Electromechanical Level Measuring System

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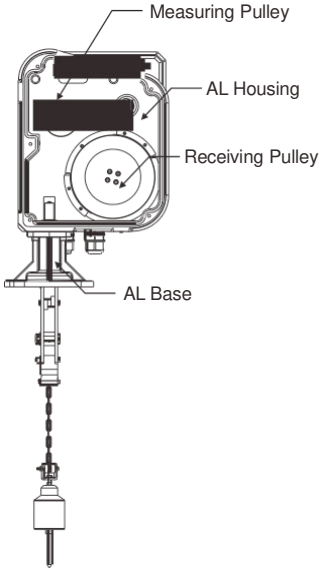
PRODUCT INTRODUCTION

WORKING PRINCIPLE

FineTek's Electro-Mechanical Level Measuring System (EE300 series) 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 immunes from the interference of environment such as sound waves, dust, capacitance, or temperature change.
- User-friendly in touch buttons with microprocessor-based calculation design.
- High level and low level alarm. (3A/250Vac,SPDTx2)
- EE300 is equipped with LCD Dot matrix: 8x2, EE400 is equipped with LCM 128x64 Dots Graphic.
- Analog output: 4-20mA dc.
- Pulse output:
  Transistor output NPN/PNP(10mm/pulse)(only EE300)
  Relay output 3A/250Vac(100mm/pulse)(only EE400)
- 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 for EE300.
- 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

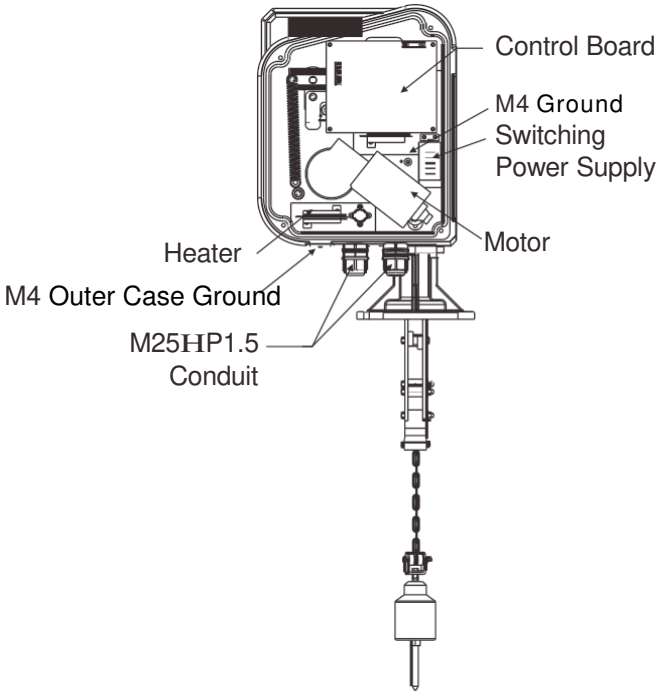
No.	Category	EE300	EE400	
1	Power supply	110~220VacK10%	110~220VacK10%	
2	Auccuracy	1. Transistor output: NPN / PNP (10mm/pulse) 2. Relay output: 3A/250Vac (100mm/pulse)	K3cm	
3	Analog output	0/4-20mA K1%	0/4-20mA K1%	
4	Ambient temperature	-35BC~60BC	-40BC~85BC(With Heater) -30BC~85BC(Without Heater)	
5	Operating temperature	-35BC~80BC	-40BC~105BC	
6	Operating pressure	—	max.+1.2bar	
7	Measuring range	max.30m(option:30~45m)	max.30m	
8	Measuring speed	Avg. 0.23m/s	Avg. 0.23m/s	
9	Protection rating	IP66	IP66	
10	Body material	Aluminum	Aluminum	
11	Display	LCD (Dot matrix , 8 X 2)	LCM (Graphic,128x64 Dots)	
12	Status LED	LED Display: 1.Lock (Red) On (Fill-Up Protection) 2.RUN (Yellow) On 3.Buried (Red) Blink for 1 second 4.Break (Red) Blink for 2 seconds 5.Auto (Blue) On 6.High Alarm (Red) On 7.Low Alarm (Red) On	LCM Display: Lock Buried Break Status Display	
13	Relay output	SPDT 3A/250Vac X 3 1. HI Alarm 2. LO Alarm 3. Buried: Blink for 1 second when alarm triggers Break: Blink for 2 seconds when alarm triggers Lock: LED on when alarm triggers	SPDT 3A/250Vac X 3 (1. HI Alarm 2. LO Alarm or Buried,Break)	
14	Operation instruction	—	SPST 3A/250V X 1	
15	Anti-Dew heater	Start heating <16BC (freeze prevention, prevent dew) in 100 W optional	Start heating <0BC (freeze prevention, prevent dew) ,max. in 80W(220Vac)	
16	Cable break detection	Yes	Yes	
17	Plumb buried detection	Yes	Yes	
18	Auto measuring mode	Yes (0.1~99h)	auto start measuring time	Yes(6~999 minute)
			intelligent measuring time	Yes(6~999 minute)
			time setting to start	Set of three (0:00~23:59)

