OPERATING MANUAL - BA06.24

Electrode probe SST

Rope probe for conductive limit level detection
in electrical conductive liquids

Index

1. About this document

1.1. Dokument function

These instructions for use describe the structure, functions and the use of the product and will help to operate the product as intended.

Read these instructions carefully before using the product. This is to avoid possible damage to persons, property or the device.

The Operating manual is part of the device and must be kept always accessible nearest its installation location.

All statements within this document correspond to the information available at the time of printing. Subject to change without prior notice.

1.2. Terms

NOTE	Notes to prevent failures, malfunctions, damage to devices or plants.

WARNING	Non-observance of the information may result in serious or fatal personal injury.

[04-5]	Exemplary notice to a type variant (>> chapter Product description - Product code)

1.3. Other documents

Besides this document the following material can be found on the Internet at www.acs-controlsystem.com:

- EU Declaration of Conformity (current version)
- Manufacturer declarations
- Certificates
- 3D-CAD models

2. Safety instructions

2.1. Autorized personnel

Installation, electrical connection, commissioning, operation, maintenance, dismounting and disposal of the device must be made by a qualified and authorized expert according to the information's in the Operating manual and the relevant standards and rules.

This expert must have read and understood the Operating manual and especially the safety instructions. During work on and with the device, the required personal protective equipment must always be worn.

2.2. Appropriate use

The device is a conductive filling level sensor for limit value detection in electrically conductive liquid media.

The operational reliability of the device is ensured only at the intended use. Inappropriate or incorrect use of this product can give risk to application specific hazards, e.g. vessel overflow through incorrect mounting or adjustment. Damage to property and persons or environmental contamination can result. Also, the characteristics of the instrument can be impaired.

An inappropriately use, disregarding the Operating manual and the technical rules, using under-qualified personnel, making unauthorized alterations as well as damage of the device releases the manufacturer from liability for any resulting damage. This renders the manufacturer‘s warranty null and void.

2.3. Operational safety

The device is safely built and tested according to state-of-the-art technology. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument. The device may only be used within the permitted operation limits. Every use besides these limits as agreed can lead to serious dangers.

The materials of the device must be checked for compatibility with the respective application requirements before use. An unsuitable material can lead to damage, abnormal behavior or destruction of the device and to the resulting dangers.

The sensors may not be used as sole device for prevention of dangerous conditions in machines and plants.

For safety and warranty reasons, any invasive work on the device beyond that described in the Operating manual may be carried out only by personnel authorized by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden. For safety reasons, only the accessory specified by the manufacturer must be used.

This measuring device meets article 4 (3) of the EU directive 2014/68/EU (pressure equipment device directive) and is designed and produced in good engineer practice.

The device meets the legal requirements of all relevant EU directives. This is confirmed by attaching the CE mark to the device. The associated EU-Declaration of Conformity can be ordered or downloaded from the homepage.

3. Product description

3.1. Function

The device is a conductive filling level sensor for limit value detection in electrically conductive liquid media.

With up to seven contact electrodes, several tasks can be carried out at the same time.
This includes:

- leakage or overflow protection
- minimum / maximum protection
- multilevel detection
- pump protection, resp. dry run protection in pipelines
- two-position-control of pumps

The alternating voltage generated by a suitable evaluation device is present between the electrode ropes.

As soon as the electrically conductive filling material forms a connection between the electrodes, a measurable current flows, which causes the connected evaluation device to react.

By using an alternating voltage, corrosion on the electrode and electrolytic decomposition of the filling material are avoided.

For the electrode probes, an additional module (diode module LBM) can be installed in the housing for line monitoring. In the event of a line break between the electrode probe and a suitable evaluation device, the evaluation device can issue a corresponding warning message.

3.2. Construction

The electrode probes can be configured variably and are therefore designed for a wide range of applications:

- for conductivities from 1 µS/cm
- for process temperatures from -20 °C to +100 °C
- Materials also for aggressive filling goods

The electrode probe is installed either directly into the container or pipe wall via the respective process connection or via a suitable holder above the filling material.

The electrode ropes can be up to 15 m long.

3.3. Product label

The product label contains the most important data for identification and use of the instrument.

