FGX Flexible Magnetic Float Level Transmitter (Digital display type) Operation Instruction

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1. Reading Labels

Thank you for purchasing this FineTek product. This operation manual describes the product features, operating principle, operation and maintenance methods, as well as precautionary measures that should be taken during the installation, operation or maintenance of this product. This manual is designed to prevent dangerous situations that can result in damage to the product or injury to an installer or operator.

- Please read this operation manual completely and carefully before installing the product.
- Please contact FineTek if this operation manual does not answer your questions.
- The content of this operation manual may be updated from time to time. Updates are Maintained on the FineTek website www.fine-tek.com for your easy access.
- Do not disassemble or attempt to repair the product as this will void the product warranty.Please return the product to FineTek for repair and calibration if required.
- This manual may utilize warning symbols. An explanation of these symbols is as follows:

Danger→this symbol indicates an incorrect operation will result in major accidents and death.

Note→this symbol an incorrect operation will result in injury to personnel and some damage to the product.

Electric shock→this symbol warns of a possible electric shock hazard.

Fire→this symbol warns of a possible fire hazard.

Prohibited→this symbol indicates the action is prohibited.

2. Product warranty

2.1 New product warranty

- We don't charge for the inspection, part/s and repair for the product of the company that has a defect within 12 months from the delivery date and meets the warranty terms.
- If the product defect is not due to human error during its transportation, user may change to a new unit from the company within 7 days from delivery date.
- When the product needs to be sent back to the factory for repair, please send the whole set, and don't disassemble the parts. Moreover, please be sure it is completely packed to avoid damage and causing more loss and defect during the transportation.
- The warranty is not available for causes that fall under the following circumstances, for which the company shall charge for the inspection, part/s and repair according to the actual condition:The product is beyond its warranty term.
  - The product or its parts are beyond the warranty period.
  - Fault or damage is caused by not following the instruction and use environment described on the operation manual.
  - The product damage is caused by a force majeure factor (natural disasters, floods,fire, earthquakes, lightning, typhoon, etc.), human destruction (scratches, dropping, latch broken, tapping, cracks and punching), human error (using improper voltage, high-humidity, water leakage, stain, corrosion, loss, improper storage, etc.) and other abnormal factors.
  - The damage is caused by the customer or the 3rd party through the installation,addition, expansion, modification and repair of parts not authorized or certified by the company.
  - The volume label information is wrong or unclear, so the product serial number can' t be confirmed.

2.2 Repair warranty

Repaired product is warranted for 6 months from the delivery date. The warranty is limited to the part(s) replaced or repaired during the repair. If the repaired or replaced part is defective within this term the same part(s) will be repaired or replaced free of charge.

2.3 Service Network

Company	Address	Telephon	Fax
Taipei Headquarters (Taiwan)	No.16, Tzuchiang St., Tucheng Industrial Park, New Taipei City 23678	+886 2 2269 6789	+886 2 2268 6682
Taichung Sales office (Taiwan)		+886 4 2465 2820	+886 4 2463 9926
Kaohsiung Sales office (Taiwan)		+886 7 333 6968	+886 7 536 8758
Fine automation Co., Ltd. (China)	No. 451, Duhui Road, Zhuanqiao Township, Minhang District, Shanghai City 201109	+86 021 64907260	+86 021 6490 7276
Aplus FineTek Sensor Inc.	355 S. Lemon Ave, Suite D, Walnut, CA 91789	1 909 598 2488	1 909 598 3188
FineTek GmbH (Germany Branch)	Frankfurter Str. 62, OG D-65428 Ruesselsehim, Germany	+49 (0)6142 17608 0	+49 (0)142 17608 20
FineTek Pte Ltd. (Singapore Branch)	37 Kaki Bukit Place, Level 4 Singapore 416215Singapore 415979	+65 6452 6340	+65 6734 1878
FineTek Co., Ltd. (Indonesia Branch)	Ruko Golden 8 Blok H No.40 Gading Serpong, Tangerang, Indonesia	+62 (21) 2923 1688	+62 (21) 2923 1988
FineTek Co., Ltd. (Malaysia Branch)	8-05, Plaza Azalea, Persiaran Bandaraya, Seksyen 14, 40000 Shah	+603 5524 7168	+603 5524 7698

3. Product Inspection

3.1 Check Content

1. Sensor

2. Operation Manual

3.2 Safety Inspection

a. Please check whether the external package is deformed or damaged. Please remember to take a picture for evidence in case you want to file for payment refund later.

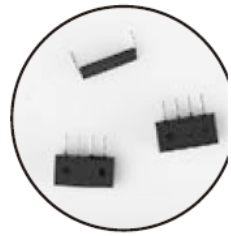
b. After unpacking, please check whether the content is deformed or damaged, or has any quality problem. Please remember to take a picture for evidence in case you want to file for payment refund later.

c. After unpacking, please check whether the content is consistent with the ordering info, and whether the quantity is right.

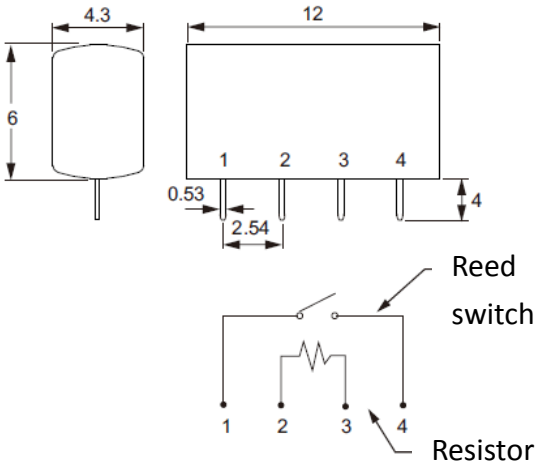
d. Please contact the company within 7 days for any of the above situations (with picture attached). Otherwise, we won’t refund, change or repair the product.