SPECIFICATION

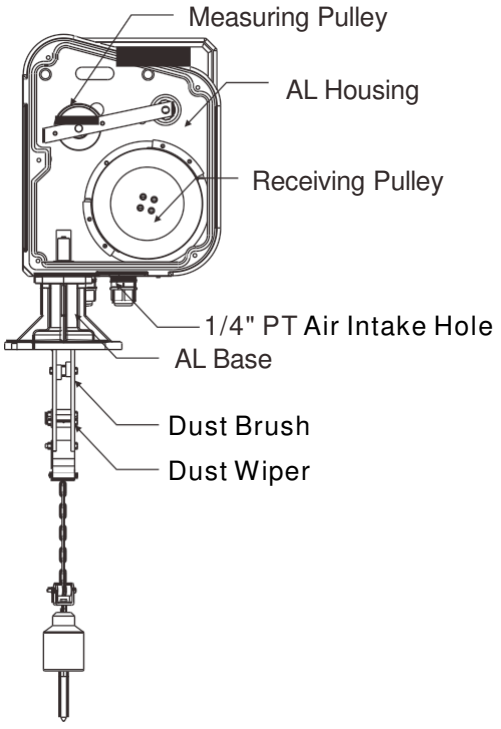
No.	Category	EE300			EE400		
19	Activating from outside	Yes			Yes		
20	Motor limited current protection	Yes			Yes		
21	Malfunction diagnosis display	Yes			Yes(alternatire of HI Alarm,Lo Alarm or Buried alarm,Break alarm)		
22	Material fill up protection	Yes			Yes		
23	Material discharge protection	No			Yes		
24	Communication protocol (RS485)	Yes	Frame	C8N1.C8N2.C801.C8E1 C7N2.C701.C7E1.C702 C7E2.	Yes	Frame	C8N1
			Baudrate	1200.2400.4800.9600 11520.14400.19200 28800.57600		Baudrate	1200.2400.4800.9600 19200.38400.57600
25	Intelligent start	Yes (Measuring interval is inverse proportional to medium level)					
26	Cable wire	f1.2mm/--			f1.2mm/12mm*0.2mm		

