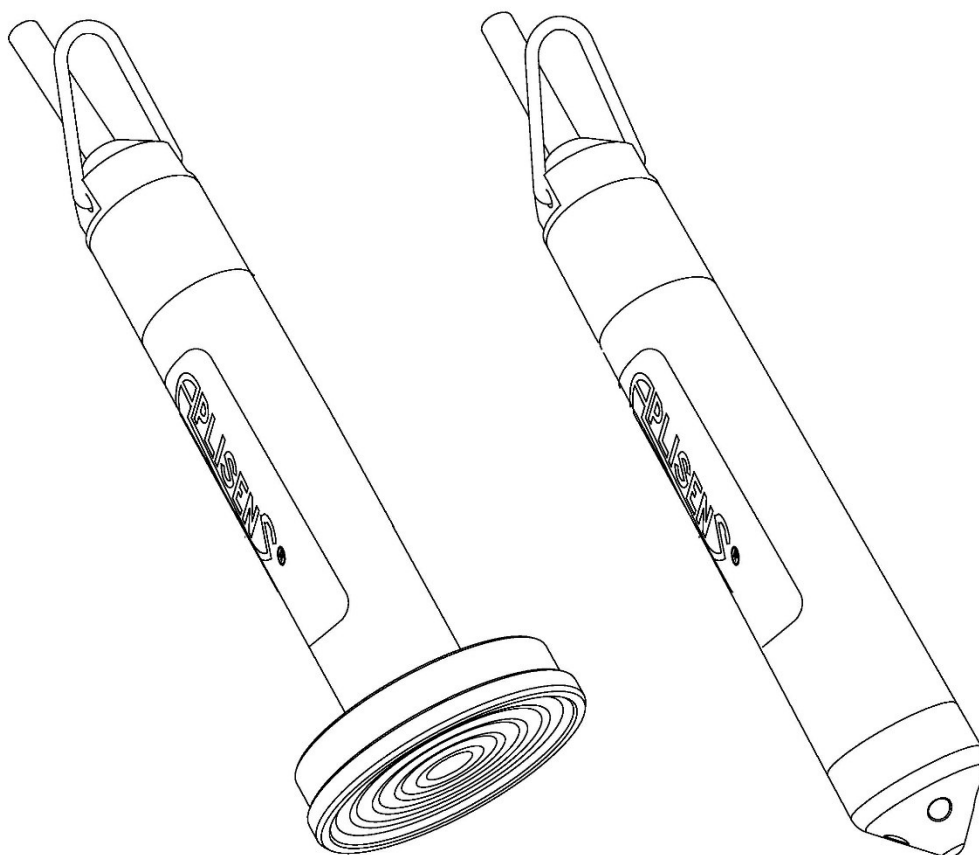


# APLISENS<sup>®</sup>

## USER'S MANUAL

### HYDROSTATIC LEVEL PROBES **SGE-25, SGE-25/Hastelloy, SGE-25S, SGE-25C, SGE-16**



PRODUCT CODE – see: (→ [Probe Identification](#)).

The QR code or ID number identifies the probes and provides quick access to the following documentation on the manufacturer’s website: user’s manual, declarations of conformity and copies of certificates.

### SGE-25

ID: 0039 0001 0000 0000 0000 0000 0001 20

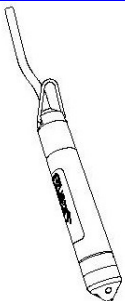
<https://www.aplisens.pl/ID/003900010000000000000000000120/>



### SGE-25 (Exi)

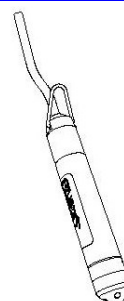
ID: 0039 0002 0000 0000 0000 0001 0001 37

<https://www.aplisens.pl/ID/003900020000000000000001000137/>



ID: 0039 0004 0000 0000 0000 0000 0001 24

[www.aplisens.pl/ID/003900040000000000000000000124](http://www.aplisens.pl/ID/003900040000000000000000000124)



### SGE-25/Hastelloy

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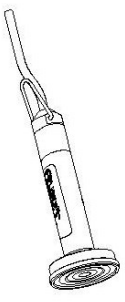
<https://www.aplisens.pl/ID/003900010000000100000000000128/>



### SGE-25S





ID: 0040 0001 0000 0000 0000 0000 0001 17

<https://www.aplisens.pl/ID/004000010000000000000000000117/>





## Symbols used

Symbol	Description
	Warning to proceed strictly in accordance with the information contained in the documentation in order to ensure the safety and full functionality of the device.
	Information particularly useful during installation and operation of the device.
	Information particularly useful during installation and operation of an Ex type device.
	Information on disposal of used equipment.

