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**FACTOCOMPONENTS**  
 INDUSTRIAL SUPPLIES AND MANUFACTURING EQUIPMENT

# Electromechanical Level Measuring System

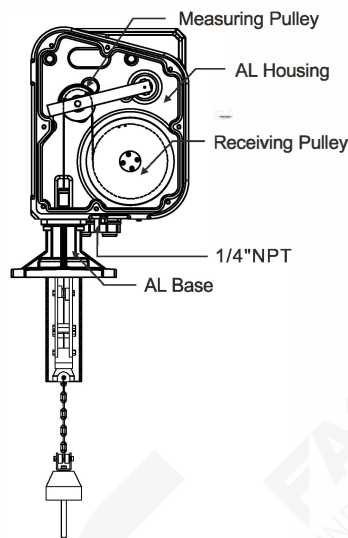


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# PRODUCT INTRODUCTION

## WORKING PRINCIPLE

FineTek's Electro-Mechanical Level Measuring System consists of plumb, cable wire, measuring pulley, position sensor, and control board to measure the material level. It senses the weight status and count the cable wire length from the device to the level of material. The EE series equips with robust position sensor to calculate the numbers of rotating circles of pulley, which can be operated in harsh environment. Moreover, it can connect with FineTek's material measurement system (MMS) to build an monitoring control system, save the production cost.



Rear View: Wiring Mechanism

## APPLICATION

- The result of measurement is not affected by environmental factors as sound waves, dust, static electricity, humidity and dielectric etc. Can be widely applied for applications in mining, cement, petrochemical, feeding and power plants.
- Suitable for different variety of materials as powder, pellet, liquid, and also good for open tanks or sealed tank with no inner pressure inside.
- Working perfectly with software of material management system (MMS), accurately monitoring and managing the level of materials inside the tank.
- It features multifunction in on, needn't extra controlling box, connecting to panel for a immediate usage is available.

## FEATURES

- Measurement immune from the interference of environment such as sound waves, dust, capacitance, or temperature change.
- User-friendly in touch buttons with microprocessor-based calculation design.
- Relay output (5A/240Vac)×4: HI, LO alarm or Pulse, Reset, fault alarm, operation indication or Lock alarm output can be.
- EE is equipped with LCM Graphic 128x64 Dots.,
- Analog output: 4-20mA dc.
- Pulse output:  
Transistor output NPN/PNP(10mm/pulse)  
Relay output (100mm/pulse)
- Cable Break Alarm: System will detect cable broken during measuring.
- Plumb Buried Protection: System can sense and stop the measurement as the plumb hit by materials and retrieve the wire to prevent the plumb being buried.
- Plumb Buried Alarm: System will detect plumb buried by the medium.
- Four Start Modes: auto start, manual start, intelligent start, and external triggered start.
- Intelligent Start: Measuring interval is inverse proportional to medium level.
- Auto Return Setup: Prevent sensing weight from buried or sliding into the tank pivot and avoid damage facility equipment while tank is empty.
- Material Fill-Up Protection: Reduce the possibility of plumb being buried.
- Measuring range of 30m (Standard), Max.45m is available.
- RS485 MODBUS communication protocol.
- Various selections of weights for different requirements.
- Freeze Prevention Capability: being able to work normally in cold temperature.

## Product Testing Standards

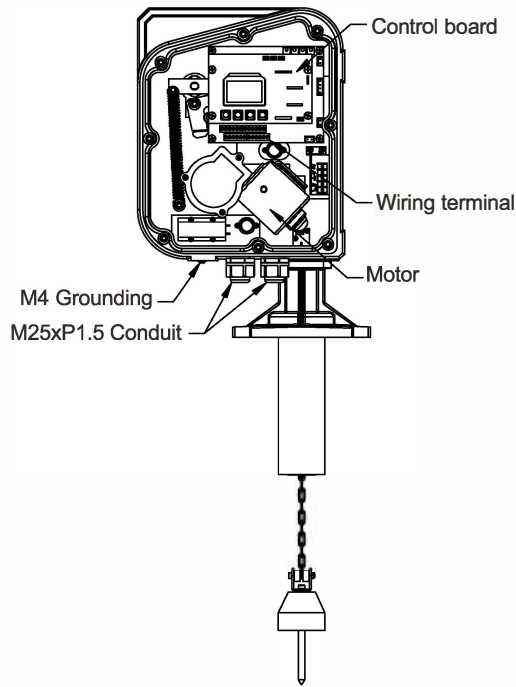
- Protection IP Rating: IP66(IEC60947-2)
- IEC Standards for Withstand Voltage: IEC60947-2
- IEC Standards for Insulation resistance: IEC60092-504
- IEC Standards for changes in power supply: IEC60092-504
- IEC Standards for power supply failure: IEC60092-504