EE300 SKETCH & DRAWING/ DIMENSION

Sketch & Drawing

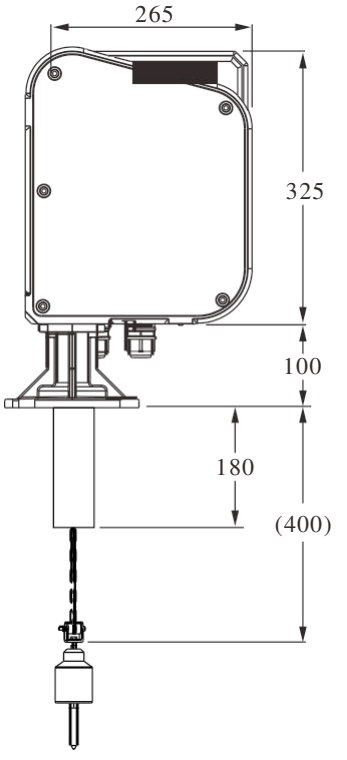


Front View: Electric Board & Motor

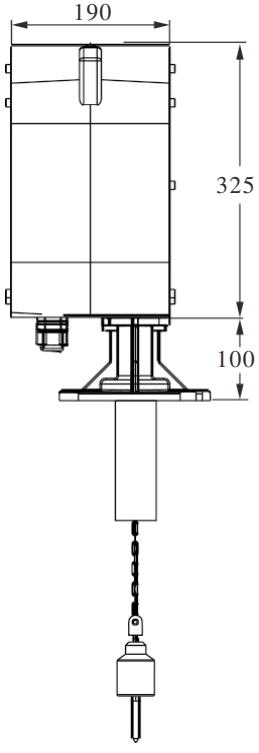


Rear View: Wiring Mechanism

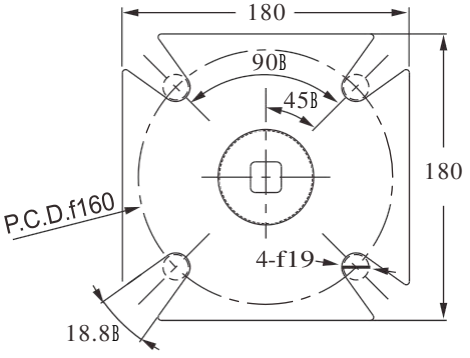
Dimension



Front View



Side View



Top View

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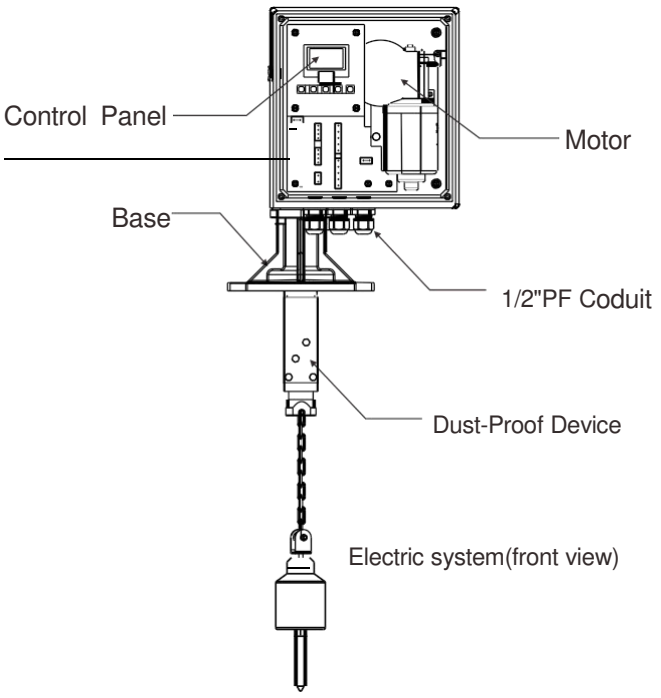
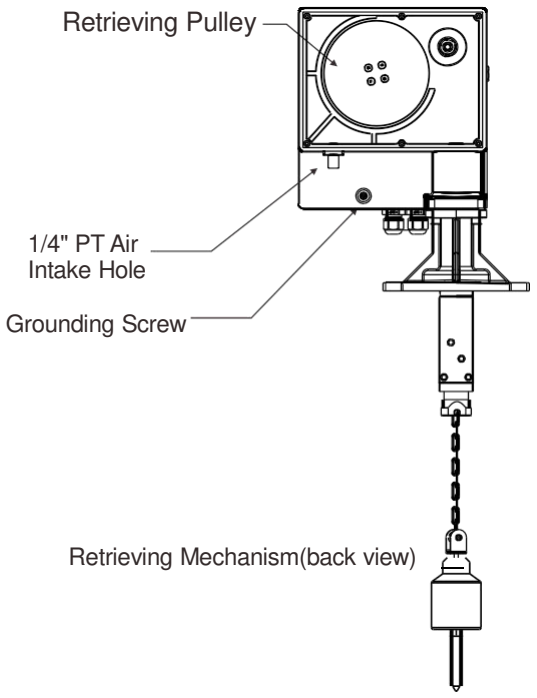
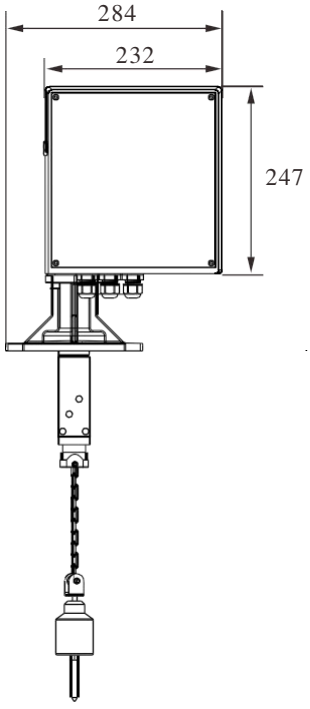
EE400 SKETCH & DRAWING/ DIMENSION

