

Operating Instruction

LT5

Float Level Gauge

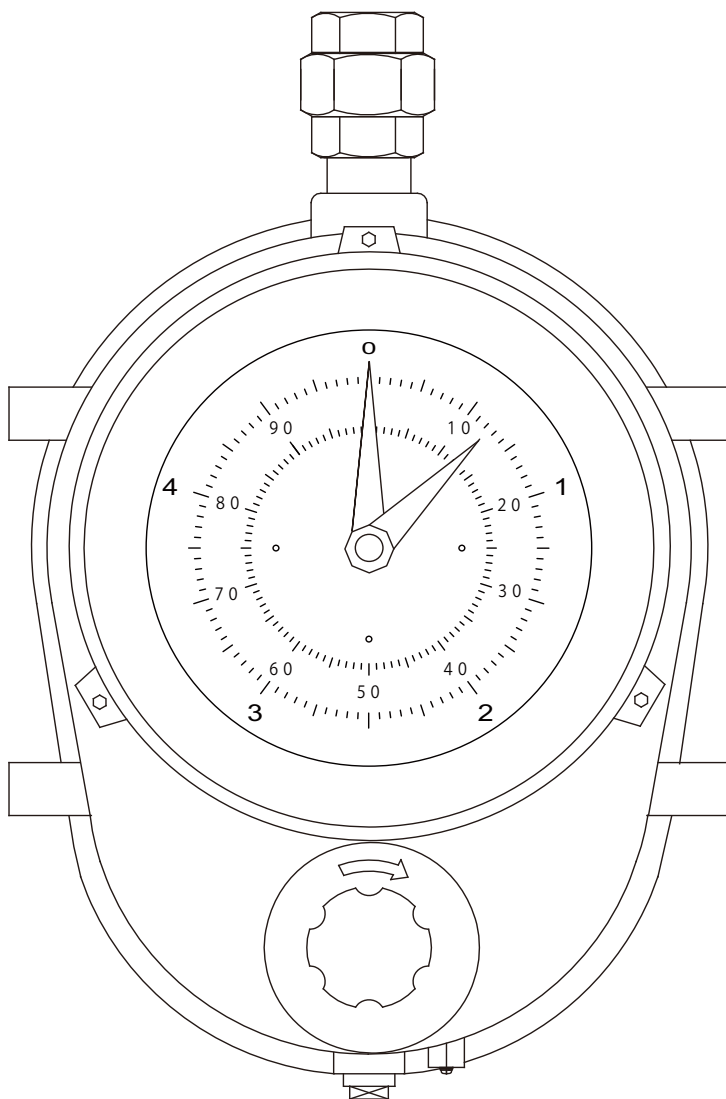


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1 Safety instructions

1.1 Designated use

The Float Tank Gauge LT5-1 perform an important role in all areas of industry. Many years of operation in wide variety of applications have proven their reliability. No electrical power is required to perform the measurement. In addition, LT series can be installed easily in your site and can measure the liquid level accurately, and can be used for the detector of the remote command. Therefore LT series are best suited for use in the following operations.

- Management of Inventory
- Batch Process
- Management of Process Tank
- Safety Drive of Tanks

1.2 Installation, commissioning, and operation

- Mounting, electrical installation, start-up, and maintenance of the instrument may only be performed by trained personnel authorized by the operator of the facility.
- Personnel must read and understand these installation instructions before performing the procedures.
- The instrument may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual must be observed.
- The installer must make sure that the measuring system is correctly wired according to the wiring diagrams. The measuring system must be grounded.
- Observe all law and regulations applicable and valid for your country and pertaining to the opening and repairing of electrical devices.
- Always be sure to wear gloves when installing any device.

1.3 Operational safety



WARNING

Changes or modifications other than those expressly approved by Endress+Hauser are strictly prohibited. Unauthorized modifications can cause malfunction or damage, resulting in serious injury or death.

1.4 Notes on safety conventions and symbols

To highlight safety-relevant or alternative operating procedures in this manual, the following conventions have been used, each indicated by a corresponding symbol on the left.

Symbol	Meaning
 DANGER A0011189-EN	DANGER! This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
 WARNING A0011190-EN	WARNING! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
 CAUTION A0011191-EN	CAUTION! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
 NOTICE A0011192-EN	NOTICE! This symbol contains information on procedures and other facts which do not result in personal injury.

1.5 Symbols for certain types of information

Symbol	Meaning
 A0011182	Allowed Indicates procedures, processes or actions that are allowed.
 A0011183	Recommendation Indicates procedures, processes or actions that are recommended.
 A0011184	Forbidden Indicates procedures, processes or actions that are forbidden.
 A0011193	Tip Indicates additional information.

2 Identification

2.1 Device designation

2.1.1 Nameplate

The following technical data are given on the instrument nameplate:

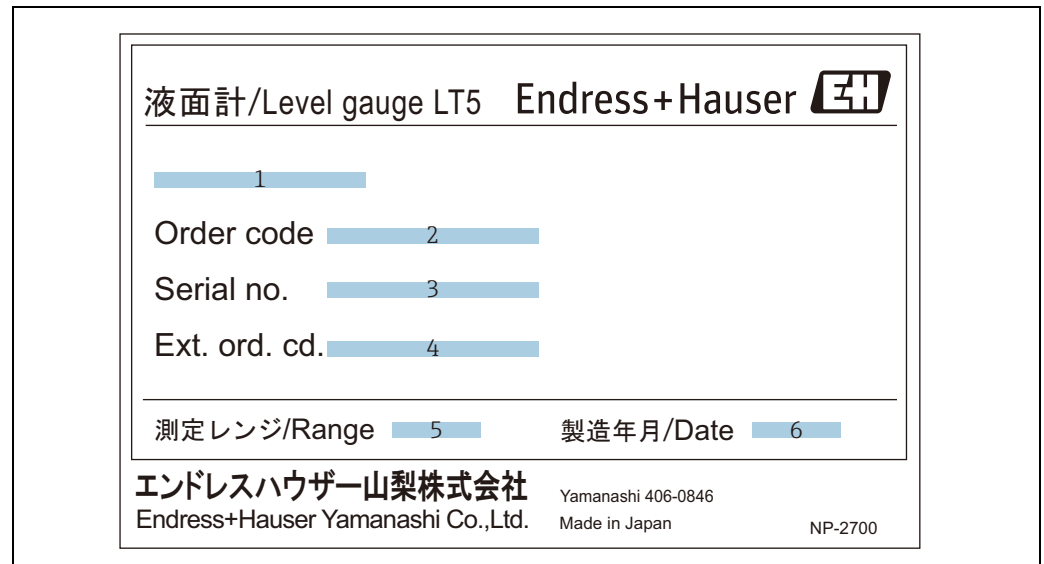


Figure 1: Nameplate

2.2 Order information

Detailed ordering information is available from the following sources:

- In the Product Configurator on the Endress+Hauser website: www.endress.com -> Click "Corporate" -> Select your country -> Click "Products" -> Select the product using the filters and search field -> Open product page -> The "Configure" button to the right of the product image opens the Product configurator.
- From your Endress+Hauser Sales Center: www.addresses.endress.com Product Configurator - the tool for individual product configuration
- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

2.3 Scope of delivery

It is extremely important to follow the instructions concerning the unpacking, transportation and storage of measuring instruments provided in the chapter "3.1 Incoming Acceptance, Transportation, Storage". Delivered Items vary depending on the product specifications (refer to "3.9 General View of Standard Drawings and Order Codes").

Accompanying documentation:

- Operating Instructions (this manual)

2.3.1 Standard packing layout with carton box

The packing layout and its procedure are vary depending on the order codes.
The flange type of the sheave elbow is delivered separately.

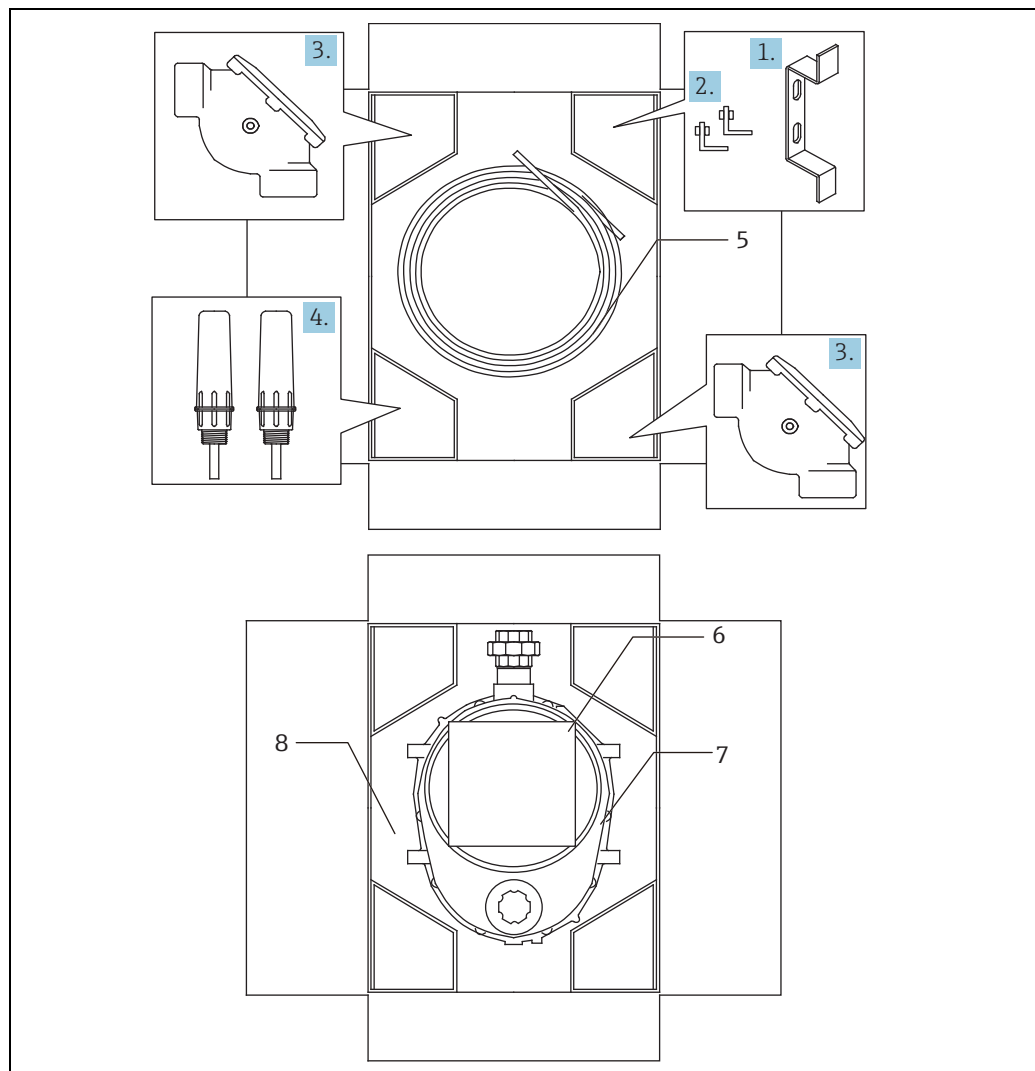


Figure 2: Packing layout

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

3 Installation

3.1 Incoming acceptance, transport, storage

3.1.1 Incoming acceptance

Check the packing and contents for any signs of damage.

Check the shipment, and make sure that nothing is missing and that the items match your order.

3.1.2 Transportation

WARNING

- Follow the safety instructions and conditions of transportation for instruments in excess of 18kg (40 lbs.).
- Do not lift the measuring instrument by its head (union or flange) during unpacking.

3.1.3 Storage

Pack the measuring instrument so that it is protected against impacts during storage and transportation. The original packing material provides the optimum protection for this.

The allowed storage temperature is -20 to +70 °C.

3.2 Installation location

Be sure to perform the following operation prior to installation of LT.



- LT series should be installed in a place where meter can be easily read.
- The float must be installed so it is positioned near the tank sidewall.
- In a spherical tank, the float must be installed so that it is positioned in line with the center of the tank.
- When installing LT on tanks that have a dome roof with a steep incline, the float must be installed so it is positioned in line with the center of the tank.
- Use an appropriate gasket on flange connection to maintain airtightness.



WARNING

The float should be positioned as far from the tank inlet or stirrer as possible, so that the waves, which caused by liquid inflow, do not directly impact the float. If there is no choice but to position the float near an inlet or stirrer, install a wave guard to protect the float. If liquid flows into the tank abruptly, the float line may be severed.

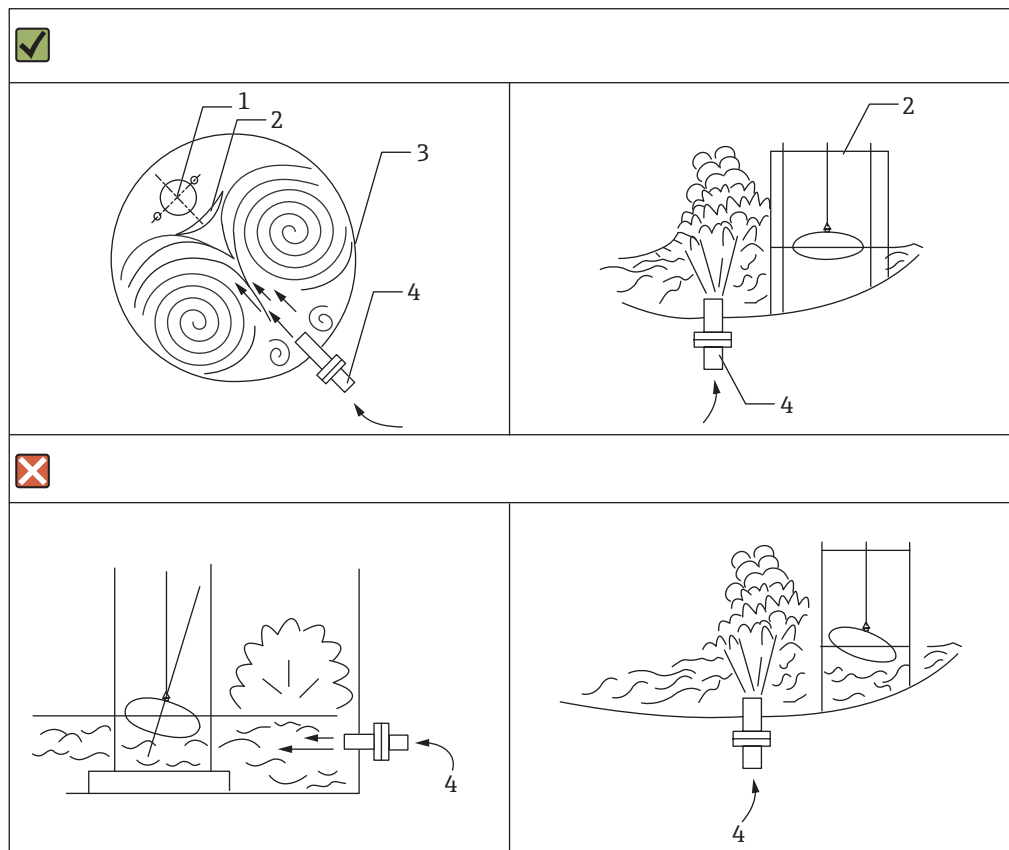


Figure 3: Setup Condition

1. Center of float
2. wave guard
3. Tank
4. Liquid inlet

3.3 Installation tool

When installing LT5, prepare the following tools.

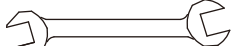
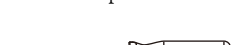
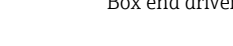
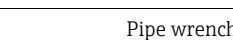
Tool	Usage of tool	LT5-1 (Low/Threaded type)	LT5-1 (Low/Threaded type)	LT5-4	LT5-6
 Box end wrench	13 mm (0.51 in): Sheave elbow cover removal	●	●	●	—
	24 mm (0.94 in): Sheave elbow cover removal	—	—	—	●
	17mm (0.67 in): Gauge head installation	○	○	○	—
	24mm (0.94 in): Gauge head installation	—	—	—	●
	24 mm (0.94 in): JIS flange installation	—	◎	◎	◎
	21 mm (0.83 in): 150lbs flange installation				
	32 mm (1.26 in): 300lbs flange installation				
 Open end wrench	19mm (0.75 in): Tighten guide wire bolt & nut of top anchor, compressing tension spring	●	●	●	●
 Water pump plier	250 mm or more (9.84 in): Top anchor installation for threaded type	●	—	—	—
 Wire cutter	Cutting trim guide wire for appropriate length	●	●	●	●
 Phillips screwdriver	Mounting measuring tape clump tool Adjusting counter type display	○	○	—	○
 Box end driver	5.5 mm (0.22 in): Measuring tape clump 8 mm (0.31 in): Display cover	○	○	○	○
 Plier	Tightening measuring clump tool	○	○	○	○
 Metal scissors	Cutting trim measuring tape	○	○	○	○
 Pipe wrench	600 mm or more (23.62 in): Guide pipe installation	○	—	—	—

Figure 4: Tools to be prepared



- : Use on tank roof
- : Use at ground level
- ◎ : Use at both on the tank roof and at ground level
- : Not in use

3.4 Welding for gauge supporter

When welding the gauge supporter, refer to the diagram below. Pipe supporter is supplied by the customer.

 Distance between outer tank wall and gauge head (LT5-6 for high pressure) is 15 mm greater than for that of LT5-1 (for low pressure) and LT5-4 (for medium pressure).

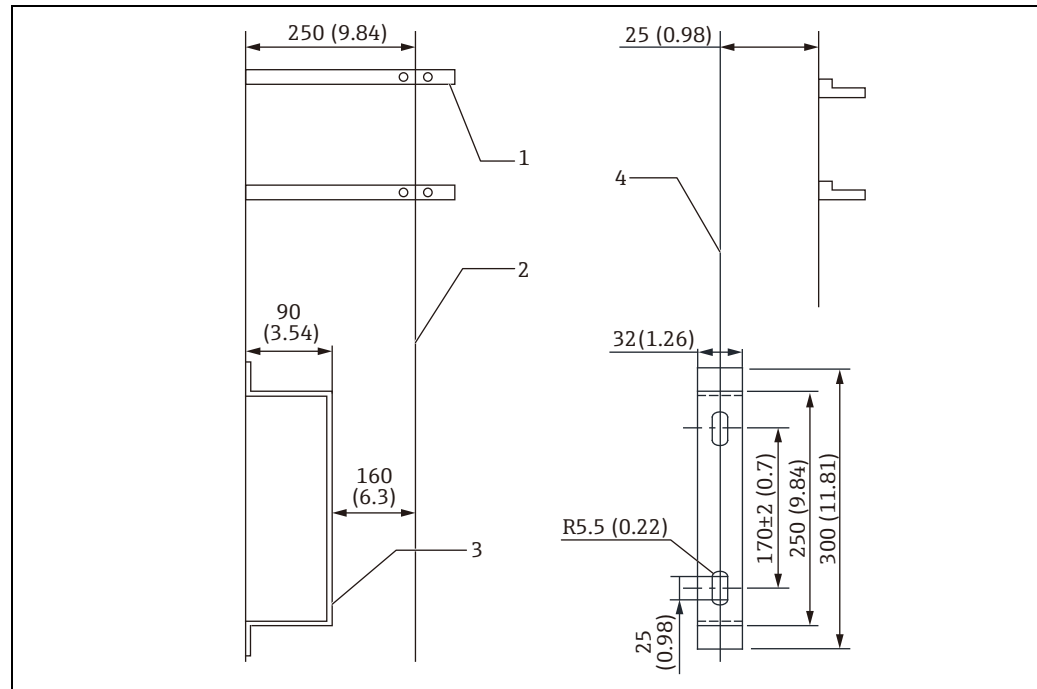


Figure 5: Gauge supporter (low and medium pressure) Unit: mm (in)

1. Pipe supporter (supplied by the customer)
2. Center line of mounting position
3. Center line of gauge supporter
4. Gauge supporter (select from SS400: $t = 4.5$ or SUS304: $t = 4.0$) with bolts

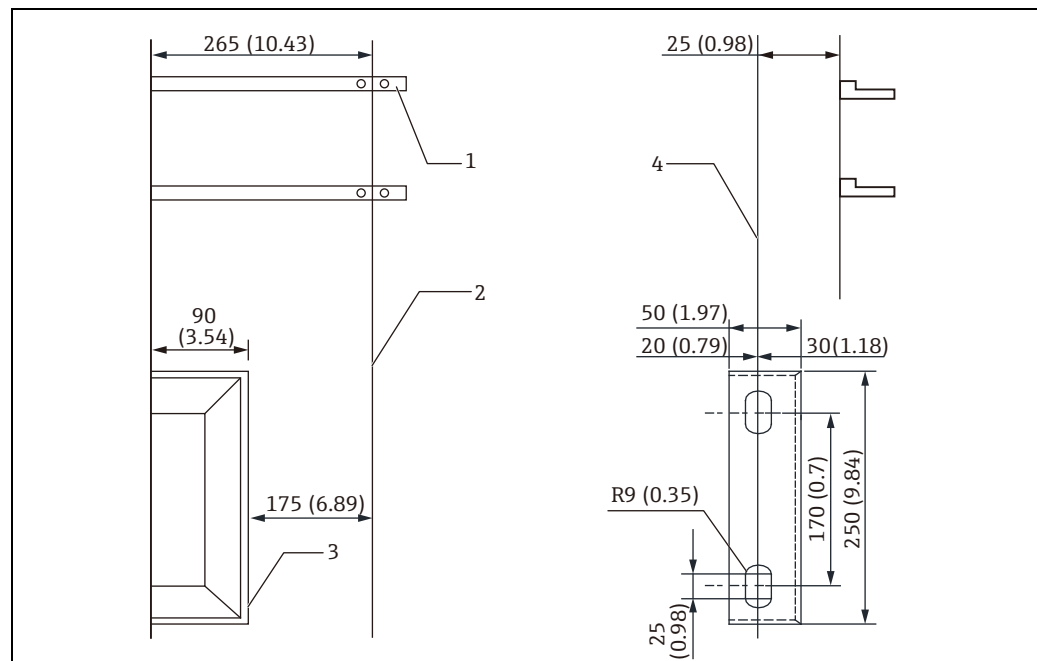


Figure 6: Gauge supporter (high pressure) Unit: mm (in)

1. Pipe supporter (supplied by the customer)
2. Center line of mounting position
3. Gauge supporter (select from SS400: $t = 4.0$ or SUS304: $t = 4.0$) with bolts
4. Center line of gauge supporter

3.5 Guide pipe

3.5.1 Guide pipe material and installation

Most LT installations will require the use of guide pipes, excluding tank top or underground applications. Pipe supporters are generally used in three sections as follows.

- Gauge head to elbow
- Elbow to elbow
- Elbow to tank roof



- The guide pipe and guide pipe supporter must be supplied by the customer.
- Vending of guide pipe must be 5 mm (0.17 in) or less.
- Spacing between the guide and the sheave elbow must be 2500 mm (98.43 in) or less.

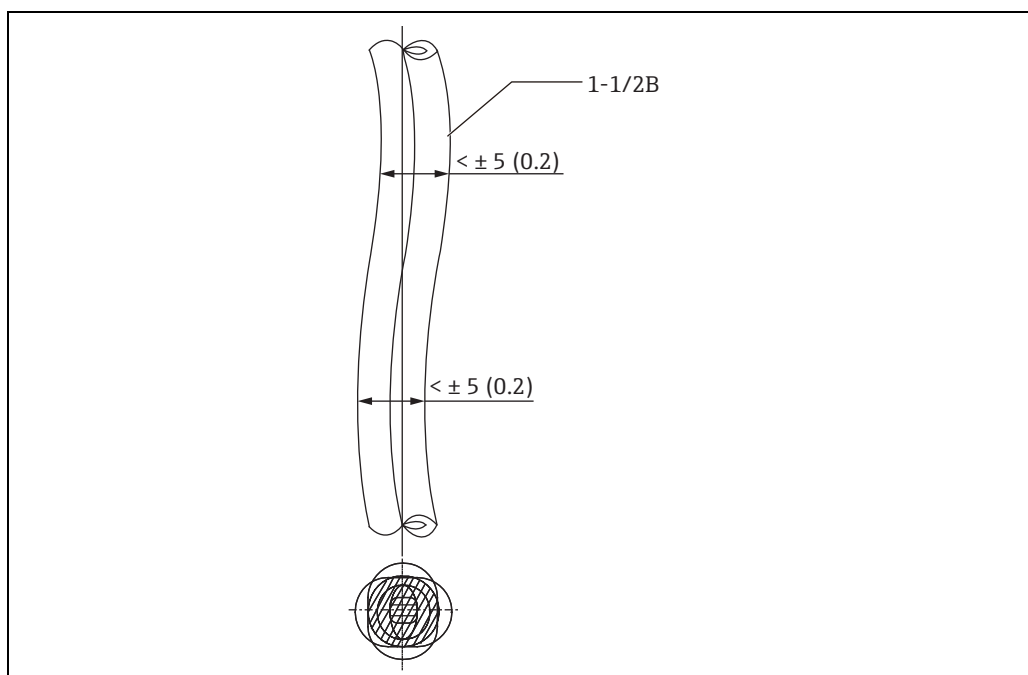


Figure 7: Attachment of guide pipe



Galvanized carbon steel pipe is recommended for use as guide pipes. When application is for extremely corrosive gas, using stainless steel or hard PVC pipe, containing a resin inner lining is recommended.

3.5.2 Guide pipe connection

NOTICE

- Use a PTFE sealing tape or gasket to maintain airtightness against gas or rain.
- Be sure connection between the guide pipe and the union is secure so that rain water does not enter LT5 from the union connection.
- Be sure that threaded connections are properly threaded to avoid a distorted or bent connection, and be sure that welded connections are straight with no burrs left on the inside.

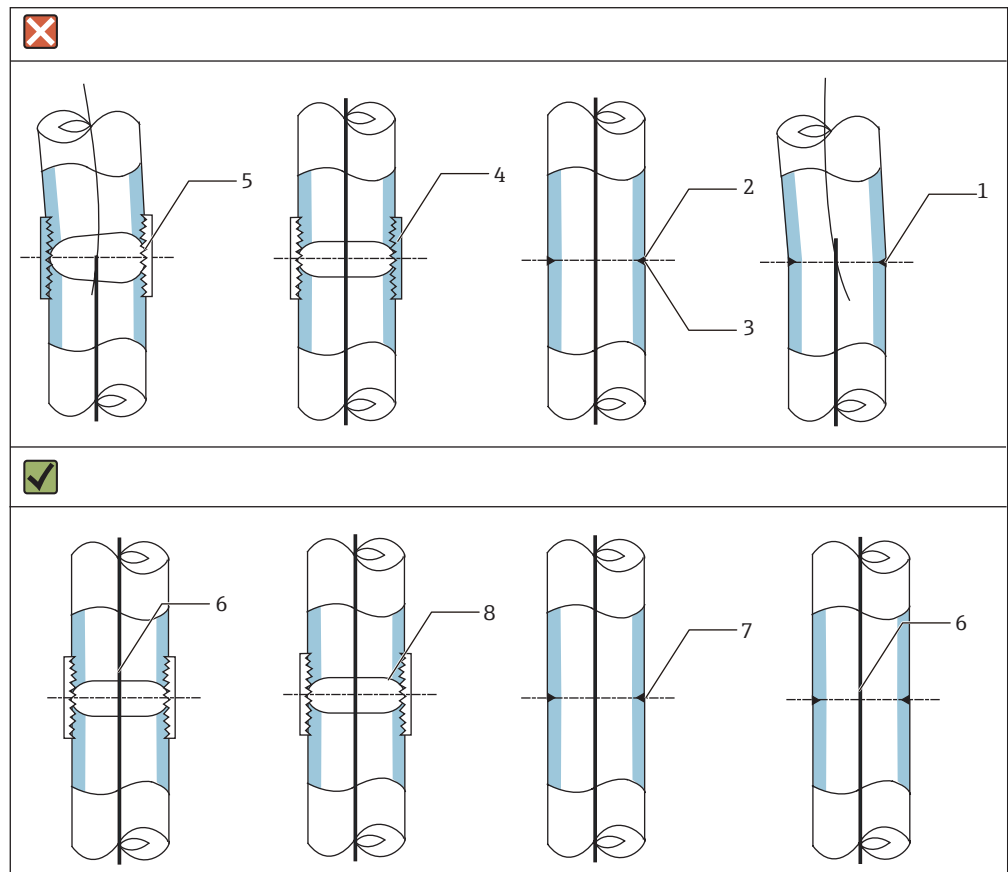


Figure 8: Guide pipe connection

1. Bending by welding
2. Welding part
3. Welding burr
4. Burr
5. Screw bending
6. Vertical line
7. Remove welding burr
8. Chamfering

3.6 Top anchor, hook and base plate setup location

When attaching the anchor hook, take the anchor hook down so that it is positioned vertically against the top anchor using a plumb.



