



## Displacer Level Meter L21/5

- Remote data transfer
- Use in potentially explosive atmospheres
- Robust and flexible design
- Reasonable price

**HART**  
COMMUNICATION PROTOCOL



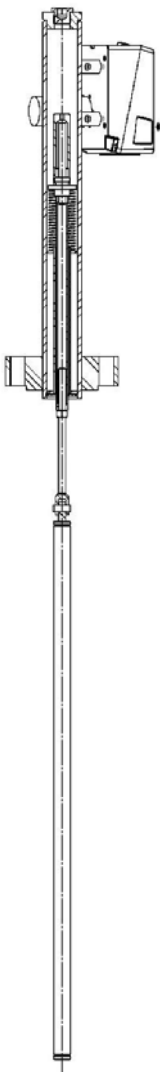
## Usage

The Displacer level meter is a device that uses the principle of Archimedes. Rod immersed in the liquid is lightened by buoyancy force, which affects the deformation of the spring. For different level is different deformation of the spring. This movement is sensed and transmitted to the scale.

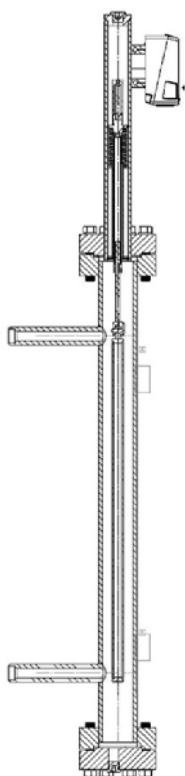
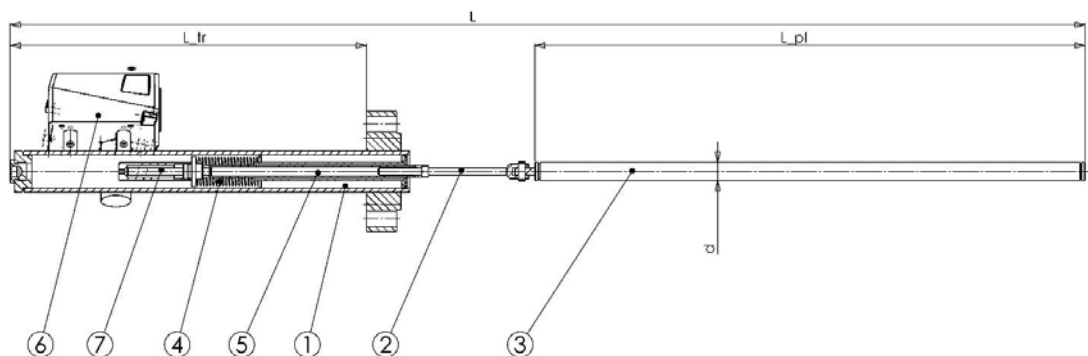
The device requires no additional body to the tank. Can be installed directly into the area where the measurement is required. The only condition is non-whirling liquid, which could adversely affect measurement accuracy.

The meter is designed to measure the level of well liquid fluids and non-crystallising liquids in open and pressure vessels. The device can adapt according to the possibilities of measuring the interface between two immiscible liquids (interface) or measurement of the density of the liquid.

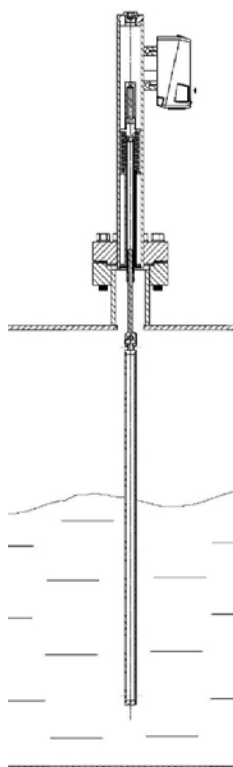
## Technical data

|                                       |                                |                                                                                      |
|---------------------------------------|--------------------------------|--------------------------------------------------------------------------------------|
| Working Conditions                    |                                |  |
| Range of measured level               | of 0.1 - 10 m                  |                                                                                      |
| Range of measured densities           | $\geq 600 \text{ kg/m}^3$      |                                                                                      |
| Medium temperature                    | -60... +450°C                  |                                                                                      |
| Temperature around indication housing | -50... +85°C                   |                                                                                      |
| Working pressure                      | 300 bar                        |                                                                                      |
| Indication                            | Angle scale                    |                                                                                      |
| Material                              |                                |                                                                                      |
| Body                                  | Stainless steel 1.4541; 1.4571 |                                                                                      |
| Float                                 | Stainless steel 1.4541; 1.4571 |                                                                                      |
|                                       | Aluminium, Titanium            |                                                                                      |
| Spring                                | Stainless spring steel 1.4568  |                                                                                      |
| Flange                                | Stainless steel 1.4541; 1.4571 |                                                                                      |
| Connection                            |                                |                                                                                      |
| Type and size                         | Flange                         |                                                                                      |
|                                       | Threaded                       |                                                                                      |
|                                       | Welded                         |                                                                                      |
|                                       | According to the customer      |                                                                                      |
| Degree of protection                  | IP 43                          |                                                                                      |
| Electromagnetic compatibility         | EN 50081-1                     |                                                                                      |

