Electromagnetic Flow meter_GT300

Transmitter: S200

Operation & maintenance Manual

Greentech Korea Co., Ltd.

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Index

1. Connection and Operation of Converter: S200_Integral type

1.1 Keys and Display

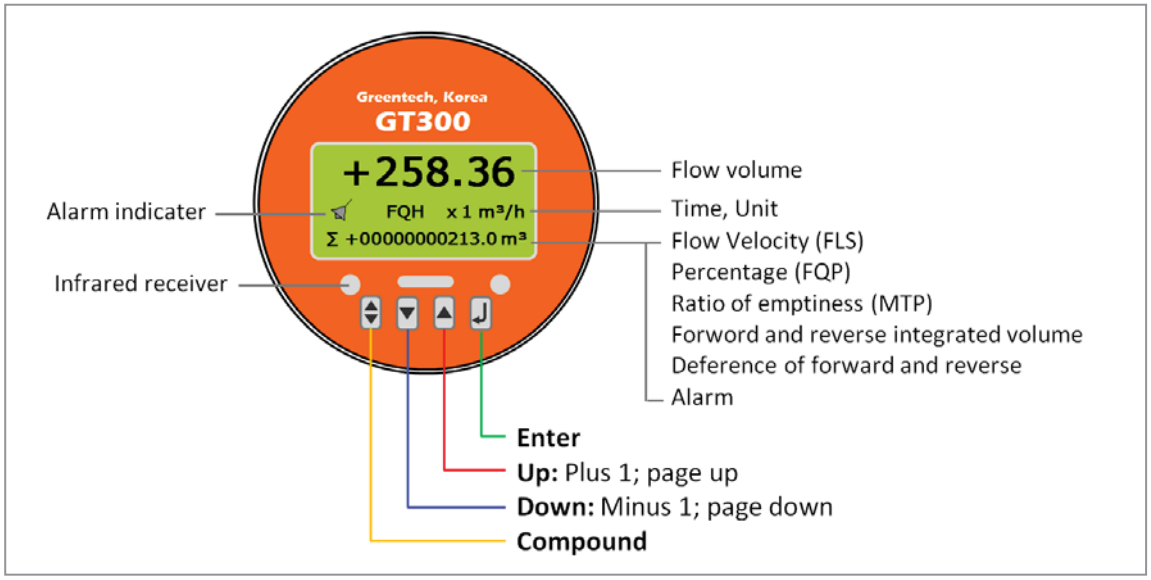

Fig. 1: Define Keys and LCD screen display (Integral type)

Instruction: When measuring, press “Compound Key + Enter” will appear password of changing state, based on distinction of secrecy, and you could change the password as we provide (initial password is 19818). Then press “Compound + Enter” Key again, and you can enter the state of setting parameter. If you want to return to the running state, push “Enter” for several seconds.

1.2 Connection of Converter (Integral type)

1.2.1 Links and Labels of Converter in Model

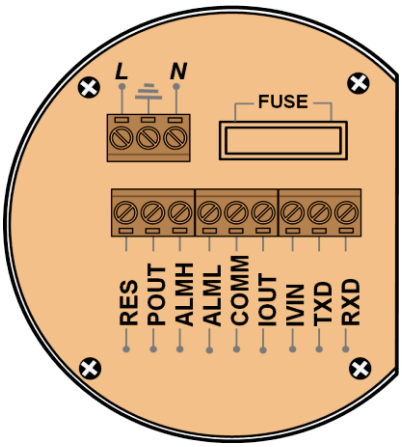

Fig. 2: Labels of connector in Model

1.2.2 Symbols and Description of Connectors in Model

RES	: Connect pull Resistance
POUT	: Frequency (Pulse) Output for Bi-directional Flow
ALMH	: Alarm Output for Upper Limit
ALML	: Alarm Output for Low Limit
COMM	: Frequency, Pulse and Current Output Ground
IOUT	: Output Current (Output Current for 2-wire)
IVIN	: 24VDC Input for 2-wire output current
TXD	: **+** Communication Input Signal
RXD	: **-** Communication Input Signal
L	: 85-250VAC or DC **+** Power Supply
N	: 85-250VAC or DC **-** Power Supply
FUSE	: Fuse for Power Supply

Table. 1: *Description of Connectors*

1.2.3 Instruction for Converter and Terminal Box: Remote type

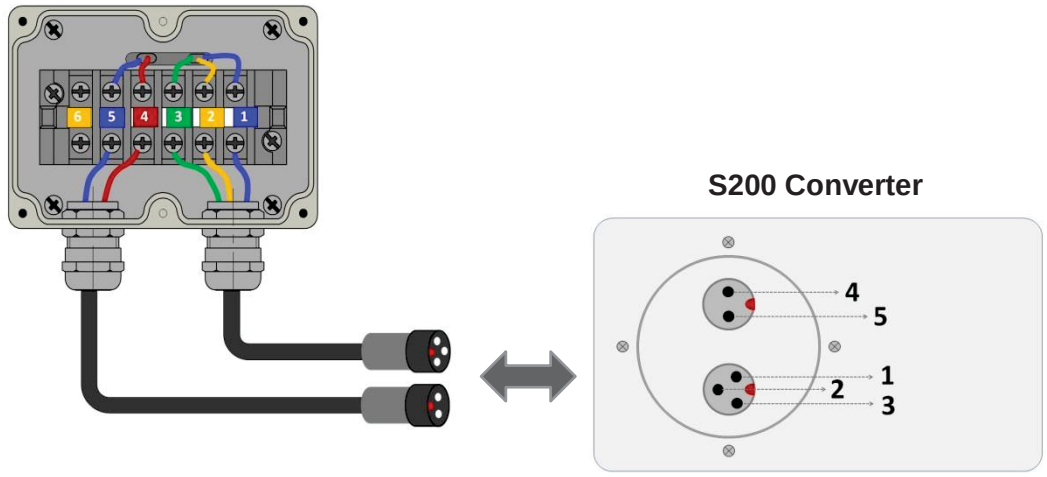

Fig. 2: *Port of Converter*

1.2.4 Output and Power Supply Cables

All cables for signals transferring and power supply has to be prepared users. However, it should be careful to choose the cables that meet the upper limit load of consuming current.
Pulse current output, alarm current output and external power supply can be seen in Fig. 3.

When inductive load is connected to converter, diode should be used as in Fig. 3.

