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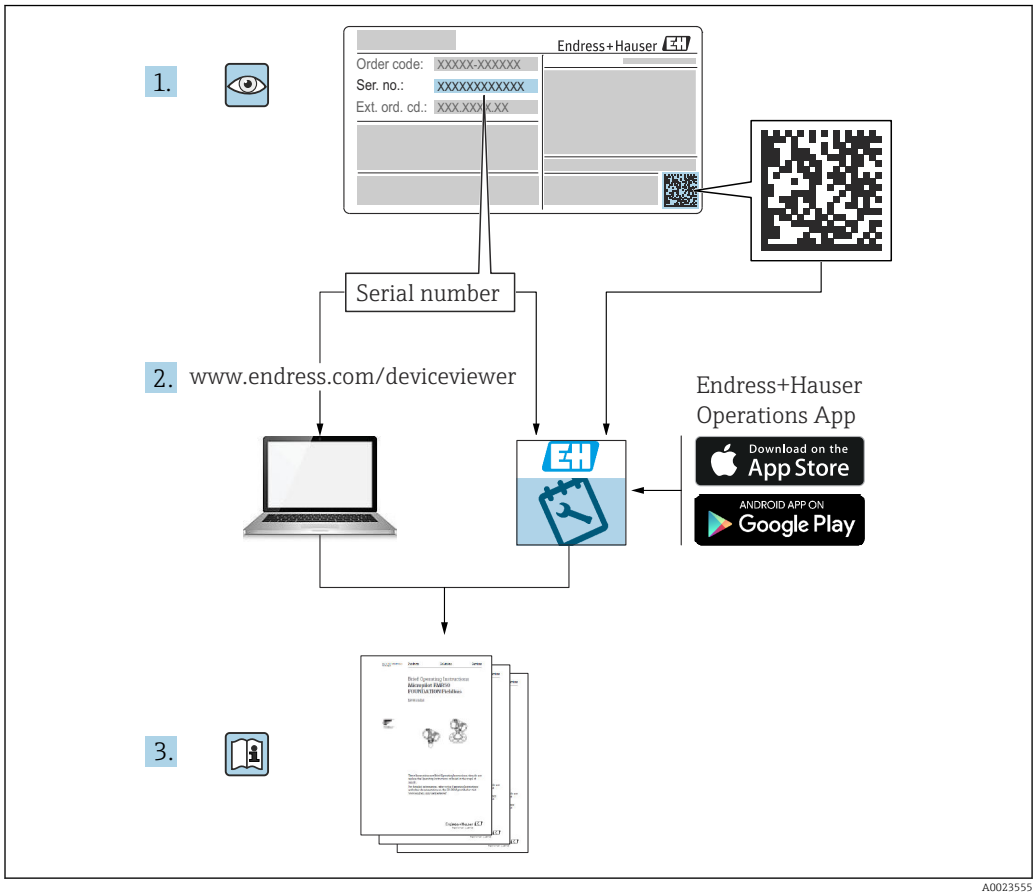
71750326
2025-11-27



# Operating Instructions
# **Float level gauge LT5**

Tank gauging

Endress+Hauser
People for Process Automation


1.
Endress+Hauser
Order code: XXXXX-XXXXXX
Ser. no.: XXXXXXXXXXX
Ext. ord. cd.: XXX XXX XX XX
Serial number
2. www.endress.com/deviceviewer
Endress+Hauser
Operations App
Download on the App Store
ANDROID APP ON Google Play
3.
A0023555

# Table of contents

# 1 Document information

## 1.1 Document function

These Operating Instructions contain all the information required in the various life cycle phases of the device: from product identification, incoming acceptance and storage, to installation, connection, operation and commissioning, through to troubleshooting, maintenance and disposal.

## 1.2 Symbols

### 1.2.1 Safety symbols

⚠ DANGER
This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

⚠ WARNING
This symbol alerts you to a potentially dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

⚠ CAUTION
This symbol alerts you to a potentially dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE
This symbol alerts you to a potentially harmful situation. Failure to avoid this situation can result in damage to the product or something in its vicinity.

### 1.2.2 Electrical symbols

| Symbol | Meaning |
|---|---|
| ⎓ | Direct current |
| ~ | Alternating current |
| ⎓ ~ | Direct and alternating current |
| ⏚ | **Ground connection**<br>A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system. |
| ⊜ | **Protective earth (PE)**<br>Ground terminals that must be connected to ground prior to establishing any other connections.<br>The ground terminals are located on the interior and exterior of the device:<br>▪ Interior ground terminal: protective earth is connected to the mains supply.<br>▪ Exterior ground terminal: device is connected to the plant grounding system. |

### 1.2.3 Tool symbols

Phillips head screwdriver

Flat blade screwdriver

Torx screwdriver


Allen key


Open-ended wrench

### 1.2.4 Symbols for certain types of information and graphics

**Permitted**
Procedures, processes or actions that are permitted

**Preferred**
Procedures, processes or actions that are preferred

**Forbidden**
Procedures, processes or actions that are forbidden

**Tip**
Indicates additional information


Reference to documentation


Reference to graphic

▶
Notice or individual step to be observed

1., 2., 3.
Series of steps


Result of a step


Visual inspection


Operation via operating tool


Write-protected parameter

**1, 2, 3, ...**
Item numbers

**A, B, C, ...**
Views

**⚠ → Safety instructions**
Observe the safety instructions contained in the associated Operating Instructions


**Temperature resistance of the connection cables**
Specifies the minimum value of the temperature resistance of the connection cables

## 1.3 Additional documentation

The following documentation types are available in the Downloads area of the Endress +Hauser website (www.endress.com/downloads):

For an overview of the scope of the associated Technical Documentation, refer to the following:
*W@M Device Viewer* (www.endress.com/deviceviewer): Enter the serial number on the nameplate.

### 1.3.1 Technical Information (TI)

**Planning aid**
This document contains all technical data related to the device, as well as an overview of accessories and other products that can be ordered for the device.

### 1.3.2 Brief Operating Instructions (KA)

**Instructions for using the system for the first time**
The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

### 1.3.3 Operating Instructions (BA)

Operating Instructions contain all the information required for all stages in the device life cycle (from product identification, incoming acceptance, storage, mounting, connection, operation, and setting to troubleshooting, maintenance, and disposal).

# 2 Safety-related basic instructions

## 2.1 Basic safety instructions

### 2.1.1 Requirements for the personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:
- Trained, qualified specialists must have a relevant qualification for this specific function and task.
- Are authorized by the plant owner/operator.
- Are familiar with federal/national regulations.
- Before starting work, read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- Follow instructions and comply with basic conditions.

The operating personnel must fulfill the following requirements:
- Are instructed and authorized according to the requirements of the task by the facility's owner-operator.
- Follow the instructions in this manual.

## 2.2 Intended use

**Applications and measured materials**
Equipment intended for use in hazardous locations, sanitary applications, or high-risk applications due to process pressure have the corresponding label attached to their nameplates.

To ensure that the device remains in proper condition for the operation time:
- Only use the device in full compliance with the data on the nameplate and the general conditions listed in the Operating Instructions and supplementary documentation.
- Check the nameplate to ensure that the ordered equipment has the correct specifications for the certification-related area (example: explosion proof, safety of pressure vessels).
- If the device is not operated at an atmospheric temperature, compliance with the relevant basic conditions specified in the relevant device documentation is absolutely essential.
- Provide permanent protection for the equipment against corrosion caused by environmental effects.
- Do not exceed the limit values in "Technical Information."

The manufacturer is not liable for damage caused by improper or non-designated use.

## 2.3 Workplace safety

For work on and with the device:
- Wear the required personal protective equipment according to local/national regulations.

## 2.4 Operational safety

Risk of injury!
- Operate the device only if it is in proper technical condition, free from errors and faults.
- The operator is responsible for interference-free operation of the device.

**Modifications to the device**

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers:
- If modifications are nevertheless required, consult with the manufacturer.

**Repair**

To ensure continued operational safety and reliability:
- Carry out repairs on the device only if they are expressly permitted.
- Observe federal/national regulations pertaining to the repair of an electrical device.
- Use only original spare parts and accessories from the manufacturer.

**Hazardous area**

To eliminate danger to persons or the facility when the device is used in the hazardous area (e.g. explosion protection):
- Check the nameplate to verify if the device ordered can be put to its intended use in the hazardous area.
- Observe the specifications in the separate supplementary documentation that is an integral part of these instructions.

## 2.5 Product safety

This device was designed in accordance with GEP (Good Engineering Practice) to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate. It meets the general safety standards and legal requirements.

### 2.5.1 CE mark

This measuring system meets the legal requirements of the applicable EU Directive. These are listed in the corresponding EU Declaration of Conformity along with the standards applied.

Endress+Hauser affixes the CE mark to this equipment as a sign of guarantee that this equipment has successfully passed testing.

# 3 Product description

## 3.1 Intended use

Float level gauge LT5 is an important measuring instrument in the process industry. With its mechanical construction that does not require a power supply, it is easy to install. Since it can be used for high-precision liquid level measurement and remote indication detection, it is ideal for the following operations.

- Inventory management
- Batch processing
- Process task control
- Safe tank operation

## 3.2 List of material specifications

*Aluminum*

| Code | Description |
|---|---|
| ADC12 | Aluminum die-casting alloy (AI-Si-Cu) |
| AC4C-T6 | Aluminum alloy casting (Al Si7Mg) |
| AC4A | Aluminum alloy casting (Al Si10Mg) |

*Stainless steel*

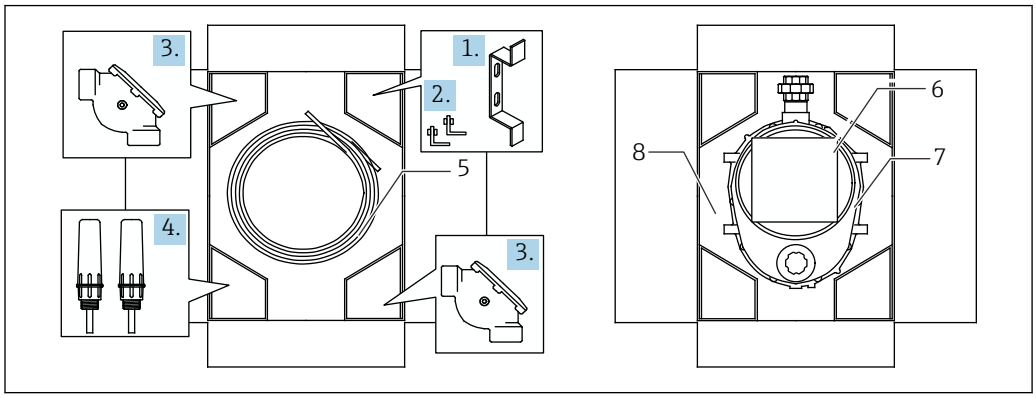
| Code | Description |
|---|---|
| SUS304 | Stainless steel (18Cr-8Ni) |
| SUS316 | Stainless steel (18Cr-12Ni-2.5Mo) |
| SCS13 | Cast stainless steel equivalent to SUS304 |
| SCS14 | Cast stainless steel equivalent to SUS316 |

*Others*

| Code | Description |
|---|---|
| SCPL1 | Cast carbon steel |
| SGP | Steel gas pipes |
| SGPW | Steel gas pipe water |
| PVC | Polyvinyl chloride |
| SS400 | Carbon steel |

## 3.3 Delivery examples

The packaging method will vary depending on the order code, etc. For the flange type, sheave elbows will be packed in a separate box.




1 *Packaging*

1 *Gauge supporter*
2 *Anchor hook*
3 *Sheave elbow*
4 *Top anchor*
5 *Guide wire*
6 *Measuring tape*
7 *Gauge head*
8 *Float (below the gauge head)*

# 4 Incoming acceptance and product identification

## 4.1 Incoming acceptance

Upon receipt of the goods, check the following.
- Are the order codes on the delivery note and the product label identical?
- Are the goods undamaged?
- Do the nameplate data match the ordering information on the delivery note?
- If required (see nameplate): Are the Safety Instructions (XA) enclosed?

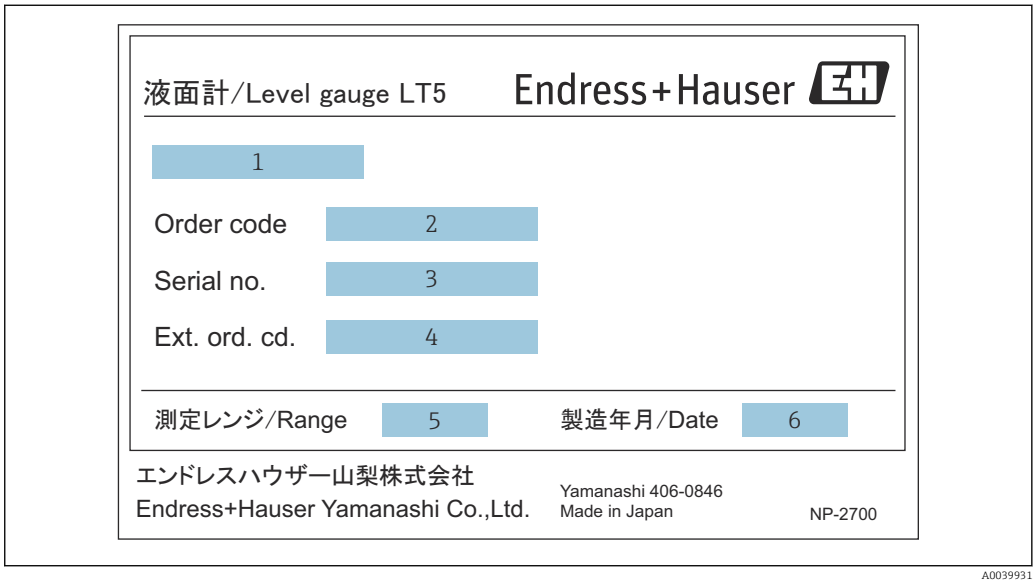
If one or more of these conditions are not satisfied, contact your Endress+Hauser Sales Center or distributor.

## 4.2 Product identification

The following options are available for identification of the device.
- Nameplate specifications
- Extended order code on the delivery note (including details of the device specification codes)
- Entering the serial number from the nameplate in *W@M Device Viewer* (www.endress.com/deviceviewer) will display all the information about the device.

Note that the information on a nameplate may be changed without notice when credentials and certificates are updated.

### 4.2.1 Nameplate specifications




2 *LT5 nameplate*

1 *Instrument code (optional)*
2 *Order code*
3 *Serial No.*
4 *Extended code*
5 *Measurement range*
6 *Manufacturing year and month*

## 4.3 Manufacturer address

Endress+Hauser Yamanashi Co., Ltd.
406-0846
862-1 Mitsukunugi, Sakaigawa-cho, Fuefuki-shi, Yamanashi

## 4.4 Storage and transport

### 4.4.1 Storage conditions

- Storage temperature: −20 to +70 °C (−4 to 158 °F)
- Store the device in its original packaging.

### 4.4.2 Transport

NOTICE

**The housing may become damaged or dislodged.**
Risk of injury

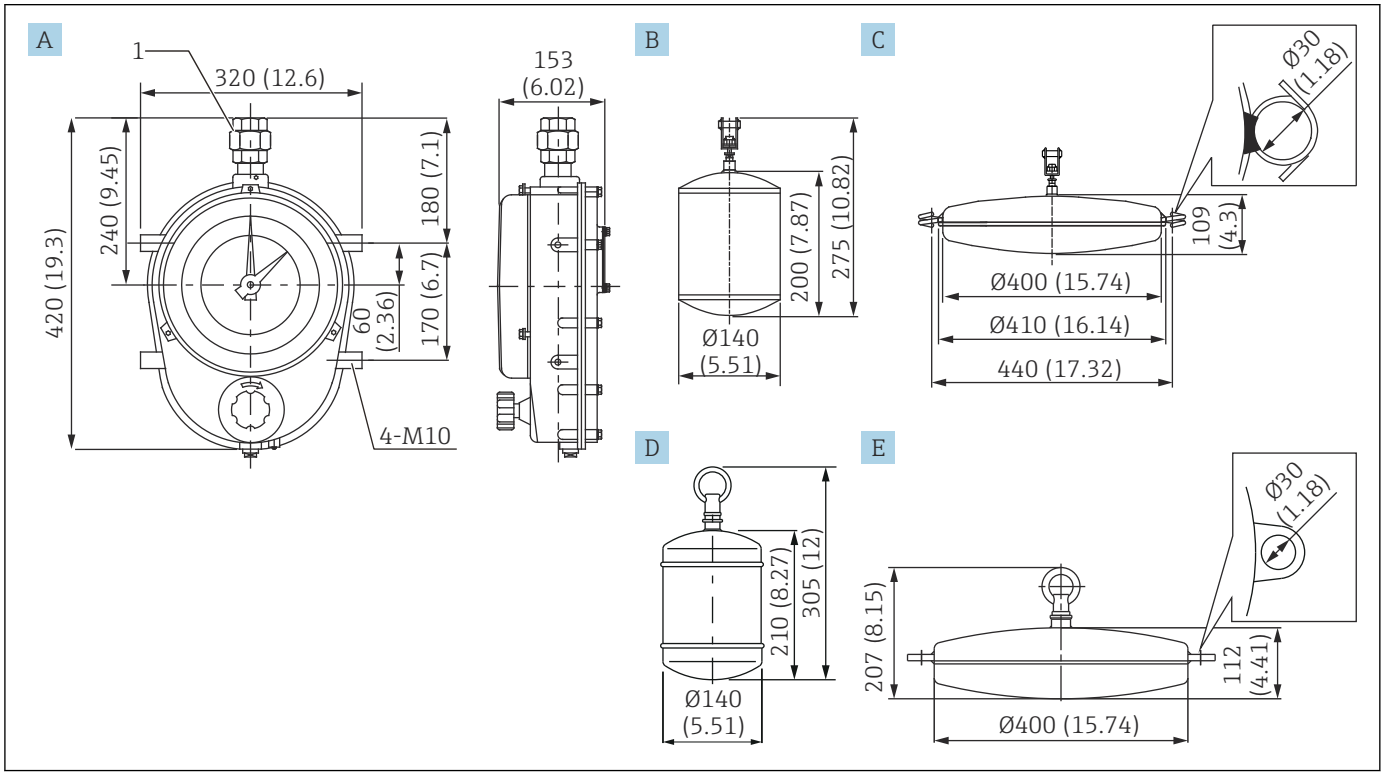
- ▶ When transporting the device to the measuring point, either use the device's original packaging or hold by the process connector.
- ▶ Secure a hoisting device (such as a hoisting ring or a lifting eye bolt) to the process connector, not to the housing. Pay attention to the device's center of gravity to prevent unexpected tilting.
- ▶ Comply with the safety precautions and transportation conditions for devices that weigh 18 kg (39.6 lbs) or more (IEC61010).

# 5 Installation

## 5.1 Dimensions of LT5

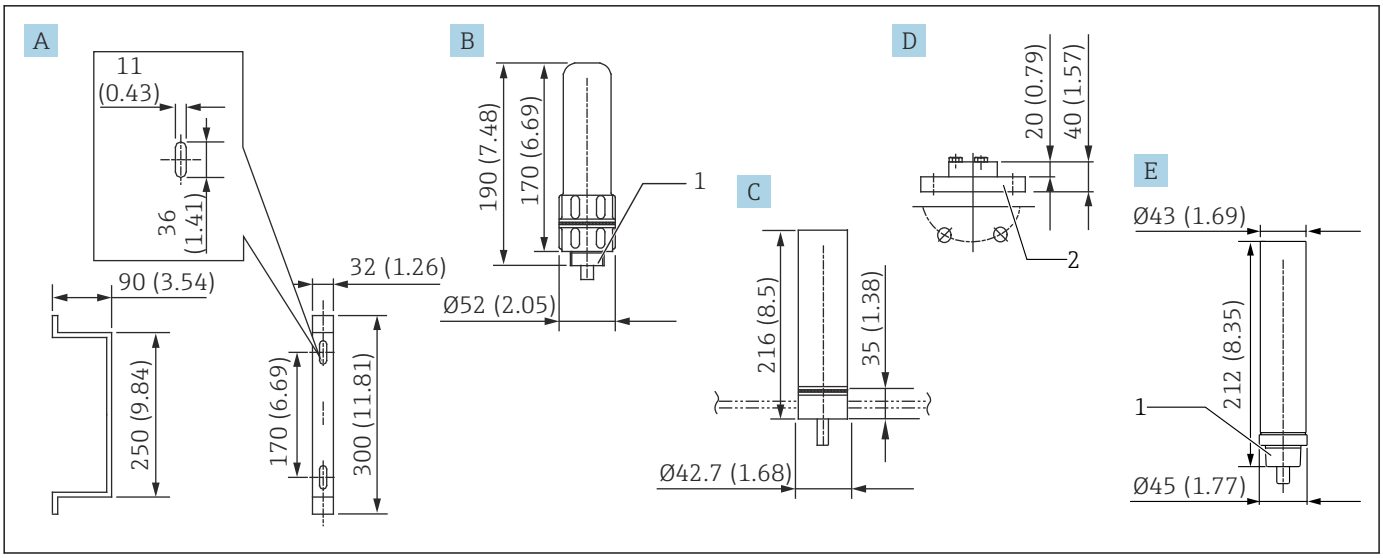
Dimensions of common components are used for the installation conditions. For further information, contact your Endress+Hauser Sales Center or distributor.

### 5.1.1 Dimensions of LT5-1 (screw-in / low-pressure type)



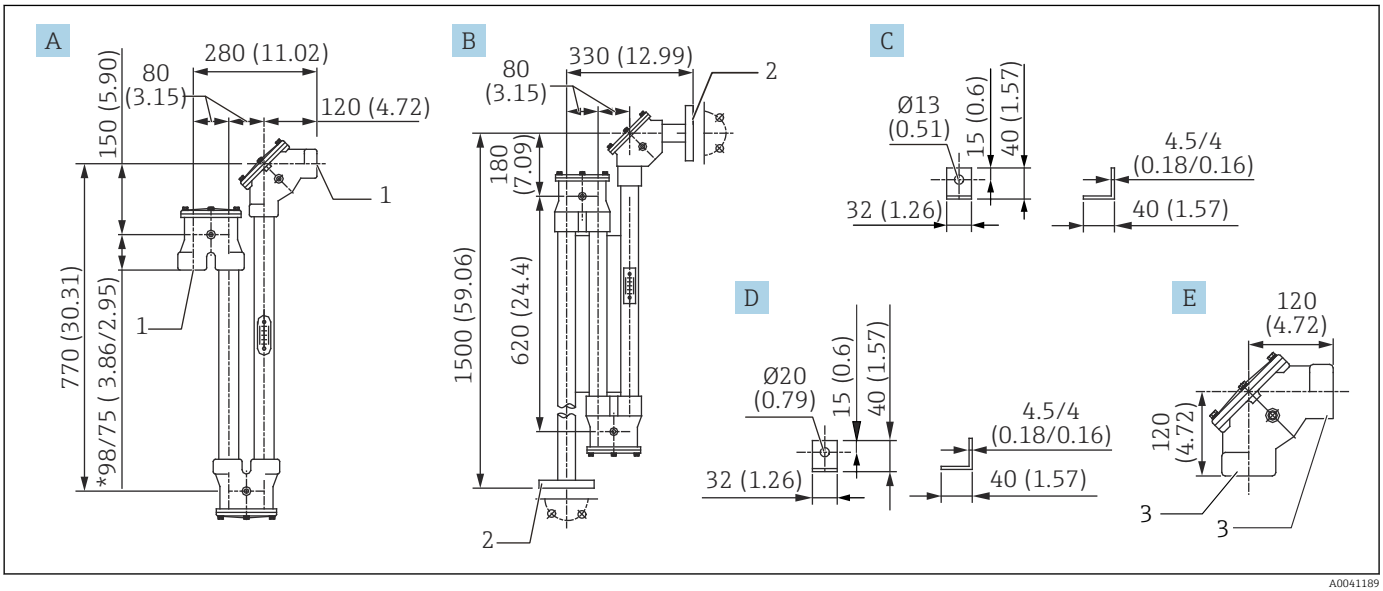

3 *LT5-1 / float dimensions. Unit of measurement mm (in)*

*A Gauge head (ADC12)*
*B Float φ140 (SUS316)*
*C Float φ400 (SUS316)*
*D Float φ140 (PVC)*
*E Float φ400 (PVC)*
*1 Union nut (select from JIS Rc 1-1/2 / ANSI NPT 1-1/2; select Rp 1-1/2 if there is no union nut)*




4 *Accessory 1. Unit of measurement mm (in)*

*A Gauge supporter (select from iron (SS400, t: 4.5 mm (0.18 in)) / SUS304, t: 4 mm (0.16 in))*
*B Top anchor (ADC6)*
*C Top anchor (SUS316 with socket welding type)*
*D Top anchor (PVC: select from JIS 10K 40A FF / ASME NPS 1-1/2" Cl. 150 FF / JPI 40A 150 lbs FF)*
*E Top anchor (SUS316)*
*1 Select from JIS R1 / ANSI NPT 1*

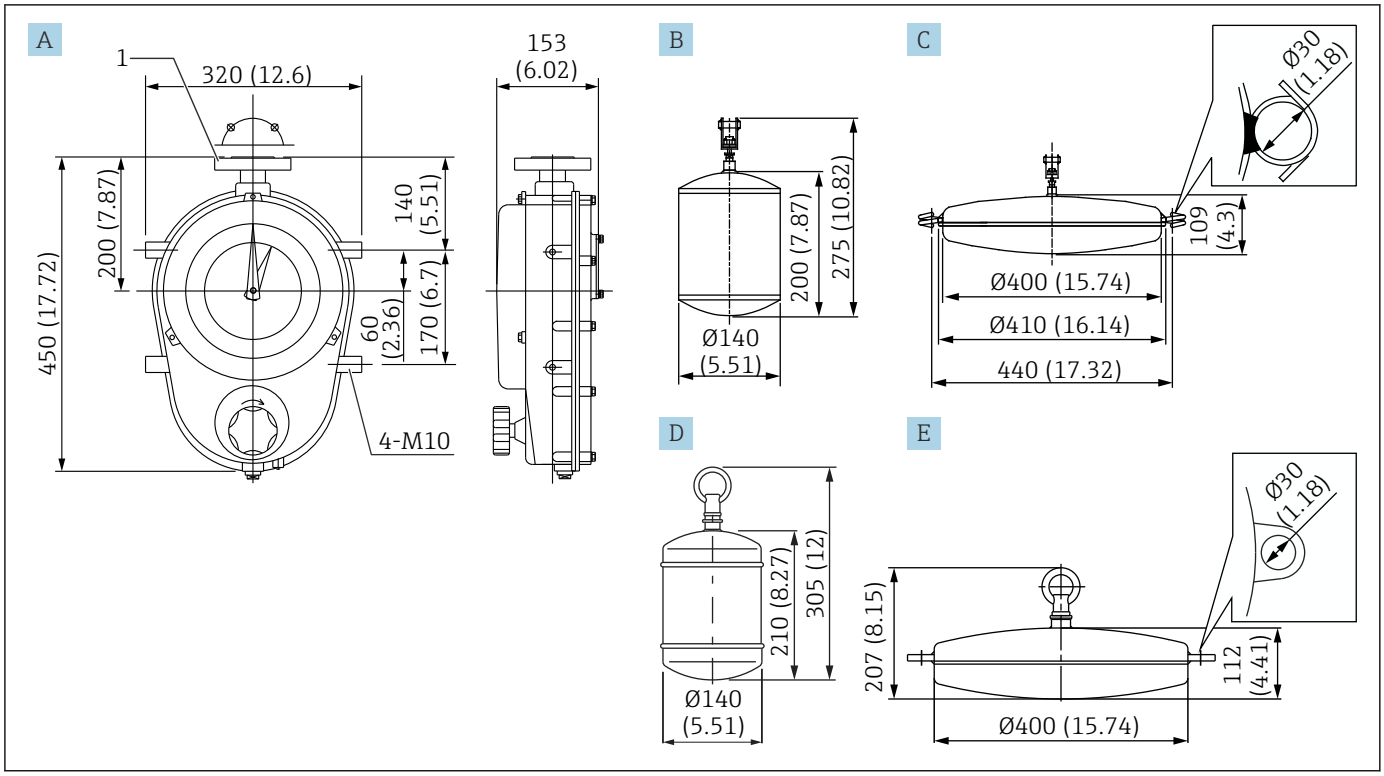



5 *Accessory 2. Unit of measurement mm (in)*

*A Seal pot (select from aluminum + iron / SCS14+SUS316)*
*B Seal pot (PVC: flange type only)*
*C Anchor hook (main unit: select from iron / SUS316; bolt: SUS316L)*
*D Anchor hook (main unit: select from iron / SUS316; bolt: PVC)*
*E 90 ° sheave elbow (select from ADC6 / SCS14)*
*1 Screw-in type (select from Rp 1-1/2 / NPT 1-1/2 as options)*
*2 Flange (select from JIS 10K 40A FF / ASME NPS 1-1/2" Cl. 150 FF / JPI 40A 150 lbs FF)*
*3 Screw-in type (select from Rp 1-1/2 / NPT 1-1/2 as options)*

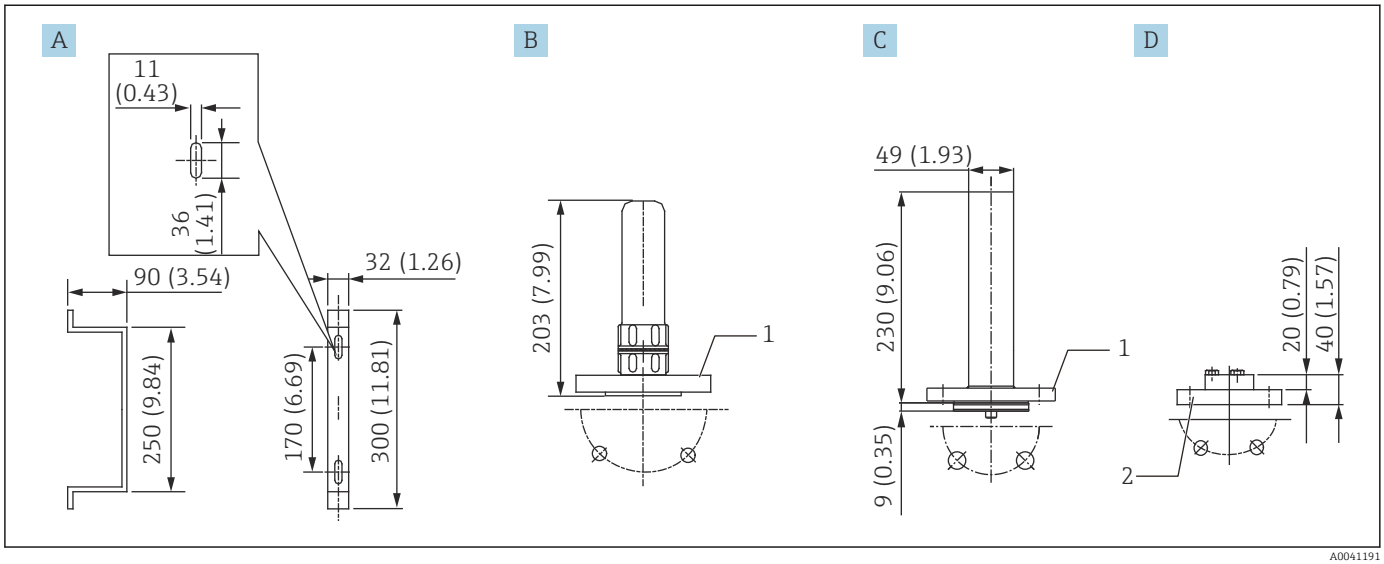
- For seal pot 98 / 75, 98 mm (3.86 in) is the dimension of an aluminum seal pot while 75 mm (2.92 in) is the dimension of a stainless steel seal pot.
- For anchor hook 4.5 / 4, 4.5 mm (0.18 in) is the thickness of an iron anchor hook while 4 mm (0.16 in) is the thickness of a stainless steel anchor hook. Anchor hooks come with bolts, nuts, and washers.