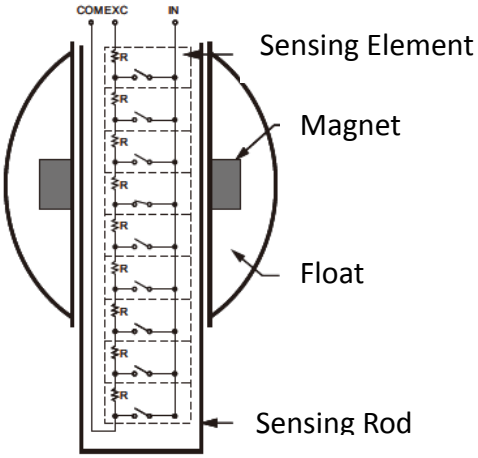
4. Summary

Flexible Magnetic Float Level Transmitter (Digital display type) is using the magnet in the float following the liquid level variation to change the bleeder circuit composed by the resistance and reed switch in the stem, the smaller gap between the reed switch, the higher the accuracy. The divider signal can be converted to analog output 0/4 ~ 20mA or digital communication (HART or RS-485) through the converter. This transmitter can be used for remote indication with digital panel meters, it's a liquid level transmitter with simple working principle and excellent
reliability.



Sensing Element

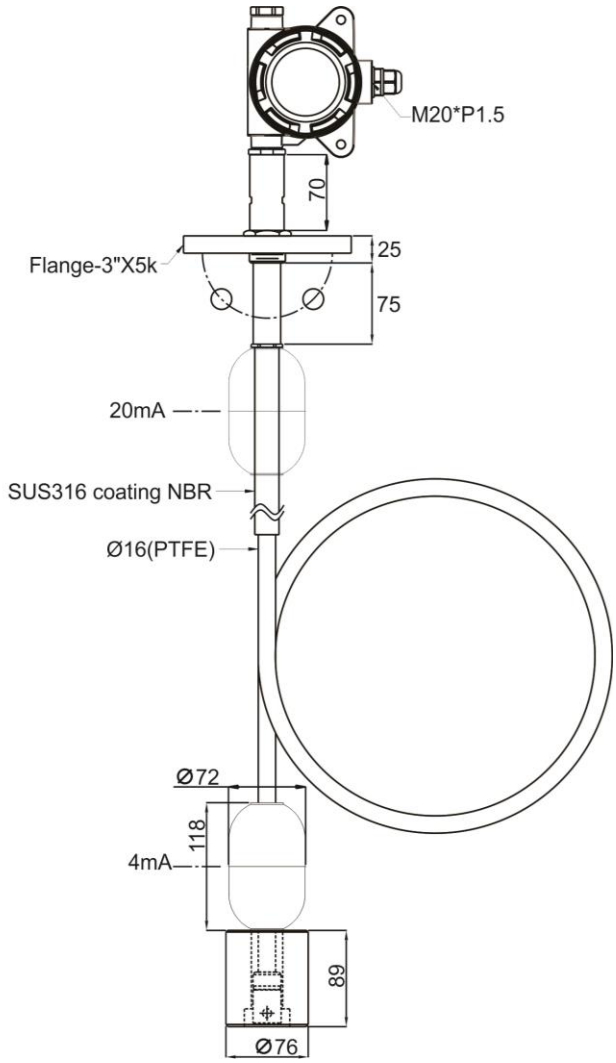




5. Features

- Magnetic reed module designed with enclosure protection to avoid transit damage and ensure readiness for installation and use.
- Unaffected by temperature or pressure variations in the usage environment.
- Stable and reliable circuit design.
- Installation is easy without the need for regular calibration and maintenance.
- 4~20mA two-wire output with HART
- Enclosure protection rating IP67