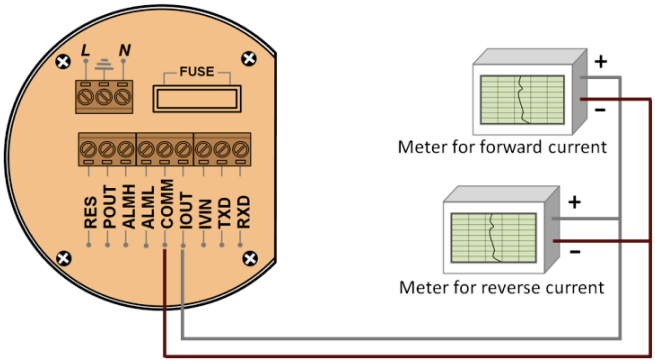

Fig. 3 (a): *Connection of Current Output*

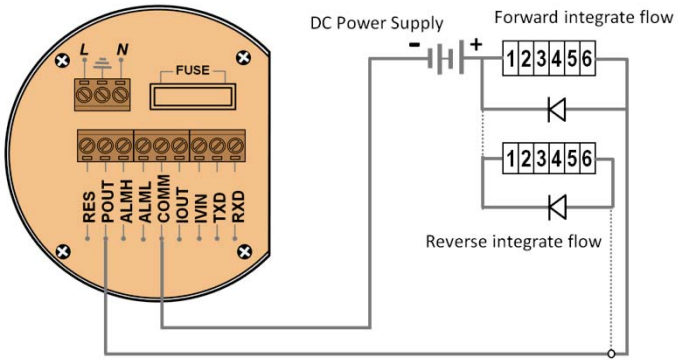

Fig. 3 (b): *Connection of Electro-Magnet Counter*

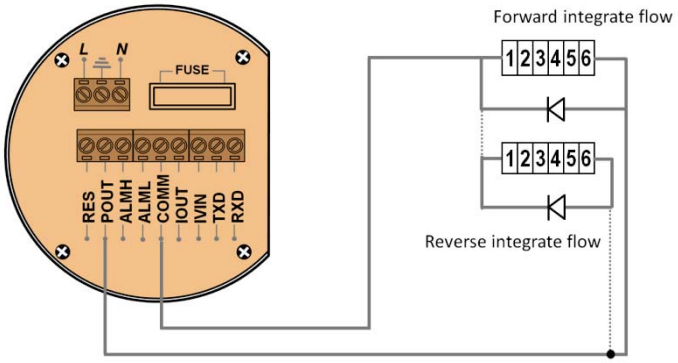

Fig. 3 (c): *Connection of Electronic Counter*

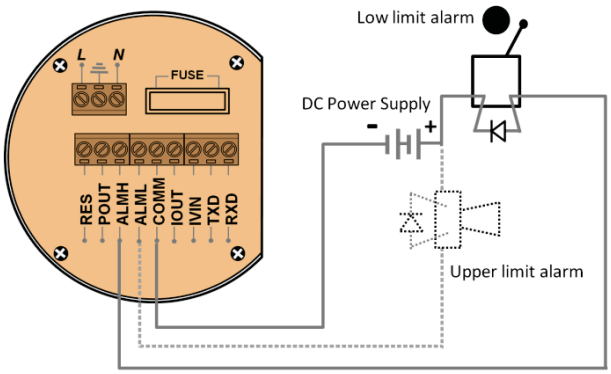

Fig. 3 (d): *Connection of Alarm Output*

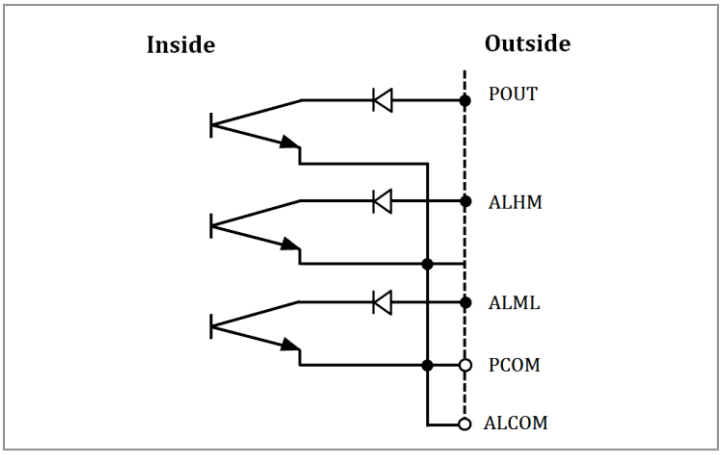

Fig. 3 (e): *Connection of OC Gate*

1.2.5 The Grounding Requirements When Installing Convert

Contact area of copper Connector PE on Converter Cabinet for grounding should be larger than 1.6mm². Contact resistance should be less than 10Ω.

Firstly, purple copper tube should be cut into 1700 mm long (the copper tube can be lengthened according to the need) to make the nail buried 1500 mm into the ground(Note : when burying nail, sprinkling a layer of broken charcoal at the top of nail, and then saline irrigation).
Then, 4mm² purple copper wire should be welded to the nail. At last, connecting ground wire to convert's flange, ground ring and pipeline's flange. It is shown in figure 4.

Note: Stainless steel must be used when fixing ground screws, spring washers and flat washers.

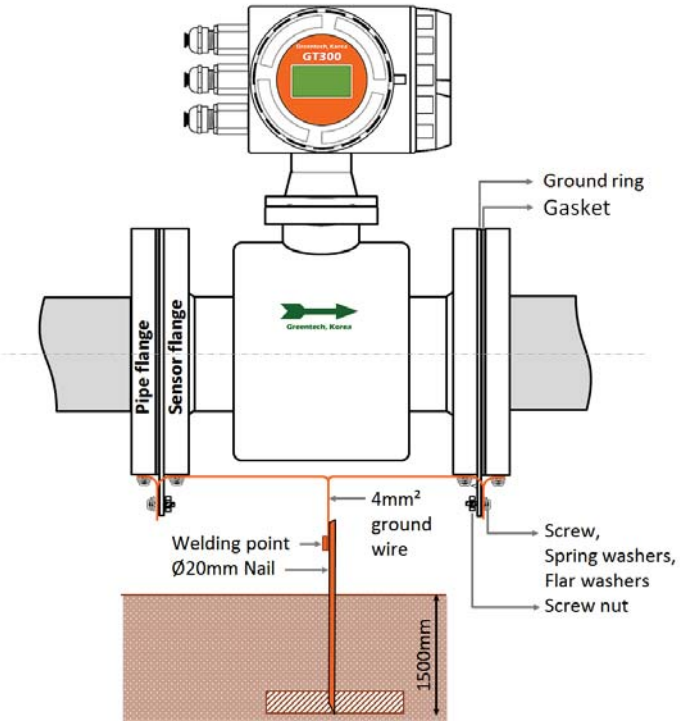

Fig. 4: *Grounding*

1.3 Digital Data Output and Count

Digital output is frequency output and pulse output. Frequency output and pulse output use the same connection output point, therefore, users can only choice one of frequency output and pulse output at the same time.

1.3.1 Frequency Output:

The range of frequency output is 0 ~ 5000Hz and frequency output opposes percent flux.

F= (Measure value / Full scale value) • the range of frequency

The up limit of frequency output can be adjusted. It can be choice from 0 ~ 5000Hz, and also can be choice low frequency: such as 0 ~ 1000Hz or 0 ~ 5000Hz.

Frequency output mode general can be used in control application, because it responses the percent flux. Users can choice pulse output when the equipment is applied to count.

1.3.2 Pulse Output Mode:

Pulse output mainly applies in count mode.
Pulse output delegates a unit flux, such as 1L or $1m^3$ etc.
Pulse output unit divide into 0.001L, 0.01L, 0.1L, 1L, $0.001m^3$, $0.01m^3$, $0.1m^3$, $1m^3$, 0.001UKG, 0.01UKG, 0.1UKG, 1UKG, 0.001USG, 0.01USG, 0.1USG, 1USG.
When users choice the pulse unit, they should notice the match of the flux range of flowmeter and pulse unit:

QL=0.0007854×D2×V (L/s)
Or **QM**=0.0007854×D2×V×10-3 (m^3/S)
Note: D-nozzle (mm) **V**-velocity of flow (m/s)

The oversize flux and too small pulse unit will be made the pulse output over the up limit.
Generally, pulse output should be controlled below 2000P/S. However, the too small flux and too large pulse unit will be made the instrument exports a pulse long time.
Otherwise, pulse output is different from frequency output.
When pulse output cumulates a pulse unit, it exports a pulse.
Therefore, pulse output is not equality. Generally, measure pulse output should choice count instrument, but not frequent instrument.

