INSTRUCTION MANUAL

FOR

TANK LEVEL GAUGE

MODEL : SLT-1100

Revision 1

14. Dunchon-daero 457beon-gil, Jungwon-gu, Seongnam-si, Gyeonggi-do, Korea

Tel : 1670-8070 , 031-627-9000

Read and understand this manual for safely usage.

・ This manual describes the product of standard specification.
Read the other manual for the product of explosion-proof specification.
・This manual describes the handling, inspection and adjustment of the product which model is mentioned on cover page.
Read and understand this manual before handling.
・Follow the additional document and/or direction, submitted by Seojin Instech and our distributor or agent, even if the terms are mentioned in this manual.
・Save this manual in proper place being available to refer immediately.
・The specification of product mentioned in this manual may not be satisfied by the condition of environment and usage. Check and consider carefully before using.
・Contact to sales office at Seojin Instech for any question or comment about this manual and product.

The followings are the description of the terms in this manual.

⚠ WARNING
Indicates a potentially hazardous situation which, if not pay attention, could result in death, serious injury or serious disaster.

⚠ CAUTION
Indicates a hazardous situation which, if not pay attention, may result in minor or moderate injury or damage to device.

	Indicates prohibited matter. The explanation with this mark shall be followed.

	Indicates instructed matter. The explanation with this mark shall be followed.

⚠ WARNING	
	This product is not explosion-proof construction. Do not install this product to the place where the flammable gas or vapor is occurred. If installed, the flammable gas or vapor may be ignited, and serious disaster may be occurred. Use the product of explosion-proof construction in this case.
	Do not modify or disassemble the product. Otherwise, the product and connected device may be malfunctioned, damaged, fired, or minor injury and electric shock may be occurred. (Follow the additional document and/or direction, submitted by Seojin Instech. and our distributor or agent.)
	Turn off the power, before wiring and inspection. Otherwise, electric leakage, fire caused by short circuit, and electric shock may be occurred.
	Ensure the wire is properly connected. The product and connected device may be malfunctioned, damaged, fired, or minor injury and electric shock may be occurred by improper wiring.
	Turn off the power immediately, if the smoke, strange smell and sound are occurred. Do not use it until the problem is solved.

CAUTION	
	Avoid strong shock and rough handling to this product. The product may be damaged by strong shock as dropping, falling, throwing, knocking, lugging, and etc.
	Follow the specification of operating temperature, operating pressure, switch rating, and etc. Otherwise, the product and connected device may be malfunctioned, damaged, fired, or minor injury and electric shock may be occurred. Check the manual or specification sheet.
	Operation test shall be done before practical usage. If the serious accident is expected to occur by malfunction of product, the other operating principle of product shall be installed in parallel.
	Check and deeply consider the chemical compatibility for material of product in advance. The part especially float, which is very thin, may be malfunctioned by miner corrosion.
	Hold the stem very close to mounting point, when carrying, installing, and removing. If hold the terminal box, it may be taken off from the flange or plug, and the product may be damaged by dropping.
	The product is 50cm or longer The product shall be kept in horizontally. The product and other goods be damaged, and minor injury may be occurred by falling.
	In case of connecting inductive or lamp load to the product. Provide protective circuit to the load to avoid over voltage and over current. If not provide, the contact may be damaged.

INTRODUCTION

A) This manual specifies the specification of general product. If you order special product, some details of specification may be different with the manual.

B) We are glad to suggest and advice for Model selection and chemical resistant of material, but final decision has to be made by the customer.

C) This manual has prepared with close attention. Ask sales office at Seojin Instech for any question or comment about the contents of this manual.

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D) For replacement parts the quality of product has frequently improved, so same spare part may not be supplied. In this case, replacement part or product may be supplied. Ask sales office at Seojin Instech for details.

E) The contents of this manual are subject to change any time without notice due to the improvement of product.

WARRANTY & DISCLAIMER

A) Seojin Instech warrants this product against defect in design, material and workmanship for a period of 1(one) year from the date of original factory shipment.

B) The warranty only covers the damage of products.
The secondary and third kind disasters are not covered by Seojin Instech.

C) Seojin Instech shall not be liable for the following.

C-a) Do not follow the description and direction in this manual.

C-b) Damage due to improper installation, wiring, usage, maintenance, inspection, storing, and etc.

C-c) Repair and modification are done by the person who is not employee of Seojin Instech and our distributor or agent.

C-d) Improper parts are used and replaced.

C-e) The damage is occurred by the device or machine except our products.

C-f) Improper usage. (See "Proper of usage" in chapter 1 in this manual)

C-g) Force Majeure including, but not limited to, fire, earthquake, tsunami, lightning, riots, revolution, war, radioactive pollution, acts of God, acts of government or governmental authorities, compliance with law, regulation, and order.

THE TERMS OF WARRANTY AND DISCLAIMER SHALL IN NO WAY LIMIT YOUR REGAL LIGHT.

Unpacking

(1) This unit has been thoroughly inspected and carefully packed at the factory to prevent damage shipment.

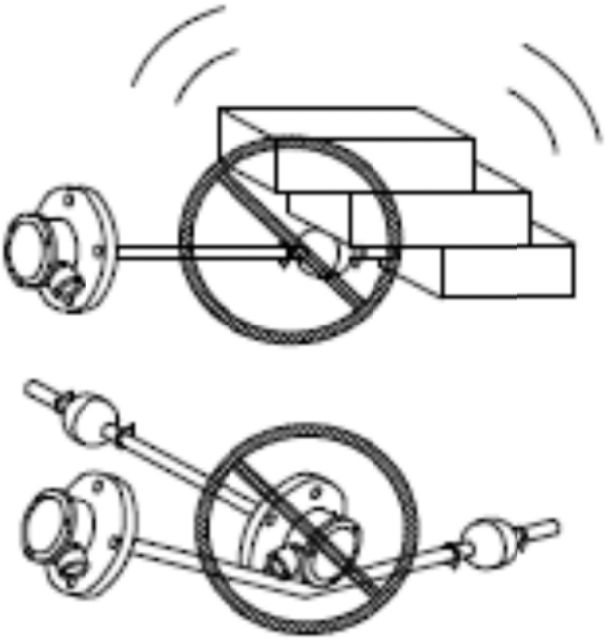
(2) When unpacking , exercise due care not to subject the instrument to mechanical shock .