The flange will be a socket type depending on specifications.

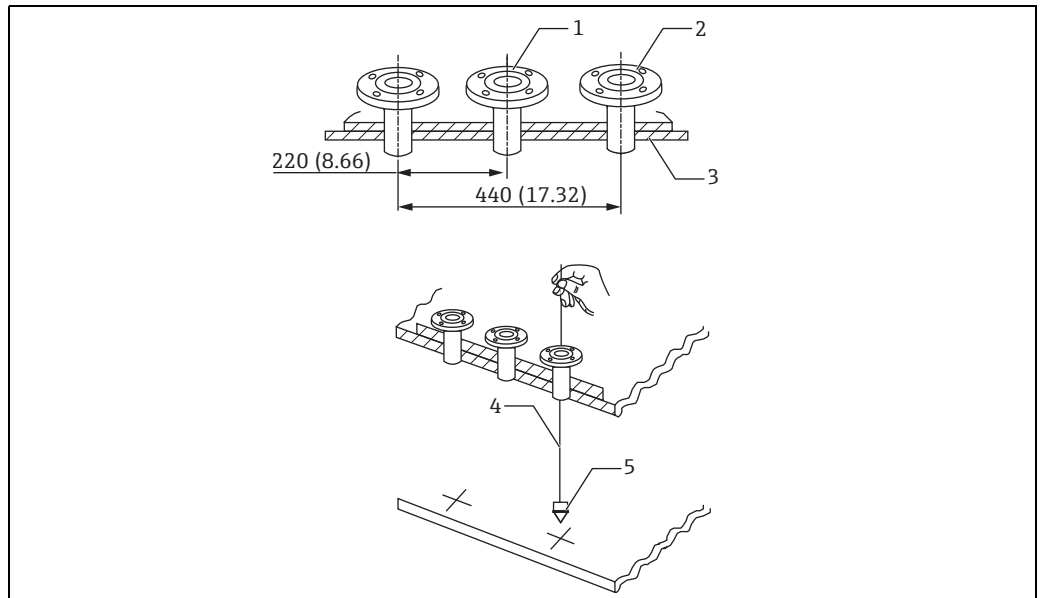


Figure 9: Confirmation for pre-installation of top anchor

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

Socket (threaded type)

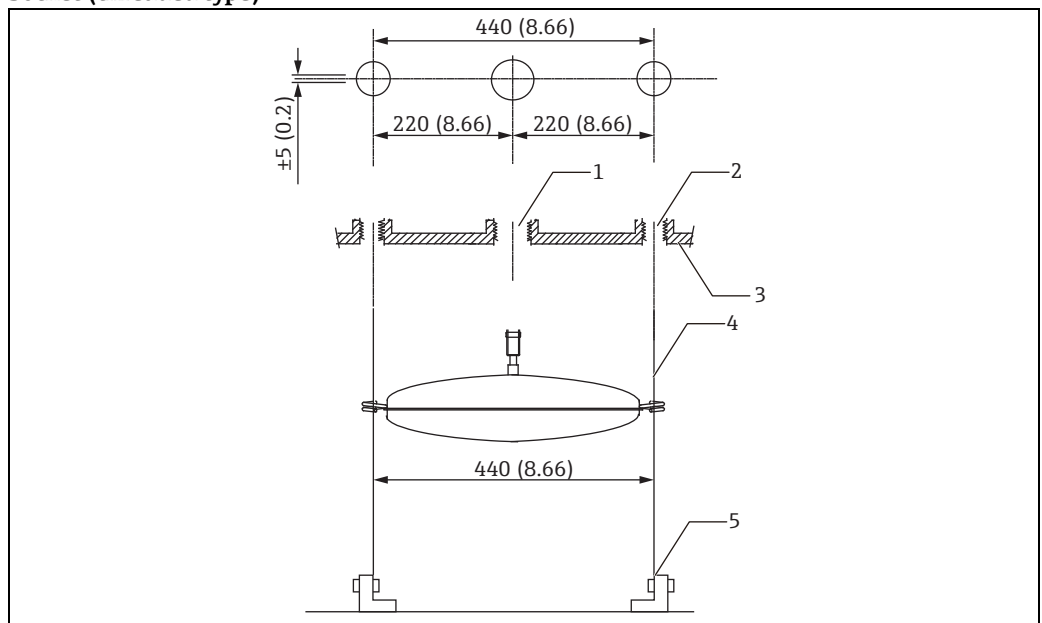


Figure 10: Attachment of anchor hook

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

3.7 Installation condition

3.7.1 Dimensions of LT5-1 (Threaded type/low pressure)

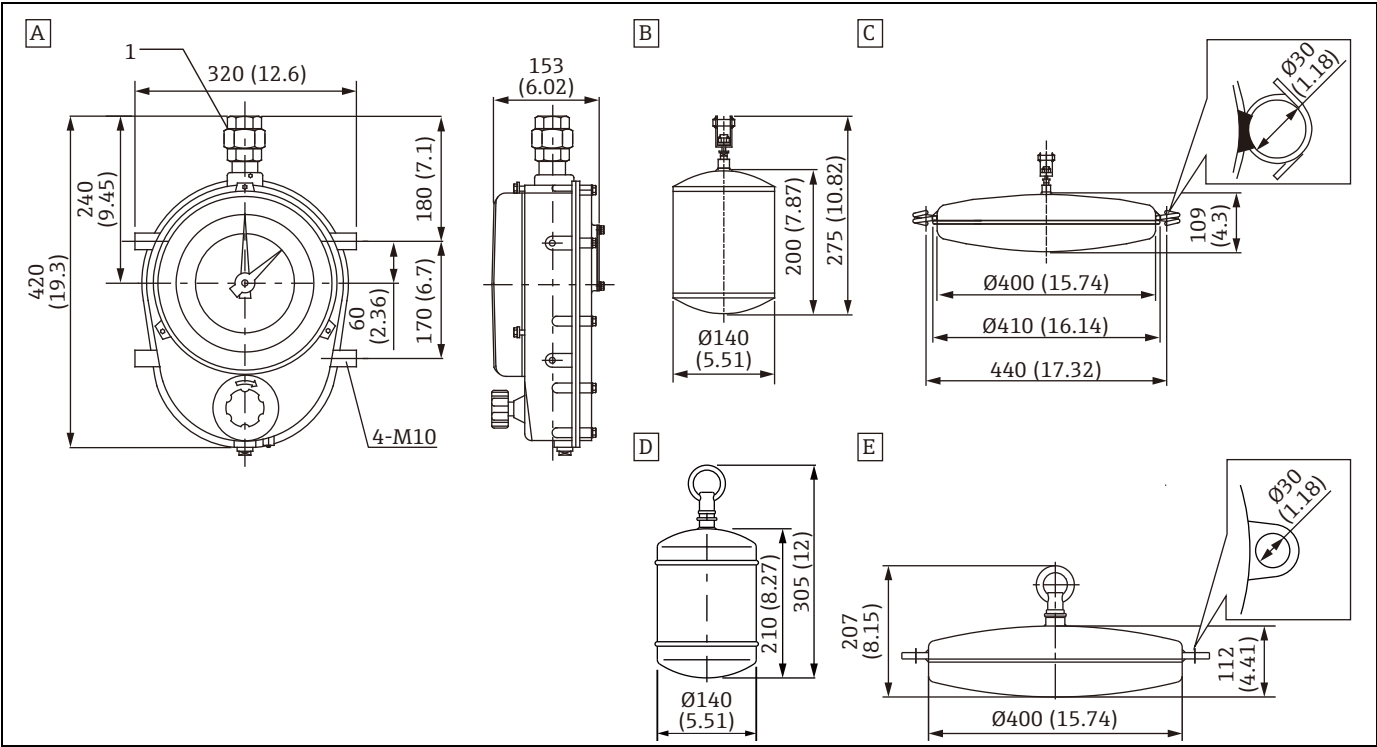


Figure 11: Dimensions of LT5-1, float, Unit: mm (in)

- A Gauge head (ADC12)
- B Float Ø140 (SUS316)
- C Float Ø400 (SUS316)
- D Float Ø140 (PVC)
- E Float Ø400 (PVC)
- 1. Union nut (select from JIS Rc 1-1, 2 /ANSI NPT 1-1/2, or Rp 1-1/2 without union nut)

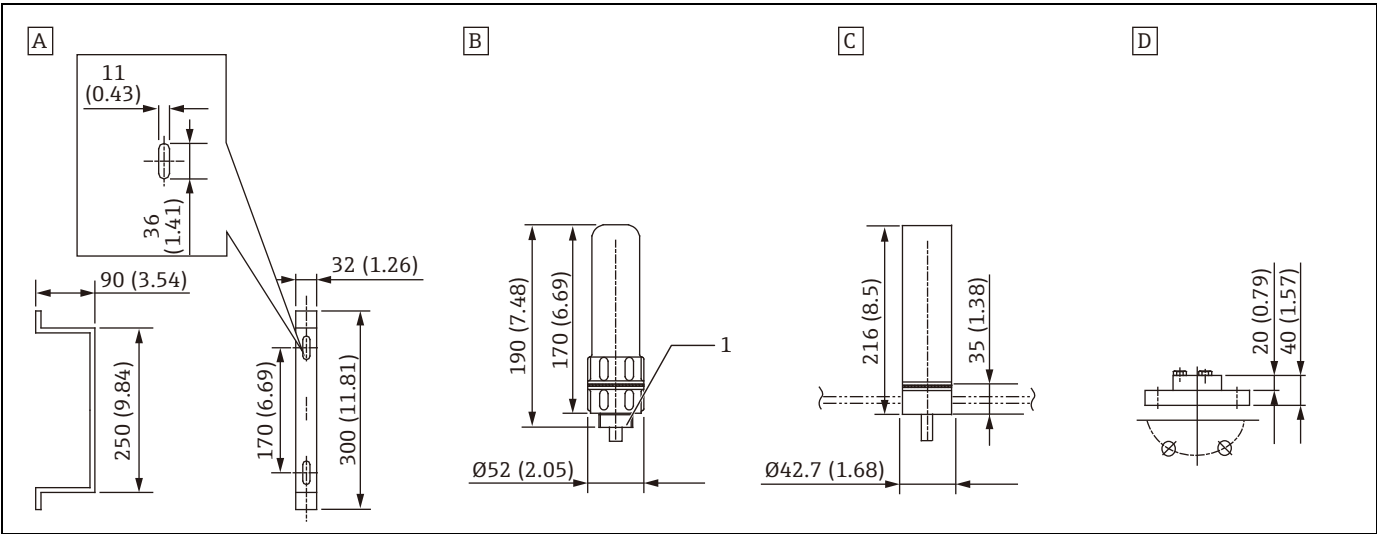


Figure 12: Accessory, Unit mm (in)

- A Gauge supporter (select from iron or SUS304)
- B Top anchor (ADC6)
- C Top anchor (SUS316 with socket welding)
- D Top anchor (PVC; flange type only)
- 1. Tip of the top anchor (select from JIS R1 or ANSI NPT1)

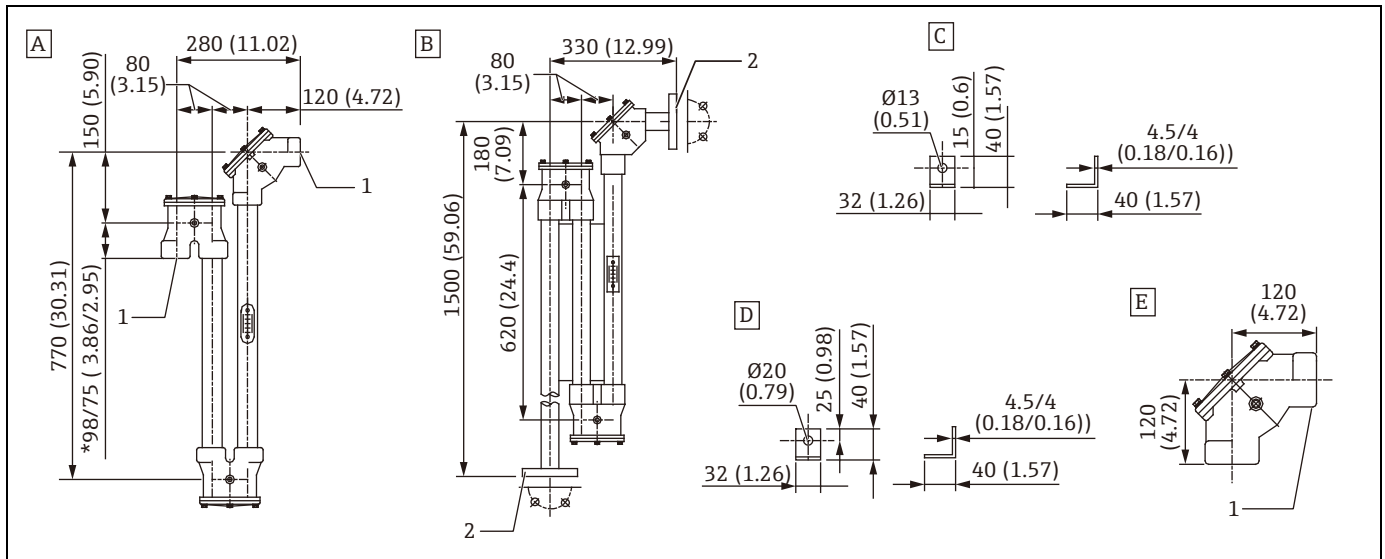


Figure 13: Accessory 2, Unit mm (in)

- A Seal pot (select from aluminum or SUS316)
- B Seal pot (PVC; flange type only)
- C Anchor hook (select from iron or SUS316)
- D Anchor hook (PVC bolt)
- E 90° sheave elbow (select from ADC6 or SCS14)
- 1. Threaded type (select from Rp1-1/2 or NPT1-1/2)
- 2. Flange (select from JIS 10K 40A FF, ASME NPS1-1/2" Cl.150 FF, or JPI 40A 150 lbs FF)



75 mm (2.95 in) of seal pot shows the dimension of SUS316 spec.

3.7.2 Dimension of LT5-1 (Flange type/low pressure)

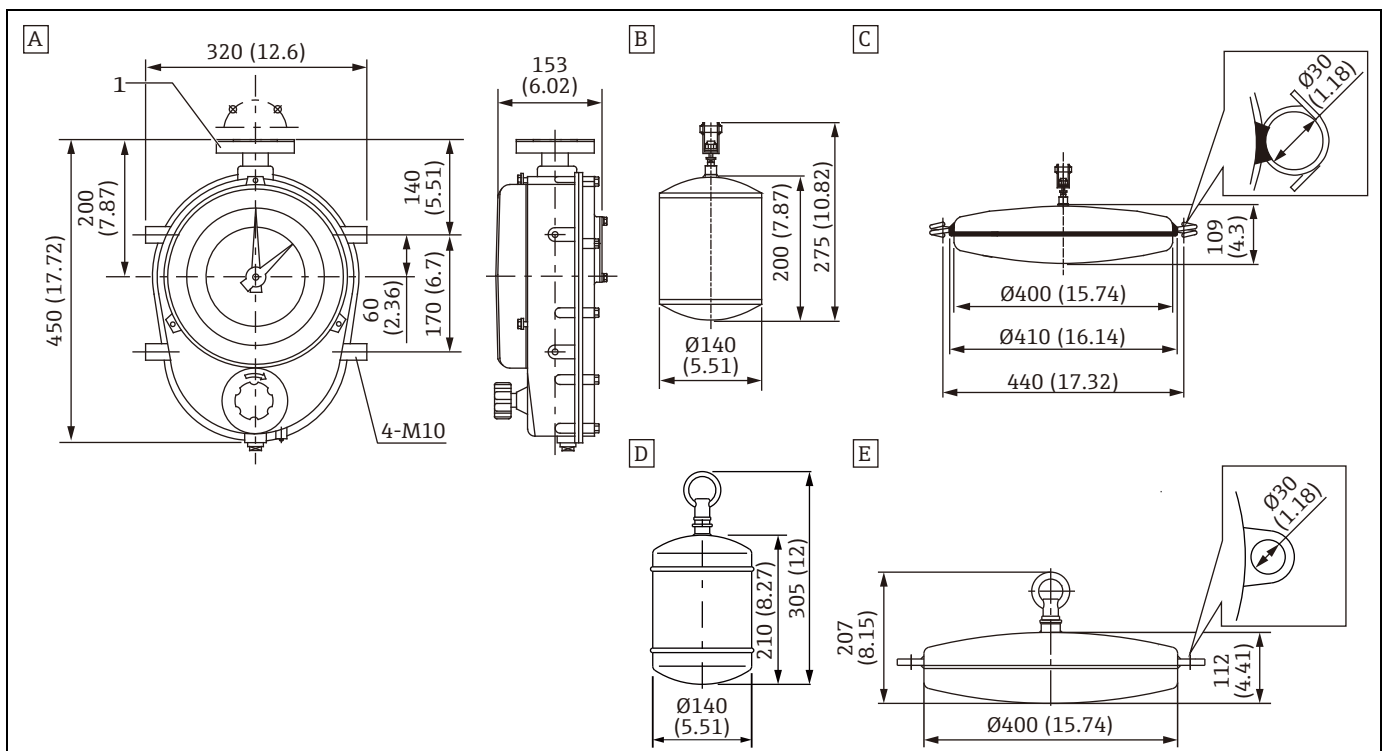


Figure 14: Dimensions of LT5-1, float, Unit: mm (in)

- A Gauge head (ADC12)
- B Float Ø140 (SUS316)
- C Float Ø400 (SUS316)
- D Float Ø140 (PVC)
- E Float Ø400 (PVC)
- 1. Flange (select from JIS 10K 40A RF, ASME NPS1-1/2" Cl.150 RF, or JPI 40A 150 lbs RF)

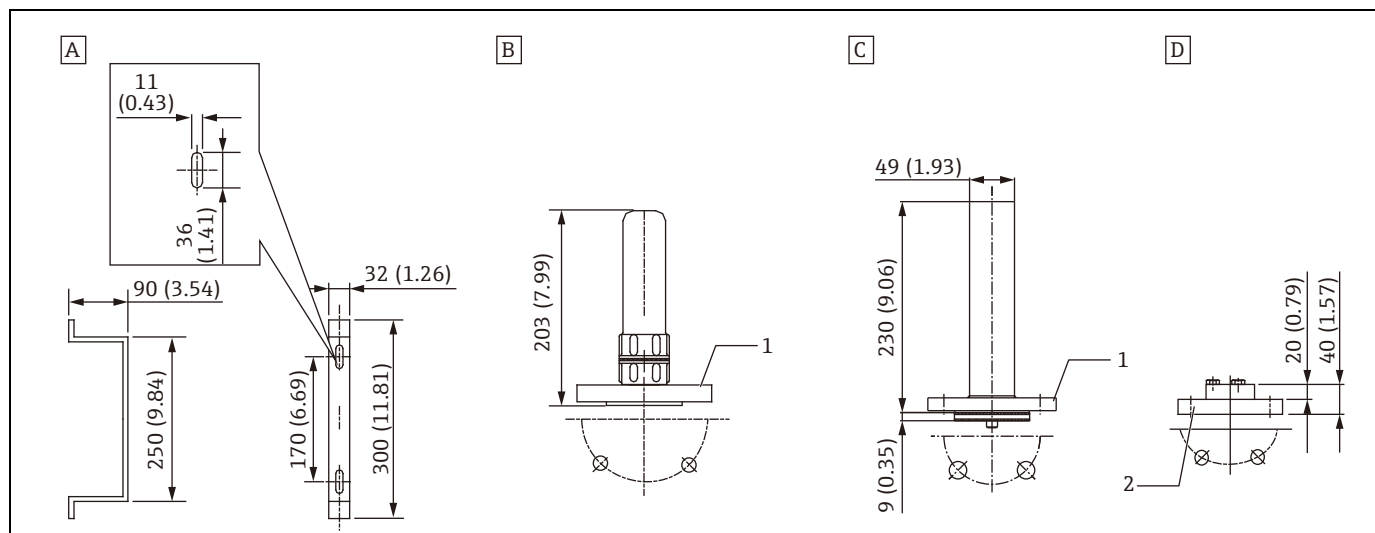


Figure 15: Accessory, Unit mm (in)

- | | |
|----|--|
| A | Gauge supporter |
| B | Socket (ADC6) |
| C | Top anchor (SUS316) |
| D | Top anchor (PVC) |
| 1. | Flange (select from JIS 10K 40A RF, ASME NPS 1-1/2" Cl.150 RF, or JPI 40A 150lbs RF) |
| 2. | Flange (select from JIS 10K 40A FF, ASME NPS 1-1/2" Cl.150 FF, or JPI 40A 150lbs FF) |

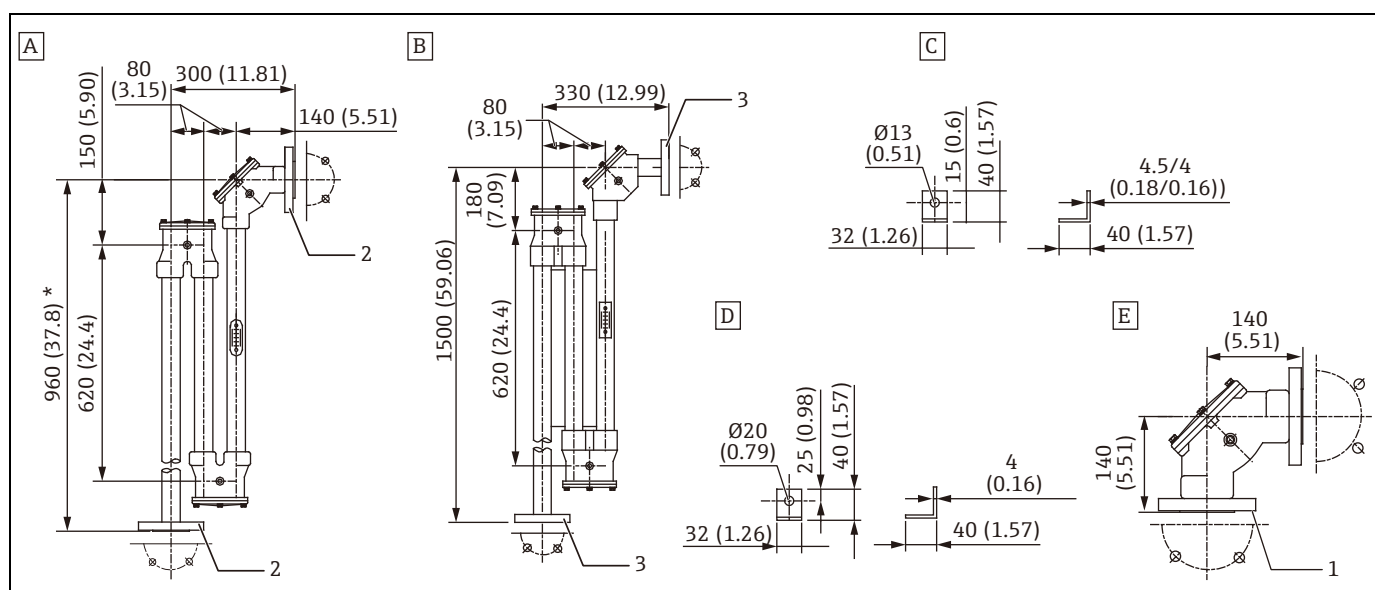


Figure 16: Accessory 2, Unit mm (in)

- | | |
|----|---|
| A | Seal pot (select from aluminum or SCS14 + SUS316, see tips below) |
| B | Seal pot (PVC) |
| C | Anchor hook (select from Iron or SUS316) |
| D | Anchor hook (PVC bolt) |
| E | 90° sheave elbow (select from ADC6+AC4A or 5CS14+SUS316) |
| 1. | Flange (select from JIS 10K 40A RF, ASME NPS 1-1/2" RF, or JPI 40A 150lbs RF) |
| 2. | Flange (select from JIS 10K 40A RF, ASME NPS 1-1/2" Cl.150 RF, or JPI 40A 150 lbs RF) |
| 3. | Flange (select from JIS 10K 40A FF, ASME NPS 1-1/2" Cl.150 FF, or JPI 40A 150 lbs FF) |



Tape only: 960 mm (37.8 in)

Tape + wire: 1500 mm (59.06 in)