Sketch & Drawing

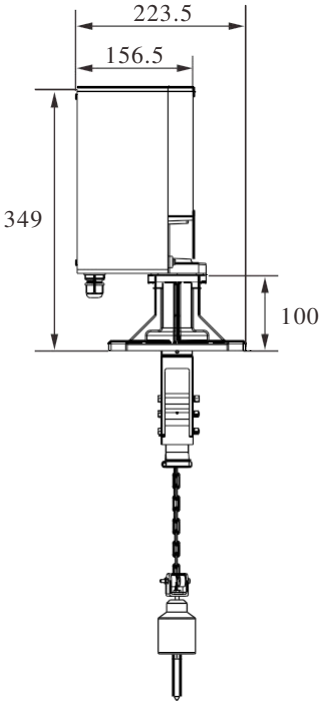




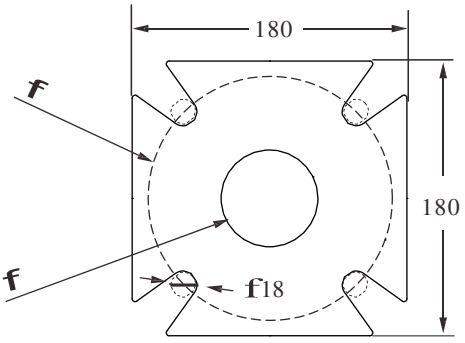
Dimension



Front View



Side View

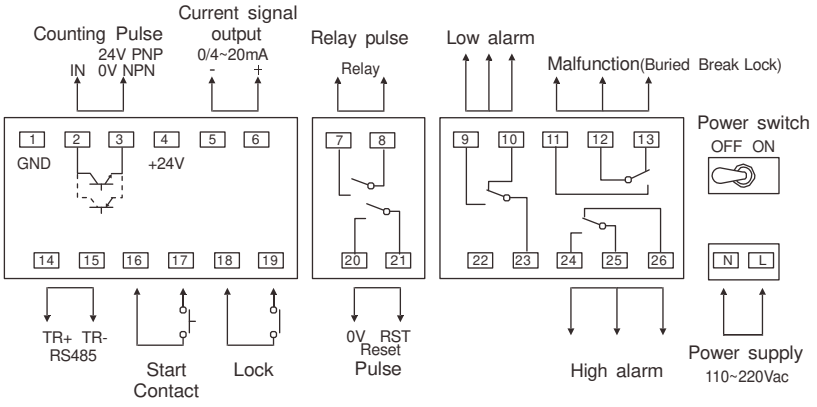


Top View

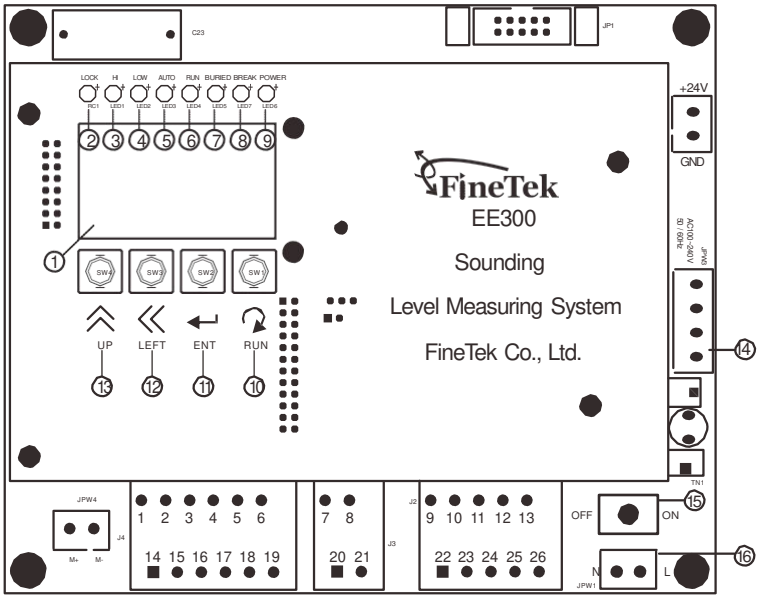
FineTek

EE300 TERMINAL WIRING DIAGRAM/ DESCRIPTION OF PANEL

EE300 Terminal Wiring Diagram



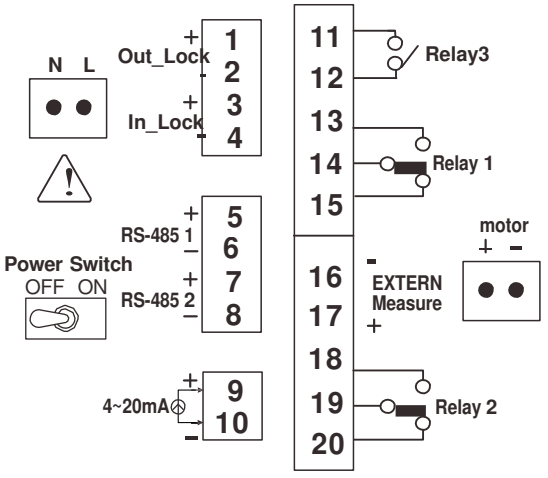
Ee300 Panel Diagram



① Characteristic LCD (Dot matrix , 8 × 2), provides the status, level command and error message.
② The “Lock” light on as the material filling and the measurement will be prohibited.
③ High Level Alarm Indicator (HI), light on if the material level excesses the preset high threshold.
④ Low Level Alarm Indicator (LOW), light on if the material level is below the preset low threshold.
⑤ Auto Start Indicator (AUTO), light on to indicate EE is in automatic operation mode.
⑥ Start Indicator (RUN), light on if the EE is in measuring period, and it turns light off status while the measurement completed.
⑦ Weight Head Buried (BURIED), blink light on /off in 1 sec period to warn operator, the LCD will show BURIED message.
⑧ Cable Break Indicator (BREAK), blink light on /off in 2 sec period to warn operator, the LCD will showBREAK message.
⑨ Power Indicator (POWER), "Light On" for power on and "Light Off" to indicate power off.
⑩ "Start", start the operation.
⑪ "Enter", acts as "confirm button" at setting mode and as "page select button" at menu mode.
⑫ "Shift", acts as "decimal shift" while enter digits and as "enter button" at menu mode.
⑬ "UP", acts as "Increment button" while enter digits and as "Escape button" at menu mode.
⑭ Terminal (H1.H2) for heater.
⑮ Power switch: to turn on, turn off power
⑯ Power connector (L.N), accepts the power of 110~220Vac, 50/60Hz。

EE400 TERMINAL WIRING DIAGTAM/ DESCRIPTION OF PANEL

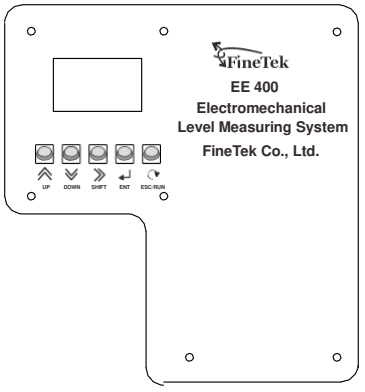
EE400 Terminal Wiring Diagram



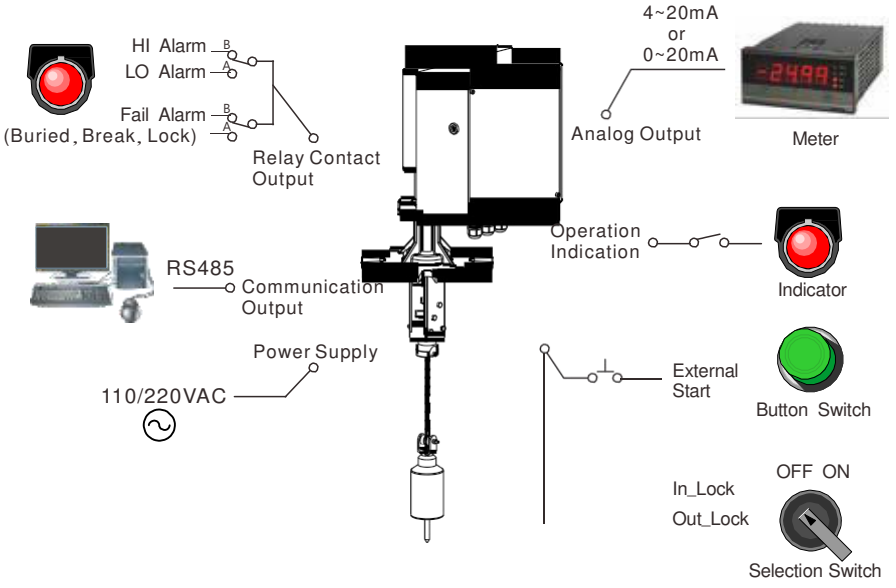
Connect No.	Name	Description of Terminal Function
LN	Power Supply	Power supply 110~220Vac±10%
Motor	Power for Motor	Power for Moter 24Vdc
1.2	out_Lock	Connecting Terminal for Discharging Material Protection Switch (Lock+, Lock-)
3.4	In_Lock	Connecting Terminal for Fill up Material Protection Switch (Lock+, Lock-)
5.6	RS-485 1	RS-485(TR+、TR−)
7.8	RS-485 2	RS-485(TR+、TR−)
9.10	Analog Output	Analog Output Terminal 0/4-20Ma (AOUT, AGND)
11.12	Relay 3	Operation Indication Relay Output (COM3, NO3)
13.14.15	Relay 1	HI, LO, Buried, Break Alarm Output Terminal (NO1,NOM1,NC1)
16.17	External Start	External Start (RUN, GND)
18.19.20	Relay 2	HI, LO, Buried, Break Alarm Output Terminal (NO2,NOM2,NC2)

- Please use 0.75mm2 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.