# SPECIFICATION(EE310)EEX2

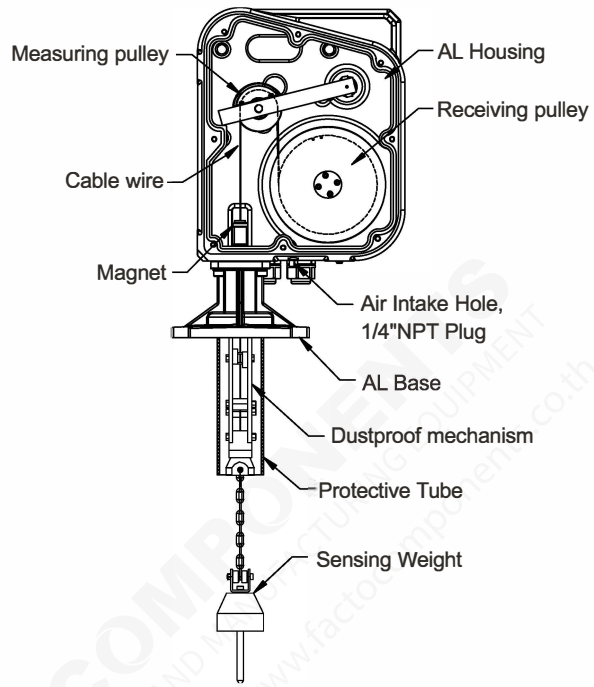
| No . | Category                        | Specification   |        |                        |
|------|---------------------------------|---|--------|------------------------|
| 1    | Power supply                    | 100~240Vac ±10%,50/60 Hz (Standard)<br>24Vdc ±10% (By order)  |        |                        |
| 2    | Measuring resolution            | Transistor output NPN / PNP ±5pulse(10mm/pulse)<br>Relay output ±1pulse(100mm/pulse)  |        |                        |
| 3    | Measuring speed                 | Avg. 0.23m/s  |        |                        |
| 4    | Analog output                   | 0/4-20mA ±1%  |        |                        |
| 5    | Pulse output                    | 1. NPN · PNP output : max. 60Vdc, max. 400mA<br>※ When the counter is connected, the pulse extraction rate needs to be > 50Hz.<br>2. Relay output (dry contact)<br>※ When the counter is connected, the pulse extraction rate needs to be > 30Hz. |        |                        |
| 6    | Relay output                    | SPDT 5A/240Vac,2A/48Vdc x4<br>1. Pulse / HI Alarm (Can be set up)      3. Failure<br>2. Reset / LO Alarm (Can be set up)      4. Run Signal / Lock (Can be set up)  |        |                        |
| 7    | Status LED                      | Indication for power & run signal & abnormal  |        |                        |
| 8    | Display                         | LCM Graphic 128x64 Dots   |        |                        |
| 9    | Ambient temp.                   | -40°C - 60°C  |        |                        |
| 10   | Operating temp.                 | -40°C - 80°C  |        |                        |
| 11   | Measuring range                 | 30m Max.  |        |                        |
| 12   | Protection level                | IP66  |        |                        |
| 13   | Body material                   | Aluminium   |        |                        |
| 14   | Anti-Dew heater (Optional)      | Start heating <16°C (prevent frostbite, prevent dew)  |        |                        |
| 15   | Cable break detection           | Yes   |        |                        |
| 16   | Sensing weight buried detection | Yes   |        |                        |
| 17   | Manual/Auto measuring mode      | Yes   |        |                        |
| 18   | Motor protection                | Yes   |        |                        |
| 19   | Malfunction diagnosis display   | Yes   |        |                        |
| 20   | Material Fill-Up protection     | Yes   |        |                        |
| 21   | External trigger start          | Yes   |        |                        |
| 22   | Communication protocol (RS485)  | Yes   | Baudra | 9600,19200,38400,57600 |
| 23   | Intelligent start               | Yes(Measuring interval is inverse proportional to medium level.)  |        |                        |
| 24   | Reset output                    | Yes   |        |                        |
| 25   | Cable wire                      | φ1.2mm  |        |                        |

# EEX2 SKETCH & DRAWING/ DIMENSION

## Sketch & Drawing



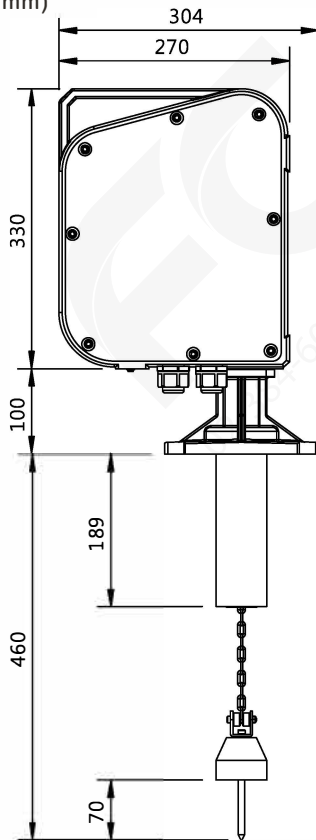
Front View: Electric Board & Motor



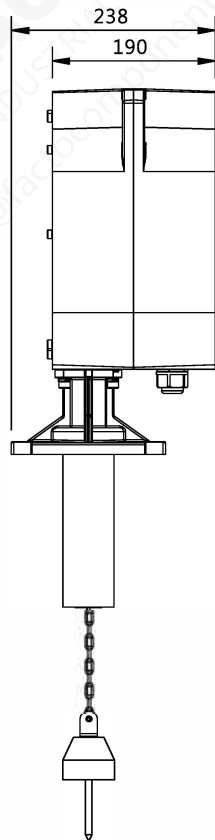
Rear View: Wiring Mechanism

## Dimension

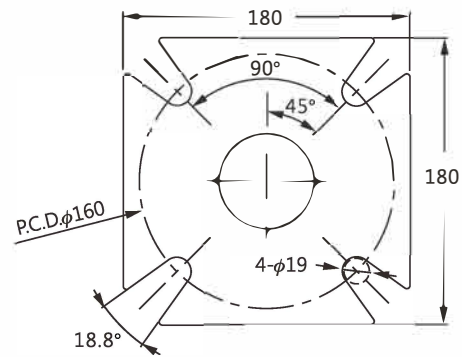
(Unit: mm)