### 5.1.2 Dimensions of LT5-1 (flange, low-pressure type)



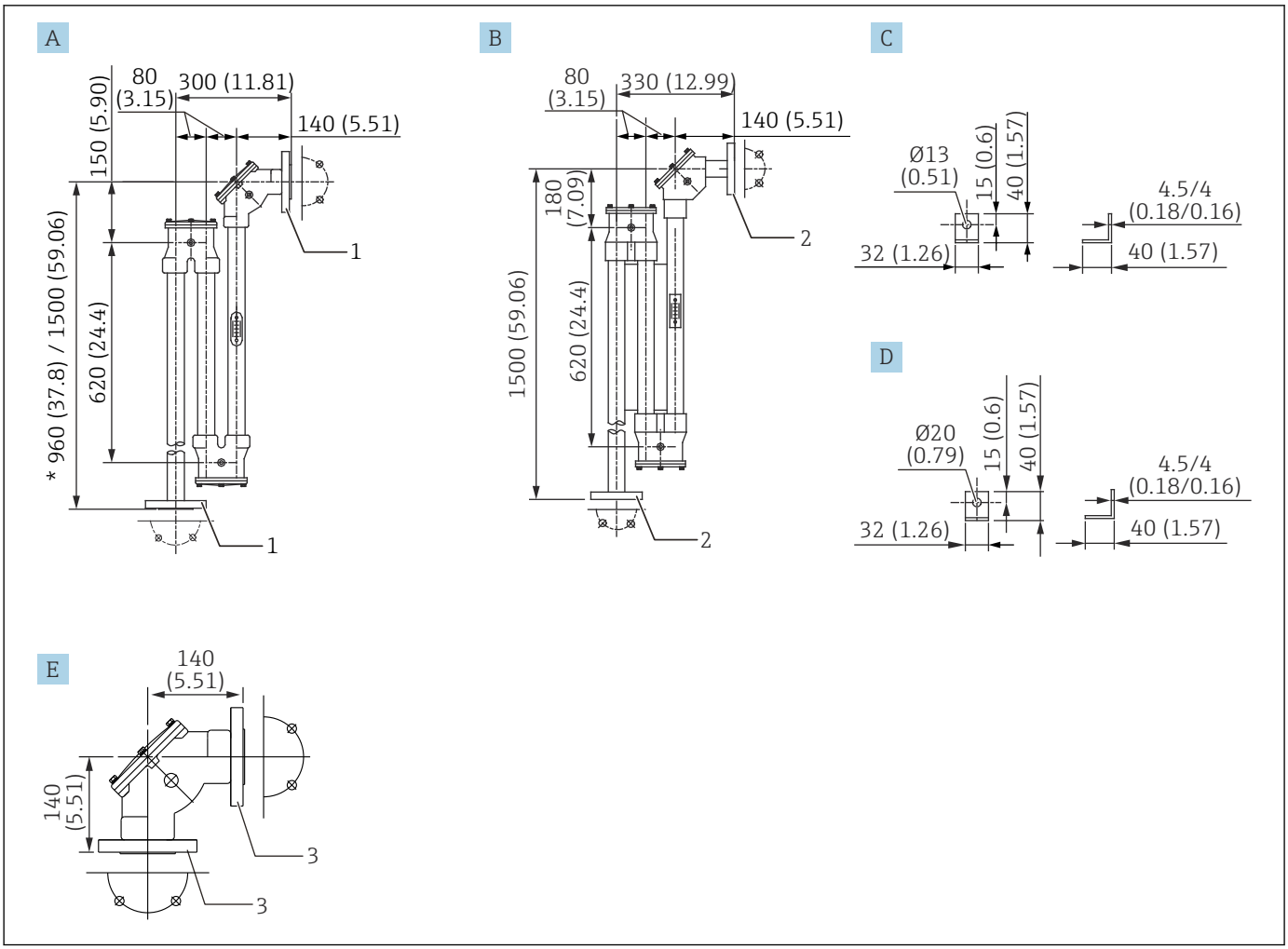

6 *Dimensions of LT5-1. Unit of measurement mm (in)*

*A Gauge head (ADC12)*
*B Float φ140 (SUS316)*
*C Float φ400 (SUS316)*
*D Float φ140 (PVC)*
*E Float φ400 (PVC)*
*1 Flange (select from JIS 10K 40A RF / ASME NPS 1-1/2" Cl. 150 RF / JPI 40A 150 lbs RF)*




7 *Accessory 1 . Unit of measurement mm (in)*

*A Gauge supporter (select from iron (SS400), t: 4.5 mm (0.18 in) / SUS304, t: 4 mm (0.16 in))*
*B Top anchor (ADC6+AC4A)*
*C Top anchor (SUS316)*
*D Top anchor (PVC)*
*1 Flange (select from JIS 10K 40A RF / ASME NPS 1-1/2" Cl. 150 RF / JPI 40A 150 lbs RF)*
*2 Flange (select from JIS 10K 40A FF / ASME NPS 1-1/2" Cl. 150 FF / JPI 40A 150 lbs FF)*

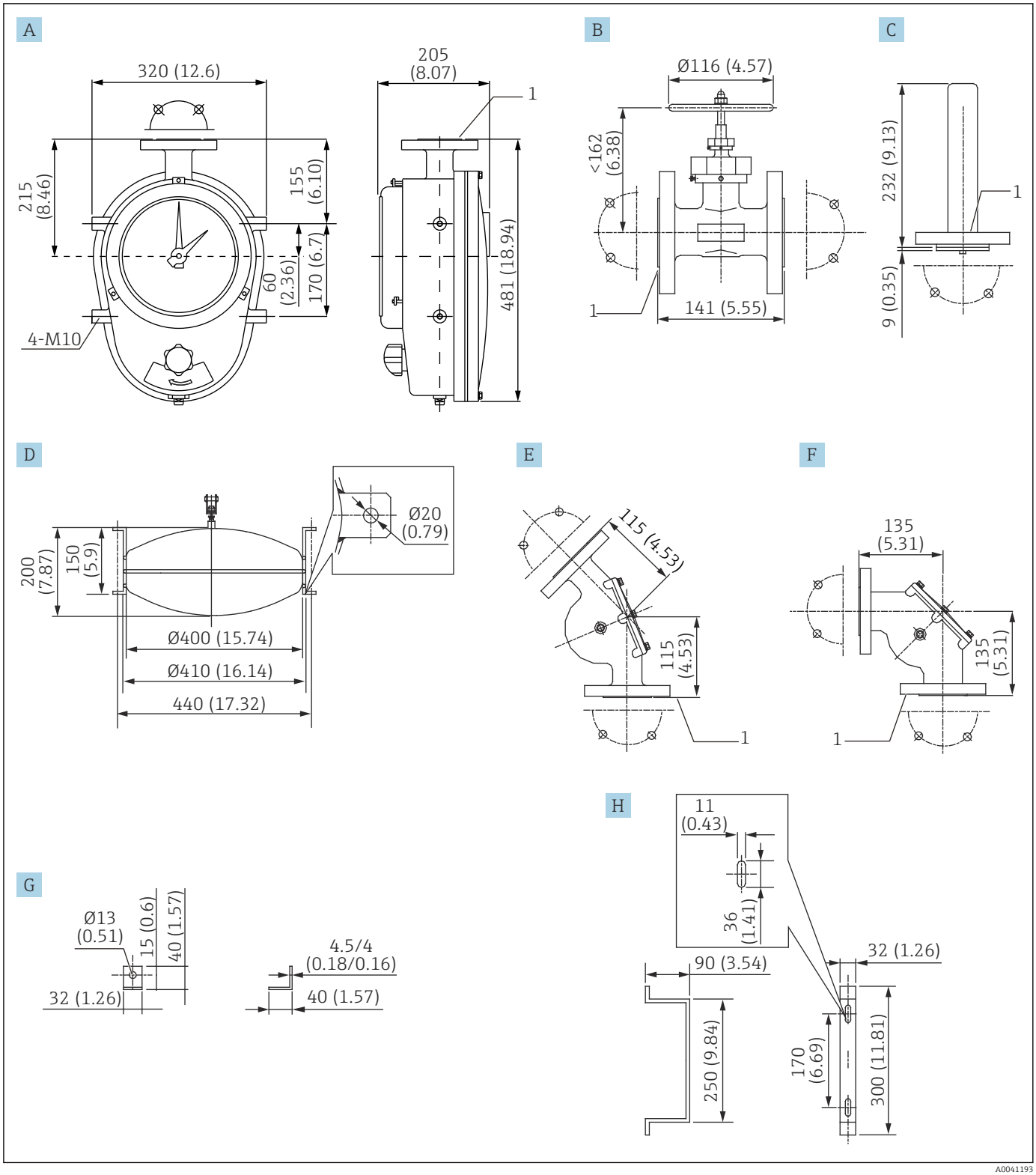



8 *Accessory 2. Unit of measurement mm (in)*

*A Seal pot (select from aluminum + iron / SCS14+SUS316; see notes below)*
*B Seal pot (PVC: flange type only)*
*C Anchor hook (main unit: select from iron / SUS316; bolt: SUS316L)*
*D Anchor hook (main unit: select from iron / SUS316; bolt: PVC)*
*E 90 ° sheave elbow (select from ADC6+AC4A / SCS14+SUS316)*
*1 Flange (select from JIS 10K 40A RF / ASME NPS 1-1/2" Cl. 150 RF / JPI 40A 150 lbs RF)*
*2 Flange (select from JIS 10K 40A FF / ASME NPS 1-1/2" Cl. 150 FF / JPI 40A 150 lbs FF)*
*3 Flange (select from JIS 10K 40A RF / ASME NPS 1-1/2" Cl. 150 RF / JPI 40A 150 lbs RF)*

- Seal pot: 960 / 1500: 960 mm (37.8 in) is the dimension of a seal pot with a measuring tape alone while 1500 mm (59.06 in) is the dimension of a seal pot with a tape and wire.
- Seal pot: 98 / 75: 98 mm (3.86 in) is the dimension of an aluminum seal pot while 75 mm (2.95 in) is the dimension of a stainless steel seal pot.
- For anchor hook 4.5 / 4, 4.5 mm (0.18 in) is the thickness of an iron anchor hook while 4 mm (0.16 in) is the thickness of a stainless steel anchor hook.
  Anchor hooks come with bolts, nuts, and washers.

### 5.1.3 Dimensions of LT5-4 (flange, medium-pressure type)




9 *Dimensions of LT5-4. Unit of measurement mm (in)*

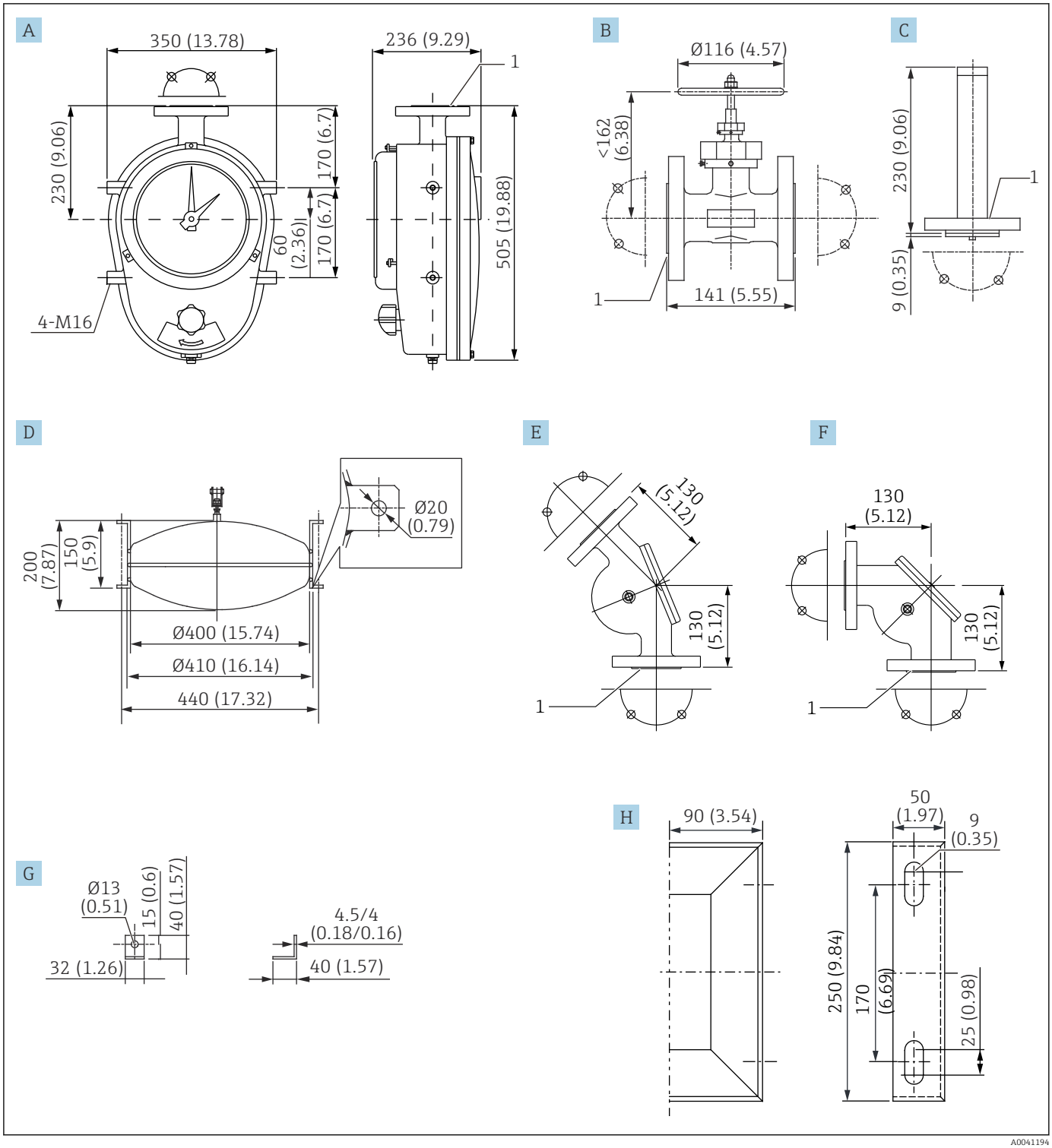
*A Gauge head (AC4C-T6)*
*B Gate valve (SCS13)*
*C Top anchor (AC4C-T6)*
*D Float φ400 (SUS316)*
*E 135 ° sheave elbow (AC4C-T6)*
*F 90 ° sheave elbow (AC4C-T6)*

*G Anchor hook (main unit: select from iron / SUS316; bolt: SUS316L)*
*H Gauge supporter (select from iron (SS400), t: 4.5 mm (0.18 in) / SUS304, t: 4 mm (0.16 in))*
*1 Flange (select from JIS 10K 40A RF / ASME NPS 1-1/2" Cl. 150 RF / JPI 40A 150 lbs RF)*

For anchor hook 4.5 / 4, 4.5 mm (0.18 in) is the thickness of an iron anchor hook while 4 mm (0.16 in) is the thickness of a stainless steel anchor hook.

Anchor hooks come with bolts, nuts, and washers.

### 5.1.4 Dimensions of LT5-6 (flange / high-pressure type)




10 *Dimensions of LT5-6. Unit of measurement mm (in)*

- *A Gauge head (iron (SCPL1))*
- *B Gate valve (SCS13)*
- *C Top anchor (select from iron (STPL/S25C) / SUS316)*
- *D Float φ400 (SUS316)*
- *E 135 ° sheave elbow (iron (SCPL1))*
- *F 90 ° sheave elbow (iron (SCPL1))*

*G Anchor hook (main unit: select from iron / SUS316; bolt: SUS316L)*
*H Gauge supporter (select from iron (SS400), t: 4 mm (0.16 in)) / SUS304, t: 4 mm (0.16 in))*
*1 Flange (select from JIS 10K/20K 40A RF / ASME NPS 1-1/2" Cl. 150/300 RF / JPI 40A 150/300 lbs RF)*

For anchor hook 4.5 / 4, 4.5 mm (0.18 in) is the thickness of an iron anchor hook while 4 mm (0.16 in) is the thickness of a stainless steel anchor hook.

Anchor hooks come with bolts, nuts, and washers.

## 5.2 Installation preparation

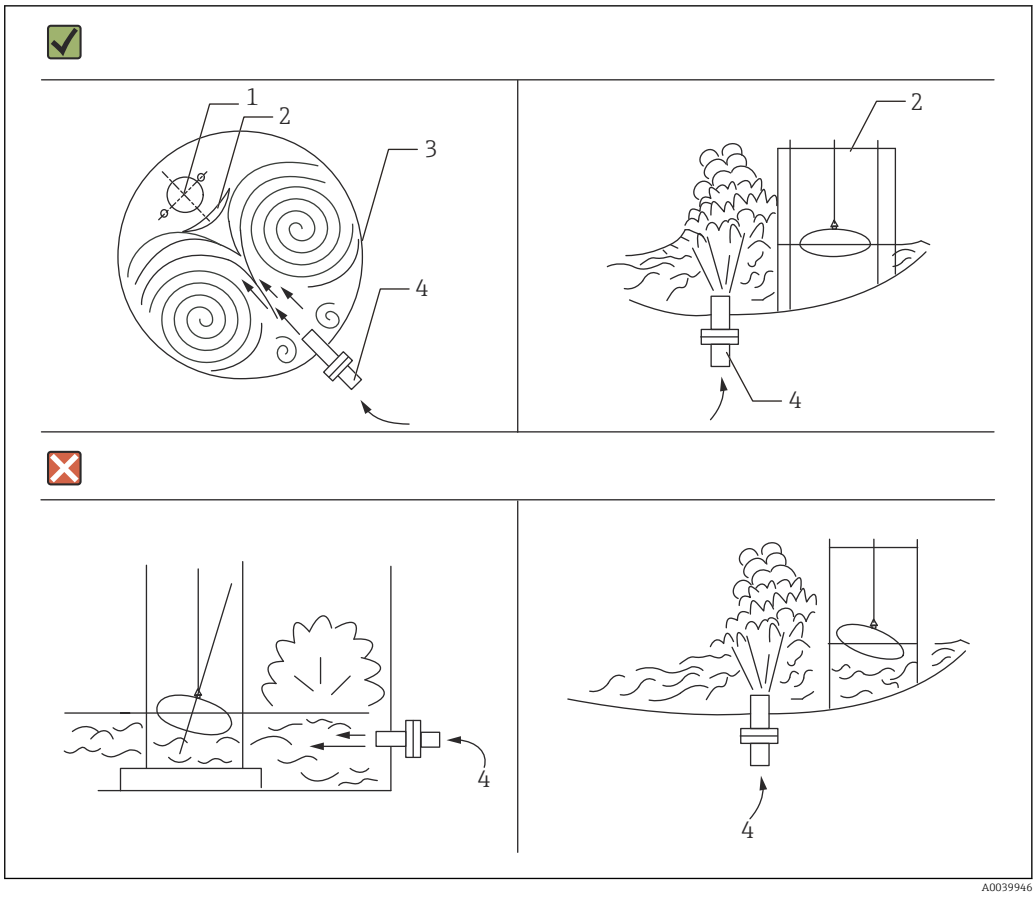
When installing LT, exercise the following precautions.

- When mounting the gauge head, select a location where it is the easiest to read the meter.
- The float must be installed so that it is positioned near the tank sidewall.
- In a spherical tank, the float must be installed so that it is positioned near the center of the tank.
- If the roof of a dome-roof tank has a steep incline, the float must be installed so that it is positioned near the center of the tank.
- Use an appropriate gasket on the flange connection to maintain airtightness.

**⚠ CAUTION**

**Risk of tape severing**

▶ Place the float as far away as possible from the tank's liquid inlet or stirrer, and install the float so that it is not impacted directly by waves. If there is no choice but to position the float where it is subjected to waves or liquid flow, install a wave guard to protect the float. Sudden injection of liquid near the float may cause the tape to sever.



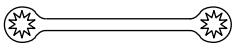
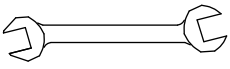

11 *Installation conditions*

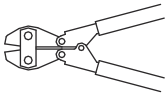
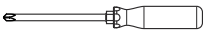
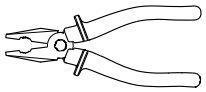
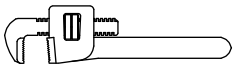
1 *Center of the float*
2 *Wave guard installation*
3 *Tank*
4 *Liquid inlet*

## 5.3 Tools

When installing LT5, prepare the following tools.

*Required tools*

| Tools | Intended use | LT5-1 (screw-in) | LT5-1 (flange) | LT5-4 | LT5-6 |
|---|---|---|---|---|---|
|  12 *Box-end wrench* | 13 mm: For sheave elbow cover | ● | ● | ● | - |
| | 24 mm: For sheave elbow cover | - | - | - | ● |
| | 17 mm: For gauge head on device supporter | ○ | ○ | ○ | - |
| | 24 mm: For gauge head on device supporter | - | - | - | ● |
| | 24 mm: JIS flange (M16 x 2) | - | ◎ | ◎ | ◎ |
| | 21 mm: 150 lbs flange (1/2" x 2) | | | | |
| | 32 mm: 300 lbs flange (3/4" x 2) | | | | |
|  13 *Wrench* | 19 mm: For tightening guide wire and compressing tension spring | ● | ● | ● | ● |

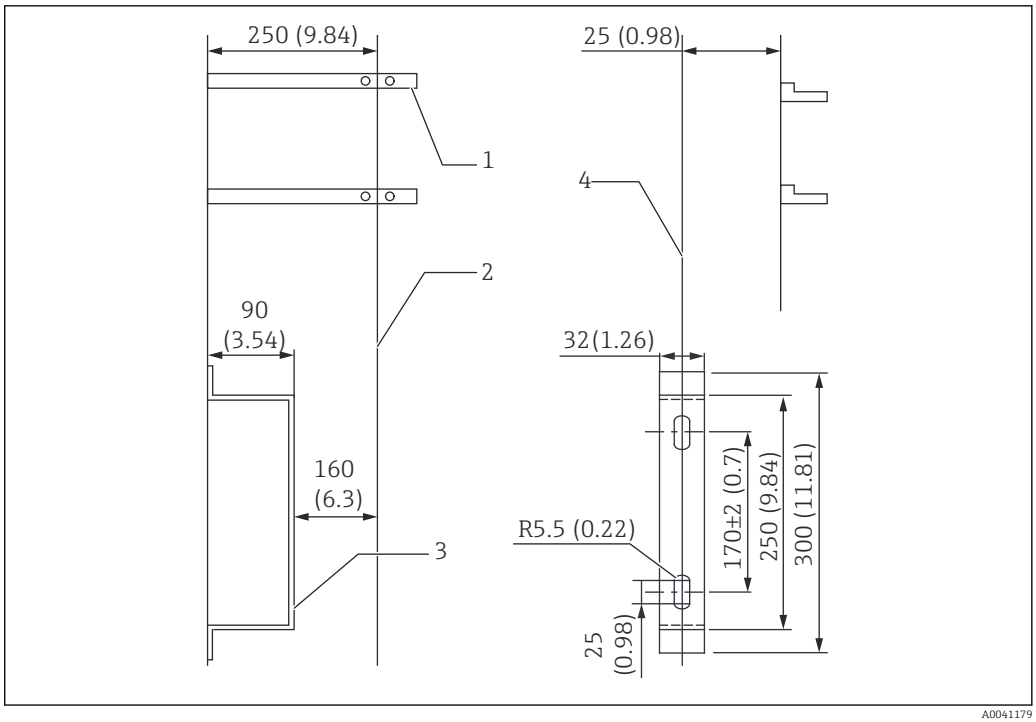
| Tools | Intended use | LT5-1 (screw-in) | LT5-1 (flange) | LT5-4 | LT5-6 |
|---|---|---|---|---|---|
|  14 *Water pump pliers* | 25 mm or more: For screw-in top anchor | ● | - | - | - |
|  15 *Wire rope cutter* | For cutting excess guide wire | ● | ● | ● | ● |
|  16 *Phillips head screwdriver* | For tape clamps and adjusting the tape clamp counter-type display | ○ | ○ | - | ○ |
|  17 *Nut driver* | 5.5 mm: For tape clamp and dial-type display<br>8 mm: For display cover | ○ | ○ | ○ | ○ |
|  18 *Pliers* | For screws for mounting tape clamps | ○ | ○ | ○ | ○ |
|  19 *Sheet metal scissors* | For cutting excess measuring tape | ○ | ○ | ○ | ○ |
|  20 *Pipe wrench* | 600 mm or more: For guide pipes of a screw-in gauge head | ○ | - | - | - |

●: Use on tank roof
○: Use at ground level
◎: Use on tank roof and at ground level
—: Do not use

## 5.4 Welding gauge supporter

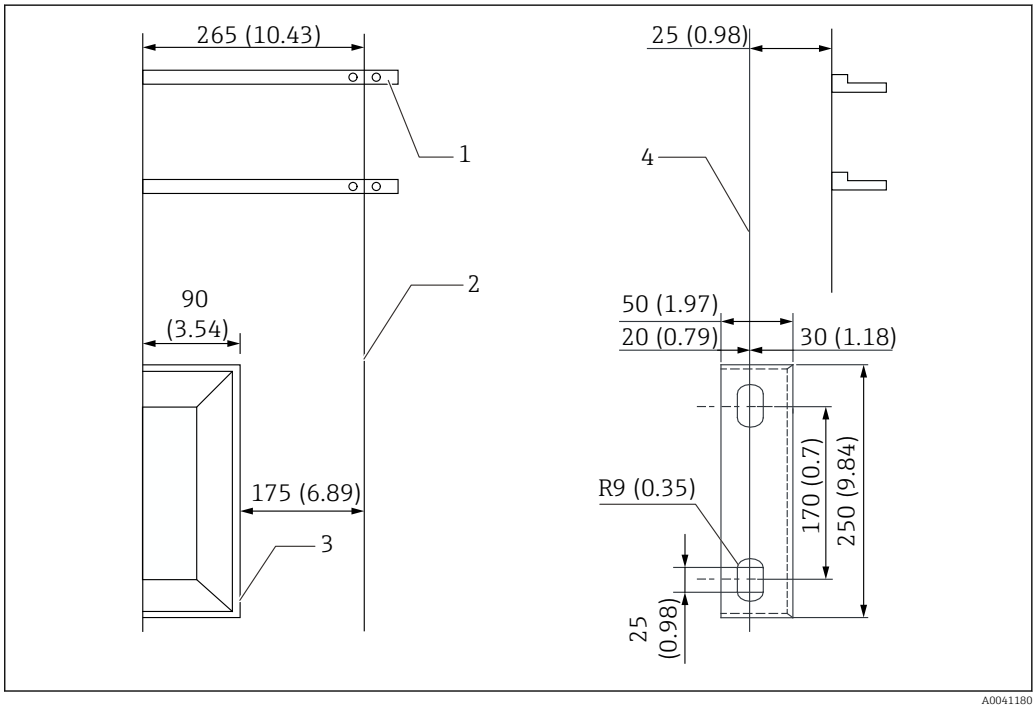
When welding the gauge supporter, refer to the diagram below. Note that pipe supporters are not supplied.

The distance from the outer tank wall to the gauge head center is 15 mm (0.59 in) longer for LT5-6 (high-pressure gauge head) compared to LT5-1 (low-pressure gauge head) and LT5-4 (medium-pressure gauge head).




21 *Gauge supporter (for low and medium pressure). Unit of measurement mm (in)*

1 *Pipe supporter (not supplied)*
2 *Center line for mounting*
3 *Gauge supporter (based on the selected option SS400: t = 4.5 / SUS304: t = 4.0)*
4 *Center line of the gauge supporter*




22 *Gauge supporter (for high pressure). Unit of measurement mm (in)*

1 *Pipe supporter (not supplied)*
2 *Center line for mounting*
3 *Gauge supporter (based on the selected option SS400: t = 4 / SUS304: t = 4.0)*
4 *Center line of the gauge supporter*

# 5.5 Guide pipe

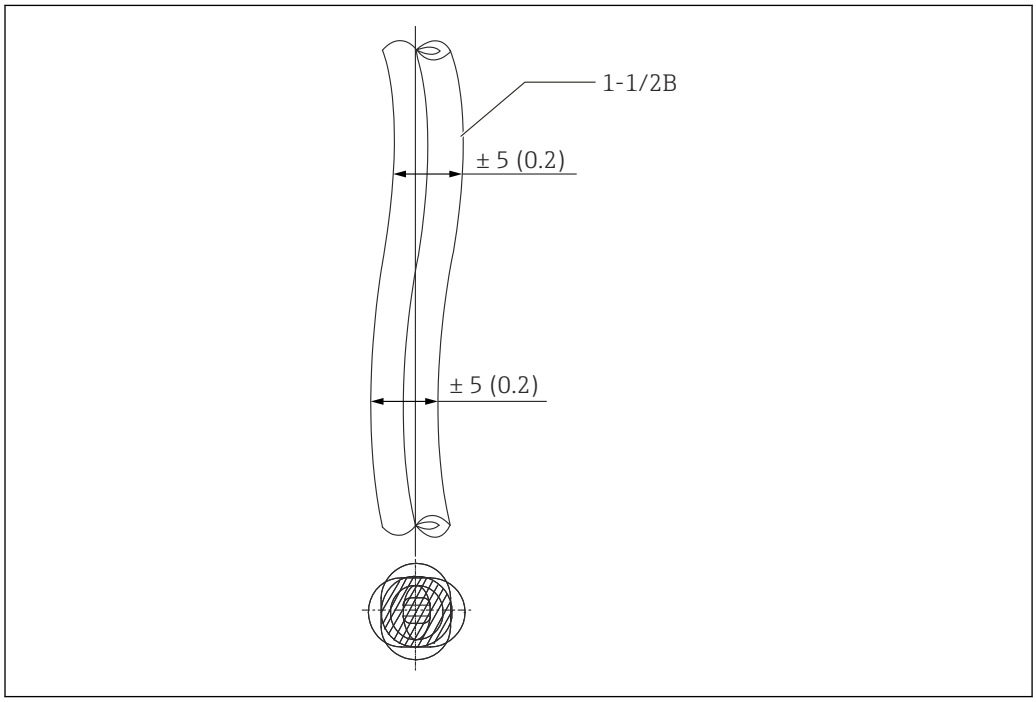
## 5.5.1 Guide pipe selection and mounting

Guide pipe mounting is required for most applications, except for tank top and underground applications. Guide pipes are generally used in three areas:

- Gauge head to sheave elbow
- Sheave elbow to sheave elbow
- Sheave elbow to tank roof

### Precautions regarding mounting

- Guide pipes and pipe supporters are not supplied by Endress+Hauser.
- Keep the bend in the guide pipe to 5 mm (0.17 in) or less.
- The space between two sheave elbows (piping distance) must not exceed 2.5 m (8.2 ft).




