

# LSP 05X Potentiometric Level Transmitter

## Safety instructions

This instrument is built and tested according to the current EU-directives and packed in technically safe condition. In order to maintain this condition and to ensure safe operation, the user must follow the hints and warnings given in this instruction.

During the installation the valid national rules have to be observed. Ignoring the warnings may lead to severe personal injury or substantial damage to property.

The product must be operated by trained staff. Correct and safe operation of this equipment is dependent on proper transport, storage, installation and operation.

All electrical wiring must conform to local standards. In order to prevent stray electrical radiation, we recommend twisted and shielded input cables, as also to keep power supply cables separated from the input cables. The connection must be made according to the connecting diagrams.

Before switching on the power supply take care that other equipment is not affected. Ensure that the supply voltage and the conditions in the environment comply with the specification of the device.

Before switching off the supply voltage check the possible effects on other equipment and the processing system.



LSP051

## WARNING

This product contains no replaceable parts. In case of malfunction the product must be shipped to Baumer for repair.

## Description

The level measuring device LSP05X utilises the potentiometric measurement principle and can be used in all medias that have a minimum conductivity of 50  $\mu\text{S}/\text{cm}$ .

From the low resistive measuring rod a high frequent current is fed through the media to the tank wall. The voltage between the tip of the rod and the tank wall is measured. This output voltage is proportional to the tank filling level.

The measurement is unaffected by temperature and adhesive media.

The instrument is ideal for measurements in small wessels with tough, pasty or strong adhesive media, such as ketchup, honey, and tooth-paste. The integrated electronics provide a 4...20 mA output.

The LSP has automatic recognition of top/bottom mounting position. Even angled installation is possible. In a non-conductive tank such as a plastic tank a reference rod must be installed.

Please observe that a non-linear conductivity in the media will affect the accuracy of the measurement.

A version with separate rod sensor and electronics is available for applications where the ambient temperature at the measuring point exceeds 60°C. Due to the high temperature limit the LSP050 is well suitable for CIP and SIP processes.

The hygienic installation is guaranteed by using one of the hygienic weld-in sleeves. (Please refer to the separate data sheet).



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## Mechanical Installation

### Welding part

Please refer to "Accessories" data sheet. The welding part has an engraved mark or hole. When the product has been mounted and correctly tightened the gland or M12 plug will align with this mark. Make sure that the gland/plug is pointing downwards to prevent fluids from penetrating into the instrument.



### Cautions

Use only the authorised special designed accessories.  
The product warranty is void when installed with other adapters.

#### **The sensor can not be shortened.**

Please be aware of the active measuring zone on the rod (see drawing)

Do not use teflon, paper or other gaskets.

The process connection must have electrical contact with the tank. If not, a separate grounding cable must be installed.

If the tank is non-conductive an additional ground electrode must be installed. This should have electrical connection to the LSP process connection.

Make sure that the rod can not touch the tank wall even with the highest movement of the media.

When installed <100 mm from the tank wall the rod must be parallel with the tank wall. For larger distances non-parallelity can be allowed.

After carefully insertion of the sensor into the welding part tighten the union with a torque of 20...30 Nm.

### After Installation and Configuration

Check the leak tightness of the sleeve.

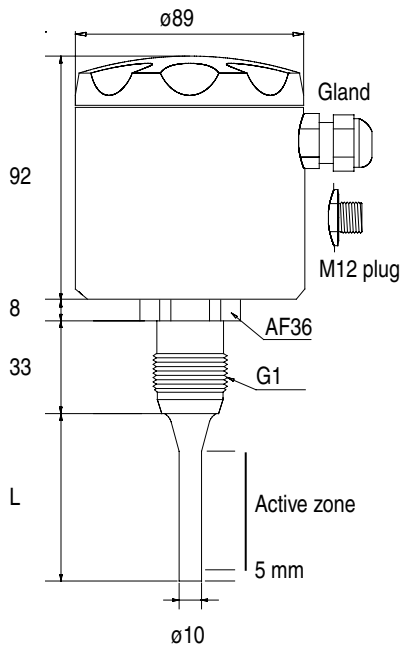
Check the tightness of glands or M12 plugs.

Check the tightness of the cover.

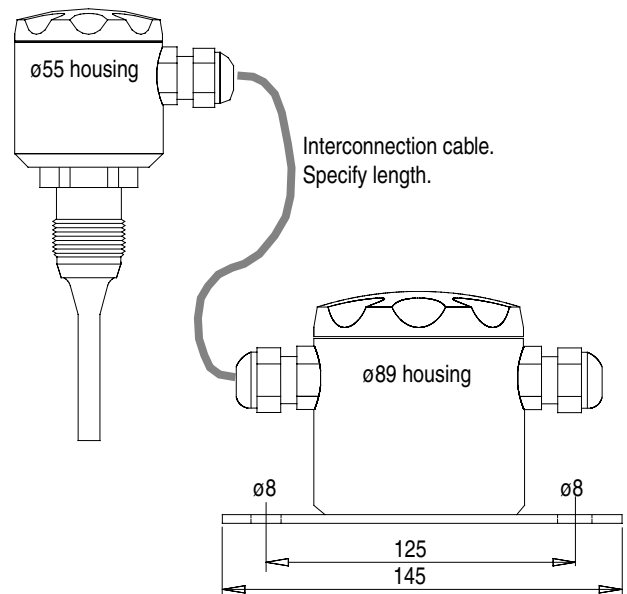
Check that the rod is not touching the tank wall.

