Almeg Controls

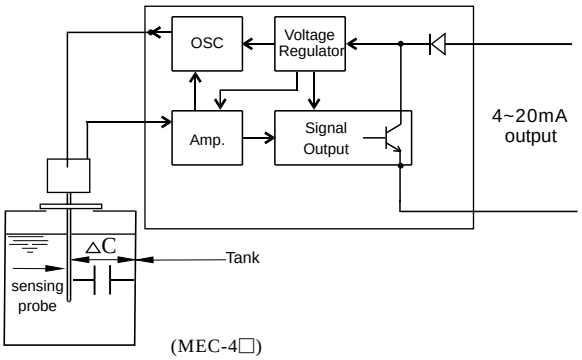
Capacitance Level Indicator Operation Manual

Product Introduction

EB(MEC) Capacitance Level Indicator is a simple and maintenance-free sensor. It could be used as a continuous level indicator with a 4~20mA output and if could operate as long as the resistance is within 400Ω (24VDC). It is compatible with PLC, IPC, programmable controllers, etc. and could be used in most applications.

Working Principle

The level measurement of a medium in a tank is accomplished by taking advantage of the capacitance theory. The tank wall, the sensing probe and the medium are all capacitors. A high frequency since wave is applied between the probe and the tank wall. The level change of the medium will consequently change the current of the applied since wave, flues forming a proportionate relationship between medium level and output contact.



(MEC-4□)

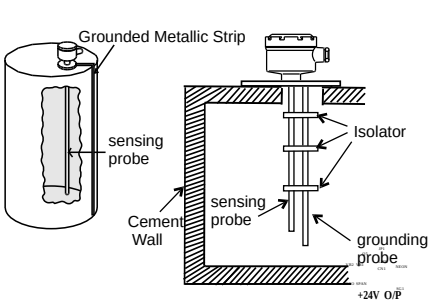
Specifications

Operating voltage: 24±2VDC
Ambient temperature: 0~55℃
Output current: 4~20mA
Load resistance: 400Ω

Type	Temp.	Wetted material
EB1100(MEC-10)	0 ~ 100 °C	304SS
EB1101(MEC-11)	0 ~ 200 °C	304SS
EB1200(MEC-20)	0 ~ 120 °C	304/316SS
EB1201(MEC-21)	0 ~ 200 °C	304/316SS
EB1300(MEC-30)	0 ~ 120 °C	304/316SS
EB1301(MEC-31)	0 ~ 200 °C	304/316SS
EB14□□	0 ~ 100 °C	304/316SS coating PVDF, PP, FEP
EB1530(MEC-53)	0 ~ 100 °C	SS FEP
EB1600	0 ~ 100 °C	SS304 + PP coating

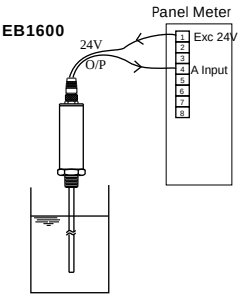
Installation& Notes

- Please go through the following points before installation and operation in order to cause proper working operations.
- Confirm that the operating voltage, operating temperature, operating pressure, material and area of application is suitable for that particular model number.
- If the medium is conduction, make sure to chose the rod probe or cable probe type with PVDF or PP material coatings.
- As the EB(MEC) uses capacitance theory for it's measurement, both the dielectric constant and the volume of the tank has an effect on the accuracy of the instrument. e.g. Medium di-electric constant is law, PCB's JP1 sensitivity should be set to "H", medium normal with as high di-elctric constant or medium/ big tanks, sensitivity could be set at "M" or "L".
- The medium's di-electric constant is a very important factor for the operation of the EB(MEC). A change in medium will change the di-electric constant to translate to a change in medium, there is also a need for calibration should the user need to change the high and low value of measurement of the medium.
- If conductive materials cants the sensing probe, the output current will be affected. If medium is non-conductive, this problem doesn't happens.
- If the non-conductive medium is corrupted by water or other conductive mediums, a jacketed sensing probe should be used.
- If installation within non metallic, cement or plastic tanks, user must attach a grounded metallic strip (figure 1) or select a dual probe sensor (figure 2)
- If the metallic tank wall must be grounded with signal ground, a dual probe EB(MEC) type must be chosen.
- In high temperature, highly corrosive environments with limited space, the Eb1600 (figure 2) is highly suitable. It's housing protection could ready IP67 and the extension diameter is only ϕ34mm. The material used can be either 304 or 316SS.