Front View



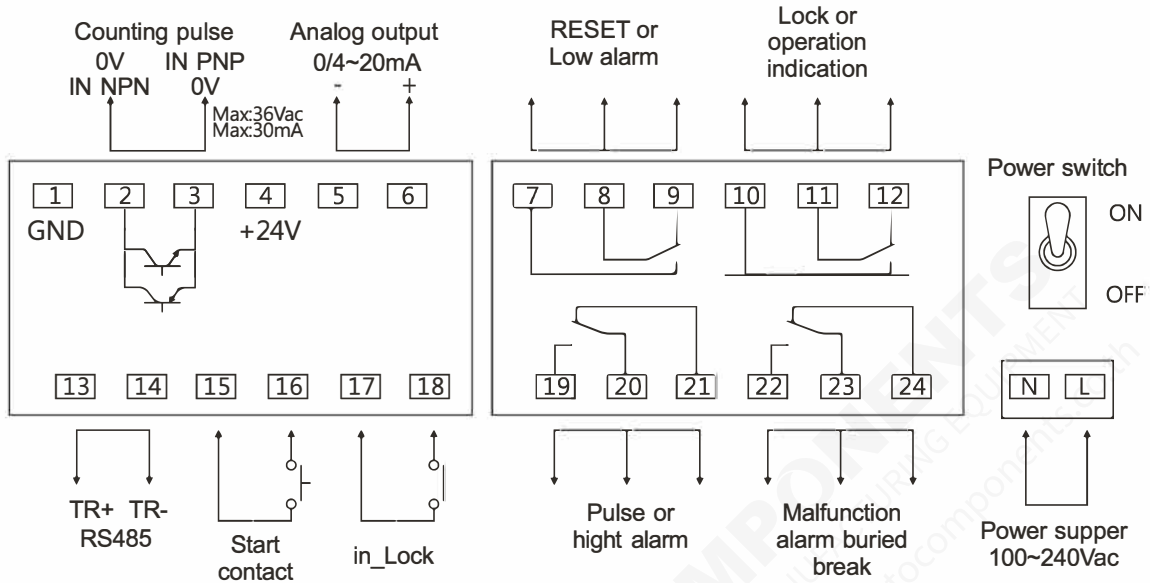
Side View



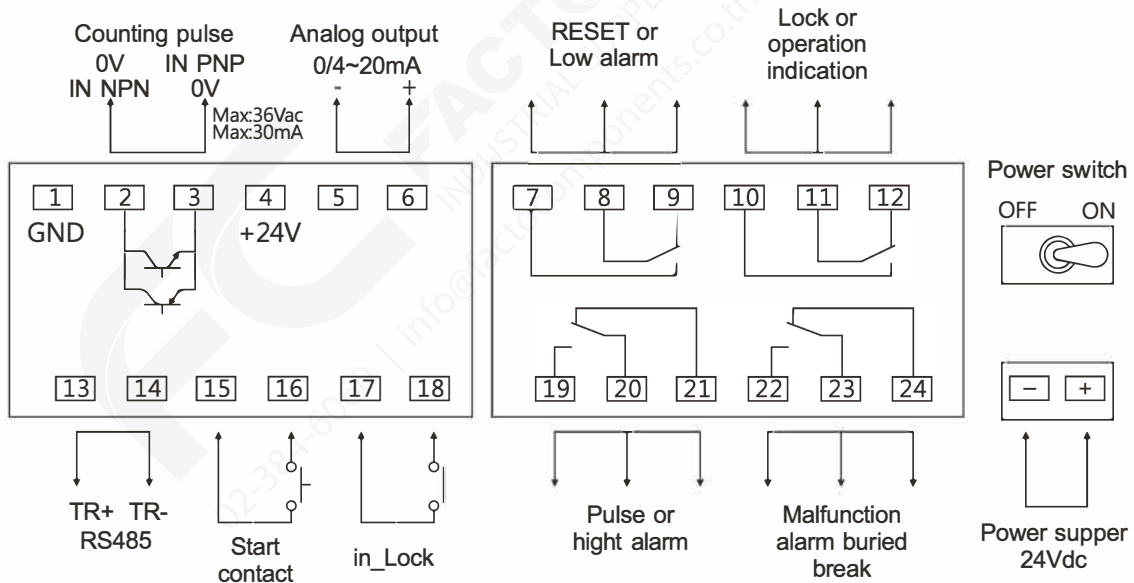
Top View

# TERMINAL WIRING DIAGRAM

## Terminal Wiring Diagram AC type

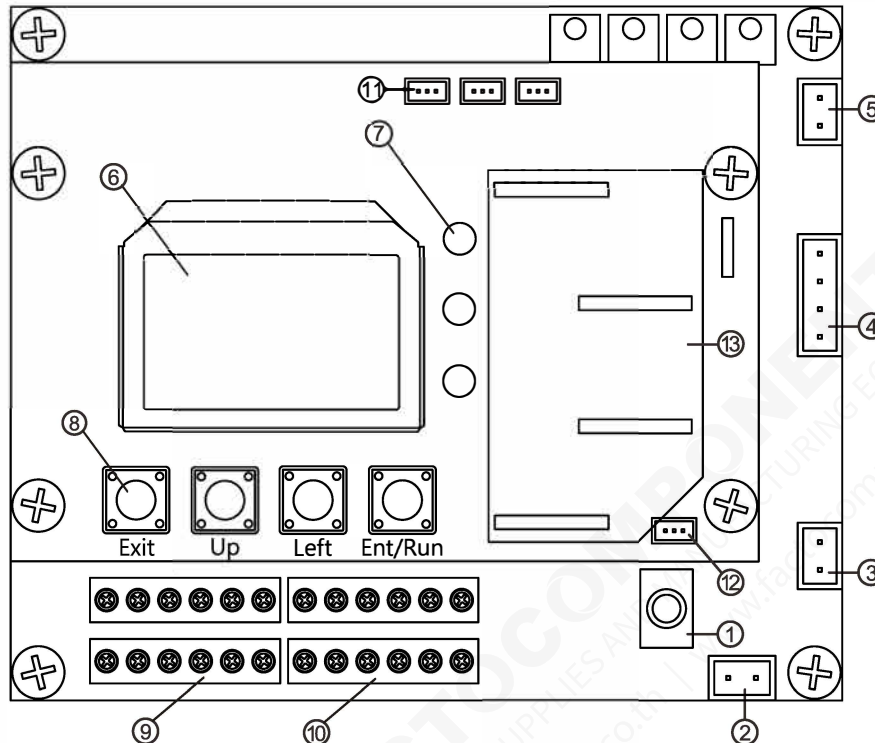


## DC type



# DESCRIPTION OF PANEL

## Panel Diagram



- ① Power switch: On-site operation, maintenance, and power off when needed.
- ② Power terminal: power input 100~240Vac, 50/60Hz or 24Vdc (please confirm the order specification)
- ③ Heater terminal: connected to the internal antifreeze heater.
- ④ Power system terminal: connect with DC power supply.
- ⑤ Motor Power terminal: connect to the motor DC24V
- ⑥ Display: status display, height indication, fault indication, parameter setting
- ⑦ Indicator light:
  - (Green) → Power indicator: Lights up when power is on, and the light is turned off when the power is disconnected.
  - (Yellow) → Operation indicator: Lights up during the measurement (up and down), and lights off when measurement ends.