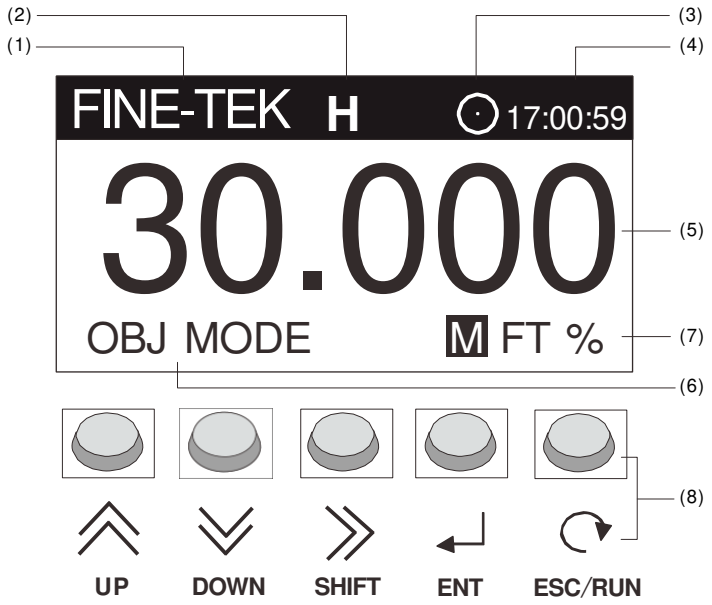
EE400 Panel Diagram



EE300-EE400 Terminal Diagram

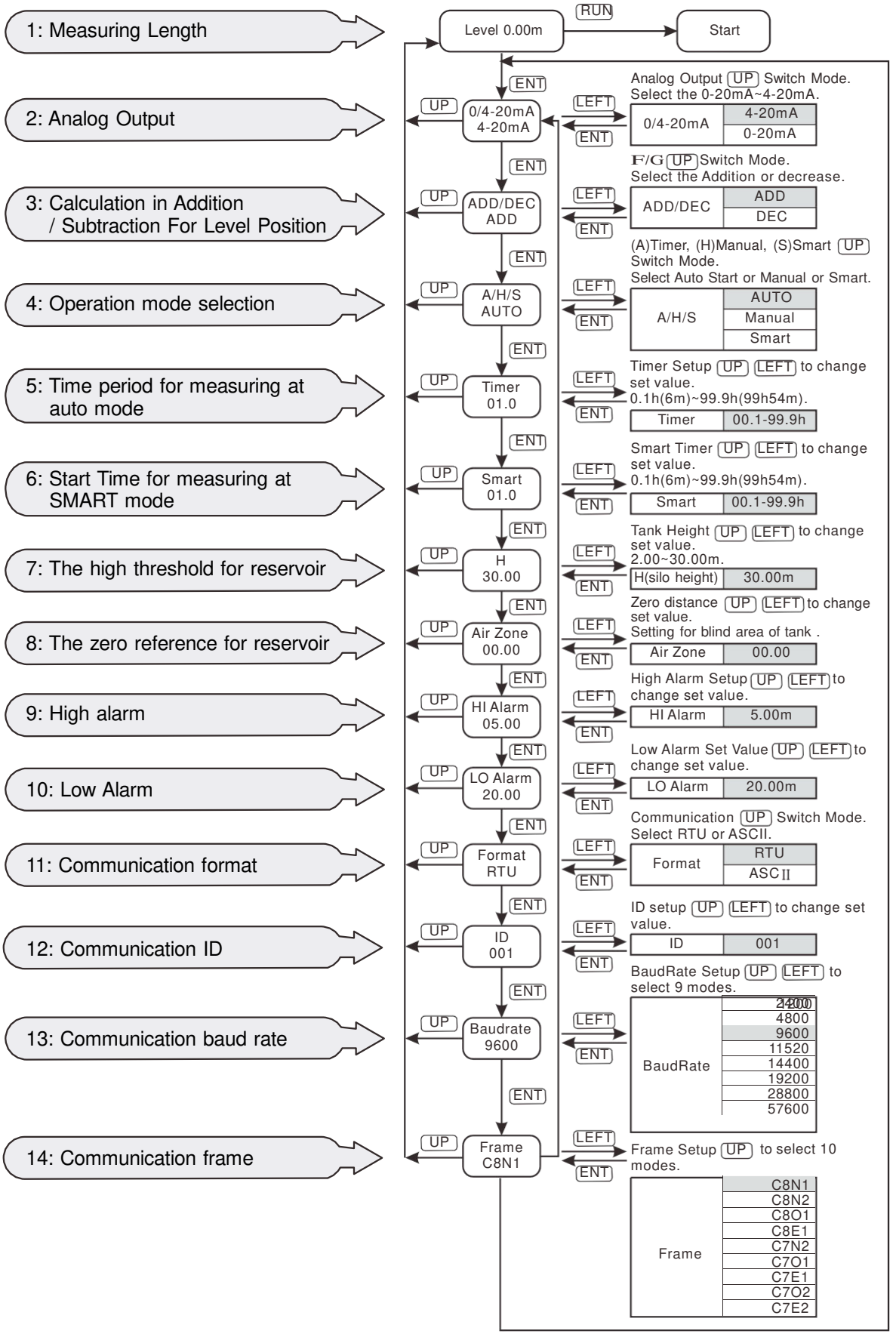


EE400 Description of Status/Function

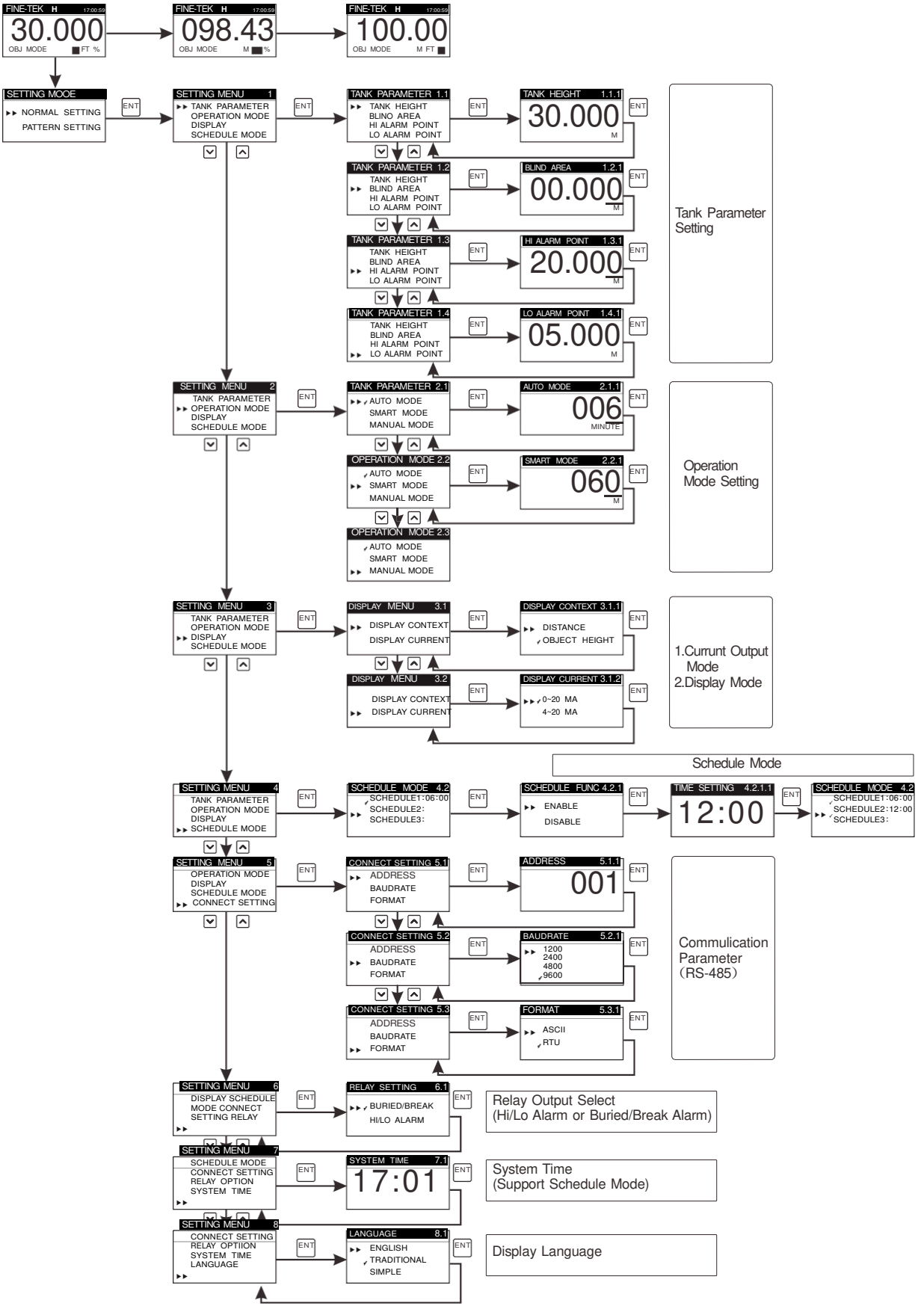


Area	Name	Description of Function	
(1)	Company Name	FineTek Co., Ltd.	
(2)	Alarm Status	Indicate the status of Hi Alarm, Lo Alarm, Motor overheated	
(3)	Measurement Time Setting	Function allows users to set the time to start measurement. This function is activated as the symbol showed.	
(4)	Time	Display the current time	
(5)	Value	Display the current measuring value	
(6)	Mode	Indicate the current value is for material height (OBJECT) or Distance (DISTANCE)	
(7)	Unit	Indicate the unit for current value is meter (METER), feet (FEET) or percentage	
(8)	Push Button	UP	"Adding number" as in number mode "Moving up" as in menu mode "Entering" to engineering password as in main menu
		DOWN	"Reducing number" as in number mode "Moving down" as in menu mode "Entering" to machine information as in main menu
		SHIFT	"Moving left" as in menu mode "Changing" unit (7) and other menu as in main menu.
		ENT	"Confirming" as in setting mode, "Page select" as in menu mode.
		ESC/RUN	Start the operation as in main menu Back to last page as in other mode.