23 *Mounting guide pipes. Unit of measurement mm (in)*

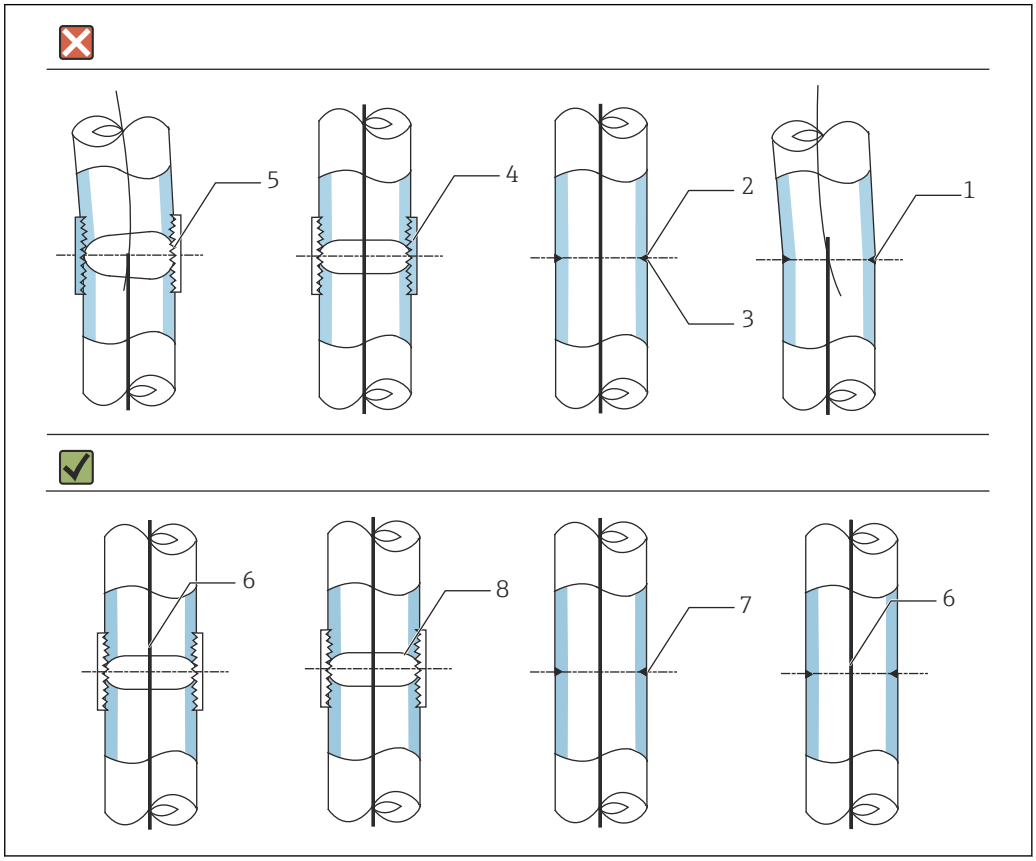
NOTICE

### Recommended materials for guide pipes

▶ Only use galvanized SGP (white pipe) or SGPW for guide pipes. When the application involves use of a corrosive gas, use of rigid PVC pipes, stainless steel pipes, or resin inner lining is recommended.

### 5.5.2 Connecting guide pipes

- Use PTFE sealing tape and gaskets on the unions and flanges in order to maintain airtightness against gas and rain.
- Ensure that the joint is sealed completely to prevent rain water from penetrating into the gauge.
- When connecting the pipes, watch out for nonlinearity caused by a bent screw in a socket connection, internal protrusion of the cut section of the pipe, bending of the joint caused by welding, and the presence of welding burrs on the inside.



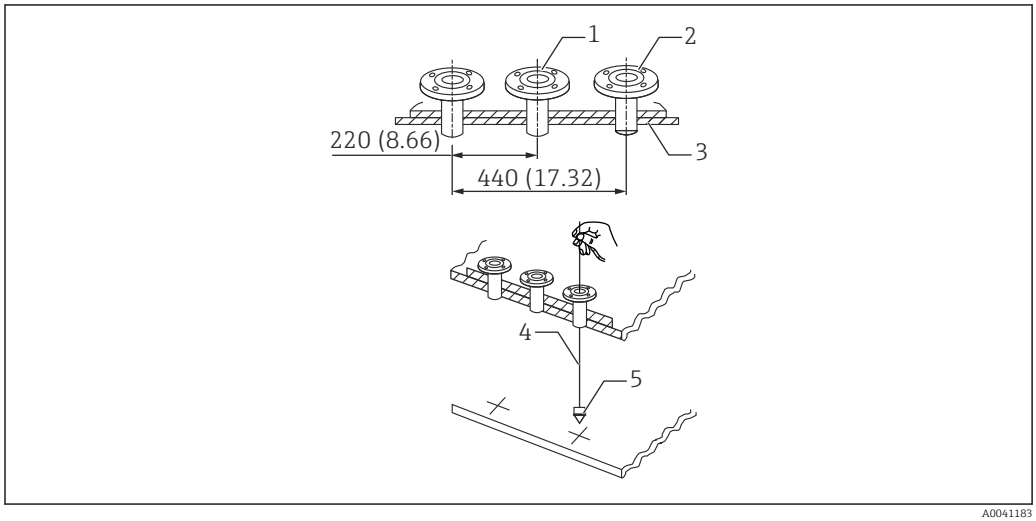

24 *Connecting guide pipes*

1 *Bend due to welding*
2 *Weld*
3 *Welding burr*
4 *Burr*
5 *Bent screw*
6 *Vertical*
7 *Ensure that there is no welding burr in the inside*
8 *Chamfering*

## 5.6 Top anchor and anchor hook

When installing an anchor hook, lower it so that it is perpendicular to the top anchor of a tank top and use a plumb to determine the position accurately.

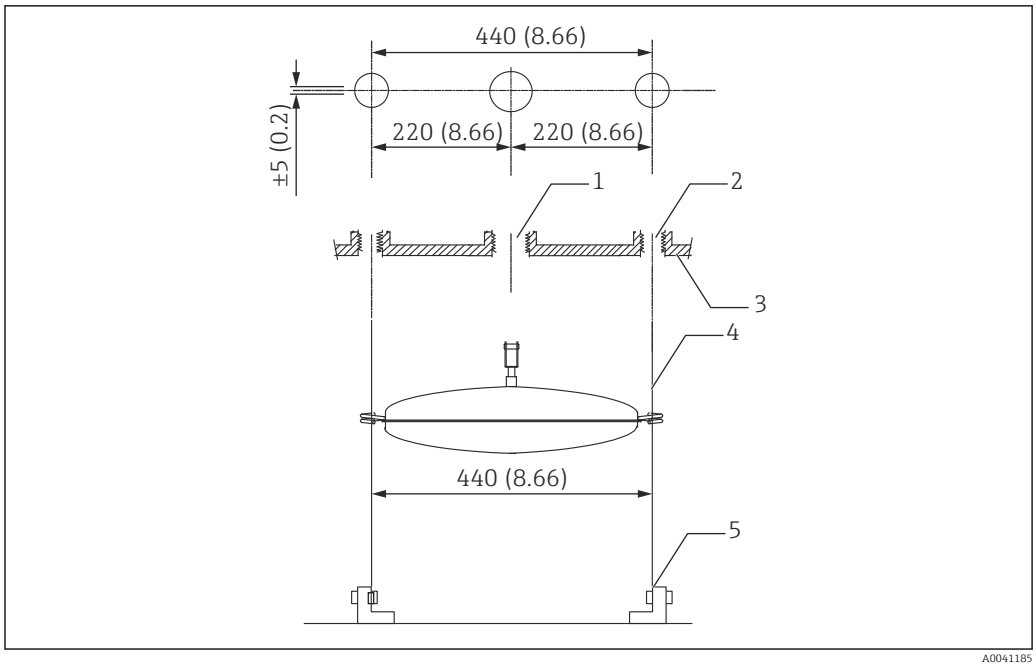
The flange will be a socket type depending on specifications.




25 *Top anchor pre-installation check. Unit of measurement mm (in)*

1 *Nozzle flange for gauge head*
2 *Nozzle flange for top anchor*
3 *Tank top*
4 *Leveling line*
5 *Plumb*

### Socket (screw-in type)




26 *Mounting anchor hooks. Unit of measurement mm (in)*

1 *1-1/2B socket*
2 *1B socket*
3 *Tank top*
4 *Guide wire (single wire)*
5 *Anchor hook*

## 5.7 Measuring tape and wire lengths

The lengths of the measuring tape and wire are longer than the actual measurable lengths for piping purposes. The length of the measuring tape and wire will vary depending on the specifications. The table below shows the actual length for each selection option of specification code 070 (measuring tape), depending on the selection options for specification code 060 (measuring range). Note that the maximum measured value that can be displayed on a gauge head corresponds to the measuring ranges. Refer to the table to select the appropriate length accordingly.

*1. Code 070 (Option 1): Measuring tape SUS316/CRT*

| 060 measurement range | | Length (total length) | Perforated tape (measurement length) | Non-perforated tape | Spare parts |
|---|---|---|---|---|---|
| 1 | 2.5 m | 13 m | 7 m | 6 m | 56004412 |
| 2 | 5 m | 13 m | 7 m | 6 m | 56004412 |
| 3 | 10 m | 24 m | 12 m | 12 m | 017860-5302 |
| 4 | 16 m | 45 m | 22 m | 23 m | 017860-5304 |
| 5 | 20 m | 45 m | 22 m | 23 m | 017860-5304 |
| 6 | 30 m | 65 m | 32 m | 33 m | 017860-5305 |
| F | 60 ft | 134.50 ft | 69.89 ft | 65.61 ft | Contact Endress+Hauser |
| H | 100 ft | 216.52 ft | 108.26 ft | 108.26 ft | Contact Endress+Hauser |

(Example) If Option 1 of specification code 070 and Option 5 of specification code 060 (CRT: 20 m (65.62 ft)) are selected, the measuring tape will have a 22 m (72.18 ft) perforated portion, a 23 m (75.46 ft) non-perforated portion, and a total length of 45 m (147.63 ft).

*2. Code 070 (Option 2): Measuring tape SUS316/tank-top mounting*

| 060 measurement range | | Length (total length) | Perforated tape (measurement length) | Non-perforated tape | Spare parts |
|---|---|---|---|---|---|
| 1 | 2.5 m | 7.15 m | 7 m | 0.15 m | 017860-5306 |
| 2 | 5 m | 7.15 m | 7 m | 0.15 m | 017860-5306 |
| 3 | 10 m | 12.15 m | 12 m | 0.15 m | 017860-5307 |
| 4 | 16 m | 22.15 m | 22 m | 0.15 m | 017860-5309 |
| 5 | 20 m | 22.15 m | 22 m | 0.15 m | 017860-5309 |
| 6 | 30 m | 32.15 m | 32 m | 0.15 m | 017860-5310 |
| F | 60 ft | 72.17 ft | 69.89 ft | 3.28 ft | Contact Endress+Hauser |
| H | 100 ft | 111.54 ft | 108.26 ft | 3.28 ft | Contact Endress+Hauser |

*3. Code 070 (Option 3): Measuring tape SUS316, seal pot/BT*

| 060 measurement range | | Length (total length) | Perforated tape (measurement length) | Non-perforated tape | Spare parts |
|---|---|---|---|---|---|
| 1 | 2.5 m | 24 m | 7 m | 17 m | Contact Endress+Hauser |
| 2 | 5 m | 24 m | 7 m | 17 m | Contact Endress+Hauser |
| 3 | 10 m | 35 m | 12 m | 23 m | Contact Endress+Hauser |

| 060 measurement range | | Length (total length) | Perforated tape (measurement length) | Non-perforated tape | Spare parts |
|---|---|---|---|---|---|
| 4 | 16 m | 55 m | 22 m | 33 m | Contact Endress+Hauser |
| 5 | 20 m | 55 m | 22 m | 33 m | Contact Endress+Hauser |
| 6 | 30 m | 75 m | 32 m | 43 m | 017860-5210 |
| F | 60 ft | 167.31 ft | 69.89 ft | 98.42 ft | Contact Endress+Hauser |
| H | 100 ft | 249.33 ft | 108.26 ft | 141.07 ft | Contact Endress+Hauser |

*4. Code 070 (Option 4): Measuring tape SUS316 + wire SUS316/FRT*

| 060 measurement range | | Length (total length) | Perforated tape (measurement length) | Non-perforated tape | Wire | Spare parts |
|---|---|---|---|---|---|---|
| 1 | 2.5 m | 16 m | 6.7 m | 0.3 m | 9 m | 017860-0005 |
| 2 | 5 m | 16 m | 6.7 m | 0.3 m | 9 m | 017860-0005 |
| 3 | 10 m | 26 m | 11.7 m | 0.3 m | 14 m | 017860-0007 |
| 4 | 16 m | 46 m | 21.7 m | 0.3 m | 24 m | 017860-0011 |
| 5 | 20 m | 46 m | 21.7 m | 0.3 m | 24 m | 017860-0011 |
| 6 | 30 m | 66 m | 31.7 m | 0.3 m | 34 m | 017860-0013 |
| F | 60 ft | 147.63 ft | 67.91 ft | 67.91 ft | 78.74 ft | Contact Endress +Hauser |
| H | 100 ft | 219.80 ft | 107.28 ft | 67.91 ft | 111.54 ft | Contact Endress +Hauser |

*5. Code 070 (Option 5) Measuring tape SUS316 + PFA-coated SUS316 wire, seal pot/CRT*

| 060 measurement range | | Length (total length) | Perforated tape (measurement length) | Non-perforated tape | Wire | Spare parts |
|---|---|---|---|---|---|---|
| 1 | 2.5 m | 18 m | 6.7 m | 0.3 m | 11 m | 017860-0006 |
| 2 | 5 m | 18 m | 6.7 m | 0.3 m | 11 m | 017860-0006 |
| 3 | 10 m | 28 m | 11.7 m | 0.3 m | 16 m | 017860-0008 |
| 4 | 16 m | 48 m | 21.7 m | 0.3 m | 26 m | 017860-0012 |
| 5 | 20 m | 48 m | 21.7 m | 0.3 m | 26 m | 017860-0012 |
| 6 | 30 m | 68 m | 31.7 m | 0.3 m | 36 m | 017860-0014 |
| F | 60 ft | 154.19 ft | 67.91 ft | 67.91 ft | 86.30 ft | Contact Endress +Hauser |
| H | 100 ft | 226.37 ft | 107.28 ft | 67.91 ft | 118.11 ft | Contact Endress +Hauser |

## 5.8 Sealing materials for wetted liquid and wetted gas parts

*List of materials*

| Product name | Component name | Name of sealing material | Type of sealing material | Packing and O-ring materials |
|---|---|---|---|---|
| LT5-1 | Gauge head | Rear cover | Cover packing | V#6502 |
| | | Check shaft | O-ring | FKM |
| | | Sprocket shaft | Oil seal | FKM |
| | | Blind board | Packing | NBR |
| | 90 ° sheave elbow | Aluminum sheave elbow | Cover packing | V#6502 |
| | | Stainless steel sheave elbow | | |
| | | Bearing | O-ring | Silicone rubber |
| | U-seal pot | Aluminum sheave elbow | Cover packing | V#6502 |
| | | | Bearing O-ring | Silicone rubber |
| | | Stainless steel sheave elbow | Cover packing | V#6502 |
| | | | Bearing O-ring | Silicone rubber |
| | | PVC sheave elbow | Cover packing | V#6502 |
| | | | Bearing O-ring | PTFE |
| | Top anchor | Aluminum, screw-in type | Cover packing | V#6502 |
| | | Stainless steel, tank welding type | | |
| | Top anchor | Aluminum, flange, screw-in type | | |
| | | Stainless steel, flange welding type | Spring retainer packing | |
| LT5-4/LT5-6 | Gauge head | Rear cover | Cover packing | PTFE |
| | | Check handle unit | Gland packing | PTFE/CR |
| | | Internal magnet cover | O-ring | PTFE |
| | | External magnet cover | O-ring | NBR *Ammonia specifications CR |
| | | Coupling unit | O-ring | PTFE |
| | Gate valve | Shaft | Shaft packing | PTFE |
| | | Cap nut unit | Packing | PTFE |
| LT5-4 | 90 ° sheave elbow | Cover | Cover packing | PTFE |
| | | Bearing | O-ring | PTFE |
| | 135 ° sheave elbow | Cover | Cover packing | PTFE |
| | | Bearing | O-ring | PTFE |
| | Top anchor | Aluminum-flange integrated type | Spring retainer packing | PTFE |
| | | Stainless steel, flange welding type | | |
| LT5-6 | 90 ° sheave elbow | Cover | Cover packing | PTFE |
| | | Bearing | O-ring | PTFE |
| | 135 ° sheave elbow | Cover | Cover packing | PTFE |
| | | Bearing | O-ring | PTFE |
| | Top anchor | Iron, flange welding type | Spring retainer packing | PTFE |
| | | Stainless steel, flange welding type | | |

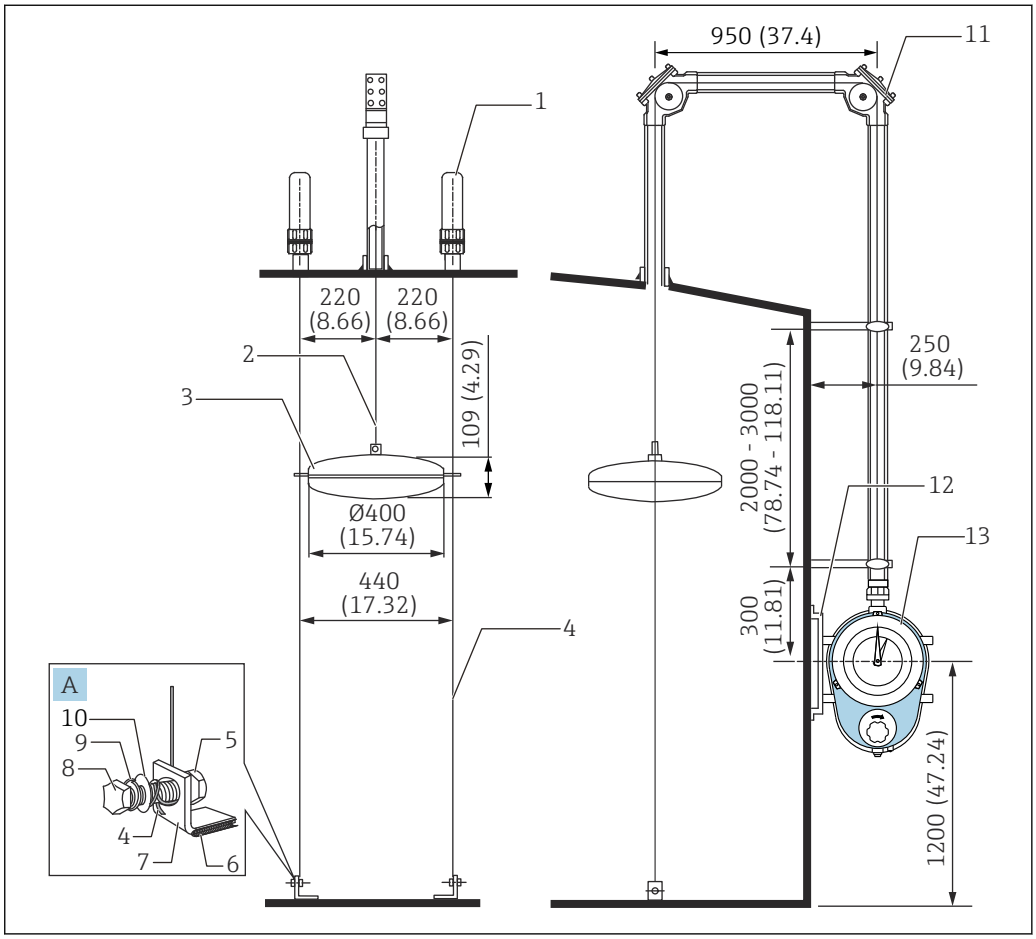
## 5.9 Material certificates

When material certificates are required, order them when ordering the products. Certificates can be provided for the following parts.

- High-pressure specification iron gauge head (the certificate for the flange is the same, as it undergoes integrated-type casting with the gauge head), cover, magnet cover, check shaft (only those without hoisting), plug
- Stainless steel measuring tape and wire (excluding PFA-coated wire)
- Stainless steel float
- Stainless steel or top anchor body, cover, flange for high pressure
- Stainless steel guide wire (excluding PFA-coated wire)
- Stainless steel anchor hook
- Main unit of the high-pressure specification iron sheave elbow (the certificate for the flange is the same, as it undergoes integrated-type casting with the main unit of the sheave elbow), cover
- Stainless steel gate valve

## 5.10 Reference installation diagrams and order codes

### 5.10.1 Cone roof tank (CRT)



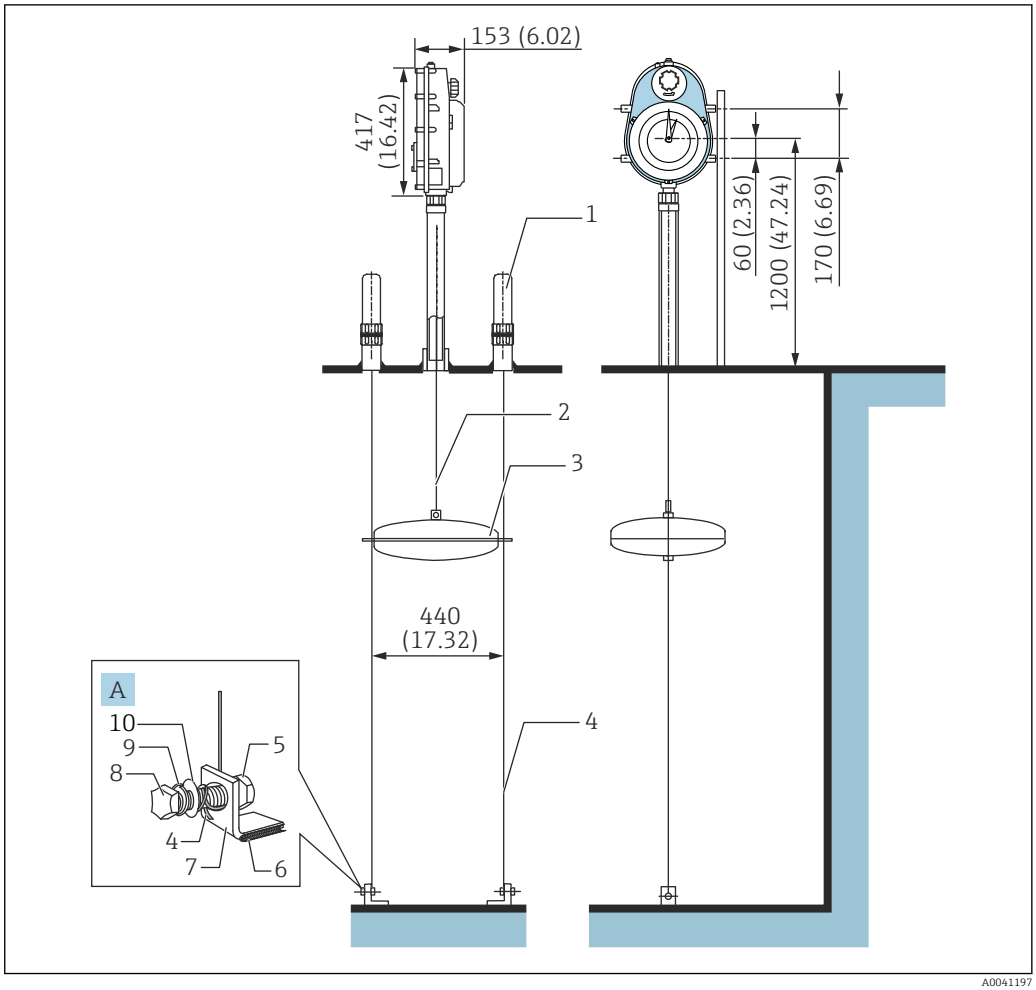

27 *Mounting on a cone roof tank. Unit of measurement mm (in)*

*A Anchor hook*
*1 Top anchor*
*2 Measuring tape*
*3 Float*
*4 Guide wire*
*5 Nut*
*6 Tank bottom (where anchor hook is welded to tank bottom)*
*7 Anchor hook*
*8 Bolt*
*9 Spring washer*
*10 Flat washer*
*11 90 ° sheave elbow*
*12 Gauge supporter*
*13 Gauge head*

*Order code example (LT5-111A031B11A111200000+PA)*

| Item | Target | Code | Specification | Quantity |
|---|---|---|---|---|
| 020 | Gauge head | 1 | 0 to 0.1961 bar / 0.01961 MPa / 2.84 psi, aluminum (ADC12), low pressure | 1 |
| 030 | Gauge head process connection | 11 | Rc 1-1/2, union nut, SUS316, screw JIS B0203 | |
| 040 | Display; cover | A | Dial display: acrylic | |
| 050 | Crank unit | 0 | None | |
| 060 | Measurement range | 3 | 10 m | |
| 070 | Measuring tape | 1 | Measuring tape SUS316, CRT | |
| 080 | Float | B | D400 mm SUS316 tape connection 5.0 kg, 0.65 ≤ density 1.05, with ring | |
| 090 | Top anchor | 11 | 2x R1, aluminum (ADC6), screw JIS B0203 | 2 |
| 100 | Guide wire | A | 3 mm-diameter single wire, SUS316 | |
| 110 | Anchor hooks; mounting bolts | 1 | Iron; SUS316 (mounting bolt) SUS316L | |
| 120 | 90 ° sheave elbow | 112 | 2x Rp 1-1/2, aluminum (ADC6), screw JIS B0203 | |
| 130 | 135 ° sheave elbow | 000 | None | - |
| 140 | Seal pot | 0 | None | |
| 150 | Gate valve | 0 | None | |
| 620 | >>Enclosed accessories | PA | Gauge supporter, iron, low-pressure/medium-pressure gauge head | 1 |

### 5.10.2 Tank top mounting (for an underground tank)



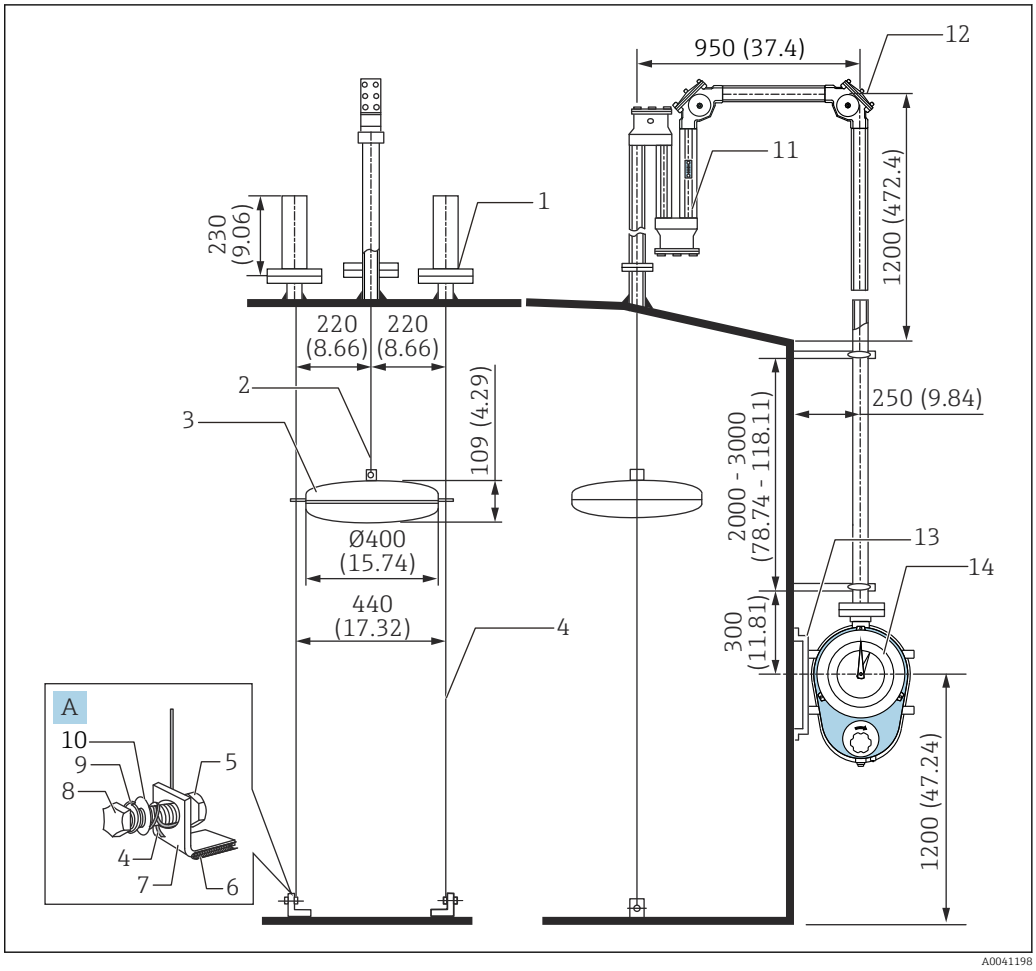

28 *Mounting on an underground tank. Unit of measurement mm (in)*

*A Anchor hook*
*1 Top anchor*
*2 Measuring tape*
*3 Float*
*4 Guide wire*
*5 Nut*
*6 Tank bottom (where anchor hook is welded to tank bottom)*
*7 Anchor hook*
*8 Bolt*
*9 Spring washer*
*10 Flat washer*

*Order code example (LT5-111C022B11A100000000)*

| Item | Target | Code | Specification | Quantity |
|---|---|---|---|---|
| 020 | Gauge head | 1 | 0 to 0.1961 bar / 0.01961 MPa / 2.84 psi, aluminum (ADC12), low pressure | 1 |
| 030 | Gauge head process connection | 11 | Rc 1-1/2, union nut, SUS316, screw JIS B0203 | |
| 040 | Display; cover | C | Reverse mounting, dial display, acrylic | |
| 050 | Crank unit | 0 | None | |
| 060 | Measurement range | 2 | 5 m | |
| 070 | Measuring tape | 2 | Measuring tape SUS316, tank top mounting | |
| 080 | Float | B | D400 mm SUS316 tape connection 5.0 kg, 0.65 ≤ density 1.05, with ring | |
| 090 | Top anchor | 11 | 2x R1, aluminum (ADC6), screw JIS B0203 | 2 |
| 100 | Guide wire | A | 3 mm-diameter single wire, SUS316 | |
| 110 | Anchor hooks; mounting bolts | 1 | Iron; SUS316 (mounting bolt) SUS316L | |
| 120 | 90 ° sheave elbow | 000 | None | - |
| 130 | 135 ° sheave elbow | 000 | None | |
| 140 | Seal pot | 0 | None | |
| 150 | Gate valve | 0 | None | |

### 5.10.3 Cone roof tank (with seal pot for CRT)



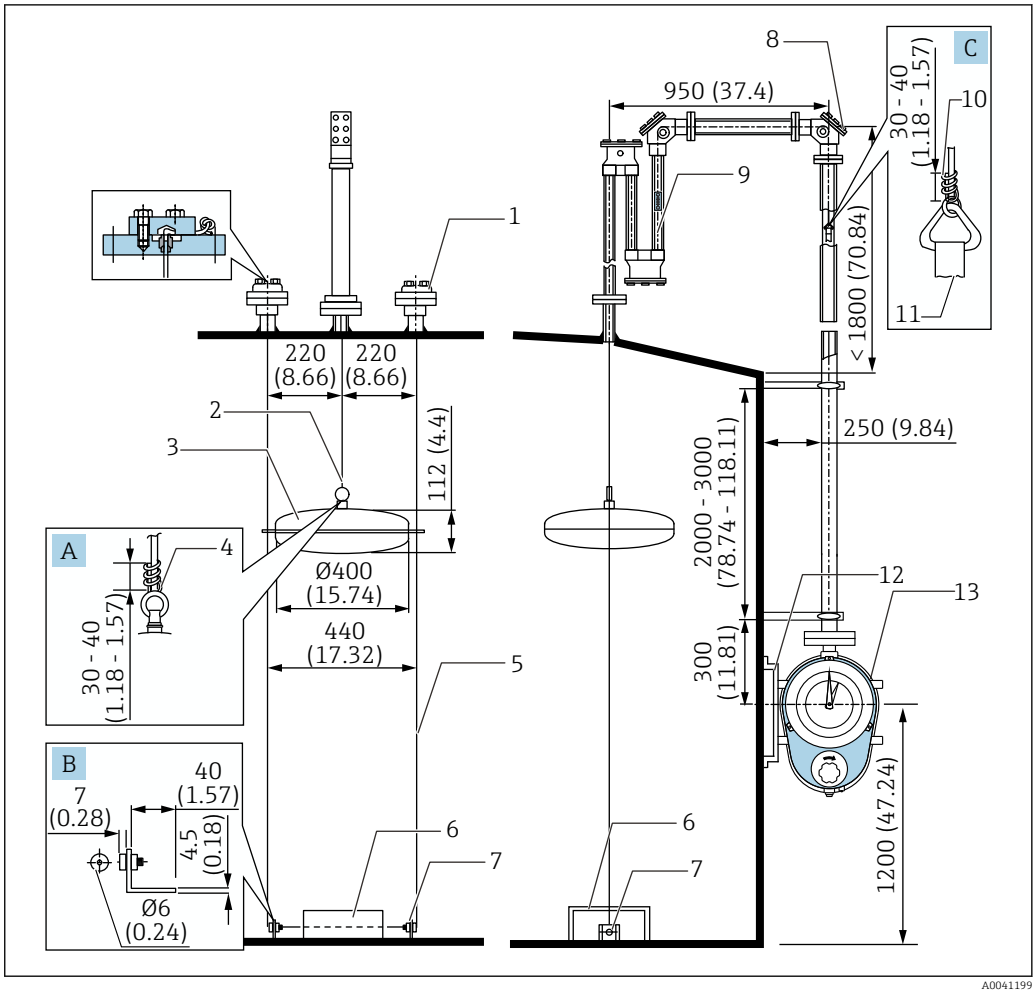

29 *Mounting with seal pot for CRT. Unit of measurement mm (in)*

*A Anchor hook*
*1 Top anchor*
*2 Measuring tape*
*3 Float*
*4 Guide wire*
*5 Nut*
*6 Tank bottom (where anchor hook is welded to tank bottom)*
*7 Anchor hook*
*8 Bolt*
*9 Spring washer*
*10 Flat washer*
*11 Seal pot*
*12 90 ° sheave elbow*
*13 Gauge supporter*
*14 Gauge head*