  - (Red) → Fault indication: Lights up on wire breakage, buried, knot, over-heat occurs, and lights off when troubleshooting is finished.
- ⑧ Button:
  - Ent/Run: Measured value display mode = start the measuring.  
Menu mode = enter into the next menu / confirm to save.
  - Left: Measured value display mode = enter into the menu.  
Menu mode = scroll down the menu.  
Number mode = cursor moves to left.
  - Up: The number on the cursor increases.
  - Exit: Return to the previous menu.
- ⑨ Input/output terminal: Transistor pulse output/external trigger/fill-in protection.
- ⑩ Relay output terminal: Relay 1~4.
- ⑪ Connector socket: wiring with Sensor connector
- ⑫ Connector socket: wiring with Sensor connector
- ⑬ Connector socket: wiring with the wireless module (if any) connector



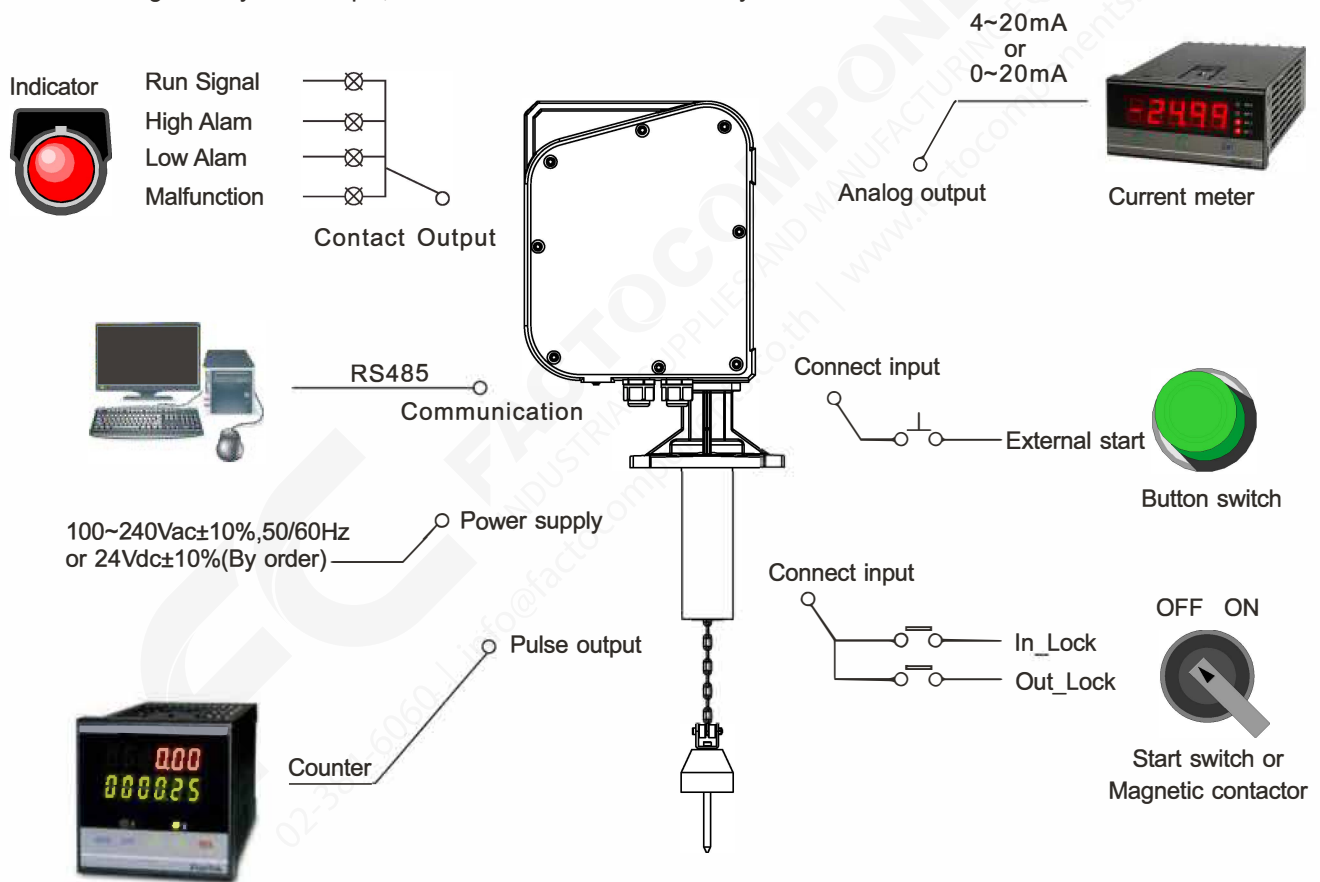
- Please use 0.75mm<sup>2</sup> multi-core cable(soft cable), prevent using signal core or 7 cores cable to damage the PCB. Power supply cable should be separated from signal cable, should use isolated cable for signal output.