## Dimensional Drawings

[mm]

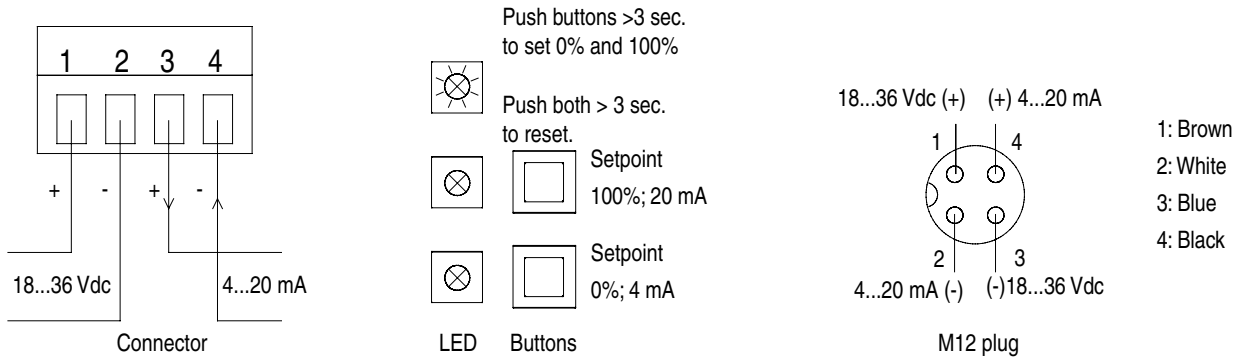


LSP050/LSP051 - integrated electronics



LSP055/LSP056 - separate electronics

## Electrical Installation



### Operator Control

The green LED indicates that a supply voltage > 18 V with the correct polarity is present.

The two red LEDs show different flashing rates according to the control of the 4...20 mA output.

The sensor can be installed in the top or the bottom of the tank.

The sensor is calibrated for installation from the top. Then 4 mA output corresponds to the tip of the rod, and 20 mA to the thread end.

When installed from the bottom of the tank an output excessive of 4 mA is obtained.

The sensor can be calibrated by pressing one of the two setpoint keys for more than 3 seconds. The relevant LED will show a steady light.

With these two buttons any empty/full level can be configured on the entire length of the rod.

The factory setting will be valid again by pressing both keys for more than 3 seconds.

The "dry" signal level is adjusted together with the low level setting.

The "dry" indication is 2.4 mA output current.

### Caution

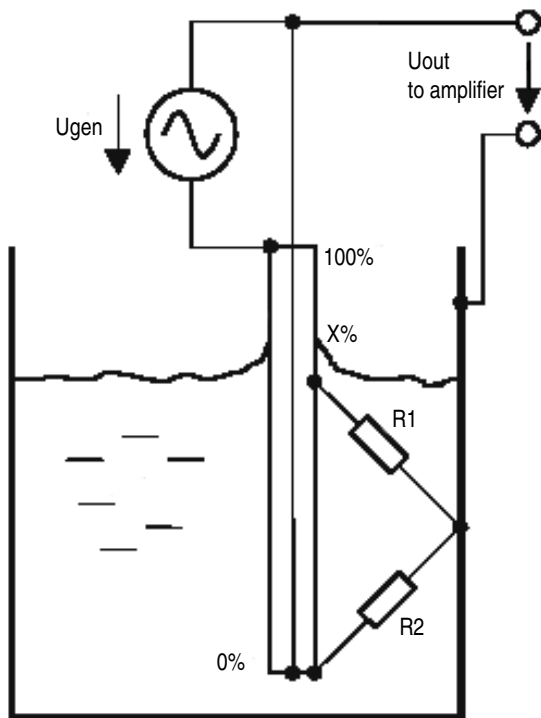
If different medias are used the low level adjustment should be made with the media having the lowest conductivity.

### Caution

The minus pole of the power supply is connected to the housing via a protective diode.

However, the 4...20 mA output is galvanically isolated from the power supply.

## Measuring Principle



### Theory

The liquid is stored in a ground connected tank.

The immersed level probe is a low resistance rod where the ends are powered by an AC generator operating in the lower kilohertz frequency range.

Between the rod and the tank wall is an endless amount of high level resistances. Since they connect to the same potential (the tank wall) they can be shown as two equivalent resistances,  $R_1$  and  $R_2$  connected to an imaginary center point.

