

www.phoenix-mt.com  
PHÖNiX Messtechnik GmbH

PHÖNiX



**Dial Type Float Level Gauge**  
Type 748.212X

INSTRUCTION MANUAL

# Contents

	Page
<b>1. USE</b>	<b>3</b>
<b>2. PRINCIPLE AND DESCRIPTION</b>	<b>3</b>
<b>2.1 Float gauge</b>	<b>3</b>
2.1.1 Head	3
2.1.2 Guiding tube	3
2.1.3 Neck	3
2.1.4 Float	3
<b>3. OPERATING CONDITIONS</b>	<b>4</b>
<b>3.1 Operating conditions</b>	<b>4</b>
<b>4. TECHNICAL DATA</b>	<b>4</b>
<b>5. MEASURING AND CONTROL</b>	<b>5</b>
<b>5.1. Control - generally</b>	<b>5</b>
<b>5.2 100% control</b>	<b>5</b>
<b>6. STORAGE AND DELIVERY</b>	<b>6</b>
<b>6.1. Storage</b>	<b>6</b>
<b>6.2. Delivery</b>	<b>6</b>
<b>7. MAINTENANCE</b>	<b>6</b>
<b>8. GUARANTEE</b>	<b>6</b>
<b>9. PACKAGING AND DISPATCH</b>	<b>6</b>
<b>10. DISPOSAL</b>	<b>6</b>
<b>11. KEY</b>	<b>6</b>

# 1. Use

Float gauges (further referred as FG) are designed to measure and control level of liquids in both open and closed tanks or in pressure storage tanks. Some types can measure even in ZONE 0 environment. Ingress protection (IP65) enables secure measuring in aggressive environments. The gauge is a mechanical-electrical device whose construction allows modular creating of the whole range of different device types. Gauges for local display work without external power supply. The individual device types are equipped with up to four micro-switches to switch between technological and limit liquid levels, with a resistance transmitter and, optionally, a powered converter with output of (0) 4-20mA (fed), 4-20mA (double connector loop), 0-10V in various combinations of the above mentioned components.

## 2. Principle and description

### 2.1 Float gauge

The device consists of a head, a neck, a guiding tube and a float. The level of the liquid is sensed by the float which freely moves along the tube. Magnets placed inside the float and a trolley create a magnetic coupling. The trolley (placed inside the guiding tube) is connected to the device head by a stainless cable (0.45mm). The trolley is carried in a magnetic field of the float and transmits liquid level changes into the head. A gear mechanism shows the immediate liquid level on a dial. Optionally, with the help of special electronic equipment of the gauge, it regulates the liquid level on the desired level. Through a resistance transmitter or a converter with a potentiometer, it maintains proportional resistance, current or voltage output signal.

#### 2.1.1 Head

The gauge head is an instrument box with a circle type index, which on a 5-metre scale, indicates the liquid level with two pointers. The head is made of an aluminium cast with electric inlets P16. The head is available in two sizes.

#### 2.1.2 Guiding tube

The guiding tube is either stainless or propylene. It is closed in its bottom part and it separates the inner part of the device from the measured liquid. The maximum length of the stainless type is 16,000mm while that of the polypropylene one is 5,800mm. According to the liquid type, we recommend to anchor the stainless tube from 3,000mm and the polypropylene one from 2,000mm. The guiding tube can be equipped only with a shoulder (low development – unusable in pressure tanks).

#### 2.1.3 Neck

The neck is a connecting complement furnished with a shoulder and a loose flange. The flange allows the guiding tube to be fitted to the tank neck and meanwhile turning the device into the position suitable for assembly and reading. The flange is usually DN50 PN16. For pressure storage tanks, the neck can be DN50 PN40 with tongue and groove shoulder.

2.1.3.1. Common length of the neck is 120mm. Meanwhile the neck can serve also as an extension up to the length of 5,000mm (it must be anchored from 1,500mm).

2.1.3.2. We can optionally provide the neck up to the length of 3,000mm (can be flooded with water, for low-placed tanks, when it is necessary to hoist the head to the non-explosive environment, etc.)