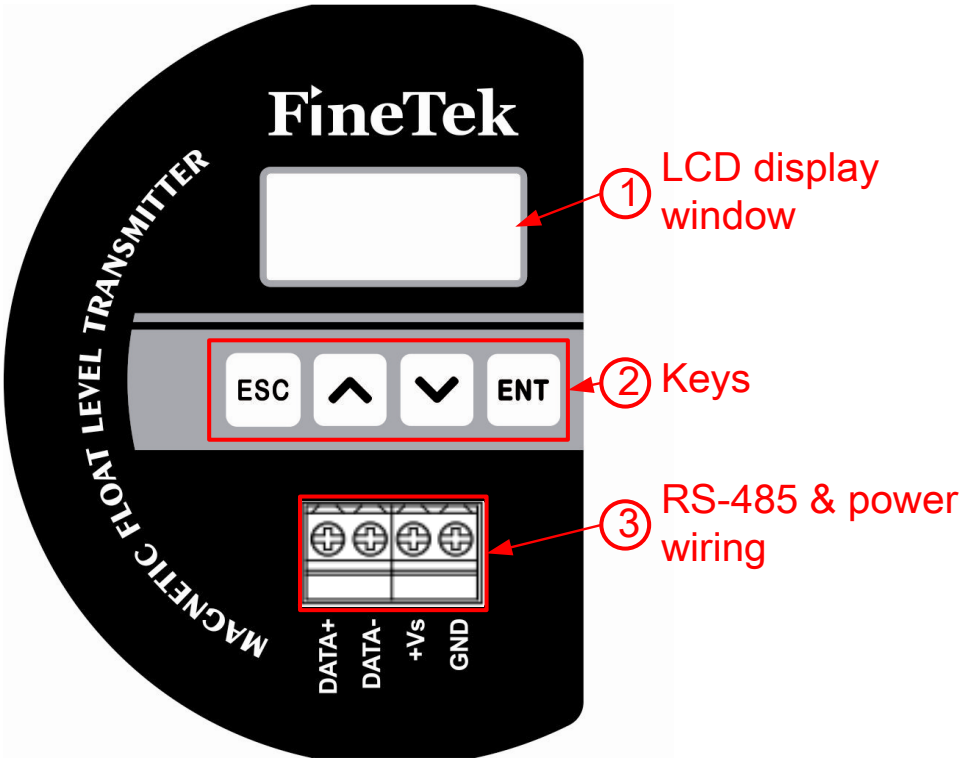
6. Dimensions



7. Specification

Input power	12 to 36 VDC
Measurement range	3001mm ~ 30000mm
Output current mode	4 ~ 20 mA　2 Wire
Resolution	12.7 mm
Linearity % F.S.	± 0.1 %
Communications interface	HART / RS-485
Ambient temperature	- 40 ~ 80℃
Operating temperature	- 40 ~ 80℃
IP Rating	IP 67

8. Panel description

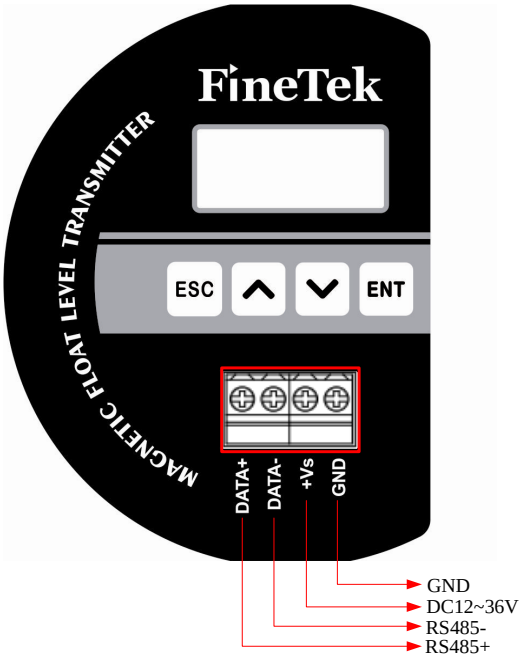


9. Wiring

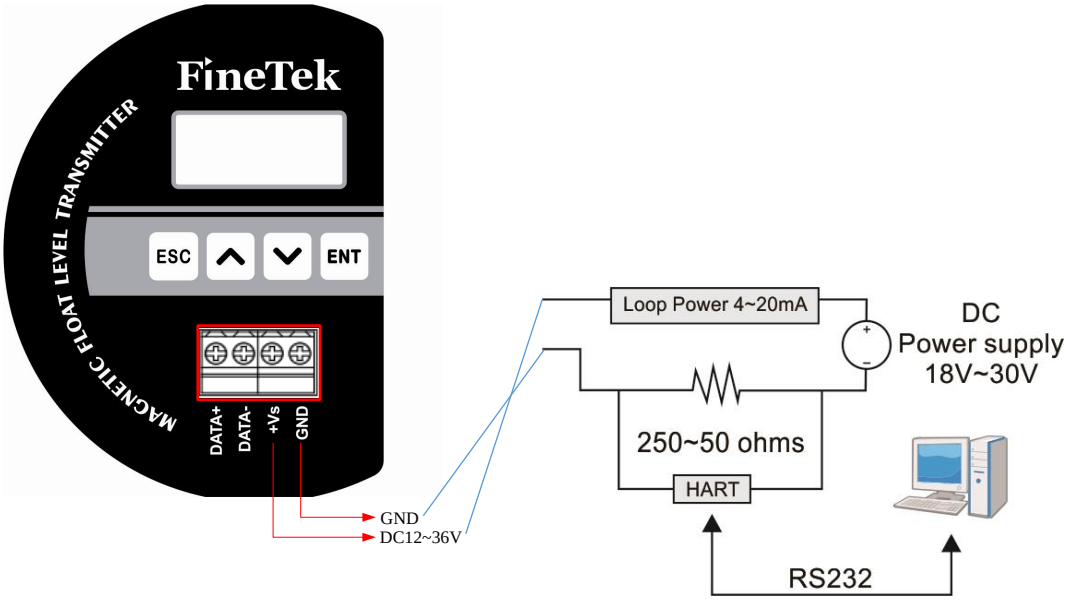
Pay attention to the following safety instructions before use

1. Wiring of this instrument is only allowed in the powered off state.
2. The power supply voltage must comply with the product's input voltage specifications.
3. If a high power supply voltage may occur, install an overvoltage protection device to protect the instrument.

