

## L21 – Magnetic Level Indicator

**Float magnetic level meter for continuous level measurement of liquids**

- Remote data transmission
- Use in potentially explosive atmospheres
- Robust and versatile design
- Reasonable price

**HART**  
COMMUNICATION PROTOCOL



**PROFI**  
PROCESS FIELD BUS  
**BUS**



## Description

The sensor type L21 is used to measure levels or interface of fluids in both open and pressurized tanks. It can also be used in applications with the formation of foam or aerosol, where contactless measurement methods fail.

Body material of these level gauges is high quality stainless steel or chemically resistant materials. Local measurement is independent from external electrical supply which allows measurement of flammable, chemically corrosive and toxic substances also in very difficult conditions, such as high process temperatures and pressures.

On the customer's request indicator can be equipped with limit switches that allow remote monitoring of minimum or maximum level of liquid in the tank, control of pumps, opening or closing valves, etc.

It can also be equipped with a continuous sensor with 4 - 20 mA current output for exact monitoring of the level in the tank remotely. Several optional digital communication protocols are available such as HART, Foundation Fieldbus, PROFIBUS etc. There are several options of transmitters including reed chain, magnetostrictive, capacitive and radar principles.

Mechanical local indication can be extended by a range of displays. All the devices are available for potentially explosive atmospheres with ATEX certificates. For easy draining (venting) there is screwed plug optionally accompanied by a valve.

Local indicator is available in the following two options:

- Glass tube in which a level indicator moves tracking magnet
- Rolling magnetic rollers in the bar, changing color according to the level (white - red).

For extreme temperature conditions it can be equipped with insulated tube, steam or electric heating of the measuring tube. Several insulation options are available according to the process conditions.

L21 is a very complex product and there are many choices that are not published here. Please contact your local distributor or factory in case of any specific requests or questions.

## Example of use of level indicator - connection options

Some conditions make difficult to use the float inside of the chamber. These conditions are for example too viscous substances, low density or intense formation of deposits. In these cases it is possible to use the version with a float outside of the chamber, connected to the gauge either by the string or by the rod.

These variants are marked:

- **L21/2** – version with counterweight (for low density)
- **L21/3** – version with a float on a string
- **L21/4** – version with a float on a rod

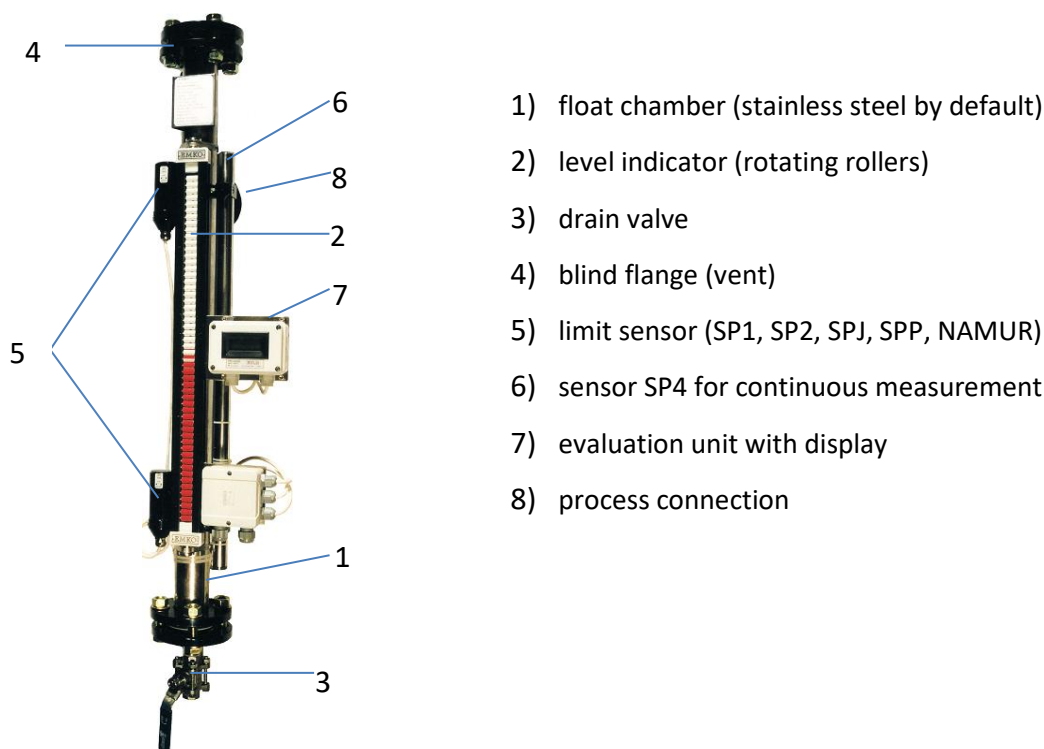


From left: L21/3, L21/4, L21/4, L21

## Product features

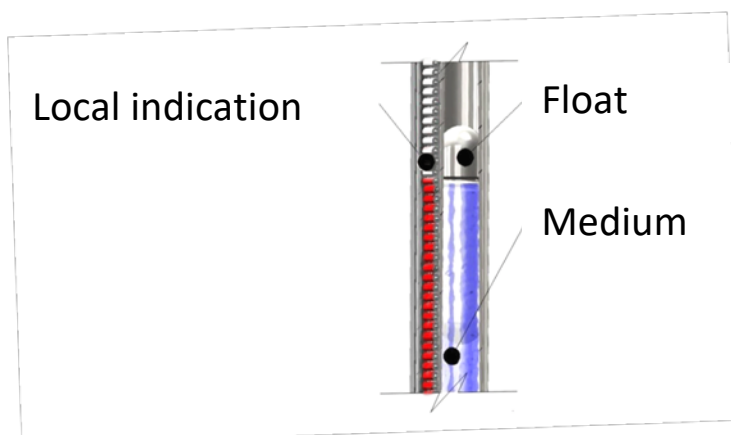
- Simple, robust and proven stainless steel design
- Ability to make parts in contact with the medium of PP, PVDF, PVC, Hastelloy or other materials in case of corrosive substances
- Stable local indication without need of power supply
- Pressure resistant and gas-tight separation of the medium and indicators
- Easy installation of the accessories using the mounting rails (limit contacts, display outputs, scales)
- Indicators including limit switches and continuous outputs can be replaced without draining the tank
- Insulated, steam or electric heated options available. Interface measurement is possible as well
- In comparison with direct gauges it has lower risk of leaks and clearer local indication
- The device is approved for use in potentially explosive atmospheres of pressure vessels and boilers
- Device is designed and pressure tested according to the customers' needs including temperatures from -196°C up to 525°C
- Device is manufactured with accordance to PED 2014/68/EU and corresponding standards
- Each device is pressure tested and verified. Calibration and strict functional tests are also performed on every device at the factory

## Example configuration



## Principle of operation

The sensor is connected via flanges or threaded connections in a vertical position to the side of the tank, in which level or interface of the liquid should be monitored. It works on the principle of connected vessels. There is sealed bypass cage with a float inside. Float has a built-in permanent magnet and follows the level of liquid in the observed tank. Local indicator as well as additional sensors are magnetically coupled to the float. As the float changes its position, magnetic rollers follow it changing their orientation and thus the color (from white to red) indication current level directly. Similarly, shuttle follower indicates the level. If requested, device can be equipped with stainless steel scale in chosen units of length, volume, percentage etc.



Float is specifically designed, manufactured and tested for requested conditions of use. Double pole magnetic system is used to create uniform and strong 360° magnetic field. Magnetic system has a high gauss rating providing large safety zone for long term service taking in count effects of ageing of the magnets over time.

Basic analogue output is based on the reed chain. Reed switches together with a network of resistors form three wire potentiometric circuit. The resistance between one pole and the “wiper” (here represented by the magnet in the float) is proportional to the level in the tank. Resistance is converted using the transducer to the standard analog signal 4 (0) to 20 mA for further processing, or advanced transducers can be used for digital communication such as HART, FOUNDATION fieldbus, PROFIBUS, Modbus, RS-485 and others.

More advanced methods of position sensing include capacitive, guided radar and magnetostrictive principles. Detailed information is available upon request in separated datasheets.

Similarly, it is possible to use a magnetic switch as a limit sensors to indicate the minimum, maximum or other selected position level in the tank. Permanent magnet in the float in this case activates the reed contact (or moves a cam that activates a micro switch in SPM version). Based on the rating of the switch it can be used directly to perform some desired function or the signal can be amplified or processed in the control system.