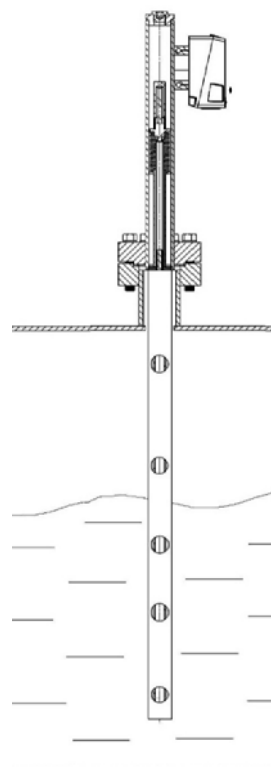
The device is composed of a body (1) in which are located all the important components. It is a welded pressure vessel, with the same internal pressure as in the tank. Inside is the spring (4), the most important part of the instrument, providing lift of the float and shift of the magnet (7). This movement is transmitted by a magnetic coupling to the pointer of angular scale in measuring box (6). The spring is connected with the float via a rod (5) and the thread (2) is to be set to the exact initial height of the float in the mounting location. The length and diameter of the float (3) is designed with respect to the required measuring range and density of the liquid, because it affects the buoyancy of the spring load. The stroke depends on the density of the liquid, the diameter of the float, the float length and stiffness of the springs.



Picture 1



Picture 2



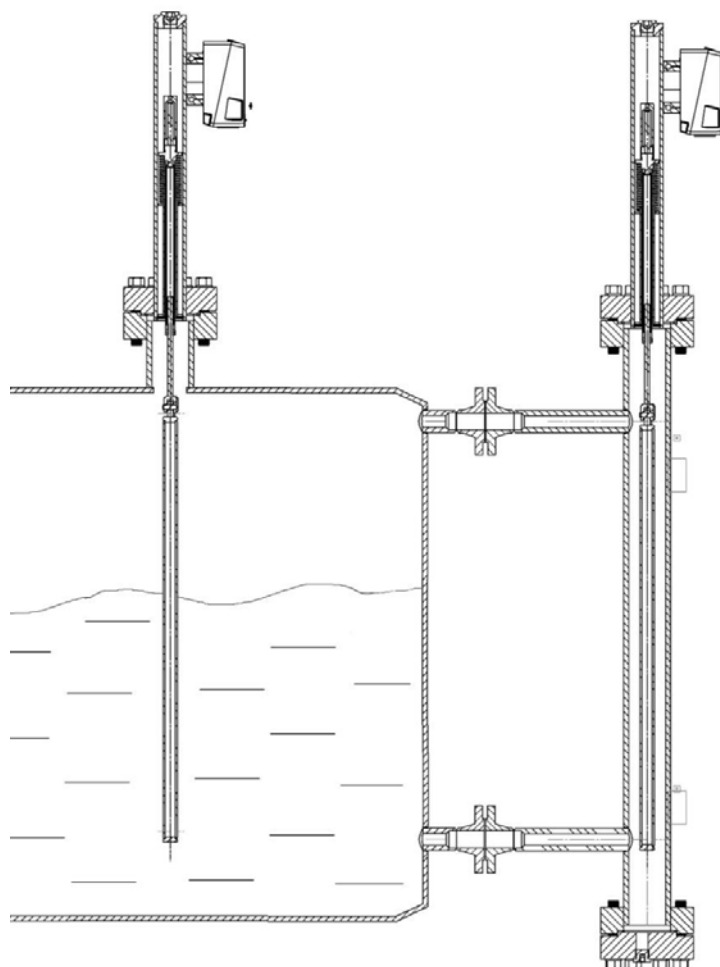
Picture 3

Possible placement variants of level meter L21/5 to the tank.