1.3.3 The Connection of Digital Output

Digital output has three connected points: digital output connected point, digital ground point, and symbol as follows:

POUT ----- digital output point; **PCOM** ----- digital ground point;
POUT is collector cut-off circuit output. Connect the line diagram as follows:

1.3.4 Digital Voltage Connect Mode

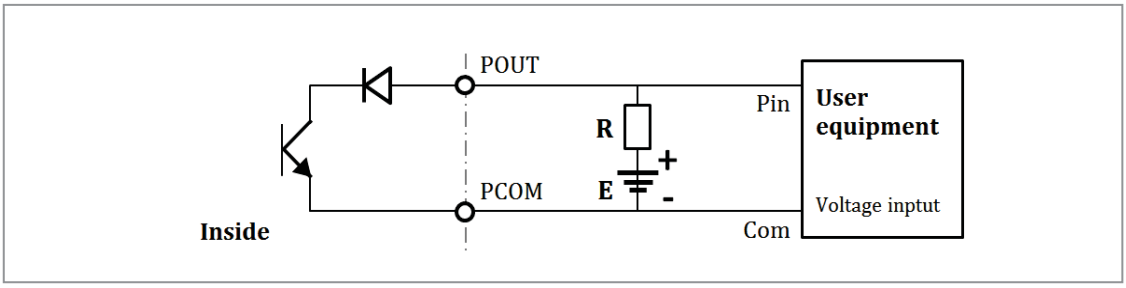

Fig. 5 (a): Connection of Digital Voltage Output

1.3.5 Digital output connect photoelectricity coupling (PLC etc.)

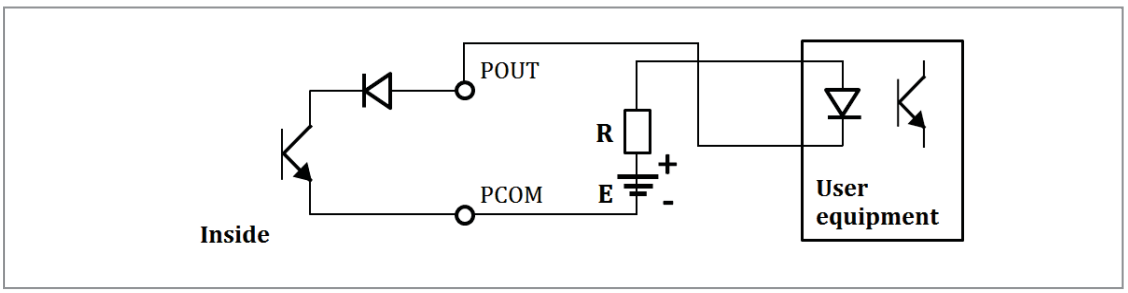

Fig. 5 (b): Digital output connect photoelectricity coupling

Commonly user's photoelectricity coupling current is about 10mA, so about E/R=10mA, E=5~24V.

1.3.6 Digital Output Connect Relay

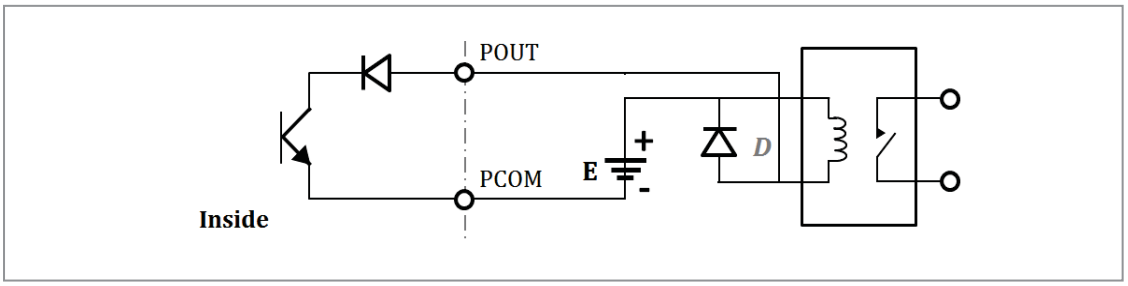

Fig. 5 (c): Digital Output Connect Relay

Commonly relay needs E as 12V or 24V. D is extending diode, now most middle relays has this diode inside. If not have, user can connect one outside. Table of digital output parameter:

Parameter	Testing condition	Minimum	Type	maximal	Unit
Working voltage	IC=100 mA	3	24	36	V
Working current	Vol1.4V	0	300	350	mA
Working frequency	IC=100mA Vcc=24V	0	5000	7500	Hz
High voltage	IC=100mA	Vcc	Vcc	Vcc	V
Low voltage	IC=100mA	0.9	1.0	1.4	V

Table. 2: DS output parameter table

2. Connection and Operation of Converter: S200_ Remote Type

2.1 Keys and Display

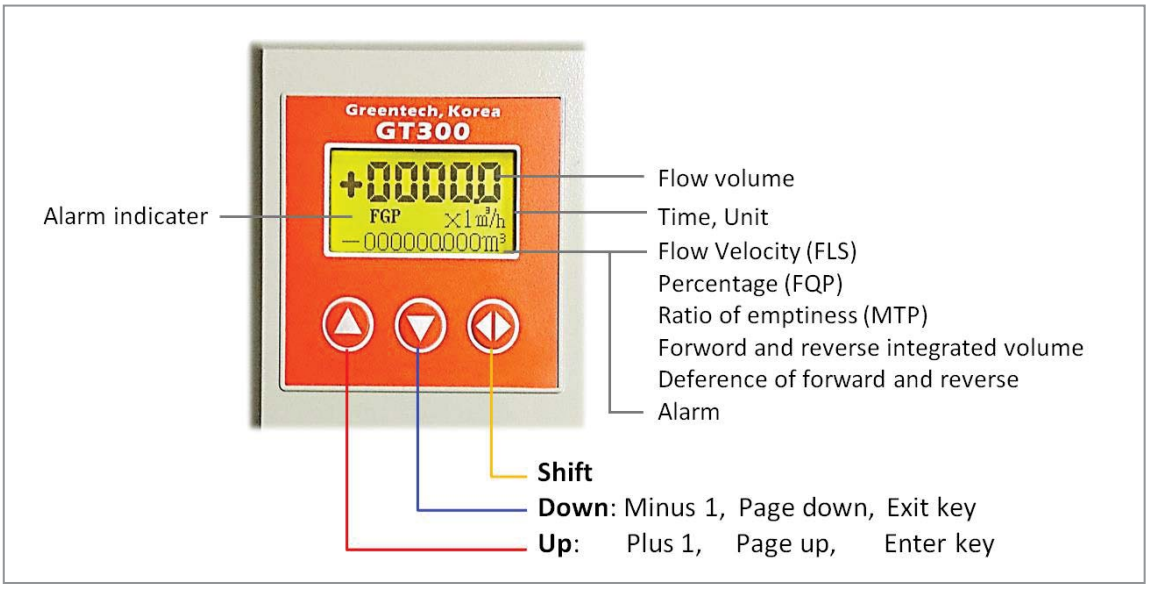

Fig. 6: Define Keys and LCD screen display (Remote type)

Instruction: Press enter key, the instrument enter into the setting parameters of select function.
Move the cursor under the enter key.
Press it and then input password when password status “00000” can be seen (initial password is 19818).
Move the cursor under the enter key again. Press it and then input settings into selected item of operating menus. Please push “▼” key down for several seconds for returning to running status.