3.7.3 Dimension of LT5-4 (Flange type/medium pressure)

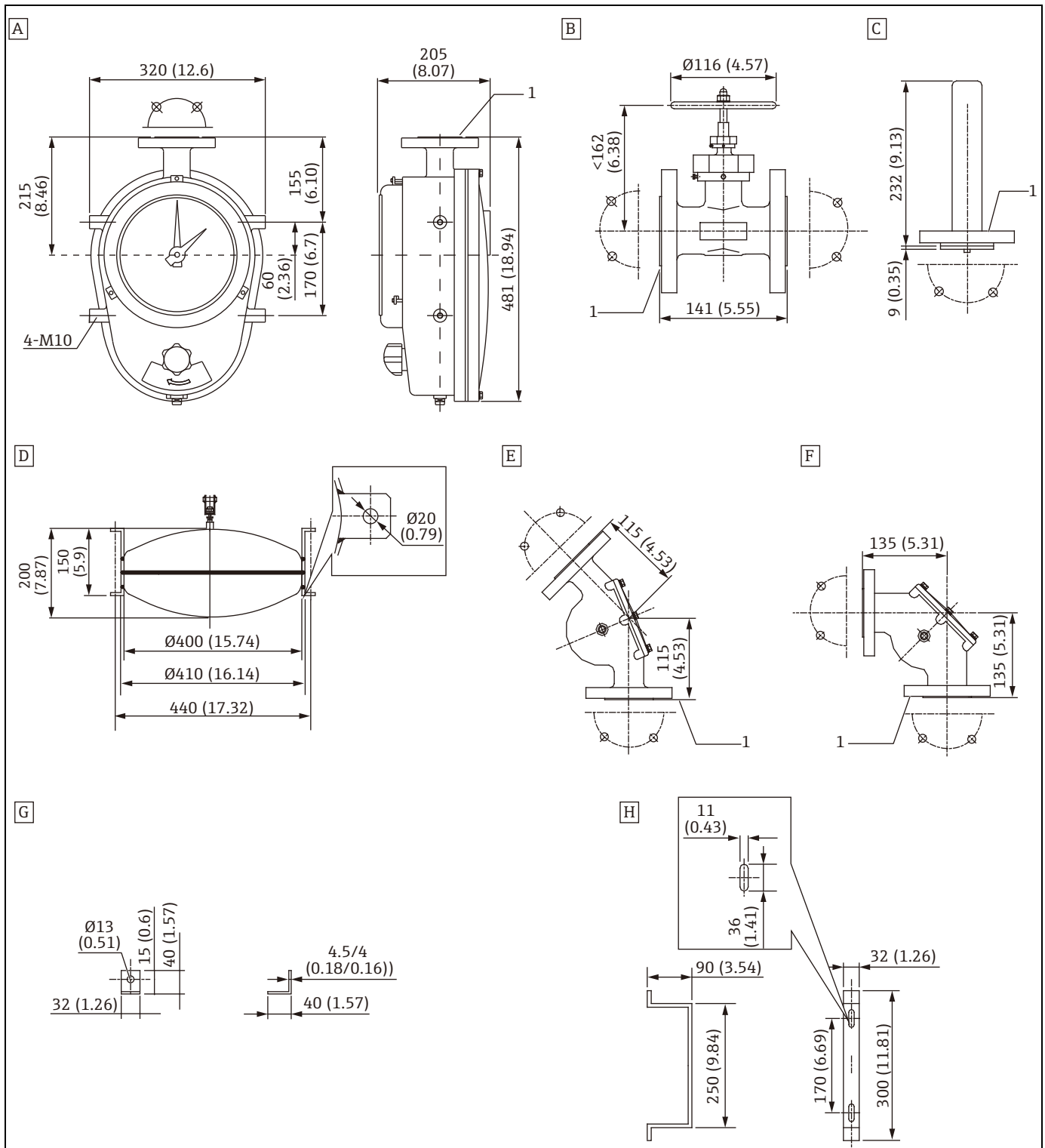


Figure 17: LT5-4, Unit mm (in)

- A Gauge head (AC4CT6)
- B Plug gate valve (SCS13)
- C Top anchor (AC4CT6)
- D Float (SUS316)
- E 135° sheave elbow (AC4CT6)
- F 90° sheave elbow (AC4CT6)
- G Anchor hook (select from iron or SUS316)
- H Gauge supporter (select from iron or SUS316)
- 1. Flange (select from JIS 10K 40A RF, ASME NPS 1-1/2" Cl.150 RF, or JPI 40A 150lbs RF)

3.7.4 Dimension of LT5-6 (Flange type/high pressure)

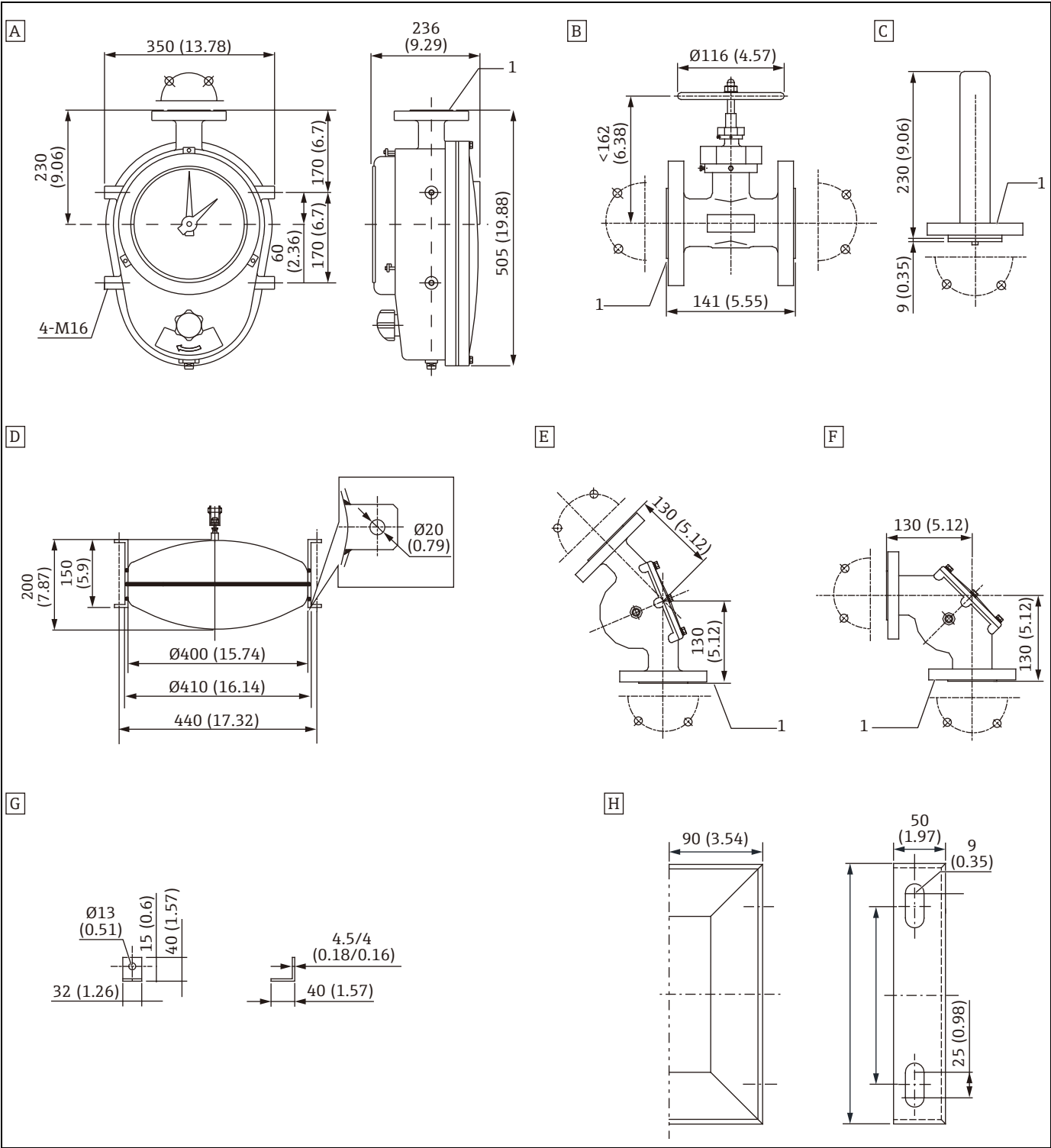


Figure 18: LT5-6, Unit mm (in)

- A Gauge head (Iron)
- B Plug gate valve (SCS13)
- C Top anchor (select from iron or SUS316)
- D Float (SUS316)
- E 135° sheave elbow (iron)
- F 90° sheave elbow (iron)
- G Anchor hook (select from iron or SUS316)
- H Gauge supporter (select from iron or SUS304)
- 1 Flange (select from JIS 10K/20K 40A RF, ASME NPS 1-1/2" Cl.150/300 RF, or JPI 40A 150/300lbs. RF)

3.8 Length of measuring tape and wire

The lengths of the measuring tape and wire are longer (extra length) than the actual measurement length and vary depending on each option. The following tables show the actual lengths according to options in 060 for each option of specification 070. However, note that the maximum length that can be displayed on the display of the LT5 gauge head simply corresponds to the measurement range. See the following tables and select the appropriate length accordingly.

In case of Feature 070 is:

1. Measuring tape SUS316, CRT

060 Measuring range		Total length	Perforated tape (Measuring length)	Not perforated tape	Spare part
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	68.89 ft	65.61 ft	Contact SC in E+H
H	100 ft	216.52 ft	108.26 ft	108.26 ft	Contact SC in E+H

2. Measuring tape SUS316, tank top installation

060 Measuring range		Total length	Perforated tape (Measuring length)	Not perforated tape	Spare part
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	68.89 ft	3.28 ft	Contact SC in E+H
H	100 ft	111.54 ft	108.26 ft	3.28 ft	Contact SC in E+H

3. Measuring tape SUS316, seal pot/BT

060 Measuring range		Total length	Perforated tape (Measuring length)	Not perforated tape	Spare part
1	2.5 m	24 m	7 m	17 m	Contact SC in E+H
2	5 m	24 m	7 m	17 m	Contact SC in E+H
3	10 m	35 m	12 m	23 m	Contact SC in E+H
4	16 m	55 m	22 m	33 m	Contact SC in E+H
5	20 m	55 m	22 m	33 m	Contact SC in E+H
6	30 m	75 m	32 m	43 m	017860-5210
F	60 ft	167.31 ft	68.89 ft	98.42 ft	Contact SC in E+H
H	100 ft	249.33 ft	108.26 ft	141.07 ft	Contact SC in E+H

4. Measuring tape SUS316 + wire SUS316, FRT

060 Measuring range		Total length tape+wire	Perforated tape (measuring length)	Not perforated tape	Wire	Spare part
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	0.98 ft	78.74 ft	Contact SC in E+H
H	100 ft	219.80 ft	107.28 ft	0.98 ft	111.54 ft	Contact SC in E+H

5. Measuring tape SUS316 + PFA coated SUS316 wire, seal pot/CRT

060 Measuring range		Total length tape+wire	Perforated tape (measuring length)	Not perforated tape	Wire	Spare part
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	0.98 ft	85.30 ft	Contact SC in E+H
H	100 ft	226.37 ft	107.28 ft	0.98 ft	118.11 ft	Contact SC in E+H

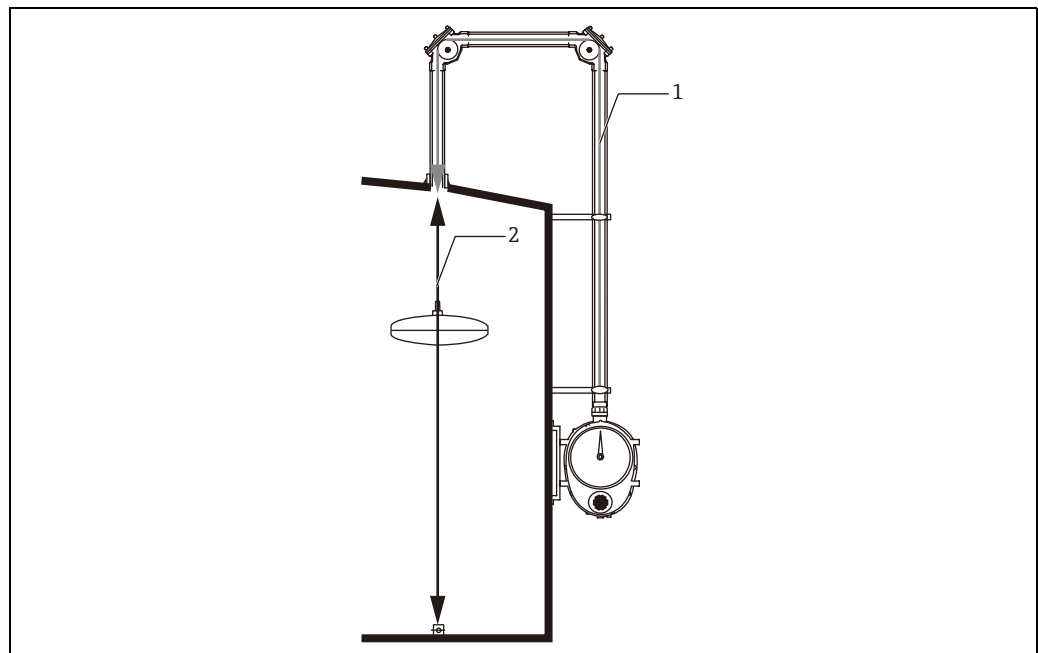


Figure 19: Measuring tape and wire (e.g. Option 1. in 070 and Option 5 in 060)

1. Perforated tape
2. Not perforated tape/wire

i In Figure19, the maximum measuring distance is 22 m and the maximum space for piping is 23 m. Thus, the total length of measuring tape is 45 m.

3.9 Sealing materials for wetting liquid and gas part

Product	Unit	Part name	Name of sealing part	Material of packing/ O-ring
LT5-1	Gauge Head	Rear Cover	Rear Packing	V#6502
		Check Shaft	O-ring	FKM
		Sprocket Shaft	Oil Seal	FKM
		Blind Board	Packing	NBR
	90° Sheave Elbow	Aluminum Sheave Elbow	Rear Packing	V#6502
		Stainless Steel Sheave Elbow		
		Bearing	O-ring	Silicon Rubber
	Liquid Seal Unit	Aluminum Sheave Elbow	Rear Packing	V#6502
			Bearing O-ring	Silicon Rubber
		Stainless Steel Sheave Elbow	Rear Packing	V#6502
			Bearing O-ring	Silicon Rubber
		PVC Sheave Elbow	Rear Packing	V#6502
			Bearing O-ring	PTFE
	Top Anchor	Aluminum Threaded Type	Rear Packing	V#6502
		Stainless Tank Welding Type		
	Top Anchor	Aluminum Flange/Threaded Type	Spring Negator Packing	
		Stainless Flange Welding Type		
LT5-4/LT5-6	Gauge Head	Rear Cover	Rear Packing	PTFE
		Check Handle	Gland Packing	PTFE/CR
		Internal Magnet Cover	O-ring	PTFE
		External Magnet Cover	O-ring	NBR (see tips below.)
		Coupling	O-ring	PTFE
	Gate Valve	Shaft	Shaft Packing	PTFE
		Cap Nut	Packing	PTFE
LT5-4	90° Sheave Elbow	Cover	Rear Packing	PTFE
		Bearing	O-ring	PTFE
	135° Sheave Elbow	Cover	Rear Packing	PTFE
		Bearing	O-ring	PTFE
	Top Anchor	Flange Integral Pattern	Spring Negator Packing	PTFE
		Stainless Flange Welding Type		
LT5-6	90° Sheave Elbow	Cover	Rear Packing	PTFE
		Bearing	O-ring	PTFE
	135°Sheave Elbow	Cover	Rear Packing	PTFE
		Bearing	O-ring	PTFE
	Top Anchor	Rolled Steel Flange Welding Type	Spring Negator Packing	PTFE
		Stainless Flange Welding Type		



When selecting the copper free, the material of o-ring is CR.

3.10 Material certificates

When material certificates are required, please 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 same as the gauge head due to integrated casting with the gauge head), cover, magnet cover, check shaft (only for without hoisting), plug
- Stainless steel measuring tape and wire (excluding PFA coated wire.)
- Stainless steel float
- Stainless steel or high-pressure specification iron top anchor, cover, flange
- Stainless steel guide wire (excluding PFA coated wire)
- Stainless steel anchor hook
- High-pressure specification iron sheave elbow (the certificate for the flange is same as the sheave elbow due to integrated casting with the sheave elbow), cover
- Stainless steel plug gate valve



Certificates cannot be issued for parts not listed above

3.11 Reference view and order code for installation

3.11.1 Cone roof tank (CRT)

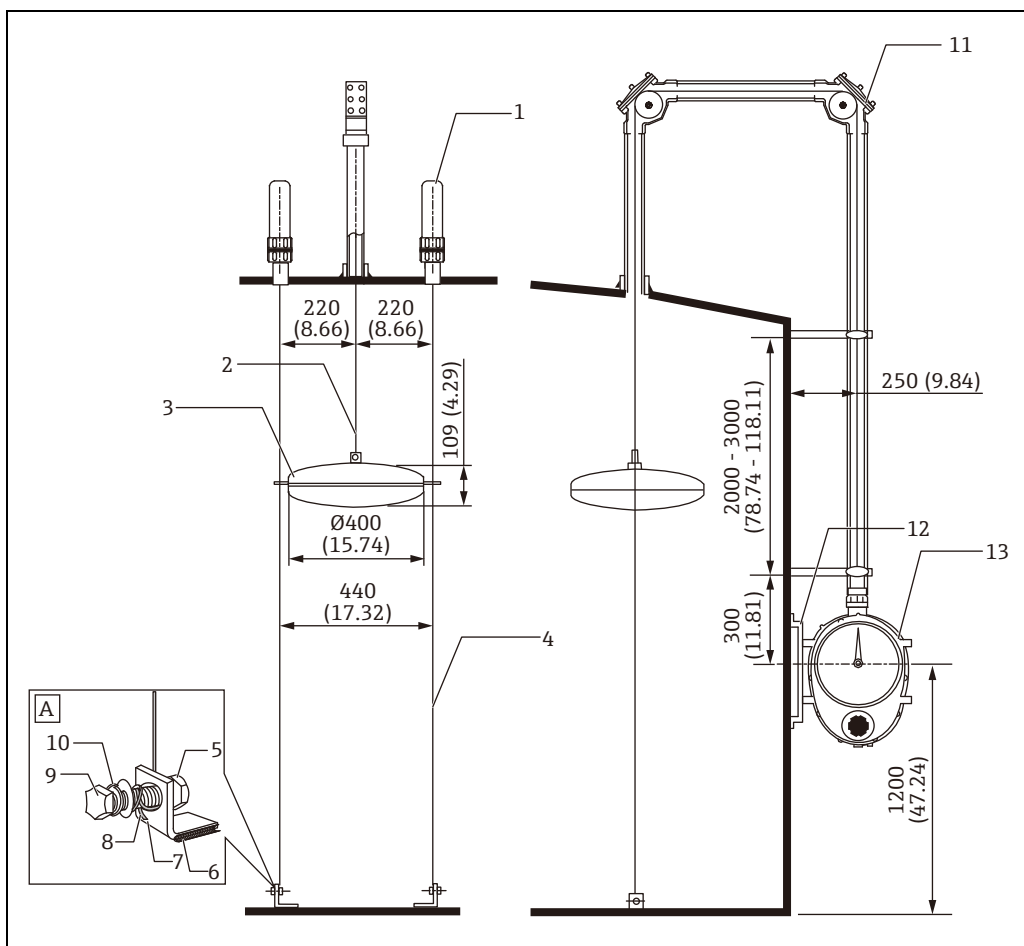


Figure 20: Cone roof tank (CRT), Unit mm (in)

- A. Anchor hook
1. Top anchor
2. Measuring tape
3. float
4. Guide wire
5. Nut
6. Wetting part (wetting to the tank)
7. Anchor hook
8. Guide wire
9. Bolt
10. Washer
11. 90° sheaves elbow
12. Gauge supporter
13. Gauge head

Order code (LT5-111A031B11A111200000+PA)

Feat.	Feature text	Option	Option text	Qty.
020	Gauge head	1	0...0.1961bar/0.01961MPa/2.84psi, Alu (ADC12), Low pressure	1
030	Gauge head connection	11A	Rc 1-1/2, union nut, SUS316, thread JIS B0203	
040	Display; cover	A	Dial display; Acrylic	
050	Crank unit	0	Not selected	
060	Measuring range	3	10 m	
070	Measuring tape	1	Measuring tape, CRT	
080	Float	B	D400mm SUS316 tape connection 5.0kg, density range $\geq 0.65... < 1.05$, rings	
090	Top anchor	11	2x R1, Alu (ADC6), thread JIS B0203	2
100	Guide wire	A	Diameter 3mm solid wire	
110	Bottom anchor; fixing bolt	1	Iron; SUS316	
120	90 degree sheave elbow	112	2x Rp1-1/2, Alu (ADC6), thread JIS B0203	
130	135 degree sheave elbow	000	Not selected	0
140	Seal pot	0	Not selected	
150	Valve	0	Not selected	
620	>>Accessory enclosed	PA	Gauge support, Iron	1

3.11.2 Tank top for underground tank

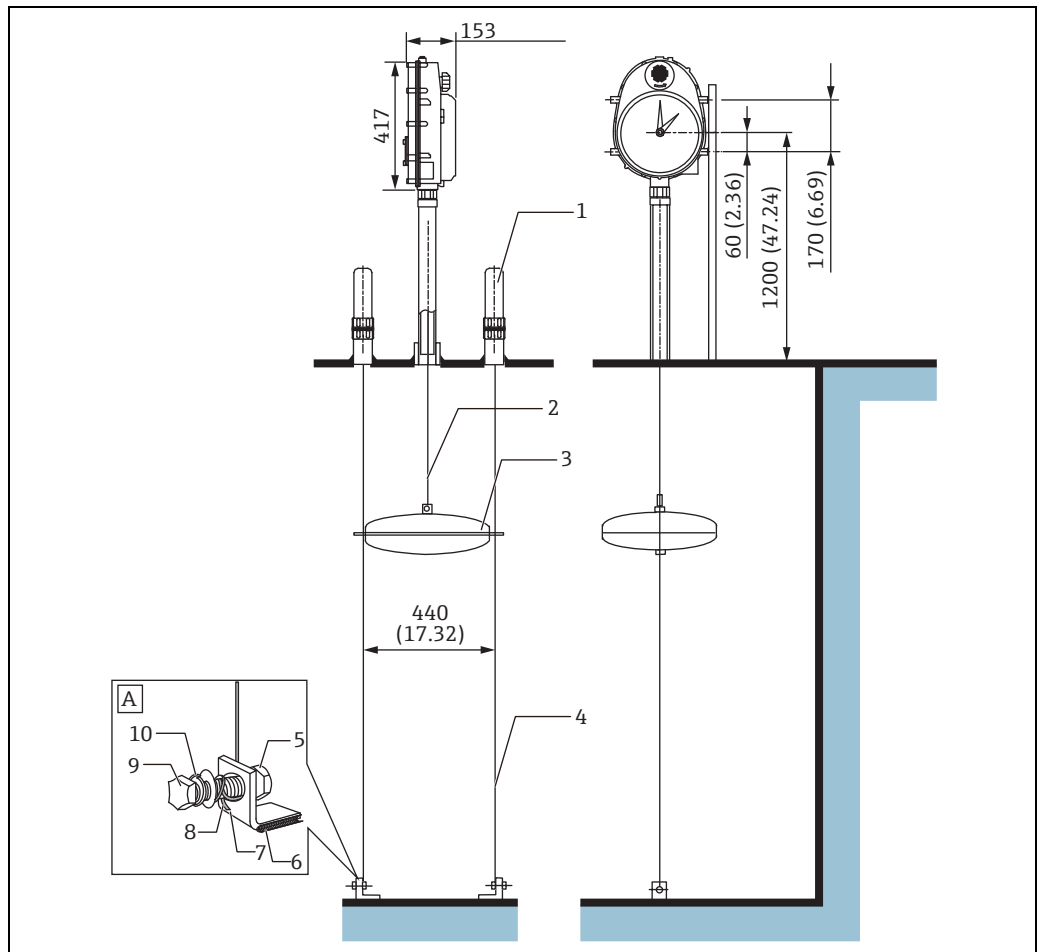


Figure 21: Underground tank, Unit mm (in)

- A *Anchor hook*
- 1. *Top anchor*
- 2. *Measuring tape*
- 3. *float*
- 4. *Guide wire*
- 5. *Nut*
- 6. *Wetting part (wetting to the tank)*
- 7. *Anchor hook*
- 8. *Guide wire*
- 9. *Bolt*
- 10. *Washer*

Order code (LT5-111C022B11A100000000)

Feat.	Feature text	Option	Option text	Qty.
020	Gauge head	1	0...0.1961bar/0.01961MPa/2.84psi, Alu (ADC12), Low pressure	1
030	Gauge head connection	11	Rc 1-1/2, union nut, SUS316, thread JIS B0203	
040	Display; cover	C	Dial display upside down; Glass + Iron	
050	Crank unit	0	Not selected	
060	Measuring range	2	5 m	
070	Measuring tape	2	Measuring tape, tank top installation	
080	Float	B	D400mm SUS316 tape connection 5.0kg, density range $\geq 0.65... < 1.05$, rings	2
090	Top anchor	11	2x R1, Alu (ADC6), thread JIS B0203	
100	Guide wire	A	Diameter 3mm solid wire	
110	Bottom anchor; fixing bolt	1	Iron; SUS316	0
120	90 degree sheave elbow	000	Not selected	
130	135 degree sheave elbow	000	Not selected	
140	Seal pot	0	Not selected	
150	Valve	0	Not selected	

3.11.3 Cone roof tank with seal pot

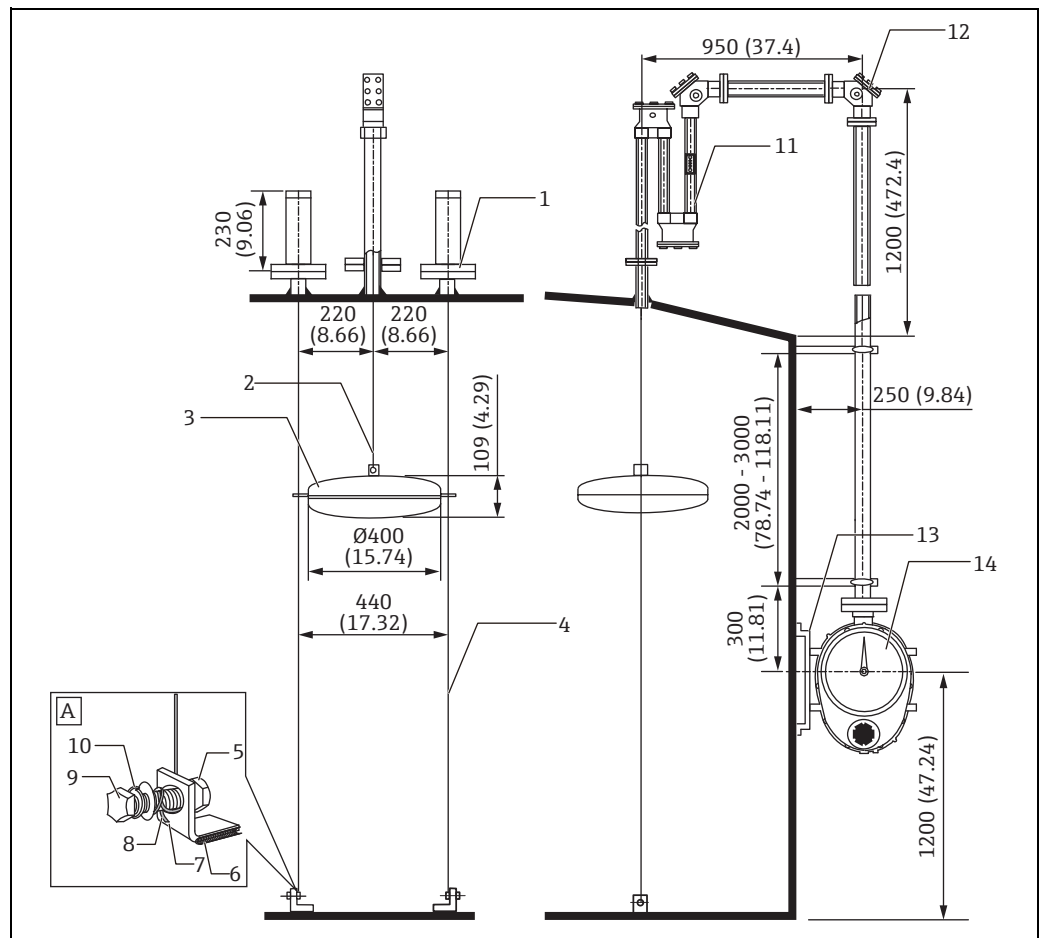


Figure 22: Cone roof tank with seal pot

- A Anchor hook
- 1. Top anchor
- 2. Measuring tape
- 3. float
- 4. Guide wire
- 5. Nut
- 6. Wetting part (wetting to the tank)
- 7. Anchor hook
- 8. Guide wire
- 9. Bolt
- 10. Washer
- 11. Seal pot
- 12. 90° sheaves elbow
- 13. Gauge supporter
- 14. Gauge head