This solution is fully comparable with the semiconductor sensing elements in the terms of reliability and precision. SIL 2 certificate is available for selected configurations. Reliability indicators are available upon request.

## Specifications

<b>Medium</b> Density	Liquids and liquefied gases From 0,4 kg/dm <sup>3</sup>
<b>Measuring range (one segment)</b> Stainless steel/plastic Standard On request	0.3 to 6.0 m 0.3 to 9.0 m
<b>Accuracy</b> Repeatability The maximum level rate	± 5 mm ± 5 mm 1 m/s
<b>Maximum pressure</b> Standard stainless steel Standard PP, PVC, PVDF	4 MPa, on request 40 MPa 0.6 MPa, on request more, depending on the version PN flanges and pressure resistance of the float
<b>Fluid temperature</b> Standard stainless steel Optional stainless steel PP and PVDF PVC	-30 to +200°C -196 to +525°C -20 to +80°C -20 to +60°C

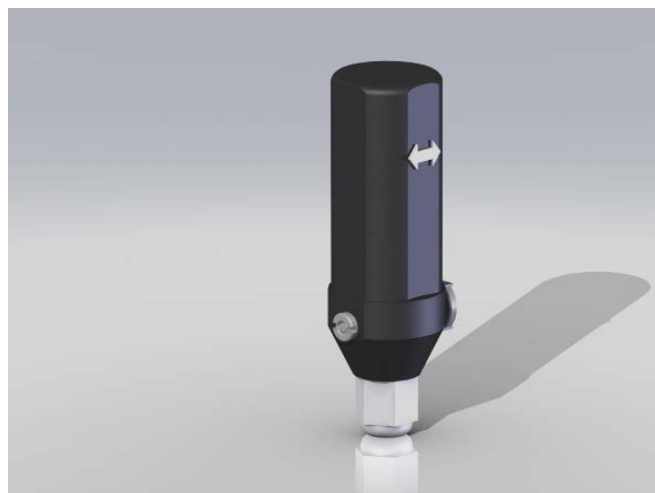
<b>Connection</b>	Flanged EN 1092-1 DN 15 to DN 50, PN 6 to PN 400, ASME B16.5, DIN, GOST threaded connections ½" - ¾" NPT, G ½" - ¾" smooth pipe for welding (others on request)
<b>Material</b> (parts in contact with fluid)	DIN 1.4541 stainless steel (DIN 1.4571, 1.4301, 1.4404), Hastelloy, PVC, PP, PVDF, other on request
<b>Weight</b>	Approximate weight of L21 in stainless steel and 1,000 mm length is 12 kg. Every 100 mm means an increase in weight of about 0,6 kg (depends on pressure class and configuration)
<b>Mounting position</b>	Vertical (side, bottom, top)
<b>Local Display</b>	Roller indicator without scale Roller indicator in selected units (m, m <sup>3</sup> , %...) Glass tube with a magnet without scale Glass tube with a magnet with scale in selected units (m, m <sup>3</sup> , %...)
<b>Switches</b>	SP1 – bi-stable switch at a minimum SP2 – bi-stable switch at maximum SP0 - switches upon reaching level SPP - switching contact I - NAMUR may be supplemented by separating contacts on DIN rail SP8 - pneumatic output SPJ – bistable switch - 3-wire (NO, NC selectable) SPM - switch with micro switch
<b>Transmitters</b> SP4 sensor  HART transmitter type 5335 in a potentially explosive atmosphere or standard  Converter PROFIBUS PA, FOUNDATION Fieldbus Type 5350 Ex in explosive environments or standard  We also offer other transmitter s with HART, FOUNDATION Fieldbus, Modbus, with display and other protocols.	Resistive position sensor with reed contacts Ambient temperature -40 to +130°C  Active output 4 - 20 mA Ambient temperature -40 to +85°C Power 8 - 30VDC  Temperature -40 to +85°C Power 9 - 30Vss
Other parameters, design and equipment can be provided on request.	

## Accessories

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

In normal / intrinsically safe design

Basic sensors allow monitoring of any level.



**Sensor SP1** - remains permanently closed when reaching the minimum chosen level. Switching contact.

**Sensor SP2** - remains permanently closed when reaching the maximum chosen level. Switching contact.

**Sensor SPP** - changeover contact

**Sensor SP0** - closed only when reaching the chosen level. Mono-stable. Its location is user adjustable sensor has marked switching point. Cable gland must be facing down.

### Specifications

Ambient temperature:	-50 to +135°C
Medium temperature:	-196 to +525°C (insulation or thermal shield may be needed)
Protection:	IP 44
Weight:	0,25 kg

Sensor must be in the case of use in potentially explosive atmospheres connected to an intrinsically safe circuit.

Max. input parameters:  $U_i = 30 \text{ V}$ ,  $I_i = 100 \text{ mA}$ ,  $L_i = 0$ ,  $C_i = 2\text{pF}$ ,  $P_i = 1\text{W}$

Medium temperature is limited to maximum 440°C

### Standard switch ratings for SP1, SP2 and SP0

Maximum current:	1 A
Ambient temperature:	-50 to +135°C
Medium temperature:	-196 to +525°C (insulation or thermal shield may be needed)
Maximum voltage:	250 V
Maximum power:	60 W

### For SPP

Maximum current:	0,5 A
Maximum voltage:	175 V
Maximum power:	10 W

Sensors SP1, SP2 and SPP are also available in NAMUR version. The design uses a magnetic circuit with two magnets, which increases resistance to vibration and shock.

## Limit switch SPJ, SPM

Flameproof sensors allow monitoring of any level.



**SPJ** - switching contact reed switch

**SPM** - changeover contact micro switch

Its location is user adjustable. Sensor has marked switching point. Cable gland must be facing down. Sensor range is up to 45 mm from float chamber allowing placement outside the insulation.

Switch is also available in Ex d version.

### Specifications and requirements J version

Ambient temperature:	-50 to +135°C
Medium temperature:	-196 to +525°C (insulation or thermal shield may be needed)
Protection:	IP 68
Maximum current:	3 A
Maximum voltage:	400 V
Maximum power:	100 W
Weight:	0,4 kg

### Specifications and requirements M version

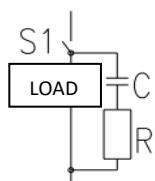
Ambient temperature:	-50 to +135°C
Medium temperature:	-196 to +525°C (insulation or thermal shield may be needed)
Protection:	IP 68
Maximum current:	5 A
Maximum voltage:	250 V
Weight:	0,4 kg

Cable 4G x 0,75 - external diameter 7,6 mm

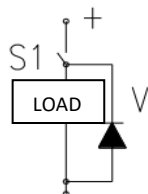
Standard cable length is 3 m and the cable cannot be shortened in Ex d variant.

Recommended contact protection  
for inductive load

$U \sim VAC$

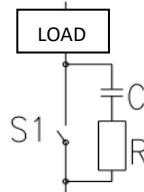


$U = VDC$



Recommended contact protection  
for inductive or resistive loads

$U \sim VAC$  nebo  $U = VDC$

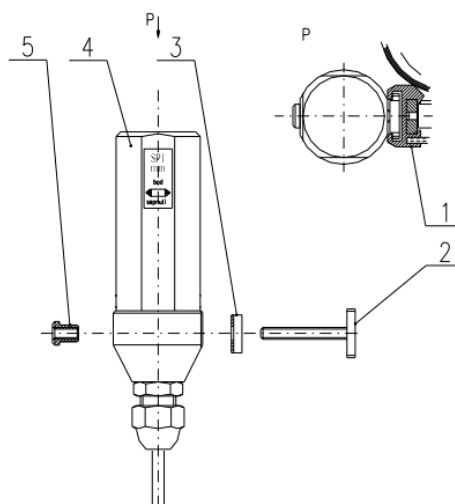


## Attaching sensors

1) Mounting the sensors to the local indication rail with rollers.

