24 -SX34			Cell constant 0.1/cm Cell constant 0.01/cm	
Process Connection -BS -BV			ISO 7/1-R1 screw thread, plug-socket conn. ISO 7/1-R1 screw thread, VarioPin conn. with SENCOM ID-chip		
		-NS			1-11 ¹ / ₂ NPT screw thread, plug-socket conn.
		-NV			1-11½ NPT screw thread, VarioPin conn. with SENCOM ID-chip
		-DF			DN50-PN63 EN flange
		-EF			DN50-PN40 EN flange
-AF			2" 600 LBS ANSI flange		
Style *A			Always *A style		
Option					N/A

***Note**: certificate according to EN 10024 is standard delivered with this sensor.

3. Dimensional drawings



Figure 3:Dimensions flanged models



Figure 4:Dimensions flanges



Figure 5: Dimensions Threaded models

Addendum 1: Available models

MS-code
SX42-SX34-DF*A
SX42-SX34-AF*A
SX42-SX24-DF*A
SX42-SX24-AF*A
SX42-SX34-BS*A
SX42-SX34-NS*A
SX42-SX24-BS*A
SX42-SX24-NS*A
SX42-SX34-BV*A
SX42-SX34-NV*A
SX42-SX24-BV*A
SX42-SX24-NV*A
SX42-SX34-EF*A
SX42-SX24-EF*A

Addendum 2: Control drawings

FM-United S	tates	
Applying stan	dards:FM Class	3600 FM Class 3610 FM Class 3810 ANSI/ISA 60079-0 ANSI/ISA 60079-11
Certificate no	.* :	FM20US0123X IS CL I, DIV 1, GP ABCD, T2T6 CL I, ZN 0, AEx ia IIC, T2T6 Ga Control Drawing: D&E 2020-024-A50
Electrical data	a :	See Note 1
Specific cond of use	itions :	See Control Drawing D&E 2020-024-A50. Temperature classes for SX42 models are defined T2T6, see Note 1.
Note 1 :	Intrinsically safe, Class I, Zone 0, / when installed pe Maximum sensor Ui= 14.4 V; Ii= 11 Ci= 0 nF (BS, NS	entity, for Class I, Division 1, Groups A, B, C and D; AEx ia IIC, Ga (entity) for hazardous (classified) locations er control drawing D&E 2020-024-A50. - input parameters: 6.5 mA; Pi= 0.3424 W; Li= 0 mH 5 and *F type) or Ci=0.4 nF (BV and NV type).
WARNING	Ambient temperat -30°C to +40°C fo -30°C to +95°C fo -30°C to +125°C -30°C to +130°C -30°C to +125°C -30°C to +125°C -30°C to +125°C -30°C to +275°C	ure: or temperature class T6, or temperature class T5, for temperature class T4 (BV and NV type), for temperature class T4 (BS, NS and *F types), for temperature class T3 (BV and NV type), for temperature class T3 (BS, NS and *F types), for temperature class T2 (BV and NV type), for temperature class T2 (BS, NS and *F types).

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

* Certification is subject to change, due to new regulations or changes in the product itself.

When a certificate is updated, a new revision under the same certificate number is created with a new date.

- FM-United States:
 - FM20US0123X (effective from 03-2021)

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



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: Uo= 14.4 V, Io = 116.5 mA, Po = 342.4 mW.
- 4. The sensor does not provide isolation from earth. Installers shall take necessary measures to prevent the possibility of sparking resulting from differing earth potentials between the sensors and interconnecting equipment. This can be realized for example by selecting interconnecting equipment which provides input-to-output and input-to-earth isolation up to 500 V rms.
- 5. Sensor Model code:

Model	Suffix Codes	Option Codes
SX42	-abcd-efgh	/i
abcd	Cell Constant:	Four alphanumeric character (A to Z, 0 to 9 or a hyphen)

- DF DN50-PN63 EN flange + terminal block EF DN50-PN40 EN flange + terminal block
- g Spare code: Any one character
- h Style code: A

Connection type:

ef

- i Option code: Up to ten alphanumeric characters (A to Z, 0 to 9 or hyphen)
- 6. WARNING POTENTIONAL 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 nonconductive.

