Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

Operation Instructions

Float Gauge LTC2230/LTC2240

BA01013G/08/EN/01.13
71227305

Endress+Hauser

People for Process Automation

Table of Contents

1 Safety Instructions

1.1 Designated Use

Wire Float Level Gauge LTC2230/LTC2240 is for compact tanks. Since LTC gauge head and its parts are compact and simple by design, it is easily installed virtually maintenance free. LTC2230 (45° Upward Display) and LTC2240 (45° downward Display) is designed especially for underground tanks or installation in compact spaces. When LTC is combined with a transmitter (AT-series), remote transmission or alerts are possible.

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.

1.3 Operational Safety

Caution!

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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.

Safety Conventions	
	Warning! A warning highlights actions or procedures which, if not performed correctly, will lead to personal injury, a safety hazard or destruction of the instrument
	Caution! Caution highlights actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the instrument
	Note! A note highlights actions or procedures which, if not performed correctly, may indirectly affect operation or may lead to an instrument response which is not planned

2 Identification

2.1 Device Designation

2.1.1 Nameplate

The following technical data are given on the instrument nameplate:

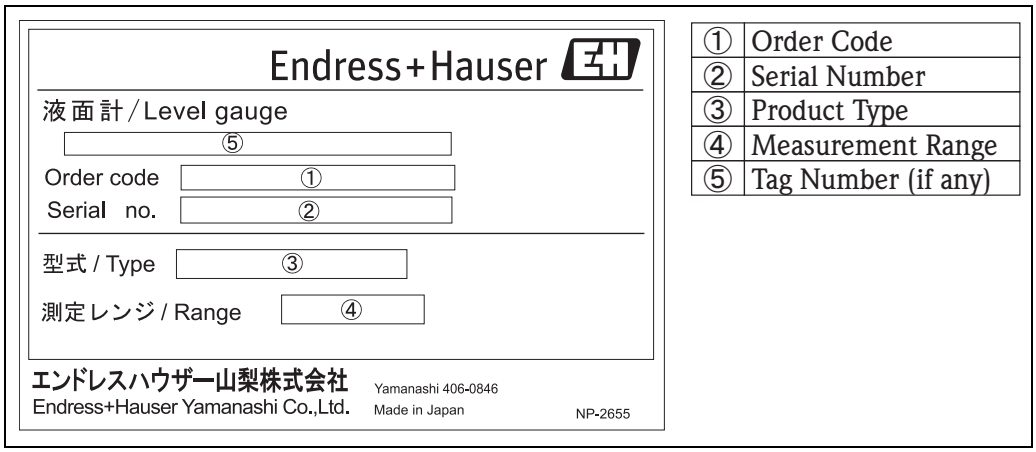


Figure 1: LTC-series Nameplate

2.2 Order Information

2.2.1 LTC2230 (Display: Upward)

010	**Function:**								
	0	Basic version							
	9	Special version, TSP-no. to be spec.							
020		**Process Connection:**							
		0	10K 150A RF, SS400 flange JIS B2220						
		1	6" 150lbs RF, SS400 flange ANSI B16.5						
		9	Special version, TSP-no. to be spec.						
030			**Measuring Range:**						
			1	2.5m					
			2	5m					
			3	10m					
			9	Special version, TSP-no.to be spec.					
040				**Display:**					
				1	Dial 1 pointer				
				9	Special version, TSP-no.to be spec.				
050					**Application:**				
					000	Gauge head only			
					081	Standard application			
					999	Special version, TSP-no.to be spec.			
060						**Float:**			
						1	2.1kg, d=140mm (0.5-0.93g/cm3)		
						2	2.4kg, d=140mm (0.94-2.0g/cm3)		
						3	Not selected		
						9	Special version, TSP-no.to be spec.		
070							**Colour:**		
							0	Sliver	
							9	Special version, TSP-no.to be spec.	
LTC2230-									Order code

2.2.2 LTC2240 (Display: Downward)

010	**Function:**								
	0	Basic version							
	9	Special version, TSP-no. to be spec.							
020		**Process Connection:**							
		0	10K 150A RF, SS400 flange JIS B2220						
		1	6" 150lbs RF, SS400 flange ANSI B16.5						
		9	Special version, TSP-no. to be spec.						
030			**Measuring Range:**						
			1	2.5m					
			2	5m					
			3	10m					
			9	Special version, TSP-no.to be spec.					
040				**Display:**					
				1	Dial 1 pointer				
				9	Special version, TSP-no.to be spec.				
050					**Application:**				
					000	Gauge head only			
					083	Standard application			
					999	Special version, TSP-no.to be spec.			
060						**Float:**			
						1	2.1kg, d=140mm (0.5-0.93g/cm3)		
						2	2.4kg, d=140mm (0.94-2.0g/cm3)		
						3	Not selected		
						9	Special version, TSP-no.to be spec.		
070							**Colour:**		
							0	Sliver	
							9	Special version, TSP-no.to be spec.	
LTC2230-									Order code

2.3 Scope of Delivery

Caution!