*Order code example (LT5-11AA023B1BA21A1000F0+PA)*

| Item | Target | Code | Specification | Quantity |
|---|---|---|---|---|
| 020 | Gauge head | 1 | 0 to 0.1961 bar / 0.01961 MPa / 2.84 psi, aluminum (ADC12), low pressure | 1 |
| 030 | Gauge head process connection | 1A | 10K 40A RF, aluminum (AC4A), flange JIS B2220 | |
| 040 | Display; cover | A | Dial display: acrylic | |
| 050 | Crank unit | 0 | None | |
| 060 | Measurement range | 2 | 5 m | |
| 070 | Measuring tape | 3 | Measuring tape SUS316, seal pot / BT | |
| 080 | Float | B | D400 mm SUS316 tape connection 5.0 kg, 0.65 ≤ density 1.05, with ring | |
| 090 | Top anchor | 1B | 2x 10K 40A RF, SUS316, flange JIS B2220 | 2 |
| 100 | Guide wire | A | 3 mm-diameter single wire, SUS316 | |
| 110 | Anchor hooks; mounting bolts | 2 | SUS316; SUS316 (mounting bolt) SUS316L | |
| 120 | 90 ° sheave elbow | 1A1 | 1x 10K 40A RF, aluminum (ADC6+AC4A), flange JIS B2220 | 1 |
| 130 | 135 ° sheave elbow | 000 | None | - |
| 140 | Seal pot | F | 10K 40A RF, SUS316, flange JIS B2220 | 1 |
| 150 | Gate valve | 0 | None | - |
| 620 | >>Enclosed accessories | PA | Gauge supporter, iron, low-pressure/medium-pressure gauge head | 1 |

### 5.10.4 Cone roof tank (with seal pot PVC for CRT)




30 *Mounting with seal pot PVC for CRT. Unit of measurement mm (in)*

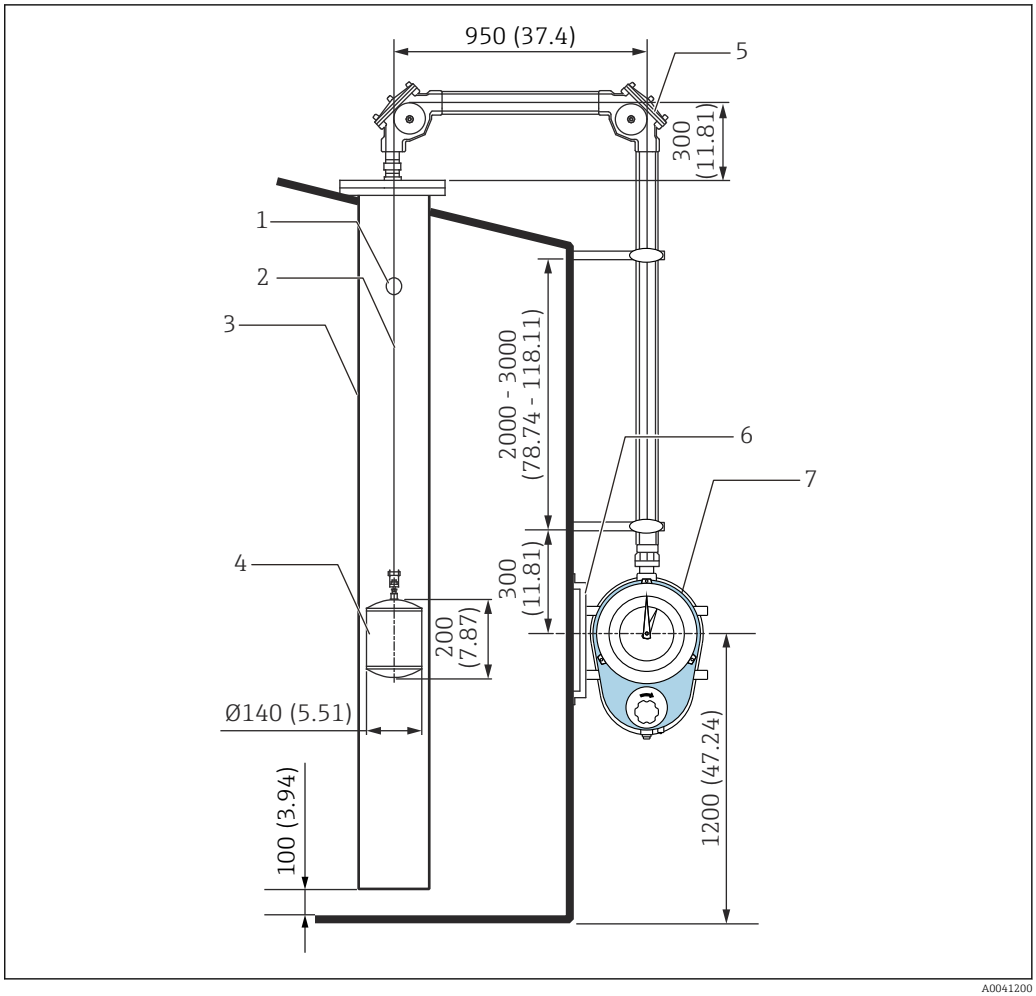
*A Float tip*
*B Anchor hook details*
*C Measuring tape, measuring wire connection*
*1 Top anchor*
*2 Measuring wire*
*3 Float*
*4 Teflon tube*
*5 Guide wire (PFA-coated wire)*
*6 Wire protection stand (not supplied)*
*7 Anchor hook*
*8 90 ° sheave elbow*
*9 Seal pot*
*10 Support wire (stainless steel, supplied)*
*11 Measuring tape*
*12 Gauge supporter*
*13 Gauge head*

- Wrap the provided Teflon-coated tube 10 to 15 times around the measuring wire.
- Coat the anchor hook if necessary.
- Position connection C in the diagram so that it is approximately 10 mm (0.39 in) below the sheave elbow when the liquid level is 0 and approximately 100 mm (3.94 in) above the gauge head when the liquid level is at its maximum.

*Order code example (LT5-11AA025H1NC41A1000N0+PA)*

| Item | Target | Code | Specification | Quantity |
|---|---|---|---|---|
| 020 | Gauge head | 1 | 0 to 0.1961 bar / 0.01961 MPa / 2.84 psi, aluminum (ADC12), low pressure | 1 |
| 030 | Gauge head process connection | 1A | 10K 40A RF, aluminum (AC4A), flange JIS B2220 | |
| 040 | Display; cover | A | Dial display: acrylic | |
| 050 | Crank unit | 0 | None | |
| 060 | Measurement range | 2 | 5 m | |
| 070 | Measuring tape | 5 | Measuring tape SUS316+PFA coated SUS316 wire, seal pot / CRT | |
| 080 | Float | H | D400 mm SUS316 wire connection 5.0 kg, 0.65 ≤ density 1.05, with ring | |
| 090 | Top anchor | 1N | 2x 10K 40A RF, PVC, flange JIS B2220 | 2 |
| 100 | Guide wire | C | 4.6 mm-diameter stranded wire, PFA-coated SUS316 | 1 |
| 110 | Anchor hooks; mounting bolts | 4 | SUS316; PVC | 2 |
| 120 | 90 ° sheave elbow | 1A1 | 1x 10K 40A RF, aluminum (ADC6+AC4A), flange JIS B2220 | 1 |
| 130 | 135 ° sheave elbow | 000 | None | - |
| 140 | Seal pot | N | 10K 40A FF, PVC, flange JIS B2220 | 1 |
| 150 | Gate valve | 0 | None | - |
| 620 | >>Enclosed accessories | PA | Gauge supporter, iron, low-pressure/medium-pressure gauge head | 1 |

### 5.10.5 Compact cone roof tank (guide pipe method)



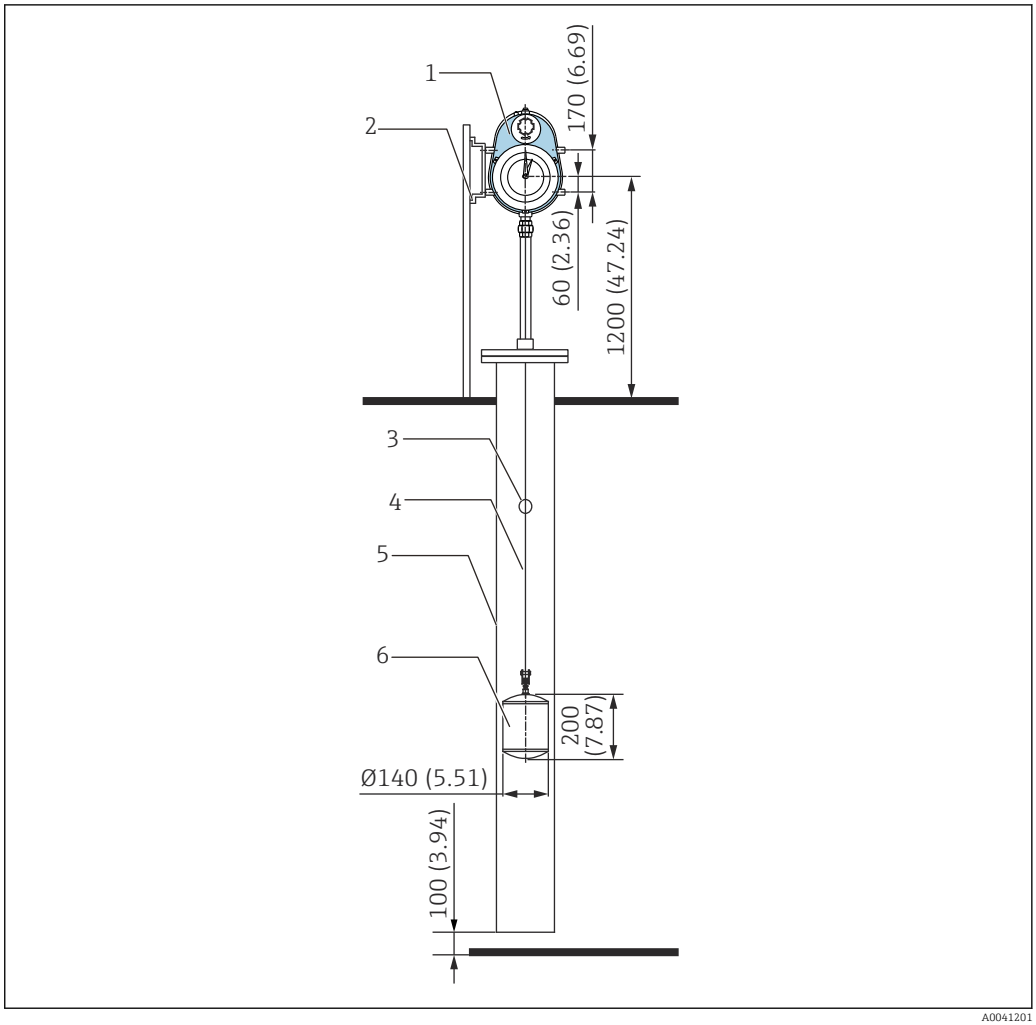

*31 Mounting on a compact cone roof tank. Unit of measurement mm (in)*

*1 Ventilation hole*
*2 Measuring tape*
*3 Guide pipe (stilling well, not supplied)*
*4 Float*
*5 90 ° sheave elbow*
*6 Gauge supporter*
*7 Gauge head*

*Order code example (LT5-111A021L000011200000+PA)*

| Item | Target | Code | Specification | Quantity |
|---|---|---|---|---|
| 020 | Gauge head | 1 | 0 to 0.1961 bar / 0.01961 MPa / 2.84 psi, aluminum (ADC12), low pressure | 1 |
| 030 | Gauge head process connection | 11 | Rc 1-1/2, union nut, SUS316, screw JIS B0203 | |
| 040 | Display; cover | A | Dial display: acrylic | |
| 050 | Crank unit | 0 | None | |
| 060 | Measurement range | 2 | 5 m | |
| 070 | Measuring tape | 1 | Measuring tape SUS316, CRT | |
| 080 | Float | L | D140 mm SUS316 tape connection 2.4 kg, 0.94 ≤ density 2.0, without ring | |
| 090 | Top anchor | 00 | None | - |
| 100 | Guide wire | 0 | None | |
| 110 | Anchor hooks; mounting bolts | 0 | None | |
| 120 | 90 ° sheave elbow | 112 | 2x Rp 1-1/2, aluminum (ADC6), screw JIS B0203 | 2 |
| 130 | 135 ° sheave elbow | 000 | None | - |
| 140 | Seal pot | 0 | None | |
| 150 | Gate valve | 0 | None | |
| 620 | >>Enclosed accessories | PA | Gauge supporter, iron, low-pressure/medium-pressure gauge head | 1 |

### 5.10.6 Tank top mounting (guide pipe method)



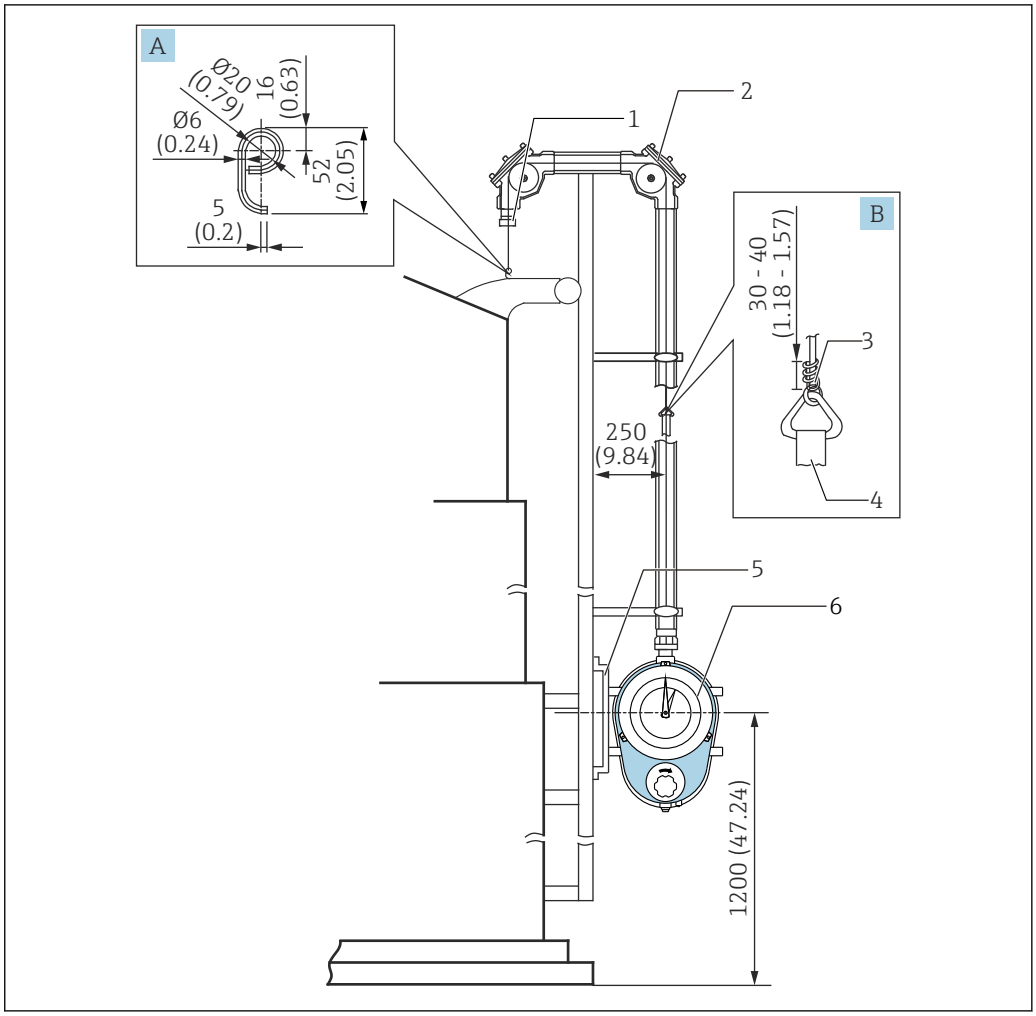

32 *Tank top mounting, unit. Unit of measurement mm (in)*

1 *Gauge head*
2 *Gauge supporter*
3 *Ventilation hole*
4 *Measuring tape*
5 *Guide pipe (stilling well, not supplied)*
6 *Float*

*Order code example (LT5-111C022L000000000000+PA)*

| Item | Target | Code | Specification | Quantity |
|---|---|---|---|---|
| 020 | Gauge head | 1 | 0 to 0.1961 bar / 0.01961 MPa / 2.84 psi, aluminum (ADC12), low pressure | 1 |
| 030 | Gauge head process connection | 11 | Rc 1-1/2, union nut, SUS316, screw JIS B0203 | |
| 040 | Display; cover | C | Reverse mounting, dial display, acrylic | |
| 050 | Crank unit | 0 | None | |
| 060 | Measurement range | 2 | 5 m | |
| 070 | Measuring tape | 2 | Measuring tape SUS316, tank top mounting | |
| 080 | Float | L | D140 mm SUS316 tape connection 2.4 kg, 0.94 ≤ density 2.0, without ring | |
| 090 | Top anchor | 00 | None | - |
| 100 | Guide wire | 0 | None | |
| 110 | Anchor hooks; mounting bolts | 0 | None | |
| 120 | 90 ° sheave elbow | 000 | None | |
| 130 | 135 ° sheave elbow | 000 | None | |
| 140 | Seal pot | 0 | None | |
| 150 | Gate valve | 0 | None | |
| 620 | >>Enclosed accessories | PA | Gauge supporter, iron, low-pressure/medium-pressure gauge head | 1 |

### 5.10.7 Gas holder



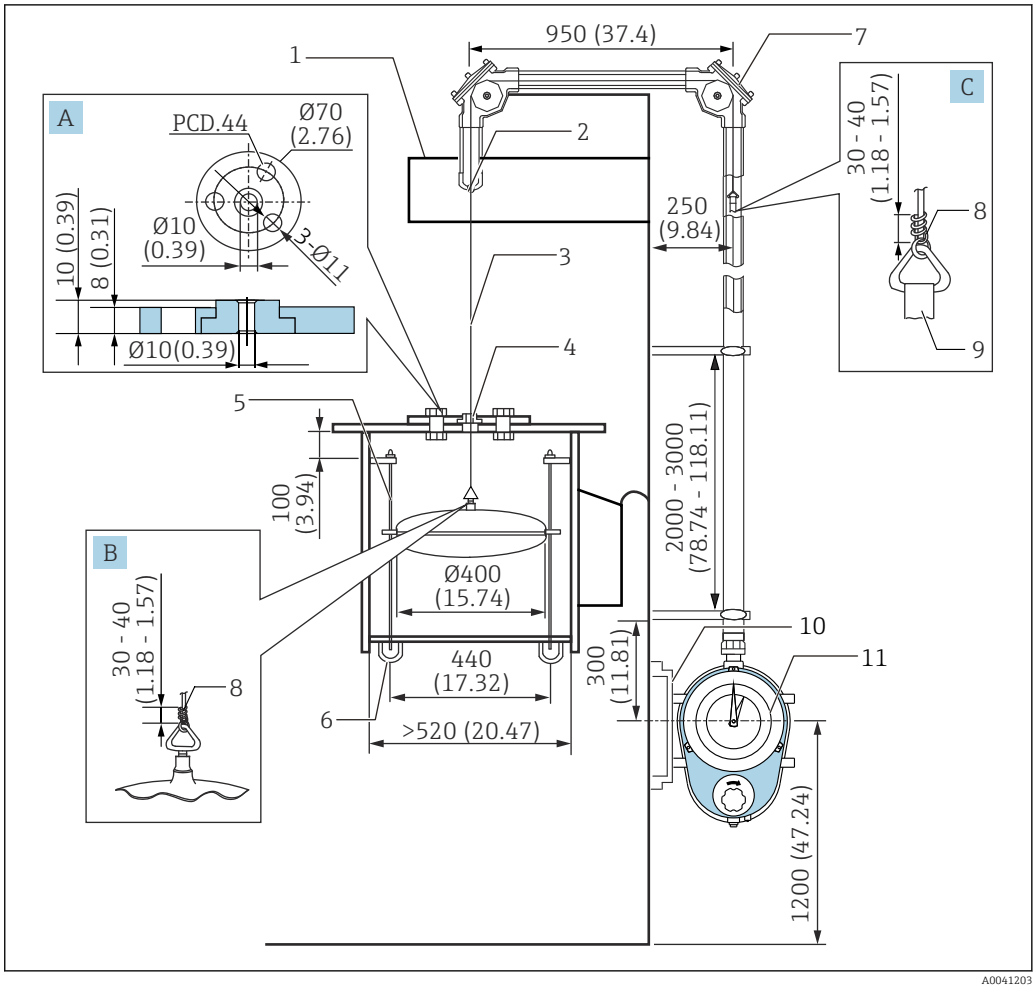

33 *Mounting a gas holder. Unit of measurement mm (in)*

*A Gas holder wire hook*
*B Measuring tape, measuring wire connection*
*1 Wire guide socket*
*2 90 ° sheave elbow*
*3 Support wire (stainless steel, supplied)*
*4 Measuring tape*
*5 Gauge supporter*
*6 Gauge head*

*Order code example (LT5-111A0340000011200000+PAPFPH)*

| Item | Target | Code | Specification | Quantity |
|---|---|---|---|---|
| 020 | Gauge head | 1 | 0 to 0.1961 bar / 0.01961 MPa / 2.84 psi, aluminum (ADC12), low pressure | 1 |
| 030 | Gauge head process connection | 11 | Rc 1-1/2, union nut, SUS316, screw JIS B0203 | |
| 040 | Display; cover | A | Dial display: acrylic | |
| 050 | Crank unit | 0 | None | |
| 060 | Measurement range | 3 | 10 m | |
| 070 | Measuring tape | 4 | Measuring tape SUS316+wire SUS316, FRT | |
| 080 | Float | 0 | None | - |
| 090 | Top anchor | 00 | None | |
| 100 | Guide wire | 0 | None | |
| 110 | Anchor hooks; mounting bolts | 0 | None | |
| 120 | 90 ° sheave elbow | 112 | 2x Rp 1-1/2, aluminum (ADC6), screw JIS B0203 | 2 |
| 130 | 135 ° sheave elbow | 000 | None | - |
| 140 | Seal pot | 0 | None | |
| 150 | Gate valve | 0 | None | |
| 620 | >>Enclosed accessories | PA | Gauge supporter, iron, low-pressure/medium-pressure gauge head | 1 |
| 620 | >>Enclosed accessories | PF | Wire guide socket, Rc 1-1/2, iron main unit, metal PVC | |
| 620 | >>Enclosed accessories | PH | Gas holder wire hook, iron | |

### 5.10.8 Floating roof tank (FRT)



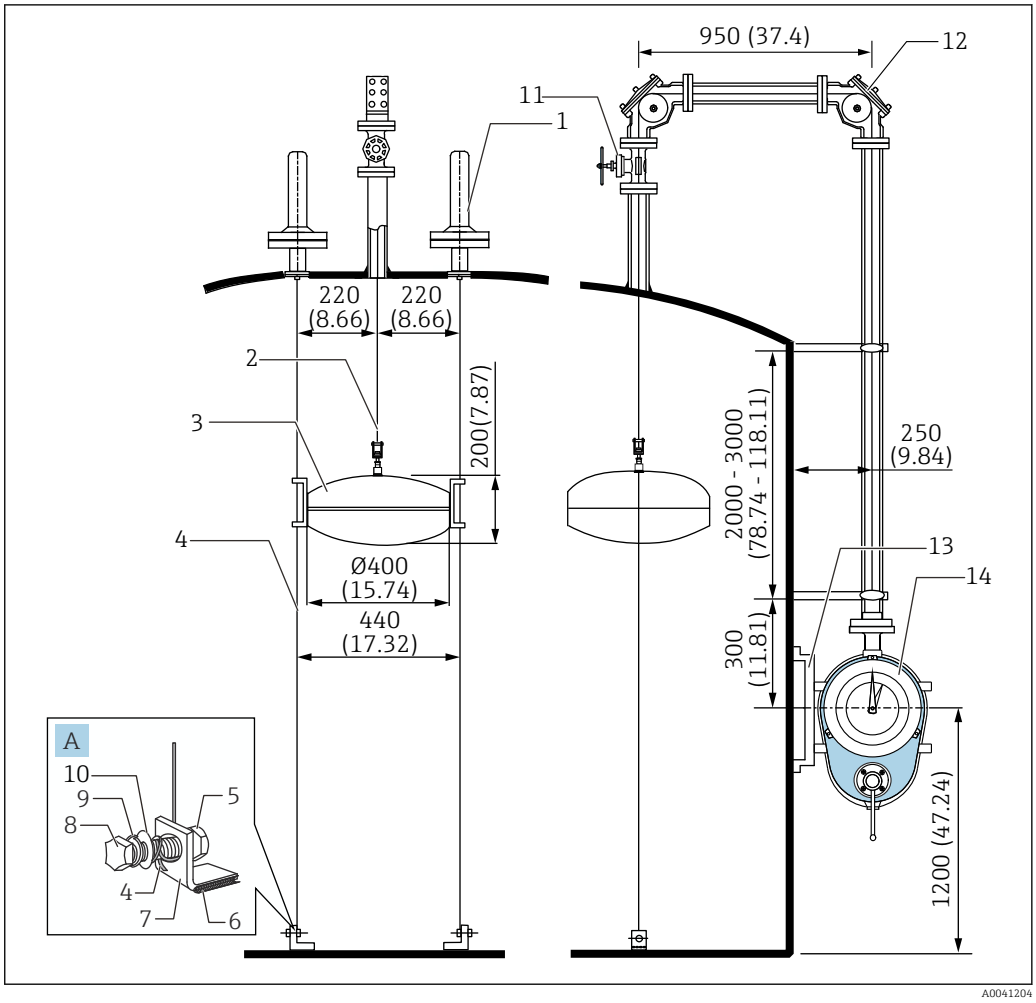

34 *Mounting on a floating roof tank. Unit of measurement mm (in)*

*A Wire guide metal*
*B Top of the float*
*C Measuring tape, measuring wire connection*
*1 Roof stand (not supplied)*
*2 Wire guide socket*
*3 Measuring wire*
*4 FRT wire guide metal*
*5 Guide bar: φ16 mm (0.63 in) (not supplied)*
*6 Pipe end: 1 B Sch 40 to 80 (not supplied)*
*7 90 ° sheave elbow*
*8 Support wire (stainless steel, supplied)*
*9 Measuring tape*
*10 Gauge supporter*
*11 Gauge head*

*Order code example (LT5-111A054E000011200000+PAPEPF)*

| Item | Target | Code | Specification | Quantity |
|---|---|---|---|---|
| 020 | Gauge head | 1 | 0 to 0.1961 bar / 0.01961 MPa / 2.84 psi, aluminum (ADC12), low pressure | 1 |
| 030 | Gauge head process connection | 11 | Rc 1-1/2, union nut, SUS316, screw JIS B0203 | |
| 040 | Display; cover | A | Dial display: acrylic | |
| 050 | Crank unit | 0 | None | |
| 060 | Measurement range | 5 | 20 m | |
| 070 | Measuring tape | 4 | Measuring tape SUS316+wire SUS316, FRT | |
| 080 | Float | E | D400 mm SUS316 wire connection 5.0 kg, 0.65 ≤ density 1.05, with ring | |
| 090 | Top anchor | 00 | None | - |
| 100 | Guide wire | 0 | None | |
| 110 | Anchor hooks; mounting bolts | 0 | None | |
| 120 | 90 ° sheave elbow | 112 | 2x Rp 1-1/2, aluminum (ADC6), screw JIS B0203 | 2 |
| 130 | 135 ° sheave elbow | 000 | None | - |
| 140 | Seal pot | 0 | None | |
| 150 | Gate valve | 0 | None | |
| 620 | >>Enclosed accessories | PA | Gauge supporter SS400, low-pressure/medium-pressure gauge head | 1 |
| 620 | >>Enclosed accessories | PE | FRT wire guide metal, main unit SS400, metal, PTFE, bolt SUS316L | |
| 620 | >>Enclosed accessories | PF | Wire guide socket, Rc 1-1/2, iron main unit, metal PVC | |

### 5.10.9 Medium-pressure dome roof tank



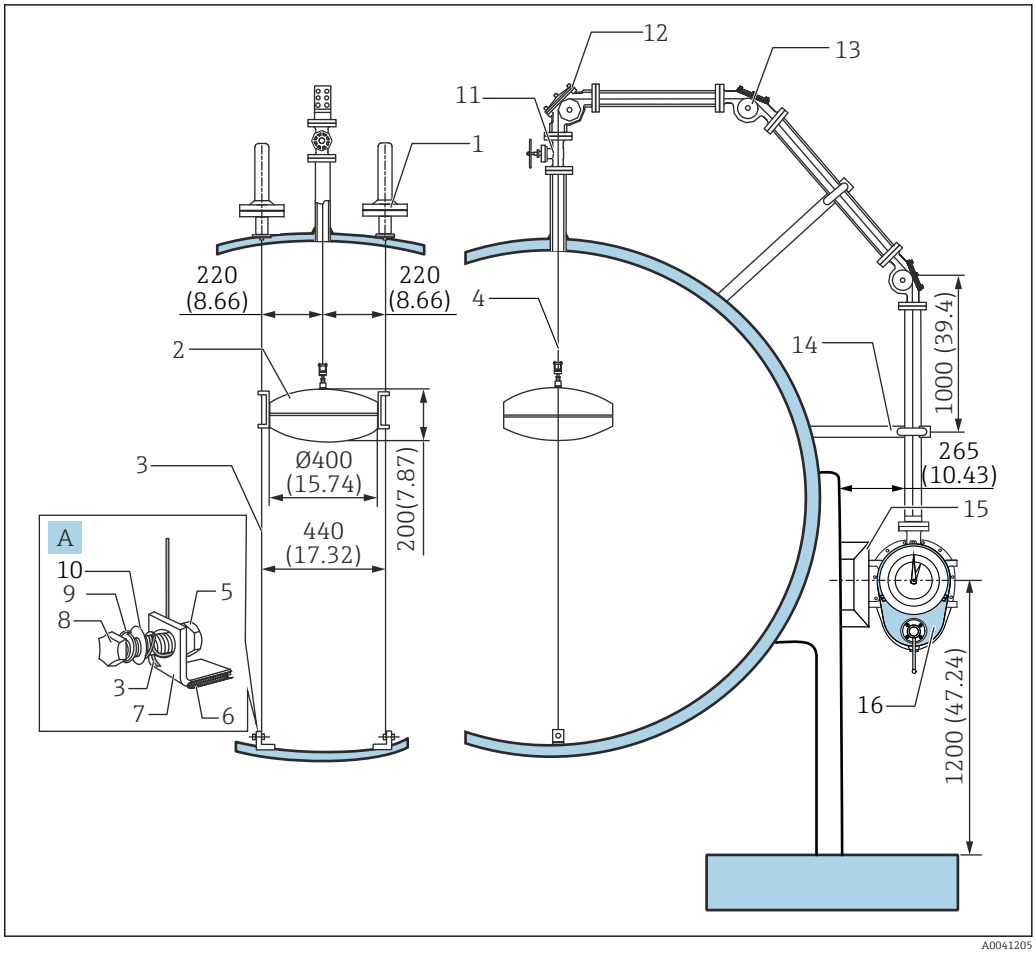

35 *Mounting on a medium-pressure dome roof tank. Unit of measurement mm (in)*

*A Anchor hook*
*1 Top anchor*
*2 Measuring tape*
*3 Float*
*4 Guide wire*
*5 Nut*
*6 Tank bottom (where anchor hook is welded to tank bottom)*
*7 Anchor hook*
*8 Bolt*
*9 Spring washer*
*10 Flat washer*
*11 Gate valve*
*12 90 ° sheave elbow*
*13 Gauge supporter*
*14 Gauge head*

*Order code example (LT5-44AB151R4AA24A200001+PA)*

| Item | Target | Code | Specification | Quantity |
|---|---|---|---|---|
| 020 | Gauge head | 4 | 0 to 0.9807 bar / 0.09807 MPa / 14.22 psi, aluminum (AC4C-T6), medium pressure | 1 |
| 030 | Gauge head process connection | 4A | 10K 40A RF, aluminum (AC4C-T6), flange JIS B2220 | |
| 040 | Display; cover | B | Dial display; glass + iron | |
| 050 | Crank unit | 1 | Available | |
| 060 | Measurement range | 5 | 20 m | |
| 070 | Measuring tape | 1 | Measuring tape SUS316, CRT | |
| 080 | Float | R | D400 mm SUS316 tape connection 8.3 kg, 0.5 ≤ density 0.7, with ring | |
| 090 | Top anchor | 4A | 2x 10K 40A RF, aluminum (AC4C-T6), flange JIS B2220 | 2 |
| 100 | Guide wire | A | 3 mm-diameter single wire, SUS316 | |
| 110 | Anchor hooks; mounting bolts | 2 | SUS316; SUS316 (mounting bolt) SUS316L | |
| 120 | 90 ° sheave elbow | 4A2 | 2x 10K 40A RF, aluminum (AC4C-T6), flange JIS B2220 | |
| 130 | 135 ° sheave elbow | 000 | None | - |
| 140 | Seal pot | 0 | None | |
| 150 | Gate valve | 1 | 10K 40A RF, SCS13, flange JIS B2220 | 1 |
| 620 | >>Enclosed accessories | PA | Gauge supporter, iron, low-pressure/medium-pressure gauge head | |

## 5.10.10 High-pressure spherical tank




36 *Mounting on a high-pressure spherical tank. Unit of measurement mm (in)*

*A Anchor hook*
*1 Top anchor*
*2 Float*
*3 Guide wire*
*4 Measuring tape*
*5 Nut*
*6 Tank bottom (where anchor hook is welded to tank bottom)*
*7 Anchor hook*
*8 Bolt*
*9 Spring washer*
*10 Flat washer*
*11 Gate valve*
*12 90 ° sheave elbow*
*13 135 ° sheave elbow*
*14 Pipe supporter (not supplied, see notes)*
*15 Gauge supporter*
*16 Gauge head*

Mount pipe supporter [14] 1 000 mm (39.38 in) below 135 ° sheave elbow [13] to support the pipes.