A high resistance input amplifier is connected between the generator and the tank wall.

Since the generator is supplying a high range current it will create a significant voltage drop across the low resistance rod.

The resistances  $R_1$  and  $R_2$  form a voltage divider in range of the immersed part of the rod. Output from this divider will indicate half the level of the liquid. The amplifier then calculate the actual level of liquid from 0 to 100%.

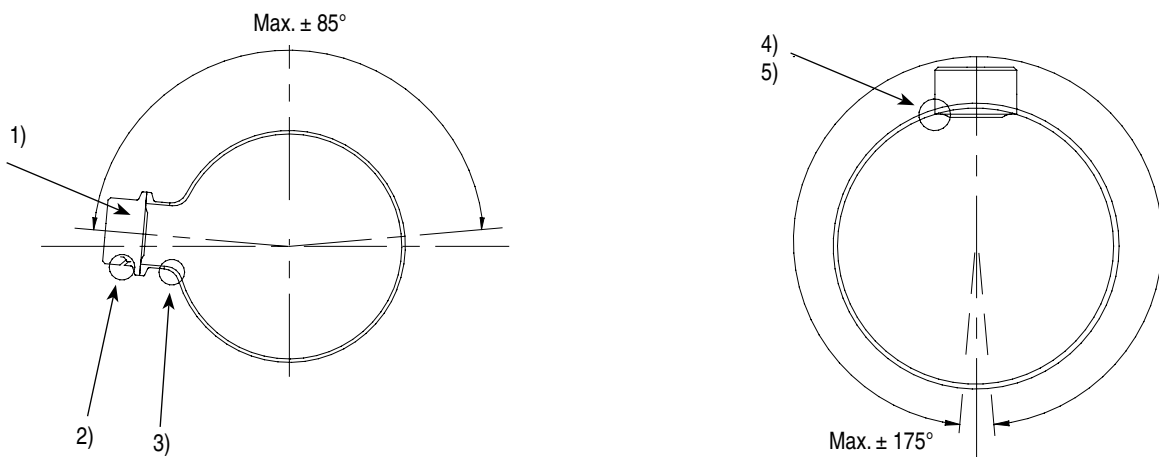
The formula is:  
 $U_{out} = 1/2 \times \text{media level (\%)} \times U_{gen}$   
 $\text{Media level (\%)} = U_{out}/U_{gen} \times 2$

The level measurement is insensitive to adhesion.

### Caution

It is very essential that the media conductivity is homogenous. Otherwise  $R_1$  will not be equal to  $R_2$  and the output voltage will be influenced.

## Mounting of 3A Approved Products



### Installation of 3A approved products:

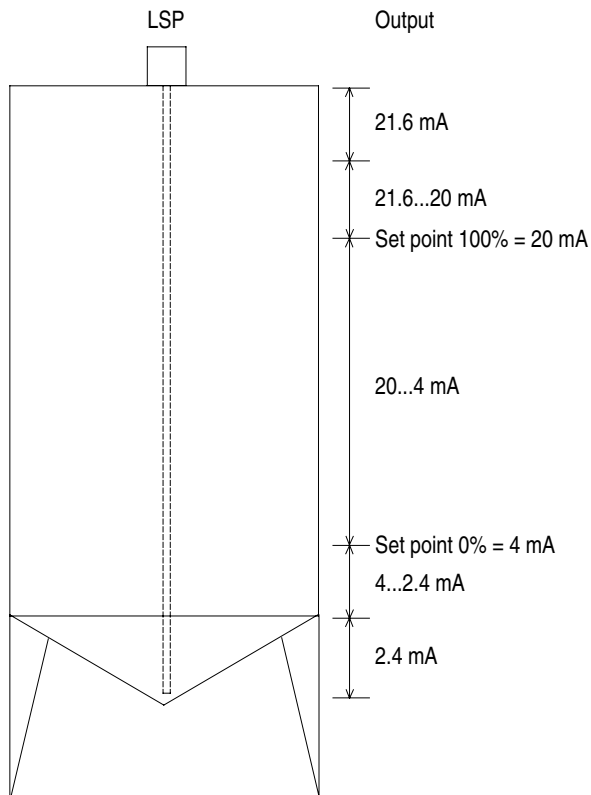
- 1) Use only a 3A approved counter part.
- 2) The inspection hole should be visible and drained.
- 3) Mount the instrument in a self drained position.
- 4) Level the inner surface of the pipe with the counter part.
- 5) Weldings should be grinded to  $Ra=0.8$

Refer to the data sheet "Accessories" for O-rings, gaskets and other accessories.

The LSP 051 and LSP 056 are approved by 3A providing it is mounted in a 3A approved counter part and installed according to the guidelines given in the installation manual.

The 3A approved products fulfill the FDA demands and follow the EHEDG guidelines regarding design, materials and finishing. Refer to the 3A marked counter parts in the data sheet "Accessories".

## Example of Application



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