



**LFT01**

**FLOAT LEVEL SENSOR**

**Instruction Manual**

Intempco	<b>LFT01 FLOAT LEVEL SENSOR USER MANUAL</b>	<b>Document No:</b> LFT01	<b>Issue Date:</b> 29/04/2014
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## 1.0 PRODUCT OVERVIEW

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### 1.1 Product Features

- Compact design, ideal for OEM applications
- Various process fittings available
- Probe lengths to 96"
- 1/4" or 1/2" resolution
- All stainless steel wetted parts
- Aluminum, stainless, polypropylene enclosures available; general purpose or explosion proof
- Continuous analog level measurement
- Analog output via head mounted hockey puck transmitter or remotely mounted DIN Rail transmitter
- Undisturbed by foaming
- Vapor insensitive
- Liquid interface detection

### 1.2 Description

The LFT01 is a reed-chain type float level transducer suitable for level measurement in vessels of up to 96 inches in height. Of high quality construction, all wetted parts are stainless 316; other materials are available upon request.

Each transducer comes standard with an enclosure, head-mounted hockey-puck or remote mounted DIN rail transmitter, float and a fitting/probe. Reliable operation and simple design makes the LFT01 an excellent choice for many level-sensing applications.

The LFT01 is a simple, reliable and cost effective means of continuous sensing of liquid levels. This device uses a magnetic float, which is free to move vertically along a stem equipped with reed magnetic switches giving a resolution of 1/4". The switches are fully contained within the stem.

There are a number of materials available depending on the liquid which will be measured. The use of a 2" or 1-1/2" NPT fitting accommodates the diameter of the float and allows the unit to be installed from the top of the vessel without removal of the float.

Each transducer comes standard with a shielded cable or a 5-pin M12 Micro-DC plug. The transmitted analog level signal is generated via either an onboard puck mounted transmitter or a DIN rail transmitter, mounted remotely. The puck or DIN rail transmitter can be used to calibrate the device for different spans within the full length of the stem. The output signal is a stepped analog signal of the industry standard 4-20mA current loop or 0-5Vdc, 0-10Vdc, or 0-5K ohms range.

### 1.3 Applications

- Ideal for level measurement where installation space is limited or tanks are compact
- Water based liquids
- Acids compatible with Stainless 316
- Hydraulic and other clean oil applications
- Chemical holding tanks with clean liquids
- Measurement of liquid levels in mobile equipment
- Machinery, Energy, Naval, Industrial, Automation
- Not recommended where liquids are dirty or sticky

## 1.4 Specifications

### 1.4.1 Sensor Specifications

Sensing Technology :	Reed Switch chain type
Measuring Range :	From 12 to 96 inches ( 304 to 2438 mm )
Resolution :	± 0.50 inch ( 13 mm ) standard ± 0.25 inch ( 6.5 mm ) optional
Applicable Floats :	See Float Types - BA, CA,
Dead Band :	Dependent on Float: See Float Types
Minimum Liquid SG :	Dependent on Float: See Float Types
Max. Pressure :	Dependent on Float: See Float Types
Media Temperature Range :	- 20 to 120 °C ( - 4 to 250 °F)
Wetted Parts	
Stem :	Stainless 316 std.
Float :	See Float Types
Fitting :	Stainless 316 std.
Process Connection Size :	1/2" or 2" NPT male
Enclosures :	See Head Types - WAx, POx, AHx, CAx, CSx, EXx, ADx, XDx
Transmitter Type	Hockey puck or DIN Rail,
Hockey Puck :	Zinc die cast enamel coated, NEMA 1/ IP40
DIN Rail :	Polyamide, NEMA 1 / IP40
Adjustments :	Via potentiometer, 20 turn