PROGRAM MING GUIDE



INSTRUCTIONS FOR EE400 COMMANDS



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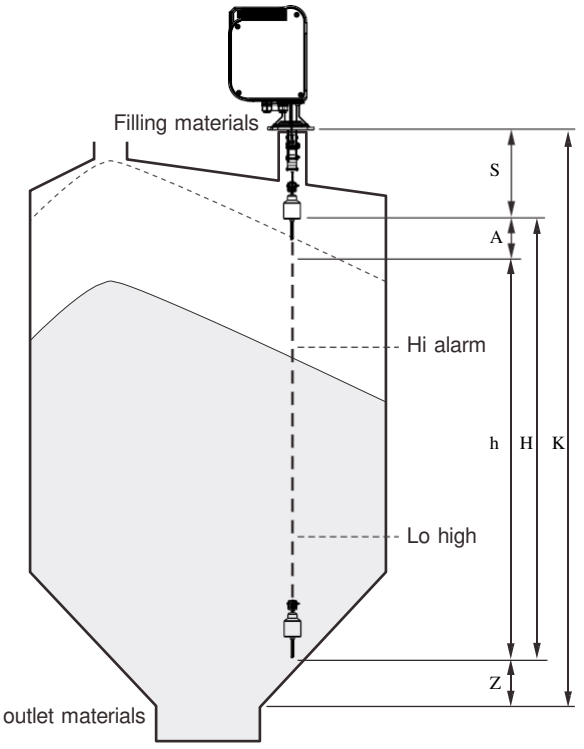
SETTING PROCEDURE

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 conveyer, ladders, and any mechanisms, suggesting the measuring level is at least 1 meter higher than silo outlet/ conveyer.
3.Materials filling conveyer must connect with filling up protection switch so that it will prevent the damage occured 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.



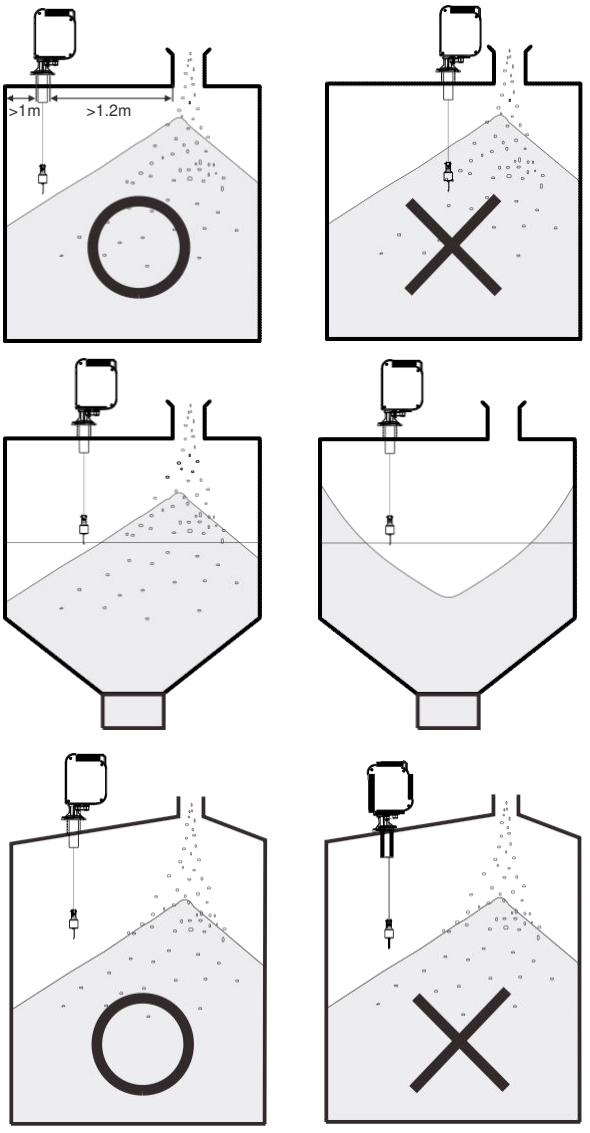
Example

Tank height K=25.00 m,Blind distance S=0.4,Safety distance Z=0.6,Air Zone(deadband) A=1m,
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) ☞ 25-(0.4+0.6)=24, FULL measuring distance will be 24.0m
2.A=1m ☞ Effective measuring distance h=23m
3.Hi Alarm = hx80% ☞ 23x0.8=18.4, hi alarm position: 18.4m
4.Lo Alarm = hx20% ☞ 23x0.2=4.6, low alarm position: 4.6m

INSTALLATION

Installation Position

- Installation position should be away from the inlet or outlet of silo at lease 1.2 m, and prevent the damage occured 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 EE300 center and tank wall should be 1m or more.
- 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.

Wiring Instruction

- FineTek suggests 0.75mm^2 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 prerent circuit short,and should be well welded and connected by terminal block well.
- Wiring should be clearly identified and in correct connect.

ORDER INFORMATION

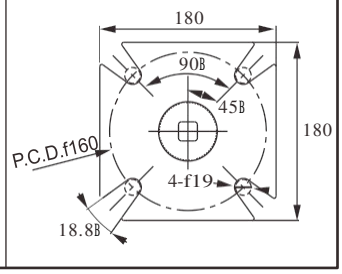
EE300-□-□□ □-□□

FREEZE PREVENTION CAPABILITY

0:None

1:Yes

CONNECTION

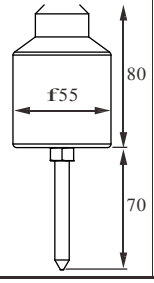
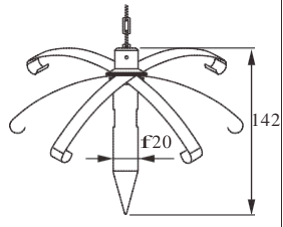
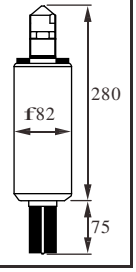
	00
Name	Standard
Type	

※Flanges For Standard Model :

4"x5kg/cm^2、4"x10kg/cm^2、4"x16kg/cm^2、4"x20kg/cm^2、4"x150Lbs

DN100 PN6 、DN100 PN10、DN100 PN16、DN100 PN25、DN100 PN40

SENSING WEIGHT TYPE

	A	B	C	D
Name	Aluminum Alloy	Stainless probe steel float type	Umbrella	Plastic Auto-Fall-Off
Type				

※Custom made is available for sensing weight

MEASURING RANGE (m)

02:2m(min.)