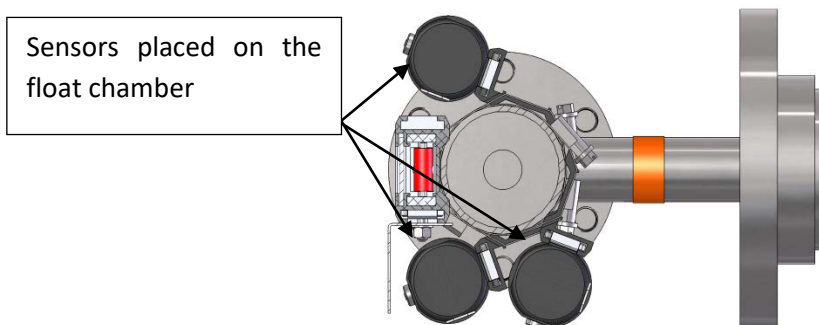
- 1) indication rail
- 2) connecting screw
- 3) washer
- 4) switch
- 5) nut

Insert connecting screw into indication rail and turn 90°. Ensure connecting screw by washer, push the switch and screw nut. Indication of switching point orients towards the operator.



2) Attached sensors can be directly on the float chamber. They are used when:

- a) Switches are too close together
- b) If there are many sensors
- c) When local indication with rollers is not used






Sensors are always installed by cable gland facing down.

## SP4 Continuous sensor for remote data transmission

Resistive position sensor with reed contacts and transmitter in the head. Eligible for intrinsically safe and flameproof.



Resistance of the sensor is converted using the converter in the head on a standard analog signal 4 (0) to 20 mA for further processing or it may be supplemented by digital HART protocol or the signal may be transmitted digitally with using FOUNDATION fieldbus or PROFIBUS.

4-20 mA   

### Specifications

Ambient temperature: -40 to +130°C (process media temperature 400°C – optional even higher)

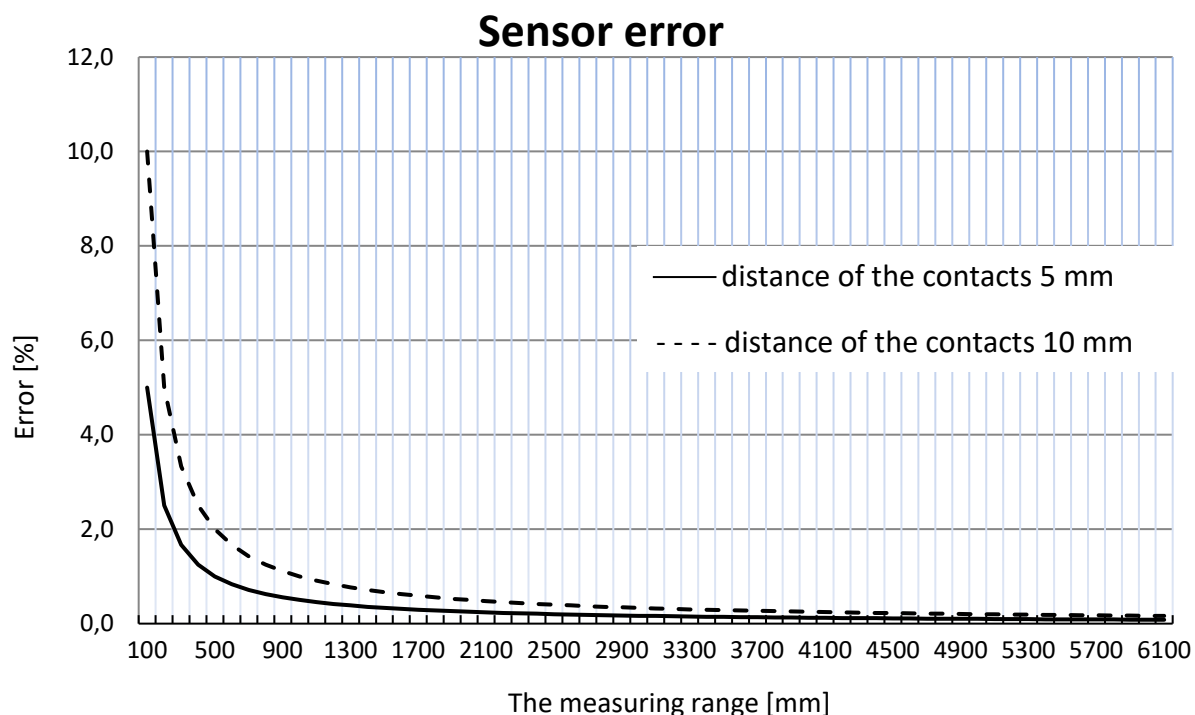
Power: 11 to 26 V<sub>ss</sub>

Protection: IP 65

Cable gland: M20 x 1.5

Distance relays: 3.5 mm, 4 mm, 8 mm

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



## 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 pressure control air: 6 bar

Maximum ambient temperature: +60°C

Operating control air flow: 40 l/min

*Sensor is available in two versions:*

**SP8 - SP8 and 1F - 2F** - Compact design with filter, which must be operated only at temperatures max. +60°C, relative to the automatic separator, in which the sub-zero temperatures for the water froze. The function of the sensor with a separator for use in frosty conditions can be equipped with self-regulating heating cable.

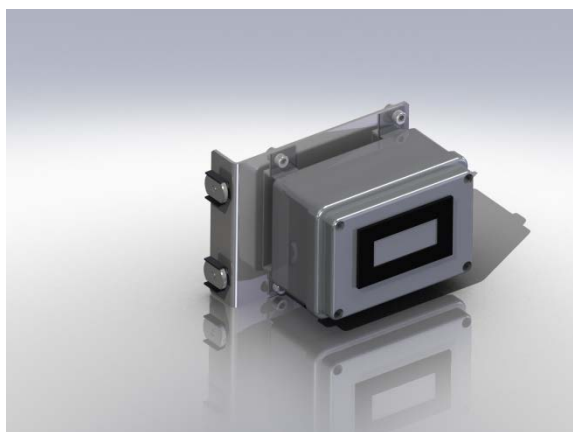
**SP8 - 1 and SP8 - 2** - Filter-free design for operation at temperatures from -15 to +60°C. To ensure proper operation of the sensor the medium must be remove of dirt through 40µm filter.

**All types of sensors can be operated in zone II.**

**Marking Equipment II 2 G c X**

## Transmitter 5102 with display

Transmitter is connected to the sensor SP4 by cable and converts the output to the standard analog signal 4 (0) to 20 mA. Can be fastened onto a level indicator or beyond. Also available in mounting to DIN rail with or without display. Three-wire connection to the sensor.



### Specifications:

Passive: 4 - 20 mA, optional LCD display

Power: 11 - 36 V<sub>ss</sub>

Ambient temperature: -30 to +70°C without display

-10 to +55°C with display

Cable glands: M20 x 1,5

Protection: IP 55

Transmitter can be placed on a level indicator or on the wall.

Optionally can be delivered also 24 V<sub>ss</sub> power supply.

## Display BA304D for potentially explosive atmospheres and HART communications

In combination with the transmitter SP4 in the head it displays the measured value while maintaining HART communication.



### Specifications:

Input:	4 - 20 mA (voltage drop of 1V)
Protection:	IP 66
Temperature:	-40 to +60°C
Maximum input par.:	Ui=30 V, Ii=200 mA Pi=0,85W
Dimensions:	H x W x D 212 x 141 x 91 mm
Cable gland:	M20 x 1,5

Display can be placed on a level indicator or on the wall.

**Panel display 472 LX for the conversion of measured data (eg. heights to the volume of the tanks of any shape = according to the calibration table)**



- 4 ¾ digit programmable
- 0 ... 20 mA; 4 ... 20 mA; ±2; ±5; ±10 V
- Linear interpolation in 248 points, 16 tables
- Data output RS 232
- Mathematical functions, digital filter
- Size of DIN 96 x 48 mm, power 230 Vss