(3) After unpacking, visually check the instrument exterior for damage.

(4) When the length exceeds 1500 mm , carry by two or more persons.
Otherwise the switch may be damaged.

(5) Keep sensor clean. Otherwise detecting errors may be caused.

(6) It doesn't place in piles.



FRAGILE (Handle with care)

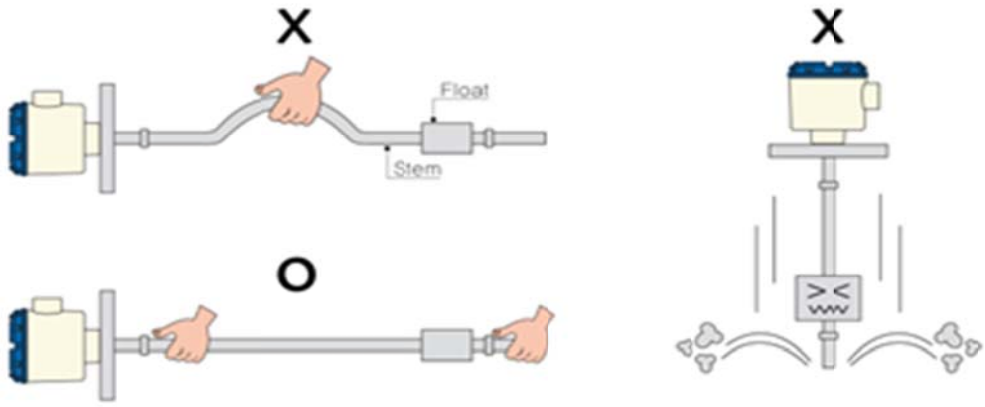
1. Do not carry the Sensor with one hand.
Stem bending is sure to please carry with two hands.

2. Do not drop the Float.
Since the magnet inside STOPPER Float damage and leaving the Lower slowly, holding hands.

3. Do not throw the Sensor or shock.
Reed Switch is a failure in the internal Stem malfunction occurs.

4. Do not remove the Sensor discretion.
This may cause damage and malfunction is not the A / S.

5. Do not use the Sensor for purposes other than level measurements.



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1. Instruction

MODEL SLT-1100～4400 Tank Level Gauge for liquid level measuring system has robust function over local and remote indicating, alarming output, continuous display signal. So we may apply this instrument to not only level measurement but also monitoring, controlling of liquid level such as water, oil, chemical solvent, etc.

2. Features

- Remote and local indication
- Easy installation, and even though lower space between installing position and ceiling, it has no difficult to mount it
- Applicable high temperature and hazardous area.

3. Principle of operation

When the liquid level in the vessel rises and falls, the float position which is connected with measuring tape will be varied according to the level of liquid. When the liquid level falls, the measuring tape will be released by the float including a weight, but when the liquid level rises, it will be wound back by a constant torque spring attached to gear mechanism. While the mechanism is under such actuation, you can find out the level position by using a digital or analog indicator at location or even control panel further. It can send DC4 ～20mA analog signal and 1~8 point alarm to the remote location.

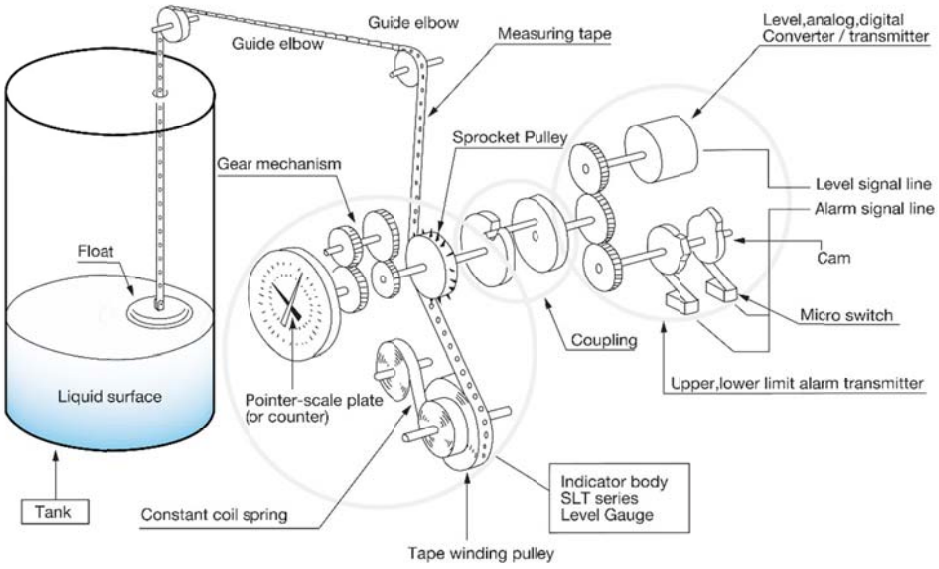


Fig. 1

4. Specification

4.1 SLT-1100 Type

Mechanical Specification

Output	: Analog Display
Dimention	: 320(W) x465(H) X 187(B)
Temperature	: -20℃ ~ + 135℃
Body Material	: ADC 12
Float Material	: 304SS or 316SS
Specific Gravity	: 0.65 Min.
Pressure	: atm.
Accuracy	: ± 2.0 ㎜
Measuring Range	: 0~2m, 3m, 5m, 6m, 10m, 12m, 15m, 20m(Max.)
Enclosure	: Weather Proof

4.2 SLT - 2200 Type

Electronics Specification

Power	: 15 ~ 32VDC
Output	: 4 ~ 20 ㎃ DC
Drive Capability	: 450Ω @ 24VDC
Calibration	: Zero & Span
Accuracy	: ± 2.0 ㎜
Potention Meter	: 2KΩ
Converter Temp.	: 0℃ ~ +70℃
Enclosure	: Explosion proof (Ex ia ⅡB T6, IP65)

Mechanical Specification

Output	: Analog Display
Dimention	: 320(W)x465(H)x 512(B)
Transmitter Material	: ADC 9 & AC2B
Enclosure	: Explosion proof (Ex ia ⅡB T6, IP65)

4.3 SLT-3300 Type

Electronics Specification

Contact Capacity	: 1 SPDT, 250VAC/6A
Output	: 8 Points Alarm Max.