### BASIC REQUIREMENTS AND SAFE USED



The manufacturer will not be liable for damage resulting from incorrect installation, failure to maintain a suitable technical condition of the device or use of the device other than for its intended purpose.

Installation should be carried out by qualified staff having the required authorizations to install electrical and I&C equipment. The installer is responsible for performing the installation in accordance with manual as well as with the electromagnetic compatibility and safety regulations and standards applicable to the type of installation.

In systems with I&C equipment, in case of leakage, there is a danger to staff due to the medium under pressure. All safety and protection requirements must be observed during installation, operation and inspections.

If a malfunction occurs, the device should be disconnected and handed over to the manufacturer for repair.



In order to minimize the risk of malfunction and associated risks to staff, the device is not to be installed or used in particularly unfavourable conditions, where the following hazards occur:

- possible mechanical impacts, excessive shocks and vibration;
- excessive temperature fluctuation;
- freezing of the medium.

Changes made to the manufacturing of products may be introduced before the paper version of the manual is updated. The up-to-date manuals are available on the manufacturer's website: [www.aplisens.com](http://www.aplisens.com)

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## 1. INTRODUCTION

### 1.1. Purpose of the document

The subject of manual are hydrostatic level probes: **SGE-25**, **SGE-25/Hastelloy**, **SGE-25S**, **SGE-25C**, **SGE-16**, hereinafter referred to as probes in the manual. The manual applies to the following versions: standard and intrinsically safe Exi.

The manual contains data, guidelines and general recommendations for the safe installation and operation of the probes, as well as procedures in the event of a possible failure.



Data on the hydrostatic level probes **SGE-25**, **SGE-25S** and **SGE-25C** in intrinsically safe version according to IECEx and ATEX are included in the Explosion-proof Device Manual marked as EN.IX.SGE.



It is forbidden to use devices in hazardous areas without appropriate permits.

## 2. SAFETY



- The installation and start-up of the device and any activities related to operation shall be carried out after thorough examination of the contents of user's manual and the instructions related thereto.
- Installation and maintenance should be carried out by qualified staff having the required authorizations to install electrical and measuring devices.
- The device shall be used according to its intended purpose in line with the permissible parameters specified on the nameplate (→ [5.2 Probe Identification](#)).
- The protection elements used by the manufacturer to ensure probe safety may be less effective if the device is operated in a manner not consistent with its intended purpose.
- Before installing or disassembling the device, it is absolutely necessary to disconnect it from the power source.
- No repairs or alterations to the probe electronic system are permitted. Assessment of damages and possible repair may only be performed by the manufacturer or authorized representative.
- Do not use instruments if damaged. In case of malfunction, the device must be put out of operation.

## 3. TRANSPORT AND STORAGE

### 3.1. Delivery check

After receiving the delivery, please refer to the general terms and conditions of contracts available on the manufacturer website:

[https://aplisens.com/ogolne\\_warunki\\_umow.html](https://aplisens.com/ogolne_warunki_umow.html)

### 3.2. Transport

Transport of probes shall be carried out with the use of covered means of transport, in original packages with diaphragm provided with protection. The packaging shall be protected against movement and direct impact of atmospheric factors.

### 3.3. Storage and use

Probes shall be stored in a factory packaging, in a room without vapours and aggressive substances, protected against mechanical impact. The cable should be coiled into a circle with a diameter of  $\geq 30$  cm, the coils of the coil should be fixed in relation to each other and the whole should be fixed in the package. Avoid cable kinks at the point where it exits the gland.

Permissible medium temperature range:

- |  |              |                |
|--|--------------|----------------|
| • SGE-25, SGE-25S, SGE-25C, SGE-25/Hastelloy | -30 ... 40°C | (-22... 104°F) |
| Special version ETFE / PTFE                  | 0 ... 80°C   | (32 ... 176°F) |
| • SGE-16                                     | 0 ... 40°C   | (32 ... 104°F) |
| Special version ETFE / PTFE                  | 0 ... 80°C   | (32 ... 176°F) |



The medium must not be allowed to freeze in the immediate vicinity of the probe.