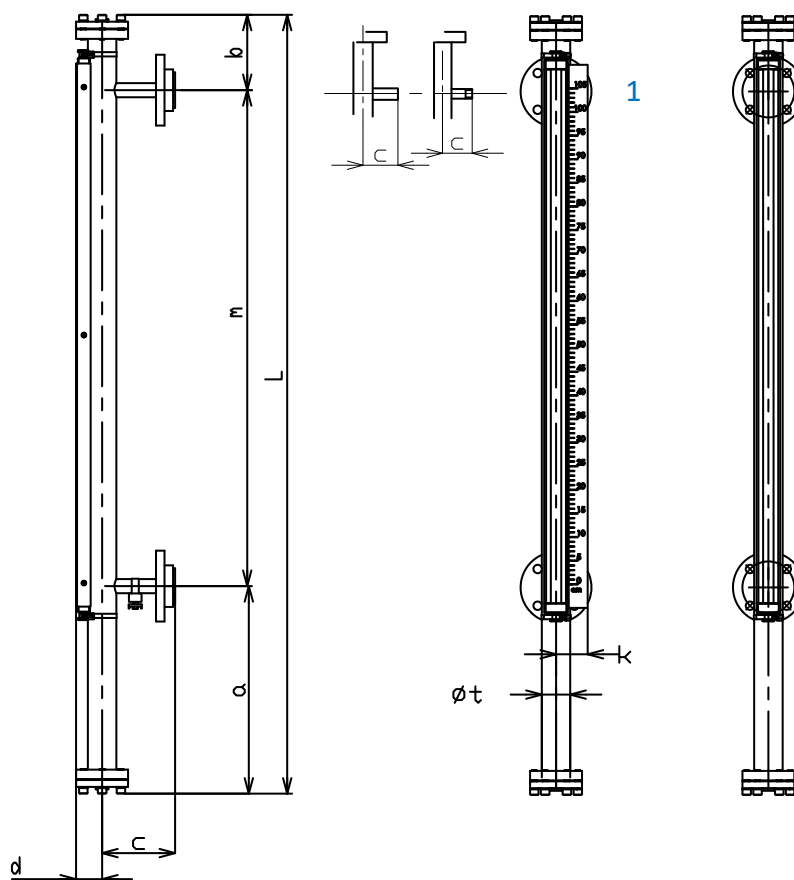
Optional:

- Four-time comparator, analog output, in real time
- Power 24/110 Vss, 10 ... 30 Vss

## Versions of mechanical connections - dimensions

The following information is for guidance only. Due to the variability of performance is not possible to cover all possibilities. The dimensions are related only to the displayed options. For more information, please contact us.

### A - Horizontal fitting - flange, welding flange, thread etc.



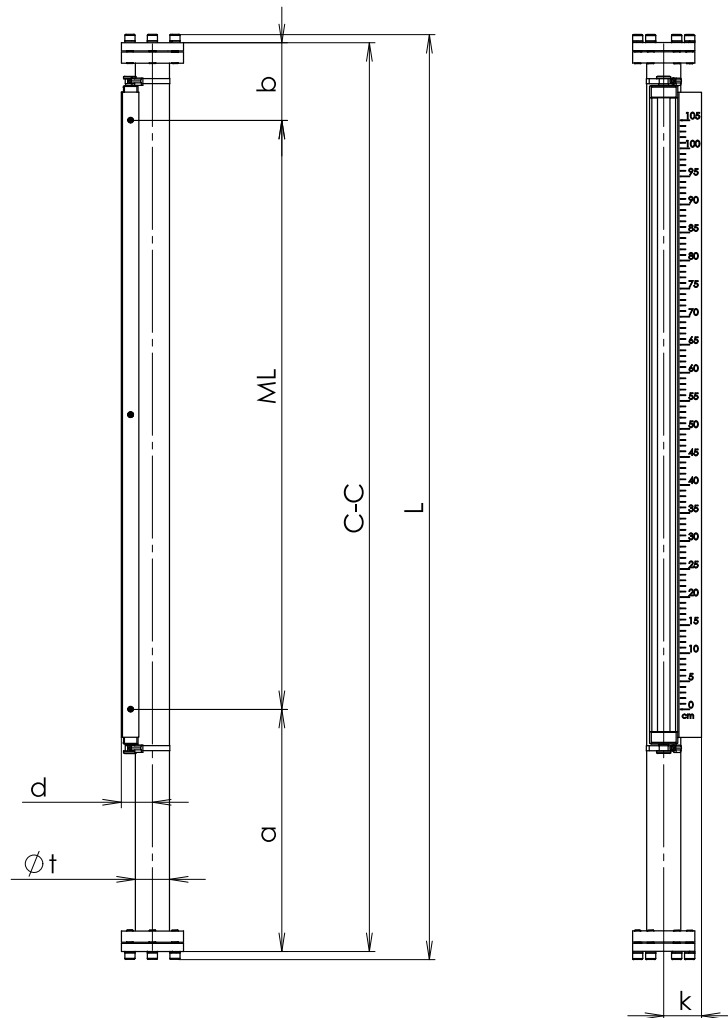
Dimensions* [mm]								
	L	m	a	b	c	d	t	K
<b>Two sides connections</b>	745-10300	300-9000	280-1300	165	150	52	60.3	67

m - measuring range

\* for the pressure to 4 MPa

1 - scale in cm, %, liters

## B - Vertical connection

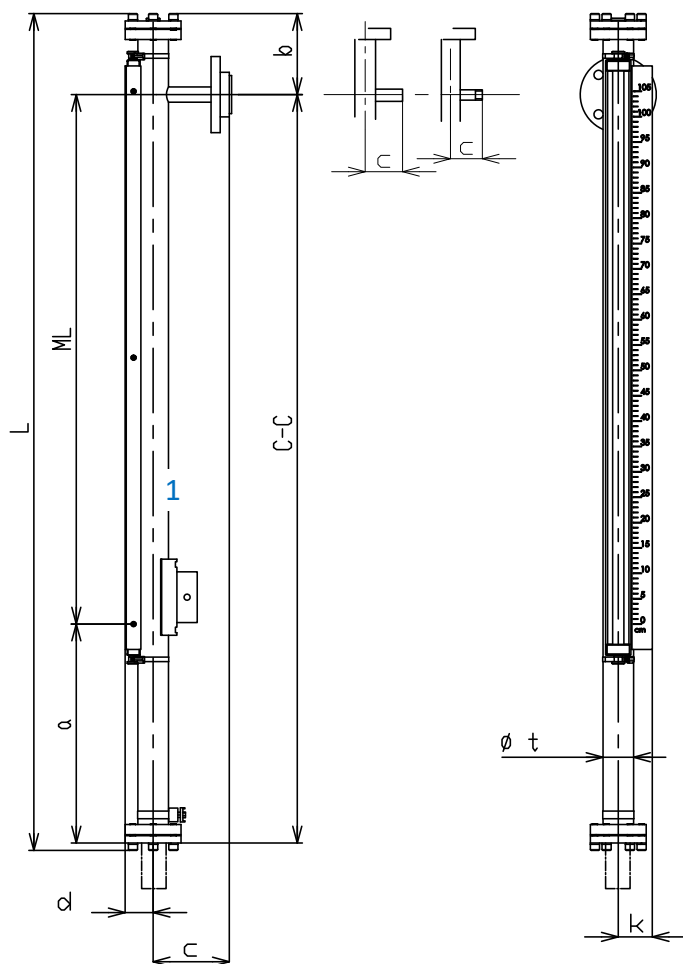


Dimensions* [mm]								
	L	ML	u	b	c	d	t	K
<b>Two vertical connections</b>	745-10300	300-9000	280-1300	165	150	52	60.3	6

ML - measuring range

\* for pressure to 4 MPa

## C - Upper side connection, lower vertical connection



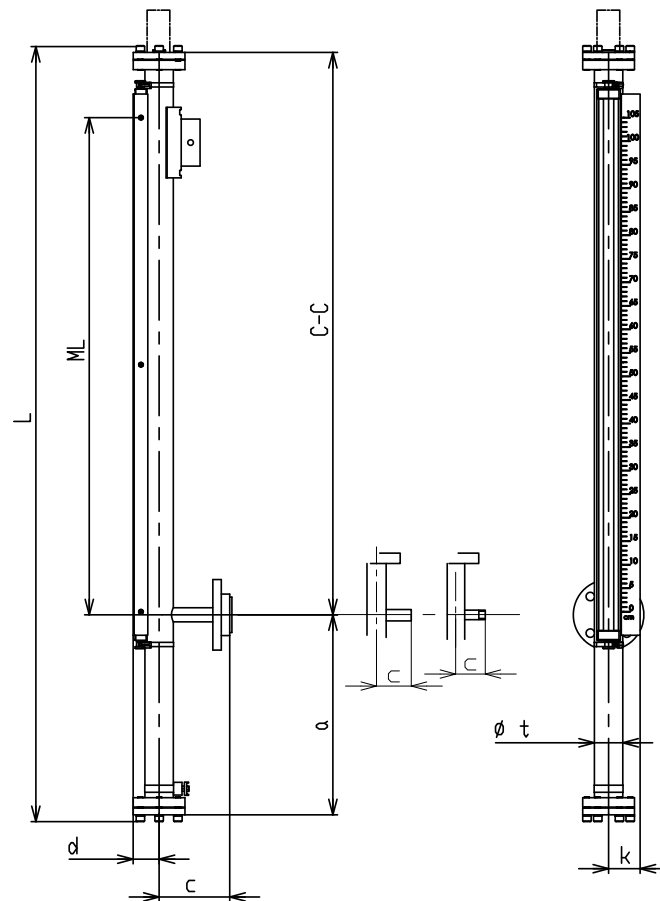
	Dimensions* [mm]							
	L	ML	u	b	c	d	t	k
<b>Upper side connection, lower vertical connection</b>	745- 10300	300- 9000	280- 1300	165	150	52	60.3	67