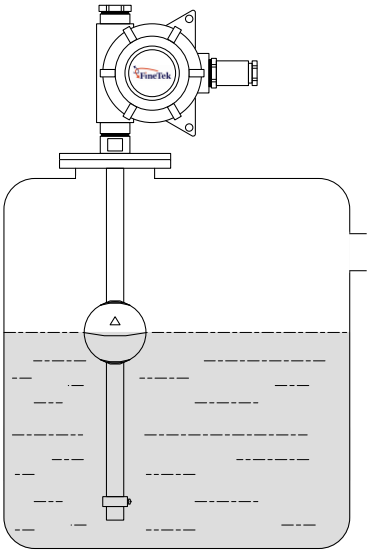
9.1 RS-485 wiring instructions



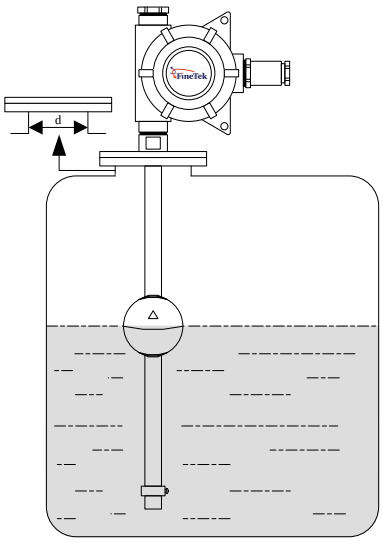
9.2 HART wiring instructions



10. Installation



The installation location should be far away from the inlet otherwise the indicator meter will produce output errors caused by liquid fluctuations at the inlet.



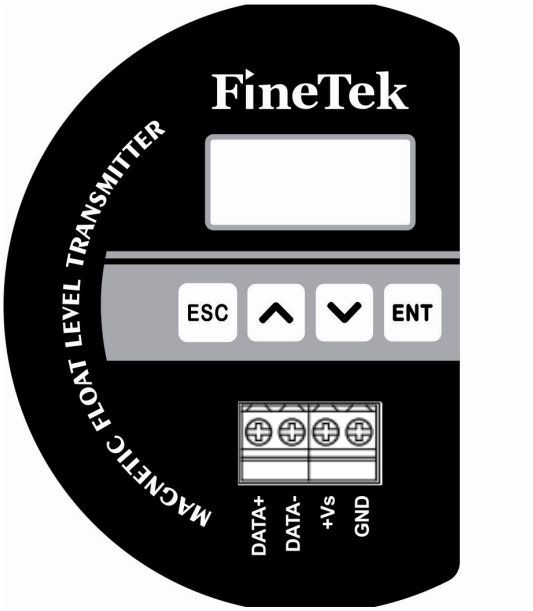
Select the flange connection pipe with a diameter larger than the diameter of the float.

※ d> float diameter for installation.

- This product has been calibrated before delivery. The user should not change the measurement position or distance arbitrarily.
- Please do not replace the float specifications of this product to avoid affecting the measurement accuracy of this product.
- The clip shall be fixed to the notch on the rod and securely locked.
- Please do not let the float impact or fall to the ground as this could break the magnet in the float causing it to lose functionality.
- During transport, the rod shall be wrapped in shock-absorbing material for protection (e.g. bubble wrap, foam etc.).

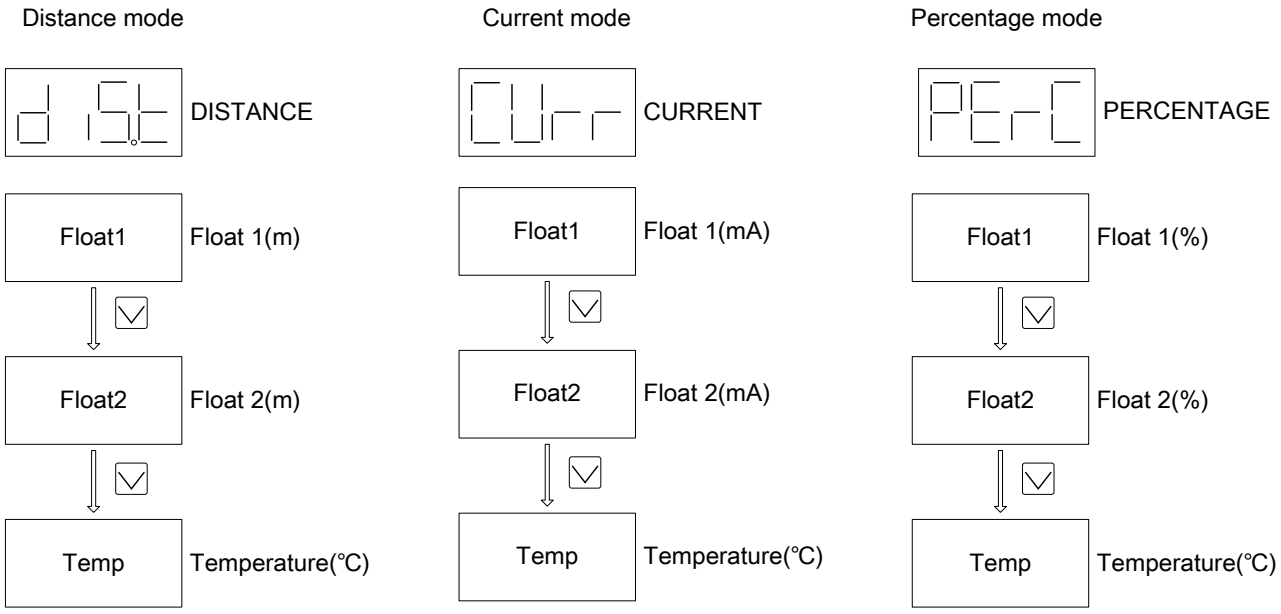
11. Display module adjustment and settings