*Order code example (LT5-66GB153R6GA26G16G204+PC)*

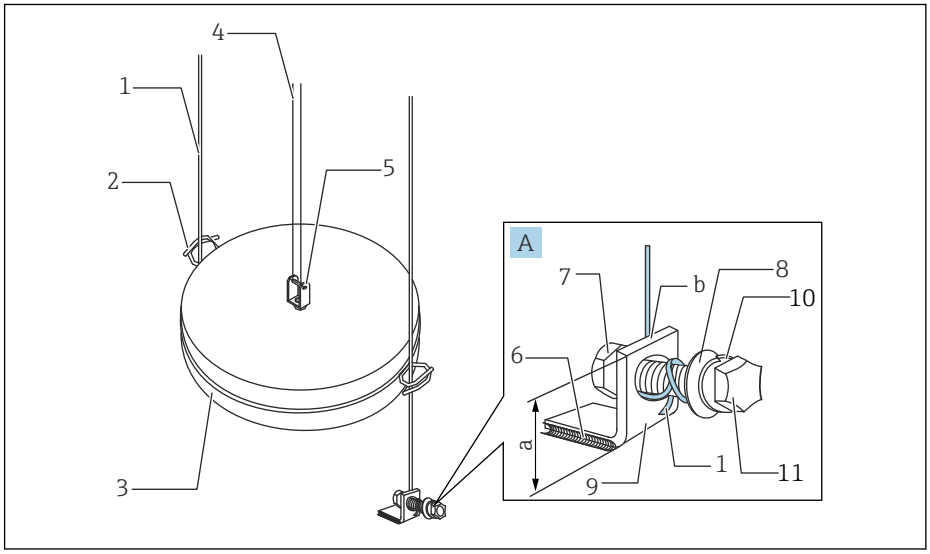
| Item | Target | Code | Specification | Quantity |
|---|---|---|---|---|
| 020 | Gauge head | 6 | 0 to 24.5 bar / 2.45 MPa / 355.25 psi, iron (SCPL1), high pressure | 1 |
| 030 | Gauge head process connection | 6G | 20K 40A RF, iron (SCPL1), flange JIS B2220 | |
| 040 | Display; cover | B | Dial display; glass + iron | |
| 050 | Crank unit | 1 | Available | |
| 060 | Measurement range | 5 | 20 m | |
| 070 | Measuring tape | 3 | Measuring tape SUS316, seal pot / BT | |
| 080 | Float | R | D400 mm SUS316 tape connection 8.3 kg, 0.5 ≤ density 0.7, with ring | |
| 090 | Top anchor | 6H | 2x 20K 40A RF, SUS316, flange JIS B2220 | 2 |
| 100 | Guide wire | A | 3 mm-diameter single wire, SUS316 | |
| 110 | Anchor hooks; mounting bolts | 2 | SUS316; SUS316 (mounting bolt) SUS316L | |
| 120 | 90 ° sheave elbow | 6G1 | 1x 20K 40A RF, iron (SCPL1), flange JIS B2220 | 1 |
| 130 | 135 ° sheave elbow | 6G2 | 2x 20K 40A RF, iron (SCPL1), flange JIS B2220 | 2 |
| 140 | Seal pot | 0 | None | - |
| 150 | Gate valve | 4 | 20K 40A RF, SCS13, flange JIS B2220 | 1 |
| 620 | >>Enclosed accessories | PC | Gauge supporter, iron, for high pressure | |

## 5.11 Mounting guide wires

### Mounting procedure

- Do not bend the guide wires.
- Pull the two guide wires, one in the perpendicular direction and the other in the parallel direction.
- Insert two washers in the packing between the top anchor and the mounting flange on the tank side. Check before placing the guide wires.
- Ensure that the guide wires and the anchor hooks at the bottom of the tank are strong enough, as they are difficult to fix once actual liquid has been injected.

1. Open the cover of the top anchor located at the top of the tank.
2. Pass the guide wire through the float's guide ring at the tank bottom and secure it tightly to the anchor hook using a nut and a bolt.
3. Cut and bend the tip of the guide wire so that it does not get caught on the float.
   ↳ The tip of the guide wire is connected to (b) so that it is smaller than the dimension of the anchor hook (a).
   Coil the guide wire once or twice from the inside of the anchor hook, and then pass it through the hole and coil it once or twice on the outside. Adjust the number of coils as necessary.

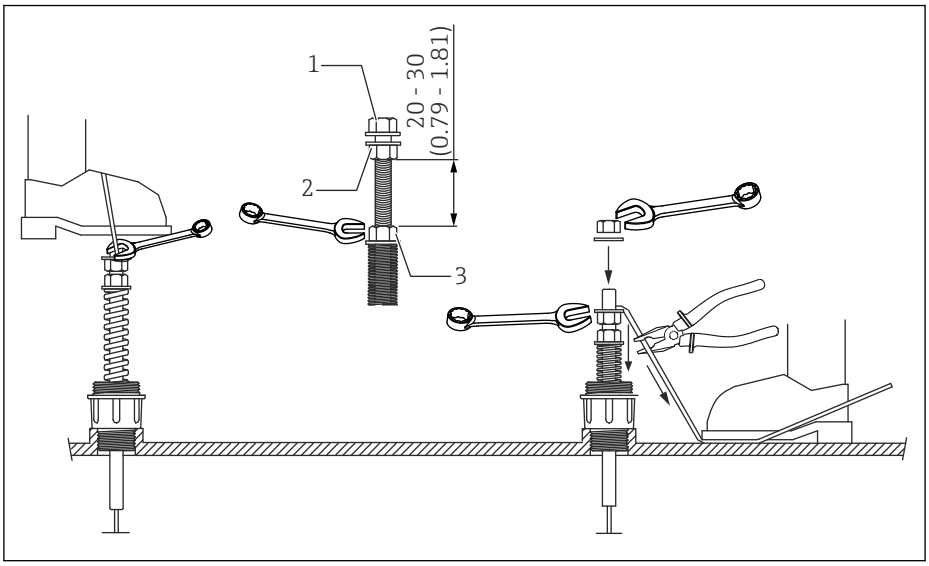



37 *Guide wire mounting 1*

*A Anchor hook*
*1 Guide wire*
*2 Guide ring*
*3 Float*
*4 Measuring tape*
*5 Universal joint*
*6 Tank bottom (where anchor hook is welded to tank bottom)*
*7 Nut*
*8 Flat washer*
*9 Anchor hook*
*10 Spring washer*
*11 Bolt*

4. Secure the guide wire in place while extending it to the tank top again.
5. Bend the tip of the guide wire along the shaft and then cut it off, leaving an excess of approximately 100 mm (3.94 in).
6. Tighten the end nuts [1] and [2].

7. Tighten nut [3] to fully activate the spring.




*38 Guide wire mounting 2. Unit of measurement mm (in)*

*1 Nut 1*
*2 Nut 2*
*3 Nut 3*

This completes the guide wire mounting process.

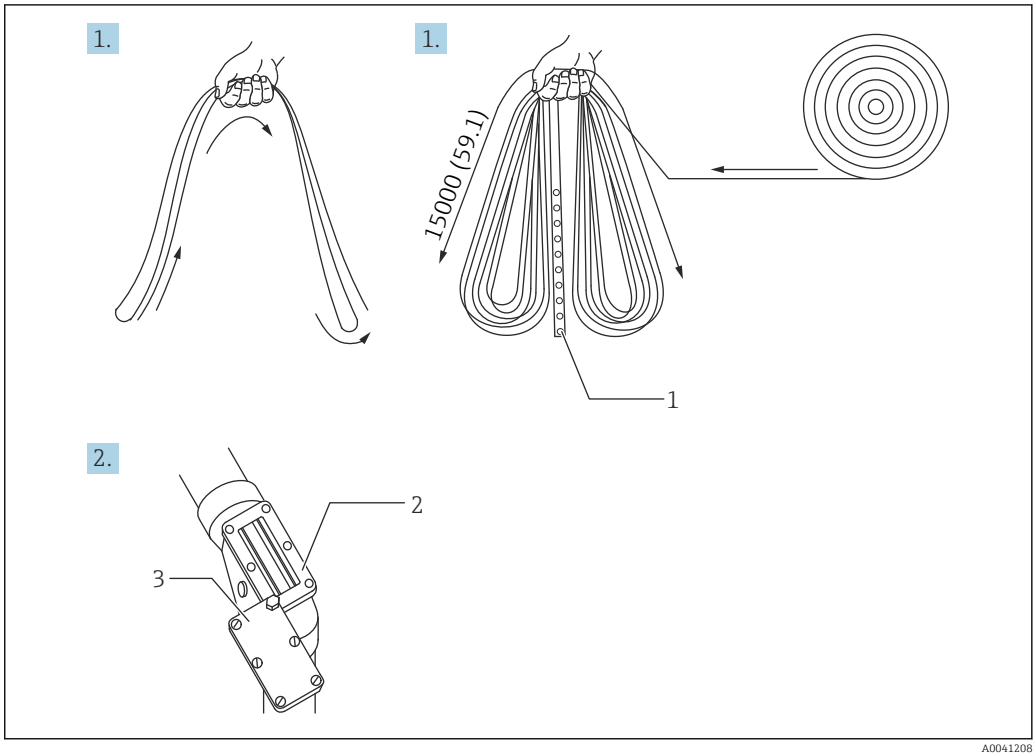
## 5.12 Mounting the measuring tape and measuring wire

- Never bend or damage the measuring tape.
- Ensure that the measuring tape does not become twisted inside the tank or while the pipes are being laid out.
- There are small holes at intervals of 20 mm (1 in (inch) if using feet as a unit) along approximately half of the entire length of the measuring tape. Mount the measuring tape so that the perforated side is wound by the gauge.
- During this process, ensure that the measuring tape and the measuring wire do not come off the sheave elbow roller, and inspect them once the process has been completed.
- If it is necessary to pass the measuring tape through a 135 ° sheave elbow, perform the mounting after ensuring that the work area is safe, as poor footing can be extremely dangerous.
- Since the joint between the float and the measuring tape cannot be repaired once actual liquid is injected, inspect the joint carefully when the connection process has been completed.

### Mounting procedure

1. Extend the measuring tape while folding it back and forth in your hand approximately every 1.5 m (4.92 in) to ensure that the tape does not become twisted.
2. Open the sheave elbow cover and the gauge head cover.
3. Mount the measuring tape while ensuring that it does not become twisted inside the guide pipe.

This completes the mounting preparation.



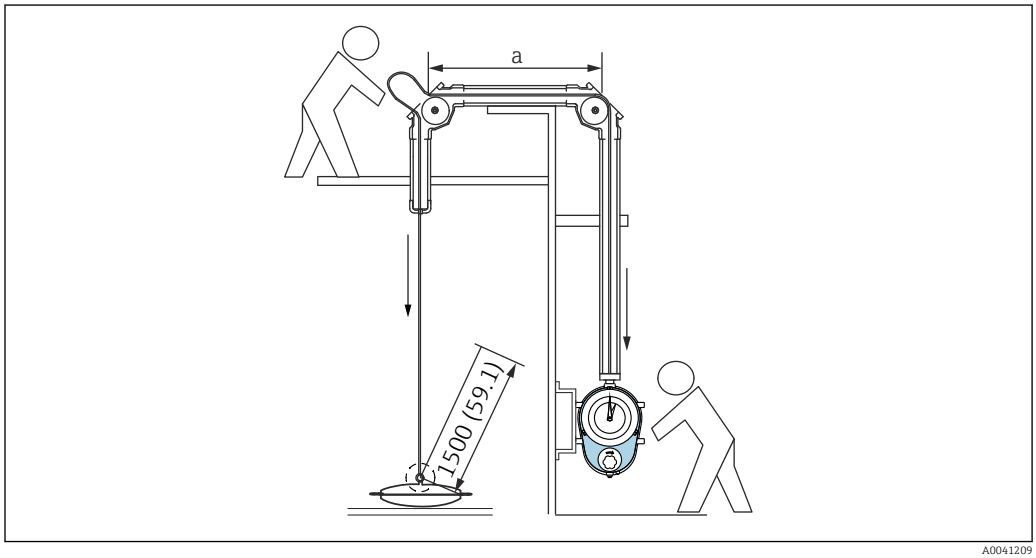

39 *Measuring tape preparation. Unit of measurement mm (in)*

1 *Perforation*
2 *Sheave elbow*
3 *Cover*

### 5.12.1 Cone roof tank

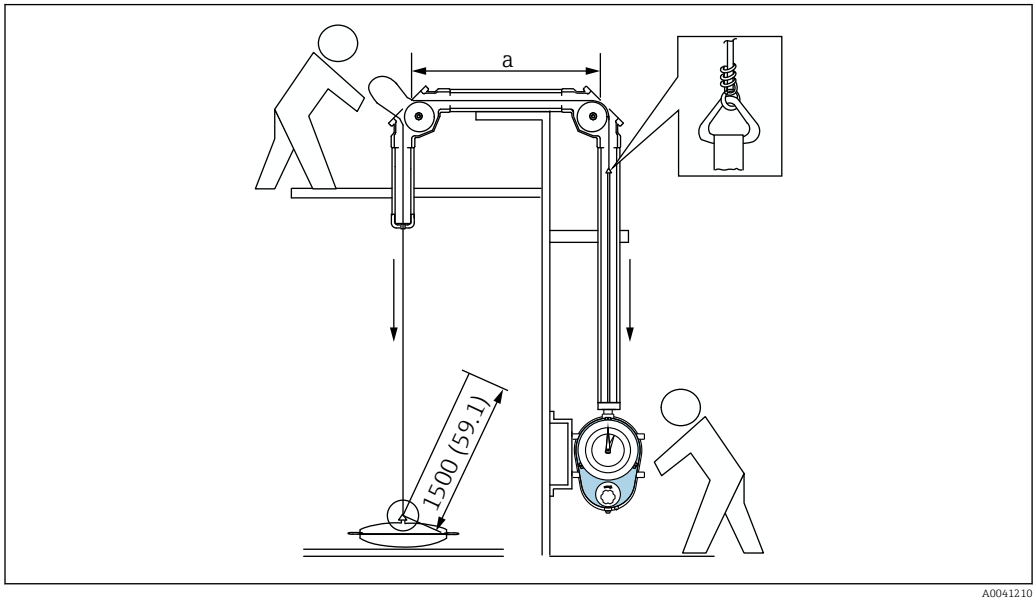
**Mounting procedure**

1. Insert one end of the measuring tape (non-perforated side) into the tank from the sheave elbow on that tank roof.
2. Pass the other end of the tape (perforated side with a looped end) through the sheave elbow on the gauge head to insert it into the gauge head.
3. Secure the end of the measuring tape to the tape drum. Wrap it around the tape drum twice, and then pull the measuring tape inside the tank.
4. As for the length to the float, cut off the measuring tape, leaving an excess of approximately 1.5 m (4.92 in).
5. Connect the measuring tape to the float.
   ↳ For more information on the connection procedure, see → 55




40 *Mounting the measuring tape: Measuring tape. Unit of measurement mm (in)*

*a Guide pipe*



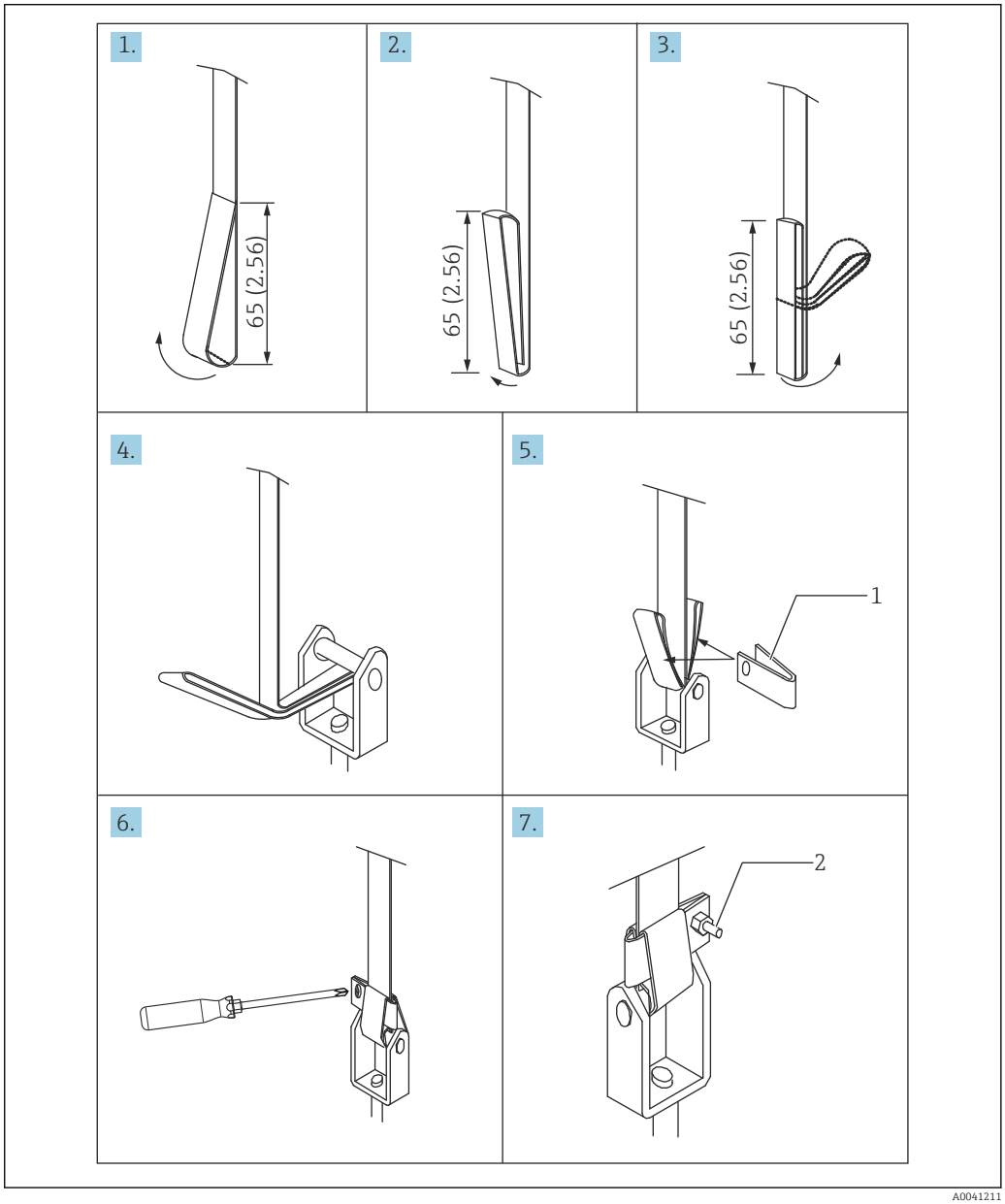

41 *Mounting the measuring tape and measuring wire: Measuring tape + measuring wire. Unit of measurement mm (in)*

*a Guide pipe*

### 5.12.2 Measuring tape and float connection procedure

1. Bend the measuring tape at 65 mm (2.56 in).
2. Bend the measuring tape again at 65 mm (2.56 in).
3. Bend the twice-folded measuring tape at the center.
4. Pass the folded measuring tape through the joint shaft.
5. Secure the tape clamp in place by tightening the screw and nut.
6. Crush the screw's thread protruding from the nut side by pinching it with pliers to prevent loosening.

This completes the connection procedure.




42 *Measuring tape and float connection. Unit of measurement mm (in)*

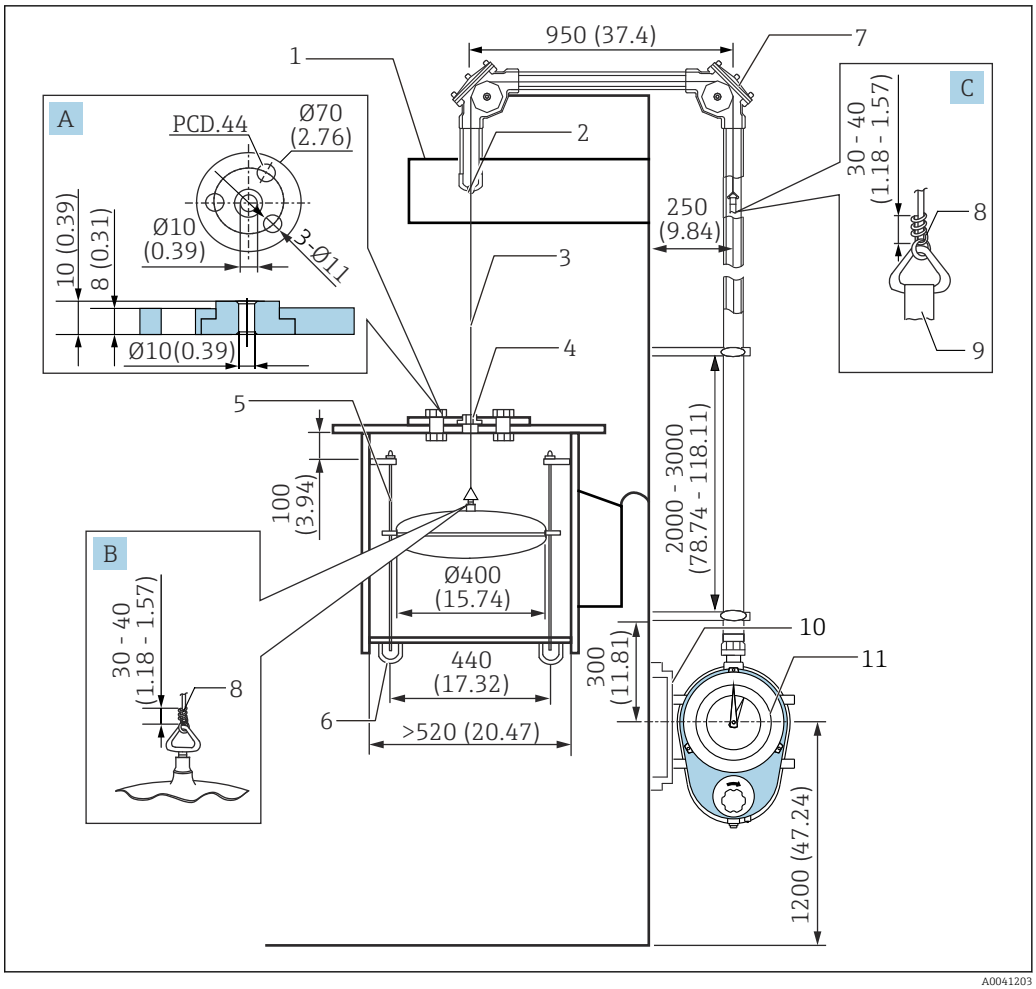
*1 Measuring tape clamp*
*2 Screw thread*

### 5.12.3 Floating roof tank

**Mounting procedure**

1. Pass the measuring wire through the sheave elbow on the tank roof from the 90° sheave elbow on the gauge head, and feed one end of the measuring wire into the tank.
2. Temporarily secure the other end in place.
3. Connect the measuring wire to the float inside the tank.
4. Wind the φ0.5 mm (0.02 in) support wire [8] (see Fig. B) onto the measuring wire approximately 10 times.
5. Reconnect the measuring wire and the measuring tape at the top of the tank.
   ↳ When the liquid level is 0, this connection should be approximately 100 mm (3.94 in) below the sheave elbow, and approximately 100 mm (3.94 in) above the gauge head when the tank is full.
6. Wind the φ0.5 mm (0.02 in) support wire [8] (see Fig. C) onto the measuring wire approximately 10 to 15 times.
7. Feed the measuring tape towards the gauge head.
8. Check to ensure that the measuring tape is not twisted.
9. Close the sheave elbow cover.

This completes the mounting procedure.




43 *Mounting the measuring tape. Unit of measurement mm (in)*

*A Wire guide metal*
*B Top of the float*
*C Measuring tape, measuring wire connection*
*1 Roof stand (not supplied)*
*2 Wire guide socket*
*3 Measuring wire*
*4 FRT wire guide metal*
*5 Guide bar: φ16 mm (0.63) (not supplied)*
*6 Pipe end: 1 B Sch 40–80 (not supplied)*
*7 90 ° sheave elbow*
*8 Support wire (stainless steel, supplied)*
*9 Measuring tape*
*10 Gauge supporter*
*11 Gauge head*

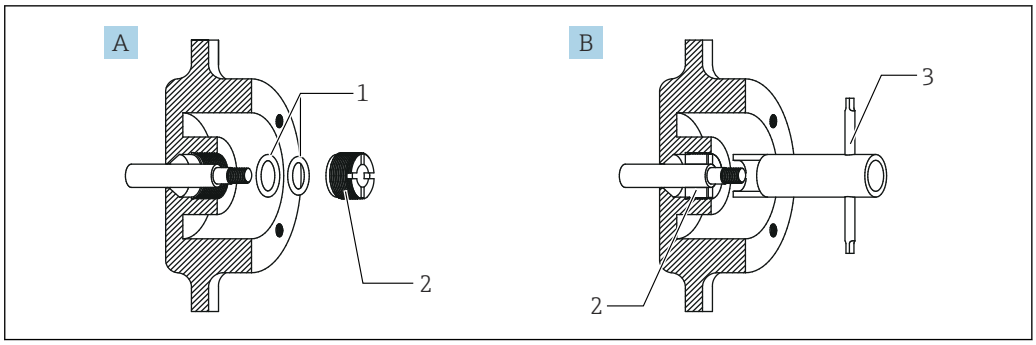
### 5.12.4 Medium/high-pressure tank

- Never bend or damage the measuring tape.
- Ensure that the measuring tape does not become twisted inside the tank or while the pipes are being laid out.
- Approximately half of the measuring tape is perforated with small holes at 20 mm (1 in) intervals. Mount the measuring tape so that the perforated side is wound by the gauge.
- During this process, ensure that the measuring tape and the measuring wire do not come off the sheave elbow roller, and inspect them once the process has been completed.
- If it is necessary to pass the measuring tape through a 135 ° sheave elbow, perform the mounting after ensuring that the work area is safe, as poor footing can be extremely dangerous.
- Since the joint between the float and the measuring tape cannot be repaired once actual liquid is injected, inspect the joint carefully when the connection process has been completed.

**Mounting procedure**

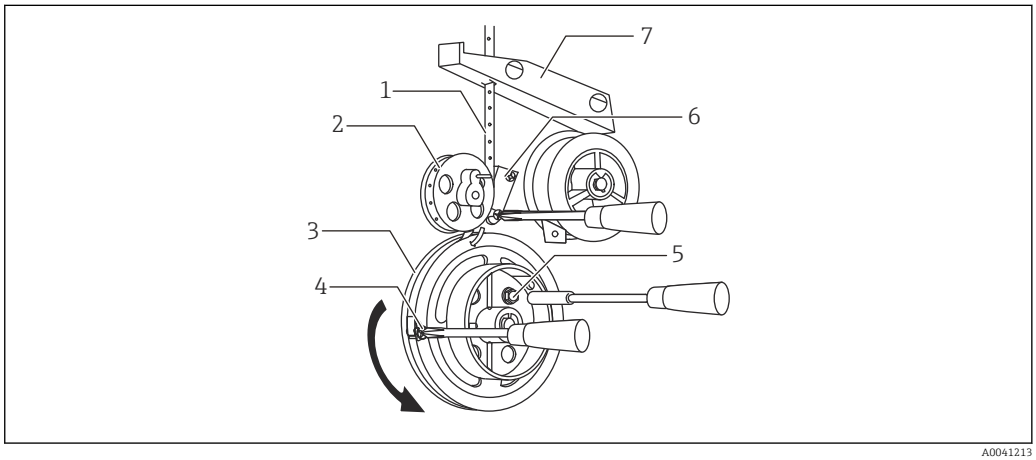
1. Turn the gate valve handle counterclockwise to open it completely, and remove the sheave elbow cover and the gauge's rear cover.
   ↳ Using the provided gland fixing tool, remove the gland on the gauge head rear cover.
   Remove the O-rings (two locations).
2. Remove the tape guide and the lock screw.
3. Insert one end of the measuring tape (non-perforated side) into the tank from the sheave elbow on top of the tank.
4. Pass the other end of the tape (perforated, looped side) through the sheave elbow on the gauge's side and insert it into the gauge.
5. After passing the measuring tape that has been inserted into the gauge through the dust guard slit, secure it to the tape drum using a tape securing screw, and then wrap it twice around the tape drum.
6. Loosen the mounting screws (two locations) and adjust the position so that the measuring tape does not interfere with the dust guard slit.
7. Pull the measuring tape inside the tank.
8. Cut the measuring tape to the length of the float, leaving an excess of approximately 1.5 m (4.92 ft).
9. Connect the measuring tape to the float.
   ↳ For details on the connection procedure, refer to → 55
10. Check to ensure that the measuring tape is not twisted.
11. Close the sheave elbow cover.
12. Tighten the gland by following the diagram below.