#### 2.1.4 Float

For liquids of different densities the producer designs different floats according to float tables and their suitability for the particular density. The floats carry type designation K XXX (diameter in mm) XXX (thickness of the float material in mm). For some types of liquid gas levels we can produce so called "quadruplet" floats. The floats are designed for different pressures and PP (PE) type for aggressive liquids.

## 3. Operating conditions

### 3.1 Operating conditions

3.11 The construction allows ensuring of the safe operation in the following environments:

- a) cold
- b) hot
- c) zones 0, 1 and zone 2 (for certain device types)
- d) dusty
- e) wet

3.12 Ingress protection

IP65

3.13 Atmospheric pressure surrounding the head

86 to 106 kPa

3.14 Measured fluid:

density 0.3 to 4 kg/dm<sup>-3</sup>

3.15 Operating overpressure at the measuring point

- for stainless type

maximum 2.2 MPa

If the float is not designed for this pressure it is necessary to place it outside the tank while the testing is in progress.

- for PP type

maximum 1 MPa

3.16 Temperature at the measuring point

- 50 °C to + 150 °C

special type

-150 °C to + 350 °C

3.17 Operating position

vertical

## 4. Technical data

4.1 Measuring range for the stainless type

maximum 16,000mm

for the polypropylene type

maximum 5,800mm

Scale for local measuring

0 - 10m

0 - 20m

4.2 Measuring accuracy for local display (for the range of 0-10m

± 0,1 %

4.3 Non-sensitivity

max. ± 8 mm

Non-sensitivity when the direction of the float motion is changed

max ± 15 mm

4.4 Resistance transmitter PSV-XX.XX.XX

overall resistance 0 - 100Ω (a table with ten measured data is delivered with the product)

Ten-revolution transmitter

0 -100Ω

4.5 Switches

4.1 Micro-switches

current carrying capacity

250 V/ 2A AC

insulation resistance

min. 2 MΩ

electrical strength

1 500 V AC

hysteresis

2% (of the scale)

4.62 Induction sensors

Operating voltage

10 - 30 V DC

Maximum switching current

100 mA

Housing material

AKV

Switching frequency

3,000 Hz

PNP output with a cable

Bi1-EH04-AP6X

NPN output with a cable

Bi1-RH04-AN6X

For special types, other sensors can be used. In the intrinsic safety version, a valid certificate, stating suitability of the inbuilt component for zone1 EExi, must be provided.

#### 4.7 Potentiometer with converter

PSA-XX.XX.XX (devices with feeding)

feeding

230 V/ 48-62 Hz

24 V AC / 48-62 Hz

0(4) - 20 mA, 0 - 10V

input unified signal

PSA- XX.XX.XX (double conductor connection in a loop)

Feeding

24 V DC

measured signal

4 -20 mA

input

max. 7 VA

output load

50 - 500  $\Omega$

operating stabilization

1 hour

output linear characteristics

(non-linearity max. 0.5 %)

special linear version

(non-linearity max. 0.3 %)

additional errors

0.05 % for each 10  $^{\circ}$ C

## 5. Measuring and control

### 5.1. Control - generally

All devices are produced within an approved QM-System under DIN EN ISO 9001.

### 5.2 100% control

Is to be carried out for every device and its parts are:

5.2.1. control of conformity of the product with customer requirements (the measuring range, inlets, scale, equipment, ...)

5.2.2. visual control

5.2.3. float weight control, float weld joints tightness control (for PP only) and pressure test for the stainless types.

5.2.4. guiding tube length control (length H control and length V control)

5.2.5. Control of mechanical functions of the device.

The device - the head is assembled on a testing bench with a guiding rod and a float. The end of the rod must be fixed with a pin. We "zero" the float gauge. With the use of calibrated tape measure, distances of 0.5m are marked on the guiding rod. Then it is checked if the desired movement of the float along the rod corresponds the data on the indicator – the dial.

Eccentric running control of assemblies and subassemblies, teeth clearance, perpendicularity of the pinion necks and the spring winding are carried out before their assembly into the FG head.