11.1 Key operating instructions

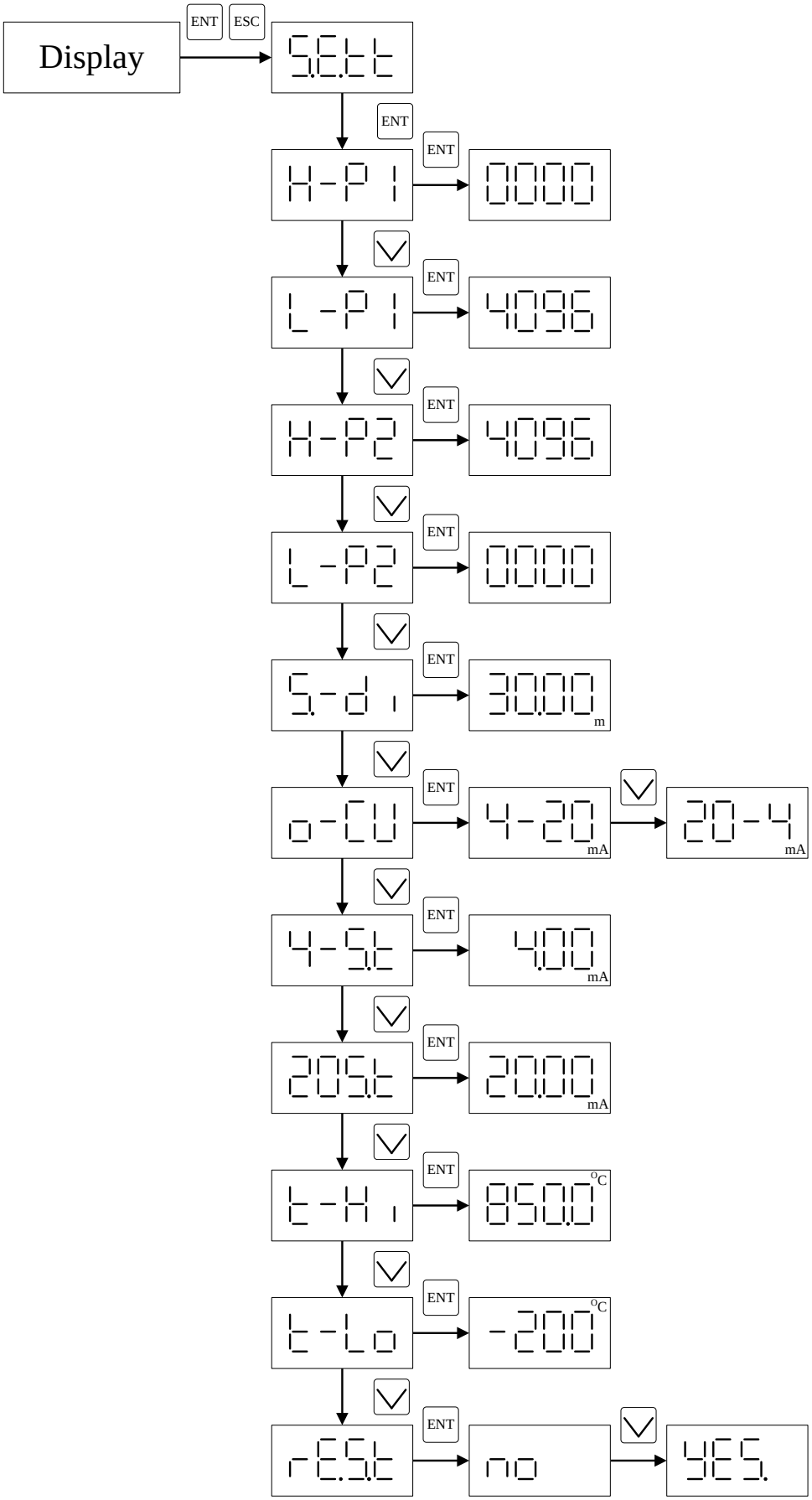


Button	Action
ESC	Escape key (Return)
^	Up key / Shift key
v	Down key / Add key
ENT	Enter key (Confirm)
ESC + ENT (Press at the same time)	Enter the main menu