This completes the mounting procedure.



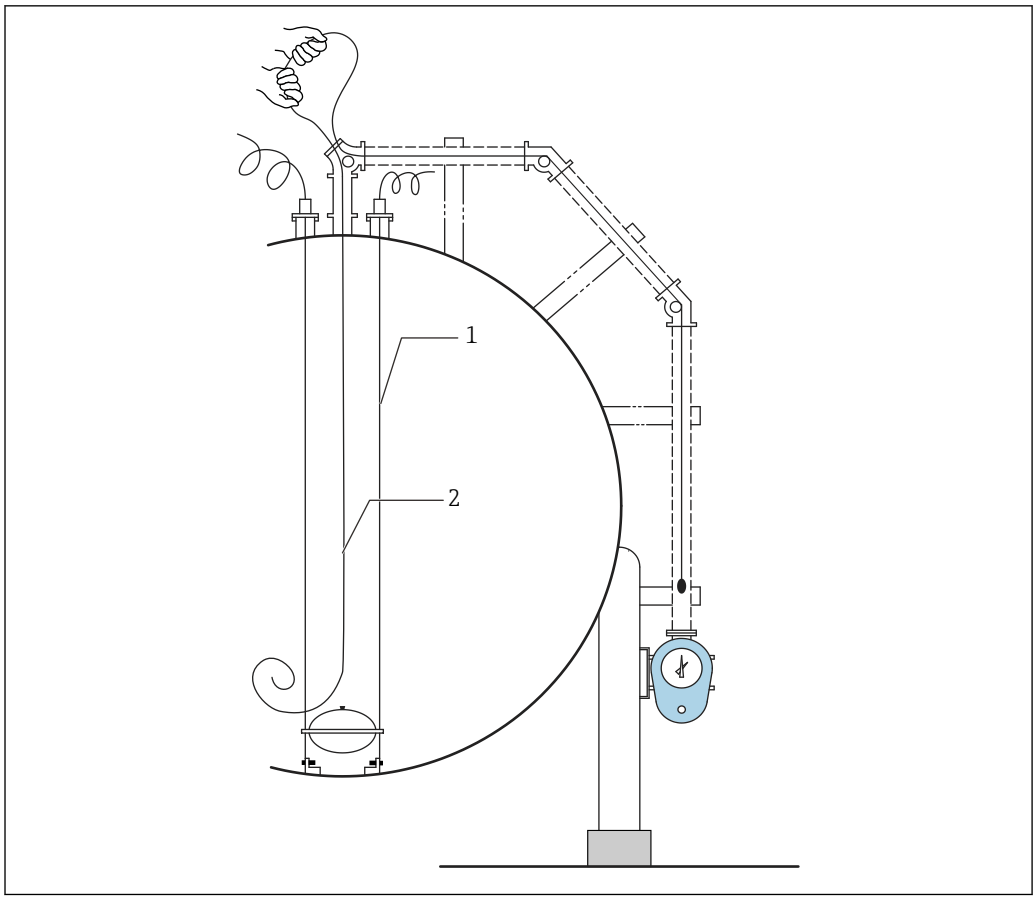

44 *Gland fixing tool*

*A Before tightening*
*B After tightening*
*1 O-ring*
*2 Gland*
*3 Gland fixing tool*




45 *LT components*

*1 Measuring tape*
*2 Sprocket*
*3 Tape drum*
*4 Tape-holding screw*
*5 Locking screw*
*6 Tape guide*
*7 Dust guard (optional for low-pressure specification)*




46 *Mounting the measuring tape*

*1 Guide wire*
*2 Measuring tape*

Cut the measuring tape after connecting it to the gauge head, leaving approximately 1.5 m (4.92 ft) from the connection to the float.

### 5.12.5 Internal adjustments

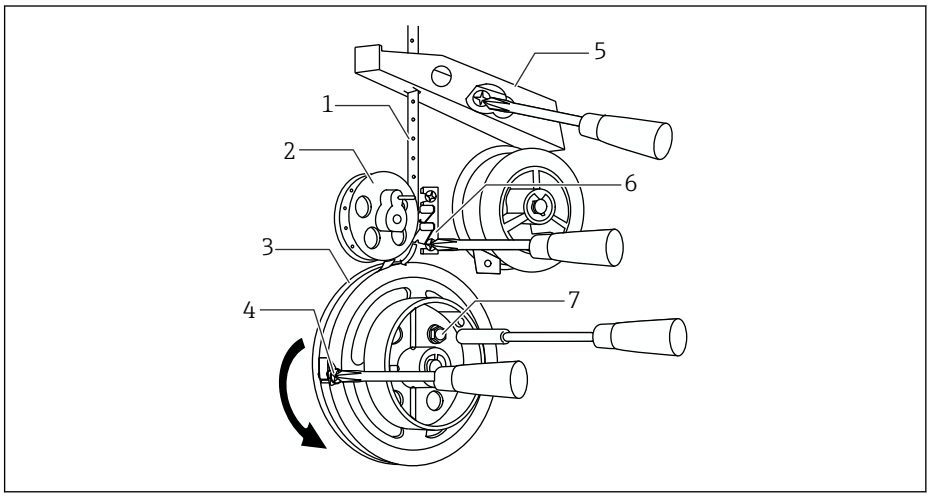
There are two types of tape guides.

- Stainless steel (for low pressure)
- Aluminum (for medium and high pressure)

If NC in specification 610 was selected, it would be aluminum (for medium and high pressure). The figure below shows a stainless steel tape guide as an example.

**Tape guide adjustment procedure**

1. Turn the tape drum inside the gauge head in the direction of the arrow in the diagram below to draw the measuring tape taut.

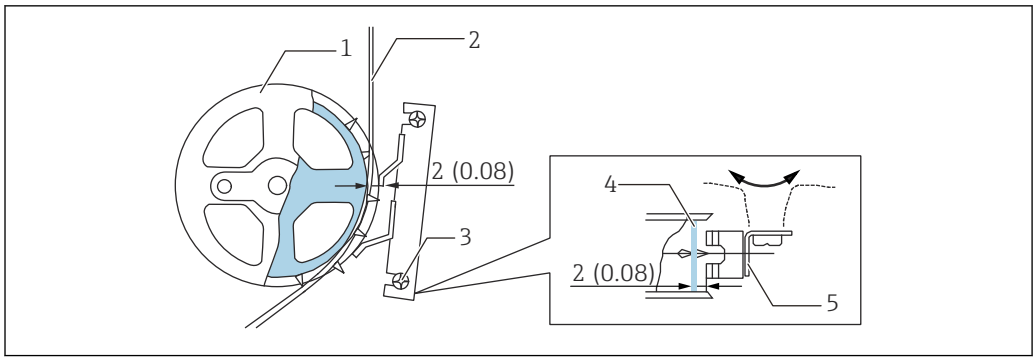



47 *Tape drum*

*1 Measuring tape*
*2 Sprocket*
*3 Tape drum*
*4 Tape-holding screw*
*5 Dust guard*
*6 Tape guide*
*7 Locking screw*

2. Once taping is completed, set the tape so that both ends of the tape guide are positioned approximately 2 mm (0.08 in) from the measuring tape surface as shown in the figure below.
   ↳ The measuring tape may come off the sprocket pins due to sudden movement caused by waves of the liquid, which may affect the reading. The tape guide prevents this from happening.
3. If it is fitted with a dust guard, loosen the mounting screws (2 locations) and adjust the position so that the measuring tape does not interfere with the dust guard slit.

This completes the adjustment procedure.




48 *Tape guide adjustment. Unit of measurement mm (in)*

*1 Sprocket*
*2 Measuring tape*
*3 Mounting screw*
*4 Measuring tape*
*5 Tape guide*

## 5.12.6 Mounting the conster

### Mounting procedure

Mount the conster after mounting the measuring tape.

- Never remove your hand when winding the conster. The force from the spring may result in injury.
- Removing the conster from the large conster drum or applying excessive force to the conster will cause uneven torque generation, resulting in inaccurate readings. Handle with care.
- When winding the conster from the small conster drum to the large conster drum, keep a firm grip on the large conster drum until force has been transmitted to the measuring tape at the end.

1. Ensure that the locking screw has been removed before securing the conster end to the large conster drum with a screw and a nut.
2. Rotate the large conster drum in the direction indicated by the arrow.
3. When securing the conster drum in place, turn the tape drum counterclockwise to ensure that the tape is taut before securing it in place.
4. If the tank is empty, wrap the tape around the small conster drum twice and secure it to the tape drum with a locking screw.
   ↳ If the tank contains actual liquid, measure the surface level of the liquid and calculate the number of windings using the following equation. Wind the tape based on the calculation result using the large conster drum and secure it in place.
5. Close the gauge head cover.
6. For LT5-4/LT5-6, close the cover's gland.

This completes the conster mounting procedure.

$$\text{Number of turns} = \frac{\text{Tank height (measuring span) - Actual liquid level}}{\text{0.6 (unit: m)}}$$

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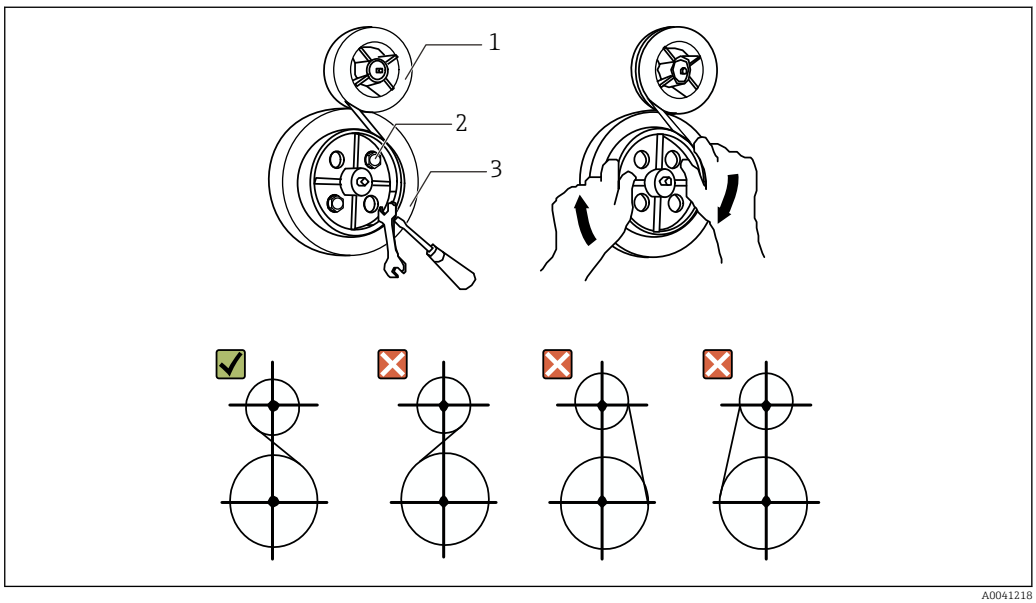



A0041218

49 *Mounting the conster*

1 *Small conster drum*
2 *Locking screw*
3 *Large conster drum*

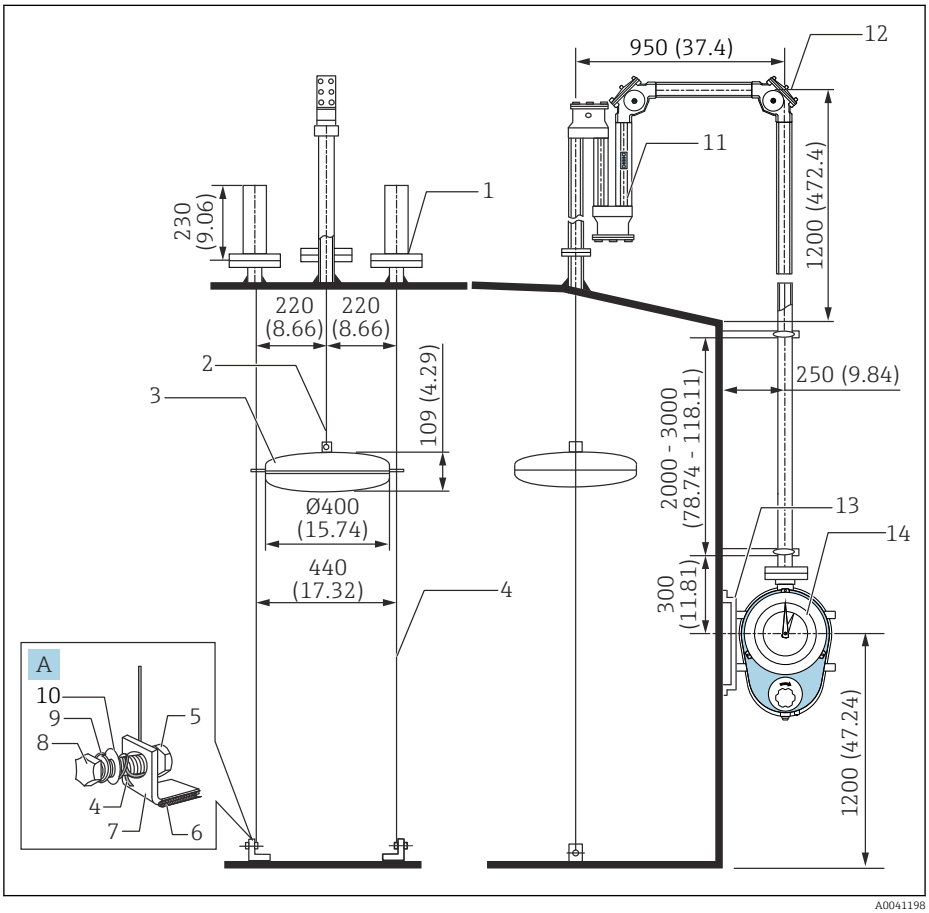
## 5.13 Liquid sealant for seal pot

### 5.13.1 Filling seal pot with liquid sealant (when installing a new gauge)

**Liquid sealant filling procedure**

1. Install the entire LT unit, including the seal pot and float, into the tank.
   ↳ Parts shown in the figure may be different depending on the selected order code.
2. Hoist the float up and down manually to confirm that the dial (or counter) display changes accordingly.

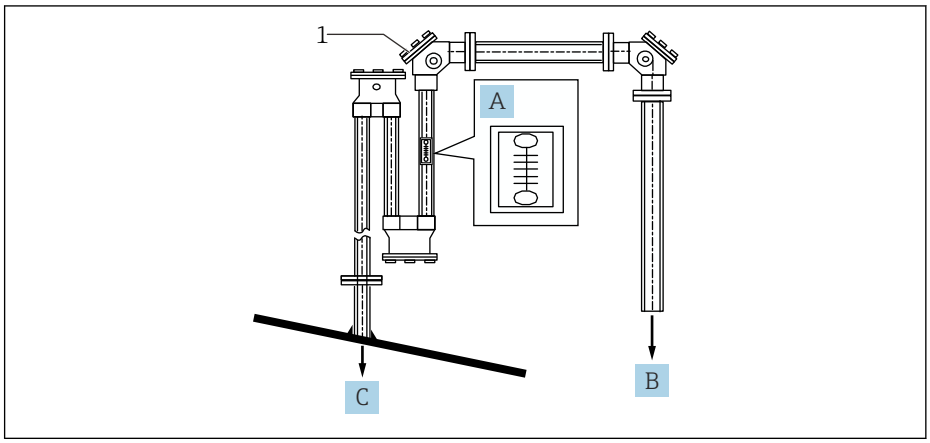
↳




50 *LT with a seal pot. Unit of measurement mm (in)*

*A Anchor hook*
*1 Top anchor*
*2 Measuring tape*
*3 Float*
*4 Guide wire*
*5 Nut*
*6 Tank bottom (where anchor hook is welded to tank bottom)*
*7 Anchor hook*
*8 Bolt*
*9 Spring washer*
*10 Flat washer*
*11 Seal pot*
*12 90 ° sheave elbow*
*13 Gauge supporter*
*14 Gauge head*

3. After checking the operation of LT, remove the cover of the 90 ° sheave elbow for the seal pot and inject the liquid sealant.
   ↳ Note that checking the operation of LT after filling it with liquid sealant may cause the liquid sealant to leak through the measuring tape.



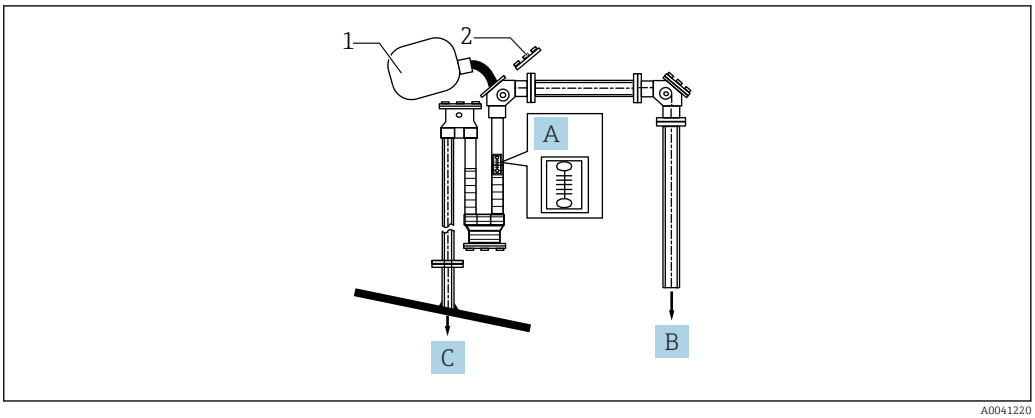

51 *Filling with liquid sealant*

*A Scale for liquid sealant*
*B To the LT5 side*
*C To inside the tank*
*1 90 ° sheave elbow*

4. Fill up to the middle of the scale for liquid sealant.
5. Close the 90 ° sheave elbow cover.

This completes the liquid sealant filling procedure.

Approximately 2 L (liters) of liquid sealant is included in the kit. This means that there will be a small amount of leftover once the seal pot has been filled with the prescribed amount. Do not discard this leftover sealant, as it will be used after the tank is in operation when refilling is required.




52 *Amount of liquid sealant*

*A Scale for liquid sealant*
*B To the LT5 side*
*C To inside the tank*
*1 Liquid sealant*
*2 90 ° sheave elbow cover*

Operating the tank without filling it with liquid sealant will cause corrosion of the LT, the sheave elbow packing, and O-rings, due to the gas components inside the tank, which will result in malfunctioning. Always fill with liquid sealant.

### 5.13.2 Filling seal pot with liquid sealant (for an installed gauge)

**Liquid sealant filling procedure**

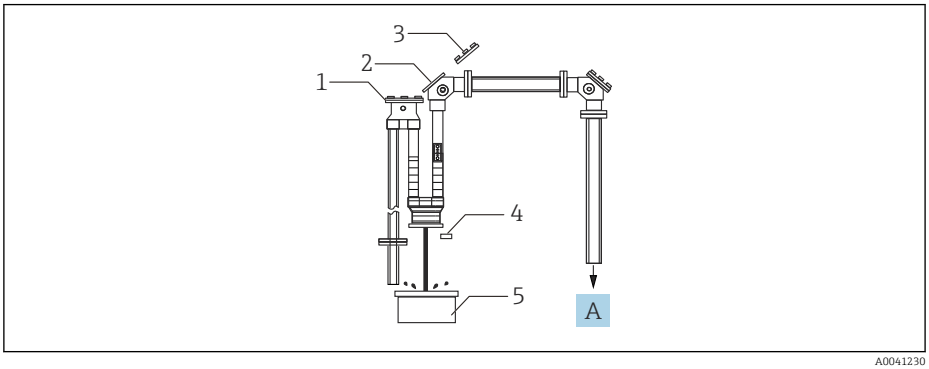
**CAUTION**

**Used liquid sealant may have become mixed with liquids in the tank, turning it into a hazardous substance.**

► Never touch used liquid sealant with bare hands.

Carefully select the material for the container that can catch the liquid sealant.

1. Place a container that can hold at least 2 L (liters) under the drain.
2. Check the surrounding area for safety, and then remove the seal pot drain plug.
3. Drain the liquid sealant from the seal pot.
4. Open the 90 ° sheave elbow cover.

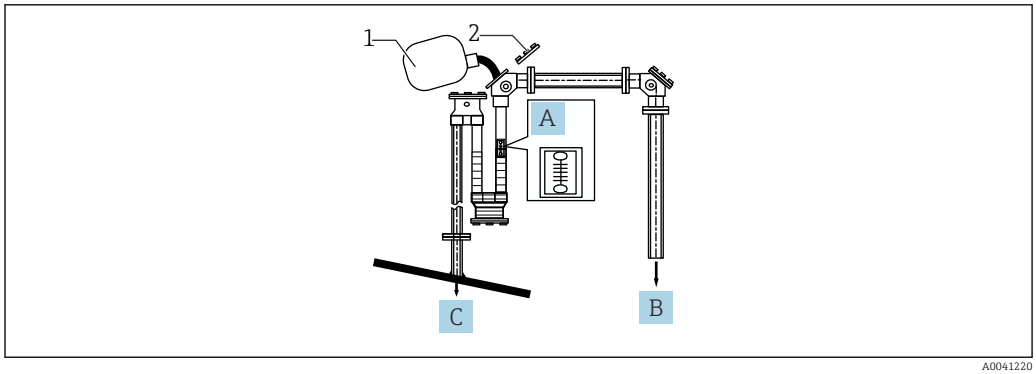



53 *Draining liquid sealant*

*A To the LT5 side*
*1 Sheave elbow*
*2 90 ° sheave elbow*
*3 90 ° sheave elbow cover*
*4 Drain plug*
*5 Container that can hold at least 2 L*

5. Close the drain plug and inject liquid sealant until it reaches the middle of the scale on the side of the seal pot.
6. Close the sheave elbow cover.

This completes the filling procedure of liquid sealant.




54 *Filling with liquid sealant*

*A Scale for liquid sealant*
*B To the LT5 side*
*C To inside the tank*
*1 Liquid sealant*
*2 90 ° sheave elbow cover*

# 6 Commissioning

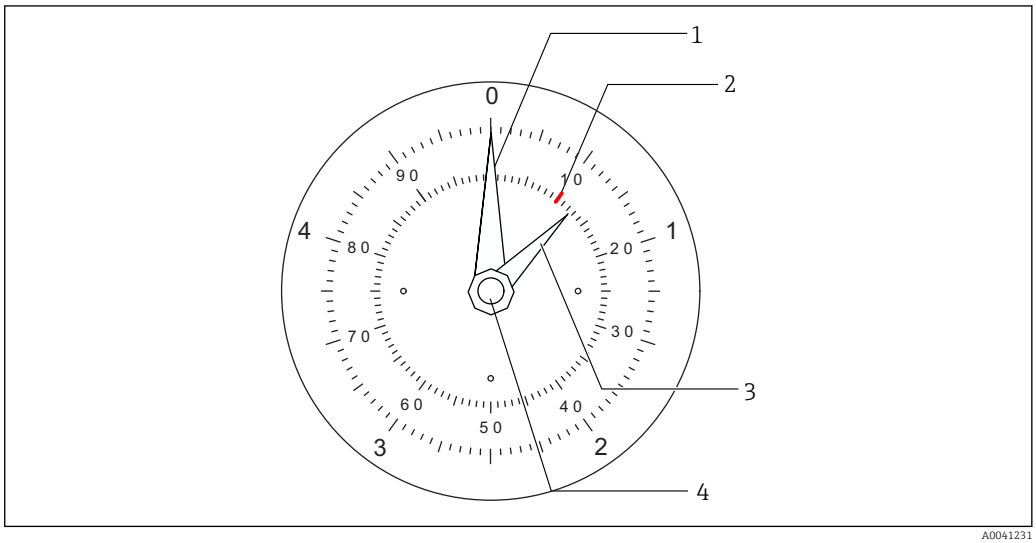
## 6.1 Dial display

**Pointer setting and scale reading procedure**

When calibrating (pointer setting) to a value that has been determined as a calculated value or a measured value, the calibration procedure will be different for a dial display and a counter display. If the tank height is under 20 m or 60 ft, select a dial display; for taller tanks, select a counter display.

1. Remove the indicator cover and loosen the cap nut.
   ↳ The long needle (white) can move freely and the short needle (yellow-green) can be freed by pulling it forward. Align the short needle with the inner scale (1 mm (0.04 in) increments) so that it corresponds to the last two digits of the liquid level.
2. Align the long needle with the outer scale.
   ↳ Since each increment of the outer scale corresponds to 100 mm (3.94 in) of liquid level, visually align the needle based on the last two digits of the liquid level.
3. After aligning the needles, tighten the cap nut firmly.
   ↳ Read the indicator by using the outer scale and the long needle to determine the 10 000 mm (393.7 in), 1 000 mm (39.37 in), and 100 mm (3.94 in) digits while using the inner scale and the short needle to determine the 10 mm (0.34 in) and 1 mm (0.04 in) digits.
   Tightening torque: 0.315 N/m

This completes the indicator setting and scale reading procedure.




55 *Dial display (5 m (16.4 ft) scale plate)*

1 *Long needle (white)*
2 *Example: 10 mm position*
3 *Short needle (green)*
4 *Cap nut*

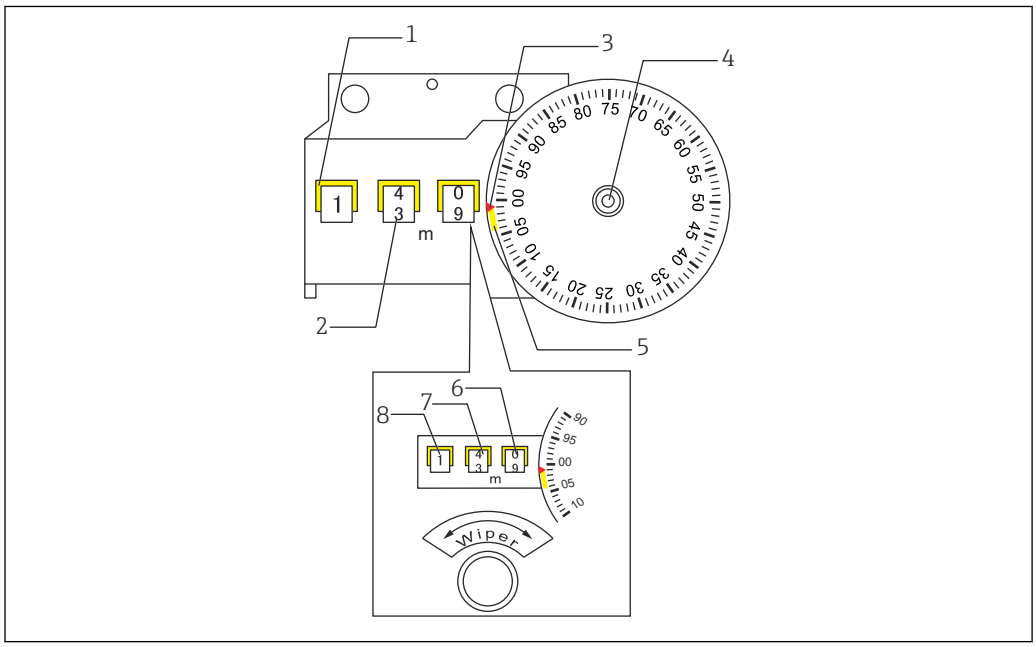
## 6.2 Counter display

### Counter display procedure

- The scale plate (1 mm (0.04 in) increments) can rotate freely.
- On the counter drum, the number on the No. 1 drum changes each time the scale plate makes one full rotation (100 mm (3.94 in)).

1. Remove the indicator cover.
2. Loosen the screw at the center of the scale plate.
3. Turn the scale plate so that the number on the counter drum corresponds to the first three digits of the liquid level.
4. Align the scale plate so that the pointer corresponds to the last two digits of the liquid level, and tighten the scale plate screw.
   ↳ If the pointer is between 97 and 03 on the scale plate, the number on the counter drum will not change instantly. It will change gradually while maintaining a constant relationship with the rotation of the scale plate. This will result in the counter indicating half values. In order to eliminate reading errors, the counter window and parts of the scale plate are color coded.

This completes the display procedure.




56 *Counter display*

1 *Counter (yellow)*
2 *Counter (black)*
3 *Pointer (red)*
4 *Screw*
5 *Range (yellow)*
6 *No. 1 drum*
7 *No. 2 drum*
8 *No. 3 drum*

When the pointer (red) is pointing towards the yellow section, read the value on the yellow side of the counter, and when it is pointing towards the black section, read the value on the black side.

(Example)

- Yellow: 14 000 mm (551.18 in)
- Black: 13 999 mm (551.14 in)

## 6.3 Indicator adjustment

There are three ways to adjust the indicator on a liquid level gauge as described below, but operation of the indicator unit is handled using the same procedure.

- Fill the tank with actual liquid and calibrate the indicator based on the measured value
- Calibrate the indicator based on a calculation when the tank is empty
- Fill the tank with water and calibrate the indicator based on the measured value

### 6.3.1 Indicator adjustment procedure using actual liquid

In order to obtain accurate data, measure the liquid level two to three times using a measuring tape which has been officially tested to have a tolerance equivalent to ±0.3 mm (0.01 in) (however ±1.2 mm (0.05 in)/10 m (32.81 ft)), and then use the data for calibration.

### 6.3.2 Indicator adjustment procedure using an empty tank

- Determine Lf from the equation below when the tank is empty and set the indicator to that value.
- When the liquid level reaches Lf, the float will gain buoyancy and the gauge will begin to operate, continuing to indicate an accurate liquid level.

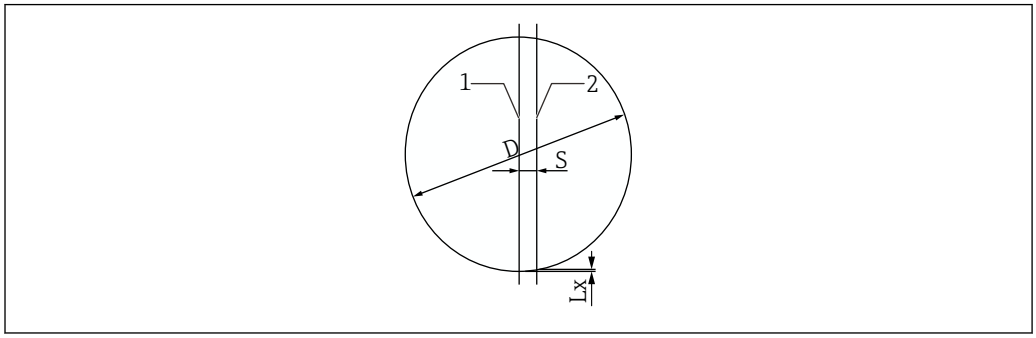
| 1. | **Liquid level at which float gains buoyancy (in water)** | |
|---|---|---|
| $Lf = \left( \frac{h}{2} + \frac{\frac{W - T}{\rho} - \frac{V}{2}}{S} \right)$ x 10 mm (0.39 in) | | |
| Tape tension | T | 1 200 g (2.65 lb) |

| Specification | Float (D) | Materials | Weight (W) | Cross-sectional area (S) | Height (h) | Volume (V) | Liquid density (g/cm³) |
|---|---|---|---|---|---|---|---|
| Low pressure | 400 mm (15.75 in) | SUS316 | 4 200 g (9.26 lb) | 1257 cm² | 10.9 cm (4.29 in) | 10 520 cm³ | 0.5 ≤ ρ < 0.65 |
| | | | 5 000 g (11.02 lb) | | | | 0.65 ≤ ρ < 1.05 |
| | | | 8 000 g (17.64 lb) | | | | 1.05 ≤ ρ ≤ 2.0 |
| | | PVC | 4 200 g (9.26 lb) | 1257 cm² | 11.2 cm (4.41 in) | 10 870 cm³ | 0.5 ≤ ρ < 0.65 |
| | | | 5 000 g (11.02 lb) | | | | 0.65 ≤ ρ < 1.05 |
| | | | 8 000 g (17.64 lb) | | | | 1.05 ≤ ρ ≤ 2.0 |
| | 140 mm (5.51 in) | SUS316 | 2 100 g (4.63 lb) | 154 cm² | 20.0 cm (7.87 in) | 2 661 cm³ | 0.5 ≤ ρ < 0.94 |
| | | | 2 400 g (5.29 lb) | | | | 0.94 ≤ ρ ≤ 2.0 |
| | | PVC | 2 100 g (4.63 lb) | 154 cm² | 21.0 cm (8.27 in) | 2 946 cm³ | 0.5 ≤ ρ < 0.94 |
| | | | 2 400 g (5.29 lb) | | | | 0.94 ≤ ρ ≤ 2.0 |
| Medium/ high pressure | 400 mm (15.75 in) | SUS316 | 8 300 g (18.3 lb) | 1257 cm² | 20.0 cm (7.87 in) | 19 200 cm³ | 0.5 ≤ ρ ≤ 0.7 |

Lf can be calculated by substituting density into the above equation.