ML - measuring range

\* for pressure to 4 MPa

1 – for level indicators longer than 3 m are used auxiliary brackets

## D - Upper vertical connection, lower side connection



	Dimensions* [mm]							
	L	ML	u	b	c	d	t	K
<b>Upper vertical connection, lower side connection</b>	745- 10300	300-280- 1300	9000	165	150	52	60.3	67

ML - measuring range

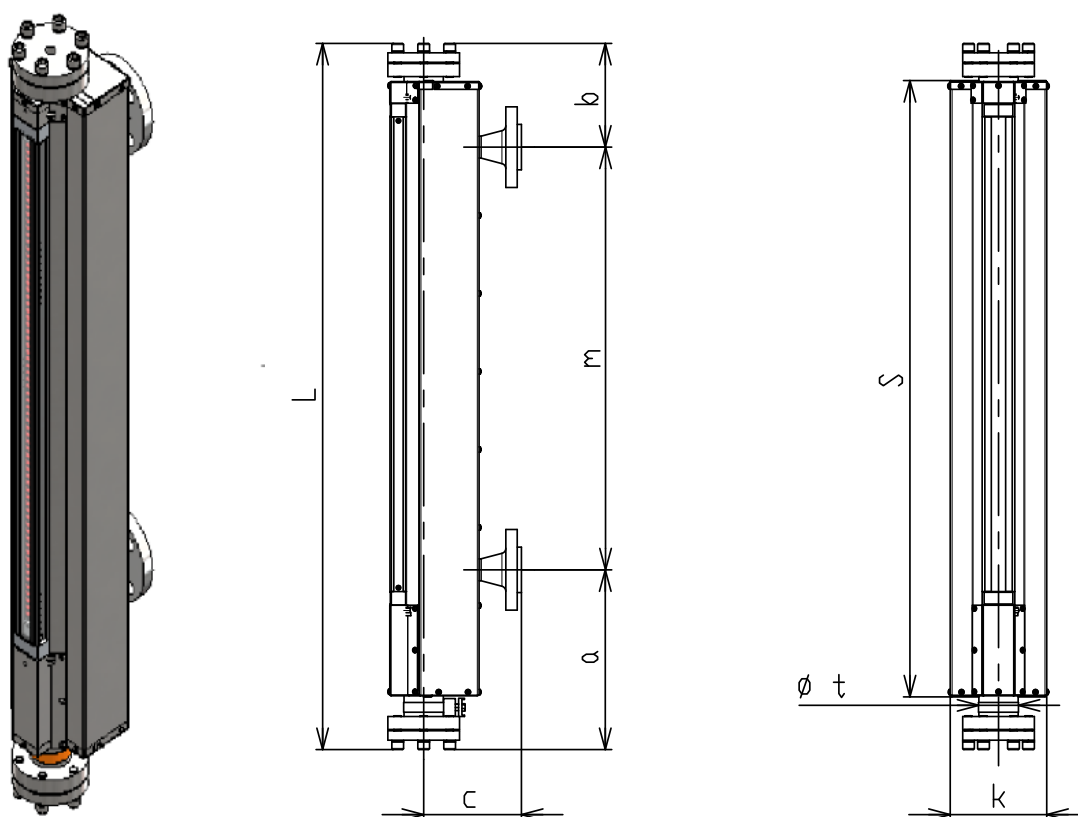
\* for pressure to 4 MPa

## Special versions

### I, OE - Insulated measuring tube, electric heating on performance 20 30W/m.

Level meter is supplied as a compact device including insulation, just connect the cable to the terminal block located in the junction box on the side of the indicator. Casing insulation is made from stainless steel, which is pressed so that the sensors are outside and can be adjusted or replaced without entering the isolation. Casing insulation of machine, rather than on site, and therefore provides increased protection own thermal insulation. The average thickness of insulation is 45 mm.

### OP - Heating steam, water



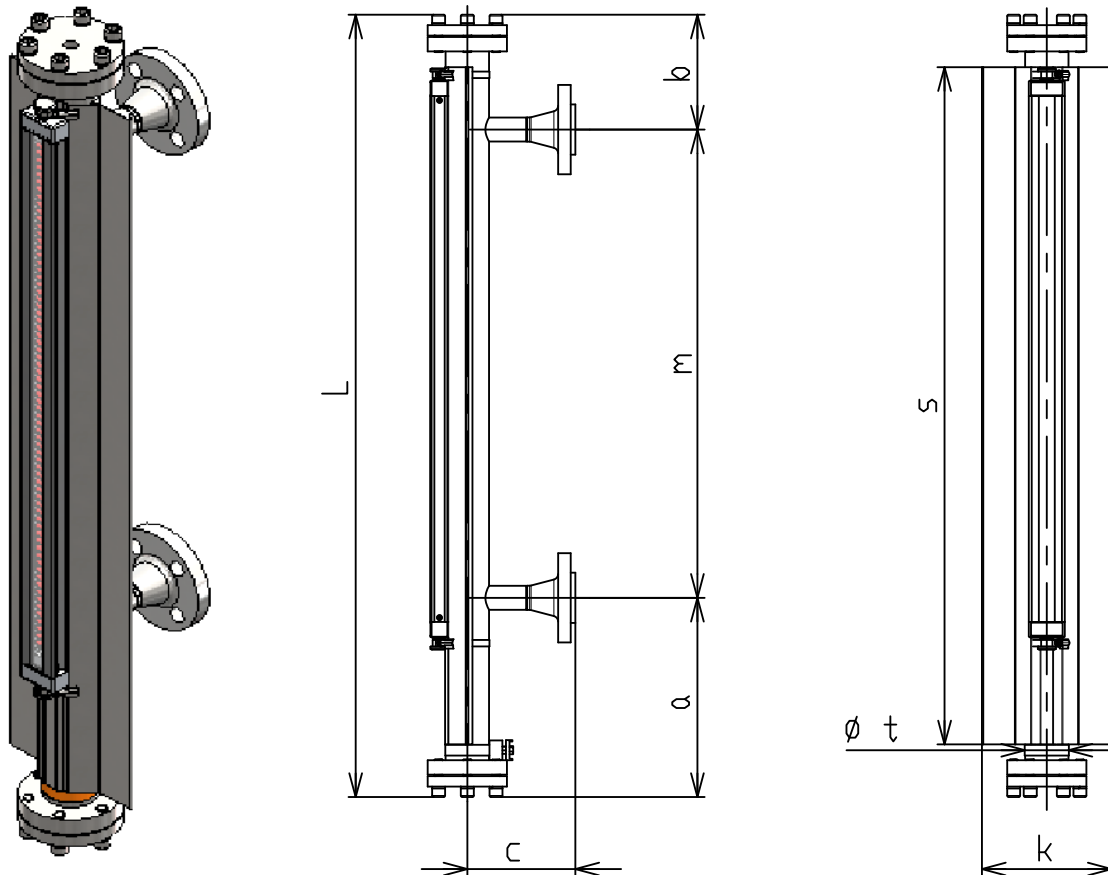
	Dimensions* [mm]							
	L	m	a	b	c	S	t	K
<b>Insulated measurement tube</b>	745-10300	300-9000	280-1300	165	150	450-10050	60.3	180

m - measuring range

\* for pressure to 4 MPa

## PI - Preparation of the insulation - thermal shield

Recommended media higher than 150°C.