According to the device type further controls shall be carried out:

Control and setting of a converter with a potentiometer

Setting regulation for: ARI10,14,20,24 – see technical conditions no.TP0899/TP GR

5.2.6. Ex d housing

The EExd is checked before its assembly into the device head. Also type, marking, complexity, documentation conformity and control sheets are checked. After closing the EExd, smooth running of the adjustment screw in its whole length must be checked at least five times.

- the used inlets of the float gauge must comply with the manufacturer certificate for EExi use

The devices are connected to the input voltage and seasoned for at least 48 hours without the trolley position being changed. Out of these 48 hours, 24 hours are spent on seasoning at the minimal output signal and the other 24 hours at the maximum output signal. The plates can be seasoned before the assembly.

## 6. Storage and delivery

### 6.1. Storage

It is possible to store FG under the ambient temperature of 5 - 55°C and relative humidity of 75% maximally.

### 6.2. Delivery

The device – the head and the float - is delivered in the packaging ensuring basic protection against mechanical damage. The packaging carries a label showing the transport position of the device and the “fragile” label, it carries the addressee’s address, number of the business transaction and serial number. The guiding rod carries its serial number on the flange (the number is embossed into an aluminium plate and attached to the flange) and is wrapped into a plastic cover to prevent dirt and moisture from getting into the contact with it.

## 7. Maintenance

7.1. The FG generally do not require any attendance or maintenance but it is advisable to carry out basic check-out and setting after a period of one to five years (depending on the operation conditions, aggressive environment, ...)

## 8. Guarantee

8.1. We grant a guarantee period of 24 months, under the condition this device has been handled and operated according to this manual. For wear and spare parts the guarantee is restricted to failures in material or construction.

8.2. The guarantee however, is not valid if the faults are caused by unauthorized changes/repairs of the device, if the device was used in contradiction with its purpose, technical or operating conditions set out by the manufacturer, by violent damage and improper assembly procedure.

## 9. Packaging and dispatch

After the final inspection the float is removed from the guiding tube, the trolley is let into the head again. Adjusting screws and free connectors (cabling) are fixed with aldurit or colour (see a procedure for specifications). Inlets are drawn up and sealed. The magnetic trolley is packed into a strip of paper, placed into the neck of the head and fixed with a string. The pin and sealing are attached to the head neck. The lower part of the flange is sealed with a tape. The housing earthing is attached and the head lids are screwed.

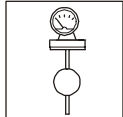
## 10. Disposal

The customer/enduser is obliged to take care for the disposal within the legal regulations.

## 11. Key

7	4	8	.	2	1	2	X	-	X	X					X	X	X	-	X	X	X	X	Length in mm
															X	X	X						Flange connection
																							Output
Pro-tection	Standard								A	0	Analogue output 4...20 mA												
	Ex								C	1	Analogue output and 1 contact												
									S	X	Contacts, X=number (max. 5)												



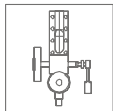


## PHÖNiX Messtechnik GmbH

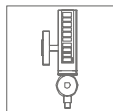
Salzschirfer Straße 13  
D-60386 Frankfurt/M.  
Tel. +49/69/41 67 42 -20  
Fax +49/69/41 67 42 - 29  
sales@phoenix-mt.com

Weitere Produkte:

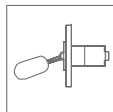
Further products:



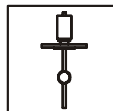
Schauglasanzeiger  
*Sight Glass Level Gauges*



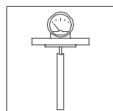
Magnetanzeiger  
*Magnetic Level Gauges*



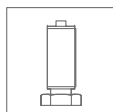
Schwimmerschalter  
*Float Switches*



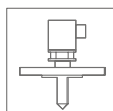
**Schwimmer Füllstandmesser**  
***Float Level Gauges***



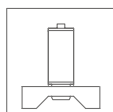
Verdränger Füllstandmesser  
*Displacer Level Gauges*



Ultraschall Füllstandmesser  
*Ultrasonic Level Gauges*



Optoelektronische Grenzwertgeber  
*Optoelectronic Level Switches*



Ultraschall Grenzscharter  
*Ultrasonic Switches*

DR748212XE Rev 03/06