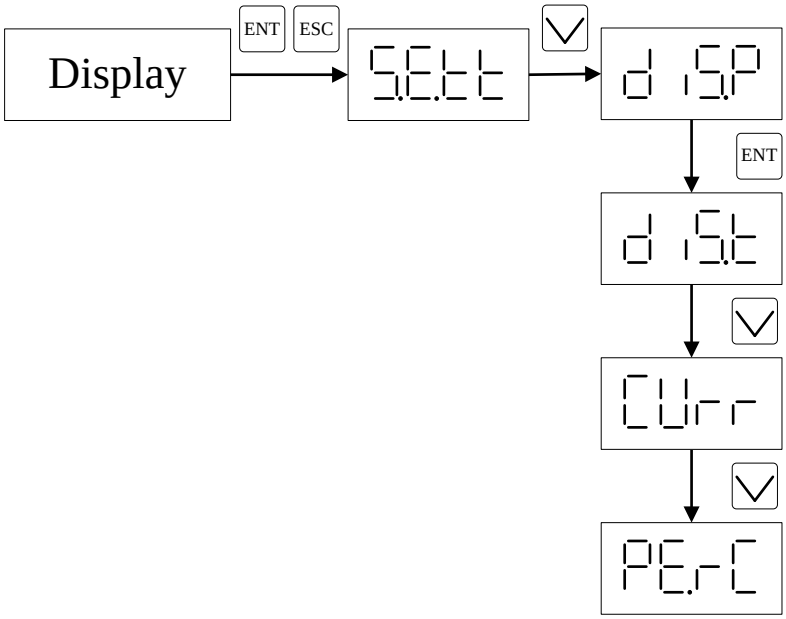
11.2 Display screen description



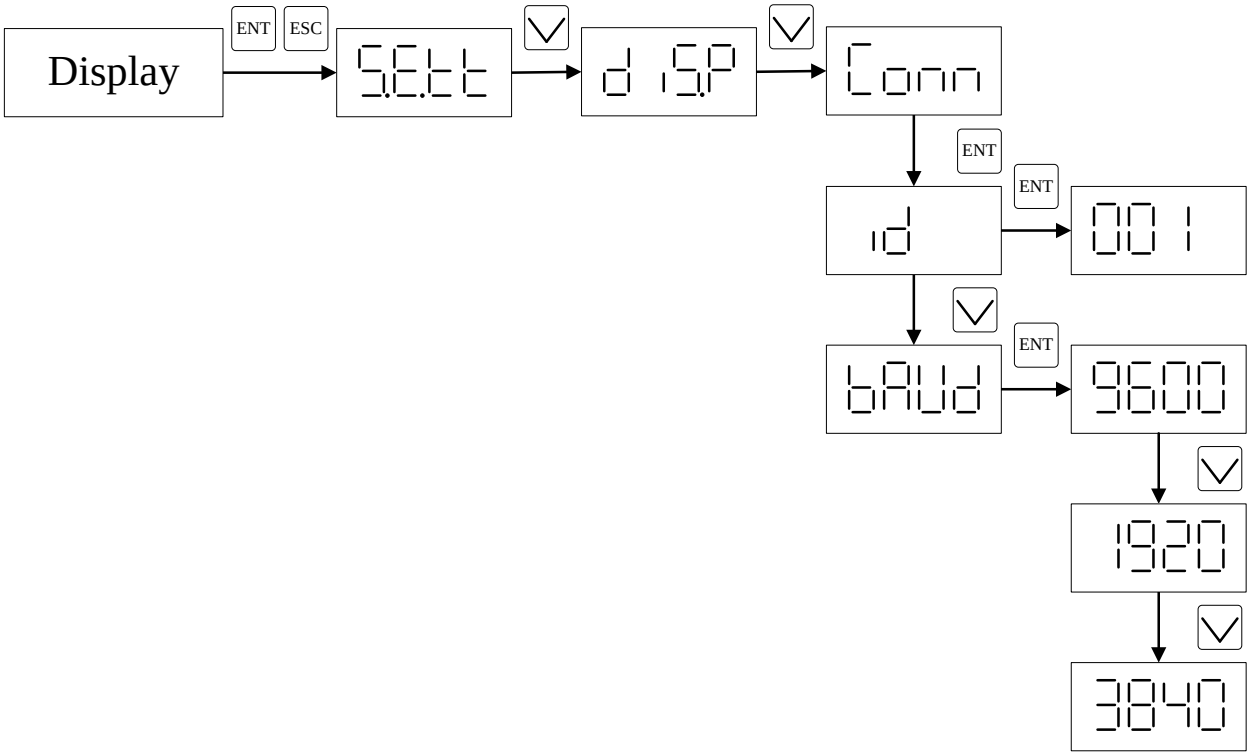
11.3 Operating flowchart



11.4 Display mode settings



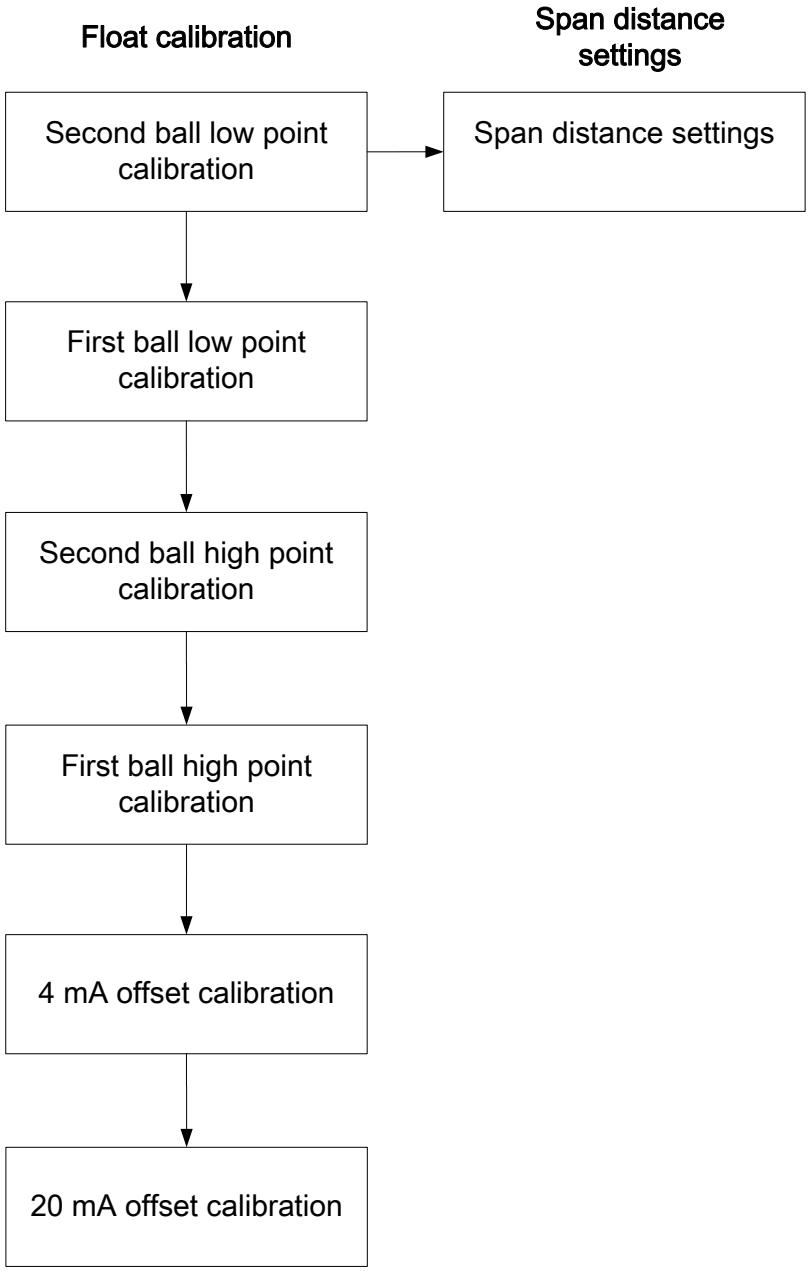
11.5 Connection settings



11.6 Program instruction description

Option	Range	Function	Function description
SEtt		SETTING	Settings
	H-P1	HIGH POINT FIRST BALL	First ball high point calibration
	L-P1	LOW POINT FIRST BALL	First ball low point calibration
	H-P2	HIGH POINT SECOND BALL	Second ball high point calibration
	L-P2	LOW POINT SECOND BALL	Second ball low point calibration
	S-d1	SPAN DISTANCE	Span distance
	o-CU	OUTPUT CURRENT	Output current settings
	4-St	4 mA OFFSET	4 mA offset
	20St	20 mA OFFSET	20 mA offset
	t-H1	TEMPERATURE HIGH SET	Temperature high point calibration
	t-Lo	TEMPERATURE LOW SET	Temperature low point calibration
	rESt	RESET	Reset to factory settings
diSP		DISPLAY CONTENT	Display content settings
	diSt	DISTANCE	Distance mode
	CUrr	CURRENT	Current mode
	PErC	PERCENTAGE	Percentage mode
Conn		CONNECT SETTING	Connection settings
	id	DEVICE ADDRESS	Device address settings (Default: 001)
	bAUd	DEVICE BAUDRATE	Device baud rate settings (Default: 9600)

11.7 Calibration procedure



※Notes:

(1) Float calibration should first calibrate 4 mA and then calibrate 20 mA.

11.8 Setting operating instructions

11.8.1 First Ball High Point Calibration

(1) Enter Menu: “Display” , press “ESC”+“ENT” , SEtt, press “ENT” , H-P1, press “ENT” , “0000”

(2) Calibration: Move the float to the top, its value will move with it, “0010” , when the value stops moving, press “ENT”

11.8.2 First Ball Low Point Calibration

(1) Enter Menu: “Display” , press “ESC”+“ENT” , SEtt, press “ENT” , H-P1, press ▽, L-P1, press “ENT” , “0511”

(2) Calibration: Move the float to the bottom, its value will move with it, “0646” , when the value stops moving, press “ENT”

11.8.3 Second Ball High Point Calibration