Order code (LT5-11AA023B1BA21A1000F0+PA)

Feat.	Feature text	Option	Option text	Qty.
020	Gauge head	1	0...0.1961bar/0.01961MPa/2.84psi, Alu (ADC12), Low pressure	1
030	Gauge head connection	1A	10K 40A RF, Alu (AC4A), flange JIS B2220	
040	Display; cover	A	Dial display; Acrylic	
050	Crank unit	0	Not selected	
060	Measuring range	2	5 m	
070	Measuring tape	3	Measuring tape, seal pot/BT	
080	Float	B	D400mm SUS316 tape connection 5.0kg, density range $\geq 0.65... < 1.05$, rings	2
090	Top anchor	1B	2x 10K 40A RF, SUS316, flange JIS B2220	
100	Guide wire	A	Diameter 3mm solid wire	
110	Bottom anchor; fixing bolt	2	SUS316; SUS316	
120	90 degree sheave elbow	1A1	1x 10K 40A RF, Alu (ADC6+AC4A), flange JIS B2220	0
130	135 degree sheave elbow	000	Not selected	
140	Seal pot	F	10K 40A RF, SUS316, flange JIS B2220	1
150	Valve	0	Not selected	0
620	>>Accessory enclosed	PA	Gauge support, Iron	1

3.11.4 Cone roof tank with seal pot PVC

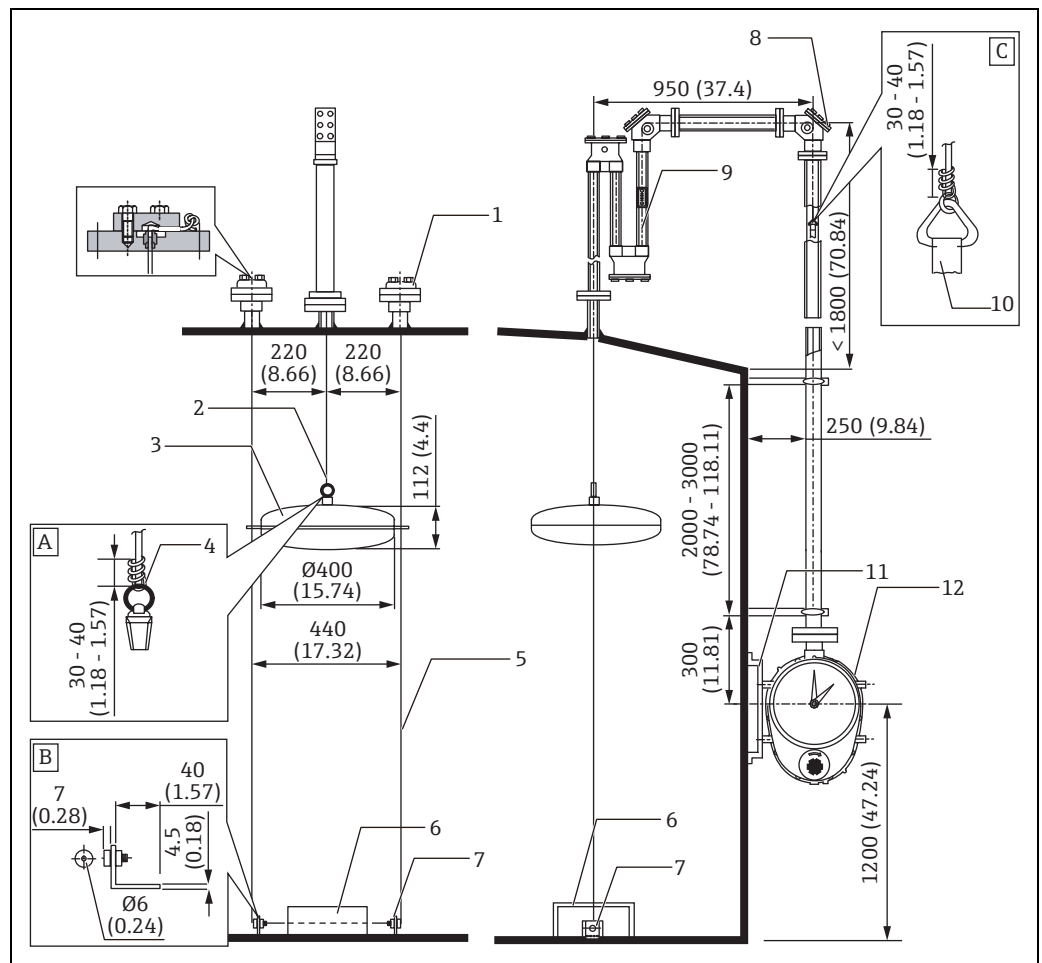


Figure 23: Cone roof tank with seal pot PVC

- A Tip of the float
- B Details of anchor hook
- C Metal triangle fittings for measuring wire
- 1. Top anchor
- 2. Measuring tape
- 3. float
- 4. Teflon-coted tube
- 5. Guide wire (PFA-coated)
- 6. Guide wire protector (supplied by the customer)
- 7. Anchor hook
- 8. 90° sheaves elbow
- 9. Seal pot
- 10. Measuring tape
- 11. Gauge supporter
- 12. Gauge head



- Bind the provided teflon-coted tube to the measuring wire ten to fifteen times.
- Coat (lining) the anchor hook if necessary.
- Set the position of the joint part C in figure 22 to be approximately level 10 mm (03.93 in) below the sheave elbow when the liquid level is zero and approximately 100 mm (3.93 in) above the gauge head when liquid is full.

Order code (LT5-11AA025H1NC41A1000N0+PA)

Feat.	Feature text	Option	Option text	Qty.
020	Gauge head	1	0...0.1961bar/0.01961MPa/2.84psi, Alu (ADC12), Low pressure	1
030	Gauge head connection	1A	10K 40A RF, Alu (AC4A), flange JIS B2220	
040	Display; cover	A	Dial display; Acrylic	
050	Crank unit	0	Not selected	
060	Measuring range	2	5 m	
070	Measuring tape	5	Measuring tape + PFA coated wire, seal pot/CRT	
080	Float	H	D400mm PVC wire connection 5.0kg, density range $\geq 0.65 \dots < 1.05$, rings	
090	Top anchor	1N	2x 10K 40A FF, PVC, flange JIS B2220	2
100	Guide wire	C	Diameter 4.6 mm strand wire, PFA coated	1
110	Bottom anchor; fixing bolt	4	SUS316; PVC	2
120	90 degree sheave elbow	1A1	1x 10K 40A RF, Alu (ADC6+AC4A), flange JIS B2220	1
130	135 degree sheave elbow	000	Not selected	0
140	Seal pot	N	10K 40A FF, PVC, flange JIS B2220	1
150	Valve	0	Not selected	0
620	>>Accessory enclosed	PA	Gauge support, Iron	1

3.11.5 Compact cone roof tank for guide pipe

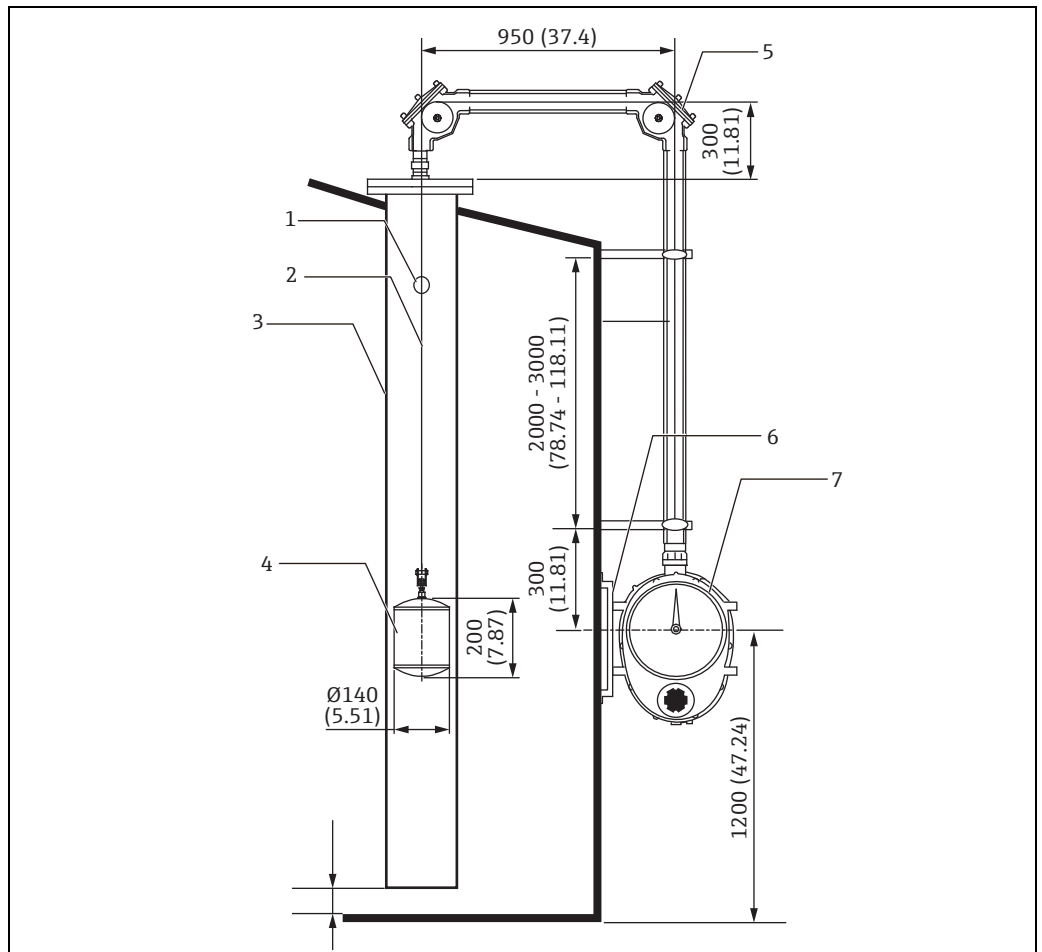


Figure 24: Compact cone roof tank for guide pipe

1. Vent hole
2. Measuring tape
3. Guide pipe (stilling well)
4. Float
5. 90° sheaves elbow
6. Gauge supporter
7. Gauge head

Order code (LT5-111A021L000011200000+PA)

Feat.	Feature text	Option	Option text	Qty.
020	Gauge head	1	0...0.1961bar/0.01961MPa/2.84psi, Alu (ADC12), Low pressure	1
030	Gauge head connection	11	Rc 1-1/2, union nut, SUS316, thread JIS B0203	
040	Display; cover	A	Dial display; Acrylic	
050	Crank unit	0	Not selected	
060	Measuring range	2	5 m	
070	Measuring tape	1	Measuring tape, CRT	
080	Float	L	D140mm SUS316 tape connection 2.4kg, density range $\geq 0.94 \dots \leq 2.0$, no rings	
090	Top anchor	00	Not selected	0
100	Guide wire	0	Not selected	
110	Bottom anchor; fixing bolt	0	Not selected	
120	90 degree sheave elbow	112	2x Rp1-1/2, Alu (ADC6), thread JIS B0203	1
130	135 degree sheave elbow	000	Not selected	0
140	Seal pot	0	Not selected	
150	Valve	0	Not selected	
620	>>Accessory enclosed	PA	Gauge support, Iron	1

3.11.6 Mounting LT at tank top using guide pipe

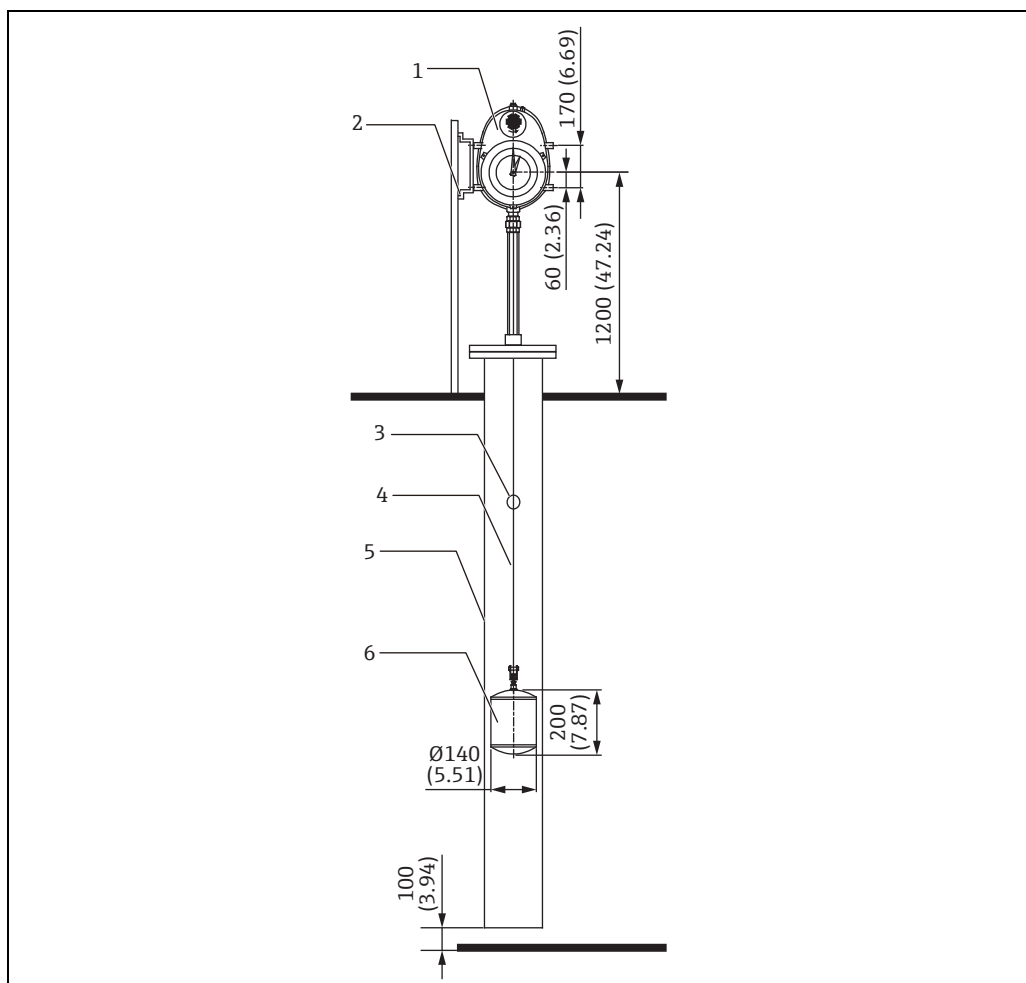


Figure 25: Mounting LT at tank top

1. Gauge head
2. Gauge supporter
3. Vent hole
4. Measuring wire
5. Guide pipe (stilling well)
6. Float

Order code (LT5-111C022L000000000000+PA)

Feat.	Feature text	Option	Option text	Qty.
020	Gauge head	1	0...0.1961bar/0.01961MPa/2.84psi, Alu (ADC12), Low pressure	1
030	Gauge head connection	11	Rc 1-1/2, union nut, SUS316, thread JIS B0203	
040	Display; cover	C	Dial display upside down; Acrylic	
050	Crank unit	0	Not selected	
060	Measuring range	2	5 m	
070	Measuring tape	2	Measuring tape, tank top installation	
080	Float	L	D140mm SUS316 tape connection 2.4kg, density range $\geq 0.94 \dots \leq 2.0$, no rings	
090	Top anchor	00	Not selected	0
100	Guide wire	0	Not selected	
110	Bottom anchor; fixing bolt	0	Not selected	
120	90 degree sheave elbow	000	Not selected	1
130	135 degree sheave elbow	000	Not selected	0
140	Seal pot	0	Not selected	
150	Valve	0	Not selected	
620	>>Accessory enclosed	PA	Gauge support, Iron	1

3.11.7 Gas holder

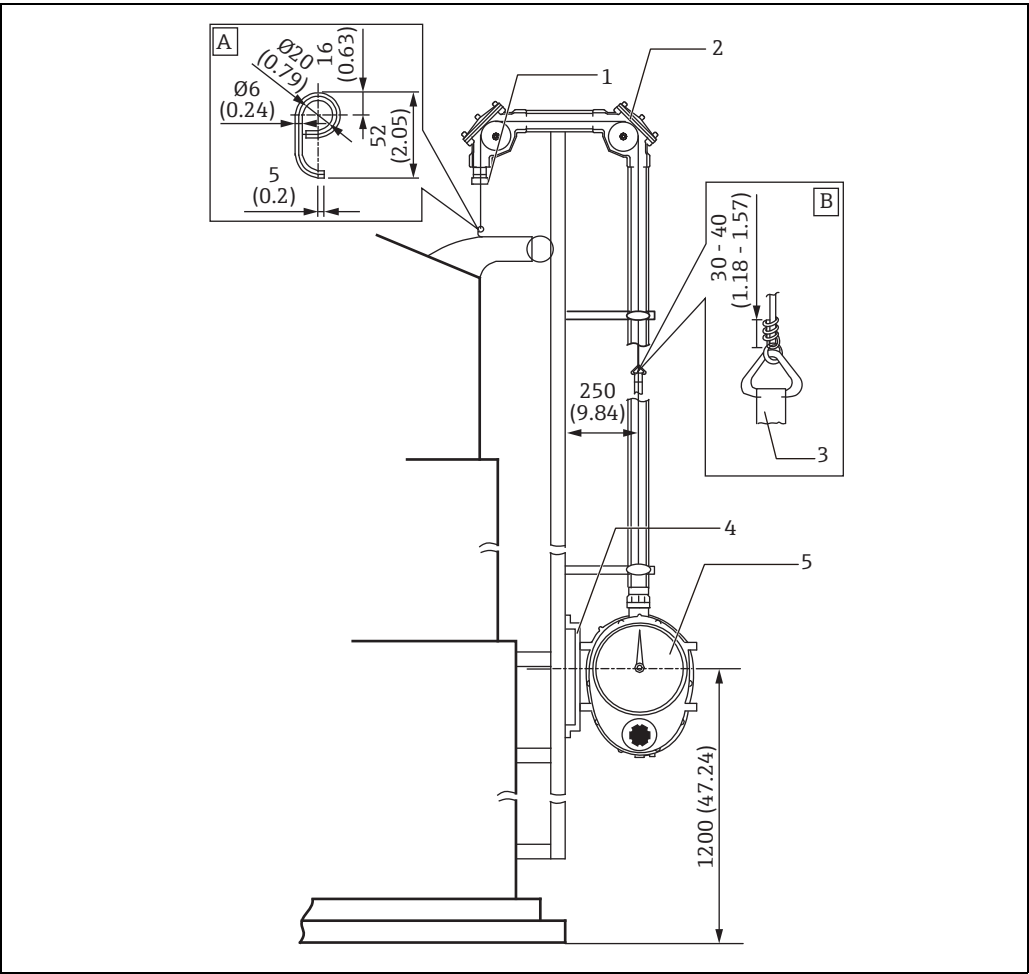


Figure 26: Gas holder

- A Gas holder wire hook
- B Metal triangle fittings for measuring wire
- 1. Wire guide socket
- 2. 90° sheaves elbow
- 3. Measuring wire
- 4. Gauge supporter
- 5. Gauge head

Order code (LT5-111A0340000011200000+PAPFPH)

Feat.	Feature text	Option	Option text	Qty.
020	Gauge head	1	0...0.1961bar/0.01961MPa/2.84psi, Alu (ADC12), Low pressure	1
030	Gauge head connection	11	Rc 1-1/2, union nut, SUS316, thread JIS B0203	
040	Display; cover	A	Dial display; Acrylic	
050	Crank unit	0	Not selected	
060	Measuring range	3	10 m	
070	Measuring tape	4	Measuring tape + wire, FRT	
080	Float	0	Not selected	0
090	Top anchor	00	Not selected	
100	Guide wire	0	Not selected	
110	Bottom anchor; fixing bolt	0	Not selected	
120	90 degree sheave elbow	112	2x Rp1-1/2, Alu (ADC6), thread JIS B0203	2
130	135 degree sheave elbow	000	Not selected	0
140	Seal pot	0	Not selected	
150	Valve	0	Not selected	
620	>>Accessory enclosed	PA	Gauge support, Iron	1
620	>>Accessory enclosed	PF	Wire guide socket, RC1-1/2	
620	>>Accessory enclosed	PH	Gas holder wire hook	

3.11.8 Floating roof tank (FRT)

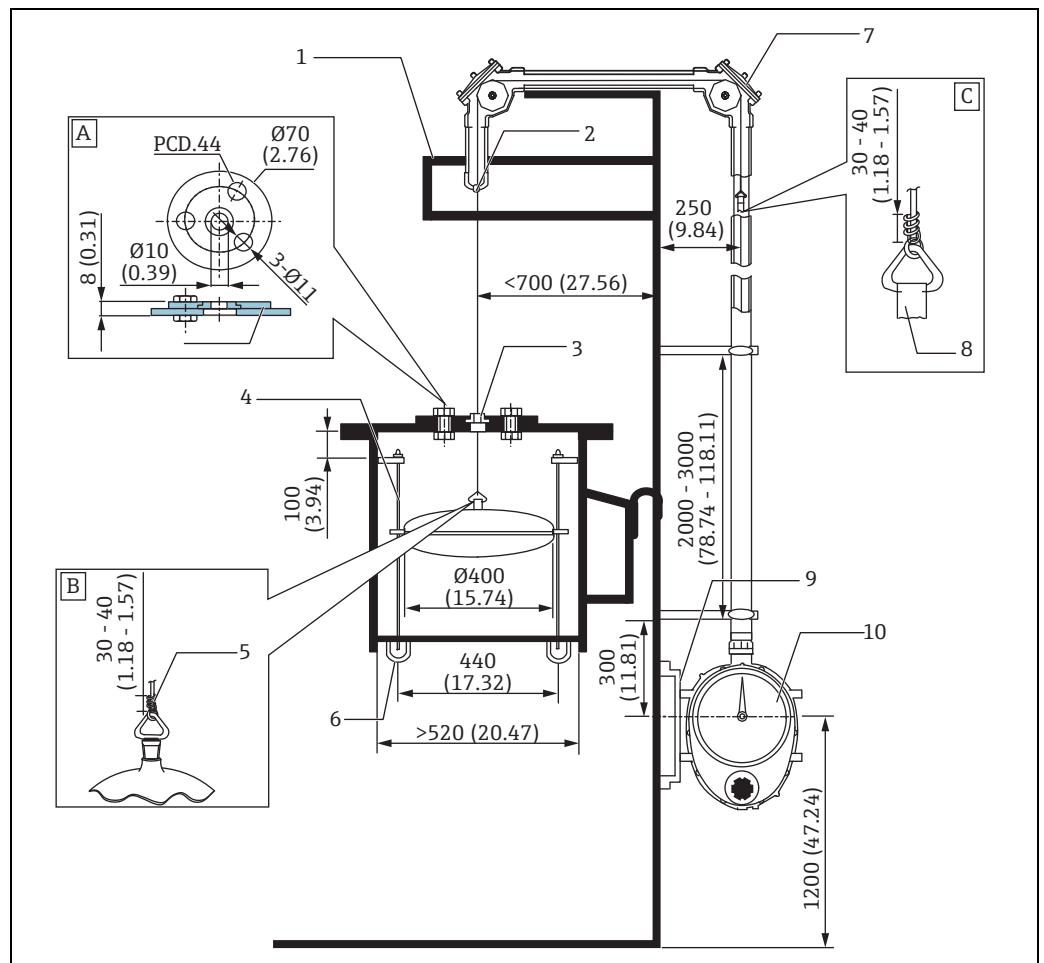


Figure 27: Floating roof tank

- A Wire guide metal
- B Upper part of float
- C Metal triangle fittings for measuring wire
- 1. Roof stand
- 2. Wire guide socket
- 3. FRT wire guide metal
- 4. Guide bar: Ø 16 mm (0.63 in)
- 5. Stainless wire (provided)
- 6. Pipe end (1^B Sch 40 to 80)
- 7. 90° sheaves elbow
- 8. Measuring wire
- 9. Gauge supporter
- 10. Gauge head

Order code (LT5-111A054E000011200000+PAPEPF)

Feat.	Feature text	Option	Option text	Qty.
020	Gauge head	1	0...0.1961bar/0.01961MPa/2.84psi, Alu (ADC12), Low pressure	1
030	Gauge head connection	11	Rc 1-1/2, union nut, SUS316, thread JIS B0203	
040	Display; cover	A	Dial display; Acrylic	
050	Crank unit	0	Not selected	
060	Measuring range	5	20 m	
070	Measuring tape	4	Measuring tape + wire, FRT	
080	Float	E	D400mm SUS316 wire connection 5.0kg, density range $\geq 0.65... < 1.05$, rings	0
090	Top anchor	00	Not selected	
100	Guide wire	0	Not selected	
110	Bottom anchor; fixing bolt	0	Not selected	
120	90 degree sheave elbow	112	2x Rp1-1/2, Alu (ADC6), thread JIS B0203	2
130	135 degree sheave elbow	000	Not selected	0
140	Seal pot	0	Not selected	
150	Valve	0	Not selected	
620	>>Accessory enclosed	PA	Gauge support, Iron	1
620	>>Accessory enclosed	PE	Wire guide metal FRT	
620	>>Accessory enclosed	PF	Wire guide socket, RC1-1/2	