- Un-shielded length of wire is not too long to prevent any short circuit. The un-shielded part must be with soldering or isolated terminal to prevent any potential danger.
- The wiring connection must be correct. Any mistakes on wiring may cause a critical damage to system.
- Power Switch: If necessary, the power can be switched to be off as in maintenance and repair.

## System Diagram

※Below image is only an example, order will be included sensor only.



Warning: In order to avoid the sensing weight to be buried or impacted by the material and cause the damage on the equipment, please install material fill-up protection. It is recommended to connect with the conveyor control switch or the "NO" contact input of the contactor. If there is a concern that the sensing weight will be caught by the conveyor and cause damage to the equipment, It is recommended to install the material outlet protection and connect it in parallel with the fill-up protection.

# SETTING PROCEDURE

## Caution

1. Don't start the measurement when the silo is empty and height of silo is unknown. It will possibly lead to the plumb falling into the silo outlet and getting stuck and damaged.
2. Be sure the measuring level must be higher than bottom of silo and avoid any possibility of being stuck by conveyor, ladders, and any mechanisms, suggesting the measuring level is at least 0.5 meter higher than silo outlet/ conveyor.
3. Materials filling conveyor must connect with filling up protection switch so that it will prevent the damage occurred by plumb got hit or buried.
4. It's necessary to consider 0.6 meter as blind area for measuring range in case the plumb got stuck and can't be retrieved.

## Setting Procedure

### **K Tank Height:**

distance between connecting flange to tank outlet

### **S Blind Distance:**

distance from connecting flange to the tip of the weight

### **Z Safety Distance:**

To avoid obstacle and prevent weight sliding into the outlet.

### **H Measuring Height:**

Full measuring range from drop and return with full pulse signal record.

### **A Air Zone(deadband):**

Variation of tank capacity and real medium level.

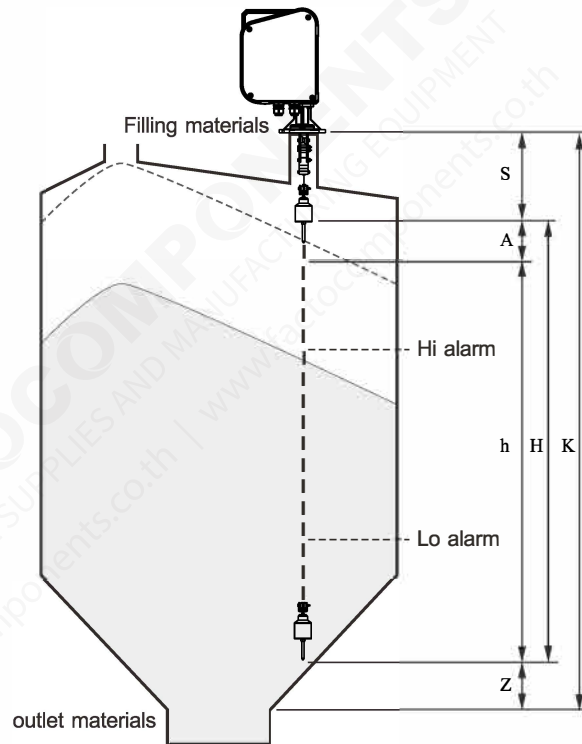
Default setting is 0.

### **H Effective measuring distance:**

distance will change according to A value and corresponds to 0/4~20mA output signal.

**Hi Alarm:** High level alarm setup.

**Lo Alarm:** Low level alarm setup.



## Example

Tank height  $K=25.00$  m, Blind distance  $S=0.4$ , Safety distance  $Z=0.6$ , Air Zone(deadband)  $A=1$  m,

Hi alarm 80%, Low alarm 20%,

In Smart Mode, please try to calculate and get the values for H(measuring range), A(starting position of effective measuring distance), Hi alarm position, Low alarm position.

1.  $H = K - (S + Z) \rightarrow 25 - (0.4 + 0.6) = 24$ , FULL measuring distance will be 24.0m

2.  $A = 1$  m  $\rightarrow$  Effective measuring distance  $h = 23$  m

3. Hi Alarm =  $h \times 80\% \rightarrow 23 \times 0.8 = 18.4$ , hi alarm position: 18.4m

4. Lo Alarm =  $h \times 20\% \rightarrow 23 \times 0.2 = 4.6$ , low alarm position: 4.6m



## Installation Position

- Installation position should be away from the inlet or outlet of silo at least 1.2 m, and prevent the damage occurred by plumb got hit or buried.
- Reservoir or tank equipped with observation window is suggested; it will be beneficial for maintenance in future. The installation location should be away from the ladder, frame or any protrusion. The minimum distance between the EE center and tank wall should be 1m or more.
- Must be located away from the inlets flow direction to avoid the cable and hammer being damaged by material or disconnected or buried.
- The optimal position is at the average depth of measured material, it will generally locate in the middle of the peak and bottom (the angle of repose after filling process), indicates below.