Mechanical Specification (Identical Condition SLT-2200)

4.4 SLT -4400 Type

Be mixed with SLT - 2200 and SLT-3300

4.5 Physical Specification

- Marking ATEX (Flameproof Enclosure)

  All units have a rating label, which carries the following important information:

  TANK LEVEL GAUGE

  Model : SLT (Except SLT-1100)

  Code : Ex d IIC T6 IP65

  -20℃≤Ta≤+60℃

  Certificate No : IECEx KTL 10.0007

  INERIS ** ATEX ****

  Equipment Group and Category  II 2G

  CE Marking

  Notified Body No. CE ****

  Warnings: DO NOT OPEN WHEN ENERGIZED.

  POWER OFF TO INSTALL & UNINSTALL

- Type Approval Standards

  The units have EC Type Examination and IECEx certificates issued by INERIS and have been approved to the following standards:

  EN60079-0:2007 IEC60079-0:2007 General Requirements

  EN60079-1:2007 IEC60079-1:2007 Flameproof Enclosure "d"

- Special Conditions For Safe Use

  T6: T° Process : -20℃ to +60℃

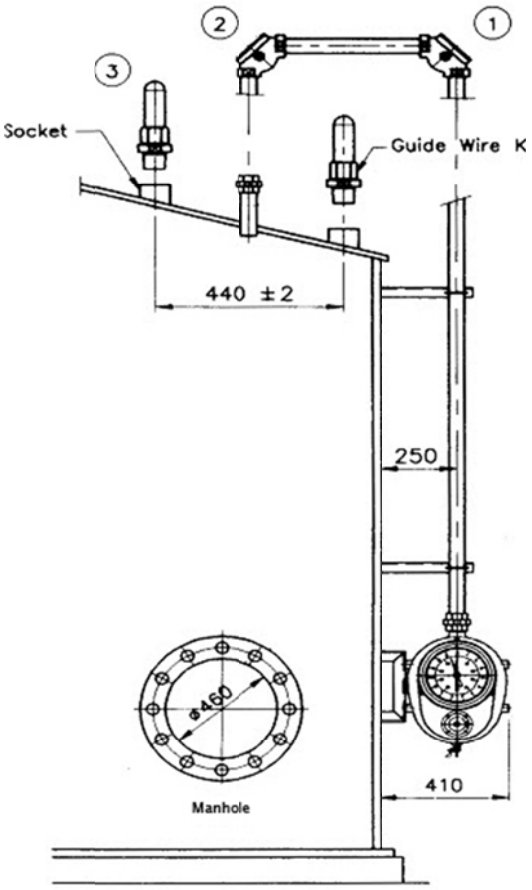
- Specifications

  1) Power Supply : DC 15V~ 32V
  2) Measuring Method : Measuring Displacement by Float
  3) Output Signal : Local Dial Indicator, 1~ 8 Point Alarm. DC 4~20mA Analog
  4) Alarm Contact : 8 Point
  5) Measuring Range: Level - 0~3m, 5m, 6m, 8m, 10m, 12m, 15m, 20m
  6) Accuracy : ± 2.0mm
  7) Specific gravity: 1.0 max

5. Installation

5.1 Checking before installation

- Before starting a work for installation, you shall prepare or arrange each component as shown figure 1.
- Assembling on each component is significantly dependent on the tank configuration or control range of liquid level. Then you have to know some variables as below.
  - * Height of tank to be mounted.
  - * Measuring range
  - * Enough space to install
- Shall position the center axis of angle elbow ① to be in accordance with the axis of guide pipe of indicator body and also the axis of angle elbow is ② on the center of float.
- Shall provide enough space for installing the indicator body.
- Check socket or flange to be combined with guide wire knob on the roof of tank.
- Provide a manhole to allow measuring float or working person approached to inside of tank.
- [Diameter of it shall be at least 460 ㎜ (18inch)] - Outside dimension of float : Φ395
- While process fluid is entering into the tank, the float hanging on the measuring tape will be shaken owing to the liquid swirl. To protect the float from moving, you might be necessary to install a protector as shown figure 2. Otherwise the life cycle of measuring tape will be shorten.



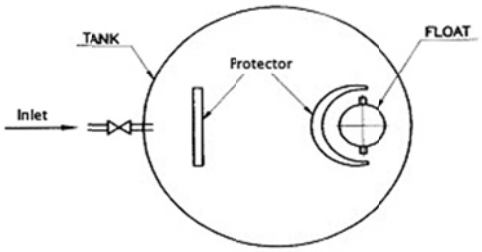


Fig. 2

5.2 Install Transmitter

- Before mounting remove transmitter cover. Turn drive shaft (6. Fig. 1) until both worm wheel screws are accessible.
- Flange the transmitter to the tank level gauge using the accessories shown in Fig. 14. In doing so, flange the transmitter such that the housing section containing the alarm contacts and the terminal box form a vertical or horizontal line.
- Ensure the driving pin engages properly. Do not use force in joining the coupling together again. Tighten hexagonal nuts (5).

① 1 Rear of tank level gauge
② 2 Threaded bolt
③ 3 Studded disc
④ 4 Spring washer
⑤ 5 Hexagonal nut
⑥ 6 Drive shaft
⑦ 7 Coupling part
⑧ 8 Hexagonal nut
⑨ 9 O-ring
⑩ 10 Driving pin
⑪ 11 Sprocket wheel Supplied accessories

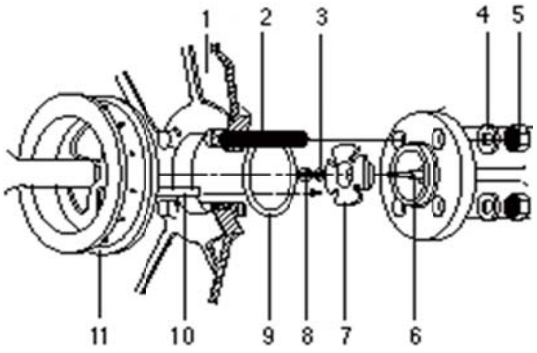


Fig. 3 Flange-mounting the transmitter

5.3 Ground

Where required the ground connection (for example, impacted by electromagnetic wave, noise, and electromagnetic field), the ground terminal unit or the terminal unit for external ground must be connected.