	Dimensions* [mm]							
	L	m	a	b	c	S	t	K
<b>Preparation of the insulation</b>	745-10300	300-9000	280-1300	165	150	450-10050	60.3	180

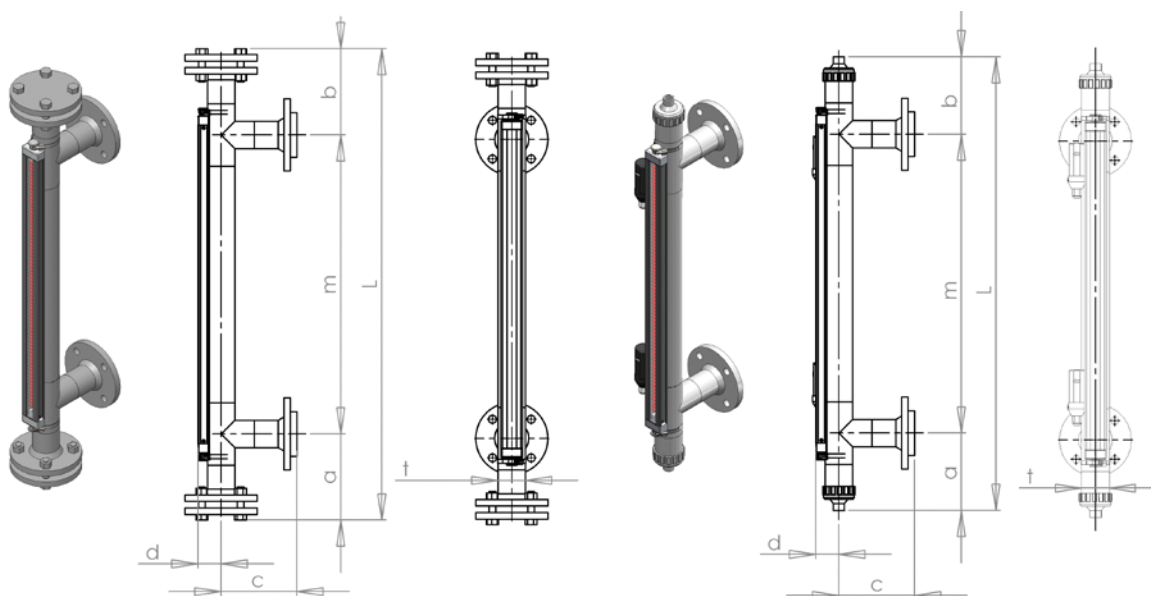
m - measuring range

\* for the pressure to 4 MPa

## Materials

Float chamber of the sensor can be made of stainless steel, polypropylene, PVC, PFA and other non-magnetic materials.

### PP - Plastic version

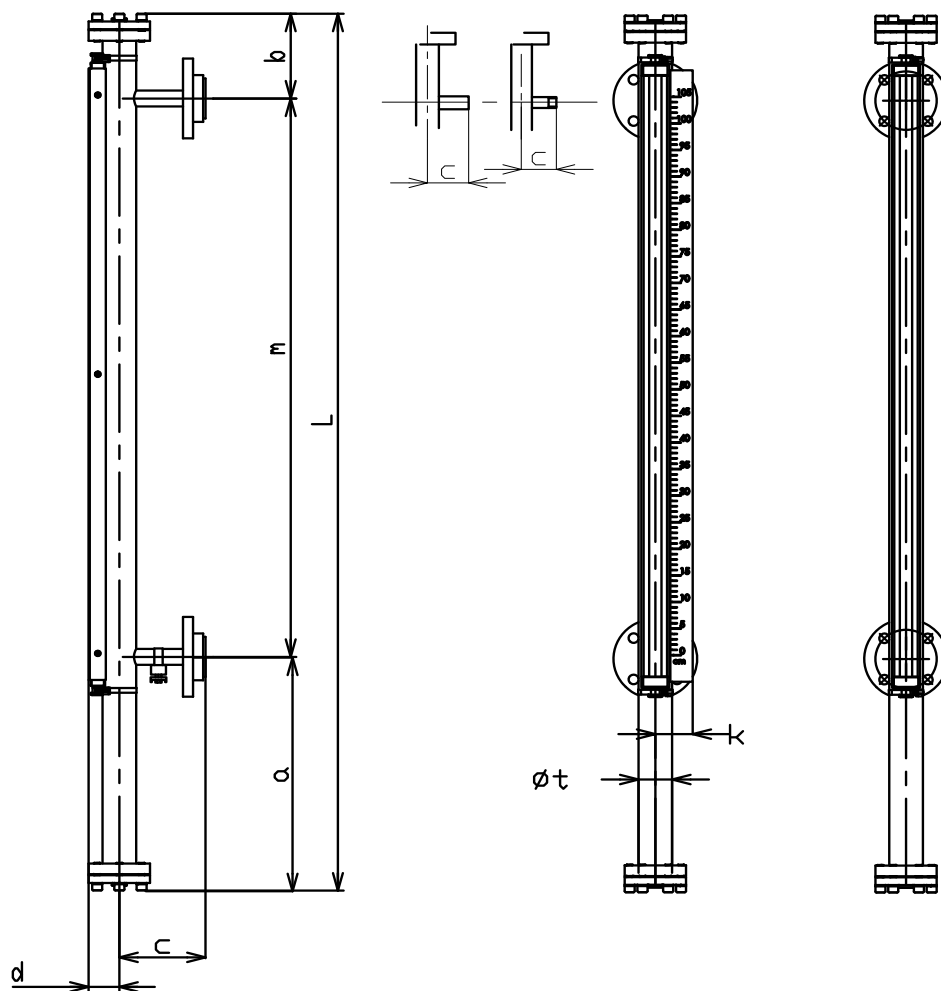


Dimensions [mm]							
	L	m	a	b	c	S	t
<b>Two sides connections</b>	745-10300	300-280-1300	9000	165	150	450-10050	63

m – measuring range

## Level meter with guided float

This solution is mainly used for dirty media and the boiling liquid. We recommend it especially for measuring ammonia. The float chamber has a larger inner diameter (usually 80 mm) than the standard solution, the float is defined by guide rods.

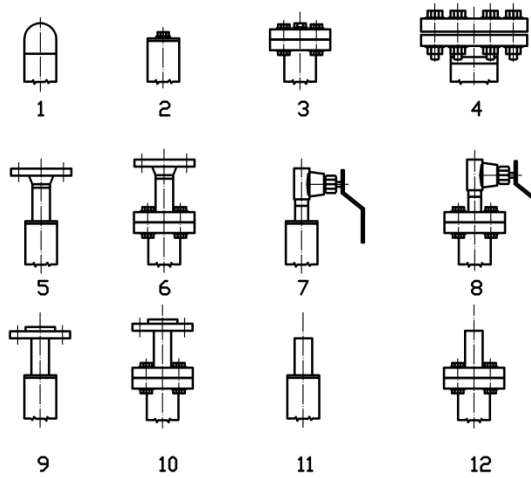


	Dimensions* [mm]					
	L	m	a	b	c	t
<b>Guide cage</b>	745-10300	300-9000	280-1300	165	150	60,3