3.4. Product code

SST [01][02][03][04][05][06][07][80][94]

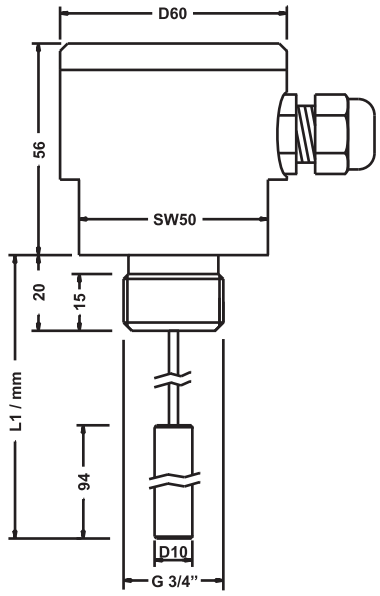
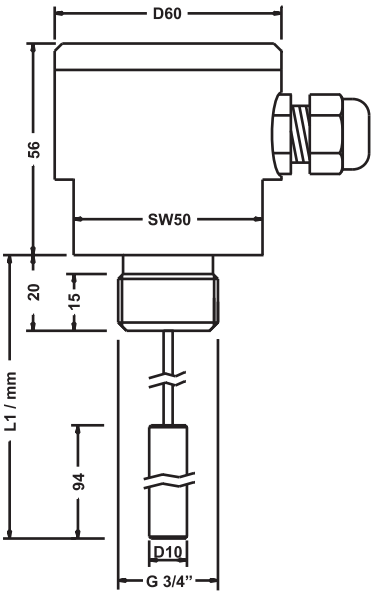
01	Version	0	Standard
02	Number of electrodes	1	1 Electrode rope
02		2	2 Electrode ropes
02		3	3 Electrode ropes
02		4	4 Electrode ropes
02		5	5 Electrode ropes
02		6	6 Electrode ropes
02		7	7 Electrode ropes
03	Process connection	G12	Thread ISO 228-1 – G½", (1x Electrode rope)
03		G34	Thread ISO 228-1 – G¾", (1x / 2x Electrode rope)
03		G10	Thread ISO 228-1 – G1", (1x ... 3x Electrode rope)
03		G15	Thread ISO 228-1 – G1 ½", (1x ... 4x Electrode rope)
03		G20	Thread ISO 228-1 – G2", (1x ... 7x Electrode rope)
04	Material electrode rope	V	CrNi-steel
05	Material process connection	E	POM / D60mm - Process connection G ½" / G ¾" / G 1"
05		D	POM / D80mm - Process connection G 1½" / G 2"
05		P	PP/ D60mm - Process connection G ½" / G ¾" / G 1"
05		M	PP / D80mm - Process connection G 1½" / G 2"
05		T	PTFE / D60mm - Process connection G ½" / G ¾" / G 1"
05		L	PTFE / D80mm - Process connection G 1½" / G 2"
06	Material electrode insulation	H	ETFE
07	Electronic - Line break	A	without
07		B	Diode module LBM
80	Length L1	-###.###	mm (≤ 15.000mm)

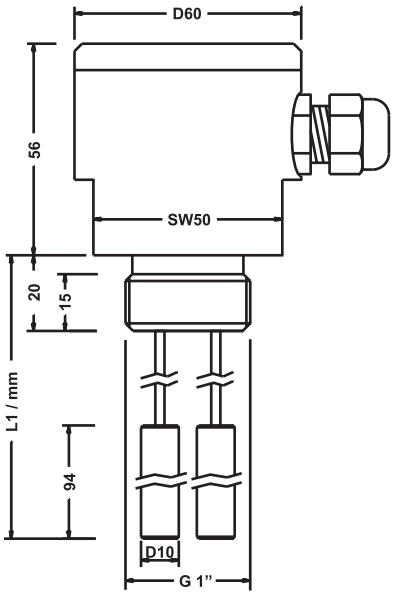
94	Additional option	-SF	LABS-free, silicone-free / paint compatible version