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".

The scope of delivery consists of:

- Assembled instrument

Accompanying documentation:

- Operating Instructions (this manual)

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

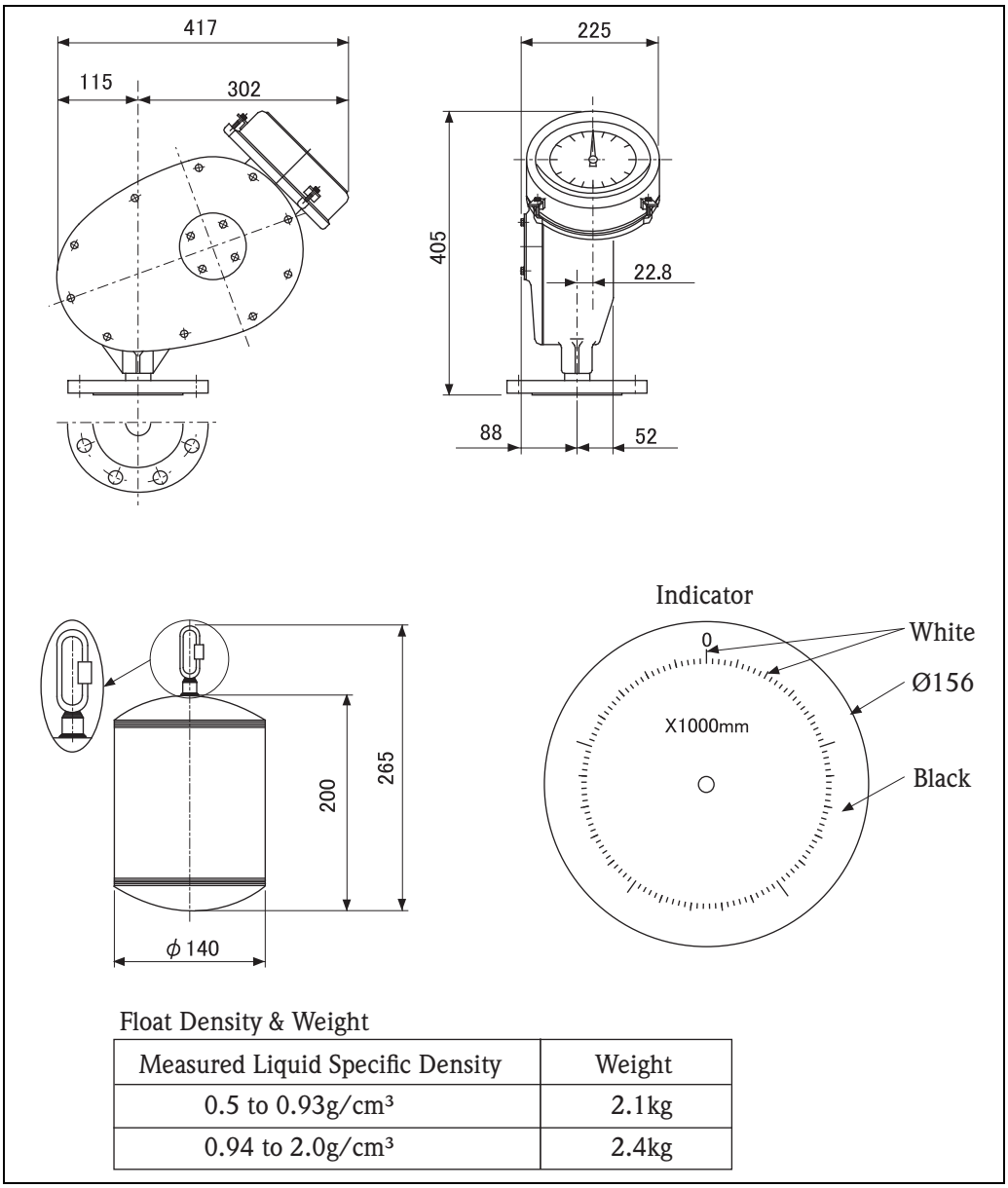
Follow the safety instructions and conditions of transportation for instruments in excess of 18kg (40 lbs.).

