



CE-2424



An ISO 9001:2008
Certified Company



INSTRUCTION MANUAL FOR CAPACITANCE TYPE LEVEL TRANSMITTER.



1.1 INTRODUCTION

Level measurement is an integral part of the process control. The liquid level reference to a datum is an important measuring parameter.

Capacitance type level measurements are based on the physical properties of a capacitor.

Capacitance of a capacitor formed by two parallel plate electrodes is

- 1) Directly proportional to area 'A' of the electrode.
- 2) Inversely proportional to distance 'd' between the plates &
- 3) Directly proportional to dielectric 'δ' positioned in between them

$$C = \frac{\delta A}{d}$$

The probe of the level sensor forms an electrical capacitor with the surrounding metal container wall when the vessel is empty; an initial capacitance exists between the electrode level sensor & the metal wall. When the sensor is covered with liquid the value of this capacitor increases & the capacitance change is measured & converted into an output signal proportional to the capacitance change.

Depending on the application requirement, a part or fully insulated flexible or solid rod probe is selected. The probe head contains the electronic capacitance current & transducer.



1.2 TECHNICAL SPECIFICATION

SPECIFICATIONS:

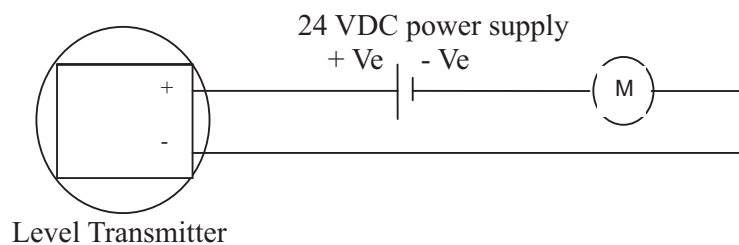
Enclosure	: Die Cast Aluminum LM-6 Alloy duly certified for Flame Proof or ABS Plastic duly approved for IP 65/67
Measuring range	: 50 to 2000 mm rugged probe, 2000 – 10000mm Flexible Probe
Cable Entry	: ¾" NPT (F) / ½" E.T.
Transmitter Type	: 2 Wires
Supply voltage	: 24 VAC
Output	: 4 – 20 m A @ constant current R. Max = 500 Ω.
Pressuring Rating	: 6 kg/cm ²
Temperature rating	: Ambient to 100 °C
Accuracy	: ± 0.25 % FSR



1.3 INSTALLATIONS AND WIRE CONNECTION

The customer is advised to follow the installations & operating instruction carefully non-adherence to which may damage the level indicator for which the manufactures will not be responsible.

- 1) Unpack the level indicator carefully.
- 2) Fix the probe unit to the tank with necessary gasket & bolts.
- 3) Connect the level transmitter as per the wiring code given.
- 4) Input power :Connect the power of 24 VDC to the respective polarity(+ve and ve)
- 5) Output: This is loop powered transmitter which can be connected to the PLC or the process controller; however the output can be checked by connecting the multimeter in series as shown below.



- 6) As the transmitter is factory calibrated, it does not require the calibration, however if required follow the below procedure (1.4)



1.4 CALIBRATION OF CAPACITANCE TYPE LEVEL TRANSMITTERS (4 TO 20 mA OUTPUT, TWO WIRE, LOOP POWERED)

Calibration principle- It is a two point straight line calibration method. The straight line is extended beyond the calibration points at both the ends by the transmitter. Calibration points (High & Low) can be anywhere between 0% (tank empty) and 100% (tank full). The low calibration point should be at the lower level than the high calibration point. For maximum accuracy, two calibration points should be as apart as possible. Calibration is done by setting output current corresponding to actual level at two calibration points.

Calibration method – Install the level transmitter on the tank. Connect an ammeter in series with the supply.(0 to 20mA RANGE).

Key near the crystal is 'H/ 'key. Key near the LED is 'L/ 'Key.

Follow steps below **IN THE SAME ORDER.**

A] SET RANGE: (Note 1)

1) Decide range: Range depends on the probe length & the dielectric constant of the liquid. There are 7 ranges as follows for a standard **WATER** level transmitter.