(1) Enter Menu: “Display” , press “ESC”+“ENT” , SEtt, press “ENT” , H-P1, press ▽ 2 times，H-P2, press “ENT” ，“0000”

(2) Calibration: Move the float to the top, its value will move with it, “0120” , when the value stops moving, press “ENT”

11.8.4 Second Ball Low Point Calibration

(1) Enter Menu: “Display” , press “ESC”+“ENT” , SEtt, press “ENT” , H-P1, press ▽ 3 times，L-P2, press “ENT” , “0000”

(2) Calibration: Move the float to the bottom, its value will move with it, “0000” , when the value stops moving, press “ENT”

※After completing the calibration in 11.8.1~11.8.4, check whether the calibration is successful. Return to main screen “Display” move the float to the bottom, it will display “400mA”， , move the float to the top, , it will display “20.00mA”

11.8.5 Total Range Settings

(1) Enter Menu: “Display” , press “ESC”+“ENT” , SEtt, press “ENT” , H-P1,

press ▽ 4 times, S-d1, press “ENT” , “06.96m”

(2) Total Range Setting: Use △ ▽ keys to adjust the total range, press “ENT”

(3) Check whether the adjustment is successful: Return to main screen, change the display mode to distance mode, move the float to the bottom, “0000” , move the float to the top, display maximum range

11.8.6 Output Current Setting

(1) Enter Menu: “Display” , press “ESC”+“ENT” , SEtt, press “ENT” , H-P1,

press ▽ 5 times, o-CU, press “ENT” , “4-20”

(2) Setting: Use △ ▽ key to switch to “4-20” or “20-4” , press “ENT”

(3) Check whether the setting is successful: If switching to “4-20” move the float to the bottom, “4.00mA” , move the float to the to top “20.00mA” ; if switching to “20-4” , move the float to the bottom, “20.00mA” , move the float to the top, “4.00mA”

11.8.7 4 mA Offset Settings

(1) Enter Menu: “Display” , press “ESC”+“ENT” , SEtt, press “ENT” , H-P1,

press ▽ 5 times，4-St, press “ENT” , “4.00” , move the float to the bottom

(2) Adjust Value: Use △ ▽ , keys to adjust the value “3.99” , press “ENT”

(3) Check whether the adjustment is successful: Measure with a digital meter and the value will be close to 4 mA.