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 +60 °C (4° F to 140° F).

3.2 Installation Conditions

3.2.1 Dimensions of LTC2230

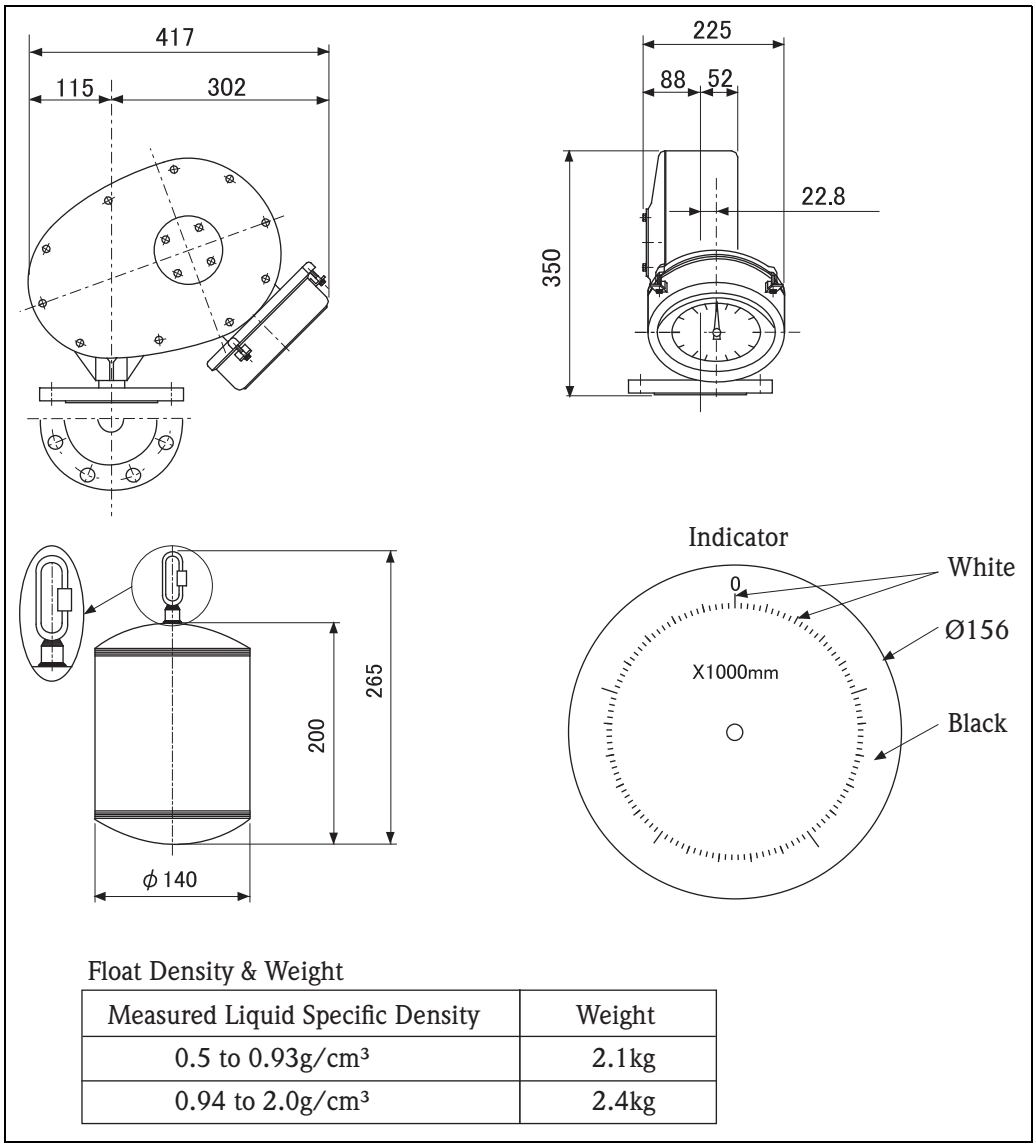


Float Density & Weight

Measured Liquid Specific Density	Weight
0.5 to 0.93g/cm³	2.1kg
0.94 to 2.0g/cm³	2.4kg

Figure 2: LTC2230 Dimensions

3.2.2 LTC2240 Dimensions



Float Density & Weight

Measured Liquid Specific Density	Weight
0.5 to 0.93g/cm³	2.1kg
0.94 to 2.0g/cm³	2.4kg