Operating temperature range and measured medium for probes in Ex version according to "Explosion-proof Device Manual" marked as EN.IX.SGE.

## 4. GUARANTEE

General terms and conditions of guarantee are available on the manufacturer's website:

[www.aplisens.com/ogolne\\_warunki\\_gwarancji](http://www.aplisens.com/ogolne_warunki_gwarancji)



The guarantee shall be repealed if the device is used against its intended use, failure to comply with user's manual or interference with the structure of the device.

## 5. IDENTIFICATION









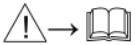
### 5.1. Manufacturer address

APLISENS S.A.  
03-192 Warsaw  
Morelowa 7 St.  
Poland

### 5.2. Probe Identification

Depending on the version of the probe, the nameplates may differ in the amount of information and parameters.

**Table 1.** Symbols appearing on the probe's nameplate

	Logo and name of manufacturer		measuring range
	CE mark		power supply voltage
	CE mark with number notified body		output signal
03-192 WARSZAWA Morelowa 7 Poland tel.: +48 22 814 07 77	manufacturer address		permissible range of ambient temperature
	QR code	IP	IP protection rating
TYPE:	probe type	Year of production	year of production
ID	probe model ID	# S/N	serial number
	note about the obligation of read the manual	//The lower part of the nameplate//	special versions

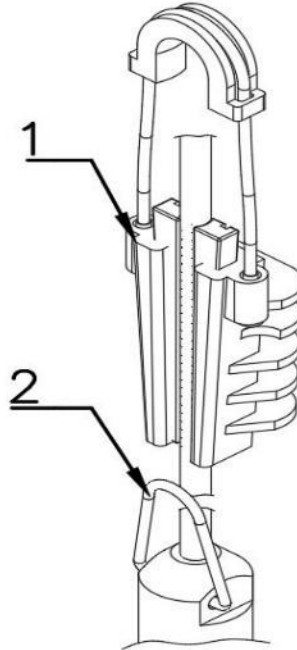
### 5.3. CE mark, declaration of conformity

The device has been designed to meet the highest safety standards, has been tested and has left the factory in a condition that is safe for operation. The device complies with the applicable standards and regulations listed in the EU Declaration of Conformity and has CE marking on nameplate.

## 6. INSTALLATION

### 6.1. General recommendation

The depth probes are installed in places where the liquid level is measured in wells, tanks, boreholes, etc. The probe is immersed in the measured medium. A special cable extends above the medium level and can be connected directly to the device cooperating with the probe or to the junction box. The probe can be hung on the power cable, e.g. by using Aplisens SG cable hanger (item 1 in Fig. 1). In the event of frequent removal of the probe or when there is a risk of catching on protruding elements during pulling up, it is recommended to hang the probe on a steel cord using the carrying eye (item 2 in Fig. 1 - does not apply to SGE-16 probes).

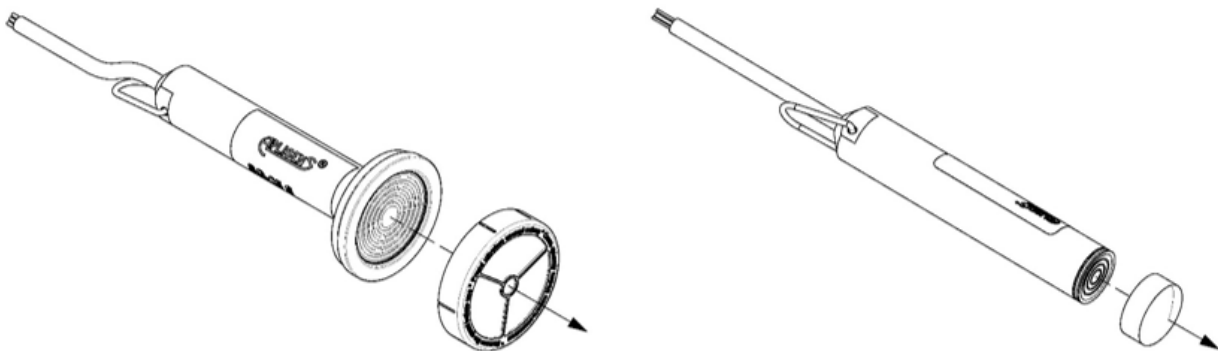


**Figure 1.** Mounting brackets for probes

The probe with an additional Teflon shielding on the cable should be hung on a carrying cable or on an internal cable (do not grab the Teflon shield). Hang the probe in Ex version with the grounding cord only by the lifting eye on an additional supporting wire.