Picture 1 - location of the float in the tank

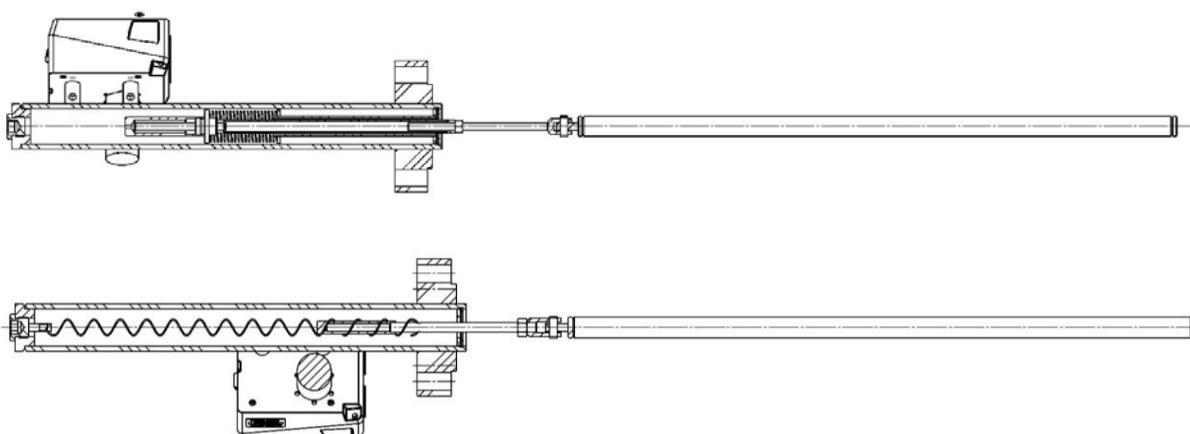
Picture 2 - location of a float in a housing located outside the tank may be connected by flanges or welded

Picture 3 - in case the float is located freely in the tank around it can be placed a jacket that prevents undesirable swirling flows.

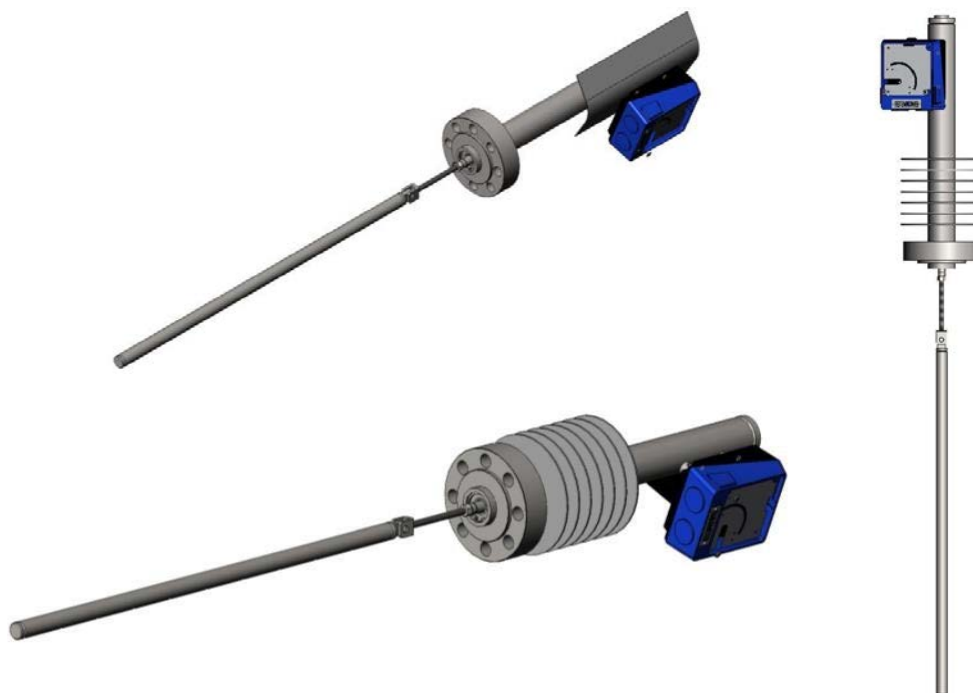


Picture 4; example - location of level meter L21/5 on the tank

Level meters can be produced in versions with compression or tension spring.



If the medium temperature is high and there would be risk of heat radiation to electrical appliances, the body can be provided with heat shield. To reduce the temperature in the upper part can be placed onto a level meter condenser plates to ensure sufficient heat dissipation.