The Housing was designed for protecting against inverse polarity.

To keep the best performance, the twisted pair cable (22AWG Min.) is recommended. The displayer must be installed in the place far from the alternative current or switching system. The probe for instrument ground must be connected into local surface of land.

Where connected with a shield cable, the shield screen must be connected to the ground of power supply.

⚠ Note

The cable impedance is defined by the maximum length possible to do the digital communication. However, better is that using the low impedance cable. The maximum length between both points is about 1,000m, where 250Ω of load and single twisted cable 22AWG-

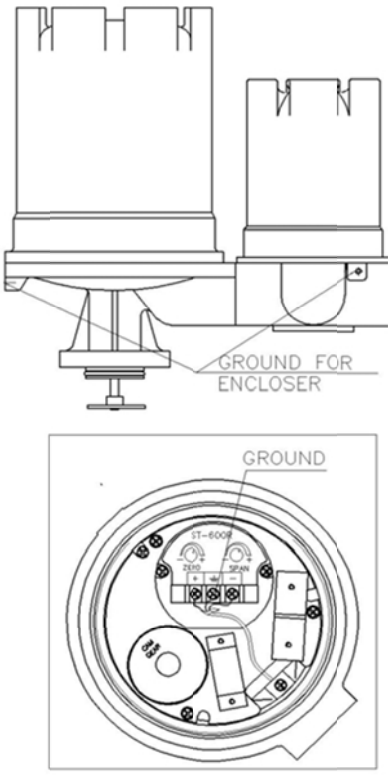


Fig. 4

207 pf/m are used.

5.4 Cable Selection

When using the external earth terminal a cable crimp lug must be used. The cable lug should be located between the two M4 stainless steel flat washers, The M4 stainless steel spring washer must be fixed between the outer flat washer and the M4 stainless steel nut to ensure that the cable lug is secured against loosening and twisting.

The internal earth bonding wire ensures that a good quality earth is maintained between the flameproof chamber casting and the flameproof cover casting.

5.5 Installation Requirements

The TANK LEVEL GAUGE must be installed in accordance with the latest issues of the relevant parts of the BS EN 60079 specifications or the equivalent IEC specifications –Selection, Installation and maintenance of electrical apparatus for use in potentially explosive atmospheres (other than mining applications or explosive processing and manufacture):-

EN60079-14:2008 Electrical Installations in Hazardous
IEC60079-14:2007 Areas (other than mines)

EN60079-10:2003 Classification of Hazardous Areas
IEC60079-10:2008

The installation of the units must also be in accordance with any local codes that may apply and should only be carried out by a competent electrical engineer who has the necessary training

5.6 Cable Glands

The TANK LEVEL GAUGE have dual cable gland entries which have a PF 3/4" entry thread as standard.

Only cable glands approved for Ex "d" applications can be used, which must be suitable for the type of cable being used and also meet the requirements of the Ex "d" flameproof installation standard EN60079-14:2008 / IEC60079-14:2007.

When only one cable entry is used the other one must be closed with an Ex "d" flameproof blanking plug, which must be suitably approved for the installation requirements.

5.7 Measuring Tape

- Don't loosen fix screw ⓧ which is located on the lower end of indicator body before float is combined with measuring tape.
- Be careful in handling the measuring tape not to give it any crack, twist, folding, scar and breaking. Also when you insert the tape into guide pipe or indicator body, give more care not to damage it.

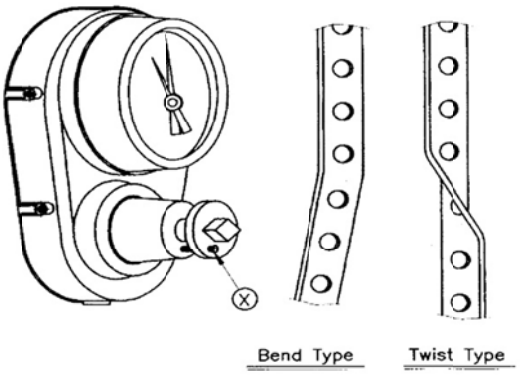


Fig. 5

5.8 Procedure to assemble each component

5.8.1 Pipe

① When you assemble the pipe to indicator body, it shall be perpendicular to the ground, if possible.

② Minimum 250 ㎜ shall be separated or kept between guide pipe and wall of Tank.

③ Be careful that the pipe assembled to indicator body is not inclined. (The inclination can be allowed within ±5 ㎜)

④ Connected part of pipe shall be sealed by suitable tape to protect the leakage of gas in tank or the infiltration of rain water into inside.

⑤ When you try to fill the gap of connection using welding or band, you shall remove all scrap or spur from the surface.

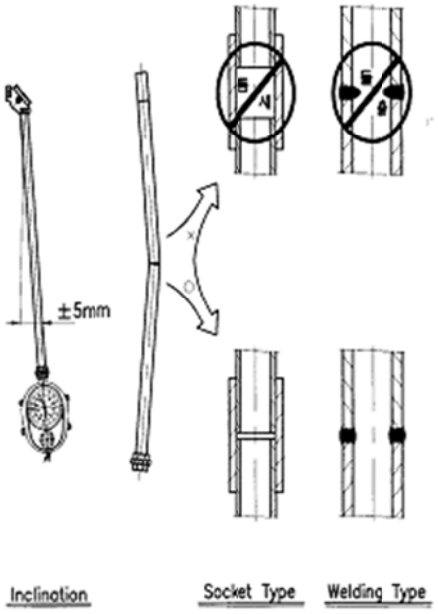
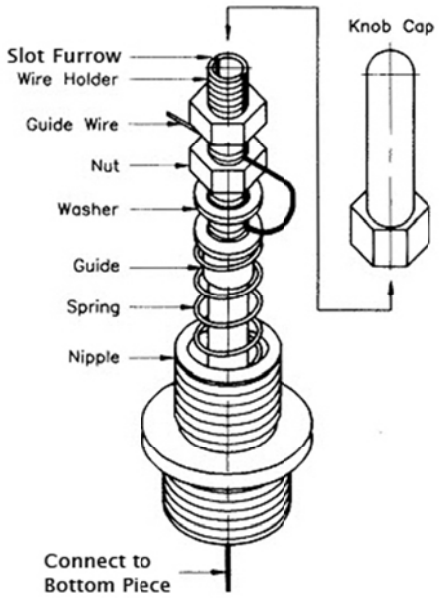