Immediately before placing the SGE-25S or SGE-25C probe in the measured medium, remove the protective cover from the probe separator. During installation, protect the probe against mechanical shocks.



**Figure 2.** Probes diaphragm cover for SGE-25S and SGE-25C

A special cable extends above the medium level and can be connected directly to the device cooperating with the probe or to the junction box. If the probe is to be in the current or in the turbulence area, it should be installed in a protective pipe, e.g. made of PVC.



## 7. ELECTRICAL CONNECTION

### 7.1. Cable connection



All connection and assembly activities must be performed with the power supply disconnected and other external voltages, if used.



Incorrect connection of the probe may endanger safety.

Risk of electric shock and / or ignition in hazardous areas.

Make the electrical connection in accordance with the diagram in fig. 3 or 4. If the transmission line is run in an open space, to remote rooms, it is recommended to install a junction box, e.g. type PP by Aplisens S.A., in order to connect the probe cable with the rest of the transmission line. The box should have an IP65 protection degree and at the same time be unsealed enough to ensure "breathing" of the probe measuring element through the capillary which is part of the cable. Do not allow the capillary outlet to become contaminated or water to enter the capillary. In the case of a long transmission line, it is recommended to run the section from the end of the probe cable using a "twisted pair", and it is also advantageous to equip the entrance to the cooperating devices with a surge protection device, e.g. the UZ-2 system by Aplisens S.A..