### 1.4.2 Environmental Specifications

Ambient Temperature Range :	- 20 to 60 °C ( 4 to 140 °F)
Storage Temperature Range :	- 40 to 80 °C ( - 40 to 176 °F)
Media Temperature Range :	- 20 to 120 °C ( - 4 to 250 °F)
Environmental Protection :	NEMA 4 / IP65 or NEMA 4X / IP66 depending on enclosure selection
Output Data, 2-wire	
Output Signals :	4-20 mA 2-wire
Maximum Loop Resistance :	$R_{max.} = [ V_{supply} - 9 \text{ VDC} ] / 20 \text{ mA}$
Accuracy :	$\leq \pm 3.0 \% \text{ FS max.} \quad \leq \pm 1.5 \% \text{ FS typ.}$
Open Circuit Detection :	Over-scale limit ( 27.0 mA ) or Under-scale limit ( 2.2 mA )
Sensing Voltage & Current :	5 VDC max., 2.5 mA max.
Warm-up :	30 sec.
Output Data, 3-wire	
Output :	1-5 VDC, 0-5 VDC, 0-10 VDC, 3-wire
Accuracy :	$\leq \pm 3.0 \% \text{ FS max.} \quad \leq \pm 1.5 \% \text{ FS typ.}$
Output Impedance :	>1 M $\Omega$
Sensing Voltage & Current :	5 VDC max., 2.5 mA max.
Warm-up :	30 sec.

### 1.4.3 Electrical Specifications

Supply Voltage :	12-32 VDC
Residual Ripple Supply Voltage:	≤ 5 %
Supply Voltage Protection :	Reverse polarity, excess voltage, override and short circuit protected
Supply Effect :	<0.02 % / V

## 2.0 INSTALLATION

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Note: Unpack the instrument carefully. Inspect all components for damage. If any damage is found, please notify an INTEMPCO representative as soon as possible prior to installation.

The INTEMPCO series LFT level sensor should be located for easy access for service and monitoring. Sensor installed transmitter or remote electronics and DIN rail should not be exposed to temperature below -40°C (-40°F) or above 70°C (158°F). This is very important when process temperatures are high and heat can be conducted up to the enclosure and to the remote electronics. Special precaution should be made to prevent exposure to corrosive atmospheres, excessive vibration, shock or physical damage. It is preferable that the LFT is not installed in proximity to high voltage wires or other sources of high electrical noise.

### 2.1 Probes

For conductive liquids, such as water and acids PFA Teflon coated probes are always used. For non-conductive liquids, such as oils, diesel fuel and MEK solvents PFA Teflon coated probes can also be used. Bare stainless probes are used for high temperature applications. The probe length is customer specified for the height of material desired to be measured.

### 2.2 Installation Precautions

Care should be taken in selecting the mounting location. High voltage wires and moving parts should be avoided. The location should also be chosen for ease of access. The probe should have sufficient space around it to allow the float sensor a full range of motion. Listed here are some concerns that should be factored into the installation of this product.

#### Specific Gravity

All liquids have a specific gravity. The magnetic float should be chosen such that its specific gravity falls within the range of that appropriate for the liquid being measured. The different specific gravities for each float are listed at the end of the manual in the custom builder.

#### Magnetic Interference

This device is sensitive to magnetic fields, so it should be located a sufficient distance away from any devices that create or intrinsically have magnetic fields. Also, if it is mounted in a vessel that is ferrous it should be mounted a sufficient distance from any surface to prevent it from affecting the float.

#### Thermal

Although the rating for the probe is -20 to +120C it should be noted that the electronics in the DIN or puck transmitter are only rated for -20 to +60C and the location of these devices should ensure that they remain within those ratings.

#### Vibration

The LFT01 series of float sensors could be affected by vibration or momentary impact. Excessive vibration may cause false sensor readings and may even cause permanent damage to the unit. The reed switches are electro-mechanical devices that physically move

under the pull of the float magnet, but they could be caused to move by excessive vibration.

#### Mounting

The float stem should be mounted rigidly so that it does not move with turbulence. It should also be mounted as vertical as possible. A few degrees off of vertical will not harm operation.

Note: Although this is a sealed and intrinsically safe device, precautions should always be taken to ensure that this device is properly grounded when used in an explosive or flammable environment otherwise a significant static charge could build up on the body of the sensor and be a source of ignition.