## Installation Instruction

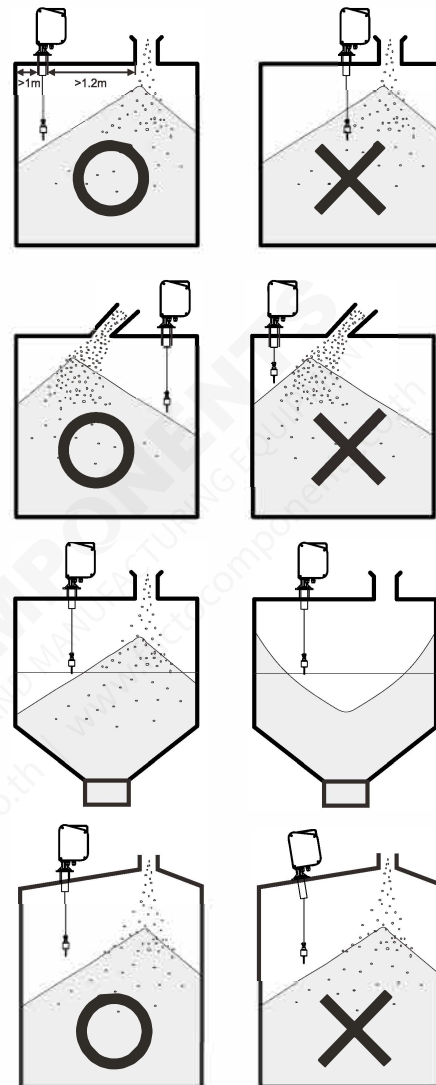
- Please ensure that the flange is horizontal positioned and the installation is vertical. The movement of sensing weigh must be vertical and aligning with central of flange so that it can prevent incorrect movement and wear on wire.
- Welding a steel tube on silo roof is necessary if the silo roof is not in horizontal shape. In order to install horizontally, the diameter of welded steel tube must be more than 4" and the length is as short as better. It is suggested to put a gasket between two flanges.
- Please make sure the housing is air tight. The aluminum cover for housing must be screwed tight.

## Caution

- The position and method of inlet condition installation:
  1. Direct filling: Please install at either side of inlet.
  2. Vortex filling: Please install at left side of inlet as in clockwise direction or at right side of inlet as in counter-clockwise direction.
  3. Sprinkle filling: Please install farthest at the opposite to inlet to avoid impact by filling.
- During installation, user should carefully check the cable wire is wound up well in pulley set and not folded, broken or squeezed.
- The cable wire should put on the hole of weight head connect and be secured indeed by screwdriver.
- Firmly secure the screws to fix the front cover and body, otherwise the dust or powder will permeate into the electric board.
- The installation hole must be larger than diameter 104 mm.
- Please do not modify the length of steel wire, it may cause malfunction of spool.

## Wiring Instruction

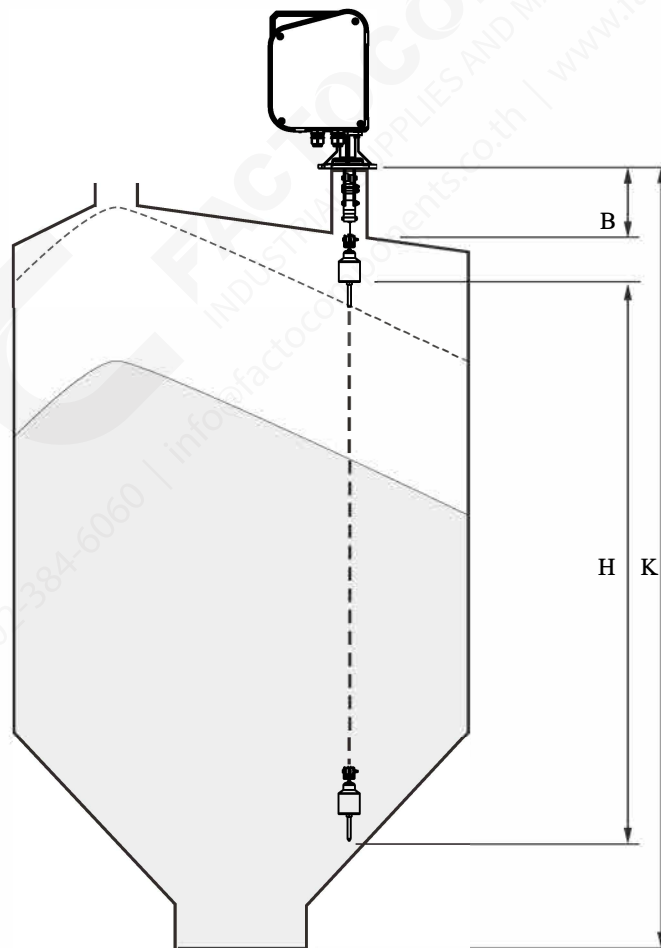
- FineTek suggests 0.75mm<sup>2</sup> non-twist multiple-cores isolated electric wire to connect with the terminal block.
- The power line should be separated from the signal lines. It should leave a flexible length of electric wire to avoid pull and drag the electric board.
- The length of wire stripping should be proper to prevent circuit short, and should be well welded and connected by terminal block well.
- Wiring should be clearly identified and in correct connect.