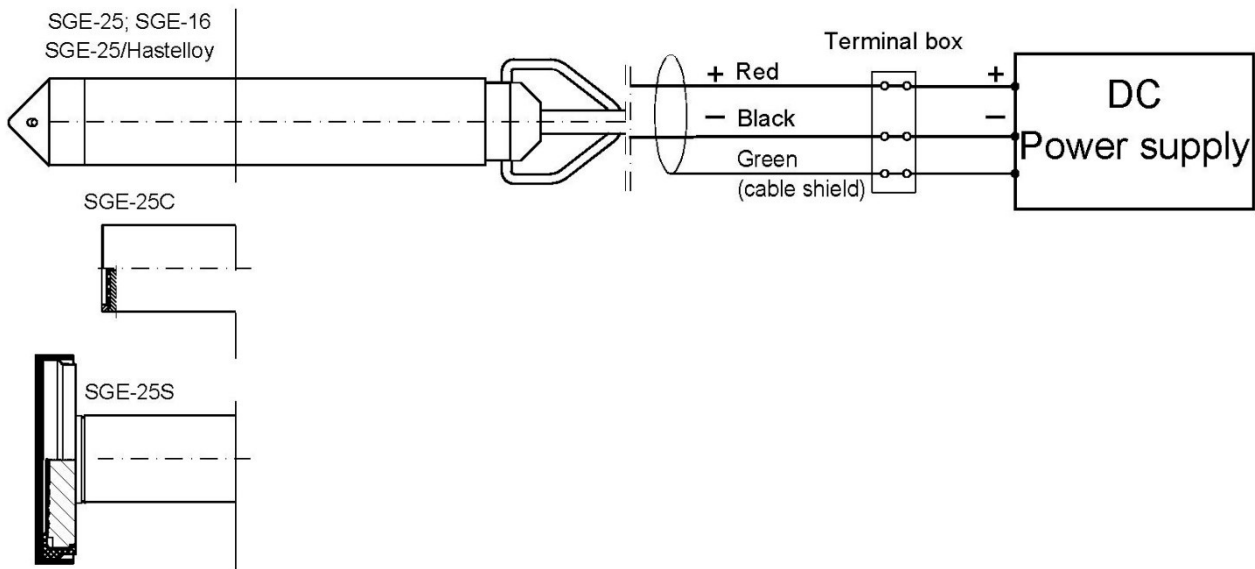


Figure 3. Electrical connection of the probe in the standard 4...20 mA version

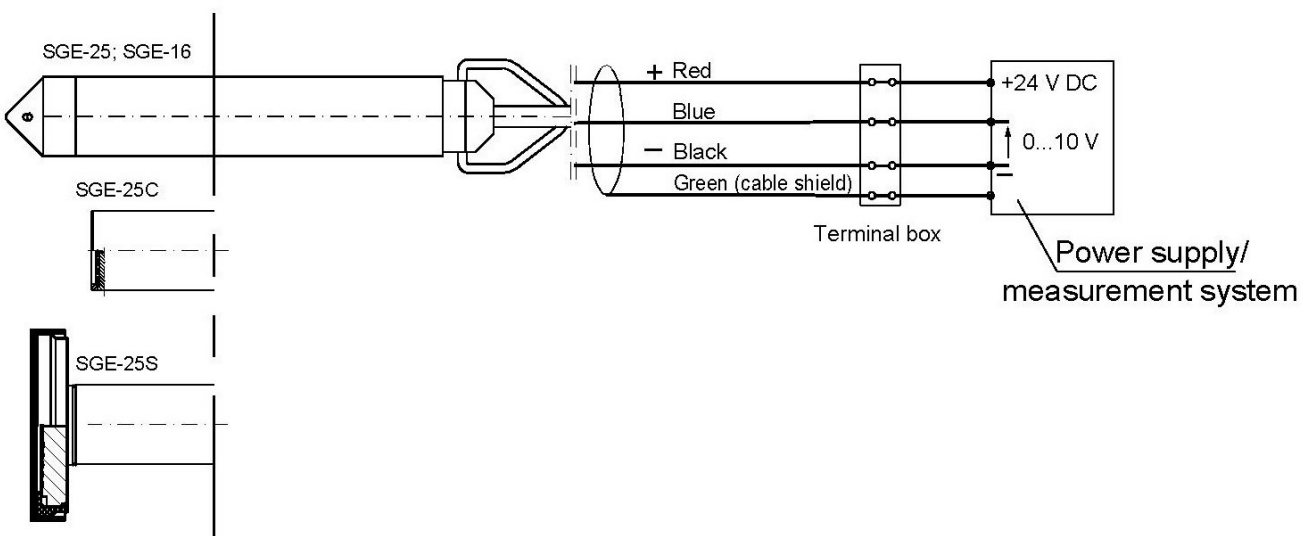


Figure 4. Probe electrical connection in three-wire version, voltage output

### 7.1.1. Depth probe with the internal PT temperature sensor.

Electrical connections and colours of the wires in the depth probe cable with an output signal of 4...20 mA with resistance temperature sensors:

Depth probe:

- red: „+”
- black: „-”
- green: cable shield (if led out)

Resistance sensor (RTD):

– white	Sensor in four-wire connection
– white	
– brown	
– brown	
– white	Sensor in three-wire connection
– brown	
– brown	

## 7.2. Power supply

### 7.2.1. Power supply voltage



Supply cables may be live.

There is a risk of electric shock and/or explosion.



Installation in potentially explosive atmospheres must comply with local standards and regulations.

**Table 2.** Permissible power supply voltage

Probe type	Output signal	MIN. Supply voltage	MAX Supply voltage
SGE-25, SGE-25/Hastelloy, SGE-25S, SGE-25C	4...20 mA	10 V DC**	36 V DC
SGE-25, SGE-25S, SGE-25C – Ex version	4...20 mA	9 V DC	28 V DC
SGE-25, SGE-25S, SGE-25C	0...10 V	13 V DC	30 V DC
SGE-25, SGE-25S, SGE-25C – TR version*	4...20 mA	10,5 V DC	36 V DC
SGE-16	4...20 mA	8 V DC	36 V DC
SGE-16	0...5 V 0...3,3 V	5 V DC 3,6 V DC	36 V DC 36 V DC

\* TR version- made for measurements in fast-moving processes  
 \*\*- special version 8 V DC

### 7.2.2. Resistance load in supply line

Power line resistance, power source resistance and additional series resistances increase the voltage drops between the power source and the probe transducer. The maximum current under normal operating conditions is 0.02 A. The maximum value of resistance in the supply circuit (together with the supply line resistances) is given by the curves:

$$R_{Lmax} \geq 20k\Omega \quad \text{For voltage output}$$

$$R_{Lmax} = \frac{(U_{sup} - U_{min})}{0,02 A} \quad \text{For current output}$$

where:

$U_{sup}$  - voltage at the terminals of the loop power supply 4...20 mA w [V]

$U_{min}$  - minimum probe voltage → [Table 2](#).

$R_{Lmax}$  - maximum resistance of the supply line [ $\Omega$ ].

### 7.2.3. Shielding

The cable shield (green wire) is led out from the probe's power supply and measurement cable. The manufacturer recommends connecting the probe cable shield to the measuring system grounding point. The earthing of the cable screen is especially justified in the environment of high EM disturbances. In a battery-assisted piezometric stand, the cable screen may or may not be grounded.