3.11.9 Doom roof tank for medium pressure

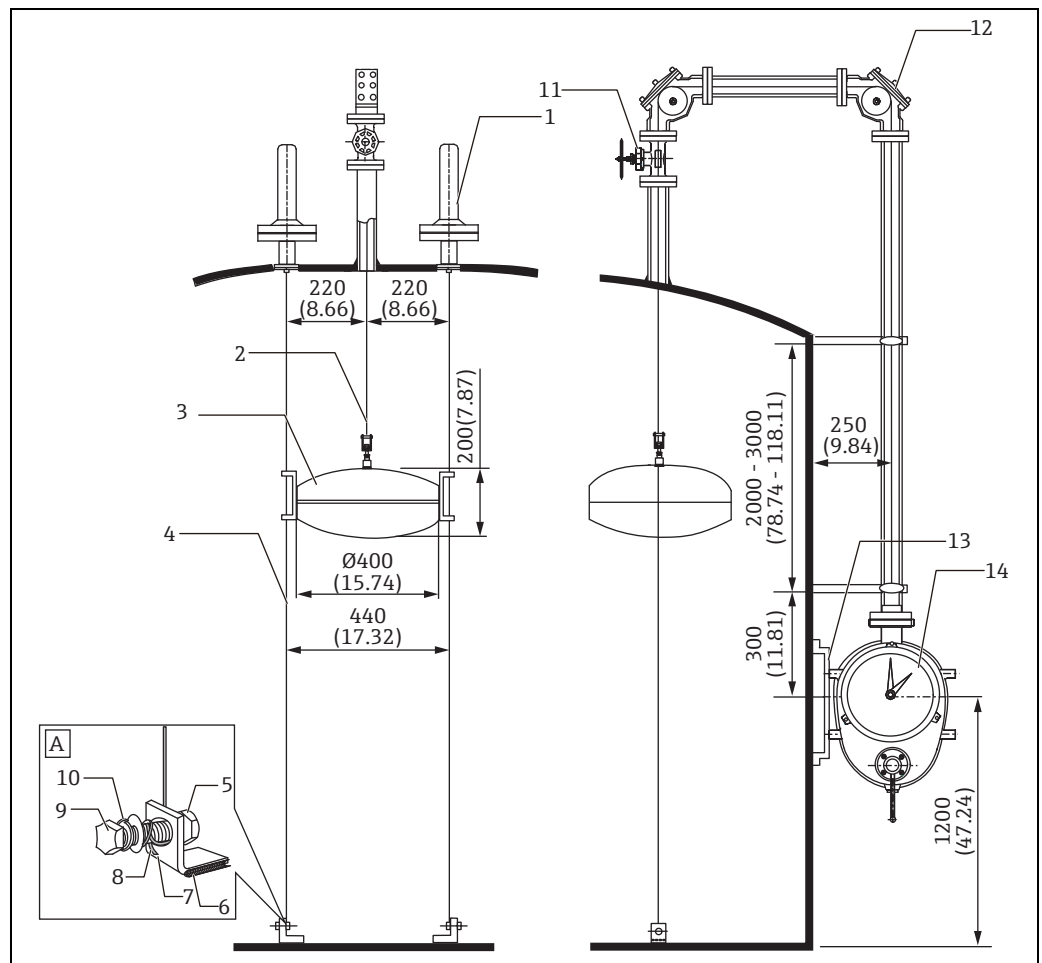


Figure 28: Dome roof tank for medium pressure

- A Anchor hook
- 1. Top anchor
- 2. Measuring tape
- 3. float
- 4. Guide wire
- 5. Nut
- 6. Wetting part (wetting to the tank)
- 7. Anchor hook
- 8. Guide wire
- 9. Bolt
- 10. Washer
- 11. Plug gate valve
- 12. 90° sheaves elbow
- 13. Gauge supporter
- 14. Gauge head

Order code (LT5-44AB151R4AA24A200001+PA)

Feat.	Feature text	Option	Option text	Qty.
020	Gauge head	4	0...0.9807bar/0.09807MPa/14.22psi, Alu (AC4CT6), medium pressure	1
030	Gauge head connection	4A	10K 40A RF, alu (AC4CT6), flange JIS B2220	
040	Display; cover	B	Dial display; Glass + Iron	
050	Crank unit	1	Selected	
060	Measuring range	5	20 m	
070	Measuring tape	1	Measuring tape, CRT	
080	Float	R	D400mm SUS316 tape connection 8.3kg, density range $\geq 0.5 \dots \leq 0.7$, rings	
090	Top anchor	4A	2x 10K 40A RF, Alu (AC4CT6), flange JIS B2220	2
100	Guide wire	A	Diameter 3mm solid wire	
110	Bottom anchor; fixing bolt	2	SUS316; SUS316	
120	90 degree sheave elbow	4A4	2x 10K 40A RF, Alu (AC4CT6), flange JIS B2220	
130	135 degree sheave elbow	000	Not selected	0
140	Seal pot	0	Not selected	
150	Valve	1	10K 40A RF, SCS13, flange JIS B2220	1
620	>>Accessory enclosed	PA	Gauge support, Iron	

3.11.10 Spherical tank for high pressure

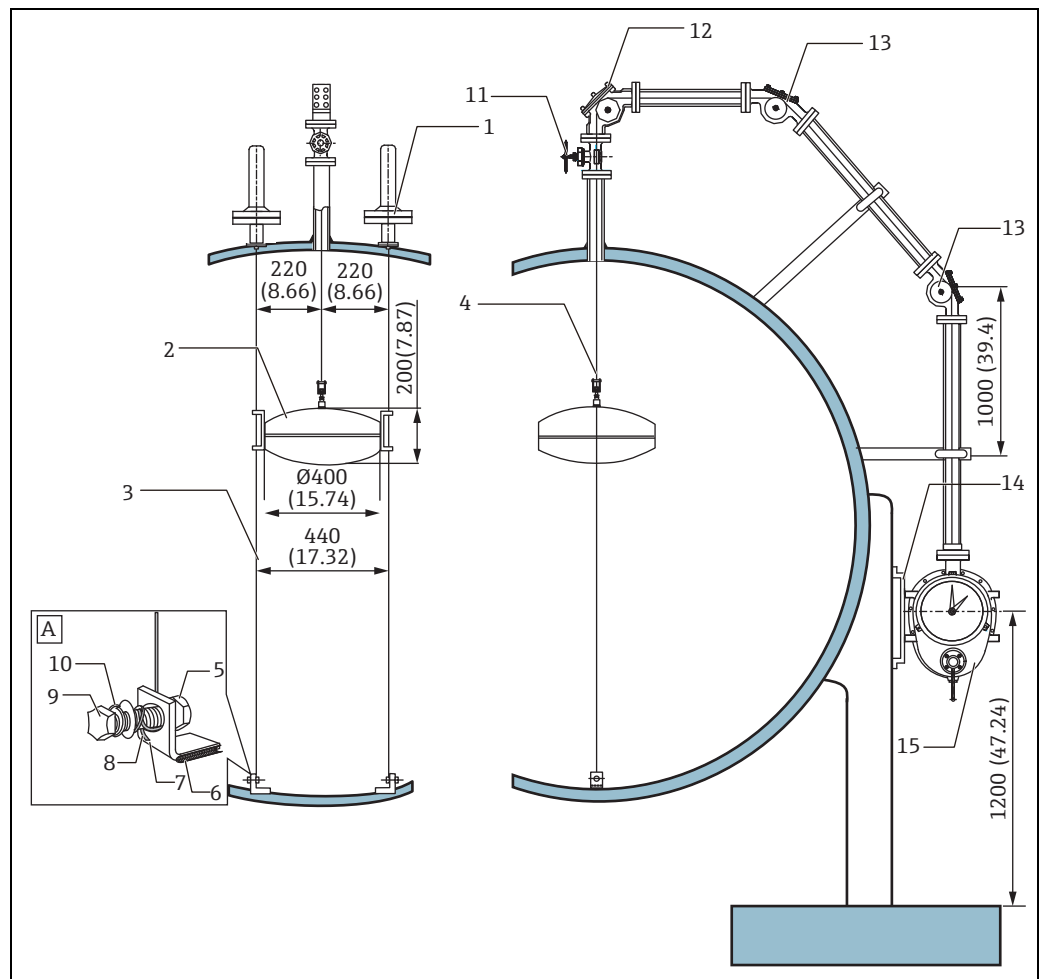


Figure 29: Spherical tank for high pressure

- A Anchor hook
- 1. Top anchor
- 2. float
- 3. Guide wire
- 4. Measuring tape
- 5. Nut
- 6. Wetting part (wetting to the tank)
- 7. Anchor hook
- 8. Guide wire
- 9. Bolt
- 10. Washer
- 11. Plug gate valve
- 12. 90° sheaves elbow
- 13. 135° sheaves elbow
- 14. Gauge supporter
- 15. Gauge head

Order code (LT5-66GB153R6GA26G16G204+PC)

Feat.	Feature text	Option	Option text	Qty.
020	Gauge head	6	0...24.5bar/2.45MPa/355.25psi, Iron, high pressure	1
030	Gauge head connection	6G	20K 40A RF, Iron, flange JIS B2220	
040	Display; cover	B	Dial display; Glass + Iron	
050	Crank unit	1	Selected	
060	Measuring range	5	20 m	
070	Measuring tape	3	Measuring tape, seal pot/BT	
080	Float	R	D400mm SUS316 tape connection 8.3kg, density range $\geq 0.5 \dots \leq 0.7$, rings	
090	Top anchor	6G	2x 20K 40A RF, Iron, flange JIS B2220	2
100	Guide wire	A	Diameter 3mm solid wire	
110	Bottom anchor; fixing bolt	2	SUS316; SUS316	
120	90 degree sheave elbow	6G1	1x 20K 40A RF, Iron, flange JIS B2220	1
130	135 degree sheave elbow	6G2	2x 20K 40A RF, Iron, flange JIS B2220	2
140	Seal pot	0	Not selected	0
150	Valve	4	20K 40A RF, SCS13, flange JIS B2220	1
620	>>Accessory enclosed	PC	Gauge supporter, Iron, high pressure	

3.12 Guide wire installation

Installation procedure

⚠ CAUTION

- Be careful not to bend the guide wire.
 - Two guide wires should be arranged in parallel to one other and perpendicular to the tank floor.
 - Check two packings (for top anchor and tank flange) on which slip washers are used, before setting the guide wires.
 - Repairing the guide wires and anchor hooks, once the tank is full, can be very difficult. Be sure to inspect their hardness before filling.
1. Open the cover of the top anchor located in the top of the tank.
 2. Straighten the guide wire, and lower it from the center hole in the top anchor, then temporarily attach the end of the wire to the top anchor.
 3. Insert the guide wire into the guide ring on the float at the bottom of the tank then, secure the guide wire to the anchor hooks by using two bolts and nuts.
 4. Cut and bend the end of the guide wire to prevent it from getting caught in the float.
 - Place the guide wire against the surface of inside anchor hook B and insert it through the anchor hook hole. Wind the end of the guide wire so that the excess is within dimension A.
 - Wind the wires 1 to 2 times each, on both the B and C sides. Adjust the number of times wound as needed.

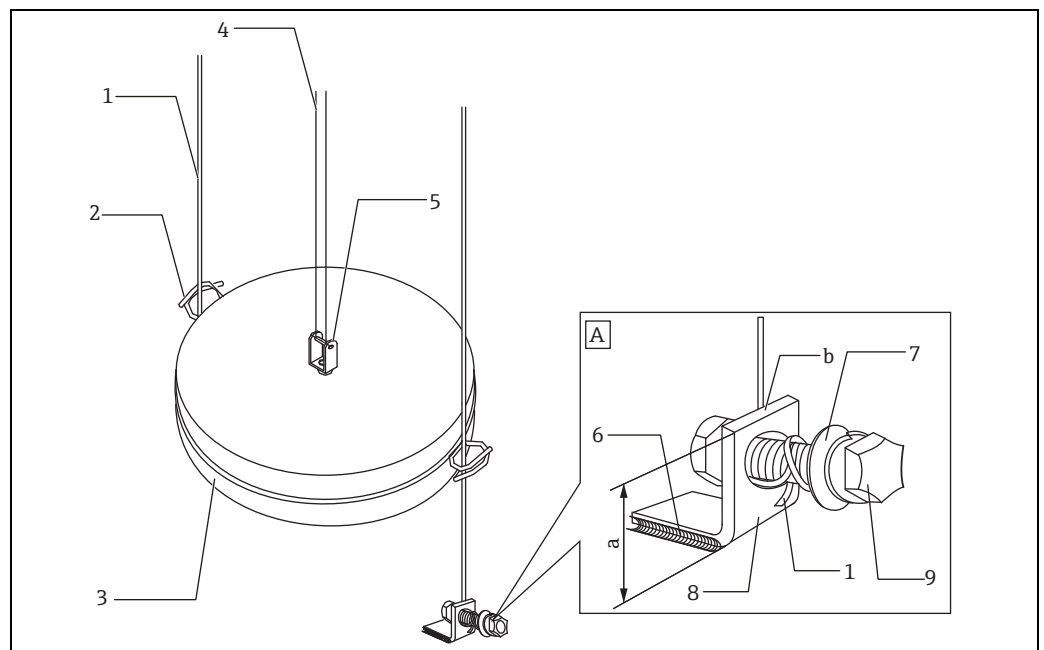


Figure 30: Guide wire installation 1

- A Anchor hook
1. Guide wire
2. Guide ring
3. Float
4. Measuring tape
5. Universal joint
6. Wetting part
7. Washer
8. Anchor hook
9. Bolt

5. Extend guide wire to the top of the tank and secure it to the top anchor.
6. Bend end of the guide wire against the main shaft and cut it off leaving approx.100mm.
7. Tighten the end nuts [1] and [2].
8. Secure the wire with the nut [3] and release the spring.

This completes the installation procedure.

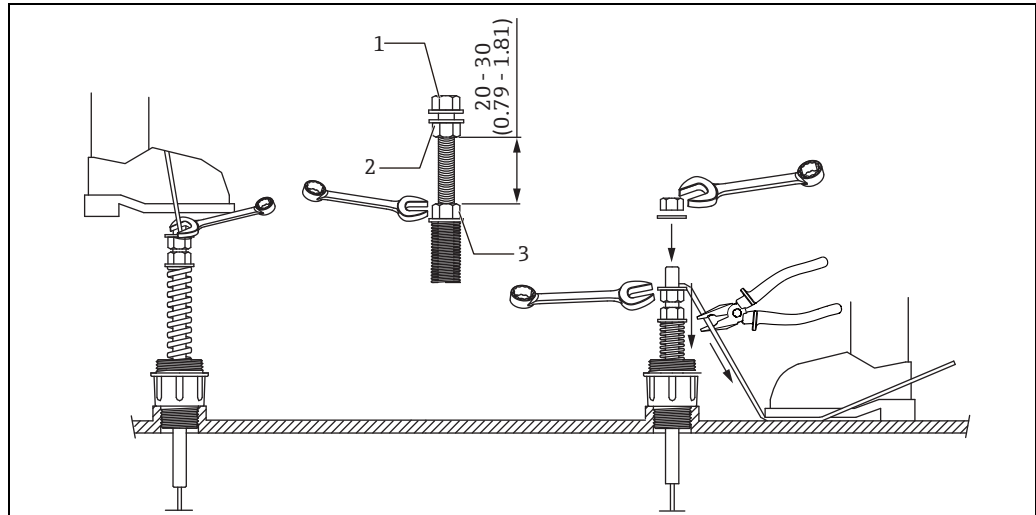


Figure 31: Guide wire installation 2

1. Nut 1
2. Nut 2
3. Nut 3

3.13 Measuring tape and wire installation

⚠ CAUTION

- Do not bend or damage the measuring tape.
- Be sure to keep the measuring tape from twisting inside of the tank or pipe.
- There are small holes at intervals of 20 mm (for feet: 1 inch) along half of the entire length of measuring tape. Attach the measuring tape to LT so that the side with the holes are wound by LT.
- Check to make sure the measuring tape does not come off the sheave elbow roller. Inspect the measuring tape after installation.
- Secure the safety of workers to counteract the extreme dangers of poor footing when measuring wire is required to be inserted into 135° sheave elbows.
- Repairing the connection components between the float and measuring wires, once the tank is fill, can be very difficult. Be sure to inspect them thoroughly before filling.

Preparation procedure

1. Extend the measuring wire and fold, as shown below to a length of 1.5m so as not to twist it.
2. Open the rear cover of LT and sheave elbow cover.
3. Attach the measuring wire without twisting.

This completes the measuring tape installation.

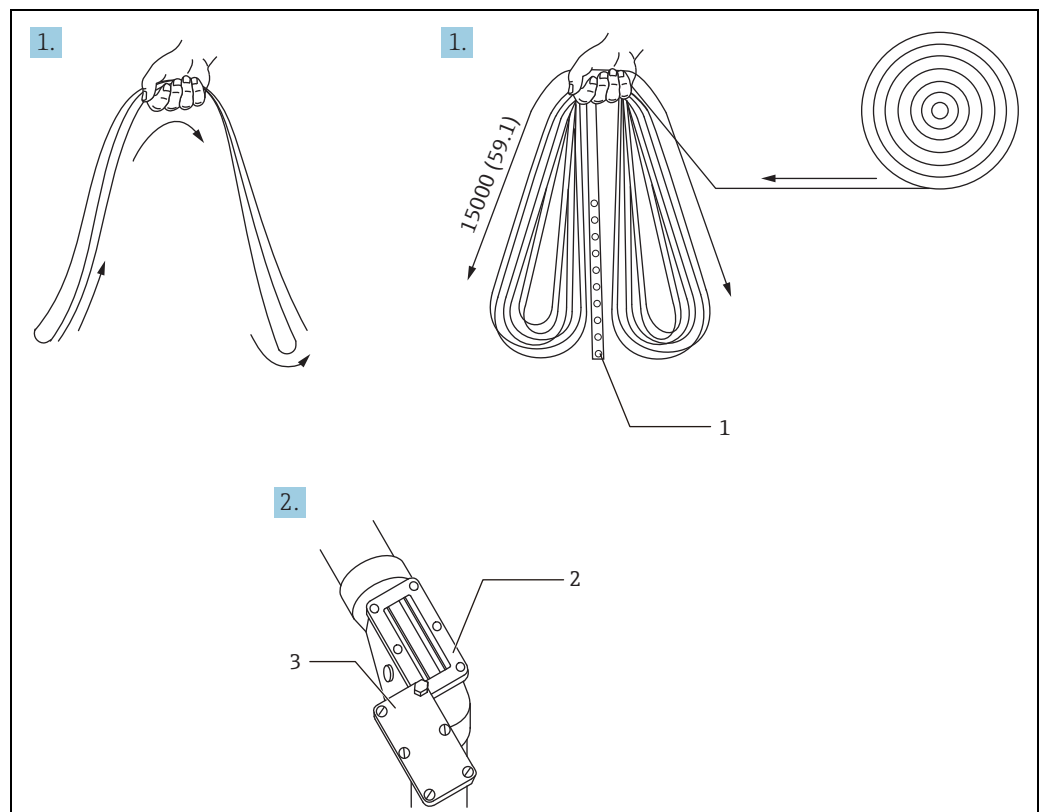


Figure 32: Measuring tape preparation

1. Small holes
2. Sheave elbow
3. Cover

3.13.1 Measuring tape installation at cone roof tank

Installation procedure

1. Insert the non-perforated side of the measuring tape directly into the tank from the 90° sheave elbow.
2. Insert the other end of the measuring tape (perforated and looped) through the 90° sheave elbow to LT located directly above the tank.
3. Secure end of the measuring tape to tape drum, wind tape twice around drum and pull into tank.
4. Cut the measuring tape off leaving approx. 1.5m
5. Connect the measuring tape to the float.
 - Refer to "3.11.2 Connection Procedure of Measuring Tape to Float" for details on the connection of the measuring tape.
6. Confirm that measuring tape is not twisted.
7. Replace the sheave elbow cover.

This completes the measuring tape installation at cone roof tank.

When installing measuring tape

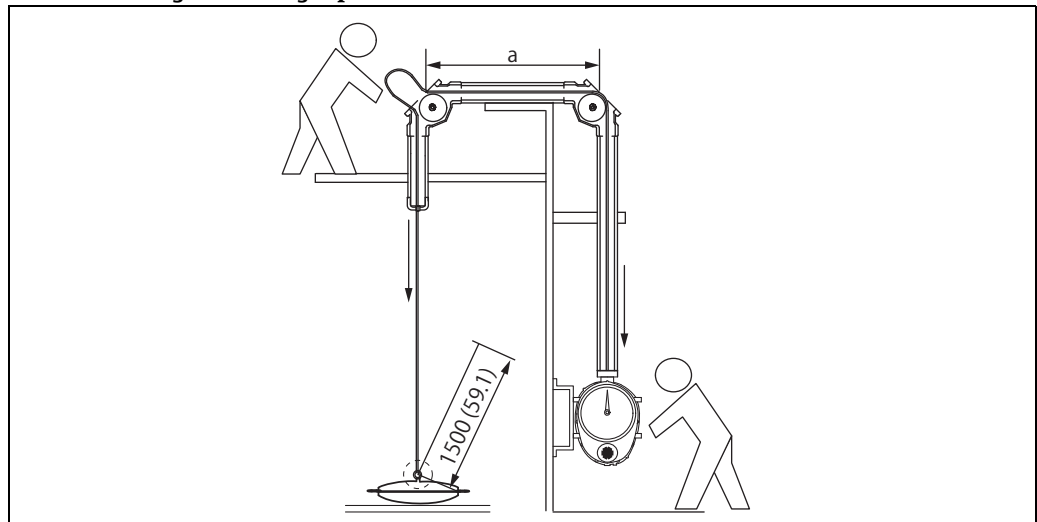


Figure 33: Measuring installation

a Guide pipe

When installing measuring tape and measuring wire

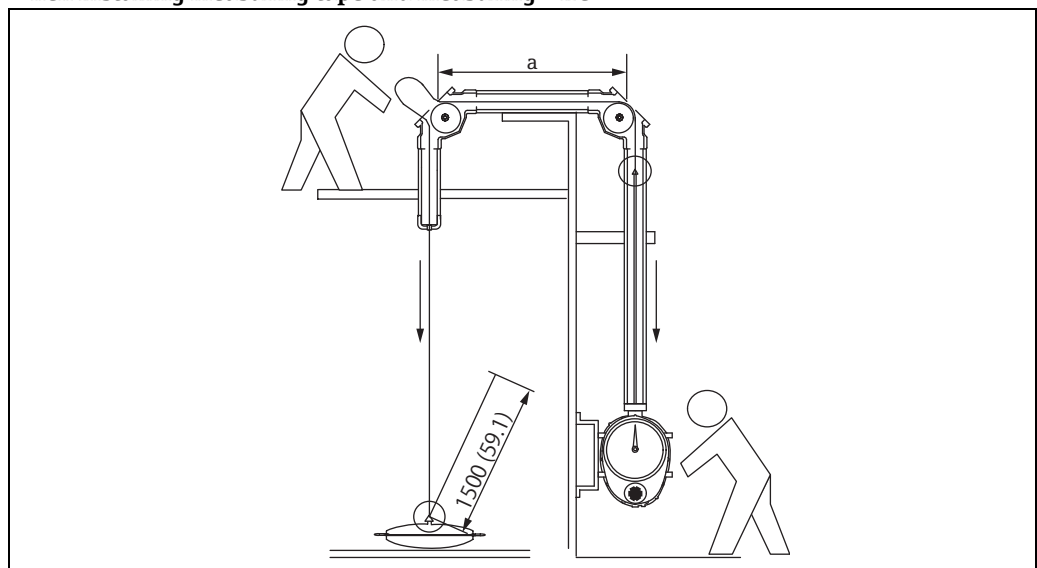


Figure 34: Measuring tape wire installation

a Guide pipe

3.13.2 Connection procedure of measuring tape to float

1. Bend the measuring tape at the length of 65mm.
2. Bend the measuring tape once again at the location shown above.
3. Bend the measuring tape twice at the center.
4. Insert the joint shaft into the bended measuring tape.
5. Insert the tape clamp into the loop of the tape.
6. Tighten the clamp strip with a bolt and nut.
7. Strip the protruding end of the bolt with pliers to lock the nut.

This completes the connection procedure of measuring tape to float.

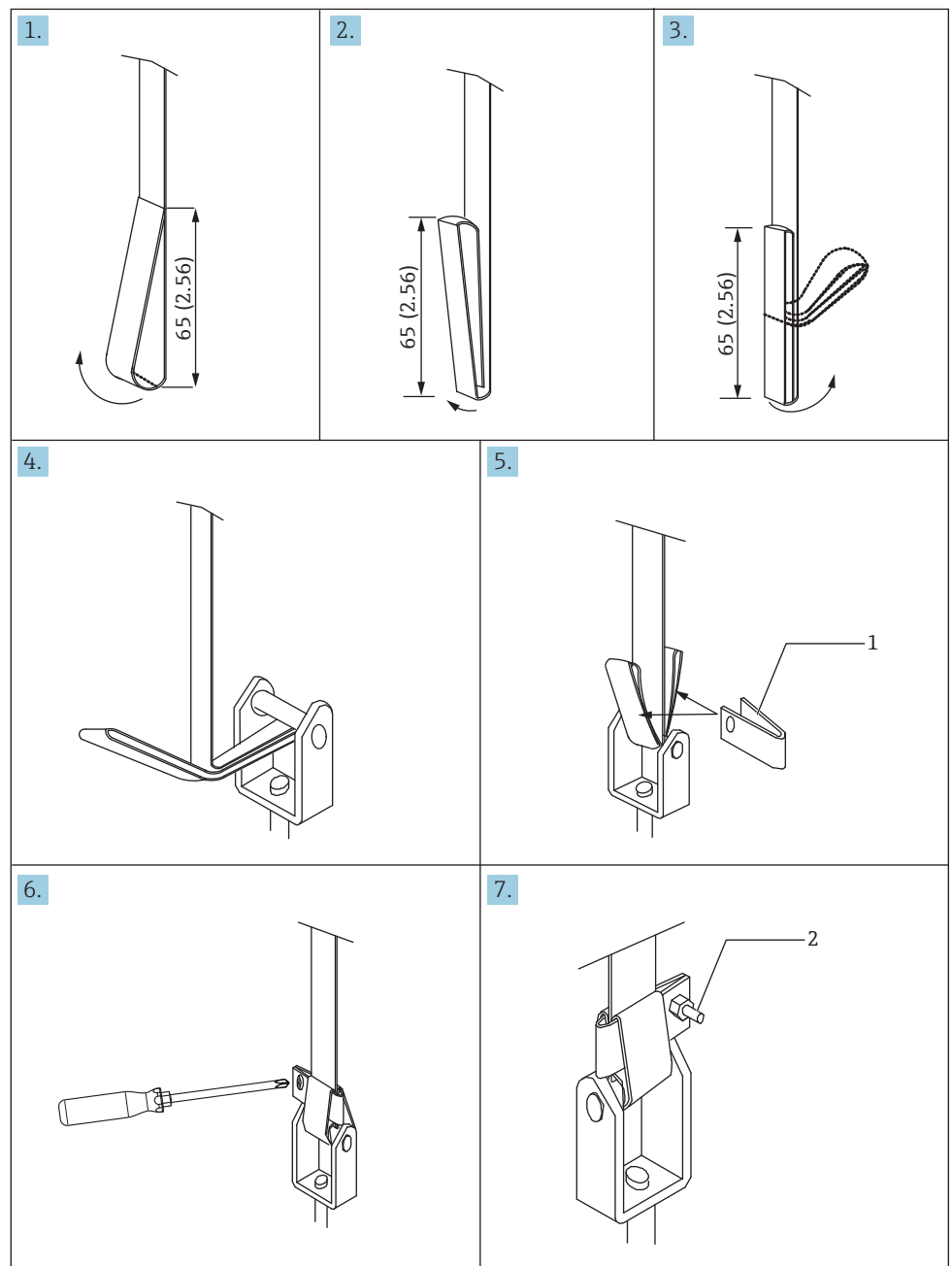


Figure 35: Connection of measuring tape to float

1. *Tape clamp*
2. *Screw thread*

3.13.3 Measuring tape installation at floating roof tank

Installation procedure

1. Insert the end of the measuring wire into the tank through the 90° sheave elbow.
2. Attach the other end of the measuring tape to the tank.
3. Connect the measuring wire to the float.
4. Connect the measuring wire to the measuring tape on the top of the tank and feed the measuring tape to LT.
5. Confirm that measuring tape is not twisted.
6. Replace the sheave elbow cover.

This completes the measuring tape installation at floating roof tank.