2.2 Connection of Converter (Remote Type)

2.2.1 Links and Labels of Converter in Model

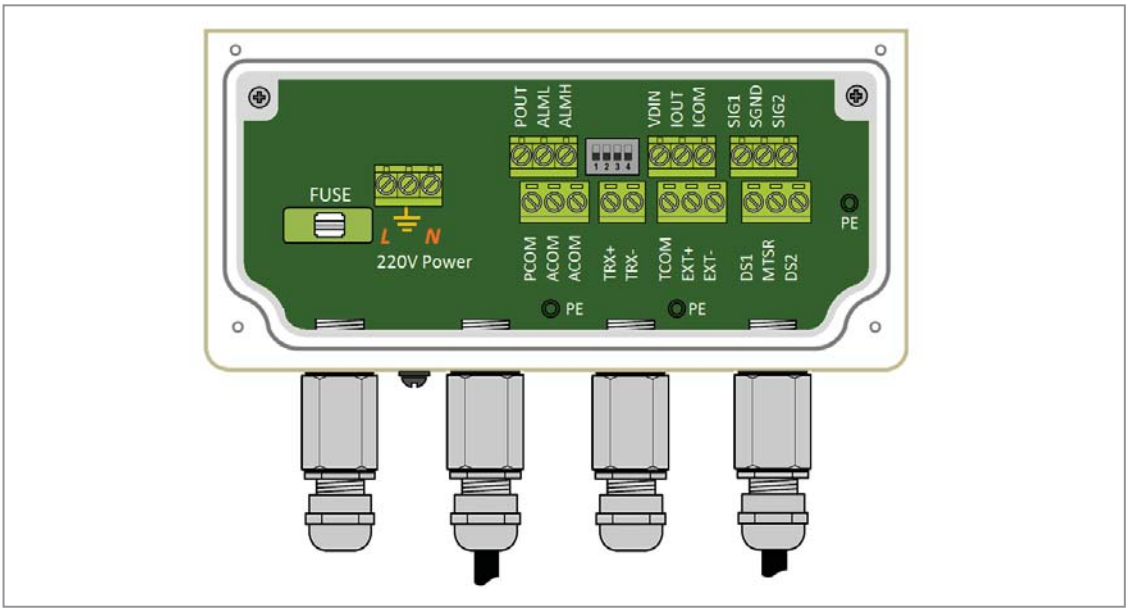

Fig. 7: Port of Converter

2.2.2 Symbols and Description of Connectors in Model

SIG1	: Signal 1	To separate model sensor
SIG2	: Signal 2	
SGND	: Signal Ground	
DS1	: Shielded Exciting 1	
DS2	: Shielded Exciting 2	
EXT+	: Exciting Current +	
EXT-	: Exciting Current -	
VDIN	: 24VDC Input for 2-wire output current	Analog current output
IOUT	: Output Current (Output Current for 2-wire)	
ICOM	: Current Output Ground	
POUT	: Frequency and Pulse Output	Frequency (Pulse) output
PCOM	: Frequency and Pulse Output Ground	
ALMH	: Alarm Output for Upper Limit	Two alarm output
ALML	: Alarm Output for Low Limit	
ACOM	: Alarm Output Ground	
TRX+	: +Communication Input Signal	Communication input
TRX-	: -Communication Input Signal	
TCOM	: Communication Input Ground	

Table. 3: Description of Connectors

2.2.3 Connection Instruction for Converter and Terminal Box

Port No.	1	2	3	4	5	6
Port color	Blue	Yellow	Green	Red	Blue	Yellow
Wire	Signal 1	Signal 2	Com	Field current 1	Field current 2	Reserve
Converter Port	SIG1	SIG2	SGND	EXT+	EXT-	N.A.

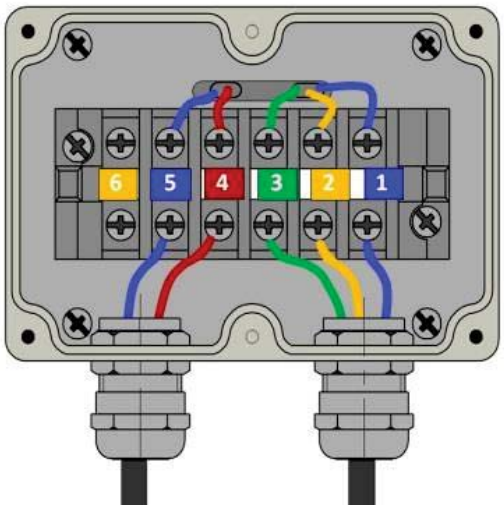

Fig. 8: Port of Converter

2.2.4 Characteristic Cable for Connection

** Signal Cable and Shield Current Cable

When separated models of converters are assembled with sensors for measuring flow of fluid which conductivity is larger than 50μS/cm, PVVP 2*0.2 mm^2 model cable (metal shielded signal cable covered with PVC) can be used as communication cable for flow signals and for Field Current.
The length of signal cable should be less than 100m. make sure the signal wire and field current wire have the same length.
The converter can output equivalent level of shielded exciting signal voltage so that interference to flow measurement signals can reduced by means of lowering the distributed capacitance of communication cable.
When measured conductivity is less than 50μS/cm or signals are transferred in remote distances, double-conductor and double-shielded signal cable at equivalent level of voltage can be used.
For example, special STT3200 cable or BTS model signal cable (triple-shielded) can be used for signal communication.
When the model STT3200 cables are used for exciting current and signals, two cables can be put together as one cable.

** Output and power line

All cables for signals transferring and power supply has to be prepared by users.
However, it should be careful to choose the cables that meet the upper limit load of consuming current.

Note: When DIP switch next to terminal is set to ON places, the converter from its inside can provide +28Vpower supply and up-pull 10kΩresistance to output Frequencies (PUL+, PUL-) to isolated OC gate, Alarm Output (ALM+.ALM-), and Status Control (INSW).

Therefore, when converter has frequency output and works with sensor together, DIP switch can be set as ON getting frequency signals from PUL+ and PCOM terminals.