Figure 3: LTC2240 Dimensions

3.3 Standard Installation

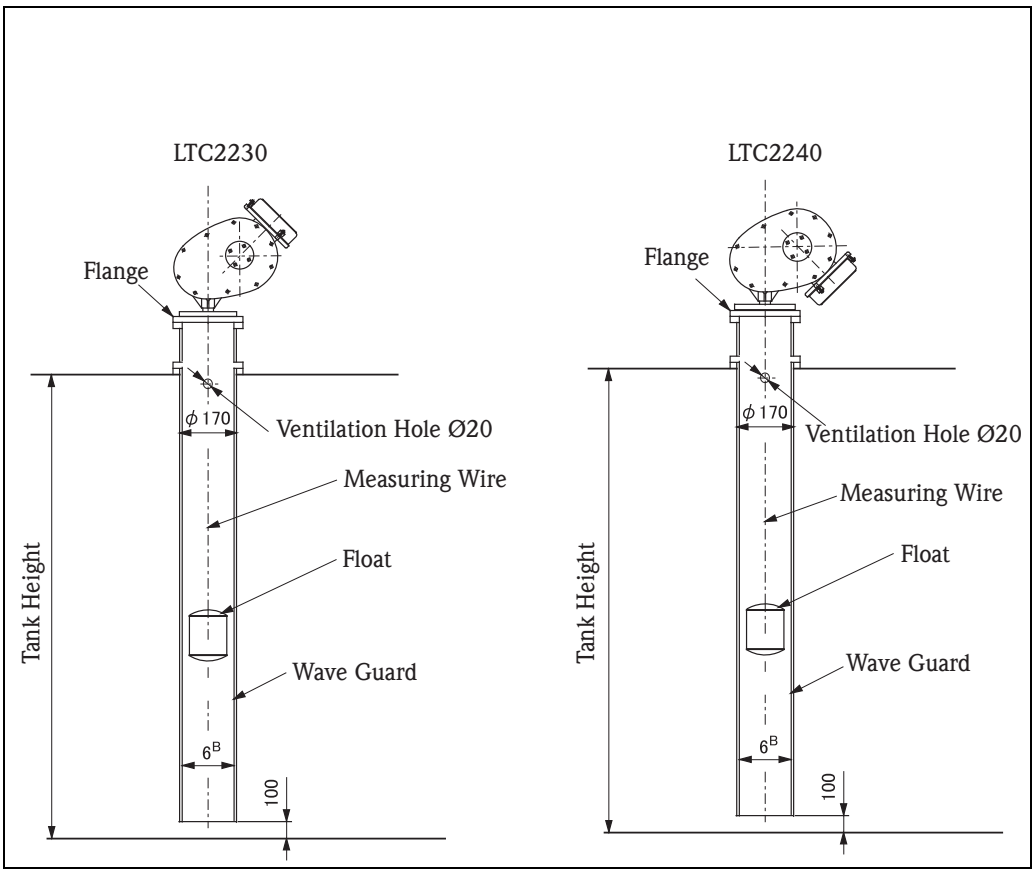


Figure 4: LTC Standard Installation

4 Installation Adjustment

4.1 Wave Guard

1. Use the following specifications for wave guards; 6B, SGP, jointless, and white pipe.
2. Completely remove burrs from weld joints and from the inside of pipe joints that have been cut and rewelded.
3. Be sure that airtightness is maintained in the flange between wave guard and gauge head.

4.2 LTC Installation

Installation Procedure

1. Remove the rear cover of gauge head [6].
2. Hold the measuring wire [2] by hand and remove the fixing sponge [1] (black, Approx, 16 x 16 x 16mm).
3. Pull on the measuring wire to connect the float [5].
   - As the float begins to weigh down on the measuring wire (1.2kg), confirm that the float is securely connected to the measuring wire before releasing.
4. Move the crimp sleeve [4] upward and connect the measuring wire to the float.
5. Move the crimp sleeve downward and crimp the center of the sleeve so that the measuring wire does not disconnect from the float.
6. Hold on to the measuring wire and lower the float slowly into the wave guard.
7. When the float reaches the bottom of the tank, install the gauge head.
8. Replace the rear cover.

This completes the installation procedure.