11.8.8 20 mA Offset Settings

(1) Enter Menu: “Display” , press “ESC”+“ENT” , SEtt, press “ENT” , H-P1,

press ^ 4 times , 20St, press “ENT” , “20.00” move the float to the top

(2) Adjust Value: Use ^ v keys to adjust the value“19.96”, press “ENT”

(3) Check whether the adjustment is successful: Measure with a digital meter and the value will be close to 20 mA

11.8.9 Reset to Factory Settings

(1) Enter Menu: “Display” , ess “ESC”+“ENT” , SEtt ,press “ENT” ,H-P1

, press ^, rESt ,press “ENT” , no

(2) Select whether to reset to factory settings: Use ^ v keys to switch to no

or YES, press “ENT”

11.8.10 Display Content Setting

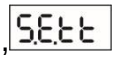
(1) Enter Menu: “Display” , press “ESC”+“ENT” ,SEtt, press v ,diSP,

press “ENT”

(2) Select Display Mode: Use ^ v keys to switch to diSt or CUrr or

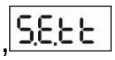
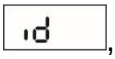
PErC , press “ENT”

11.8.11 Device Baud Rate Setting

(1) Enter Menu: “Display” , press “ESC”+“ENT” ,  ,press  ,  ,press “ENT”  ,press  ,  ,press “ENT” , “9600”

(2) Setting: Use  keys to adjust the band rate “9600” or “19200” or “38400”, press “ENT”

11.8.12 Device Address Setting

(1) Enter Menu: “Display” , press “ESC”+“ENT” ,  ,press  ,  ,press “ENT”  , press “ENT” , “001”

(2) Setting: Use  keys to adjust the address, press “ENT” , “001”

12. Digital Communications Protocol

Auto ID				
Address	Len	Type	Variable Name	Description
4103	2	FLOAT32	PFC_DISPLAY_VALUE1	one ball distance
4105	2	FLOAT32	PFC_DISPLAY_VALUE2	two ball distance
4107	2	FLOAT32	PFC_DISPLAY_VALUE3	TEMP
4109	2	FLOAT32	PFC_CALIBRATION_DISTANCE	Total range
Read only				
Address	Len	Type	Variable Name	Description
4128	1	UINT16	PFC_ADC_NOW_VALUE_ONE	adc one
4129	1	UINT16	PFC_ADC_NOW_VALUE_TWO	adc two
4130	2	FLOAT32	PFC_DISPLAY_PERCENTAGE1	1%
4132	2	FLOAT32	PFC_DISPLAY_PERCENTAGE2	2%
4134	2	FLOAT32	PFC_DISPLAY_VALUE1	one ball distance
4136	2	FLOAT32	PFC_DISPLAY_VALUE2	two ball distance
4138	2	FLOAT32	PFC_DISPLAY_CURRENT1	Current 1
4140	2	FLOAT32	PFC_DISPLAY_CURRENT2	Current 2
Read and Write				
Address	Len	Type	Variable Name	Description
4142	1	UINT16	PFC_MODBUS_ID	id
4143	2	UINT32	PFC_MODBUS_BAUDRATE	baudrate
4145	2	FLOAT32	PFC_CALIBRATION_DISTANCE	Distance
4147	1	UINT16	PFC_DISPLAY_1_VALUE_HIGH_LIMIT	one ball h
4148	1	UINT16	PFC_DISPLAY_1_VALUE_LOW_LIMIT	one ball l
4149	1	UINT16	PFC_DISPLAY_2_VALUE_HIGH_LIMIT	two ball h
4150	1	UINT16	PFC_DISPLAY_2_VALUE_LOW_LIMIT	two ball l
4151	1	UINT16	PFC_CURRENT_MODE	Current mode
4152	2	FLOAT32	PFC_4MA_OFFSET	4mA Offset
4154	2	FLOAT32	PFC_20MA_OFFSET	20mA Offset
4156	2	FLOAT32	PFC_PT100_HIGH_CALIBRATION	High temperature calibration
4158	2	FLOAT32	PFC_PT100_LOW_CALIBRATION	ow temperature calibration
4160	1	UINT16	PFC_MEASUREMENT_MODE	Display mode
4161	1	UINT16	PFC_MODBUS_SAVE	Save
4163	1	UINT16	PFC_TEMP_ON_OFF	Temperature switch

13. Troubleshooting

Trouble	Possible cause	Solution
No current output	Wiring error	Make sure the connection is correct
The current output abnormality	Wrong direction of float	Confirm the direction of the float installation
	The inner magnet of the float breaks	Replace the float
	Incorrect correction value	High-low recalibrate
Float Doesn't work	Floating ball rupture	Replace the float
RS485 communication exception	Wiring error	Make sure the connection is correct
	Connection setting error	Verify that the connection settings (comport, ID, baud, rate) are correct
HART communication cannot connect	There is no series 250~500Ω resistor on the power terminal	The 250~500Ω resistor is connected in series at the power terminal