### **2.3 Installation Procedure**

1. Before installation ensure that the LFT01 is properly calibrated for the expected range of measurement. (See Calibration page 9)
2. Clean the float and the stem of the sensor to ensure there is no contamination to the liquid due to residue that may remain from the production process.
3. If the installation hole is larger than the size of the float proceed to step 4, otherwise remove the retaining collar at the bottom of the stem and remove the float.
4. Insert the stem through the mounting hole and hand tighten the body of the sensor by screwing it into the threaded mount.
5. Further tighten the sensor in the NPT threaded hole using a wrench going only  $\frac{1}{2}$  turn further.
6. If the float was removed in step 3, put the float back onto the stem and replace the retaining collar at the base of the stem.
7. Install an appropriate cable from the controller or input device to the LFT01. Ensure that the cable is shielded and that the shielding is only connected to ground at the controller end, not at the sensor end.
8. Verify the LFT01 is functioning properly.

## 2.3 Electrical Installation

### 2.3.1 Head Mounted Transmitter Connections (Refer Figure 1.)

**Note:** All wiring between the power supply and the head mounted hockey-puck transmitter should be done with 18 AWG to 22 AWG wiring. A shielded twisted pair cable may be used.

**CAUTION:** Units are designed to operate on 12 to 32 VDC power only. Application of 110 VAC will destroy the instrument.

1. Make sure the power source is turned **OFF**
2. Remove the head cover and pull supply wires through the conduit connection.
3. Verify that the positive side of the probe (Blue wire) is connected to the “P” terminal of the transmitter and that the probe reference ground (Green Wire) is connected to the “G” terminal of the transmitter.
4. Connect the positive side of the loop to the “+” terminal of the transmitter.
5. Connect the loop current meter in series with the negative supply wire as follows:
  - a) Negative “-” transmitter wire to the positive meter terminal.
  - b) Negative “-” meter terminal to negative “-” power source terminal.
6. Turn **ON** the power. The meter may read anywhere on the scale at either end. This is normal until calibration has been completed. Proceed to the calibration instructions.

**Note:** Leave the shield unattached at the transmitter and the power supply. If the output signal is noisy connect the shield to ground of the power source.

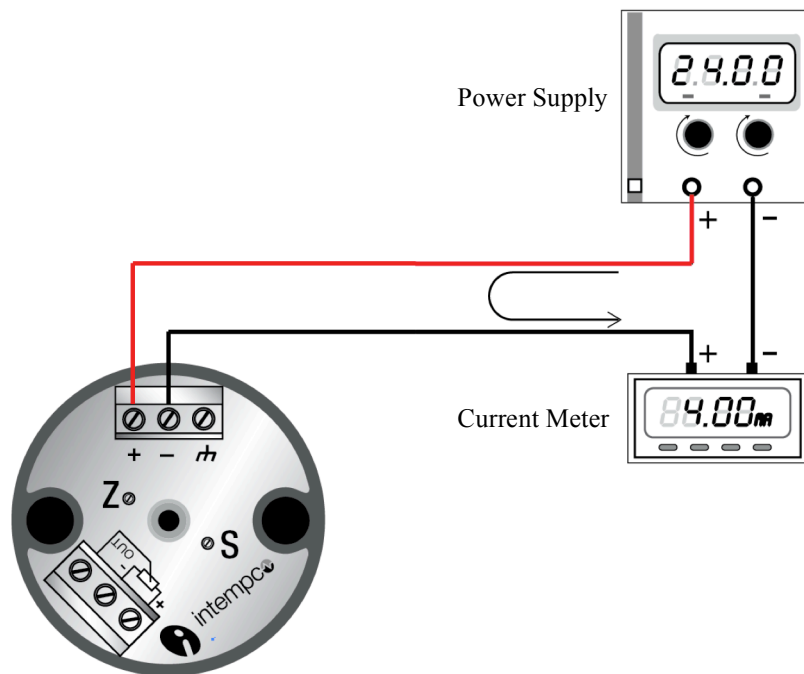


Figure 1. Head Mounted Transmitter

### 2.3.2 DIN RAIL Remote Transmitter Connections (Refer Figure 2.)

**Note:** All wiring between the power supply and the DIN rail transmitter should be done with 18 AWG to 22 AWG wiring. A shielded twisted pair cable may be used. Between DIN RAIL transmitter and the remote electronic module installed in the head, use a shielded twisted pair cable with 3 or 4 conductors, 18AWG to 22 AWG. Cable runs of up to 300 M (1000 ft) are permitted.