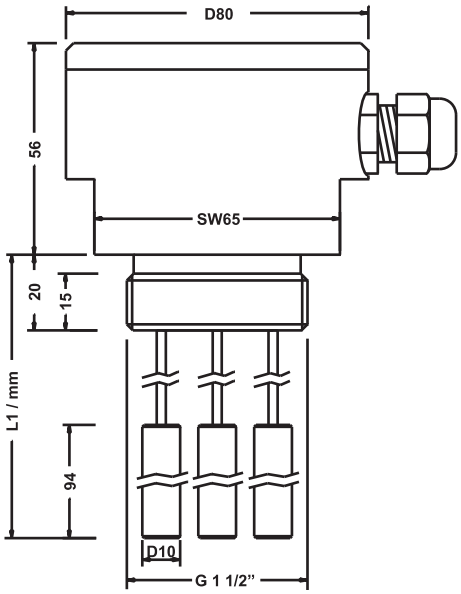
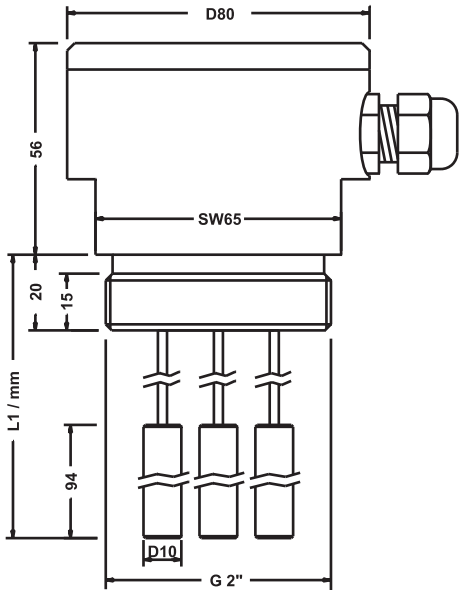
Differing versions are normally marked by the character Y at the product code.

3.5. Dimensions

Dimensions in mm

Thread ISO 228-1 – G1/2" [03-G12] **1 Electrode rope [02-1]**	**Thread ISO 228-1 – G3/4" [03-G34]** **1 Electrode rope [02-1]**
Process pressure Pmax = pressureless Torque Mmax = 50Nm	Prozessdruck Pmax = pressureless Torque Mmax = 50Nm
	

Thread ISO 228-1 – G1" [03-G10] **2 Electrode ropes [02-2]**	
Process pressure Pmax = pressureless Torque Mmax = 50Nm	
	

Thread ISO 228-1 – G1 1/2" [03-G15] **3 Electrode ropes [02-3]**	**Thread ISO 228-1 – G2" [03-G20]** **3 Electrode ropes [02-3]**
Process pressure Pmax = pressureless Torque Mmax = 50Nm	Process pressure Pmax = pressureless Torque Mmax = 50Nm
	

3.6. Packaging, transport, storage

The device is protected by packaging. It can handle normal loads during transport. Transport must be carried out in due consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Up to the time of installation, the packages must be left closed and, unless otherwise indicated, must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration
- Storage and transport temperature -20...+85°C
- Relative humidity 20...85%

3.7. Accessories

For installation and electrical connection an extensive portfolio, that is optimally matched to the device is available:

- Welding sockets
- Reduction adapter
- Gaskets
- Connection cables

4. Installation

4.1. Ambient and process conditions

The correct function of the device within the specific technical data can only be guaranteed, if the permitted ambient and process conditions at the installation place (» chapter Technical Data) will not be exceeded. Hence make sure before mounting that all parts of the instrument exposed to the process (e.g. sensor tip, electrode rope, process connection, process gasket) are suitable for the existing process conditions (e.g. process pressure, process temperature, chemical properties of the medium, abrasion, mechanical influences).

4.2. Installation place

Mount the electrode probe in a place in the container where no strong lateral forces, such as agitators or filling openings, can act on the electrode cables. This is especially true for particularly long electrode ropes.

If necessary, install the device in a bypass if dense, heavy foam, wild turbulence or foamed liquid are to be expected.

Allow enough mounting space outside the container to be able to insert the electrode probe into the system without using force.

Electrode ropes are not suitable for side installation.