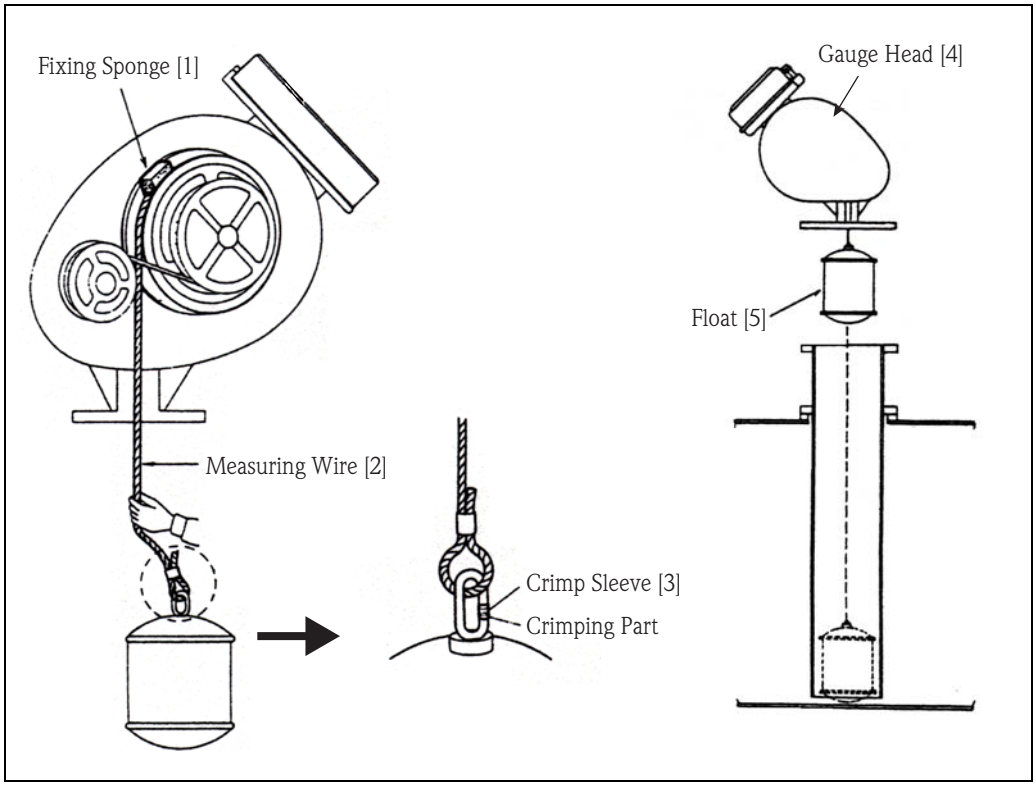


Figure 5: LTC Gauge Head Installation

4.3 Indicator Adjustment

Following are the three universal procedures for indicator adjustment:

- 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.

Note!
After removing the cover, the indicator can be removed by pulling it outward. Align and insert the indicator, using calculated value.

4.3.1 Calibration Using Actual Measuring Liquid

After filling the tank halfway with liquid, the indicator calibration should be performed. This is the ideal level for calibrating indicator. Calibration is possible, however, whether tank is low or filled to capacity.
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.

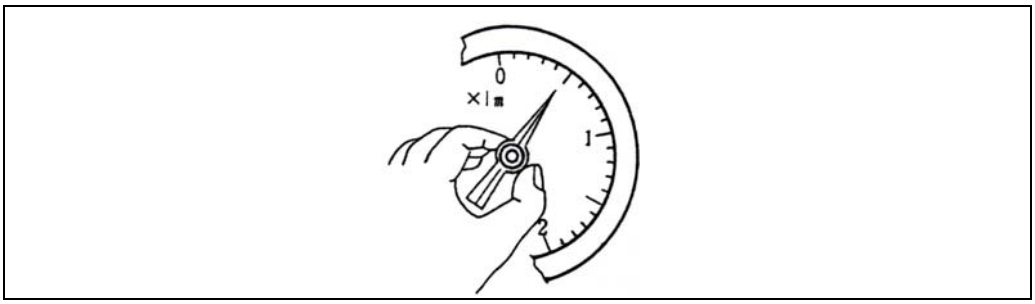


Figure 6: Indicator Adjustment

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 LTC will show proper liquid level.

$$Lf = h + \frac{\frac{W - W1}{\rho} - Q}{A} \quad (cm)$$

h：Lower half of float height••••••10cm
W：Float weight••••••( )g (see following table)
W1：Conster spring weight••••••1200g
ρ：Specific density of liquid••••••( )g/cm³
Q：Lower half of float volume••••••1331cm³
A：Cross-sectional area of crindrical part of float••••••154cm²

Measured Specific Density	0.5～0.93g/cm³	0.94～2.0g/cm³
Float Weight (Allowable Range ± 100g)	2100g	2400g

For expample: When the density of measuring liquid is 1;

$$Lf = h + \frac{\frac{2400 - 1200}{1} - 1331}{154} \fallingdotseq 9.15\ (cm)$$

↓

Set the indicator to 90mm (9cm).