Fig. 6

5.8.2 Guide Wire Knob and Bottom Piece

The distance which should be assembled between both guide wire knobs, or both bottom pieces, shall be 440±2 ㎜ and the wire knobs and bottom pieces shall be combined on the same vertical axis.



① Guide Wire Knob

- Install the nipple of guide wire knob into the socket on top of tank.
- Remove cap of guide wire knob, taking wire holder out. Pull the guide wire out through inside of wire holder.
- Pull out guide wire from slot furrow between the washer and guide.
- Then, insert guide wire to slot furrow between the upper nut and lower nut and tighten the upper nut not to loosen.
- Let the other end of guide wire being hung through socket or flange from top of tank, and assemble the cap of knob.

Fig. 7

② Bottom Piece

Combine a bolt for fixing wire to both bottom pieces and lock with nut. Then insert an end of guide wire into a hole for wire fix bolt. After pulling out the guide tightly, the nut shall be tightened with more strength.
After finishing the combining work, cut the wire with proper remaining about 10 ㎝.

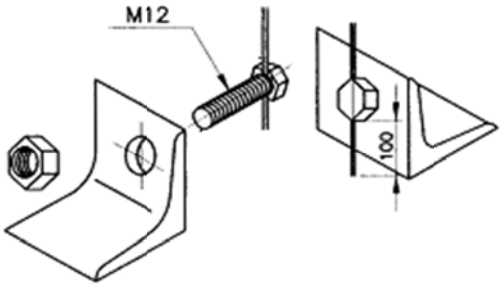


Fig. 8

5.9 Procedure for installation

① As shown on the No. 3,4,5,6,7,8 and 9(if applicable) of para.9, to be attached all components or parts to the tank before installing the indicator body, 90° elbow, guide pipe, socket, guide wire knob and bottom piece.

② Remove rubber band, which is attached for protection of measuring tape at the shipment.

③ Check the condition of tape and then loosen the winding slowly

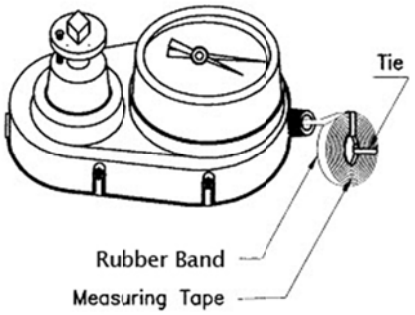


Fig. 9

④ Put the measuring tape through guide wire pipe of indication with the same tying a rope or wire on the end of it at this time. You shall put out carefully the rope or wire not to be the measuring tape twisted (Refer to the fig. 10).

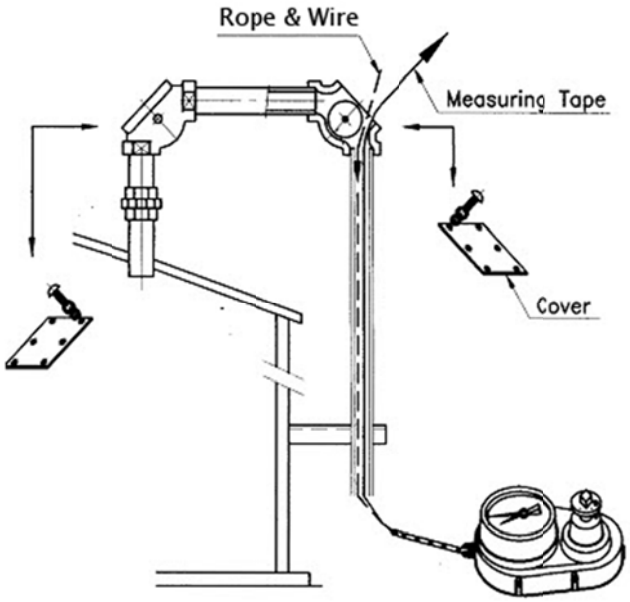


Fig. 10

⑥ Remove rope or wire from the measuring tape at this time, and make sure that there is no twisting, scar or breaking on the tape. (Refer to the fig. 12)

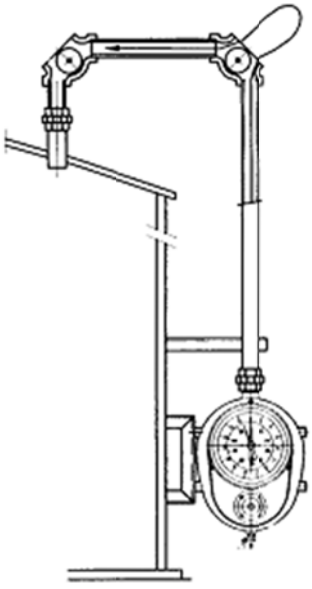


Fig. 12

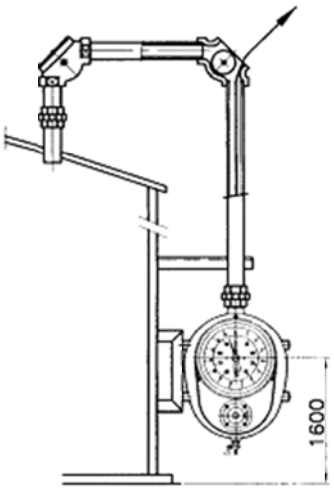


Fig. 11

⑤ After completing to install the indicator body on the side or top of tank or on the suitable place in accordance with an approval drawing or installation drawing, pull the measuring tape to be ready attached more tightly.
(Refer to the fig. 11)

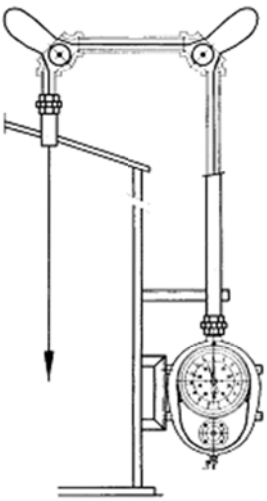


Fig. 13

⑦ Once again, put the measuring tape through both wheels, connection pipe and socket on the roof until it comes to inside of tank. You shall frequently check whether the both wheels have smooth rotation or not, when the tape passes

on (Refer to the fig. 13).
Then, push it toward bottom of tank.