4.3. Installation notes

WARNING	Install the device only into pressureless systems. There is a risk of fast escaping media resp. pressure blow.

WARNING	Let the system cool down sufficiently before installing the device. There is a risk of dangerous and hot media escaping.

Do not remove packaging until just before mounting and check the device for any damage.

The insulation of the electrode rope must not be damaged or removed at any point except at the electrode tip.

The rope is shortened on the side of the connection housing. Loosen the rope fixing ring inside the connection housing and pull out the rope to the required rope length. Then attach the rope by tightening the fixing ring, shorten it with pliers and strip 10mm of insulation.

When installed, the uninsulated electrode tips must not touch the container wall if it is made of metal or electrically conductive plastic.

Sealing faces and threads at the device and at the installation point must be clean and without damage.
Parallel threads must be sealed by a suitable O-ring, flat or profile gasket. An additional sealing material such as yam, hemp or PTFE tape should not be used. Tapered threads should be wound with additional sealing material, e.g. PTFE tape for sealing.

The tightening of the thread process connection may only be done at the hexagon by a suitable spanner at most with the maximum permitted torque strength (» chapter Product description - Dimensions).

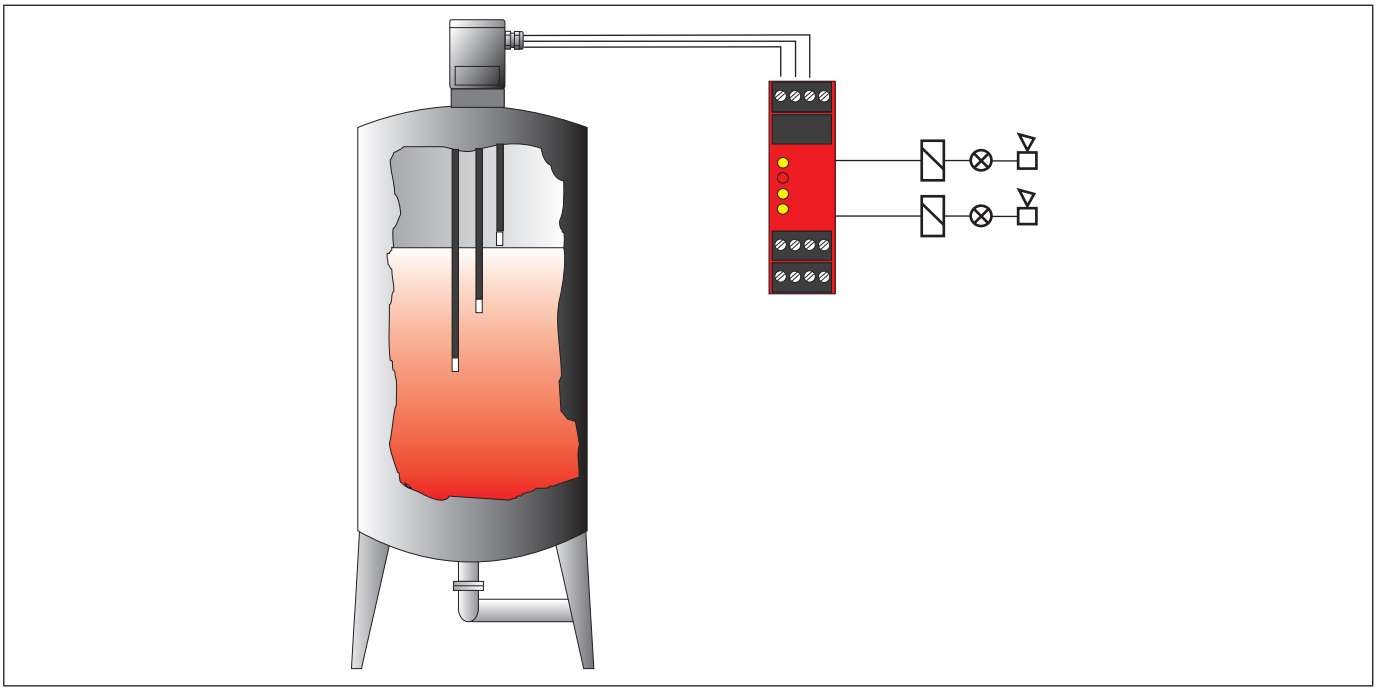
5. Electrical connection

5.1. Terminal assignment

5.1.1. Two-point-control

For two-point control, an electrode probe with three ropes should be used, with the longest rope forming the reference electrode.