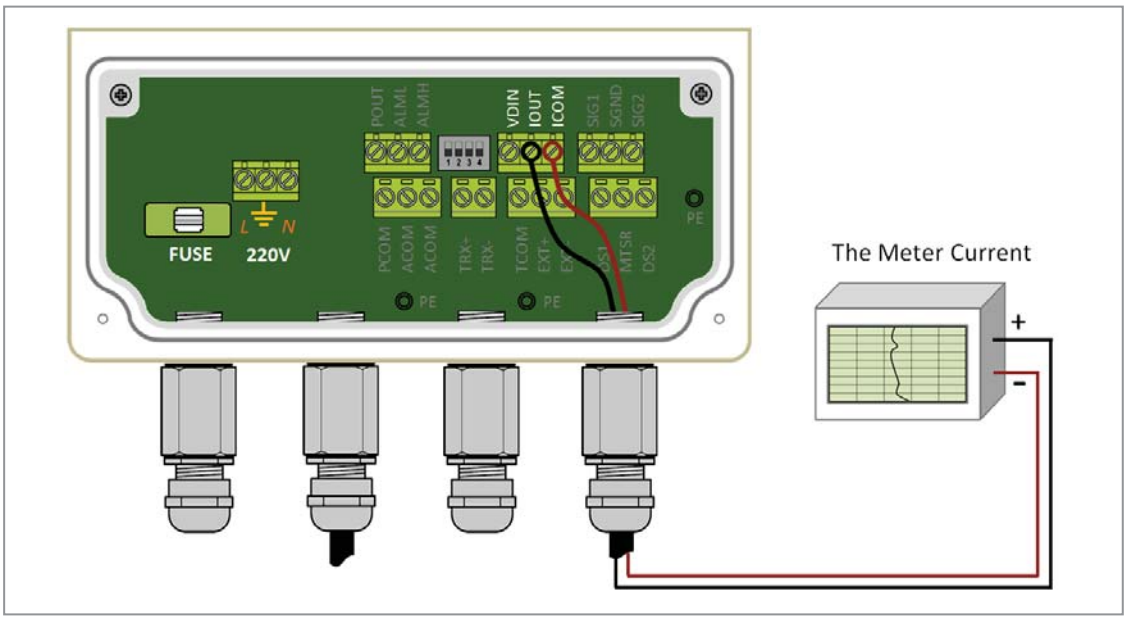

Fig. 9 (a): Connection of Current Output

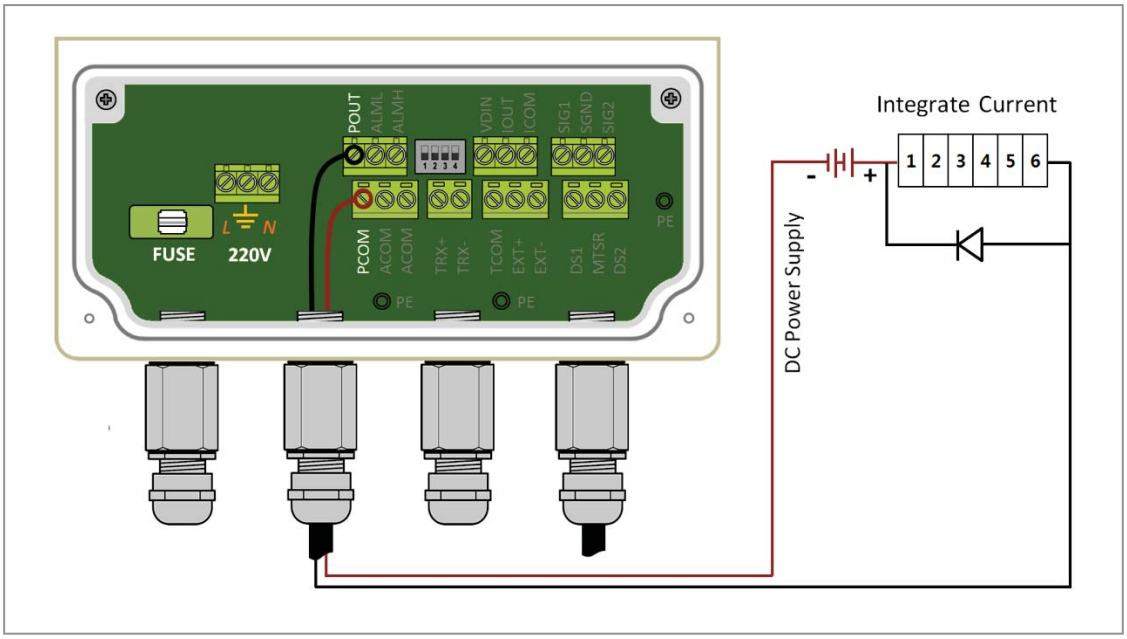

Fig. 9 (b): *Connection with Electromagnetic Counter*

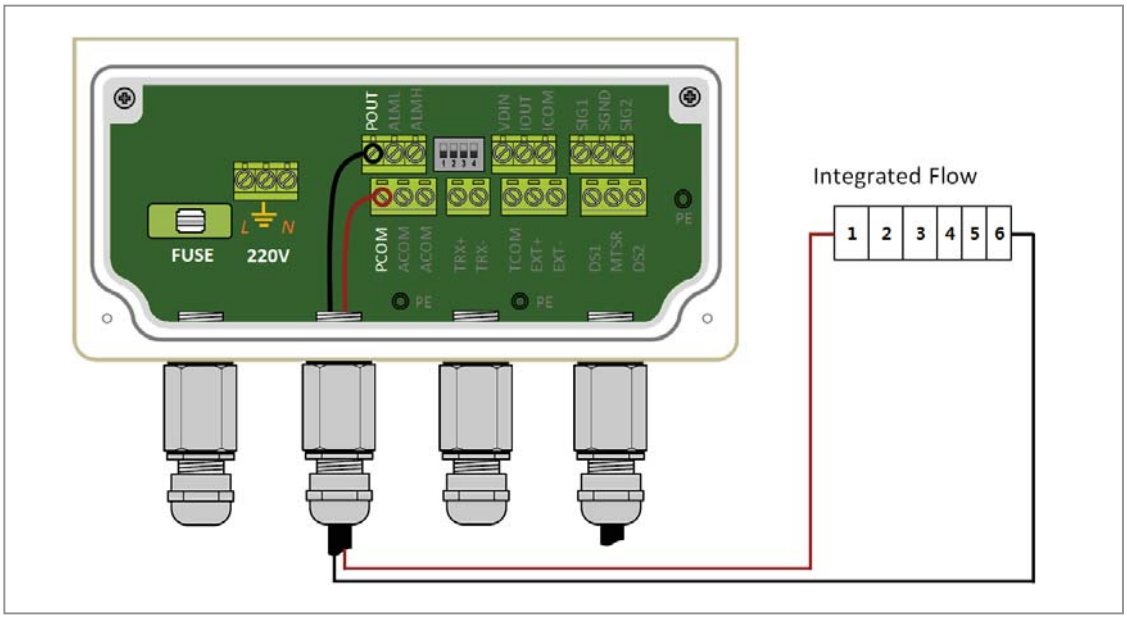

Fig. 9 (c): *Connection with Electronic Counter*

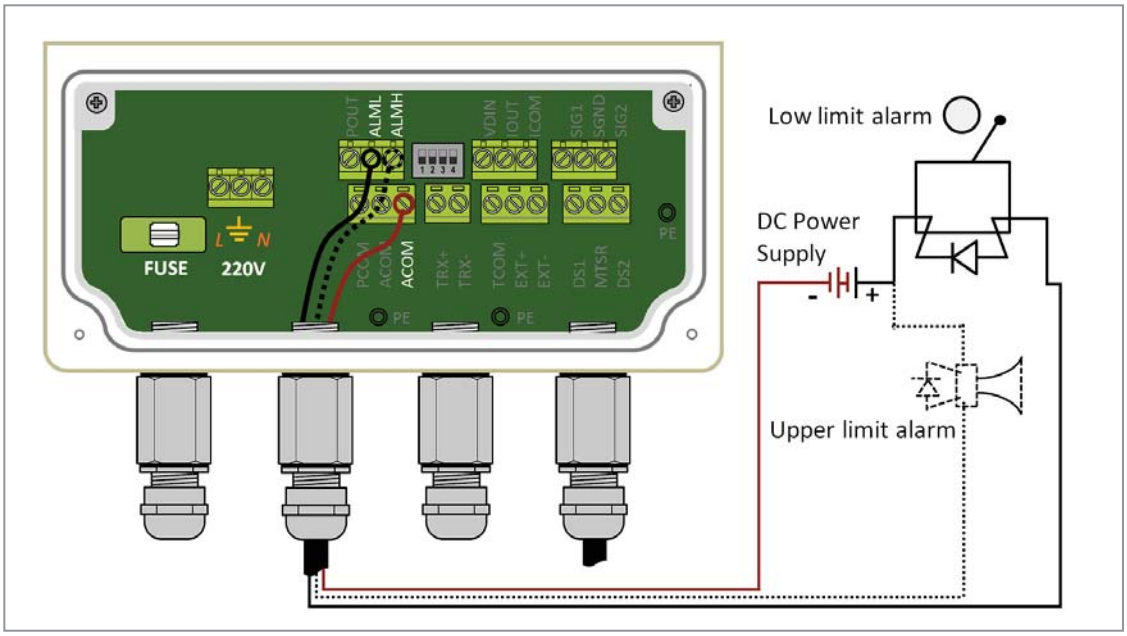

Fig. 9 (d): *Connection of Alarm Output*

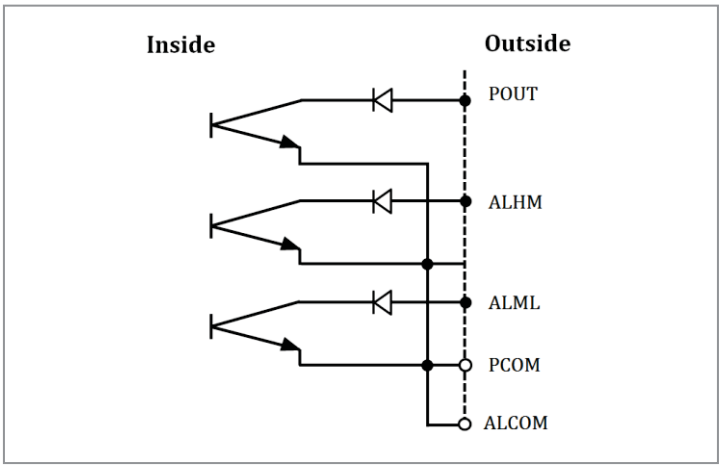

Fig. 9 (e): *Connection of OC Gate*

2.3 Digital Data Output and Count

Digital output is frequency output and pulse output. Frequency output and pulse output use the same connection output point, therefore, users can only choice one of frequency output and pulse output at the same time.