⑧ Disassemble set screw from bracket attached on the both side of float, and separate guide fix bracket from it. Then, put the end of wire into a hole on the bracket and tighten the set screw again (Refer to fig. 14).

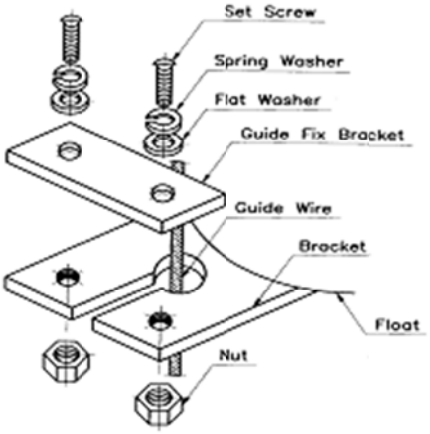


Fig. 14

⚠ CAUTION

Released Indicator Body is set to 0% and fixed by Fix Lever. Supplied Measuring Tape is longer than consumed actually length. It install in the Measuring Tape Pipe. And then install Indicator Body. Finally, Assemble Float and it after cut the certain extra of it.

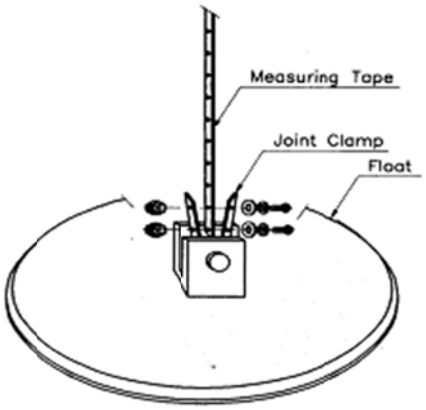


Fig. 15

⑨ Loosen small bolts and nuts from the tape joint clamp which are attached on float after pulling the measuring tape tightly, cutting the tape with remaining as much as the length of it which can fold the cutting and measuring tape in two layers, allow two holes on tape penetrate each other, then insert the loosened bolt into two fold holes on the tape and tighten the nuts and make them lock more tightly using a washer or Loctite
.

⑩ Check the pipe connection to prevent leakage after closing elbow cap.

⑪ Remove fix screw of hoist gear box which is the lower part of indicator body and loosen fix lever which makes hoist gear shaft not move properly. Shift hoist stopper to the front and lock fix lever again.

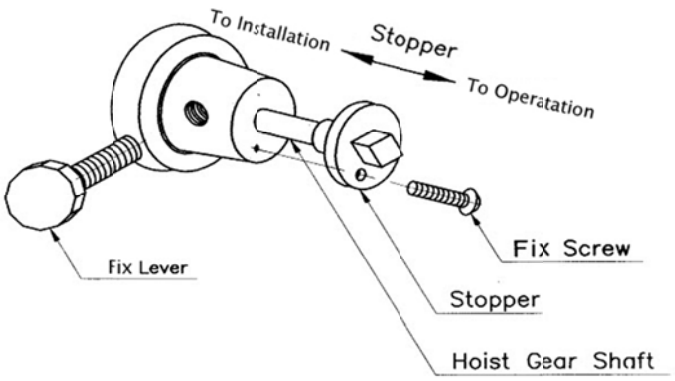


Fig. 16

6. Adjustment

6.1 Checking the operating condition in manual.

- Push hoist lever knob, put lever to knob and turn counter in clockwise direction.
- Float will be raised and the dial will be moved.
- Cheek operating condition of guide wire and float in tank.

> ⚠ Caution ⚠
>
> When float is in the air and the lever is removed from knob, the float will be failed free and inside gear or measuring tape may be effected badly. This is major cause of damage or mis-operation, and when float is lower, loosen the lever slowly in clockwise direction.

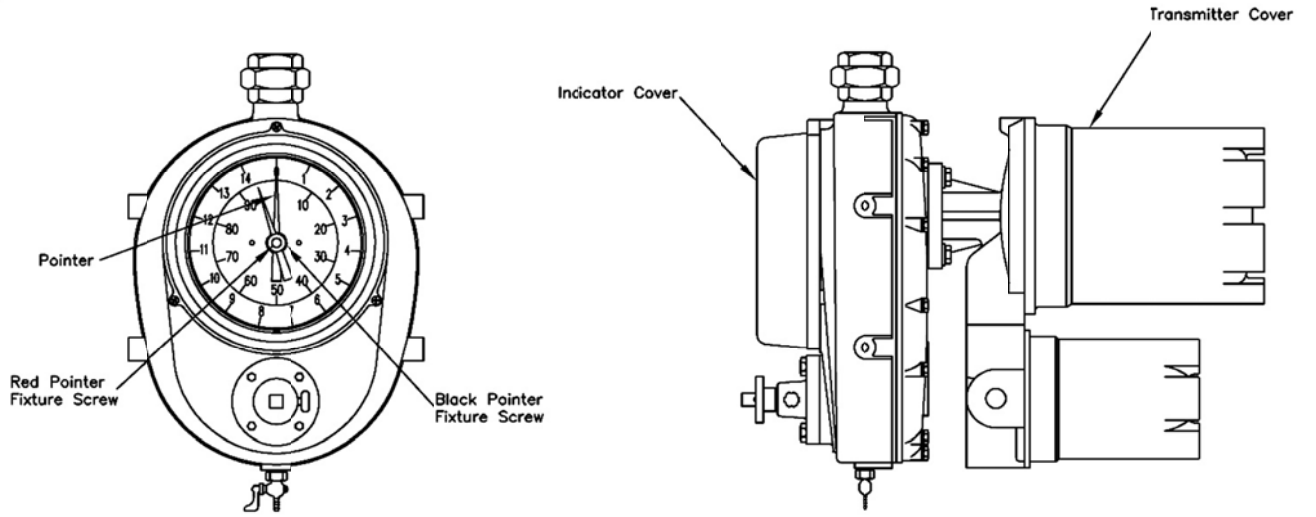
6.2 Adjusting "0" point of dial after testing

- This is because measuring tape and float are not connected properly, and then adjust tape length as much as value of error happened to the equipment.