WARNING – POTENTIONAL 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.



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: Uo= 6.6 V, Io = 100 mA, Po = 165 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:

Model	Suffix Codes	Option Codes
SX42	-abcd-efgh	/i
abcd	Cell Constant:	Four alphanumeric character (A to Z, 0 to 9 or a hyphen)
ef	Connection type:	BV ISO 7/1-R1 screw thread + connector with ID-chip NV NPT screw thread + connector with ID-chip
g	Spare code:	Any one character
h	Style code:	A
i	Option code:	Up to ten alphanumeric characters (A to Z, 0 to 9 or hyphen)

6. WARNING – POTENTIONAL 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 nonconductive.

WARNING – POTENTIONAL 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-Canada

	Applying standards	: CAN/CSA-C22.2 No. 60079-0 CAN/CSA-C22.2 No. 60079-11		
	Certificate no.*	: FM20CA0062X IS CL I, DIV 1, GP ABCD, T2T6 CL I, ZN 0, Ex ia IIC, T2T6 Ga Control Drawing: D&E 2020-024-A51		
	Electrical data	: See Note 2		
	Specific conditions of use	: See Control Drawing D&E 2020-024-A51. Temperature classes for SX42 models are defined T2T6, see Note 2.		
Note 2:	 Intrinsically safe, entity, for Class I, Division 1, Groups A, B, C and D Class I, Zone 0, Ex ia IIC, Ga (entity) for hazardous (classified) locati When installed per control drawing D&E 2020-024-A51. Maximum sensor input parameters: Ui= 14.4 V; Ii= 116.5 mA; Pi= 0.3424 W; Li= 0 mH; Ci= 0 nF (BS, NS and *F type) or Ci= 0.4 nF (BV and NV type). 			
	Ambient temperature: -30°C to +40°C for temperature class T6, -30°C to +95°C for temperature class T5, -30°C to +125°C for temperature class T4 (BV and NV type), -30°C to +130°C for temperature class T4 (BS, NS and *F types), -30°C to +125°C for temperature class T3 (BV and NV type), -30°C to +165°C for temperature class T3 (BS, NS and *F types), -30°C to +125°C for temperature class T2 (BV and NV type), -30°C to +275°C for temperature class T2 (BS, NS and *F types).			



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

* Certification is subject to change, due to new regulations or changes in the product itself.

When a certificate is updated, a new revision under the same certificate number is created with a new date. _

- FM-Canada:
 - FM20CA0062X (effective from 03-2021)

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



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: Uo= 14.4 V, Io = 116.5 mA, Po = 342.4 mW.
- 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.
 Sensor Model code:

Model	Suffix Codes	Option Codes
SX42	-abcd-efgh	/i
abcd	Cell Constant:	Four alphanumeric character (A to Z, 0 to 9 or a hyphen)
ef	Connection type:	BS ISO7/1-R1 screw thread + connector without ID-chip BV ISO 7/1-R1 screw thread + connector with ID-chip NS NPT screw thread + connector without ID-chip NV NPT screw thread + connector with ID-chip AF 2-inch 600 LBS ANSI flange + terminal block DF DN50-PN63 EN flange + terminal block EF DN50-PN40 EN flange + terminal block
g	Spare code:	Any one character
h	Style code:	A
i	Option code:	Up to ten alphanumeric characters

(A to Z, 0 to 9 or hyphen)

6. WARNING-POTENTIONAL 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-POTENTIONAL 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.



Control drawing: D&E 2020-024-A51 (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 (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: Uo= 6.6 V, Io = 100 mA, Po = 165 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:

Model	Suffix Codes	Option Codes
SX42	-abcd-efgh	/i
abcd	Cell Constant:	Four alphanumeric character (A to Z, 0 to 9 or a hyphen)
ef	Connection type:	BV ISO 7/1-R1 screw thread + connector with ID-chip NV NPT screw thread + connector with ID-chip
g	Spare code:	Any one character
h	Style code:	A
i	Option code:	Up to ten alphanumeric characters (A to Z, 0 to 9 or hyphen)

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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 – POTENTIONAL 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.

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