### 7.3. Overvoltage protection

The probes may be exposed to switching or other overvoltage, for example due to lightning. Surge diodes are used to protect against overvoltage between the wires of the transmission line. In order to protect against overvoltage between the transmission line and the earth or the housing (against which the diodes connected between the lines of the line are not protected), standard and Exi probes. In the "SA" version, they are equipped with additional protection in the form of overvoltage limiters. Additionally, an external protective device can be used, e.g. the UZ-2 system by APLISENS S.A.

### 7.4. Final Inspection of cabling

After completing the electrical installation of the probe it is necessary to check the following:

- is the probe connected according to the information given in section → [7.1 Cable connection](#);
- when using a junction box, that the glands are tightened;
- are the diaphragm covers (SGE-25S and SGE-25C) removed.

## 8. MAINTENANCE

### 8.1. Periodic inspections

Periodic inspections should be carried out in accordance with the standards applicable to the user. During the inspection it is necessary to check the condition of the head (absence of loosening and leakage), separating diaphragms (tarnish, corrosion) and the electrical connection (checking the condition of the cable), as well as the stability of the holder (if used). Check for signs of mechanical damage in the form of impact marks or dents.

#### 8.1.1. „Zero” check

Every 2 years or in accordance with the user's standards, check the probe's "zero" by pulling the probe above the liquid mirror and reading the output signal. In case of excessive deviation of the indication in "zero", the probe should be returned to the manufacturer for correction of the characteristics.

### 8.2. Non-periodic inspections

If the probe has been subjected to mechanical damage, pressure overload, hydraulic impulses, electrical surges, deposits, crystallization of the medium, etching of the diaphragm, or if the probe is found to be working incorrectly, the device should be inspected. Check the condition of the diaphragm, clean it, check the electrical functionality and processing characteristics.



If the signal is missing in the transmission line or its value is incorrect, check the power supply line, the state of connections on terminal strips, connections, etc. Check the correct value of the supply voltage and the resistance of the load.

### 8.3. Cleaning/washing

To remove impurities from the external surfaces of the probe wipe it with a cloth dampened in water.

#### 8.3.1. Diaphragm cleaning

The only possible method of cleaning the probe diaphragms is to dissolve the sludge produced.



Do not remove deposits and impurities from the probe diaphragms, which are formed during operation, mechanically using tools, since the diaphragms and the probes can be damaged.

#### 8.4. Spare parts

Parts of the probe that may be worn or damaged and must be replaced: cable and gland seals. The cable and seals can only be replaced by the manufacturer.

#### 8.5. Repairs

Faulty or non-operational probe shall be provided to the manufacturer or an authorized representative.

#### 8.6. Returns

In the following cases the, probe should be returned directly to the manufacturer:

- need for repair;
- need for factory calibration or „zero” calibration;
- replacement of improperly selected/shipped probe.

### 9. SCRAPPING, DISPOSAL



Worn or damaged devices shall be scrapped in accordance with WEEE Directive (2012/19/EU) on waste electrical and electronic equipment or returned to the manufacturer.

### 10. HISTORY OF REVISIONS

Revision No.	Document revision	Description of changes
-	Edition E4/2019.04	Figure and description of SGE-25/Hastelloy probe was added.
1	01.A.001/2021.09	New version of the document. Prepared by DBFD.
2	01.A.002/2022.11	Marine certificate update, editorial changes. Prepared by DBFD.
3	01.A.003/2023.01	PL.IX.SG annex update. Prepared by DCF.

## Explosion-proof Device Manual EN.IX.SGE

HYDROSTATIC LEVEL PROBES  
TYPE: SGE-25, SGE-25S, SGE-25C  
INTRINSICALLY SAFE VERSION

### 1. Introduction

Explosion-proof Device Manual EN.IX.SGE applies only to hydrostatic level probes SGE-25, SGE-25S, SGE-25C in intrinsically safe version with marking as in point 2 on the nameplate and Ex in the Product Certificate. When installing and using Ex probes, the User's Manual EN.IO.SGE and Explosion-proof Device Manual EN.IX.SGE should be used.

### 2. Explosion-proof marking

#### 2.1. Explosion-proof marking in accordance with the ATEX directive and IECEx requirements (based on FTZU 12ATEX0193X and IECEx FTZU 13.0004X certificates)

The probes are produced in accordance with the requirements of the following standards:

EN IEC 60079-0:2018 (IEC 60079-0:2017); EN 60079-11:2012 (IEC 60079-11:2011); EN 50303:2000.