30:30m(option:30m~45m)

FineTek

ORDER INFORMATION

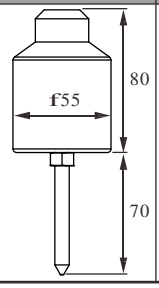
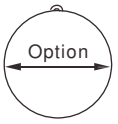
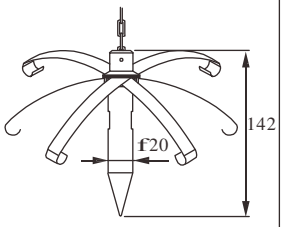
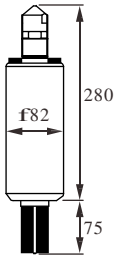
EE400-□-□□□□-□□

FREEZE PREVENTION CAPABILITY

0:None

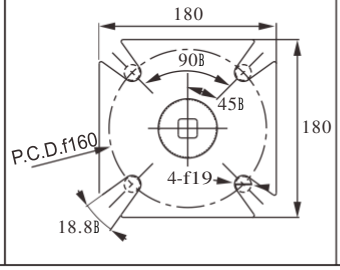
1:Yes

SENSING WEIGHT TYPE

	A	B	C	D
Name	Aluminum Alloy	Stainless probe steel float type	Umbrella	Plastic Auto-Fall-Off
Type				

※Custom made is available for sensing weight

CONNECTION

	00	01
Name	Standard	Customized
Type		Customized by customer's Requirement

※Flanges For Standard Model :

4"x5kg/cm^2、4"x10kg/cm^2、4"x16kg/cm^2、4"x20kg/cm^2、4"x150Lbs

DN100 PN6 、DN100 PN10、DN100 PN16、DN100 PN25、DN100 PN40

WIRE TYPE

0:Steel Wire

1:Steel Belt

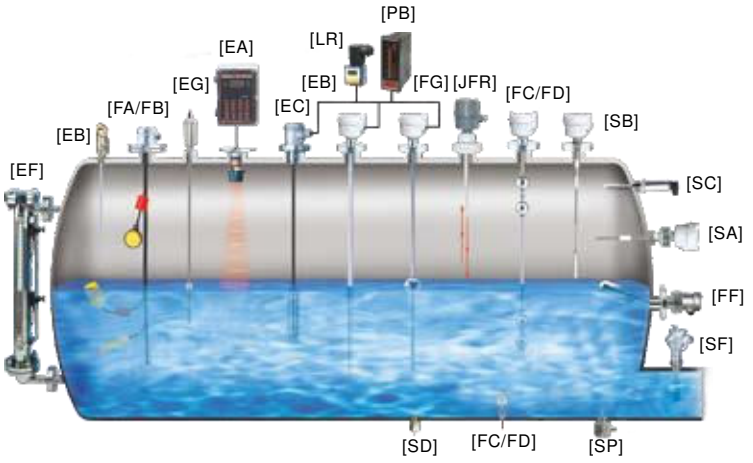
MEASURING RANGE (m)

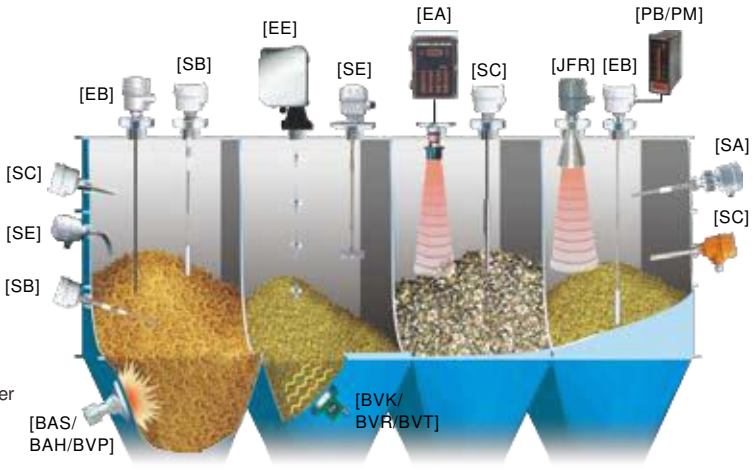
02:2m(min.)

30:30m(max.)

EXAMPLES OF TANK MOUNTING

[FC/FD] Mini Float/Magnetic Float Level Switch
[FG] Magnetic Float Level Transmitter
[FF] Side Mounting Float Switch
[FA/FB] Cable Float Level Switch
[SP] Thermal Dispersion Flow Switch
[SF] Paddle Flow Switch
[SD] Optical Level Switch
[SE] Rotary Paddle Level Switch
[SA] Capacitance Level Switch
[EC] Pressure Level Transmitter
[LR] Loop Power Indicator
[SC] Vibrating Probe Level Switch
[SC] Tuning Fork Level Switch
[EB] RF-Capacitance Level Transmitter
[SB] RF-Capacitance / Admittance Level Switch
[EG] Magnetostrictive Level Transmitter
[EF] By-Pass Level Transmitter
[MEF] Mini By-Pass Level Transmitter
[EA] Ultrasonic Level Transmitter
[JFR] FMCW Radar Level Transmitter
[EE] Electromechanical Level Measuring System
[ED] Speed Monitor
[SRT/SRS] Conveyer Belt Misalignment Switch & Safety Cable Pull Switch
[PB/PM] Microprocessor Based Bargraphic Display Scaling Meter
[BRD/AE] Valve and Controller for Dust Collector System
[BAS/BAH/BVP] Air Hammer
[BVK/BVR/BVT] Pneumatic Vibrator





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