# ORDER INFORMATION

Please provide the following parameters and equipment needs when inquiring

1. The name of the material to be measured: \_\_\_\_\_
2. Material morphology:  powder  granular  massive  fluid
3. Granularity: \_\_\_\_\_
4. Specific gravity: \_\_\_\_\_
5. Pressure:  normal pressure  
 Transient Pressure: \_\_\_\_\_ kg / cm<sup>2</sup>  
 sustained pressure: \_\_\_\_\_ kg / cm<sup>2</sup>
6. Tank -temperature: \_\_\_\_\_ °C
7. Humidity: \_\_\_\_\_ %
8. Supply Voltage:  AC: \_\_\_\_\_ V  DC: \_\_\_\_\_ V
9. Installation size:  Screw thread specifications  flange specifications
10. RCU controller:  required  not required
11. Control box  not required  
 required , need functional description: \_\_\_\_\_
12. Other instrumentation needs:  not required  
 required , specifications description: \_\_\_\_\_
13. Tank height (K): \_\_\_\_\_ m
14. Extension tube height (B): \_\_\_\_\_ m
15. Measuring span (H): \_\_\_\_\_ m



# ORDER INFORMATION

EEX 2 0 0 0 0 - <sup>09</sup> <sup>10</sup> <sup>11</sup> 272850 <sup>18</sup> <sup>19</sup> <sup>20</sup> <sup>21</sup> <sup>22</sup> <sup>23</sup> 0 <sup>25</sup> <sup>26</sup> <sup>27</sup> <sup>28</sup> <sup>29</sup>

<sup>09</sup> <sup>10</sup> **Anti-freeze Heater**

- 00: N/A
- 01: With Heater

<sup>11</sup> **Power Supply**

- C: 100~240Vac,50/60Hz
- D: 20~28Vdc

<sup>18</sup> <sup>19</sup> <sup>20</sup> <sup>21</sup> <sup>22</sup> <sup>23</sup> **Connection**

|             |          |
|-------------|----------|
| <b>Code</b> | 000000   |
| <b>Name</b> | Standard |
| <b>Type</b> |          |

※Flanges For Standard Model :  
 4"x5kg/cm<sup>2</sup>、4"x10kg/cm<sup>2</sup>、4"x16kg/cm<sup>2</sup>、  
 4"x20kg/cm<sup>2</sup>、4"x150Lbs  
 DN100 PN6、DN100 PN10、DN100 PN16、  
 DN100 PN25、DN100 PN40

<sup>25</sup> **Sensing weight type**

| Code        | A                                | B                             | C                           | D                        |
|-------------|----------------------------------|-------------------------------|-----------------------------|--------------------------|
| <b>Name</b> | Standard type<br>Stainless steel | Float type<br>Stainless steel | Umbrella<br>Stainless steel | Auto-Fall-Off<br>Plastic |
| <b>Type</b> |                                  |                               |                             |                          |

※Custom made is available for sensing weight

<sup>26</sup> <sup>27</sup> <sup>28</sup> <sup>29</sup> **Length**

| Code | Probe Length  |
|------|---|
| 3000 | 3000mm(3m)(Minimum)                                     |
| A300 | 30000mm (30m) Maximum "A" means multiplied by 100 times |

# RCU1 Remote Control Unit

## WORKING PRINCIPLE

The Remote Control Unit (hereinafter RCU) is to read and control instruments/ sensors connected through RS-485 or Zigbee. All data received from instruments/ sensors can be displayed on the RCU. The RCU, as a Middle Master, can transfer the data to the PC. Smart and easy-to-use, the RCU allows the user to efficiently revise parameters of instruments/ sensors and then monitor. With ModBus Potocol and FineTek's unique Auto ID, the RCU is designed to connect our instruments/ sensors.

## FEATURES

- Utilizing ModBus Potocol and FineTek unique Auto ID
- Driven by a microprocessor, user-friendly
- Power Input: 20~250Vdc/ Vac
- Communication interface: RS-485 or ZigBee wireless
- Relay output: SPDT 3A/250Vac x 1 (alarm outputted)
- LCM (Graphic 128x64 Dots)
- LED indicator: measuring/ connection/ Alarm
- Effective range of ZigBee: 200 meters
- Two units of RS-485; one unit of ZigBee
- User setting adjustability

## TEST & PROTECTION

Protection: IP65 (IEC60529)