(fig.1)

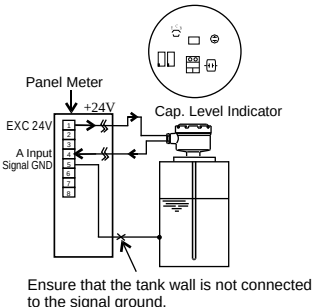
(fig.2)



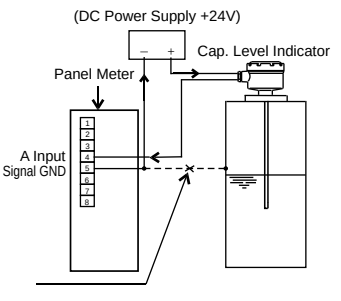
(fig.3)

Wiring

- Use 18AWG*2C shielding cable to connect to EB's(MEC) PCB's CN1(+24V,O/P) terminals, take note not to connect the shielding wire to the exterior housing.
- After installing the EB(MEC) of top mounting position, check that the exterior housing and the tank wall have a good connection, and also ensure that the tank wall is not connected to the signal ground.
- Connect the indicated wiring from the sensor to A-Input and +24V OUT of the meter, also take note that the meter already provides a 24VDC excitation voltage, do not connect to another power source. (Figure 4)
- If the metes does not provide 24VDC excitation voltage, provide a separate 24V power supply and connect if as shown in figure 5.
- The maximum distance the wire can be extended is dependent on the load resistance of the circuit, using 24V power supply as reference, the maximum load resistance must not exceed 400Ω, or else the accuracy of the readings will be effected.
- After connection, please clear the terminal housing free of debris, then apply housing cover screw and wire outlet before screwing to prevent moisture from seeping in. Do not lay cables near to strong/heavy power lines to avoid noise.
- Connection cables should be placed apart from electric devices (e.g. Convoyer, solenoids), please check that all connections are correct before operation starts.
- When doing connection, take note not to let rain water seep in the terminal housing.



(fig.4)



(fig.5)

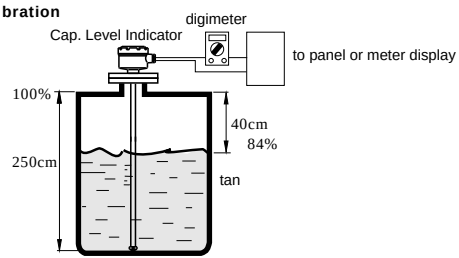
Calibration

Pre-calibration preparation:

1) Find out the capacitance value of the tank when the tank is full. Remove the circuit board from the EB(MEC), then use a capacitance tester to detect the capacitance value between sensing probe and vessel wall. There are 3 sensitivity ranges to select from, H range is 0-150PF, M range is 0-500PF, L range is 0-1500PF. Then adjust the sensitivity range at the levels (L, M, H). Depending on medium characteristics, medium with good conductivity should choose sensitivity L or M, medium with low conductivity or small tanks, usually H sensitivity is used.
2) Standard calibration method (high accuracy):
   A. When medium is low or when the tank is empty, ZERO can be calibrated until a current output of 4mA.
   B. When medium is high or when the tank is full, SPAN can be calibrated until a current output of 20mA.
3) Quick Calibration method (low accuracy):
   Outdoor calibration can be done as follows. At the O/P terminal, connect a digit meter and set it to DC current
   A. ZERO calibration: Move the EB(MEC) to 30cm away from the tank wall, then connect the housing to H tank wall, adjust ZERO until an output of 4mA.
   B. SPAN calibration: e.g. After the EB(MEC) is top-mounted, the tank height 250cm, current medium height is 40cm away from full tank.

   Use digit meter connect to O/P, set to current setting.
   250cm (tank height)/ 16mA= 15.625 cm/mA
   250cm-40cm (Distance of medium to top)=
   210cm (medium height)
   210cm/ 15.625cm/mA=13.44mA
   (Calibrate SPAN until it reaches value)
   In percentage: 13.44mA/ 16mA×100%=84%

Outdoor Calibration



Trouble Shooting

1. Output current too high when empty tank.
   A. Check the sensitivity jumper whether it is at the correct position.
   B. Please the circuit board and housing apart, check whether ZERO can output 4mA, use hand to touch the sensing probe to check whether is there an increase in output. (Should have increase under normal working operation)
   C. Check whether the tank is really empty.
2. Output current reaches at 0mA, ZERO calibration useless:
   A. Check whether the EB(MEC) ground is connected to signal ground of the display meter(should not be connected)
   B. Check whether power supply wires are connected correctly. (24VDC O/P)
3. Output current and medium level has very large discrepancies: e.g. half-full tank should have 12mA output, but output is instead 15mA)
   A. Check the jumper setting whether it is of the correct position
   B. Recalibrate the SPAN and ZERO settings.
   C. Check whether the screws on the circuit board is fastened.
   D. Check whether the screw or flange connection is fastened.
   E. Check whether the power supply is 24V±2V.