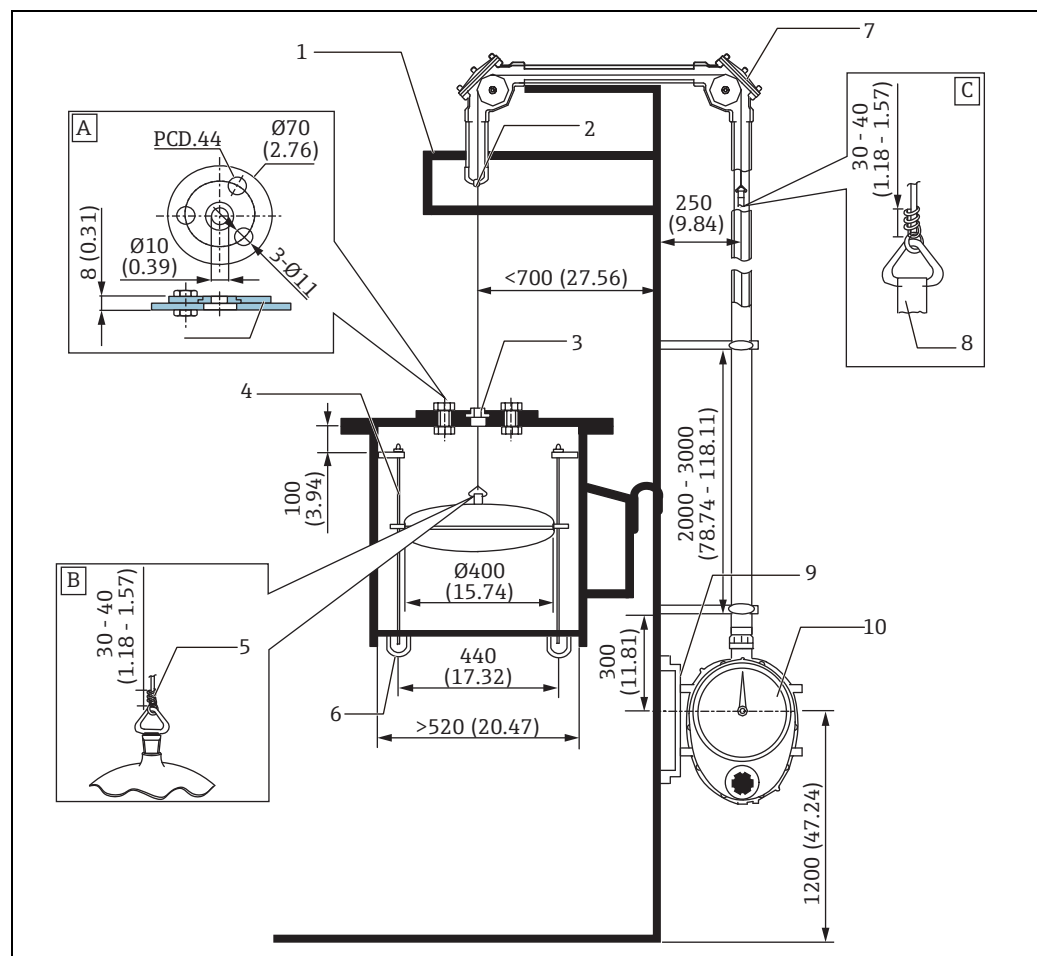


Figure 36: Measuring Wire

- | | |
|-----|--|
| A | Wire guide metal |
| B | Upper part of float |
| C | Hook for measuring wire |
| 1. | Roof stand |
| 2. | Wire guide socket |
| 3. | FRT wire guide metal |
| 4. | Guide bar: $\varnothing 16$ mm (0.63 in) |
| 5. | Stainless wire (provided) |
| 6. | Pipe end (1^B Sch 40 to 80) |
| 7. | 90° sheaves elbow |
| 8. | Measuring wire |
| 9. | Gauge supporter |
| 10. | Gauge head |

3.13.4 Installation of measuring tape at medium/high pressure tank

⚠ CAUTION

- Do not bend or damage the measuring tape.
- Be sure to keep the measuring tape from twisting inside of the tank or pipe.
- There are small holes at intervals of 20 mm (for feet: 1 inch) along half of the entire length of measuring tape. Attach the measuring tape to LT so that the side with the holes are wound by LT.
- Check to make sure the measuring tape does not come off the sheave elbow roller. Inspect the measuring tape after installation.
- Secure the safety of workers to counteract the extreme dangers of poor footing when measuring wire is required to be inserted into 135° sheave elbows.
- Repairing the connection components between the float and measuring wires, once the tank is fill, can be very difficult. Be sure to inspect them thoroughly before filling.

Installation procedure

1. Rotate gate valve counter clockwise and open gate valve completely, and then remove sheave elbow cover and rear cover of LT.
 - Remove gland of the gauge head rear cover with a gland fixing tool.
 - Remove O-rings (2pcs.).
2. Remove tape guide, and lock screw.
3. Insert non-perforated end of the measuring tape into tank through 90° sheave elbow (refer to Figure 33).
4. Insert the perforated and looped end of the measuring tape thorough 135° sheave elbows to LT (refer to Figure 34).
5. Once the measuring tape is inserted into measuring gauge through narrow opening in dust cover, secure to the tape drum with set screw, then wind the tape twice around tape drum.
6. Loosen screws (2pcs.) and adjust measuring tape so that it does not obstruct opening in dust cover.
7. Pull measuring tape inside the tank.
8. Cut measuring tape off leaving approx. 1.5m.
9. Connect measuring tape to the float.
 - Refer to "3.11.2 Connection Procedure of Measuring Tape to Float" for details on the connection of the measuring tape.
10. Confirm that measuring tape is not twisted.
11. Replace sheave elbow cover.
12. Follow Figure 33 and tighten gland.

This completes the installation procedure.

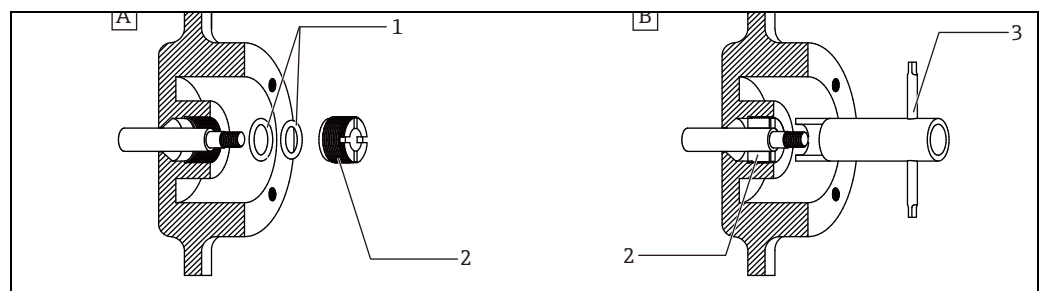


Figure 37: Gland Fixing Tool

- | | |
|----|-------------------------|
| A | Wire guide metal |
| B | Upper part of float |
| C | Hook for measuring wire |
| 1. | Roof stand |
| 2. | Wire guide socket |
| 3. | FRT wire guide metal |

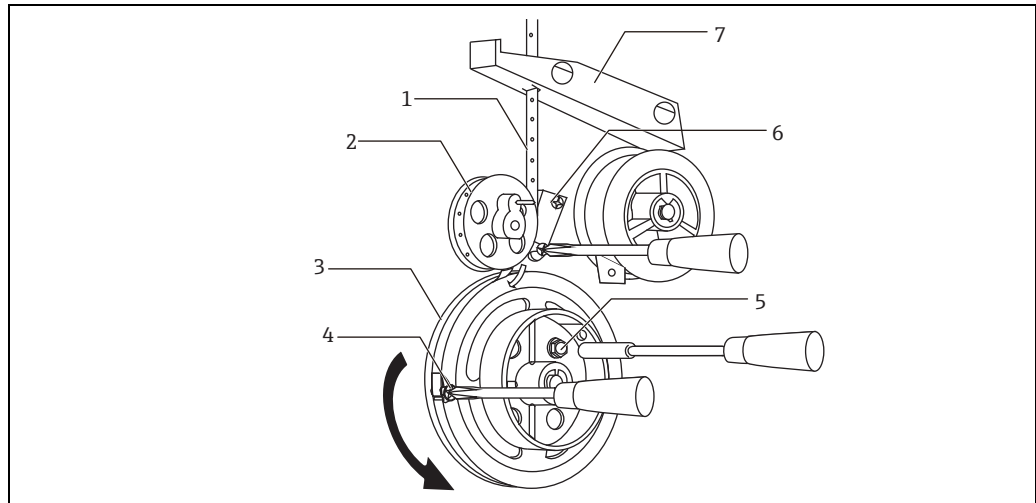


Figure 38: LT parts configuration

1. Measuring tape
2. Sprocket
3. Tape drum
4. Set screw for tape
5. Lock screw
6. Tape guide
7. Dust cover

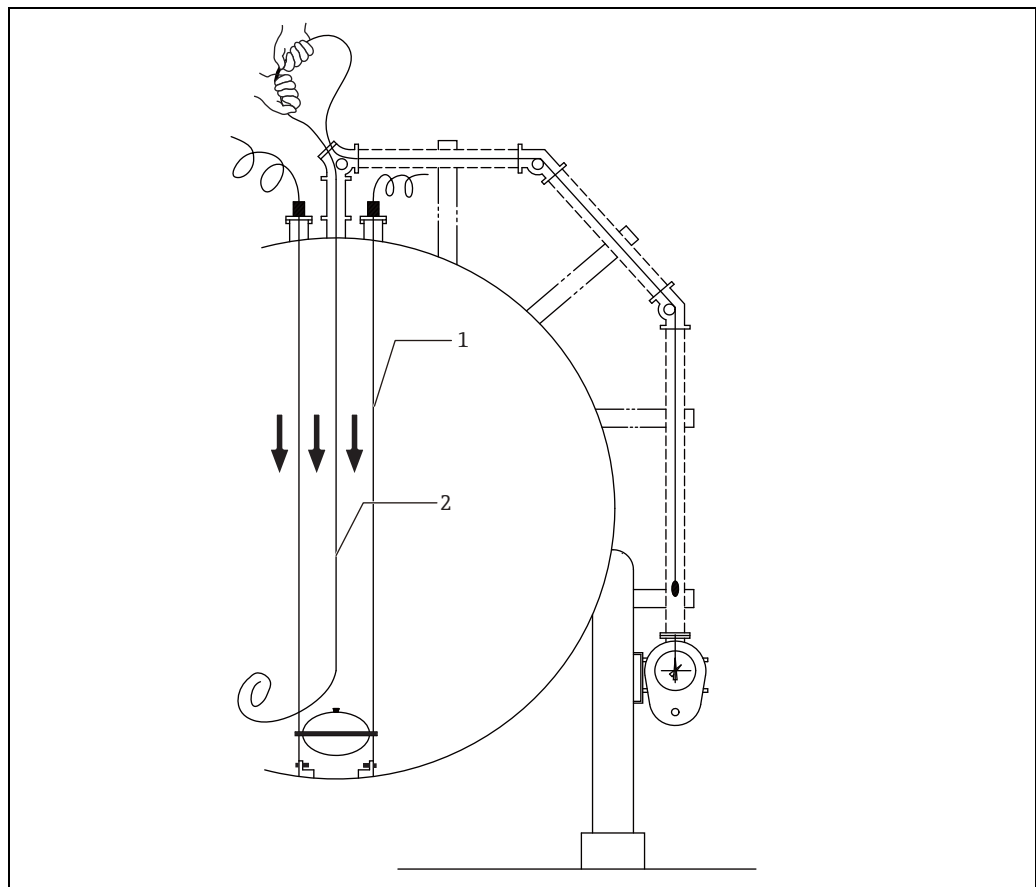


Figure 39: Measuring tape installation

1. Guide wire
2. Measuring tape

i Cut the measuring tape off leaving approximately 1500 mm (59.1 in) from the connection of the float after connecting measuring tape to the tank.

3.13.5 Internal parts adjustment

Tape guide adjustment procedure

1. Turn the LT tape drum in the direction indicated by arrow to put tension on the measuring tape.

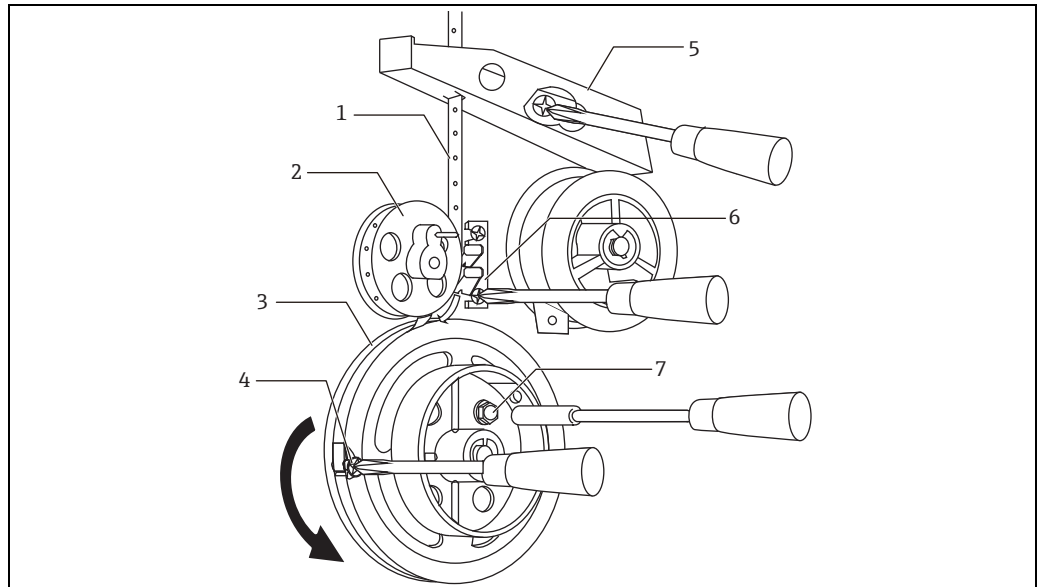


Figure 40: Tape drum

1. Measuring tape
 2. Sprocket
 3. Tape drum
 4. Set screw for tape
 5. Dust cover
 6. Tape guide
 7. Lock screw
2. After the measuring tape is properly set, adjust the two tape guide heads so that they are positioned at 2mm from the tape surface.
 - The measuring tape may come off the sprocket pins [6] since it moves abruptly with liquid waves. The tape guide prevents this.
 3. When the dust cover is installed, loosen screws (2pcs.) and adjust measuring tape [7] so that it does not obstruct opening in dust cover.

This completed the tape guide adjustment procedure.

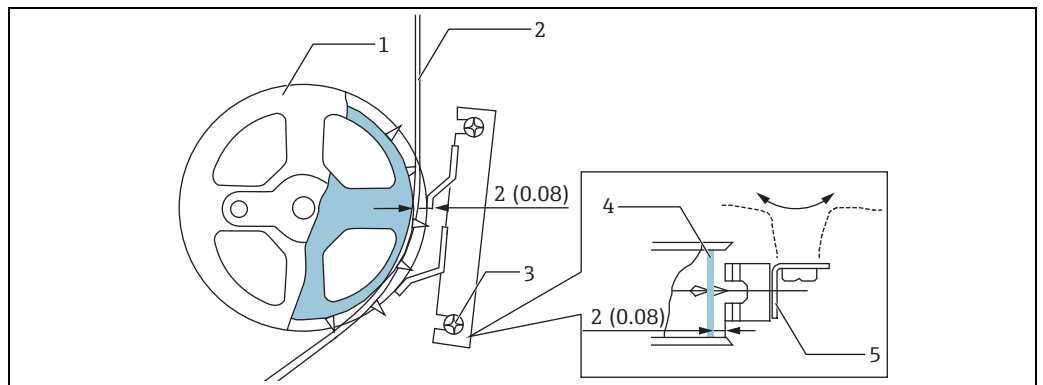


Figure 41: Tape guide adjustment

1. Sprocket
2. Measuring tape
3. Set screw
4. Measuring tape
5. Tape guide

3.13.6 Setting conster drum

Setting procedure

The conster drum should be set after the measuring tape has been installed.

⚠ CAUTION

- When winding the conster motor from the large drum to the small drum, keep a firm grip on the large drum until the spring is completely wound. Releasing it may result in injury due to the spring recoiling.
 - The conster may separate from the track of the large conster drum, or disproportionate torque may result when the excessive force is applied, resulting in inaccurate readings. Handle with care.
 - When winding the conster from the small conster drum to the large conster drum, keep firm grip on the large drum until the measuring tape is taut.
1. After confirming that the lock screw has been removed, secure the head of the conster to the large conster drum with the bolts and nuts.
 2. Rotate the conster drum in the direction indicated by the figure below.
 3. When fixing the conster drum, rotate the tape drum counter clockwise to tighten the tape.
 4. When the tank is empty, roll the tape twice around a small conster drum and secure it with bolts.
 - Once the tank is fill, measure the surface level of the fluid and use the equation on the following page to determine the number of times the tape should be rolled. Roll the tape around a large conster drum the exact number of times required based on the calculation.
 5. Replace rear cover.
 6. Close the gland of LT5-4 or LT5-6 rear cover.

This completes the setting procedure.

$$\text{巻取回数} = \frac{\text{タンク高さ（測定スパン）} - \text{実際の液位（実尺値）}}{600 \text{（単位：mm）}}$$

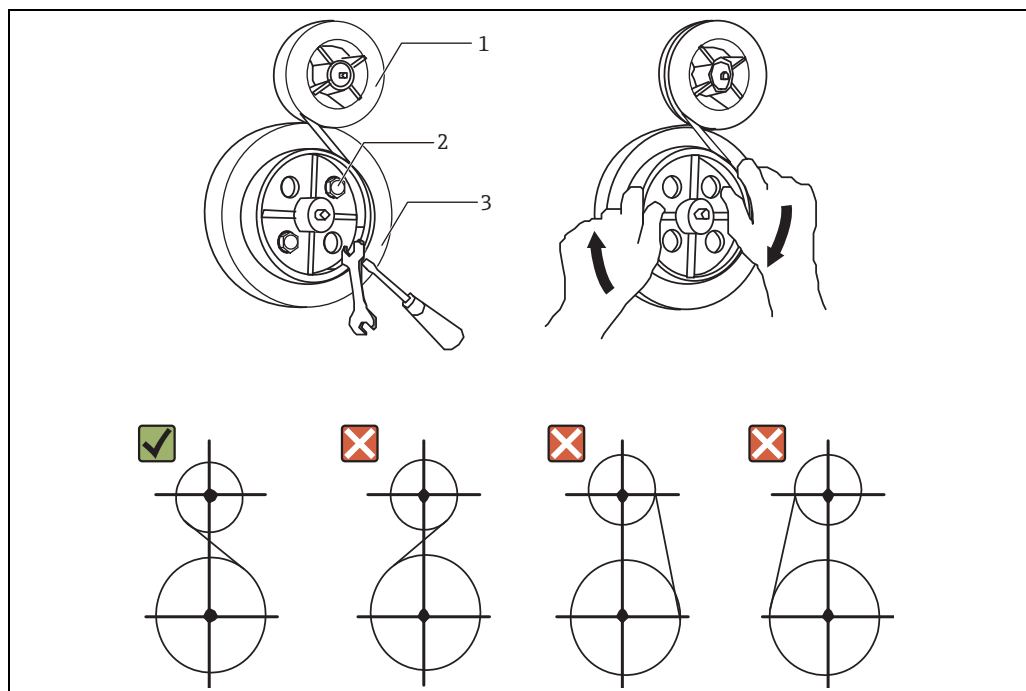


Figure 42: Conster drum setting

1. Conster drum (small)
2. Lock screw
3. Conster drum (Large)

3.14 Liquid sealant for seal pot

3.14.1 Filling seal pot with liquid sealant when installing new LT

Liquid sealant filling procedure

1. Install entire LT unit including the seal pot and float into the tank.
 - Parts of the drawing shown below may vary, depending on order code selected by customers.
2. Hoist the float up and down manually to confirm that the dial (or counter) display changes accordingly.

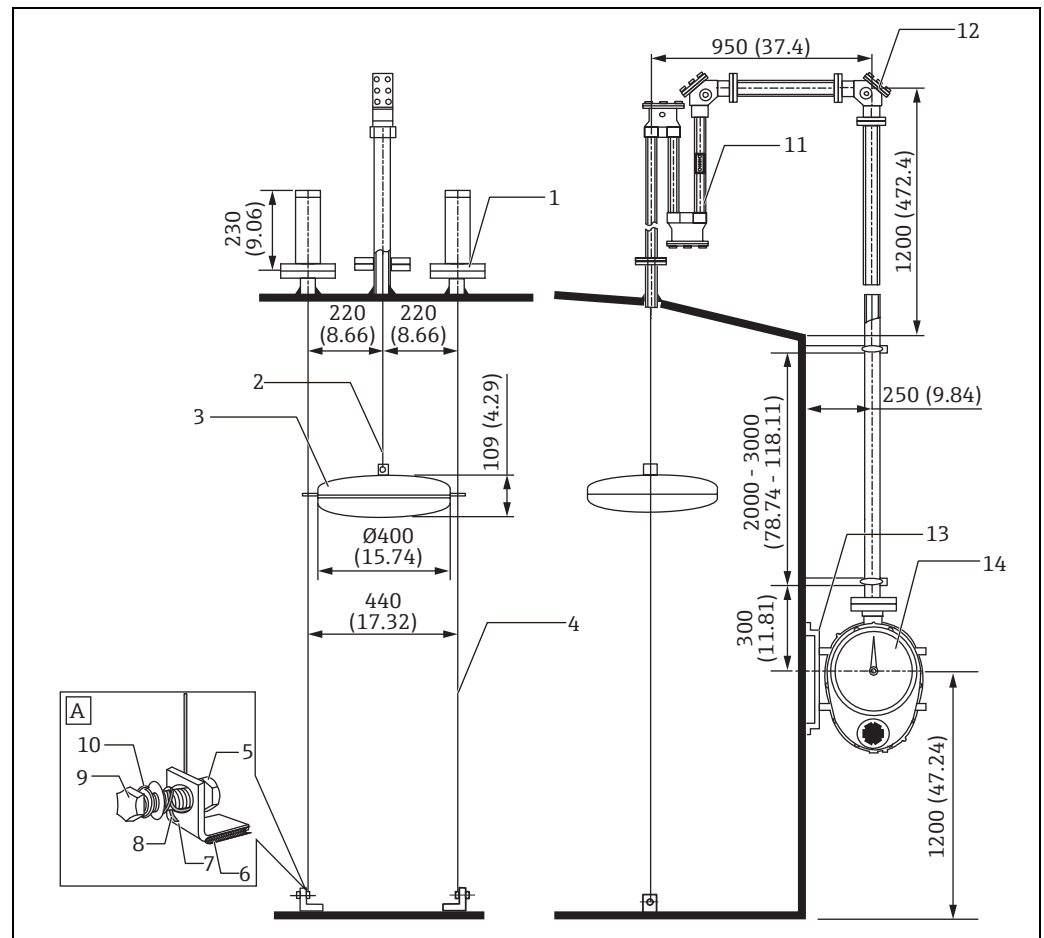


Figure 43: LT with seal pot

- | | |
|-----|------------------------------------|
| A | Anchor hook |
| 1. | Top anchor |
| 2. | Measuring tape |
| 3. | float |
| 4. | Guide wire |
| 5. | Nut |
| 6. | Wetting part (wetting to the tank) |
| 7. | Anchor hook |
| 8. | Guide wire |
| 9. | Bolt |
| 10. | Washer |
| 11. | Seal pot |
| 12. | 90° sheaves elbow |
| 13. | Gauge supporter |
| 14. | Gauge head |

3. After LT operation check, remove the sheave elbow cover and fill with liquid sealant.

⚠ CAUTION After administering liquid sealant and checking LT operation, the liquid sealant may leak into the tank through the measuring tape.

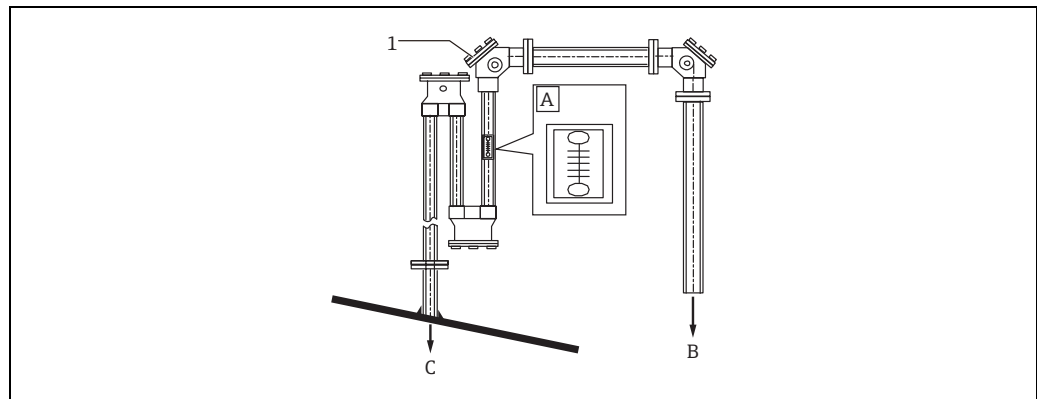


Figure 44: Filling seal pot with liquid sealant

A Liquid sealant indicator

B To LT5

C To inside the tank

1. 90° sheaves elbow

4. Administer liquid sealant until it comes up to the center of the indicator.

5. Replace 90° sheave elbow cover.

This completes the liquid sealant filling procedure.

i 2 l (liter) of liquid sealant is contained in the kit. When administering the proper amount of liquid sealant, a small amount will remain in the bottle. Do not dispose remaining liquid sealant. It is used as needed, following running LT.

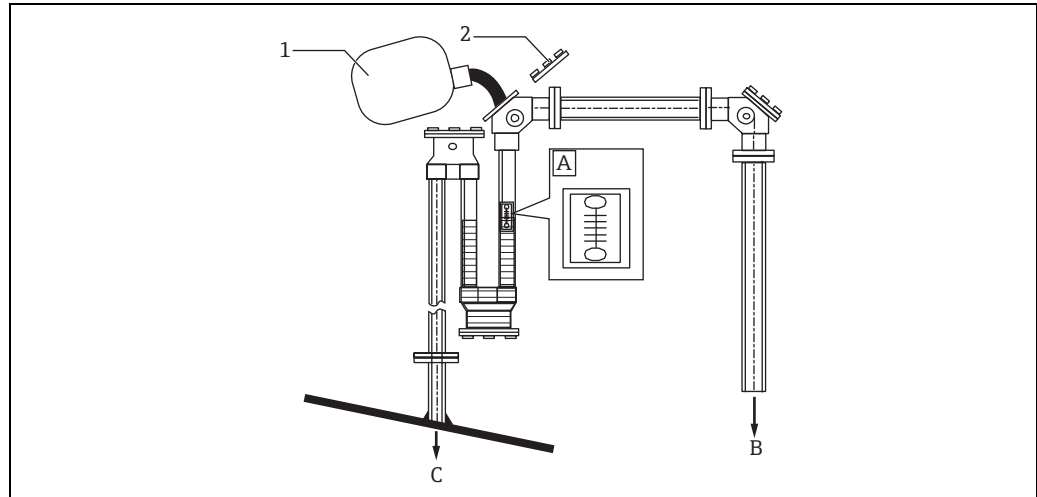


Figure 45: Amount of liquid sealant

A Liquid sealant indicator

B To LT5

C To inside the tank

1. Liquid sealant

2. 90° sheaves elbow cover

i If the tank is run without liquid sealant, LT seals, O-rings, or sheave elbows may be damaged by gas contained the tank, and may cause LT to malfunction. Be sure to administer liquid sealant prior to tank operation.