4.3.3 Calibration Water Filling Procedure

Indicator adjustment is performed during water filling test. Measure the water level using a measuring tape, then align indicator to the calculated value. After calculating the value, correct for the value error difference of submerging float in water and in any liquid other than water (density = 1g/cm3), using the following formula.

$$Lb = h + \frac{W - W1}{A} \left(\frac{1}{\rho} - 1 \right)$$

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

5 Maintenance

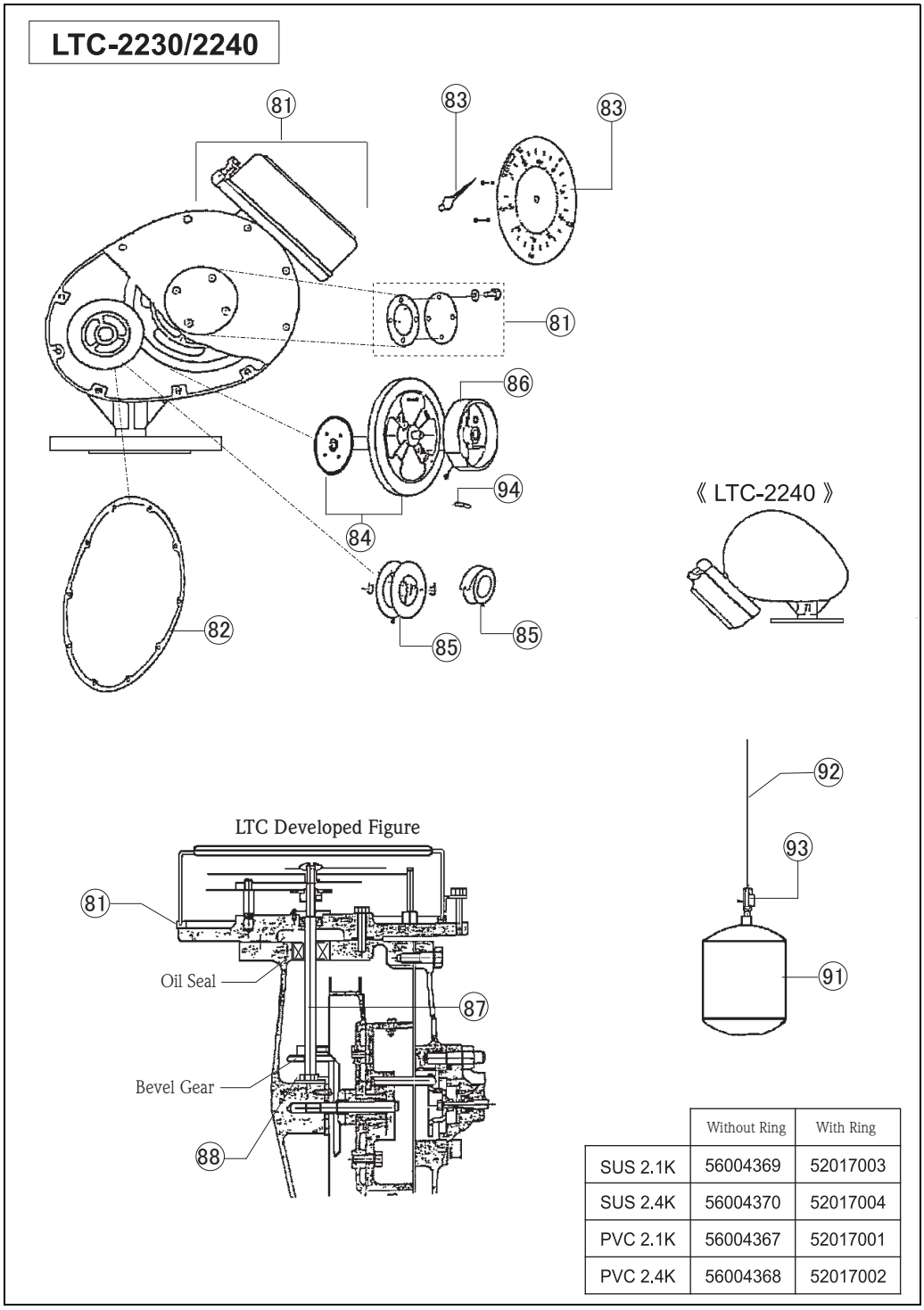
The wire float gauge requires no particular attention or maintenance. It should consistently display accurate values under normal conditions. Component life varies, however, depending on installation environment inside the tank, as well as on frequency of use. Inspect components according to the following table.