The probes may operate in areas where there is a risk of explosion, in accordance with the rating of the explosion protection design:

ATEX:

I M1 Ex ia I Ma  
II 1G Ex ia IIC T6/T5/T4 Ga  
or



I M1 Ex ia I Ma  
II 2G Ex ia IIC T6/T5/T4 Gb  
or

I M1 Ex ia I Ma  
II 1G Ex ia IIB T6/T5/T4 Ga (for probe with PTFE sheathed cable with metal cord)  
FTZU 12ATEX0193X

IECEx:

Ex ia I Ma  
Ex ia IIC T6/T5/T4 Ga  
or  
Ex ia I Ma  
Ex ia IIC T6/T5/T4 Gb  
or  
Ex ia I Ma  
Ex ia IIB T6/T5/T4 Ga (for probe with PTFE sheathed cable with metal cord)  
IECEx FTZU 13.0004X

#### Permissible input parameters (based on data from the FTZU 12ATEX0193X, IECEx FTZU 13.0004X certificates and validation documentation)



- The probes should be powered from co-operating power supply and measuring devices with relevant intrinsic-safety certificates, whose parameters of outputs to the danger zone should not exceed the acceptable power supply parameters for the probes given in points a) and b).

- Probes in "SA version" should be powered from devices with galvanically separated power supply.



- Minimum probes power supply 9 V DC.

- The probe is an intrinsically safe device with protection level "ia" when the supply circuit has protection level "ia" or an intrinsically safe device with protection level "ib" when the supply circuit has protection level "ib".

a) Acceptable input parameters for power supply with linear characteristics:

$U_i = 28 \text{ V DC}$   $I_i = 0,1 \text{ A}$

b) Acceptable input parameters for power supply with trapezoidal and rectangular characteristics:

$U_i = 28 \text{ V DC}$   $I_i = 0,08 \text{ A}$

## EN.IX.SGE

c) Input capacity and inductance:  $C_i = 2,5 \text{ nF}^*$ ;  $L_i = 0 \text{ mH}^*$

\*) The capacitance and inductance of the cable must be taken into account, which for a permanently connected wire are:

$C_k = 0,2 \text{ nF/m}$  i  $L_k = 1 \text{ } \mu\text{H/m}$ .

The input capacitance  $C_w$  and inductance  $L_w$  taking into account the parameters of the cable connected permanently is:

$C_w = C_i + a \cdot C_k = 2,5 \text{ nF} + a \cdot 0,2 \text{ nF/m}$ ;  $L_w = L_i + a \cdot L_k = 0 \text{ } \mu\text{H} + a \cdot 1 \text{ } \mu\text{H/m}$

Where: - a - length of the cable permanently installed in the probe in metres.

„Pi” for all types of power supply: see table Z1.

**Table Z1.** Temperature class dependence on ambient temperature  $T_a$  and total amount of input power  $P_i$

$P_i$ [W]	$T_a$ [°C]	Temperature class
0,7	45	T6
	70	T5
	80	T4, group I
1,2	55	T5
	80	T4, group I

$T_a$ - ambient temperature (i.e. of measured medium).

Permissible medium temperature range in special versions → 3.3. Storage and use in EN.IO.SGE manual.

## 2.2. Explosion-proof marking in accordance with the ATEX directive (based on KDB 09ATEX007X certificate)

The probes are produced in accordance with the requirements of the following standards:

EN IEC 60079-0:2018; EN 60079-11:2012; EN 50303:2000.

The probes may operate in areas where there is a risk of explosion, in accordance with the rating of the explosion protection design:

ATEX:



I M1 Ex ia I Ma

II 1G Ex ia IIC T4/T5/T6 Ga

II 1G Ex ia IIB T4/T5/T6 Ga (for probe with PTFE sheathed cable)

KDB 09ATEX 007X

### Permissible input parameters (based on data from the certificate KDB 09ATEX007X and validation documentation)



- The probes should be powered from co-operating power supply and measuring devices with relevant intrinsic-safety certificates, whose parameters of outputs to the danger zone should not exceed the acceptable power supply parameters for the probes given in points a) and b).

- Probes in "SA version" should be powered from devices with galvanically separated power supply.



- Minimum probes power supply 9 V DC.