6.3 Adjusting zero and span of ST-600R converter.

- Adjust zero volume to 4mA on converter when the front scale indicates "0".
- Adjust span volume to 20mA on converter when the scale indicates maximum level.
- Repeat more than 3 times like above in order to calibrate exactly

7. Zero Calibration Procedures



If you can measure fluid level manually before calibration, fix point position after remove indicator cover and loosen fixture screw

Calibration that measuring range 300~16800㎜ set into 4~20㎃

7-1. Zero Calibration Procedures

① Remove Transmitter Cover

② Remove angle elbow of "U" Seal Pot cover at top of tank (In the case of "U" seal pot addition type).

Remove angle elbow cover at top of tank (In the case of normal type).

③ Pull the measuring tape so that indicator should be 300mm at ("U" Seal Pot of) top of tank. At this point, be careful measuring not to Measuring tape twisted.

④ Connect red and brown wire to measure resistance at potentiometer of Transmitter Assembly and adjust tester to 20~100Ω(Ohm).

⑤ When the tank gauge is indicated 300mm, assemble Transmitter Assembly to the body.

If resistance of potentiometer is 20~100 Ω(Ohm), you can skip ④, ⑤.

⑥ Connect potable ampere meter in series and be prepare to verify ㎃.

⑦ zero volume of transmitter to 4.0㎃

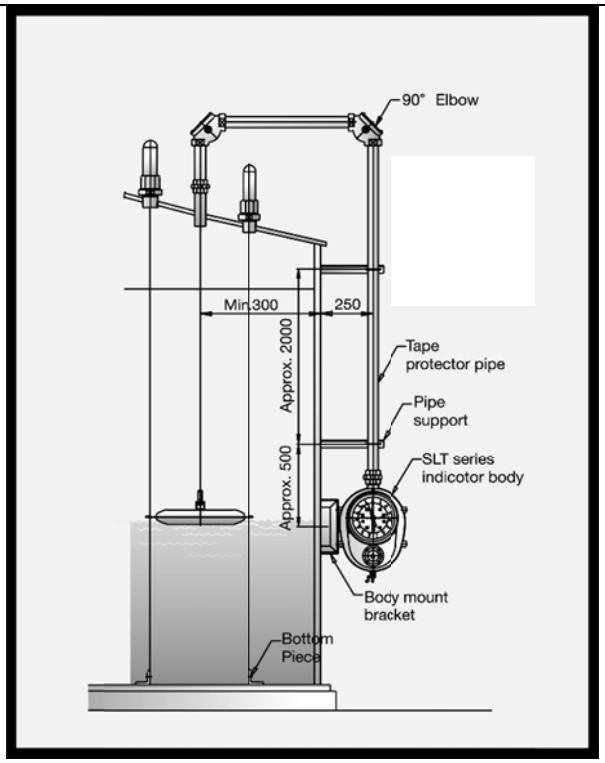
⑧ Turn the hoist lever so that the indicator meter will be 16800mm. Measure the resistance value of the potentiometer when it is locked in position and have the volume of the transmitter span at the value of 20㎃

⑨ Repeat ③, ⑦, ⑧ to output 4~20㎃

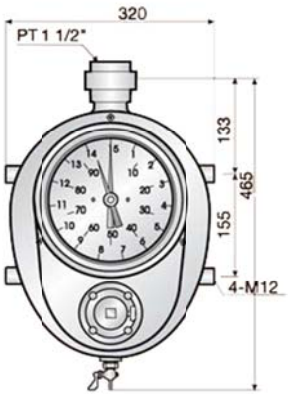
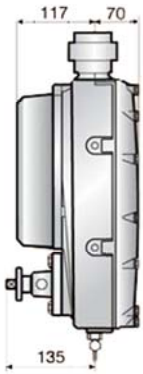
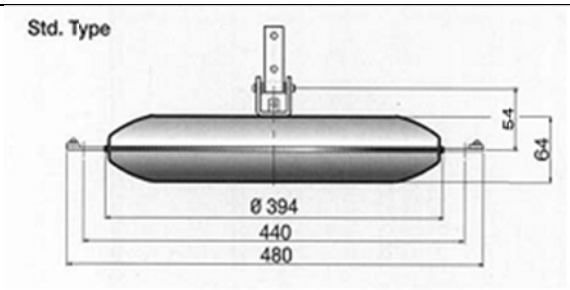
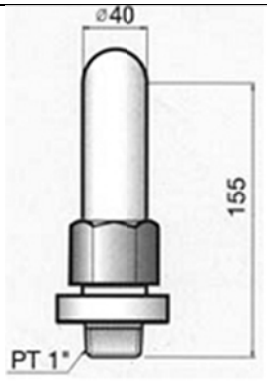
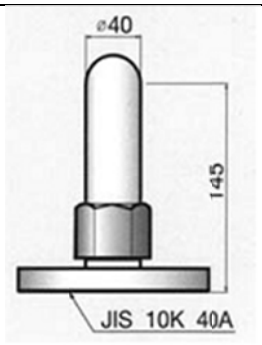
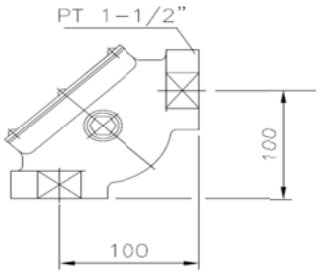
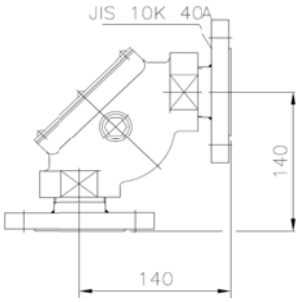
⑩ If the calibration is complete to ⑨, calculate error after repeat measurement at interval of 1m and record it according to the calibration sheet or inspection sheet.