Inspection Parts	Descriptions
Conster Wear	Remove the dust and other particles on the front surface of the constar. Replace the conster if any cracks are discovered.
Fog or Condensation on Indicator Screen	Confirm that indicator cover is securely tightened and that there is no foreign substances on the sealing.

6 Troubleshooting

6.1 Spare Parts

Spare parts are contained in kits. Spare parts for LTC-series which can be ordered from Endress+Hauser are shown with their order numbers in the diagram below. Contact Endress+Hauser service representatives for further assistance.



	Without Ring	With Ring
SUS 2.1K	56004369	52017003
SUS 2.4K	56004370	52017004
PVC 2.1K	56004367	52017001
PVC 2.4K	56004368	52017002

Figure 7: Spare Parts

	No.	Specification		No.	Specification
81	56004495	Steel front cover assy, low P. L	88	56004487	Rulon metal
	70106496	U-rubber, LT22 indicator cover	91	52017003	Float FL140, SUS316, 2.1kg with ring
82	56004462	Packing, rear cover, hiker cork		52017004	Float FL140, SUS316, 2.4kg with ring
	56004462	Packing, rear cover, cork		52017001	Float FL140, PVC, 2.4kg with ring
83	56004318	Dial plate, 2.5m,		52017002	Float FL140, PVC, 2.1kg with ring
	56004316	Dial plate, 10m		56004369	Float LF140, 316, 2.1kg, w/o ring
	56004320	Dial plate, 5m		56004370	Float LF140, 316, 2.4kg, w/o ring
	56004391	Index Alu		56004367	Float LF140, PVC, 2.1kg, w/o ring
84	56004529	Wire drum, gear		56004368	Float LF140, PVC, 2.4kg, w/o ring
85	56004302	Conster drum	92	56004413	Measuring wire 0.8mm, 10m
	52015582	Conster spring, 5m		56004416	Measuring wire 0.8mm, 5m
	017860-5033	Conster spring, 10m	93	56004405	Lifting ring float 140D
86	56004304	Conster reeling drum	94	56004925	Wire sleeve 0.8mm
87	70106001	Main shaft assembly			

6.2 Failure Causes and Countermeasures

Symptom	Possible Causes	Countermeasures
Indicator does not move.	1. Severed measuring tape 2. Conster broken or damaged 3. Sunken float	1. Replace measuring wire 2. Replace conster 3. Replace float
Error value of indicator arise.	1. Conster worn or damaged 2. Indicator loose	1. Replace conster 2. Remove the indicator cover and check the needle.
There is difference between the measuring value of liquid level and the indicated value on the display.	1. LTC malfunction or failure 2. No LTC defects found	1. Inspect and/or perform the countermeasures described above. 2. Measurement value inaccurate due to accumulated sludge, improper calculation, etc..

6.3 Return

1. The following procedure must be performed before returning LTC float level switch to Endress+Hauser e.g. for repair or calibration.
   - Remove all residue. Pay special attention to the gasket grooves and crevices where fluid may be present. This is especially important if the fluid is corrosive, poisonous, carcinogenic, radioactive, or otherwise hazardous.
   - Always enclose a duly completed "Declaration of Hazardous Material and De-contamination" form (a copy of the “Declaration of Hazardous Material and De-contamination” is included at the end of this operating manual). Only then can Endress+Hauser transport, examine, and repair a returned device.
   - Enclose special handling instructions if necessary, for example a safety data sheet as per EN 91/155/EEC.
2. Additionally specify:
   - An exact description of the application
   - The chemical and physical characteristics of the instrument
   - A short description of the error that occurred (specify the error code where possible)
   - Operating time of the device

Note!
A copy of the “Declaration of Contamination” is included at the top of this operating manual.

Caution!
- Hazardous materials may be attached to damaged parts of LTC or its plastic material. Unless hazardous materials are completely removed from LTC, no repair request is accepted.
- Incomplete cleaning of the instrument may result in waste disposal or cause harm to personnel (burns, etc.). Any costs arising from this will be charged to the operator of the instrument.