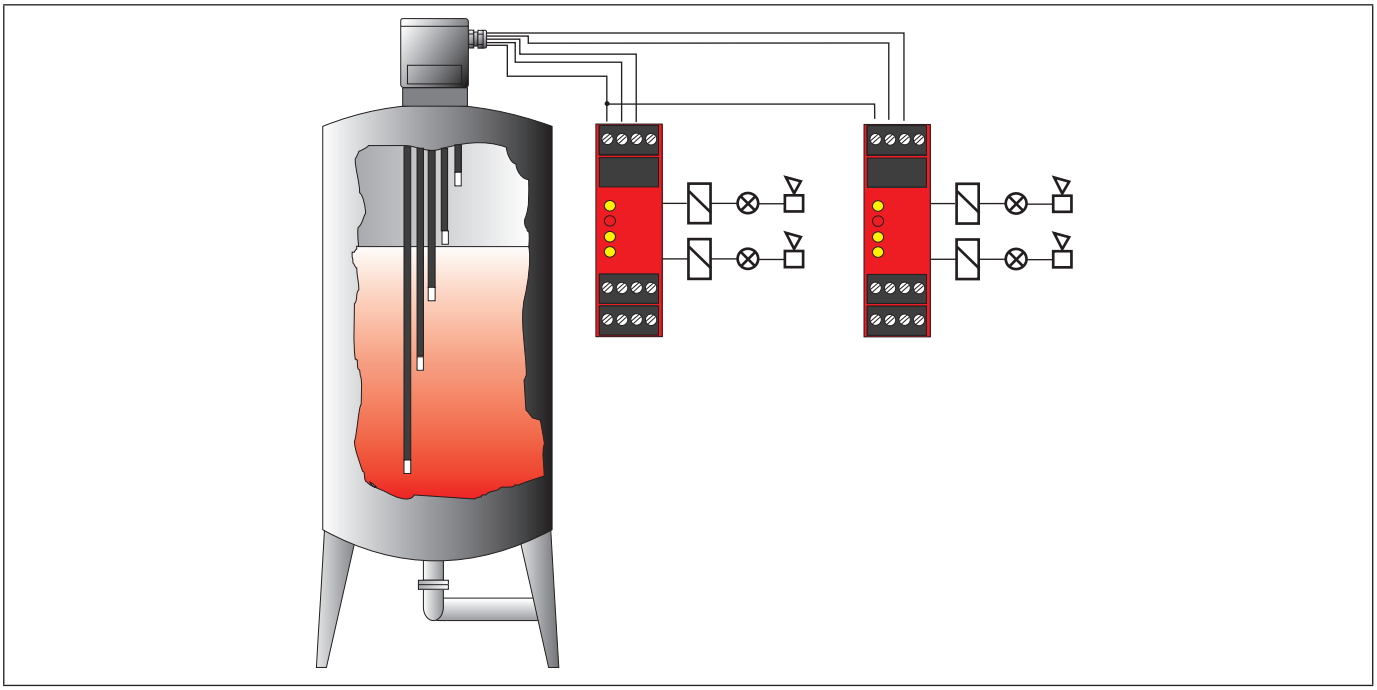
The evaluation device with a function for two-point control maintains the filling level between the upper and lower limit levels.



5.1.2. Four-point detection

For four-point detection, an electrode probe with five ropes should be used, with the longest rope being the Reference electrode forms.

For the evaluation, for example, two two-channel evaluation devices are used, the two reference connections of which must be connected to the longest electrode.



5.2. Connection cable

For the connection, only use suitable cables that meet the requirements, for example in terms of temperature, material or routing at the installation location.

In the event of strong electromagnetic radiation, shielded signal and measuring cables must be used.