- The probe is an intrinsically safe device with protection level "ia" when the supply circuit has protection level "ia" or an intrinsically safe device with protection level "ib" when the supply circuit has protection level "ib".

a) Acceptable input parameters for power supply with linear characteristics:

$U_i = 28 \text{ V DC}$   $I_i = 0,1 \text{ A}$

b) Acceptable input parameters for power supply with trapezoidal and rectangular characteristics:

$U_i = 28 \text{ V DC}$   $I_i = 0,08 \text{ A}$

c) Input capacity and inductance:  $C_i = 25 \text{ nF}$ ;  $L_i = 0,4 \text{ mH}$

\*) The capacitance and inductance of the cable must be taken into account, which for a permanently connected wire are:

$C_k = 0,2 \text{ nF/m}$  i  $L_k = 1 \text{ } \mu\text{H/m}$ .

The input capacitance  $C_w$  and inductance  $L_w$  taking into account the parameters of the cable connected permanently is:

$C_w = C_i + a \cdot C_k = 25 \text{ nF} + a \cdot 0,2 \text{ nF/m}$ ;  $L_w = L_i + a \cdot L_k = 400 \text{ }\mu\text{H} + a \cdot 1 \text{ }\mu\text{H/m}$   
 Where: - a - length of the cable permanently installed in the probe in metres.

„Pi” for all types of power supply: see table Z2.

**Table Z2.** Temperature class dependence on ambient temperature  $T_a$  and total amount of input power  $P_i$

$P_i$ [W]	$T_a$ [°C]	Temperature class
0,7	50	T6
	80	T5, T4, group I
1,2	40	T6
	75	T5
	80	T4, group I

$T_a$ - ambient temperature (i.e. of measured medium).

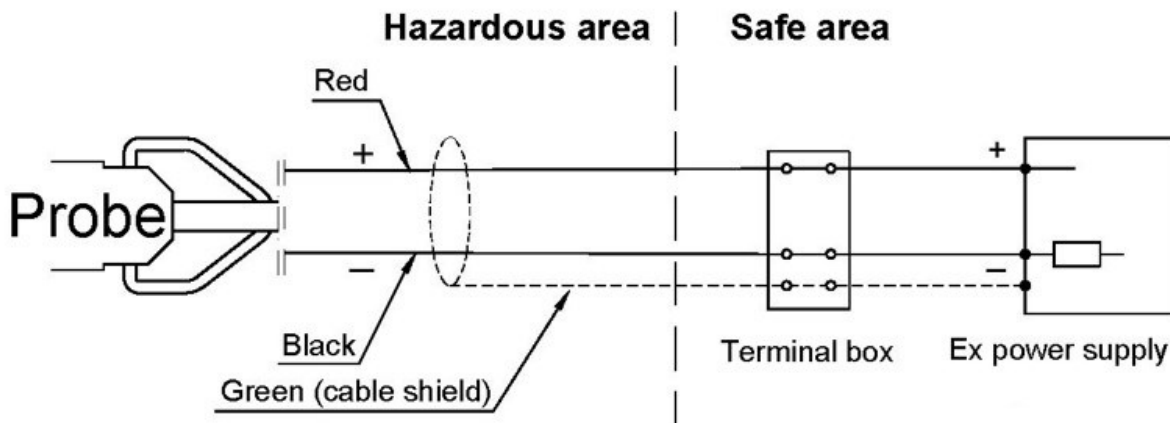
Permissible medium temperature range in special versions → [Storage and use](#) in EN.IO.SGE manual.

### 3. Connection of probes in Ex version



Connections of the probe and devices in the probe measuring loop must be made in accordance with intrinsic safety and explosion protection standards and conditions of use in hazardous areas.

Failure to follow these rules can lead to an explosion and can be dangerous.



**Figure 1.Ex.** Connection of Ex probes



No repairs or other interference with the electrical system of the probe are allowed. Damage assessment and possible repair can be done only by the manufacturer or a unit authorized by him.

Connections of devices in the probe's measuring loop should be made in accordance with intrinsic safety standards.

### 4. Special conditions for safe use

- Ambient temperature range from  $T_a = -40^\circ\text{C}$  to...- see table Z1, Z2.
- Process temperature (medium) at the diaphragm of the transmitter or probe must be in range of ambient temperature.
- Probes in the surge arrester version that are labelled as "**SA version**", do not meet the insulation test (500 V rms) required by EN 60079-11:2012. This must be taken into account when installing the device.