6.4 Disposal

In case of disposal, separate the various components according to their materials.

6.5 Contact Addresses of Endress+Hauser

The addresses of Endress+Hauser are given on the back cover of this operating manual. If you have any questions, do not hesitate to contact Endress+Hauser representative.

7 Technical Data

Measuring Range	0 to 2.5m, 5m, 10m
Display	Dial 1 Pointer
Accuracy	±30mm (ρ = 1g/cm^3)
Maximum Operating Pressure	Max. 20kPa
Measuring Specific Density Range	0.5 to 2.0g/cm^3
Total Weight	LTC2230: 8kg LTC2240: 8kg
Allowable Temperature Range	-20 to +60°C
Process Connection	10K 150A RF, SS400 flange JIS B2220 6" 150lbs RF, SS400 flange ANSI B16.5

Endress+Hauser

People for Process Automation

Declaration of Hazardous Material and De-Contamination
Erklärung zur Kontamination und Reinigung

RA No. ☐☐☐☐☐☐☐☐

Please reference the Return Authorization Number (RA#), obtained from Endress+Hauser, on all paperwork and mark the RA# clearly on the outside of the box. If this procedure is not followed, it may result in the refusal of the package at our facility.
Bitte geben Sie die von E+H mitgeteilte Rücklieferungsnummer (RA#) auf allen Lieferpapieren an und vermerken Sie diese auch außen auf der Verpackung. Nichtbeachtung dieser Anweisung führt zur Ablehnung ihrer Lieferung.

Because of legal regulations and for the safety of our employees and operating equipment, we need the "Declaration of Hazardous Material and De-Contamination", with your signature, before your order can be handled. Please make absolutely sure to attach it to the outside of the packaging.
Aufgrund der gesetzlichen Vorschriften und zum Schutz unserer Mitarbeiter und Betriebseinrichtungen, benötigen wir die unterschriebene "Erklärung zur Kontamination und Reinigung", bevor Ihr Auftrag bearbeitet werden kann. Bringen Sie diese unbedingt außen an der Verpackung an.

Type of instrument / sensor
Geräte-/Sensortyp _____

Serial number
Seriennummer _____

☐ **Used as SIL device in a Safety Instrumented System** / Einsatz als SIL Gerät in Schutzeinrichtungen

Process data/Prozessdaten
Temperature / Temperatur_____ [°F] _____ [°C]
Pressure / Druck _____ [psi] _____ [Pa]
Conductivity / Leitfähigkeit _____ [µS/cm]
Viscosity /Viskosität _____ [cp] _____ [mm²/s]

Medium and warnings
Warnhinweise zum Medium

	Medium /concentration Medium /Konzentration	Identification CAS No.	flammable entzündlich	toxic giftig	corrosive ätzend	harmful/ irritant gesundheits-schädlich/ reizend	other * sonstiges*	harmless unbedenklich
Process medium / Medium im Prozess								
Medium for process cleaning / Medium zur Prozessreinigung								
Returned part cleaned with / Medium zur Endreinigung								

* explosive; oxidising; dangerous for the environment; biological risk; radioactive
* explosive; brandfördernd; umweltgefährlich; biogefährlich; radioaktiv

Please tick should one of the above be applicable, include safety data sheet and, if necessary, special handling instructions.
Zutreffendes ankreuzen; trifft einer der Warnhinweise zu, Sicherheitsdatenblatt und ggf. spezielle Handhabungsvorschriften beilegen.

Description of failure / Fehlerbeschreibung _____

_____

_____

Company data / Angaben zum Absender

Company /Firma _____

_____

Address / Adresse

_____

_____

Phone number of contact person / Telefon-Nr. Ansprechpartner:

_____

Fax / E-Mail _____

Your order No. / Ihre Auftragsnr. _____

"We hereby certify that this declaration is filled out truthfully and completely to the best of our knowledge.We further certify that the returned parts have been carefully cleaned. To the best of our knowledge they are free of any residues in dangerous quantities."
"Wir bestätigen, die vorliegende Erklärung nach unserem besten Wissen wahrheitsgetreu und vollständig ausgefüllt zu haben. Wir bestätigen weiter, dass die zurückgesandten Teile sorgfältig gereinigt wurden und nach unserem besten Wissen frei von Rückständen in gefahrbringender Menge sind."

_____ (place, date / Ort, Datum)

_____ Name, dept./Abt. (please print /bitte Druckschrift)

_____ Signature / Unterschrift

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

Phone: ++81 55 266 4964
Fax: ++81 55 266 4969

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