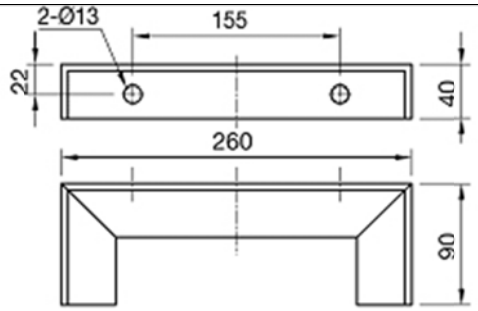
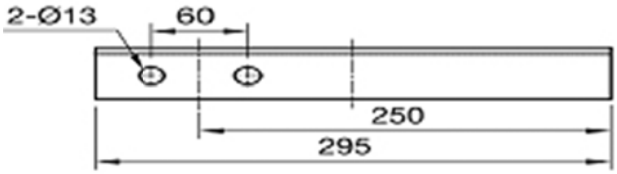
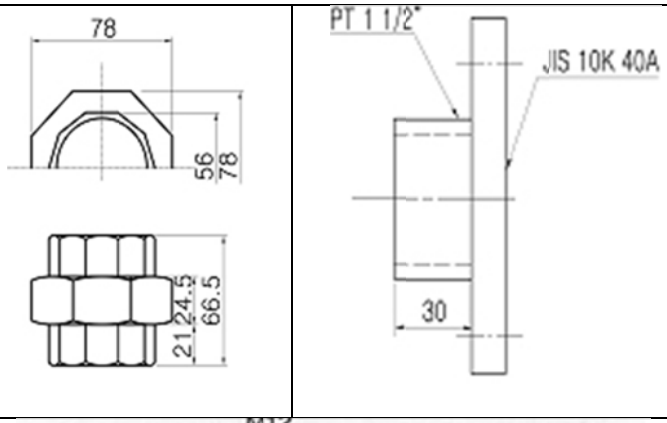
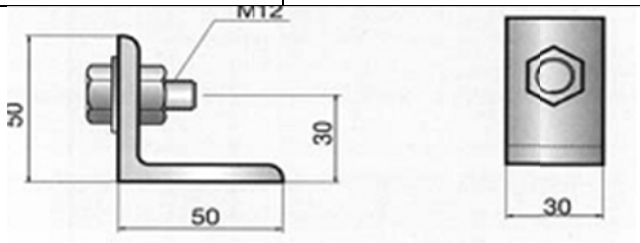
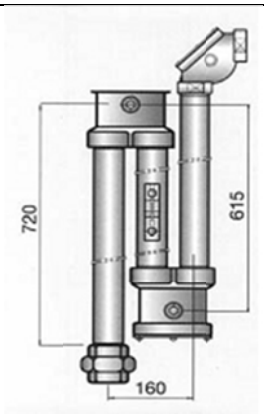
8. Mounting

SIDE MOUNT TYPE



9. Components of system

No.	Component	External form and Dimension	Material	Q'TY
1	Indicator Body	 	Body: ADC12 Back Cover: ADC12 Scale Cover: ADC12	1
2	Float		Std.: 304SS Option: 316SS	1
3	Guide Wire Knob (option)	 	Knob: AC2B Nipple: SS41 Flange 304SS	1
4	90° Elbow (Option)	 	Body: AC2B Flange: 304SS	2

No.	Component	External form and Dimension	Material	Q,TY
5	Body Mount Bracket		SS41&epoxy coating or 304SS	1
6	Pipe Supporter		SS41&epoxy coating or 304SS	1
7	Flange & Union (Option)		Flange: 304SS Union: SS41 Option: 304SS	1
8	Bottom Piece		304SS Option: 316SS	2
9	U-Type Seal Pot		Elbow: AC2B Pipe: 304SS Oil: Silicon (10,000cs)	1

10. Checking before service

Touble	Cause applicable
Indicating scale is not worked	● Check power supply (DC 13V～32V) ● Check if measuring tape is broken or its way is drifted away from tape winding pulley ● Chock if constant spring is broken ● - Check if float is untied from tape and is on the bottom of tank
Indicating scale is miss-operated	● Check if there are folding, crack, scar and twisting on the tape ● Check the length of measuring tape ● Check constant spring ● Check if indicating scale is loosened ● Check if there is sludge in tank ● - Check the condition of converter setting

Mounting Distance

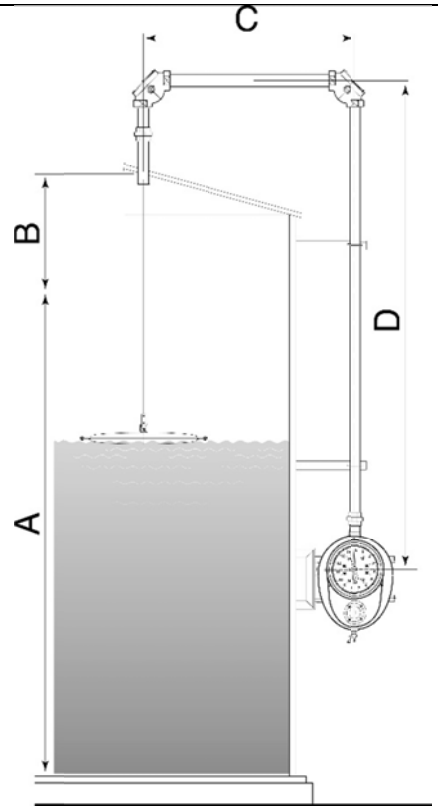


Fig. 17

Sign	Length
A	mm
B	mm
C	mm
D	mm