3.14.2 Filing seal pot with liquid sealant for installed LT

Liquid sealant filling procedure

WARNING

- Do not allow used liquid sealant to contact hands or skin. If used liquid sealant mingles with liquid from the tank, it may become a hazardous substance.
 - Exercise caution against substance from containers which used to drain liquid sealant.
1. Prepare a container for 2 ℓ (liter) or more and place under the sheave elbow outlet.
 2. After confirming the safety of the vicinity around the tank, remove the seal pot drain bolt.
 3. Drain the liquid sealant from the seal pot.
 4. Remove the cover of the 90° sheave elbow.

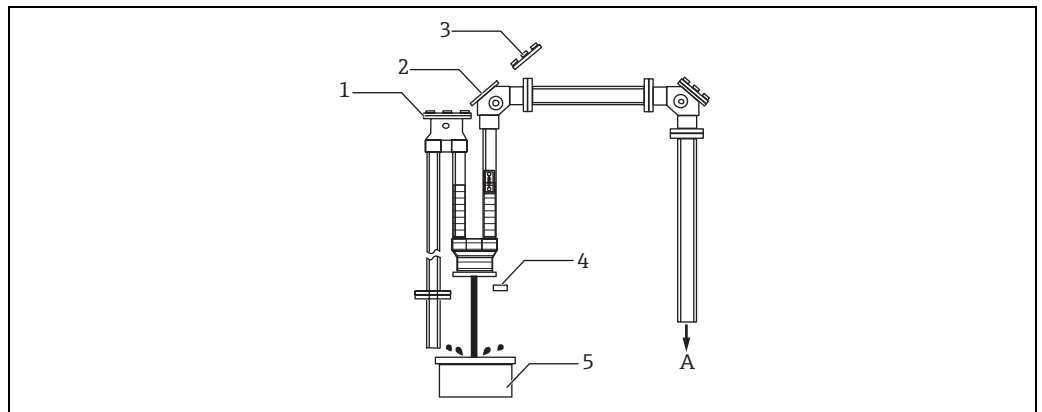


Figure 46: Draining seal liquid

A To LT5

1. Sheaves elbow

2. 90° sheaves elbow

3. 90° sheaves elbow cover

4. Drain plug

5. Container for 2 ℓ or more

5. Tighten the drain bolt and fill until liquid sealant reaches the center of the indicator on the seal pot side.

6. Replace the sheave elbow.

This completes the filling seal liquid procedure.

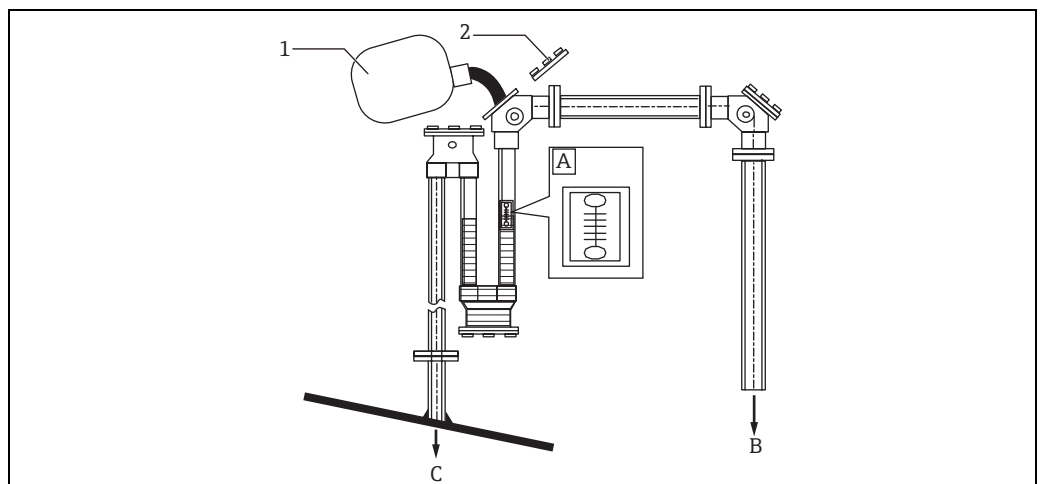


Figure 47: Filling seal liquid

A Liquid sealant indicator

B To LT5

C To inside the tank

1. Liquid sealant

2. 90° sheaves elbow cover

4 Display

4.1 Dial display

Pointer setting and scale reading procedure

When calibrating (pointer setting) to authorized value as calculated value or measured value, calibrating procedure will depend on which display type is used. Use the dial type display when tank height is 20 m or less, and use the counter type display when tank height is 20 m or more.

1. Remove the indication cover and loosen the cap nut.
 - The long indicator needle (white) can be turned freely, whereas the short one (green-yellow) can be freed by pulling it.
2. Align the short needle with inner scale (1 mm/one scale), as it corresponds to lower value in liquid level.
3. Align the long needle with the outer scale.
 - As one scale notch corresponds to 100 mm, the outer scale is aligned visually, according to the lower two digits in liquid level value.
4. After aligning the needles, tighten the cap nut firmly.
 - Long indicator needle (outer scale): 10000 mm, 1000 mm, 100 mm values; Short indicator needle (inner scale): 10 mm, 1 mm values.

This completes the setting and reading procedure.

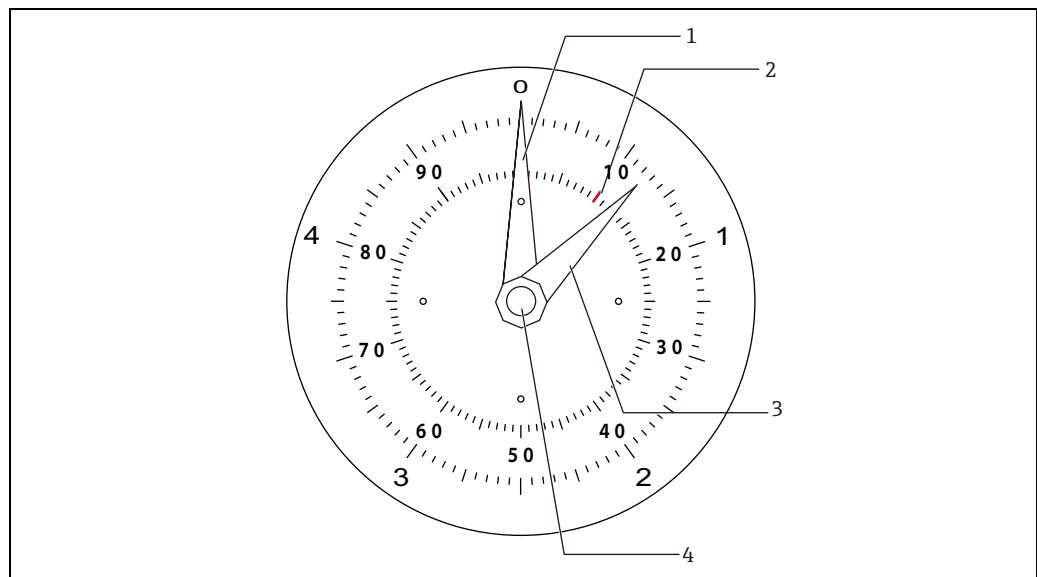


Figure 48: Dial display

1. Long indicator needle (white)
2. Set the needle to 1/10 when the needle is positioned at 10 mm.
3. Short indicator needle (green)
4. Cap nut

4.2 Counter display

Counter display procedure

1. Remove the indicator cover.
2. Loosen the screw at the center of the scale plate.
 - The scale plate can rotate freely (1 scale notch is equivalent to 1 mm.).
 - The counter changes one digit for every notch (100 mm) the scale plate moves.
3. Rotate the scale plate and align the numerical value of the counter to the three upper digits values of liquid level.
4. Align the scale plate to the pointer which corresponds to the two lower digit values in liquid level, then tighten the scale plate screw.
 - If the pointer is indicating a range of between 97 and 03 on the scale plate, as in the figure below, the counter will not change instantly. As it changes gradually, keeping constant the relation between the rotation of the scale plate and numerical change, the counter will display half values. Thus, in order to rule out incorrect reading, the counter window and parts of the scale plate are correlated by color.

This completes the counter display procedure.

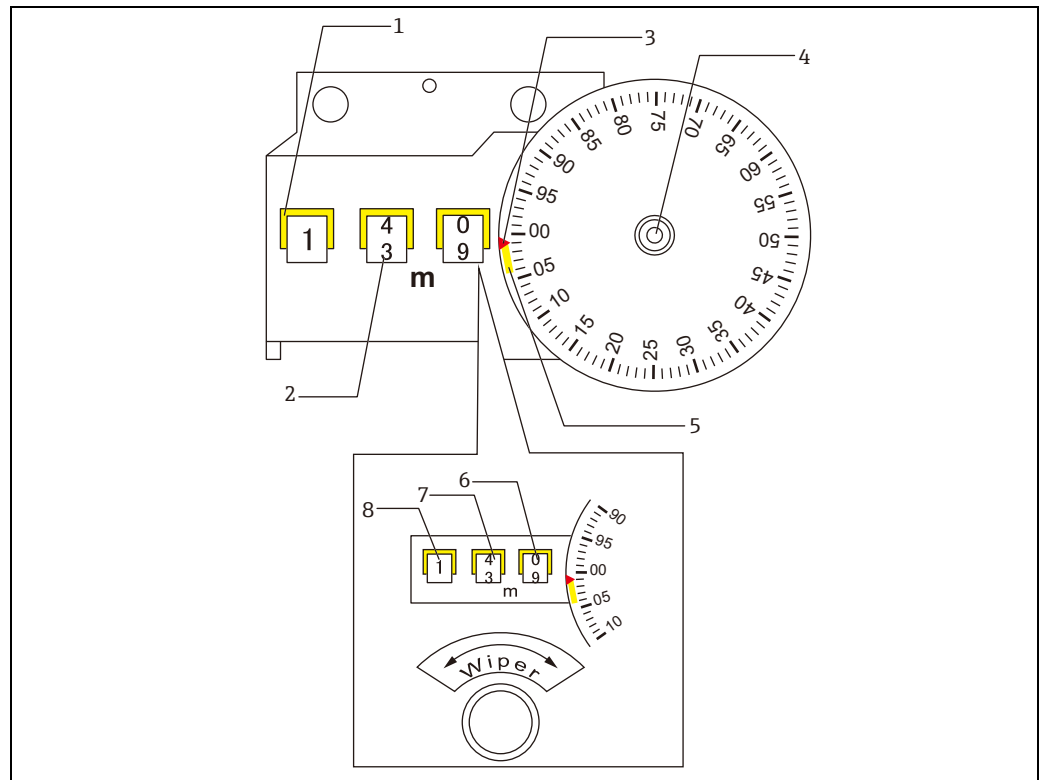


Figure 49: Counter display

1. Counter (yellow)
2. Counter (black)
3. Pointer (red)
4. Screw
5. Range (yellow)
6. First drum
7. Second drum
8. Third drum



Read the value of the range of the yellow counter when the red pointer points to the range of the yellow and read the value of the black counter when it points to black counter.

(e.g.)

Yellow: 14000 mm

Black: 13999 mm

4.3 Indication adjustment

Following are the three universal procedures for indicator adjustment, however the operation of the indication can be performed by using all the same procedures.

- Fill the tank with actual liquid and calibrate the indicator to measured volume.
- With the tank empty, calibrate the indicator using formulaic calculations.
- Fill the tank with water and calibrate the indicator to measured volume.

4.3.1 Calibration using actual measuring liquid

In order to obtain a reliable value, measure the liquid level two or three times, using a measuring tape which has been officially tested accurate to within ±0.3 mm/m (±1.2mm/10 m). Calibrate to the values only after accurate data has been gathered.

4.3.2 Calibration through calculation for empty tank

1. When the tank is empty, calculate the liquid level L_f using the following formula and set indicator to the determined value.
2. When liquid reaches to the value of L_f , the float gains buoyancy and LT will show proper liquid level.

1.	Draft of the float when tank is empty				
$L_f = \frac{h}{2} + \frac{\frac{W - T}{\rho} - \frac{V}{2}}{S} = 80.11 \text{ mm}$					
Dimension of float	D	400 mm	Height of float	h	200 mm
Weight of float	W	8300 g	Volume of float	V	19200 cm ³
Cross section area of draft line	S	1256.64 cm ²	Tension of tape	T	1200 g
Density of actual liquid	ρ	1 g/cm ³ (if empty = water)			

 Assign specific density to the formula above.

When float is installed in a spherical tank, where it will tend to deviate off center, find L_x in the formula below and add it to the product of L_f in formula 2 above.

$L_x = \frac{D}{2} - \sqrt{\frac{D^2}{4} - S^2}$	L_x	Correction amount of liquid level indication by deviation caused by float installation (mm)
	D	Diameter of spherical tank (mm)
	S	Deviation distance from center of tank to center of float (mm)

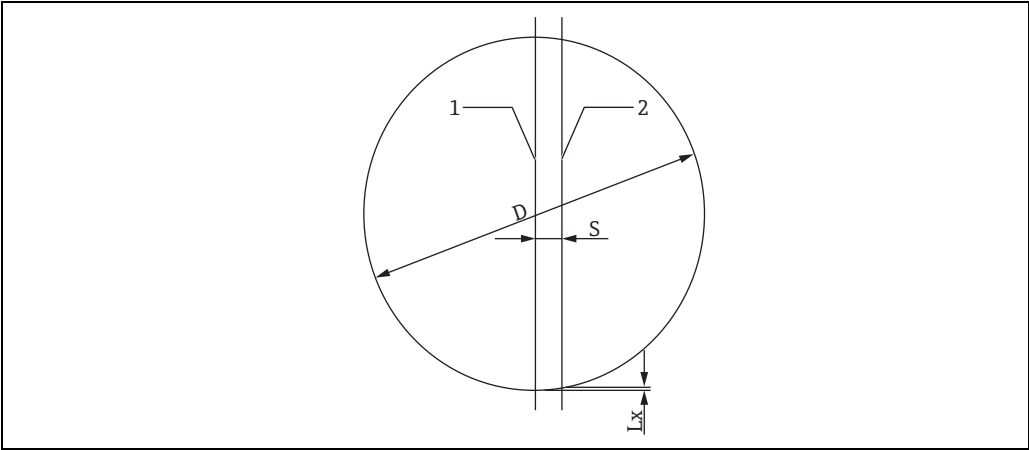


Figure 50: Setting indicator of spherical tank

1. Center of the tank
2. Center of the float for mounting

4.3.3 Calibration water filling procedure

When LT installation is complete, the water filling test is generally performed. Since measuring for level is usually more difficult with other liquids, calibrating to water is recommended. The indicator will be calibrated one again when the tank is filled with a commodity liquid. Using the following formula, calculate the difference between where the float gains buoyancy in both water and commodity liquid. Then correct the indicator value with water in the tank before filling it with a commodity liquid.

i After setting the LT indicator to the measured value for water, determine L_B in the formula above. If the value of L_B is a positive integer, add that value to the determined indicator value. If the value of L is a negative integer, subtract that value from the determined indicator value. This will be the final indicator value.

Calculation of 5000 g/Ø400 mm float for LT5-1

The following values show one of the typical example. Change a value which substitutes to the formula depending on the specification required.

1.	Draft of the float when tank is empty				
$L_f = \frac{h}{2} + \frac{\frac{W - T}{\rho} - \frac{V}{2}}{S} = 42.88 \text{ mm}$					
Dimension of float	D	400 mm	Height of float	h	109 mm
Weight of float	W	5000 g	Volume of float	V	10520 cm ³
Cross section area of draft line	S	1256.64 cm ²	Tension of tape	T	1200 g
Density of actual liquid	ρ	1 g/cm ³ (if empty = water)			
2.	Correction of the indicated value when filling water in tank				
$L_b = L_f \text{ (Water)} + L_f \text{ (Actual liquid)} = 7.56 \text{ mm}$					
Dimension of float	D	400 mm	Height of float	h	109 mm
Weight of float	W	5000 g	Volume of float	V	10520 cm ³
Cross section area of draft line	S	1256.64 cm ²	Tension of tape	T	1200 g
Density of actual liquid	ρ	0.8 g/cm ³ (actual liquid)			

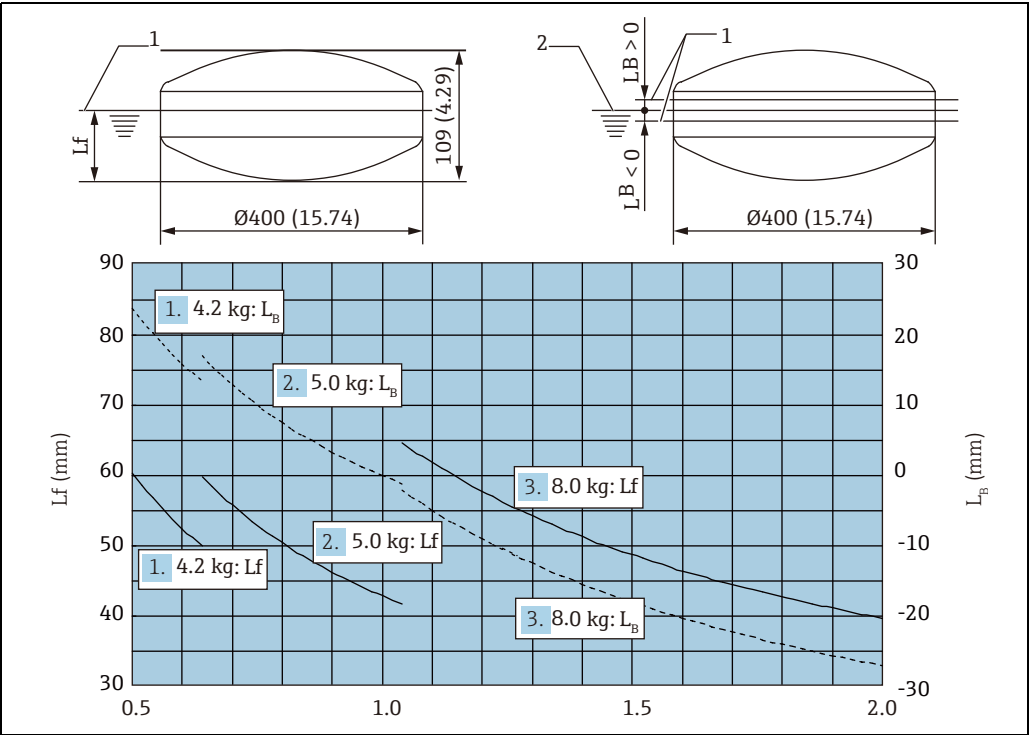


Figure 51: Graph of Ø400 float: Liquid density (g/cm³) for LT5-1, Unit: mm (in)

- 1. Draft on the density ρ
- 2. Water (draft on the density 1.0 g/cm³)

Calculation of 2100g/Ø140 mm float for LT5-1

The following values show one of the typical example. Change a value which substitutes to the formula depending on the specification required.

1.	Draft of the float when tank is empty				
$L_f = \frac{h}{2} + \frac{\frac{W - T}{\rho} - \frac{V}{2}}{S} = 73.02 \text{ mm}$					
Dimension of float	D	140 mm	Height of float	h	200 mm
Weight of float	W	2100 g	Volume of float	V	2661.2 cm ³
Cross section area of draft line	S	153.94 cm ²	Tension of tape	T	1200 g
Density of actual liquid	ρ	1 g/cm ³ (if empty = water)			
2.	Correction of the indicated value when filing water in tank				
$L_b = L_f (\text{Water}) + L_f (\text{Actual liquid}) = 14.61 \text{ mm}$					
Dimension of float	D	140 mm	Height of float	h	200 mm
Weight of float	W	2100 g	Volume of float	V	2661.2 cm ³
Cross section area of draft line	S	153.94 cm ²	Tension of tape	T	1200 g
Density of actual liquid	ρ	1 g/cm ³ (actual liquid)			

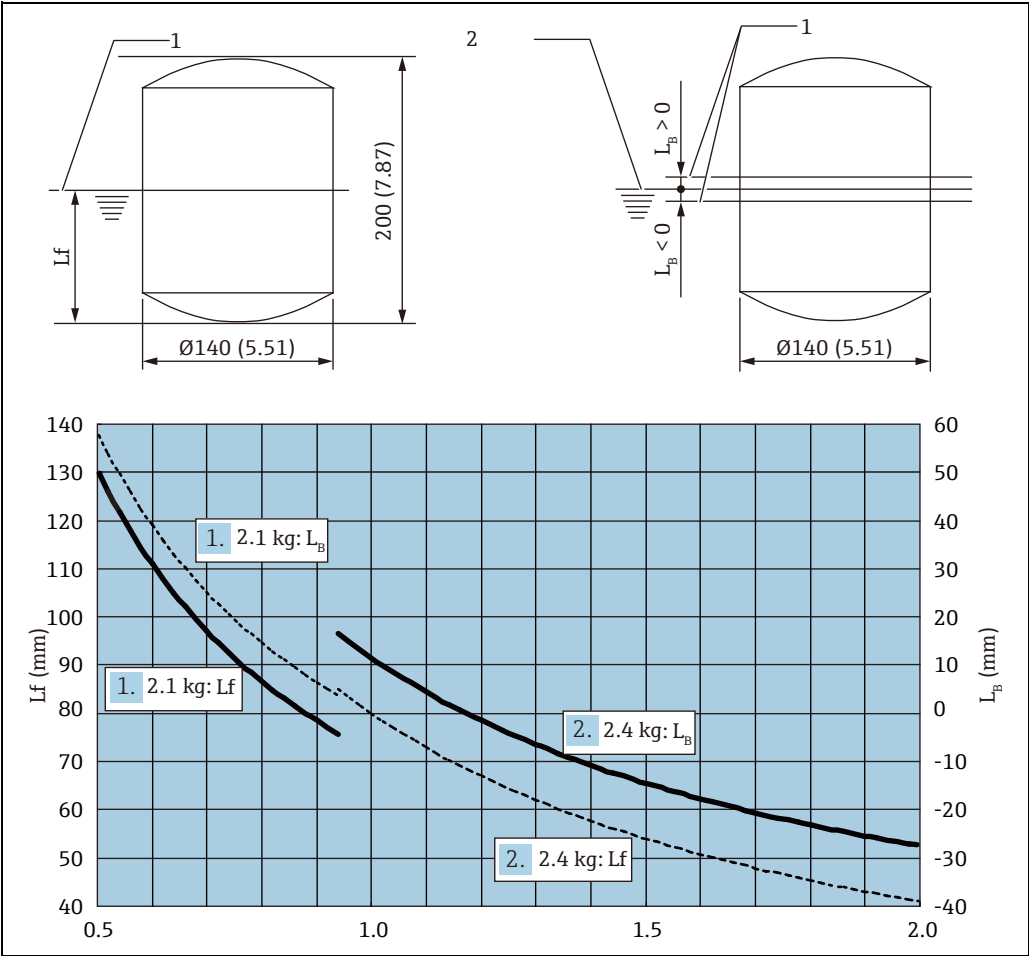


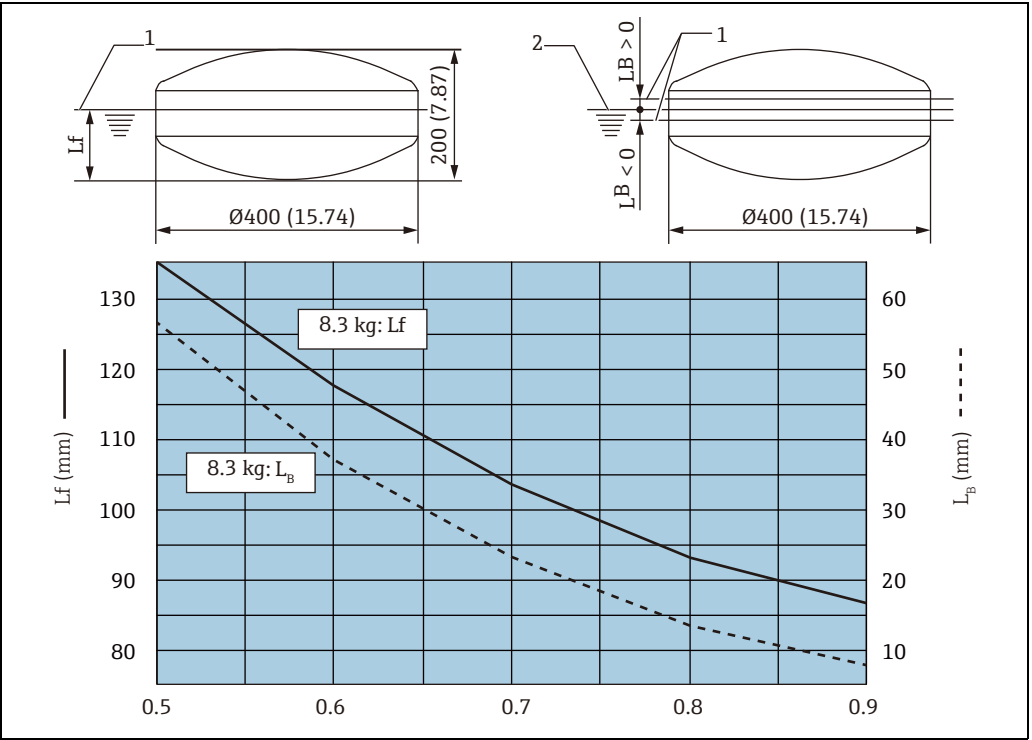
Figure 52: Indicator value for Ø140 float

1. Draft on the density ρ
2. Water (draft on the density 1.0 g/cm³)

Calculation of 8300g/Ø140 mm float for LT5-4/LT5-6

The following values show one of the typical example. Change a value which substitutes to the formula depending on the specification required.

1.	Draft of the float when tank is empty				
$L_f = \frac{h}{2} + \frac{\frac{W - T}{\rho} - \frac{V}{2}}{S} = 80.11 \text{ mm}$					
Dimension of float	D	400 mm	Height of float	h	200 mm
Weight of float	W	8300 g	Volume of float	V	19200 cm ³
Cross section area of draft line	S	1256.64 cm ²	Tension of tape	T	1200 g
Density of actual liquid	ρ	1 g/cm ³ (if empty = water)			
2.	Correction of the indicated value when filling water in tank				
$L_b = L_f (\text{Water}) + L_f (\text{Actual liquid}) = 7.56 \text{ mm}$					
Dimension of float	D	400 mm	Height of float	h	200 mm
Weight of float	W	8300 g	Volume of float	V	19200 cm ³
Cross section area of draft line	S	1256.64 cm ²	Tension of tape	T	1200 g
Density of actual liquid	ρ	1 g/cm ³ (actual liquid)			



4.3.4 LT startup and handling precautions for water and airtightness test

If misshapes occur, such as the damage to measuring tape while inside spherical tanks (i.e. tanks for liquefied gas), tank operation and recovery costs can be extensive. It has been our experience, that most issues involving measuring tape failures arise during test operation or in initial operation of the tank. To prevent such incidents, be sure to complete the following procedures. By taking these preventive steps, misshapes can be avoided early on.

1. For high pressure tanks, be sure to keep the plug gate valve open and set the tank level gauge to measurement mode. Failure to open the valve may result in measuring tape failure.
 - If the valve is not open while filling tank with water, drain the water or remove the sheave elbow cover. Then, stop the measuring tape by hands, open the valve gradually and reel the measuring tape to LT.
2. For the water test, open the water-feed valve partially and supply water to a depth of 500 to 1000mm.
3. Large amount of water may damage the measuring tape. If the float is in close proximity to an inlet, install the wave guard so float is unaffected.
4. If test for airtightness is performed while opening the gate valve, make sure the following components are firmly tightened.
 - Drain plug on the bottom of LT
 - Rear cover bolts
 - Gland of gauge head rear cover
 - Sheave elbow covers

If these items are not secure, large volumes of air may discharge from the system, causing vibrations that will damage the measuring tape.