## Manufacturer part number

L21/5    ... /    ... /    ... /    ... /    ... /    ... /    ... / side connection  
0       1       2       3       4       5       6

Ex .: L21/5/630/DN80PN160/N/SP6

0. Measuring range "M" in mm
1. Connecting the unit to the tank, connecting dimensions (DN25-PN16, G3/4 "...")
  - A horizontal connection
  - B vertical connection
  - C vertical inlet, horizontal discharge
  - D horizontal flow, vertical discharge
  - E upper flange on the tank
2. Material
  - N stainless
  - PP polypropylene
  - Other materials
3. Remote transmission of measured values
  - SP1 minimum (NAMUR)
  - SP2 maximum (NAMUR)
  - SP4 electrical output 4-20 mA (see display and converter in technical data section)
  - SPJ - switching contact reed switch
  - SPM - changeover contact with micro switch
  - SP8 - limit sensor pneumatic

HART Communication

Foundation Fieldbus, PROFIBUS communication

Range of applications

- 4. NO normal environment
- EX explosive environment
- ZO special versions  
pollutant, settling and crystallizing liquids
  
- 5. A local indication traverse magnet
- B local indication with rollers
- HT version for temperatures up to 400°C
- HP1 max. pressure 1,6 MPa, minimum density of 500 kg/m<sup>3</sup>
- HP2 max. pressure of 4 MPa, min. density of 830 kg/m<sup>3</sup>
- HP3 max. pressure 0,6 MPa- PP float min. density 700 kg/m<sup>3</sup>
- LI interface of two liquids of different density
  
- 6. I insulated measuring pipe
- OP OE heating of the measuring tube by steam or hot water, an electric heating
- PI thermal shield – preparation of the insulation

## Accessories

### Limit switch SP1, SP2, SPP, SP0

In normal/intrinsically safe design, sensors enables monitoring of any level.

- Sensor SP1 - remains permanently closed when reaching the minimum chosen level. Switch contact.
- Sensor SP2 - remains permanently closed when reaching the maximum chosen level. Switch contact.
- Sensor SPP - changeover contact
- Sensor SP0 - closes only when the chosen level is reached. Monostabil.

Sensor location is user adjustable has indicated switching point, installs the bushing down.

### Specifications and requirements

- Ambient temperature: -40 to +125°C
- Medium temperature: -40 to +300°C
- Protection: IP 44

In case of use in potentially explosive atmospheres sensor must be connected in intrinsically safe circuit.

Maximum input parameters  $U_i = 30V$ ,  $I_i = 100\text{ mA}$ ,  $L_i = 0$ ,  $C_i = 0$

For normal design are limit contact parameters:

- Maximum current: 1 A
- Maximum voltage: 250 V
- Maximum switching power: 60 W

Sensors SP1 and SP2 are available also as NAMUR. The design uses a magnetic sensor circuit with two magnets, which increases resistance to vibrations, shocks and strokes.

### The limit switch SPJ, SPM

Flameproof

Sensors allow the monitoring of any level.

- Sensor SPJ - switching contact with reed switch
- Sensor SPM - changeover contact with microswitch

Its position is user-adjustable sensor has indicated switching point, installs by the bushing down. Reserve in the sensor range is up to 45 mm.

### Specifications and requirements version J

- Ambient temperature: -40 to +125°C
- Medium temperature: -100 to +300°C
- Protection: IP 66
- Maximum current: 3 A
- Maximum voltage: 400 V DC
- Maximum switching capacity: 100 W
- Weight: 0,4 kg

IIG ExdIICT4

### Continuous sensor SP4 for remote data transmission

Resistive encoder with reed contacts with transmitter in the head. Possible as intrinsically safe and flameproof.

The sensor resistance is converted using the transmitter in the head on a standard analog signal 4 (0) to 20 mA for further processing, or it can be supplemented by digital HART protocol or the signal may be transmitted digitally only using FOUNDATION fieldbus or PROFIBUS.

### Specifications

- Ambient temperature: -40 to +130°C (process media temperature 400°C - on request even higher)
- Power: 11 to 26 V DC
- Protection: IP 65
- Cable gland: M20 x 1.5
- Accuracy: Up to 0,1 mm

Reserve of the sensor range at least 20 mm. Suitable for locations outside of the insulation.

### The limit switch SP8 - pneumatic

- Sensor SP8-1 - remains permanently closed when reaching the minimum chosen level.
- Sensor SP8-2 - remains permanently closed when reaching the maximum chosen level.

## Specifications and requirements:

|                                          |          |
|------------------------------------------|----------|
| Maximum overpressure of the control air: | 6 bar    |
| Maximum ambient temperature:             | +60°C    |
| Operating rate flow of the control air:  | 40 l/min |

Sensor is available in two variants:

- SP8 - 1F and SP8 - 2F - Compact design with a filter that must be operated only at plus temperatures of max. to 60°C, relative to the automatic separator, in which the water would freeze at the minus temperatures. For operating sensor with a separator in frosty conditions can be fitted with a self-regulating heating cable.
- SP8 - 1 and SP8 - 2 - Design without filter for operation at temperatures from -15 to +60°C. To ensure proper operation of the sensor must control the media to remove moisture and dirt through a 40µm filter.

All types of sensors can be operated in zone II.

Equipment mark II 2 G c X