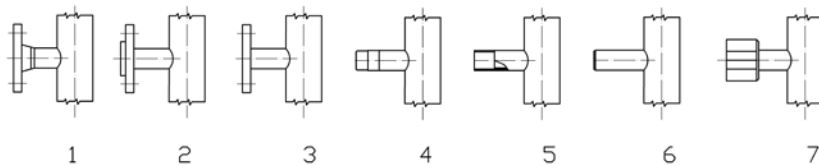
m - measuring range

\* for pressure to 4 MPa

## Types of mechanical connections and endings of float chamber



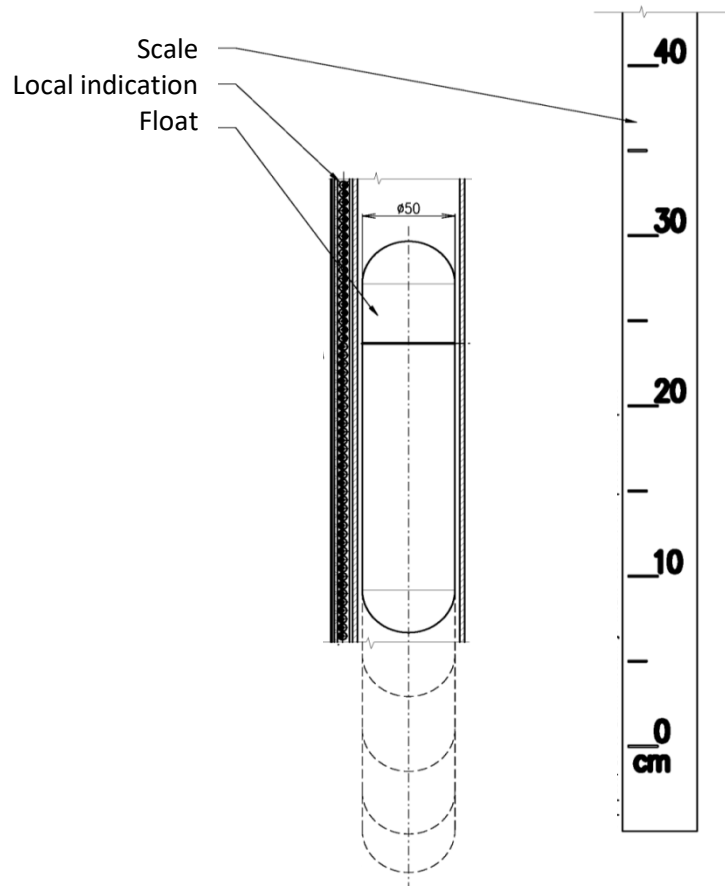
- 1) welded dished ending
- 2) flat ending with vent plug
- 3) flange with vent plug
- 4) flange with sealing surfaces
- 5) flat ending with welded vent flange
- 6) flange with welded vent flange
- 7) flat ending with vent valve
- 8) flange with vent valve
- 9) flat ending with free vent flange
- 10) flange with free vent flange
- 11) flat ending with pipe welding flange (available threads inner / outer)
- 12) flange with pipe welding flange (available threads inner / outer)



- 1) with welded flange
- 2) with freely rotating flange
- 3) with blind flange
- 4) external thread
- 5) internal thread
- 6) for welding
- 7) with union nut

## Float dimensions and dependence on the density

The float type, its length and diameter are chosen according to media parameters and operating conditions. For illustration we present a table of dimensions for selected densities in the most widely used type of float (stainless steel, Ø50 mm, PN16).



Float length [mm]	Medium density [kg/m <sup>3</sup> ]
1010	400
515	500
361	600
287	700
243	800
213	900
191	1000
176	1100
164	1200

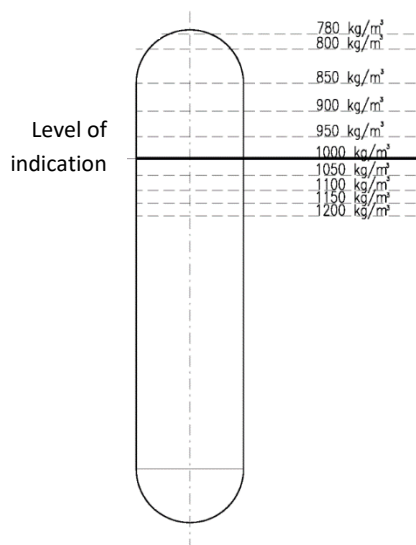
Changes of the operating conditions (temperature, pressure, density) causes shift of the measuring edge, depending on the density of the liquid. If we know the density we can correct it by moving the scale and sensors.

Optionally it is possible the float for different densities supply with weight.

Float material: Stainless steel DIN 1.4541, DIN 1.4571, titanium, PP, PVC, PTFE, full-composite design.

Materials magnetic coupling: Samarium-cobalt, neodymium-boron. They are powerful magnetic materials. We use AlNiCo material for high temperature.

Maximum float speed at which is a local indicator function is up to 1,5 m/s.



## Indication local level using two-colours rollers

Indicator bar with metal rollers that meet the requirements for outdoor use, resistance to sunlight, resistance to temperature fluctuations - dimensional stability and resistance to vibration. Metal rollers have lower pivot friction and therefore display shows lower hysteresis and a bigger margin range (up to 40 mm). For less demanding applications, it is possible to use plastic rollers.



## Manufacturer type number

L21	.../	.../	.../	.../	.../	.../	.../	.../ side connections
	0	1	2	3	4	5	6	7

E.g.: L21/2000/ADN25-PN16/N/SP1/NO/B/I

0	Types of the level meter L21	
	2	version with counterweight (for low density)
	3	version with a float on a string
	4	version with a float on a rod
1	Measuring range "M" in mm	
2	Connecting the unit to the tank, connecting dimensions (DN25-PN16, G3/4"...)	
	A	Horizontal connection
	B	Vertical connection
	C	Vertical inlet, horizontal outlet
	D	Horizontal inlet, vertical outlet
	E	Upper
	F	Lower
3	Material	
	N	Stainless steel
	PP	Polypropylene
	PVDF	PVDF - lining
	Other materials	
4	Remote transmission of measurement values	
	SP1 minimum (NAMUR)	
	SP2 maximum (NAMUR)	
	SP4 electrical output 4 - 20 mA (display and transmitter see specification)	
	SPJ - switching contact reed relay	
	SPM - changeover contact micro switch	
	SP8 - limit sensor pneumatic	
	HART communication	
	FF - FOUNDATION Fieldbus, PROFIBUS communication	
	Scope of application	
5	NO	Normal environment
	EX	Explosive environment
	ZO Special design	Pollutant, sediment and crystallizing liquids
6	A	Local indication traverse magnet
	B	Local indication spin rollers
	LI	Interface between two fluids of different density
7	I	Insulated measuring tube
	OP, OE	Measuring tube heated with steam or hot water, electric heating
	PI	Thermal shield - preparation of the insulation

## Explosive atmospheres

Safety has been verified according to standards ČSN EN IEC 60079-0:2018, ČSN EN 60079-11:2012, testing institute FTZÚ certificate number **FTZÚ 02 ATEX 0453X**.

When using more than one sensor, it is necessary to use cabling to connected devices according to ČSN EN 60079-25:2011

Input parameters of intrinsically safe circuit:

$U_i = 30 \text{ V}$ ,  $I_i = 100 \text{ mA}$ ,  $L_i = 0$ ,  $C_i = 2 \text{ pF}$ ,  $P_i = 1 \text{ W}$

Measured medium and ambient temperature:

Temperature class	Ambient temperature	Max. medium temperature
T6	$-40^\circ\text{C} \leq T_a \leq 80^\circ\text{C}$	$-196^\circ\text{C} \leq T_m \leq 80^\circ\text{C}$
T5	$-40^\circ\text{C} \leq T_a \leq 95^\circ\text{C}$	$-196^\circ\text{C} \leq T_m \leq 95^\circ\text{C}$
T4	$-40^\circ\text{C} \leq T_a \leq 130^\circ\text{C}$	$-196^\circ\text{C} \leq T_m \leq 130^\circ\text{C}$
T3	$-40^\circ\text{C} \leq T_a \leq 130^\circ\text{C}$	$-196^\circ\text{C} \leq T_m \leq 195^\circ\text{C}$
T2	$-40^\circ\text{C} \leq T_a \leq 130^\circ\text{C}$	$-196^\circ\text{C} \leq T_m \leq 290^\circ\text{C}$
T1	$-40^\circ\text{C} \leq T_a \leq 130^\circ\text{C}$	$-196^\circ\text{C} \leq T_m \leq 440^\circ\text{C}$

## Device marking label



## Equipment is approved

In terms of safety	Technical Inspection Institute Prague, organization of state supervision, Jílová 14, Ostrava, ref. no. 2990/07.02/99/15.7/1.2
For use in potentially explosive atmospheres	FTZÚ EX II 1G/2G Ex ia IIC T6-T1 Ga/Gb

## Ordering

When ordering please specify:

- Type of medium, concentration in %, the content of mechanical and ferromagnetic impurities
- Density and viscosity
- Temperature and pressure (operating and maximal)
- Measuring range
- Units
- Requirements for the electrical outputs

## Installation

- Before you install the device, check that the measuring body doesn't contain any impurities
- Careful when inserting the float into its proper position, the upper part has two indentations at a distance of 6 mm from each other
- Sealing must be centered in the flanges and threads
- Fittings can be tightened by torque specified for the operating pressure in the tanks
- Each unit is pressure tested 1.5 times of the operating pressure, which is specified in the order, the float is only tested 1.3 times of the pressure
- Check the operating data on level meter label if that correspond to the measured liquid
- Before commissioning, make sure the drain and air plugs, drain and air valves are closed
- Open the shut-off valve at the meter connecting flanges, first upper valve
- Now it's ready for measurement
- Avoid pressure surges and abrupt changes in level - risk of float damage
- During handling with the level indicator it's necessary to avoid abrupt changes in position so that the float chamber due to the acceleration of gravity moved as slowly as possible in order to prevent impact damage.
- It's recommended to separate level meter from the vessel by valves

## Maintenance

During normal operation device does not require special maintenance. Operation focuses only on checking for leaks, or contaminated liquids in measuring the periodic draining or flushing the measuring tube, or cleaning float. During this activity follow appropriate safety, fire and environmental measures.