- Range 1 – 0 to 160 mm (Probe length)**
- Range 2 – 160mm to 320 mm**
- Range 3 – 320mm to 640 mm**
- Range 4 – 640mm to 1280 mm**
- Range 5 – 1280mm to 2560mm**
- Range 6 – 2560mm to 5120mm**
- Range 7 – 5120mm to 10240mm**

2) Press both keys simultaneously & hold them pressed for 5 seconds. At the end of 5 seconds, transmitter will enter '**RANGE SET MODE**'. Blinking LED will be OFF. Now you can release both keys.

3) LED will start showing present range in a cyclic manner. '**Range display cycle**' consists of LED off for 3 Seconds followed by number of flashes equal to present range. One has to count number of flashes to get the range setting.

4) Range setting can be increased or decreased using '**H/ ' key or 'L/ ' key** respectively. These keys can be pressed anytime during 'Range display cycle'. Display cycle is reset when any key is pressed. Key can be pressed repeatedly without waiting for a display cycle.

5) Once desired range is shown in the Range display cycle (Number of LED flashes), do not press any key. LED will show 4 display cycles for you to confirm proper range setting. At the end of 4th display cycle, Range setting is saved in the memory. Transmitter will come out of '**RANGE SET MODE**' to RUN mode. LED will start blinking.

CAPACITANCE TYPE LEVEL TRANSMITTER



Note 1: Range is factory set. It need not be set again unless probe length or liquid is changed. So skip this step.

B] SET LOW CALIBRATION POINT:

1) Fill the tank preferably up to 0% to 30% of the full capacity. Measure the actual level using a dipstick. Calculate expected output current using equation given below.
Expected current (mA) = ((Actual liquid level / Full scale level) * 16) + 4

2) Press 'L/ ' key & hold it pressed for 5 seconds. At the end of 5 seconds, transmitter will enter 'LOW SET' mode. Level reading corresponding to low calibration point is stored in the memory. LED will be permanently ON. Ammeter will show approximately 8.0 mA. 'LOW SET' mode can be entered by pressing 'L/ ' key only. Once in set mode, any one of the two keys can be pressed to decrement or increment the current respectively.

3) If the expected current is less than the current shown by an ammeter, press & hold 'L/ ' key. If the expected current is more than the current shown by an ammeter, press & hold 'H/ ' key.

4) After 2 seconds, depending on the key pressed, current will start falling or rising fast in steps at the rate of 0.1 mA / 0.4 seconds.

5) Once the current shown by an ammeter is near an expected current, release the key.

6) Fine adjustment in the current can be done by repeatedly pressing a key momentarily. Every time a key is pressed, the current will change by approximately 5 uA. (Key has to be pressed twice to get 10 uA change in the current)

7) Once an ammeter starts showing current equal to the expected current, stop pressing any key. After about 10 seconds, current setting corresponding to low calibration point is stored in the memory. Transmitter will come out of 'LOW SET' mode to RUN mode.

LED will start blinking.

CAPACITANCE TYPE LEVEL TRANSMITTER



C] SET HIGH CALIBRATION POINT:

1) Fill the tank preferably up to 70% to 100% of the full capacity. Measure the actual level using a dipstick. Calculate expected output current using equation given below.

$$\text{Expected current (mA)} = ((\text{Actual liquid level} / \text{Full scale level}) * 16) + 4$$

2) Press 'H/' key & hold it pressed for 5 seconds. At the end of 5 seconds, transmitter will enter 'HIGH SET' mode. Level reading corresponding to high calibration point is stored in the memory. LED will be permanently ON. Ammeter will show approximately 16.0 mA. 'HIGH SET' mode can be entered by pressing 'H/' key only. Once in set mode, any one of the two keys can be pressed to decrement or increment the current respectively.

3) If the expected current is less than the current shown by an ammeter, press & hold 'L/' key. If the expected current is more than the current shown by an ammeter, press & hold 'H/' key.

4) After 2 seconds, depending on the key pressed, current will start falling or rising fast in steps at the rate of 0.1 mA / 0.4 seconds.

5) Once the current shown by an ammeter is near an expected current, release the key.

6) Fine adjustment in the current can be done by repeatedly pressing a key momentarily. Every time a key is pressed, the current will change by approximately 5 uA. (Key has to be pressed twice to get 10 uA change in the current)

7) Once an ammeter starts showing current equal to the expected current, stop pressing any key. After about 10 seconds, current setting corresponding to high calibration point is stored in the memory. Transmitter will come out of 'HIGH SET' mode to RUN mode.

LED will start blinking.