5. When opening LT rear cover upon completion of airtightness check test, confirm that the inner tank is either at atmospheric pressure or that the gate valve is closed before opening LT.
 - Do not open LT or sheave elbow covers to abruptly discharge compression built up by the airtightness check test. This will damage the measuring tape.
6. Be sure to open the gate valve when filling tank with commodity liquids such as liquefied gas.
 - Closing the gate valve must be restricted almost exclusively to the emergencies or to period of maintaining liquid level.

5 Operation

5.1 Check handle

This is used in order to check that a gauge operates properly.

⚠ CAUTION

- Checking gauge performance using the check handle, only after filling the tank with liquid.
- The check handle is not a float hoisting handle. Do not forcibly hoist the float using the check handle.
- Refer to "5.2 Handling of Hoisting Handle" for details on using the hoisting handle.

Check handle using procedure

1. Push the check handle, attached to the bottom of LT, inside LT.
2. Push the check handle while rotating the check handle to the right.
3. Rotate the check handle to the left when indicator is approx. 4 to 5mm over scale.
4. Check the LT indicator.

This completes the check handle using procedure.

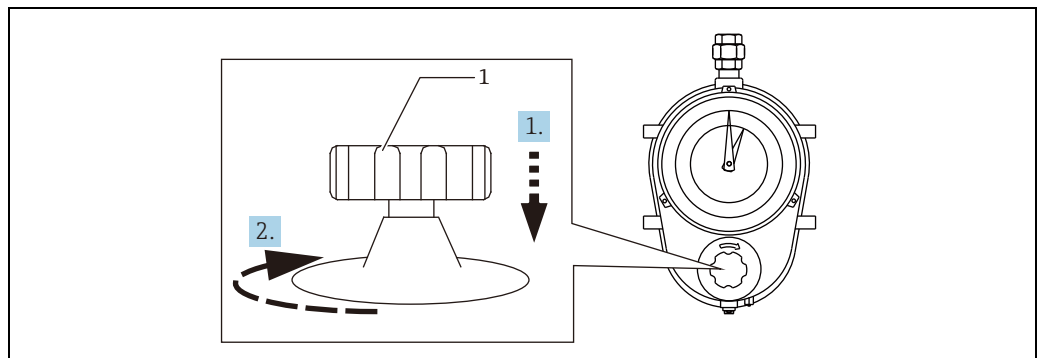


Figure 54: Check handle

1. Check handle

5.2 Hoist unit (LT5-1)

The hoist handle is used to hoist up float when not in use. This helps to add life to LT when utilized for tanks with a stirrer and/or for tanks containing corrosive liquid.

⚠ CAUTION

- Do not release grip on hoist handle, when hoisting or lowering the float. Doing so may cause float to fall resulting in severe damage to float.
- When lowering the float, do not continue rotating handle after it reaches liquid surface.
- When handle reaches the A position, shown in Figure 50, the float is freed from the handle. Remove the handle while float is in use.

Hoist up procedure

1. Secure the handle to the knob, using the wing bolt.
2. Push the knob while pulling the handle. Release the handle when the knob is pushed into position B.
3. After confirming that the knob is secure in position B, rotate the handle counter clockwise for one rotation, within 2 seconds.
4. To stop in the middle of hoisting, push the stopper to the deepest possible depth and secure the win bolt.
5. Put the handle back slowly and push the stopper against LT body.
 - The float will not fall by releasing handle.
 - Remove the handle when hoist operation is complete.

This completes the hoist procedure.

Hoist down procedure

1. Insert the handle into the knob and fix it as shown below, rotate it counter clockwise, and then loosen the win bolt. Secure the stopper with the win bolt after returning the stopper to original position.
2. Rotate the handle clockwise.
 - When the float reaches the liquid surface, the handle decreases suddenly and the LT indicator will stop. Do not rotate the handle any further.
3. After completion of lowering float, pull the knob, pulling the handle, and release the knob when the knob is in the condition A.
4. Remove the handle when lowering operation is complete.

This completes the lowering procedure.

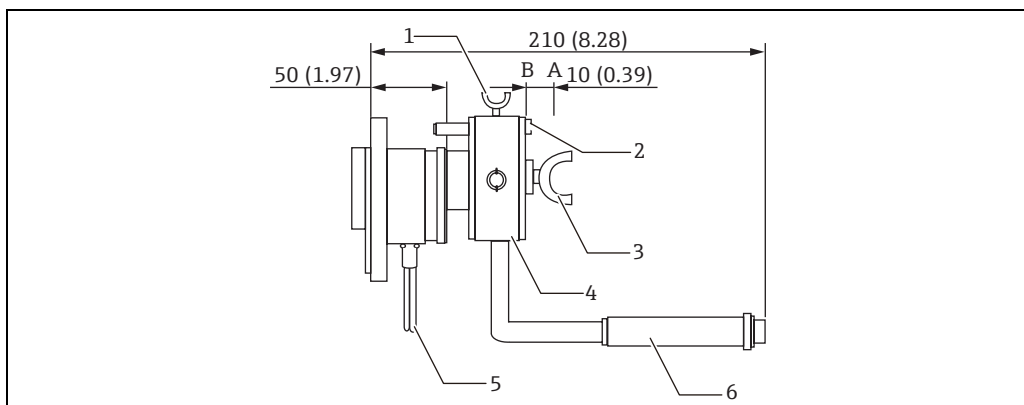


Figure 55: Hoist unit for LT5-1

1. Win bolt
2. Stopper
3. Win bolt 2
4. Knob
5. Handle
6. Handle

5.3 Hoist unit (LT5-4/LT5-6)

The hoist handle is used to hoist up float when not in use. This helps to add life to LT when utilized for tanks with a stirrer and/or for tanks containing corrosive liquid.

CAUTION

- Do not release grip on hoist handle, when hoisting or lowering the float. Doing so may cause float to fall resulting in severe damage to float. If the handle must be released when hoisting float, lock the handle first.
- Do not tilt the handle over 90 degrees or more toward its axis. This may cause the damage to the float, measuring tape, or conster.
- Do not continue rotating the handle after float reaches liquid surface.

Hoist Up and Down Procedure

1. Remove the lock chain.
2. Slowly rotate handle in smooth circles (refer to previous page).
 - The tape drum gear and the hoist shaft gear will begin to engage at 90 degrees.
3. Rotate handle to position B, turn handle counter clockwise, and hoist or lower float.
 - After hoisting float, do not leave hand. Be sure to secure it with the lock chain first (refer to C).
4. Remove lock chain when lowering float.
5. Rotate handle clockwise to lower float.
 - When float reaches the liquid surface, the indicator or counter will stop at current liquid level.
6. After lowering float, rotate handle 180 degrees against shaft to enable liquid to be measured.
7. While the float in service, loop lock chain 1 to 2 times around crank handle and place chain hock on the loop nearest the screw (refer to A).

This completes the hoist and lowering of float procedure.

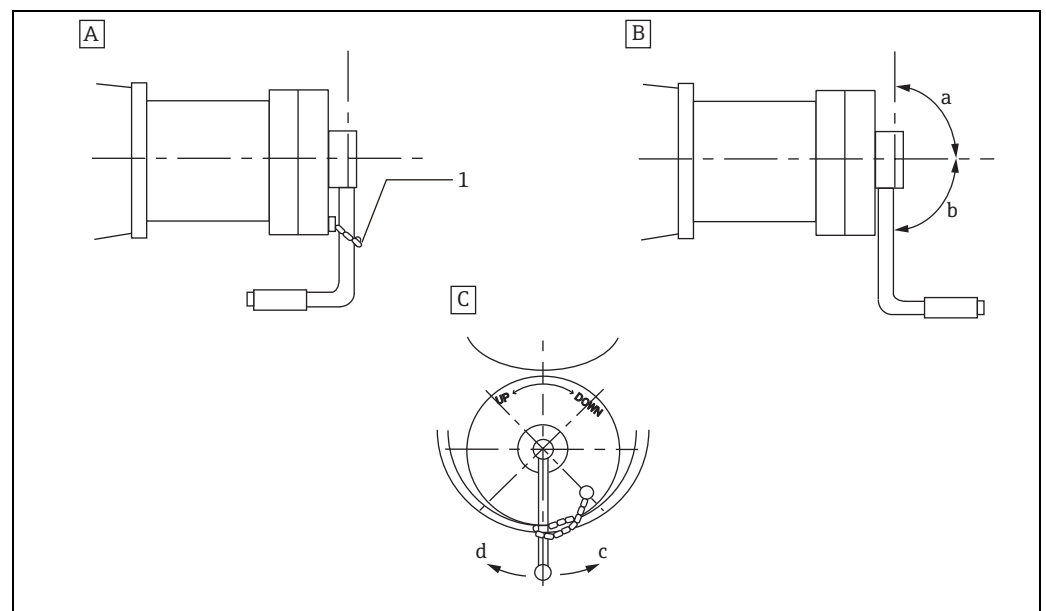


Figure 56: Hoist handle (LT5-4/LT5-6)

- A During measurement
- B While hoisting up and down
- C Front view
- a Deviated position of gears
- b Engagement position of gears
- c Hoisting float
- d Lowering float
- 1. Lock chain

6 Parts replacement

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

If gas begins leaking from the side of LT body, O-rings must be replaced.

The following steps 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 discharge all remaining pressure in the pipe.
3. Remove the attached disc.
4. Remove the transmitter if attached.
5. Remove coupling from the side of LT and remove gland and O-rings (2pcs.) by using a gland fixing tool.
6. Inspect the other components. Replace O-rings and other wear items as necessary
7. Replace O-rings, tighten gland and assemble transmitter according to steps above in reverse order.
8. Open gate valve gradually.
 - Opening gate valve abruptly will release a sudden burst of air from the system, which may result in the damage to the measuring tape.

This completes the replacement procedure.

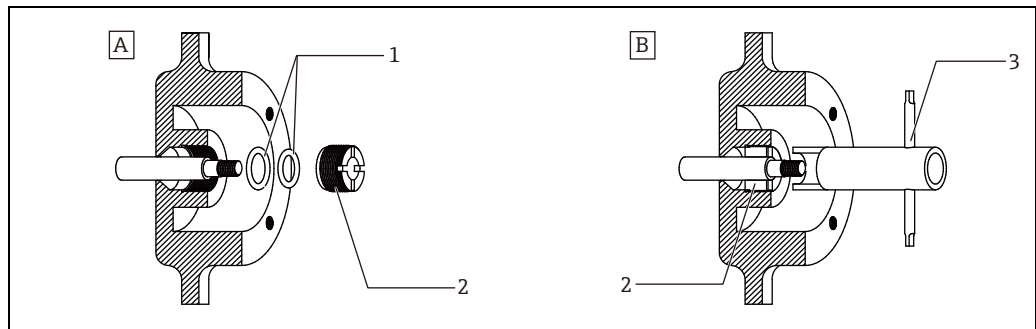


Figure 57: O-ring replacement

A Before tightening gland

B After tightening gland

1. O-ring

2. Gland

3. Gland fixing tool

6.2 Drive check replacement (LT5-4/LT5-6)

The drive check system is essential to confirming LT operation and employed frequently, causing inevitable wear and tear, but is designed to be easily repaired and serviced.

Replacement procedure

1. Remove LT rear cover and tape drum.
2. Loosen socket head cap screw of the check handle and remove check handle.
3. Remove gland clamp, using a spanner or crescent wrench (nominal 46).
4. Remove gland spring, collar, seal metal.
5. Pull check shaft out toward the tape drum.
6. After completing parts replacement, assemble drive check according to steps above in reverse order.

This completes the replacement procedure.

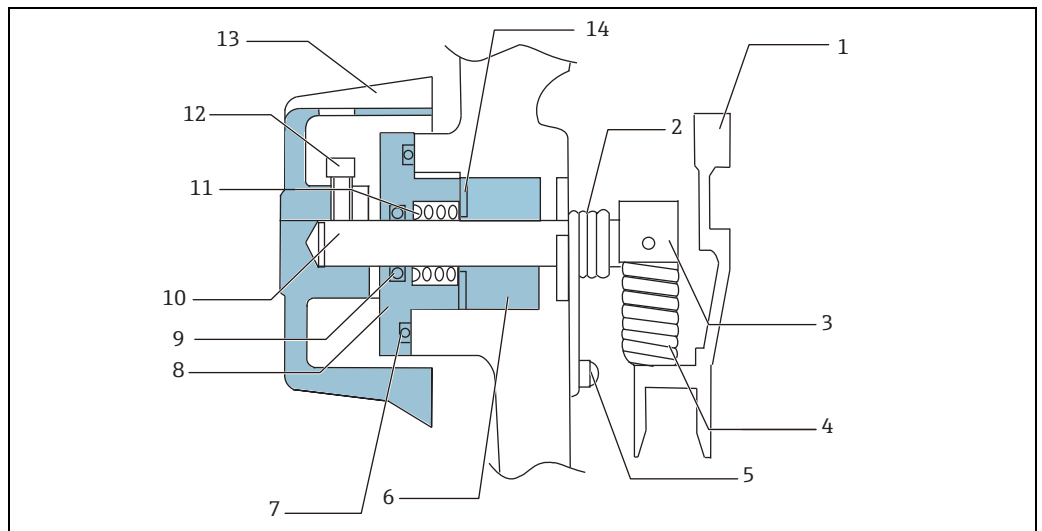


Figure 58: Parts name of drive check unit

1. Tape drum
2. Check spring
3. Check boss
4. Spring
5. Spring set 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

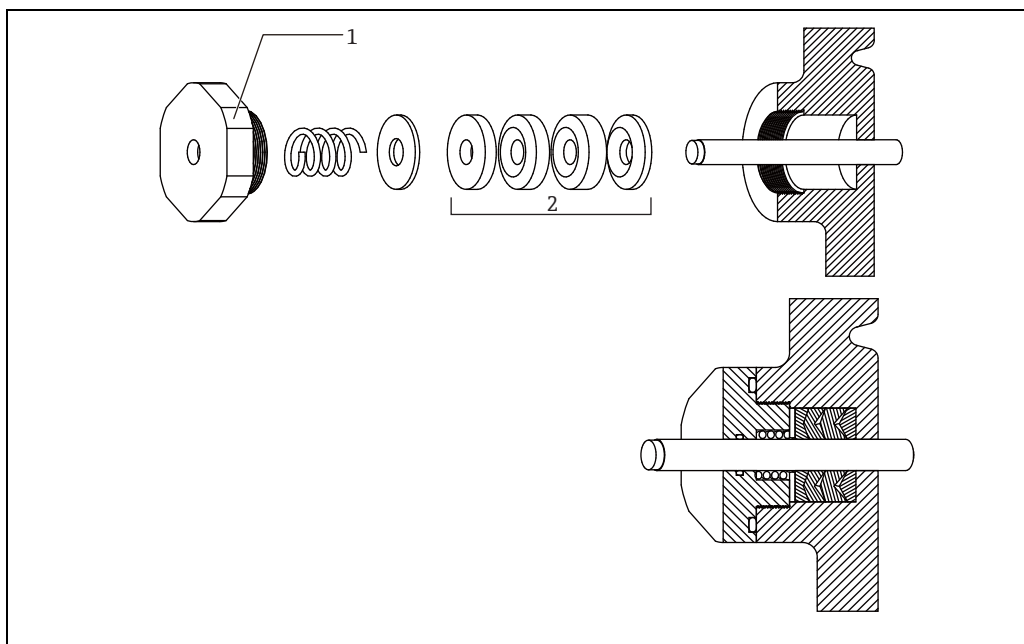


Figure 59: Drive check unit

1. Gland clamp
2. Seal metal

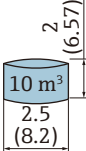
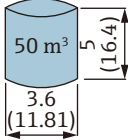
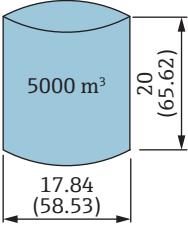
7 Maintenance

7.1 Precaution prior to maintenance

⚠ WARNING

- Use due vigilance when working with flammable liquid tanks. Allow flammable liquids plenty of time to diffuse before pumping or transferring to tank (refer to the table below).
- Be sure to wear antistatic clothing, gloves, and safety shoes.
- Follow directions of the safety supervisor

Recommended standing time static from Electricity Safety Guideline (National Institute of Industrial Safety)

Conductivity of charging material (S/m)	Flammable liquid (example)	Volume of charging material (m³)			
		10 or less	10 to 50	50 to 500	5000 or grater
10 ⁻⁸ or greater	Acetic acid Ethanol Ethyl chloride Methanol Light oil	1 min. or more	1 min. or more	1 min. or more	2 min. or more
10 ⁻¹² to 10 ⁻⁸	Vinyl acetate Toluene Benzene Gasoline	2 min. or more	3 min. or more	10 min. or more	30 min. or more
10 ⁻¹⁴ to 10 ⁻¹²	Methyl cyclohexane	4 min. or more	5 min. or more	60 min. or more	120 min. or more
10 ⁻¹⁴ or less	Carbon tetrachloride	10 min. or more	10 min. or more	120 min. or more	240 min. or more
					

Unit: m (ft)

7.2 Daily inspection

LT does not require any inspections after it has been properly installed in a tank.

7.3 Periodical inspection

Follow the table below to perform the periodical inspection.

Product/Part	Check item	Check procedure
Gauge Head (for all LT)	Corrosion check and cleaning of tape protective pipe	- After opening the gauge head rear cover, check accumulation of rust. - If necessary, remove rust by tapping the protective pipe with a wooden hammer.
	Check of reduction gear engagement and bearing	- After removing the indicator cover, rotate the reduction gear to check engagement and confirm that backlash is within 1 mm of indication. - Check the bearing.
	Friction on tape drum and sprocket	After opening the gauge head rear cover, check bearings of drums for corrosion or dust. Clean them as needed.
	Characteristic change of conster	- Check the level gauge operation with the drive check. If the measured value is not stable, clean the conster. - If the level gauge is not recovered, replace the conster.
	Water drops and dimming on indicator window	Confirm the indicator cover is tightened firmly and there is no dust contamination on the gasket.
Gauge Head (LT5-4/LT5-6)	Check of drive check	Check the condition of the check spring inside the gauge head and its performance.
	Check of magnet coupling	Replace the sprocket to strip the rust and remove the dust (1 to 2 times in a year).
	Check of O-ring leak	Check airtightness of LT with, using soap water.
Sheave Elbow	Sheave elbow friction	- In sheave elbow, remove measuring tape from roller and check to rotate smoothly. - Remove bearing and check friction. - Remove dust from roller.

8 Troubleshooting

8.1 Failure causes and countermeasures

Product/Part	Check item	Check procedure
Indication does not change at all	- Breakage of measuring tape - Guide wire caught - Breakage of conster - Drive check caught - Wear and tear of gear which is connected to the indication system - Improper setting of sprocket or measuring tape - Float sinking	- Open the tank and replace the measuring tape. - After opening the tank, re-stretch the guide wire. - Replace the conster. - Open the rear cover of gauge head and repair or replace the conster. - Replace the entire gear unit of the indication system - Check the gear after opening rear cover of gauge head. - Replace the float after opening the tank
Frequent indication error	Deterioration of conster	Check variation of indication value and replace the conster if deteriorated.
	- Apply to items 2, 4, 5, 6 mentioned above. - Loosening of indicator pointer - Improper setting of tape guide - Kink or twist of measuring tape	- Check the internal parts of the gauge head. - Check lock nut for the indicator pointer after opening indicator cover. - Check the gap between the sprocket and tape guide. - Pull measuring tape out and check after opening sheave elbow cover. The measuring tape can be repaired depending on the condition of it.
There is difference of value between the indication of measuring tape and the indicator of the display.	- Some error found in the gauge head. - No error found in the gauge head.	- Inspect the items mentioned above and have countermeasures. - Failure by measuring liquid - Negative influence by measuring technique - Negative influence by sludge deposition - Negative influence by strong wind - Error of measuring scale
Check handle can not rotate and return.	- Check shaft has rusted. - Check driver spring is deteriorate.	- Clean up the shaft and replace entire check handle unit. - Replace the spring.
Check handle can not rotate and return.	- Check shaft has rusted. - Check driver spring is deteriorate.	- Clean up the shaft and replace entire check handle unit. - Replace the spring.
Drive check does not work. (LT5-4/LT5-6)	- Loosening of set screw of check handle - Breakage of check driver spring - The spring gets stuck in the tape drum and can not move.	- Tighten the set screw. - Replace the entire check unit. - Repair the check unit or replace the entire unit.
Gas leakage (LT5-4/LT5-6)	- Airtight leakage at the junction part of the rear cover - Airtight leakage of penetration part of the drive check unit	- Replace the packing or apply the seal end agent to the junction part. - Replace the seal metal.

9 Repair

9.1 General information on repairs

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

Spare parts are contained in suitable kits. They contain the related replacement instructions.

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

9.2 Repairs to Ex-approved devices

When carrying out repairs to Ex-approved devices, please note the following:

- Repairs to Ex-approved devices may only be carried out by trained personnel or by the Endress+Hauser Service.
- Comply with the prevailing standards, national Ex-area regulations, safety instructions (XA) and certificates.
- Only use original spare parts from Endress+Hauser.
- When ordering a spare part, please note the device designation on the nameplate. Only replace parts with identical parts.
- Carry out repairs according to the instructions. On completion of repairs, carry out the specified routine test on the device.
- Only Endress+Hauser Service may convert a certified device into a different certified variant.
- Document all repair work and conversions.

9.3 Spare parts

Some interchangeable measuring device components are listed on an overview sign in the connection compartment cover.

The spare part overview sign contains the following information:

- A list of the most important spare parts for the measuring device, including their ordering information.
- The URL for the W@M Device Viewer (www.endress.com/deviceviewer):
All the spare parts for the measuring device, along with the order code, are listed here and can be ordered. If available, users can also download the associated Installation Instructions.

9.4 Endress+Hauser service

Endress+Hauser provides various services.



Contact your Endress+Hauser Sales Center for information on service and spare parts.

9.5 Return

The measuring device must be returned if repairs or a factory calibration are required, or if the wrong measuring device has been ordered or delivered. According to legal regulations, Endress+Hauser, as an ISO-certified company, is required to follow certain procedures when handling returned products that are in contact with medium.

To ensure swift, safe and professional device returns, please read the return procedures and conditions on the Endress+Hauser website at www.services.endress.com/return-material

9.6 Disposal

Observe the following notes during disposal:

- Observe valid federal/national regulations.
- Ensure proper separation and reuse of the device components.

10 Technical data

Item	Product root	Measuring range/Specification
Measuring range	LT5	0 - 2.5, 5, 10, 16, 20, 30m 0 to 60ft, 100ft
Accuracy	Ø400 mm float	±2mm (Under the condition of; specific Density: 1g/cm ³ ,measuring range; 10m)
	Ø140 mm float	±30mm (Under the condition of; specific Density: 1g/cm ³ ,measuring range; 10m)
Maximum operating Pressure	LT5-1	0...0.1961bar/0.01961MPa/2.84psi
	LT5-4	0...0.9807bar/0.09807MPa/14.22psi
	LT5-6	0...24.5bar/2.45MPa/355.25psi
Operating temperature limits	LT5-1	Wetted parts: -200....+200°C Gauge head: -20....+70°C
	LT5-4/LT5-6	Wetted parts: -45 to +80°C Gauge head: -20 to +70°C
Display	LT5	Two pointers or Counter (min. readable scale:1mm) Counter only for 30m or 100ft
Process connection	LT5-1 threaded, low pressure	Rp 1-1/2, w/o union nut, thread JIS B0203 Rc 1-1/2, union nut, SUS316, thread JIS B0203 NPT 1-1/2, union nut, SUS316, thread ANSI
	LT5-1 flange, low pressure flange spec./material	10K 40A RF, Alu (AC4A), flange JIS B2220 10K 40A RF, SUS316, flange JIS B2220 NPS 1-1/2" Cl.150 RF, Alu (AC4A) flange ASME B16.5 NPS 1-1/2" Cl.150 RF, SUS316 flange ASME B16.5 40A 150lbs RF, Alu (AC4A), flange JPI 7S-15 40A 150lbs RF, SUS316, flange JPI 7S-15 10K 150A RF, SUS316, flange JIS B2220 NPS 6" Cl.150 RF, SUS316 flange ASME B16.5 150A 150lbs RF, SUS316, flange JPI 7S-15
	LT5-4 (flange, medium pressure) Flange spec./material	10K 40A RF, alu (AC4CT6), flange JIS B2220 NPS 1-1/2" Cl.150 RF, Alu (AC4CT6) flange ASME B16.5 40A 150lbs RF, Alu (AC4CT6), flange JPI 7S-15
	LT5-6 (flange, high pressure) Flange spec./Gauge material/Bolt material	10K 40A RF, Iron, flange JIS B2220 NPS 1-1/2" Cl.150 RF, iron flange ASME B16.5 40A 150lbs RF, Iron, flange JPI 7S-15 20K 40A RF, Iron, flange JIS B2220 NPS 1-1/2" Cl.300 RF, iron flange ASME B16.5 40A 300lbs RF, Iron, flange JPI 7S-15

Ø400 mm	Weight	ρ: Liquid Density (g/cm ³)
Low pressure	4.2 kg	$0.5 \leq \rho < 0.65$
Low pressure	5.0 kg	$0.65 \leq \rho < 1.05$
Low pressure	8.0 kg	$1.05 \leq \rho \leq 2.0$
High pressure	8.3 kg	$0.5 \leq \rho \leq 0.7$

Ø140 mm	Weight	ρ: Liquid Density (g/cm ³)
Low pressure	2.1 kg	$0.5 \leq \rho < 0.94$
Low pressure	2.4 kg	$0.94 \leq \rho < 2.0$

Item	Product	Coupling
Coupling (Gauge head and display)	LT5-1 (Threaded/flange low pressure)	Shaft
	LT5-4 (Flange/medium pressure)	Pressure bulkhead magnet coupling
	LT5-6 (Flange/high pressure)	Pressure bulkhead magnet coupling

Item	Product	Weight
Total weight	LT5-1 (Threaded/flange low pressure)	Approximately 15 kg
	LT5-4 (Flange/medium pressure)	Approximately 22 kg
	LT5-6 (Flange/high pressure)	Approximately 100 kg

Item	Product	Color
Color	Gauge head	E+H blue
	Other components	Silver



SUS316 or PVC is an available option for float material in low pressure conditions.

11 Materials defined by standards

Aluminum

Symbols	Descriptions
ADC12	Aluminum Alloy Die Casting (Si-Si-Cu)
AC4CT6	Aluminum Alloy Casting (Si7Mg)
AC4A	Aluminum Alloy Casting (Si10Mg)

Stainless steel

Symbols	Descriptions
SUS304	Stainless Steel (18Cr-8Ni)
SUS316	Stainless Steel (18Cr-12Ni-2.5Mo)
SCS13	Stainless Steel Cast Steel equivalent to SUS304
SCS14	Stainless Steel Cast Steel equivalent to SUS316

Others

Symbols	Descriptions
SGP	Steel gas pipe
PVC	Polyvinyl chloride

www.addresses.endress.com

For more Endress+Hauser product please visit: www.ainstru.com
Mail: Sales@ainstru.com