**CAUTION:** Units are designed to operate on 12 to 32 VDC power only. Application of 110 VAC will destroy the instrument.

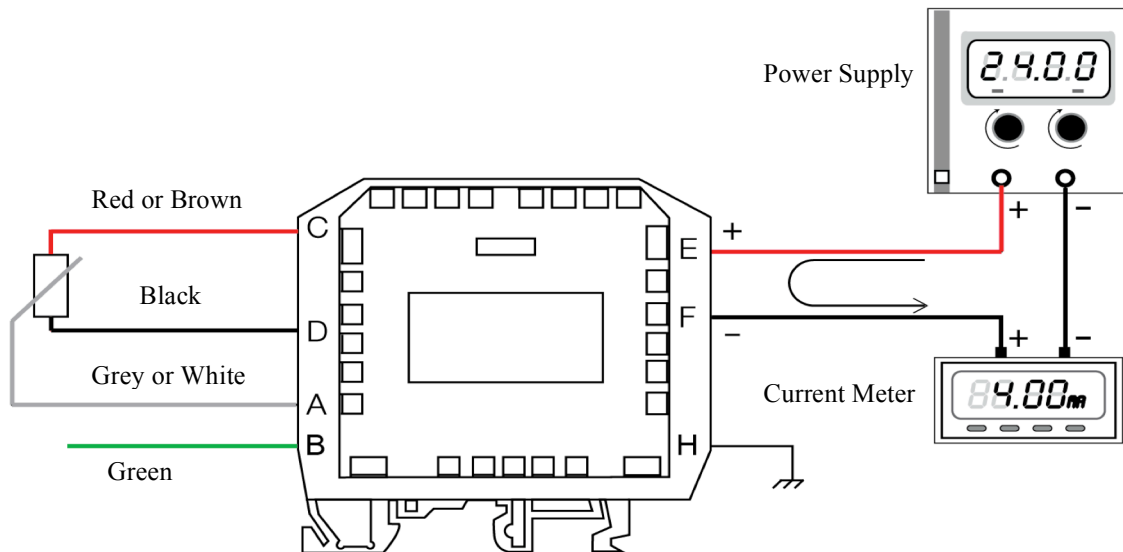


Figure 2. DIN-RAIL Transmitter with Head-Mounted Remote Module

The **Remote Module (RM)** is normally installed inside the enclosure or head of the LFT level sensor. The “Blue Wire” (Probe +) and “Green Wire” (Probe Ref. Ground) are factory connected. Verify that they are connected and do not connect any other wires to these two terminals.

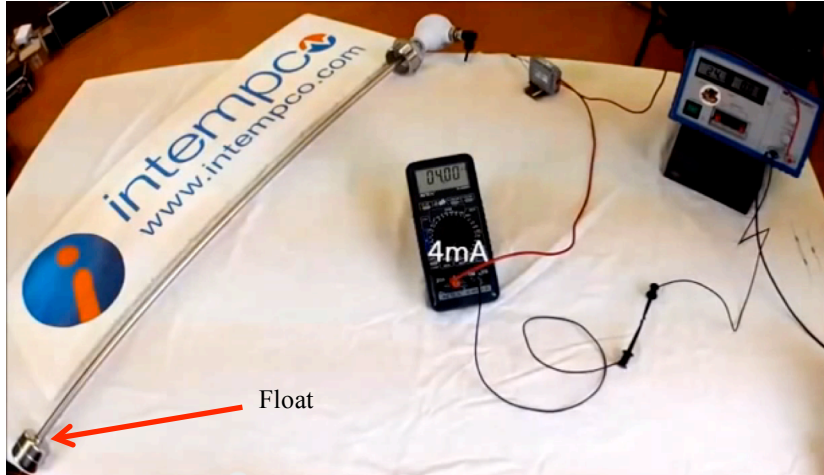
1. Make sure the power source is turned OFF.
2. Connect the Black Wire to the terminal “D” of the DIN-RAIL Transmitter.
3. Connect the Grey or White Wire to the terminal “A” of the DIN-RAIL Transmitter.
4. Connect the Red or Brown Wire to the terminal “C” of the DIN-RAIL Transmitter.
5. Connect the “E ” terminal (“+ ” loop) of the DIN RAIL to the positive side of the power supply.
6. Connect the “F ” terminal (“- ” loop) of the DIN RAIL to the positive side of the meter.
7. Connect the negative of the power supply to the negative of the meter.