Pressure test: IEC60947-2

Insulation resistance Test: IEC60092-504

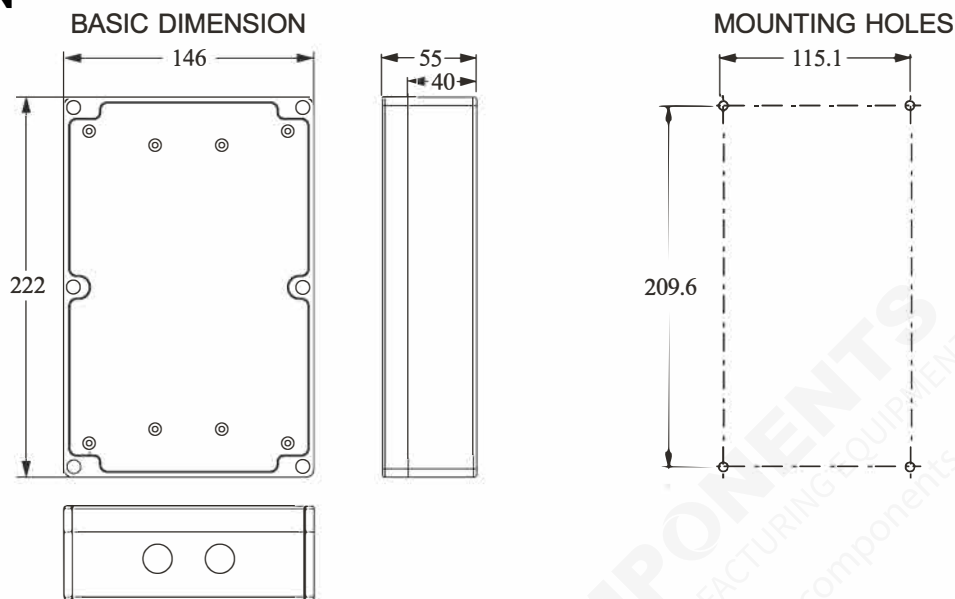
Power supply test: IEC60092-504

Power supply failure Test: IEC60092-504

## SYSTEM DIAGRAM



## DIMENSION



## SPECIFICATION

| NO | ITEM                    | DESCRIPTION  |
|----|-------------------------|--|
| 1  | POWER SUPPLY            | DC/AC 20V~250V   |
| 2  | MAXIMUM CURRENT         | 200mA~250mA (While connecting 128 sensors)   |
| 3  | OPERATING TEMPERATURE   | 0~50°C(32~122°F)   |
| 4  | PROTECTION STANDARD     | IP65   |
| 5  | BODY MATERIAL           | PP   |
| 6  | DISPLAY                 | LCM 128*64 dots Graphic Display  |
| 7  | RELAY OUTPUT            | SPDT 3A/250V X 1<br>(Sensor_alarm*1 (Sending an alarm signal))                                     |
| 8  | COMMUNICATION INTERFACE | 1 \ RS-485(Master)max up to 128 sensor<br>2 \ RS-485(Slave)  |
| 9  | LED INDICATORS          | 1 \ RS-485(Master)*1 LED<br>2 \ RS-485(Slave)*1 LED<br>3 \ Measure*1 LED<br>4 \ Sensor_alarm*1 LED |
| 10 | EFFECTIVE RANG          | Up to 200m   |
| 11 | OTHER                   | 1 \ User Settings<br>2 \ Unit Under Control<br>3 \ Overall Control (Parameter Copy)                |

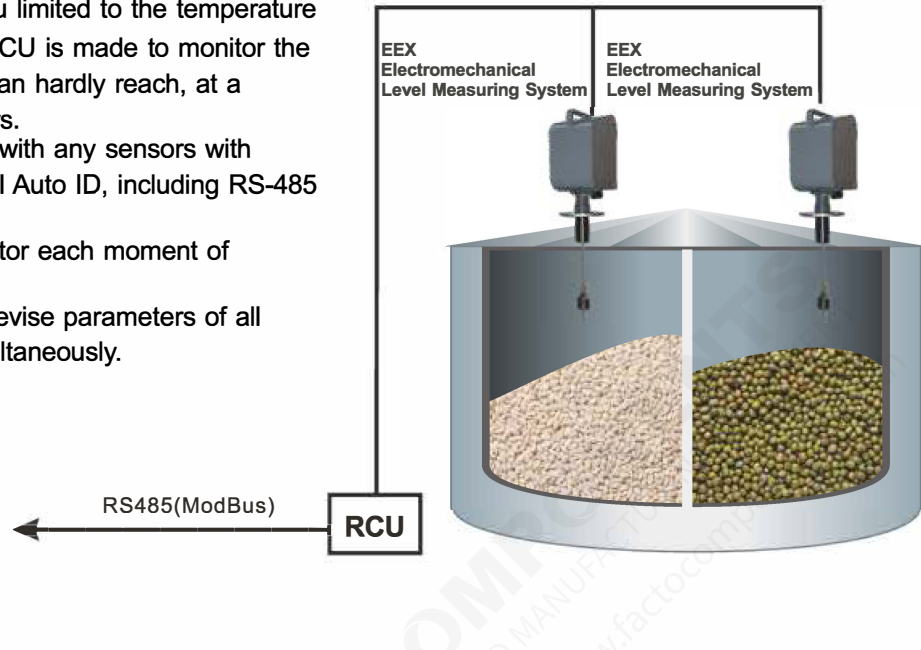
# APPLICATION

Available in indoor facilities, not limited to control centers, and outdoor lieu limited to the temperature from -40°C~85°C, the RCU is made to monitor the sensors where people can hardly reach, at a maximum of 128 sensors.

The RCU is compatible with any sensors with FineTek Modbus Potocol Auto ID, including RS-485 and Zigbee

Enable the user to monitor each moment of sensors connected.

The user is allowed to revise parameters of all sensors connected simultaneously.



# ORDER INFORMATION

RCU 1 0 0 0 0 - <sup>09</sup>A <sup>10</sup>3 <sup>11</sup> <sup>12</sup>

<sup>09</sup> <sup>10</sup> **INPUT** \_\_\_\_\_  
A3: EEX Electromechanical Level Measuring System

<sup>11</sup> **COMMUNICATION** \_\_\_\_\_  
A: RS-485

<sup>12</sup> **OPERATING TEMPERATURE** \_\_\_\_\_  
A: Standard Type(0~50°C/32~122°F)



**FACTO COMPONENTS CO., LTD. | บริษัท แฟคโต คอมโพเนนส์ จำกัด**

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