Electrical connection may only be performed by an authorized person.

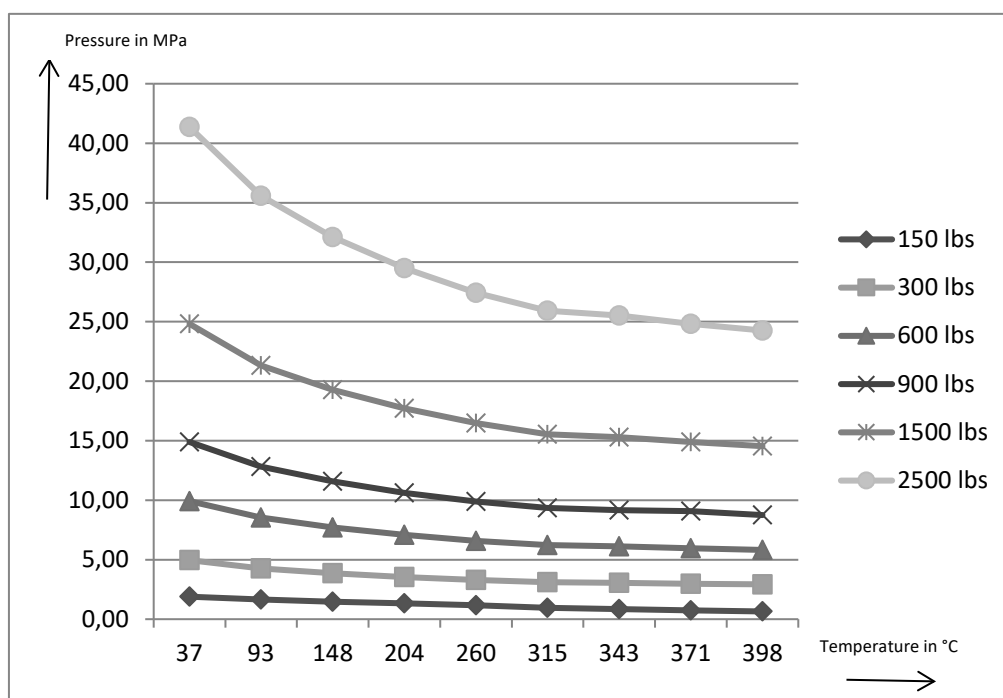
## Appendix 1

Table pressure - temperature ANSI

ASME / ANSI B16.5 – 1988

### Maximum pressure in MPa

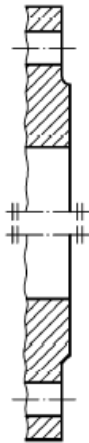
Temperature in °C	150 lbs	300 lbs	600 lbs	900 lbs	1,500 lbs	2,500 lbs
37	1,89	4,96	9,92	14,89	24,82	41,36
93	1,65	4,27	8,54	12,82	21,33	35,57
148	1,48	3,86	7,72	11,58	19,27	32,12
204	1,34	3,55	7,10	10,61	17,71	29,50
260	1,17	3,30	6,58	9,89	16,47	27,44
315	0,96	3,10	6,23	9,34	15,54	25,92
343	0,86	3,06	6,13	9,17	15,30	25,51
371	0,75	2,96	5,96	8,92	14,89	24,82
398	0,65	2,93	5,82	8,75	14,54	24,26



## Appendix 2



Type A  
Flat face



Type B  
Raised face (B1 and B2  
(see Table 2))



Type C  
Tongue



Type D  
Groove



Type E  
Spigot



Type F  
Recess



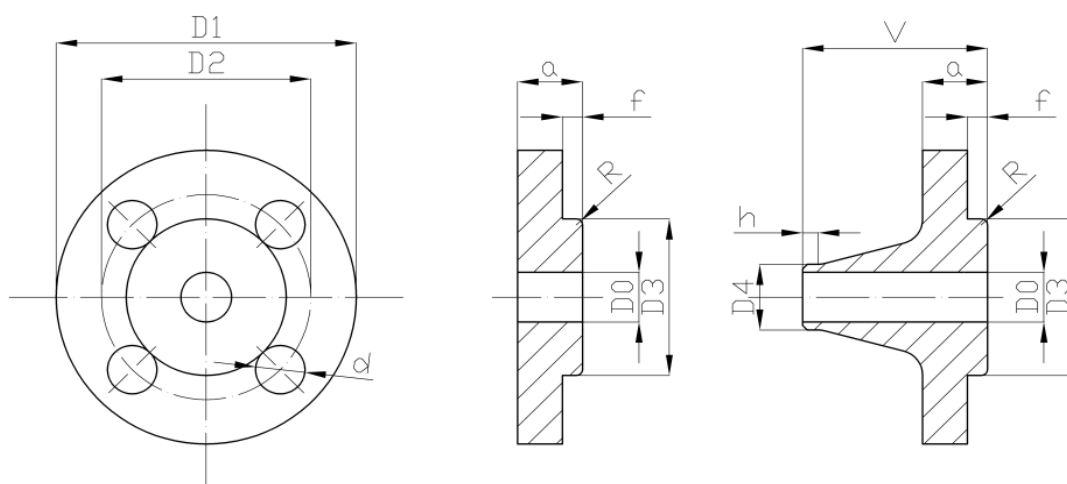
Type G  
O-ring spigot



Type H  
O-ring groove

## Appendix 3

Commonly used flanges



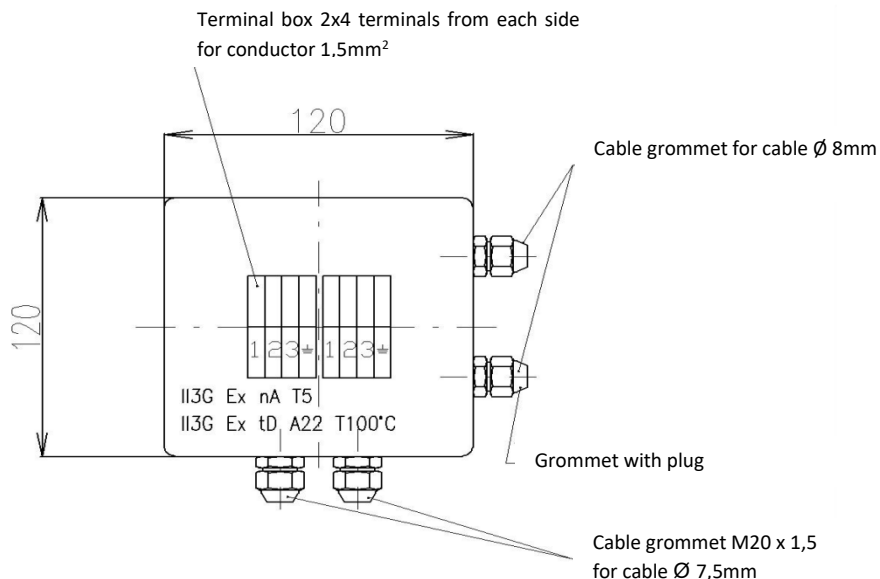
Dimensions in mm

CSN EN 1092									
PN 40	D0	D1	D2	D3	D4	a	f	h	V
DN 25	34,5	115	85	68	33,7	18	2	6	40
DN 40	49,5	150	110	88	48,3	18	2	7	45
DN 50	61,5	165	125	102	60,3	20	2	8	48

ANSI B 16.5									
150 lbs	D0	D1	D2	D3	D4	a	f	h	V
1"	26,7	108	79,2	50,8	33,5	14,2	1,6	-	55,6
1 1/2"	40,9	127	98,6	73,2	48,3	17,5	1,6	-	62
2"	52,6	152,4	120,7	91,9	60,5	19,1	1,6	-	63,5

## Appendix 4

### Example design of the terminal box:



Just for illustration, actual connection may vary depending on your configuration. Connection schematics is supplied with each device.

### Example of electrical connection:

FINISHING SET FOR HEATING CABLE  
 II 2D Ex tD A21 Ip66, T1 195°, T80°C KEMA 07 ATEX 0124