2.3.1 Frequency Output:

The range of frequency output is 0 ~ 5000Hz and frequency output opposes percent flux.

F= (Measure value / Full scale value) • the range of frequency

The up limit of frequency output can be adjusted. It can be choice from 0 ~ 5000Hz, and also can be choice low frequency: such as 0 ~ 1000Hz or 0 ~ 5000Hz.

Frequency output mode general can be used in control application, because it responses the percent flux. Users can choice pulse output when the equipment is applied to count.

2.3.2 Pulse Output Mode:

Pulse output mainly applies in count mode.
Pulse output delegates a unit flux, such as 1L or $1m^3$ etc.
Pulse output unit divide into 0.001L, 0.01L, 0.1L, 1L, $0.001m^3$, $0.01m^3$, $0.1m^3$, $1m^3$, 0.001UKG, 0.01UKG, 0.1UKG, 1UKG, 0.001USG, 0.01USG, 0.1USG, 1USG.
When users choice the pulse unit, they should notice the match of the flux range of flowmeter and pulse unit:

QL=0.0007854×D2×V (L/s) or
QM=0.0007854×D2×V×10-3 (m^3/S)
Note: D-nozzle (mm) **V**-velocity of flow (m/s)

The oversize flux and too small pulse unit will be made the pulse output over the up limit.
Generally, pulse output should be controlled below 2000P/S. However, the too small flux and too large pulse unit will be made the instrument exports a pulse long time.
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2.3.3 The Connection of Digital Output

Digital output has three connected points: digital output connected point, digital ground point, and symbol as follows:

POUT ----- digital output point; **PCOM** ----- digital ground point;
POUT is collector cut-off circuit output. Connect the line diagram as follows:

2.3.4 Digital Voltage Connect Mode

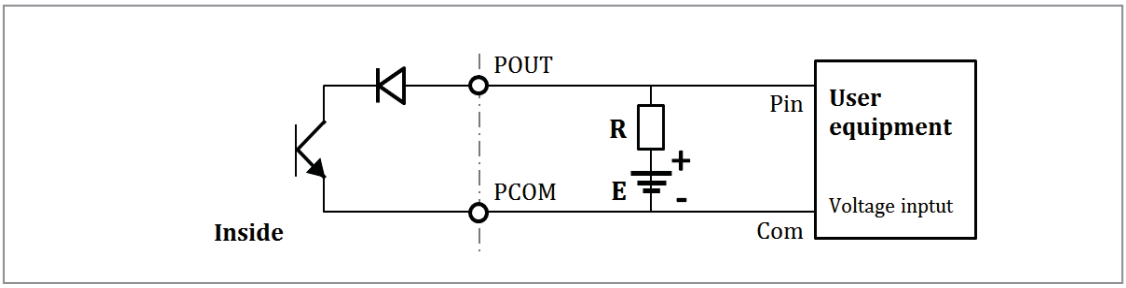


Fig. 10 (a): Connection of Digital Voltage Output

2.3.5 Digital output connect photoelectricity coupling (PLC etc.)

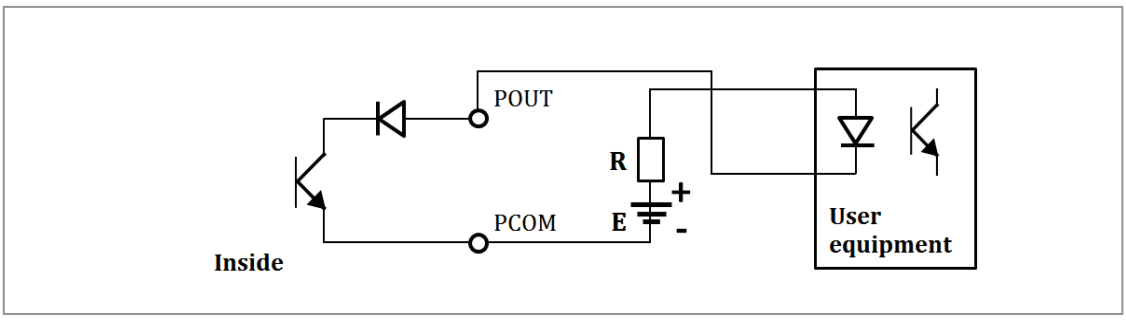


Fig. 10 (b): Digital output connect photoelectricity coupling

Commonly user's photoelectricity coupling current is about 10mA, so about E/R=10mA, E=5~24V.

2.3.6 Digital Output Connect Relay

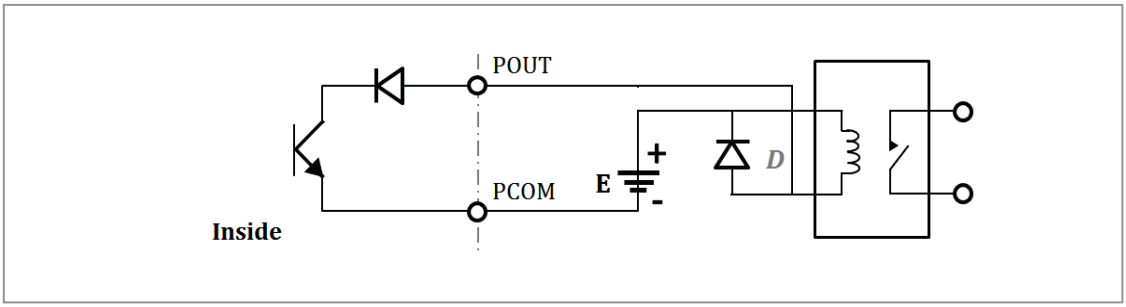


Fig. 10 (c): Digital Output Connect Relay

Commonly relay needs E as 12V or 24V. D is extending diode, now most middle relays has this diode inside.
If not have, user can connect one outside. Table of digital output parameter:

Parameter	Testing condition	Minimum	Type	maximal	Unit
Working voltage	IC=100 mA	3	24	36	V
Working current	Vol1.4V	0	300	350	mA
Working frequency	IC=100mA Vcc=24V	0	5000	7500	Hz
High voltage	IC=100mA	Vcc	Vcc	Vcc	V
Low voltage	IC=100mA	0.9	1.0	1.4	V

Table. 4: DS output parameter table:

2.4 Simulated Data Output and Count

2.4.1 Simulation Signal Output

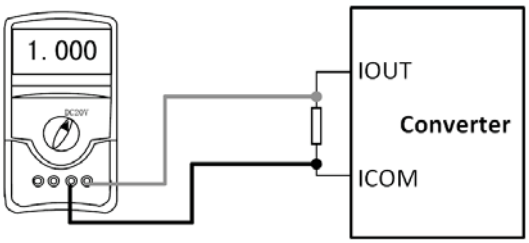
Simulation signal output can be separated two signals: 0~10mA, 4~20mA.
User can select one when parameter setting.
Simulation signal output inner is 24V under0~20mA, it can drive 750Ω resistance.
The percent flux of simulation signal output:

I_0 = (Measure value / Full scale value) ×the scale of current + the zero point of current

The current zero is 0 when 0~10mA, and the current zero is 4mA when 4~20mA.
It can be advanced simulation signal output distinguish.
User can select the range of measure.
The manufacture's parameter have been adjusted, it can't need adjust. If have abnormity, it can consult 7.4.1.