Impedance	≤ 25Ω/wire
Cable diameter	3,5...8mm
Cable cross section	≤ 2,5 mm2
Shielding	Braided shield /shield foil

5.3. Connection notes

WARNICG	Install the device only in de-energized state.

NOTE	For start-up deactivate all connected control devices.

Lay cables separately from power lines and ground the cable shield on one side.

A suitable evaluation device must be connected to the electrode cables inside the connection housing via the connection cable. The cable is connected to the electrode cables via terminals or screw connections in the connection housing. Use insulated cable lugs for connection.

For electrode probes, an additional module (diode module LBM) can be installed in the housing for line monitoring. This must always be connected between the shortest rope and the longest rope. Connection polarity does not need to be taken into account. This module must not be installed when using evaluation devices or transmitters that do not support line monitoring.

6. Operation

The device is not intended to be operated.

7. Error diagnosis and Troubleshooting

The operator of the system is responsible for taking suitable measures to rectify faults.

In case of malfunction check:

Component / area	**Check**	**Troubleshooting**
Enclosure	Damage	Replace device or send in for repair
Electrode rope	Pollution	Clean device or send in for repair
	Damage	Replace device or send in for repair
Signal evaluation	Connection cable damaged	Change resp. repair cable
	No function	Reverse operation voltage connection
	Wrong function	Adapt resp. repair
	No line break monitoring Diode module LBM	Install diode module
		Check connection of diode module
		Change diode module

If the malfunction cannot be eliminated, please contact the manufacturer.

8. Maintenenance

At appropriate use, the device is free of maintenance.

Solid coatings on the electrode contacts can lead to faulty measurement results. In this case the sensor lens must be regularly cleaned. Don’t use sharp resp. hard tools, pressured air or aggressive chemicals.

9. Repair

The device is not intended for repair by the user. A repair may only be carried out by the manufacturer.

9.1. Dismounting

Use suitable protective clothing, e.g. goggles, gloves.

WARNING	Let the device and the system cool down sufficiently fore dismounting it. There is a risk of hot surfaces as well as dangerous and hot media escaping.

9.2. Return

Returns can only be accepted if the device has been equipped with a Decontamination declaration enclosed. The decontamination declaration is available at https://www.acs-controlsystem.com at the download area and must be completely filled in, and affixed securely and weather-proof to the outside of the packaging.

9.3. Disposal

As required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), products of ACS are marked with the depicted symbol in order to minimize the disposal of WEEE as unsorted municipal waste. Such products may not be disposed of as unsorted municipal waste and can be returned to ACS for disposal.
The return follows the conditions stipulated in the General Terms and Conditions or as individually agreed by ACS.

10. Technical Data

Reference conditions	Ta = +15°C..+25°C (+59°F..+77°F) / pa = 860..1060kPa / r.F. = 45..75%

10.1. Input resistance/conductivity

Sensor type	conductive
Measuring range	≤ 1MOhm / ≥ 1µS/cm

10.2. Process conditions

Process temperature Tp	-20...+100°C (+14°F...+212°F)
	[05-P]/[05-M] (PP): -5...+100°C (+23°F...+212°F)
Process pressure	drucklos

10.3. Environmental conditions

Ambient temperature Ta	-20...+100°C (+14°F...+212°F)
	[05-P]/[05-M] (PP): -5...+100°C (+23°F...+212°F)
Protection level	IP65 (EN/IEC 60529)
Climatic classification	4K4H (EN/IEC 60721-3-4)
Shock classification	15g [11ms] (EN/IEC 60068-2-27)
Vibration classification	4g [10...2000 Hz] (EN/IEC 60068-2-6)
EM compatibility	Operation device class B / Industrial range (EN/IEC 61326)
Insulation voltage	500Vac
Protection class	III
Pollution degree	2
Altitude above sea level	2000m above sea level
MTTF	TBD
Weight	Depends on variant

10.4. Materials

Process wetted	Stahl 1.4404/316L or 1.4571/316Ti, ETFE, NBR, POM/PP/PTFE
Not process wetted	PA, CR, FKM/FPM

11. Revision

Version	**Changes**
BA05.09	Original version
BA12.20	Correction protection level IP65
	Electroden insulation ETFE
BA06.24	Enclosure D40 is omitted

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