**Note:** Leave the shield unattached at the transmitter and the power supply. If the output signal is noisy connect the shield to ground of the power source.

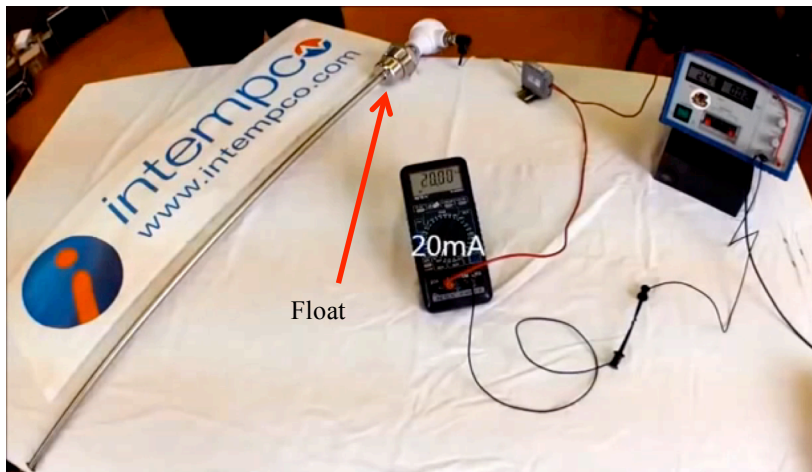


### 3.0 CALIBRATION

1. Install an appropriate power supply and calibration display.
2. Zero adjust: place the float at the bottom of the stem, or the lowest desired spot on the stem and adjust the Z screw on the DIN transmitter until the calibration display shows the desired value (4mA for current loop, 0 volts for voltage 5 or 10 volts, 1 ohm approximate for 5Kohms resistor range).



3. Span adjust: Move the float to the highest desired location on the stem or the top and adjust the S screw until the calibration display shows the desired max value (20mA for current loop, 5 volts for 5 volts, 10 volts for 10 volts and 5Kohms for 5Kohms).



4. Adjusting the span may move the zero point, so repeat steps 2 and 3 until there is no longer any deviation.
5. Install the LFT01 in the vessel.

It is the policy of INTEMPCO to comply with all worldwide safety and EMC/EMI regulations that apply. INTEMPCO is constantly pursuing certification of its products to the European New Approach Directives.

INTEMPCO will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct, but INTEMPCO Controls, Ltd. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient-connected applications.

#### WARRANTY/DISCLAIMER

INTEMPCO Controls, Ltd. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. INTEMPCO Warranty adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that INTEMPCO's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. INTEMPCO's Customer Service Department will issue an Return Merchandise Authorized (RMA) number immediately upon phone or written request. Upon examination by INTEMPCO, if the unit is found to be defective, it will be repaired or replaced at no charge. INTEMPCO's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of INTEMPCO's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

INTEMPCO is pleased to offer suggestions on the use of its various products. However, INTEMPCO neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by INTEMPCO, either verbal or written. INTEMPCO warrants only that the parts manufactured by it will be as specified and free of defects. INTEMPCO MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of INTEMPCO with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall INTEMPCO be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by INTEMPCO is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, INTEMPCO assumes no responsibility as set forth in our basic WARRANTY / DISCLAIMER language, and, additionally, purchaser will indemnify INTEMPCO and hold INTEMPCO harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

#### RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the INTEMPCO Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO INTEMPCO, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (RMA) NUMBER FROM INTEMPCO CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned RMA number should then be marked on the outside of the return package and on any correspondence. The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting INTEMPCO:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult INTEMPCO for current repair charges. Have the following information available BEFORE contacting INTEMPCO:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

INTEMPCO's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.