If a float is being installed to a spherical tank away from the tank center line, add Lx, which can be determined from the following equation, to Lf in 2 above.

| | | |
|---|---|---|
| $Lx = \frac{D}{2} - \sqrt{\frac{D^2}{4} - S^2}$ | Lx | Correction amount for level indication for deviation caused by float installation |
| | D | Diameter of a spherical tank, etc. |
| | S | Deviation distance from the center of the tank to the center of the float (mm) |




A0041235

57 *Indicator adjustment on a spherical tank*

*1 Center of the tank*
*2 Center of float installation*

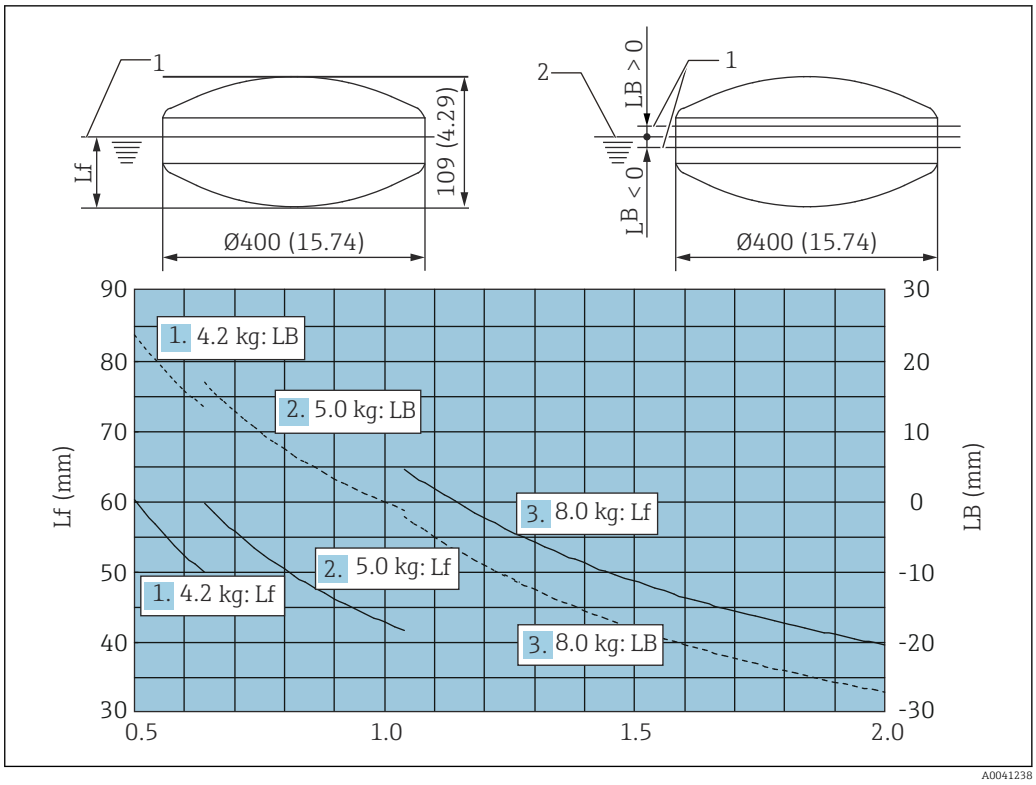
### 6.3.3 Indicator adjustment procedure with a water-filled tank

When a tank is completed, a water-filling test is generally performed. Since it is difficult to take measurements once the tank has been filled with actual liquid, the indicator can be adjusted when the tank is filled with water and then re-adjusted once the tank has been filled with actual liquid. In this case, the following equation is used to determine the difference in the initial floating position of the float when the tank is filled with water and actual liquid in order to correct the value that is indicated when the tank is filled with water.

After calibrating the gauge indicator to the measured value with water, determine Lb from the following equation. If Lb is a positive value, it is added to the measured indicator value; if it is a negative value, the subtracted value becomes the final indicator value.

**Equation: SUS316 φ400 mm (15.75 in), 5 000 g (11.02 lb) float**

| | | | | | |
|---|---|---|---|---|---|
| 1. | **Draft surface Lf (the height of the liquid level from the bottom of the float when the float gains buoyancy)** | | | | |
| $Lf = \left( \frac{h}{2} + \frac{\frac{W - T}{\rho} - \frac{V}{2}}{S} \right)$ x 10 mm (0.39 in) | | | | | |
| Float diameter | D | 400 mm (15.75 in) | Float height | h | 10.9 cm (4.29 in) |
| Float mass | W | 5 000 g (11.02 lb) | Float volume | V | 10 520 $cm^3$ |
| Waterline cross section | $S = \pi D^2/4$ | 1 256.64 $cm^2$ | Tape tension | T | 1 200 g (2.65 lb) |
| Density of measurement liquid | ρ (water) | 1 g (0.002 lb)/ $cm^3$ | Calculated draft surface value | Lf (water) | 42.9 mm (1.69 in) |
| | ρ (with actual liquid) | 0.8 g (0.002 lb)/ $cm^3$ | | Lf (actual liquid) | 50.4 mm (1.98 in) |
| 2. | Correction of indicated value with simulated actual liquid | | Lb = Lf (water) - Lf (actual liquid) | | −7.5 mm (−0.3 in) |



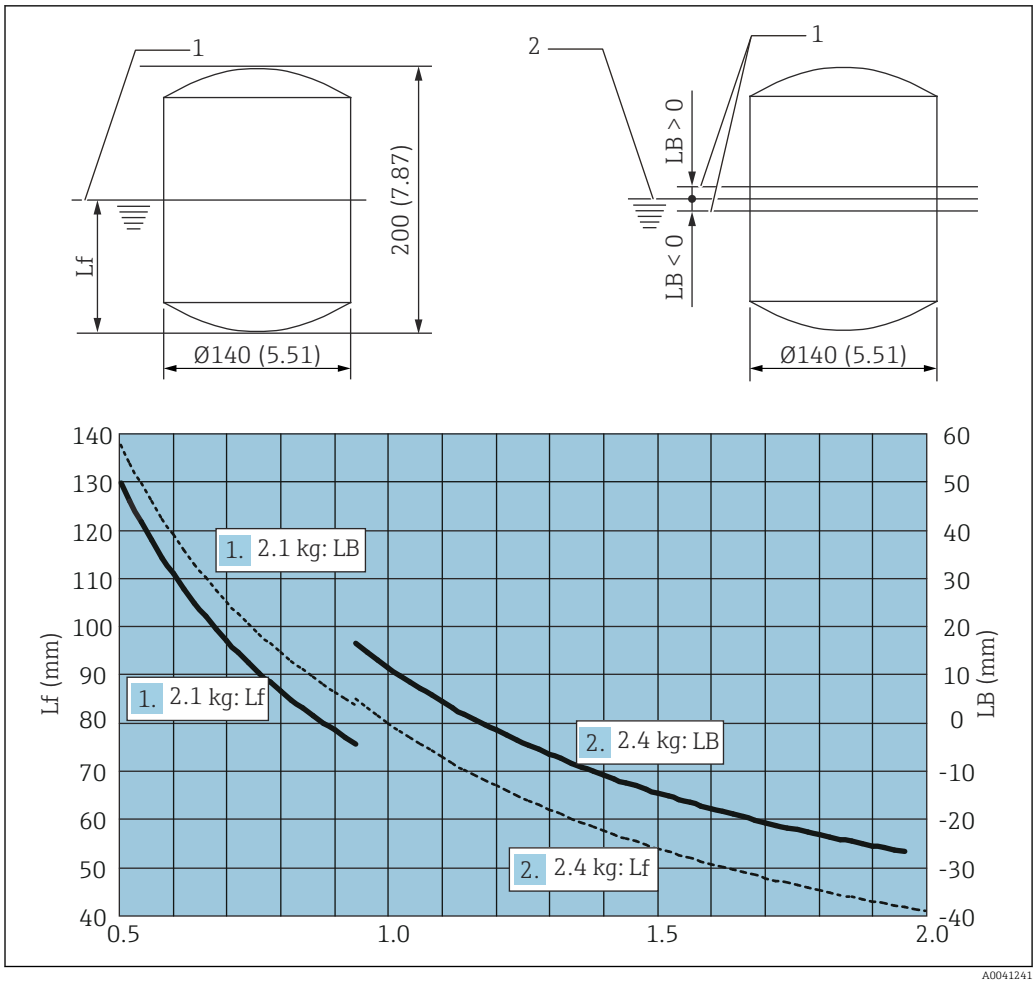

58 *Graph of LT5-1 φ400 mm (15.75 in) float: Density of measurement liquid ρ (g/cm3). Measurement unit mm (in)*

*1 Draft surface at density ρ*
*2 Water (draft surface at a density of 1.0 g (0.002 lb)/cm³)*

### Equation: SUS316 φ140 mm (5.51 in), 2 100 g (4.63 lb) float

Change the values used in the equation according to the float specifications.

| 1. | **Liquid level at which float gains buoyancy (in water)** | | | | |
|---|---|---|---|---|---|
| $Lf = \left( \frac{h}{2} + \frac{\frac{W - T}{\rho} - \frac{V}{2}}{S} \right)$ x 10 mm (0.39 in) | | | | | |
| Float diameter | D | 140 mm (5.51 in) | Float height | h | 20 cm (7.87 in) |
| Float mass | W | 2 100 g (4.63 lb) | Float volume | V | 2 661.2 $cm^3$ |
| Waterline cross section | $S = \pi D^2/4$ | 153.94 $cm^2$ | Tape tension | T | 1 200 g (2.65 lb) |
| Density of measurement liquid | ρ | 1 g (0.002 lb)/ $cm^3$ | Calculated draft surface value | Lf | 72 mm (2.83 in) |
| | ρ (with actual liquid) | 0.8 g (0.001 lb)/ $cm^3$ | | Lf (actual liquid) | 86.6 mm (3.41 in) |
| 2. | Correction of indicated value with simulated actual liquid | | Lb = Lf (water) - Lf (actual liquid) | | −14.6 mm (−0.57 in) |




59 *Indicator value when the tank is filled with water. Measurement unit mm (in)*

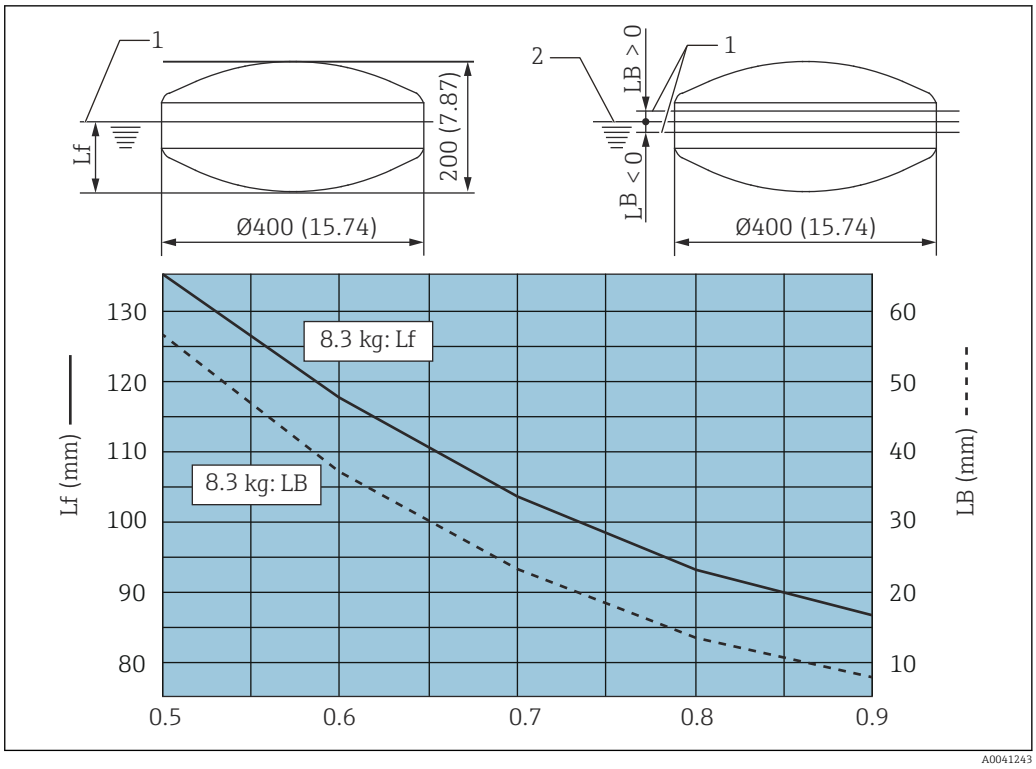
*1 Draft surface at density ρ*
*2 Water (draft surface at a density of 1.0 g (0.002 lb)/cm³)*

## Equation: SUS316 φ400 mm (15.75 in), 8 300 g (18.30 lb) float

| 1. | **Liquid level at which float gains buoyancy (in water)** |
|---|---|

$$Lf = \left( \frac{h}{2} + \frac{\frac{W - T}{\rho} - \frac{V}{2}}{S} \right) \times 10 \text{ mm (0.39 in)}$$

| | | | | | |
|---|---|---|---|---|---|
| Float diameter | D | 400 mm (15.75 in) | Float height | h | 20 cm (7.87 in) |
| Float mass | W | 8 300 g (18.30 lb) | Float volume | V | 19 200 $cm^3$ |
| Waterline cross section | $S = \pi D^2/4$ | 1 256.64 $cm^2$ | Tape tension | T | 1 200 g (2.65 lb) |
| Density of measurement liquid | ρ (water) | 1 g (0.002 lb)/ $cm^3$ | Calculated draft surface value | Lf | 80.1 mm (3.15 in) |
| | ρ (with actual liquid) | 0.5 g (0.001 lb)/ $cm^3$ | | Lf (actual liquid) | 136.6 mm (5.38 in) |
| 2. | Correction of indicated value with simulated actual liquid | | Lb = Lf (water) - Lf (actual liquid) | | −56.5 mm (−2.22 in) |




60 *Graph of LT5-4/LT5-6 φ400 mm (15.75 in) float: Density of measurement liquid ρ (g/cm³). Measurement unit mm (in)*

1 *Draft surface at density ρ*
2 *Water (draft surface at a density of 1.0 g (0.002 lb)/cm³)*

## 6.4 Precautions for water-filling and airtightness tests and handling of gauge at startup

In high-pressure tanks, such as liquid gas tanks, damage to the measuring tape and other such accidents have a significant impact on the operation of the tank, and the recovery cost can be extensive. It has been our experience that all issues involving damaged measuring tapes arise during the testing phase or the initial operation of the tank. To prevent such incidents, be sure to implement the following measures. These measures will prevent incidents that occur during the initial operation of the tank.

- For high-pressure tanks, always open the gate valve when performing a water-filling test of the tank and set the LT to measurement mode. Failure to perform this step may result in damage to the measuring tape.
  If you notice that the gate valve has not been opened after you have started to fill the tank with water, either drain the water or open the sheave elbow cover and open the gate valve while applying a brake to the measuring tape with your hand, and allow the LT to gradually wind the measuring tape.
- In the water-filling test, partially open the water-feeding valve and fill it with water slowly until a depth of approximately 500 to 1 000 mm (19.69 to 39.37 in) is reached.
- When a large amount of water is injected, the measuring tape may become damaged. If the float is near the water inlet, install a wave guard to protect the float from being affected directly by the water surface.
- If performing an airtightness test of LT with the gate valve open, check to ensure that the following LT components have been firmly tightened before performing the test. Failure to tighten the following components will lead to massive air release, which creates a super high-speed airflow near the gate valve that vibrates and damages the measuring tape.
  - Drain plug under the main unit of LT
  - Rear cover bolts
  - Gland on the gauge head rear cover
  - Covers for the elbows
- When opening the rear cover of LT after the airtightness test is complete, check to make sure that the internal pressure of the tank is atmospheric pressure or that the gate valve is closed before opening LT.
  Never open LT or the sheave elbow cover in an attempt to release the compressed air from the airtightness test in a hurry. This will damage the measuring tape.
- Always open the gate valve when injecting actual liquid, such as liquefied gas, into the tank.
  Only close the gate valve in case of an emergency or when the liquid surface is stopped.

# 7 Operation

## 7.1 Check handle (standard)

A check handle is used to confirm that LT is operating properly.

**⚠ CAUTION**

**Handling a hoist handle**

Operation during hoisting/lowering and restrictions on the winding direction

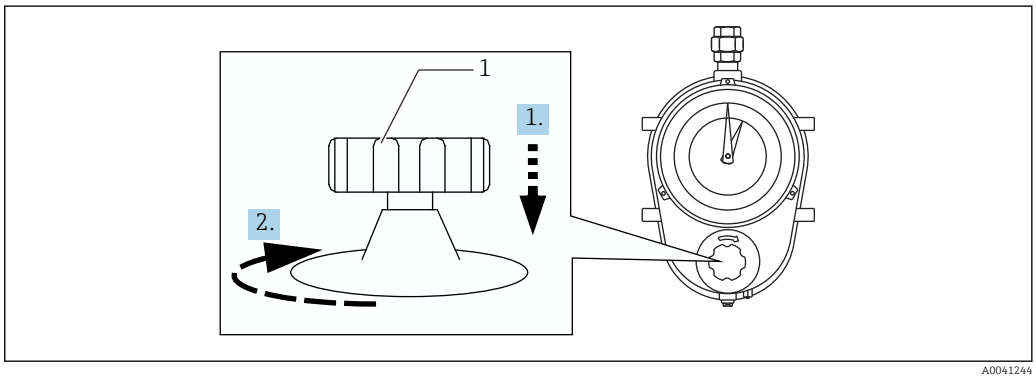
- Do not let go of the handle when hoisting or lowering. Letting go of the hoist handle may cause the float to fall and damage LT. When letting go of the handle during the operation, lock the hoist handle.
- Do not tilt the hoist handle over 90 ° in the axial direction. This may damage the float, tape, conster, and other components.

- When checking the operation using a check handle, make sure that the tank has been filled with liquid first.
- A check handle is not a float hoist handle. Do not forcibly hoist the float using the check handle.
- Handling a hoist handle → 76

**Check handle operation procedure**

1. Locate the check handle found at the bottom of the main unit of LT and push it inside the main unit of LT.
2. Return it to the left side when it points to 4 to 5 mm (0.16 to 0.20) above the indicator on the scale plate, and let go of the check handle.
3. Check the scale plate indicator on the main unit of LT.

This completes the operation procedure.

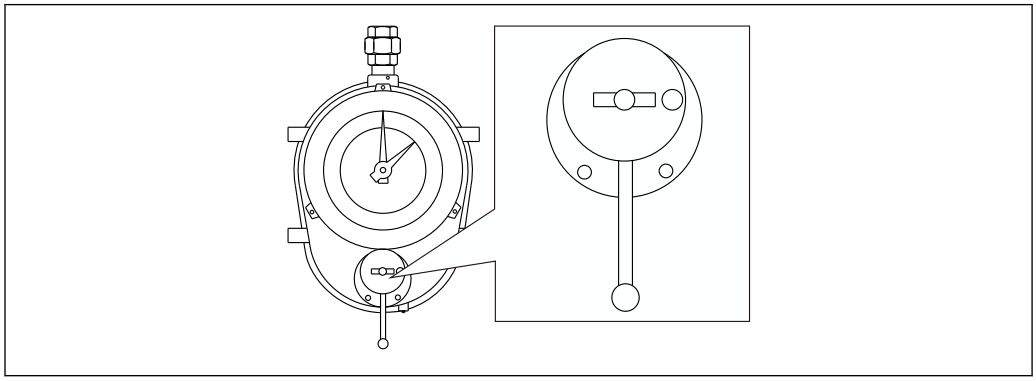



*61 Check handle*

*1 Check handle*

## 7.2 Hoist handle (optional)

A hoist handle is attached to the gauge head, and it allows the float to be raised and lowered manually for purposes other than measuring the liquid level. In locations with poor measurement conditions (such as tanks with mixers and tanks for corrosive liquids), hoisting the float and measuring tape in advance helps to prevent them from being damaged, thereby improving the service life of LT.




62 *Hoist handle*

### 7.2.1 Handling a hoist handle (for LT5-1)

- Never let go of the handle when hoisting or lowering the float. Letting go of the hoist handle may cause the float to fall and damage LT.
- Once the float has been lowered enough to reach the liquid level, stop cranking the handle.
- When the hoist handle reaches position A in the following figure, the float will be freed from the handle. Remove the handle while taking measurements.

**Hoisting procedure**

1. Secure the handle to the knob using a wing bolt.
2. Push in the knob while pulling the puller and release the puller once it has been fully pushed in to position B.
3. After confirming that the knob is securely positioned in position B, rotate it counterclockwise at an approximate rate of 2 seconds per rotation.
4. To stop hoisting in the middle of the procedure, push in the stopper to the deepest level and secure it with a wing bolt.
5. Bring the handle back slowly and place the stopper against the main unit.
   ↳ The float will no longer fall even if you let go of the handle.
   Remove the handle when it is not being used after the float has been hoisted.

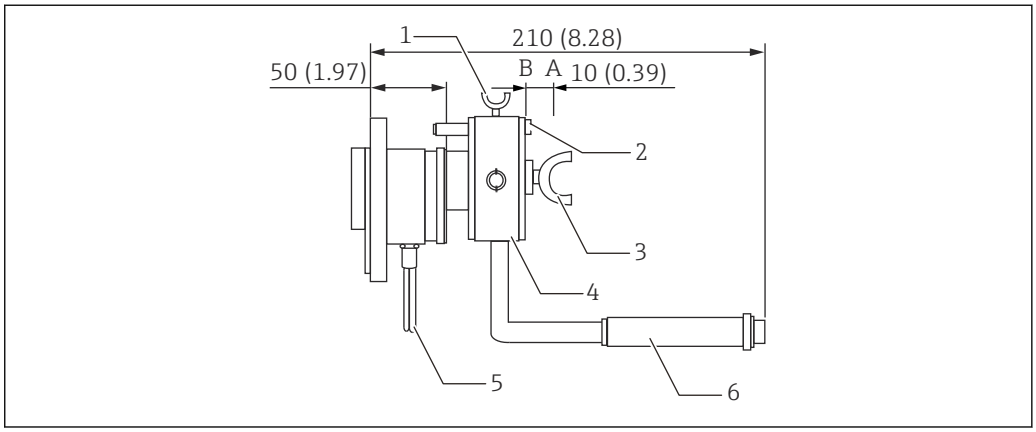
This completes the hoisting procedure.

**Lowering procedure**

1. Insert the handle into the knob and secure it as shown in the figure. Turn it counterclockwise slightly and then loosen the wing bolt. Return the stopper to its place and secure it with the wing bolt.
2. Rotate the handle clockwise.
   ↳ The float will be lowered. Once the float reaches the liquid surface, the force on the handle will decrease suddenly and the LT indicator will stop. Do not rotate the handle any further.
3. Once the float has been lowered, pull the knob while pulling on the puller, and then let go of the puller once condition A is reached.

4. Remove the handle when it is not being used after the float has been lowered.

This completes the lowering procedure.




63 *Handling a hoist handle (LT5-1). Unit of measurement mm (in)*

*1 Wing bolt 1*
*2 Stopper*
*3 Wing bolt 2*
*4 Knob*
*5 Puller*
*6 Handle*

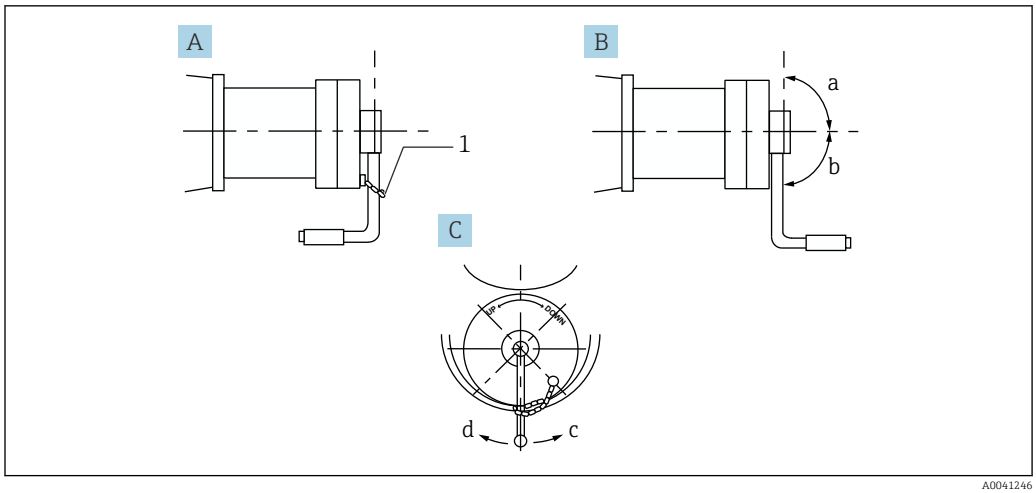
## 7.2.2 Handling a hoist handle (for LT5-4/LT5-6)

- Do not let go of the handle when hoisting or lowering. Letting go of the hoist handle may cause the float to fall and damage LT. When letting go of the handle during the operation, lock the hoist handle.
- Do not tilt the hoist handle over 90 ° in the axial direction. This may damage the float, tape, conster, and other components.

### Hoisting and lowering procedure

1. Remove the lock chain.
2. Move the handle slightly in the circumferential direction, and then gradually rotate it 180 ° in the axial direction.
   ↳ The tape drum gear and the hoist shaft gear will begin to engage starting from around the 90 ° position.
3. Once the handle has been rotated to position B, rotate the handle counterclockwise to hoist the float.
4. Once the float has been hoisted, always secure it in place with a lock chain before letting go of the handle (refer to C).
   ↳ Remove the lock chain when lowering the float.
5. Rotate the handle clockwise to lower the float.
   ↳ Once the float reaches the liquid surface, the indicator or counter display will stop at the current liquid level.
6. Once the float has been hoisted, rotate the handle 180 ° in the axial direction to put it in measurement mode.
7. To keep it in measurement mode, wrap the lock chain around the handle once or twice and place the end hook into the ring near the bolt (refer to A).

This completes the hoisting and lowering procedure.




64 *Hoist handle (LT5-4/LT5-6)*

*A During measurement*
*B During hoisting or lowering*
*C Front*
*a Dislodged gear*
*b Meshed gear*
*c Hoisting*
*d Lowering*
*1 Lock chain*

# 8 Diagnostics and troubleshooting

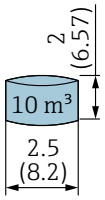
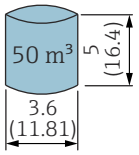
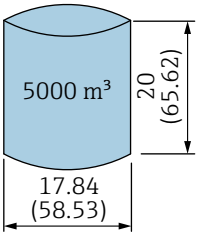
*Causes of malfunction and countermeasures*

| Error | Possible cause | Countermeasure |
|---|---|---|
| Indicator does not change at all | Severed measuring tape | Open the tank and replace the measuring tape |
| | Guide wire is caught on the float | Open the tank and replace the guide wire if necessary |
| | Broken conster | Replace the conster |
| | Check handle is caught | Open the gauge rear cover and perform repair and inspection |
| | Worn transmission gear that is connected to the indicator | Replace the entire reduction gear unit of the indicator |
| | Improper installment of sprocket or dislodged measuring tape | Open the gauge rear cover and perform an inspection |
| | Sunken float | Open the tank and replace it |
| Frequent indicator error | Deterioration of conster | Investigate any variance in the indicated values when operating the check handle and replace if deteriorated |
| | Corresponding to 2, 4, 5, and 6 in the previous section | Inspect the internal parts of the gauge head |
| | Loose indicator pointer | Remove the indicator cover and inspect the cap nut of the pointer |
| | Improper setting of tape guide | Check the gap between the sprocket and tape guide. |
| | Twisted measuring tape | Open the sheave elbow cover, forcefully pull out the measuring tape to inspect it, and repair it if necessary |
| Discrepancy between measured values and indicated values | Gauge error | Perform the inspection in the preceding section and implement measures |
| | No gauge error | Various problems caused by measurement |
| | | Effects of the measurement technique |
| | | Effects of sludge deposit |
| | | Effects of strong wind |
| | | Error in the measuring scale |
| Check handle does not turn or return to position | The check shaft is rusted | Clean the shaft and replace the entire check handle unit |
| | The spring in the check unit has deteriorated | Replace the spring |
| Check handle does not work (LT5-4/LT5-6) | The check handle set screw is loose | Tighten the set screw |
| | Broken check driver spring | Replace the entire check unit |
| | Tape drum does not move because a spring is caught in it | Repair manually or replace the entire check unit |
| Gas leak (LT5-4/LT5-6) | Compromised airtightness of the gauge head rear cover joint surface | Replace the packing or apply an end sealant to the joint surface |
| | Compromised airtightness at check handle shaft | Replace the seal metal |

# 9 Maintenance

## 9.1 Before performing maintenance

- Let tanks rest sufficiently before performing maintenance, especially tanks for flammable liquids (refer to the table below).
- When working on a flammable liquid tank, wear anti-static clothing, safety footwear, and gloves.
- Perform maintenance in the presence of a safety controller.

| **Conductivity of charged object (S/m)** | **Flammable liquid examples** | **Volume of charged object ($m^3$)** | | | |
|---|---|---|---|---|---|
| | | **10 or less** | **10 to 50** | **50 to 5000** | **5000 or more** |
| $10^{-8}$ or higher | Acetic acid<br>Ethanol<br>Ethyl chloride<br>Methanol<br>Light oil | 1 minute or longer | 1 minute or longer | 1 minute or longer | 1 minute or longer |
| $10^{12}$ to $10^{-8}$ | Vinyl acetate<br>Toluene<br>Benzene<br>Gasoline | 2 minutes or longer | 3 minutes or longer | 10 minutes or longer | 30 minutes or longer |
| $10^{-14}$ to $10^{-12}$ | Methyl cyclohexane | 4 minutes or longer | 5 minutes or longer | 60 minutes or longer | 120 minutes or longer |
| $10^{-14}$ or lower | Carbon tetrachloride | 10 minutes or longer | 10 minutes or longer | 120 minutes or longer | 240 minutes or longer |
| | |  *Unit of measurement mm (in)* |  *Unit of measurement mm (in)* |  *Unit of measurement mm (in)* | |

## 9.2 Periodic inspection

Perform periodic inspection according to the procedures in the table below.

| Product / Component | Inspection item | Inspection method |
|---|---|---|
| Gauge head (for all LT) | Corrosion check and cleaning of tape protective pipe | Open the rear cover of the gauge head and check the state of rust deposition. |
| | | If necessary, remove rust by tapping the protective pipe with a wooden hammer. |
| | Bearing and engagement of reduction gear in the indicator | Remove the indicator cover, rotate the reduction gear, and check if the engagement play is within 1 mm (0.04 in). |
| | | Similarly, check the wear on the bearing. |
| | Friction on tape drum and sprocket | Open the rear cover of the gauge head, check the degree of wear of the bearing in each drum as well as deposition of rust and dust, and clean them. |
| | Characteristic change of conster | Use the check handle to investigate. If the indicated value is not consistent, remove any deposits on the conster. |
| | | If this does not fix the problem, replace it with a new one. |
| | Condensation and fogging of indicator window | Check to make sure that the indicator cover is tightened properly and that there is no foreign matter lodged in the packing surface. |
| | Check handle inspection | Check to make sure that the check handle returns to the original position after it is pushed in and then released. |
| Gauge head (LT5-4/LT5-6) | Inspection of the check handle unit | Inspect the check spring inside the gauge head for any deformation and check the operation condition as well. |
| | Magnet coupling inspection | Remove the sprocket and completely remove any rust or debris (once or twice a year). |
| | Leaky packing inspection for gauge head | Check airtightness using soapy water. |
| Sheave elbow | Wear on sheave elbow | For the sheave elbow, remove the measuring tape from the roller surface and check to ensure that it rotates smoothly. |
| | | Remove the bearing and check for wear. |
| | | Clean any deposits from the guide roller. |

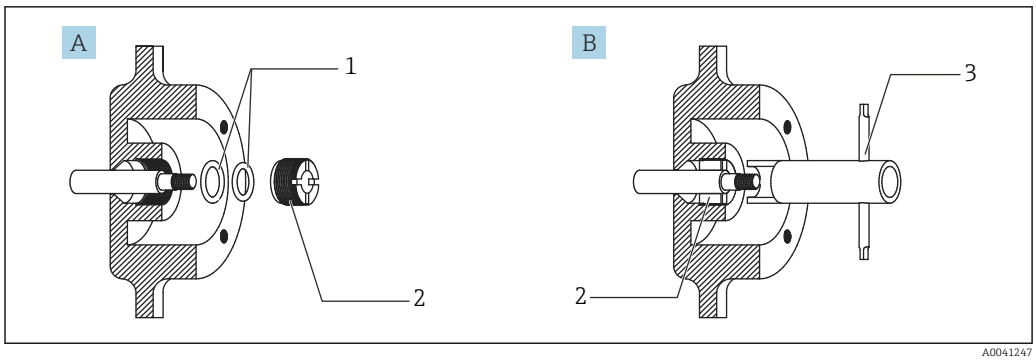
## 9.3 Replacement of O-ring for transmitter (LT5-4/LT5-6)

If gas begins leaking from the main unit side, sealing O-rings must be replaced. The following procedure must be performed carefully due to the tank being under pressure from within.

### Replacement procedure

1. Close the gate valve at the top of the tank.
2. Gradually release all residual pressure inside the LT main unit and pipes.
3. Remove the rear cover of the main unit.
4. Remove the transmitter if attached.
5. Remove the coupling on the LT side. Remove the gland using the included gland fixing tool and remove the two O-rings.
6. When replacing O-rings, replace any other parts that are worn.
7. Replace the O-rings and then tighten the gland. Reassemble the unit by following the above procedure in reverse order.
8. Gradually open the gate valve.
   ↳ Opening the gate valve abruptly will release a sudden burst of air from the system, which may result in damage to the measuring tape.

This completes the replacement procedure.




*65 Replacement of O-rings*

*A Before tightening*
*B After tightening*
*1 O-ring*
*2 Gland*
*3 Gland fixing tool*

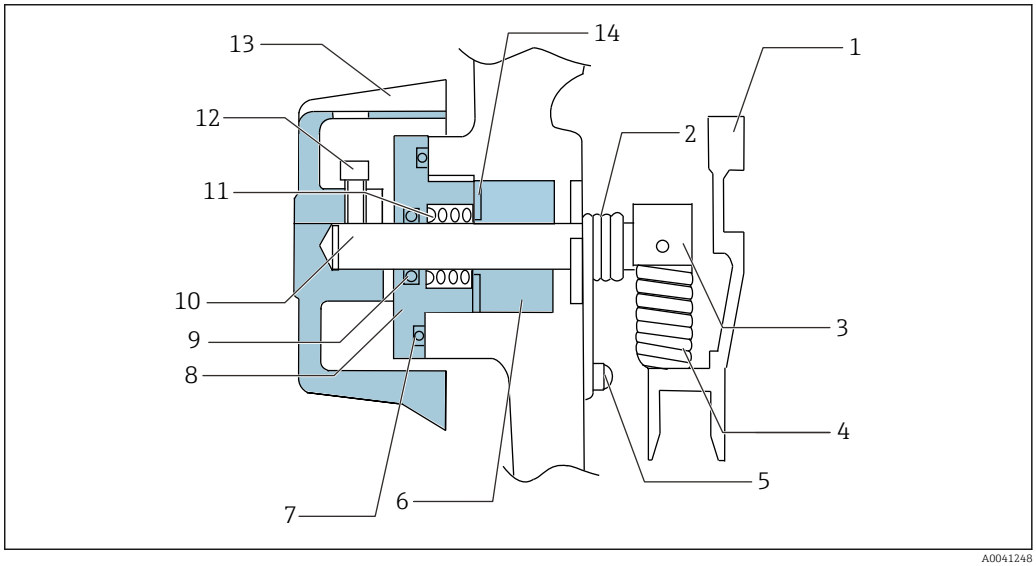
## 9.4 Replacement of the check handle unit (LT5-4/LT5-6)

The check handle unit is an important mechanism for checking the LT's operation status, and it is prone to wear and tear as it is used frequently. It is designed so that each part can be replaced easily if it becomes worn.

### Replacement procedure

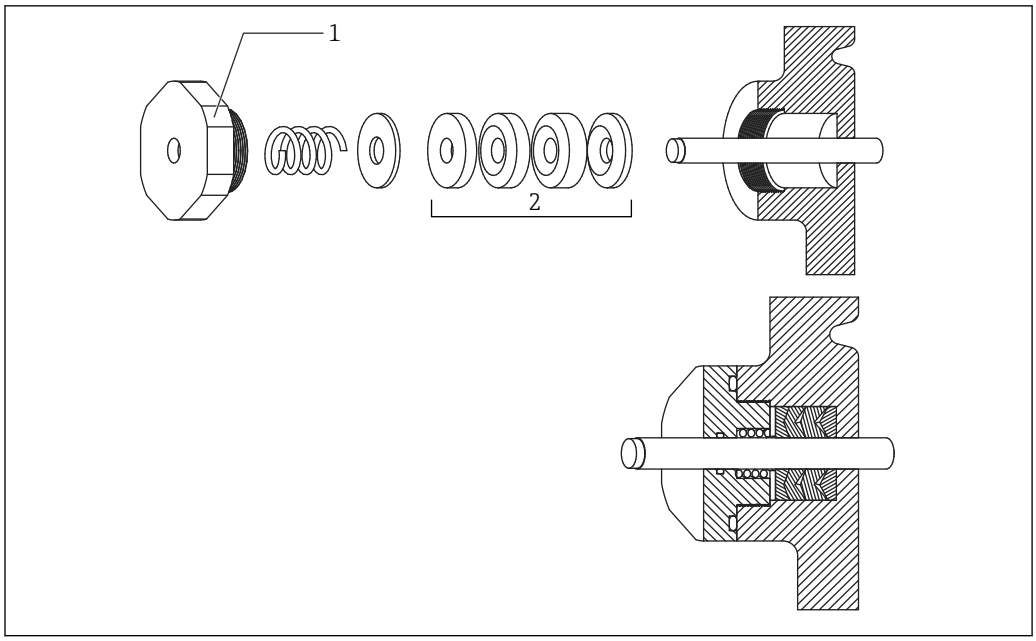
1. Remove the LT rear cover and the tape drum.
2. Loosen the socket head screw on the check handle and remove the check handle.
3. Remove the gland clamp with a No. 46 wrench or a monkey wrench.
4. Remove the gland spring, collar, and seal metal.
5. Pull out the check shaft toward the tape drum.
6. Once the part has been replaced, reassemble by following the above procedure in reverse order.

This completes the replacement procedure.




66 *Names of the check handle unit*

*1 Tape drum*
*2 Check spring*
*3 Check boss*
*4 Spring*
*5 Spring holder screw*
*6 Seal metal*
*7 O-ring*
*8 Gland clamp*
*9 O-ring*
*10 Check shaft*
*11 Gland spring*
*12 Socket head screw*
*13 Check handle*
*14 Collar*




*67 Check handle unit*

*1 Gland clamp*
*2 Seal metal*

# 10 Repair

## 10.1 General information on repairs

### 10.1.1 Repair concept

The Endress+Hauser repair concept assumes that the devices have a modular design and that repairs can be done by the Endress+Hauser Service Department or specially trained customers.

Spare parts are contained in suitable kits. They also come with relevant replacement instructions.

For more information on service and spare parts, contact the Service Department at Endress+Hauser.

### 10.1.2 Repairs to Ex-approved devices

**⚠ WARNING**

**Incorrect repair can compromise electrical safety!**
Explosion hazard!

- Only specialist personnel or the manufacturer's service team may carry out repairs on Ex-certified devices in accordance with national regulations.
- Relevant standards and national regulations on hazardous areas, safety instructions and certificates must be observed.
- Only use original spare parts from the manufacturer.
- Please note the device designation on the nameplate. Only identical parts may be used as replacements.
- Carry out repairs according to the instructions.
- Only the manufacturer's service team is permitted to modify a certified device and convert it to another certified version.

## 10.2 Spare parts

Some replaceable device components are clearly listed on the overview label found on the terminal unit cover.

The spare parts overview label contains the following information:
- List of major device spare parts (including ordering information for the spare parts)
- URL of *W@M Device Viewer* (www.endress.com/deviceviewer):
  All spare parts for the device are listed together with their order codes so that you can order them. If available, users can also download the associated Installation Instructions.

## 10.3 Endress+Hauser services

Endress+Hauser offers a wide range of services.

Your Endress+Hauser Sales Center can provide detailed information on the services.

## 10.4 Return

The requirements for safe device return can vary depending on the device type and national legislation.

1. Refer to the web page for information:
   http://www.endress.com/support/return-material
   ↳ Select the region.
2. Return the device if repairs or a factory calibration are required, or if the wrong device was ordered or delivered.

## 10.5 Disposal

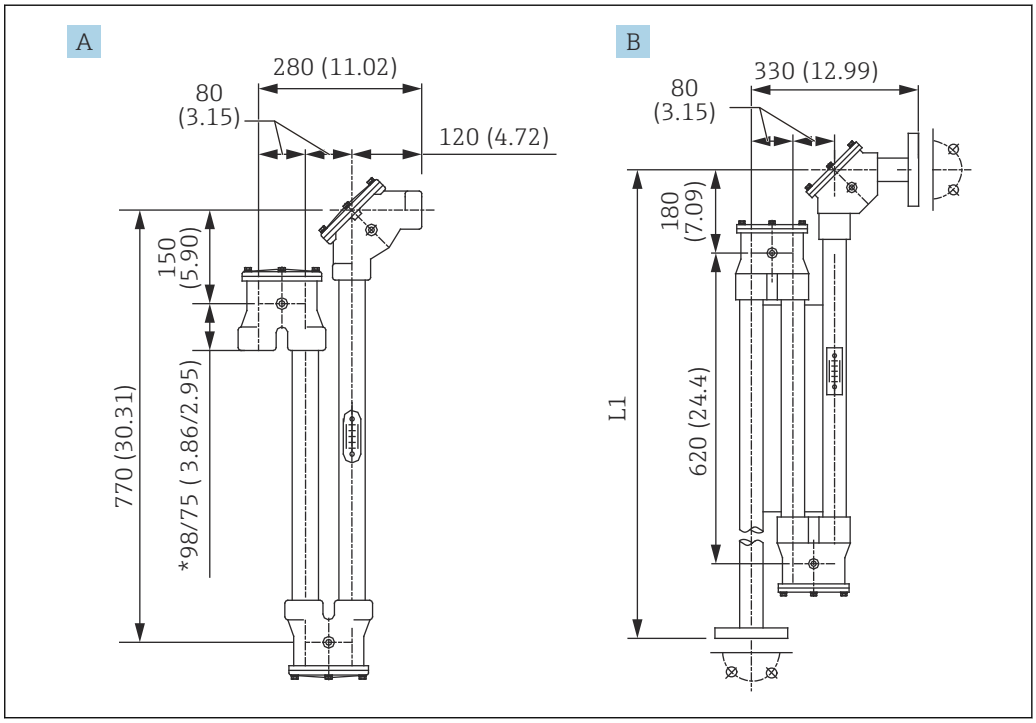
Observe the following notes during disposal:
- Observe valid federal/national regulations.
- Ensure proper separation and reuse of the device components.

# 11 Accessories

## 11.1 Seal pot

A seal pot is filled with liquid sealant to prevent vapor from escaping the tank.

| | |
|---|---|
| **Liquid sealant** | Flow paraffin (spindle oil): When an LT5 that comes with a 1 150 cc seal pot is selected, liquid sealant is also included. |
| **Maximum sealing pressure** | 400 mm $H_2O$ |
| **Form** | U-shaped |
| **Connection specification** | Screw-in type / flange type |




*68 Seal pot. Unit of measurement mm (in)*

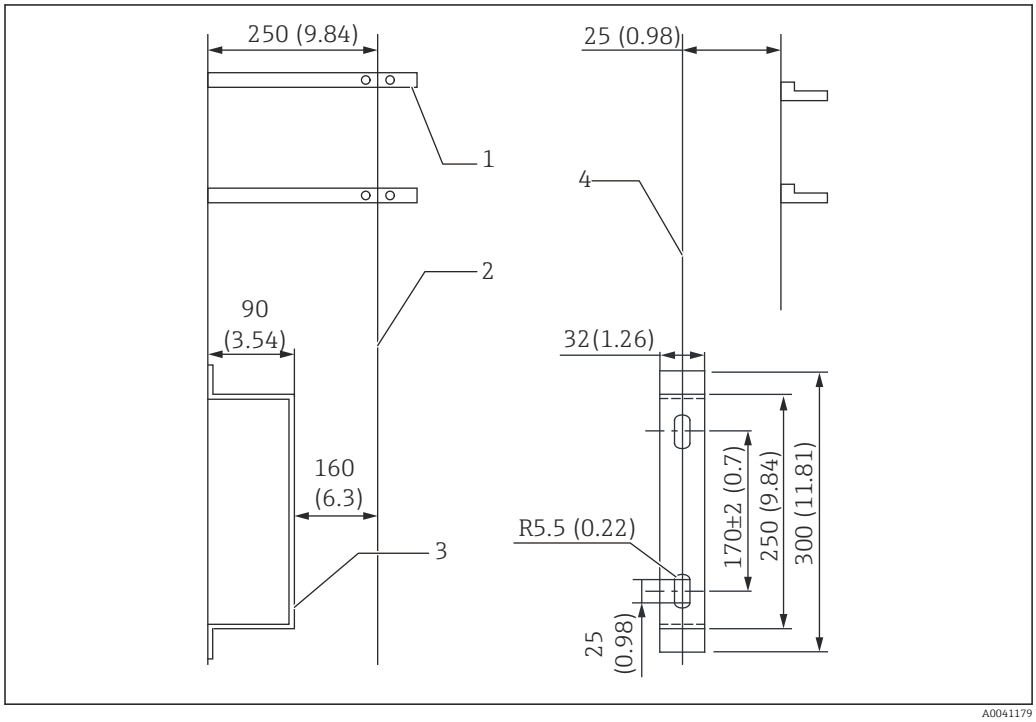
*A Seal pot (select from aluminum + iron / SCS14+SUS316)*
*B Seal pot (PVC: flange type only)*
*L1 Tape + wire: 1 500 mm (59.06 in) / tape only: 960 mm (37.8 in)*

For seal pot 98 / 75, 98 mm (3.86 in) is the dimension of an aluminum seal pot while 75 mm (2.92 in) is the dimension of a stainless steel seal pot.

## 11.2 Gauge supporter

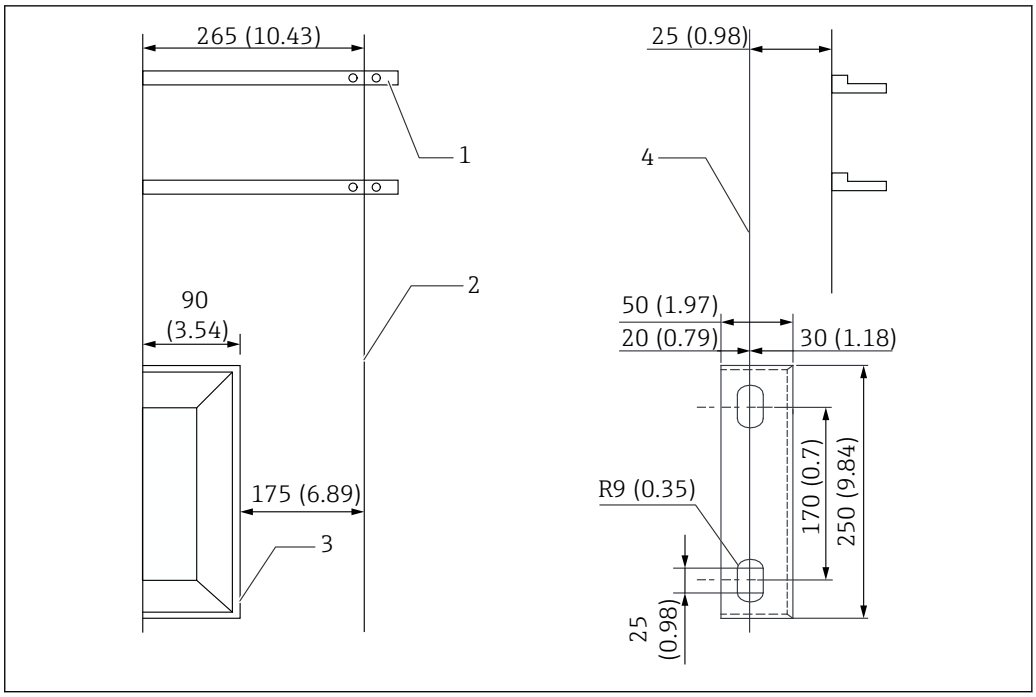
A gauge supporter is used for mounting the gauge on the external wall of a tank. Note that pipe supporters are not supplied.

The distance from the outer tank wall to the gauge head center is 15 mm (0.59 in) longer for LT5-6 (high-pressure gauge head) compared to LT5-1 (low-pressure gauge head) and LT5-4 (medium-pressure gauge head).




69 *Gauge supporter (for low and medium pressure). Unit of measurement mm (in)*

1 *Pipe supporter (not supplied)*
2 *Center line for mounting*
3 *Gauge supporter (based on the selected option SS400: t = 4.5 / SUS304: t = 4.0)*
4 *Center line of the gauge supporter*




*70 Gauge supporter (for high pressure). Unit of measurement mm (in)*

*1 Pipe supporter (not supplied)*
*2 Center line for mounting*
*3 Gauge supporter (based on the selected option SS400: t = 4 / SUS304: t = 4.0)*
*4 Center line of the gauge supporter*

## 11.3 Guide pipe

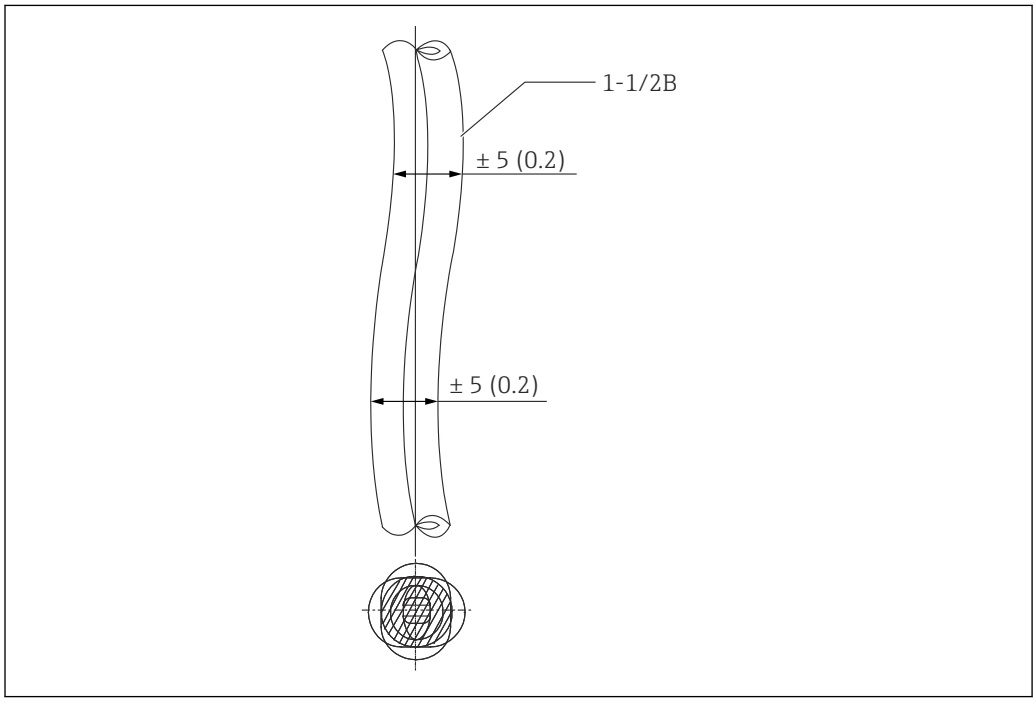
### 11.3.1 Guide pipe selection and mounting

Guide pipe mounting is required for most applications, except for tank top and underground applications. Guide pipes are generally used in three areas:

- Gauge head to sheave elbow
- Sheave elbow to sheave elbow
- Sheave elbow to tank roof

#### Precautions regarding mounting

- Guide pipes and pipe supporters are not supplied by Endress+Hauser.
- Keep the bend in the guide pipe to 5 mm (0.17 in) or less.
- The space between two sheave elbows (piping distance) must not exceed 2.5 m (8.2 ft).




71 *Mounting guide pipes. Unit of measurement mm (in)*

NOTICE

**Recommended materials for guide pipes**

▶ Only use galvanized SGP (white pipe) or SGPW for guide pipes. When the application involves use of a corrosive gas, use of rigid PVC pipes, stainless steel pipes, or resin inner lining is recommended.

## 11.4 Mounting and enclosed accessories

*Ordering information: 610 mounting accessories*

| | | |
|---|---|---|
| NA | Copper-free gearing | If copper materials are used in the gear mechanism for whatever reason, the material is switched to something else, such as aluminum or stainless steel. The magnet coupling and drain plug sealant will be changed from NBR to CR. It is effective for applications such as those involving ammonia.<br>As a general rule, copper materials cannot be used for the gear mechanism. |
| NB | Custody transfer seal | This is an option in which a hole is created on the rear cover of the main unit and the bolt for the display cover. Subsequent to bonded approval, a displacer wire for sealing may be inserted. |
| NC | Fixed tape guide (aluminum) | This is an option for securing the tape inside so that it does not become detached.<br>Standard LT5-1 is made of stainless steel.<br>Aluminum LT5-4 and LT5-6 are mounted as a standard item.<br>For applications where there is a risk of hunting on the float, we recommend an aluminum material regardless of the low-, medium-, or high-pressure specifications. |
| ND | Dust guard | This is an internal component that prevents dust, which is generated when iron pipes are used, from entering the gear inside the gauge head.<br>LT5-4 and LT5-6 are mounted as standard items. |
| NE | Conster winding drum: Aluminum | This is a conster winding drum made of aluminum.<br>It is effective when a standard conster winding drum made of Bakelite cannot be used.<br>An aluminum conster winding drum is standard for LT5-4 and LT5-6. |

*Ordering information: 620 enclosed accessories*

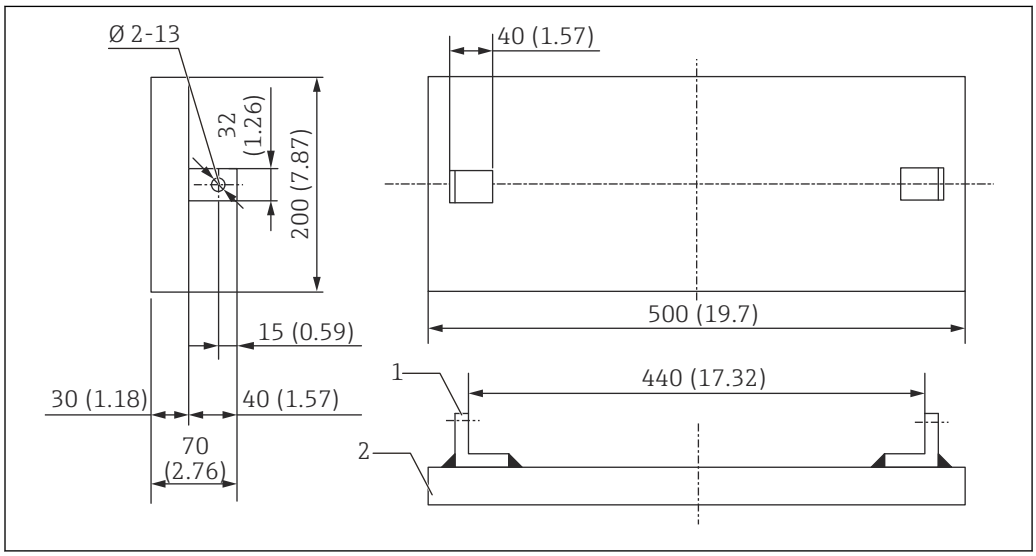
| | | |
|---|---|---|
| PE | FRT wire guide metal | This wire guide is installed on the floating roof. It protects the measuring wire from wear due to contact with the roof. |
| PF | Wire guide socket Rc 1-1/2 | This is a socket for mounting on the pipes of a floating roof tank or a gas holder tank. It protects the measuring wire from wear due to contact with the pipes. |
| PG | Wire guide socket NPT 1-1/2 | |
| PH | Gas holder wire hook | This hook is welded onto a gas holder tank and connected to a measuring wire. |

## 11.5 Anchor weight

When an anchor hook cannot be installed at the bottom of the tank (such as when there is liquid inside the tank), use an anchor weight to keep the guide wire taut.

| | |
|---|---|
| **Materials** | SS400 / SUS316 |
| **Weight** | Approx. 23 kg (50.71 lb) |

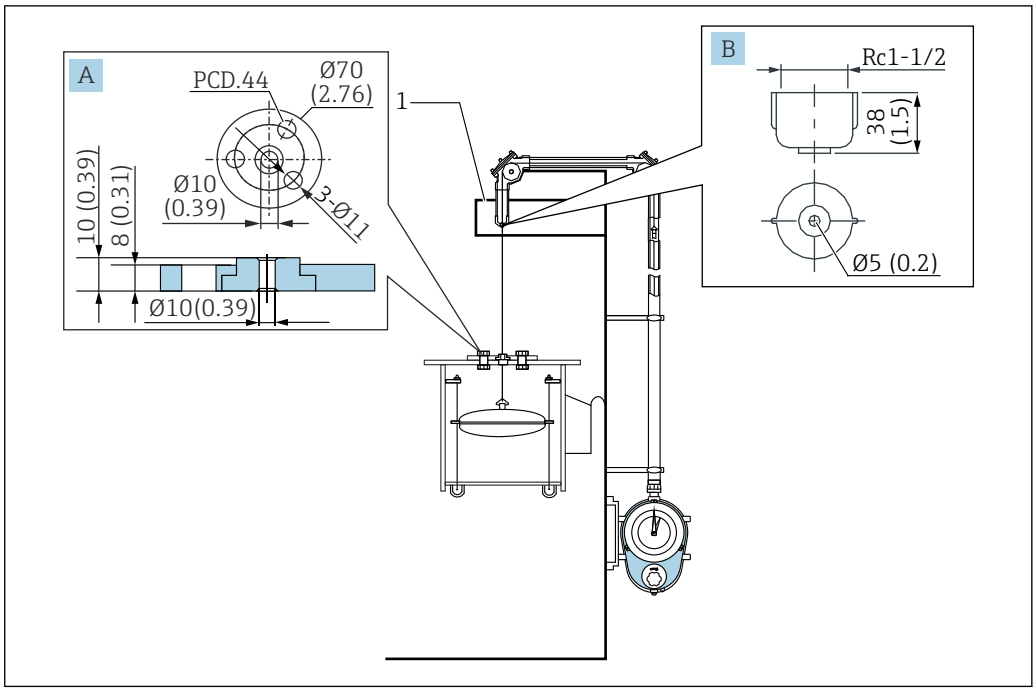
Special specification is required in order to use this anchor weight.




72 *Anchor weight. Unit of measurement mm (in)*

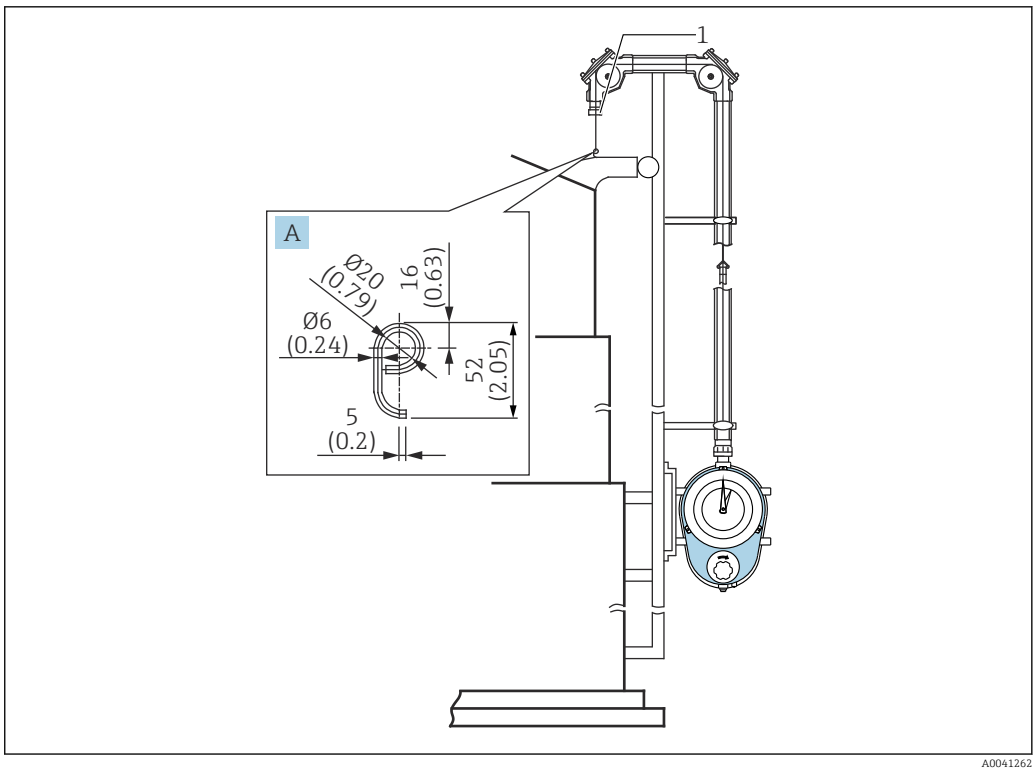
*1 Anchor hook*
*2 Anchor weight*

## 11.6 Wire guide metal and wire guide socket




73 *Wire guide metal and wire guide socket. Unit of measurement mm (in)*

*A Wire guide metal*
*B Wire guide socket*
*1 Roof stand*




74 *Wire hook and wire guide socket. Unit of measurement mm (in)*

*A Wire hook*
*1 Wire guide socket*

# Index

## Symbols



## A



## C



## D



## E



## F



## G



## H



## I



## L



## M



## O



## P



## R

## S



## T



## U



## W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