2.4.2 Simulation Signal Output Adjust.

(1) The Converter adjust preparative
When the converter is running 15 minutes, the inner of converter becomes stabilization.
Preparative 0.1% ampere meter or 250Ω 0.1% voltage instrument



(2) Current zero correct
When the converter getting into parameter setting, selecting to "Current zero correct" and enter to it.
The standard of signal fountain getting to "0".
Adjust parameter make ampere meter is 4mA (0.004mA).

(3) The full scale current correct
To select "current correct" to enter.
Adjust the converter parameter make ampere meter is 20mA (0.004mA)
Adjust the current zero and the full range, the current function of the converter reached exactness. The line degree of current output of conversion should be controlled within the scope of 0.1%

(4) Current line degree checking
You can place the standard signal source in 75% 50% 25%, and check the line degree of current output

3. Setting Parameters

Converters can be operated in two ways: ***1. Self-testing way*** ***2. Parameters setting way***

As soon as turning on the converter, it works in self-testing way doing all testing functions and displaying test data automatically. However, when it works in parameters testing way, parameters should be input by operators through keying three keys on its panel.

3.1 Function Keys (Integral Type)

3.1.1 Keys' Function in Self-Testing Way

"Down" key: Selecting displayed data on lower line in turn;
"Up" key: Selecting displayed data on higher line in turn;
"Compound" key + **"Enter"** key: Come into parameter setting;
"Enter" key: Press it to come into the picture of select function;
Under the measure, adjust of the LCD contract is used **"Compound"** key **+ "Up"** key or **"Compound"** key **+ "Down"** key for several seconds.

3.1.2 Keys' Function for Parameters Setting

"Down" key: Subtract 1 from the number at cursor area;
"Up" key: Plus 1 to the number at cursor area;
"Compound" key **+ "Down"** key: Cursor turns left;
"Compound" key **+ "Up"** key: Cursor turns right; **"Enter"** key: In/Out submenu;
"Enter" key: Press for two seconds under any state and will return to automate measure way.

Note:

(1) When use **"Compound"** key, you should press **"Compound"** key and **"Up"** or **"Down"** both;
(2) It will return to the measure way automatically after 3 minutes when under the parameter setting way;
(3) Direct select of zero correction about the flow, you can move the cursor to the left **+** or **-** , and use **"Down"** or **"Up"** to switch.

3.2 Function Keys for Setting Parameters (Integral Type)

To set or correct working parameters, the converter should be running in parameters setting way instead of measuring status.
In measuring status, push **"Compound" + "Enter"** keys getting to the select of parameter and transfer password (00000), and then correct the password with one of the new passwords that are provided by manufacturer (Initial password is 19818).
Finally, push the **"Compound" + "Enter"** keys to work in Parameters Setting Way.

3.2.1 Functions Select Menu

Push **"Compound" + "Enter"** keys to the functions select menu, push **"Up"** or **"Down"** keys to select, there are three functions:

Code	Functions	Explain
1	Parameters Set	Select this function; It can enter the picture of parameter.
2	Clr Total Rec	Select this function, It can be gross reset operation.
3	Fact Modif Rec	Select this function, It can be check the factor's modify Record

3.2.2 Parameters Setting

Press **"Compound"+"Enter"** key, it displays **"Parameters Set"** function.
Input password (Initial password is 19818).

Press **"Compound"+"Enter"** key, it getting to Parameters Setting status.

3.2.3 Clr Total Rec

To push **"Compound"+"Enter"** keys getting to the select of parameter, then push **"Up"** key to **"Clr Total Rec"**, input the passwords.
When the passwords becomes **"00000"**, this function is done, the gross is 0 in the instrument.

3.2.4 Fact Modif Rec

To push **"Compound"+"Enter"** keys getting to the select of parameter, then push **"Up"** key to **"Fact Modify Rec"** (Detail consult the Appendix Five)

3.3 Function Keys (Remote Type)

3.3.1 Keys' Function in Self- Testing Way

"Down" key: Selecting displayed data on lower line in turn;
"Enter" key: Press it to come into the picture of select function;
"Move" key: It moves cursor left and right.

3.3.2 Keys' Function for Parameters Setting

"Down" key: Subtract 1 from the number at cursor area;
"Up" key: Plus 1 to the number at cursor area;
Press the **"Move"** key and move the cursor to the down of the **"Up"** key. Press the **"Up"** key and enter into the child menu.
Press the **"Move"** key and move the cursor to the down of the **"Down"** key. Press the **"Down"** key and return to the parent menu.

3.4 Function Keys for Setting Parameters (Remote Type)

To set or correct working parameters, the converter should be running in parameters setting way instead of measuring status.
In measuring status, click **"Enter"** keys getting to the select of parameter and transfer password (0000), and then correct the password with one of the new passwords that are provided by manufacturer (Initial password is **19818**). Finally, push the **"Enter"** keys to work in Parameters Setting Way.

3.4.1 Functions Select Menu

Press "Enter" key getting to the select of function picture. And Press it to select. There are three functions:

Code	Function content	Explain
1	Parameter code	Select this function It can be enter the picture of parameter.
2	Gross reset	Select this function It can be gross reset operation.
3	Record Sensor Fact Alteration	It will record sensor fact history by changed.

3.4.2 Parameters Setting

Press **"Enter"** key, it displays **"Parameters Setting"** function. Input password. Press **"move"** key, Move cursor on the **"Enter"** key, Press it getting to Parameters Setting status.

3.4.3 Gross Reset

Press **"Enter"** key, and it displays **"Parameters Setting"** function. Press **"Enter"** key again.
Turn over page to **"Gross reset"**. Input password of gross reset **"00002"**. Press **"Enter"** key again, when **"00002"** change to **"00000"**.The reset function finished.

3.5 Setting Parameters in Menu (Same for Integral Type and Remote Type)

There are 54 parameters, user can set every parameter. The List of Parameters is shown below:

No.	Parameters Words	Setting Way	Limits of Parameters	Grades
1	Language	Select	English	2
2	Comm Addres	Set count	0 ~ 99	2
3	Baud Rate	Select	300 ~ 38400	2
4	Snsr Size	Select	3 ~ 3000mm	2
5	Flow Unit	Select	L/h, L/m, L/s, m^3/h, m^3/m, m^3/s, UKG, USG	2
6	Flow Range	Set count	0.0000 ~ 99999	2
7	Flow Rspns	Select	01 ~ 64 SEC	2
8	Flow Direct	Select	Enable / Disable	2
9	Flow Zero	Set count	0000 ~ ±9999	2
10	Flow Cutoff	Set count	000.00 ~ 599.99%	2
11	Cutoff Ena	Select	Enable / Disable	2
12	Total Unit	Select	0.001L ~ 1L, 0.001m^3 ~ 1m^3, 0.001UKG ~ 1UKG, 0.001USG ~ 1USG	2
13	SegmaN Ena	Select	Enable / Disable	2
14	Analog Type	Select	0 ~ 10mA / 4~20mA	2
15	Pulse Type	Select	Frequency / Pulse	2
16	Pulse Fact	Select	0.001L ~ 1L, 0.001m^3 ~ 1m^3, 0.001UKG ~ 1UKG, 0.001USG ~ 1USG	2
17	Freque Max	Select	0000 ~ 9999	2
18	Mtsnsr Ena	Select	Enable / Disable	2
19	Mtsnsr Trip	Set count	00000 ~ 59999	2
20	Alm Hi Ena	Select	Enable / Disable	2
21	Alm Hi Val	Set count	000.00 ~ 599.99 %	2
22	Alm Lo Ena	Select	Enable / Disable	2
23	Alm Lo Val	Set count	000.00 ~ 599.99 %	2
24	Sys Alm Ena	Select	Enable / Disable	2
25	Clr Sum Key	Set count	0 ~ 99999	3
26	Snsr Code1	User set	Finished Y / M (0 ~ 99999)	4
27	Snsr Code2	User set	Product number	4
28	Field Type	Select	Mode 1, 2, 3	4
29	Sensor Fact	Set count	0.0000 ~ 5.9999	4
30	Line CRC Ena	Select	Enable / Disable	2
31	Lineary CRC1	User set	00.000 ~ 19.999 m/s	4
32	Lineary Fact 1	User set	0.0000 ~ 1.9999	4
33	Lineary CRC2	User set	00.000 ~ 19.999m/s	4
34	Lineary Fact 2	User set	0.0000 ~ 1.9999	4
35	Lineary CRC3	User set	00.000 ~ 19.999 m/s	4
36	Lineary Fact 3	User set	0.0000 ~ 1.9999	4
37	Lineary CRC4	User set	00.000 ~ 19.999 m/s	4
38	Lineary Fact4	User set	0.0000 ~ 1.9999	4
39	FwdTotal Lo	Correctable	00000 ~ 99999	5
40	FwdTotal Hi	Correctable	0000 ~ 9999	5
41	RevTotal Lo	Correctable	00000 ~ 99999	5
42	RevTotal Hi	Correctable	0000 ~ 9999	5
43	PlsntLmtEna	Select	Enable / Disable	3
44	PlsntLmtVal	Select	0.010 ~ 0.800 m/s	3

45	Plsnt Delay	Select	400 ~ 2500 ms	3
46	Pass Word 1	User correct	00000 ~ 99999	5
47	Pass Word 2	User correct	00000 ~ 99999	5
48	Pass Word 3	User correct	00000 ~ 99999	5
49	Pass Word 4	User correct	00000 ~ 99999	5
50	Analog Zero	Set count	0.0000 ~ 1.9999	5
51	Anlg Range	Set count	0.0000 ~ 3.9999	5
52	Meter Fact	Set count	0.0000 ~ 5.9999	5
53	MeterCode 1	Factory set	Finished Y / M (0 ~ 99999)	6
54	MeterCode 2	Factory set	Product Serial No. 0 ~ 99999	6

Parameters of converters can decide the running status, process and output ways as well as state of output. Correct option and setting of parameters can keep the converters running optimally and get higher accuracies of output bother in display and in measurement.

There are 6 grades of passwords for setting parameters function.
Grades 1 to grade 5 of passwords are for users and grade 6 of password is for manufacturer.
Users can reset their passwords of grades 1~4 in grade 5.

Users can check converters parameters in any grade of password. However, if users want to change parameters of converters, deferent grade of parameters have to be used by the users.

- Grade 1 of password (set by manufacturer as **00521**): users can only read parameter.
- Grade 2 of password (set by manufacturer as **03210**): users can change 1~24 parameters.
- Grade 3 of password (set by manufacturer as **06108**): users can change 1~25parameters.
- Grade 4 of password (set by manufacturer as **07206**): users can change 1~38parameters.
- Grade 5 of password (Fixed): users can change **1~52** parameters.
- Grade 6 of password (Fixed: 19818): users can change **1~54** parameters.

Password Grade 5 can be set by skilled users. Grade 4 is mainly used for resetting total volume in password. Grades 1~3 can be set by anyone who can be chosen by users.

3.6 Details Parameters

3.6.1 Language

There are 2 languages for GT300_S200 Converter operation. They can be set by users according to the users needs.

3.6.2 Comm Addres

It means this instrument's address when communicates with many, and has 01~99, holding the 0.

3.6.3 Baud Rate

300, 1200, 2400, 4800, 9600, 38400, baud rate.

3.6.4 Snsr Size

GT300_S200 Converters can be equipped with some deferent sensors that have deferent diameter of measuring pipes. The pipes in deferent diameters from 3mm to 3000mm can be chosen in relative table.

3.6.5 Flow Unit

The flow unit can choose form the parameters (L/s, L/m, L/h, m^3/s, m^3/m, m^3/h), and the user can choose the proper unit according to the technological requirement and using habit.

3.6.6 Flow Range

Flow range means upper limit value, and lower limit value is set "0" automatically.

So, it makes the range, and makes the relation of percent display, frequency output and current output with flow:

percent display = (flow measure / measure range) * 100 %;
frequency output = (flow measure / measure range) * frequency full;
current output = (flow measure / measure range) * current full + base point;
pulse output will not affect.

3.6.7 Flow Rspns

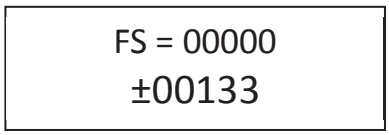
It means time of filter measure value. The long one can enhance the stability of flow display and output digital, and fits for gross add up of pulse flow; the short one means fast respond rate, and fits for production control. It is set by select.

3.6.8 Flow Direct

If users think the direct and design are differ, just change the direct parameter is OK, but not change exciting or signal.

3.6.9 Flow Zero

Make sure the sensor is full of flow, and the flow is stillness. Flow zero is shown as velocity of flow, mm/s.



Converter's zero-flow correction displays like this:
Upper small words: FS means measure value of zero;
Lower large words: correction value of zero.
When FS is not "0", make FS = 0.
Note: if change the value on next line and FS increases, please change the "+, -" to correct FS to zero. Flow zero is the compound value of the sensor, and should be recorded in sensor list and band. The unit will be mm/s, and the sign will be opposite with correction value.

3.6.10 Flow Cutoff

Flow cutoff is set in percentage of Upper Limit Range of flow, and users can delete all Negligible Small Signals of flow volume and percentage out of displaying and outputting them.

3.6.11 Total Unit

Converter display is counter with 9 bits, and the max is 999999999.
Integrator units are L, m^3 (liter, stere).
Flow integrator value: 0.001L, 0.010L, 0.100L, 1.000L :
0.001m^3, 0.010m^3, 0.100m^3, 1.000m^3 :
0.001 UKG, 0.010 UKG, 0.100 UKG, 1.000 UKG ;
0.001 USG, 0.010 USG, 0.100 USG, 1.000 USG :

3.6.12 SegmaN Ena

When "SegmaN Ena" is "enable", if the flow flows, the sensor will export pulse and current. When it is "disable", the sensor will export pulse as "0" and current as "0" (4mA or 0mA) for the flow flows reversals.

3.6.13 Analog Type

Output current types can be chosen by users as 1~10mA or 4~20mA practically.

3.6.14 Pulse Type

Two kinds of Pulse Outputs are can be chosen: Frequency Output and Pulse Output. Frequency Output is continuous square waveform and Pulse output is a serial wave of square wave. Frequency output is mainly used for instant flow and total integrated flow in short time measurement.

Frequency output can be chosen in equivalent frequency unit and volume of integrated flow can be displayed. Frequency Output can be used in long time measurement for total integrated flow with volume units.
Frequency output and pulse output are usually from OC gates so that DC power supplies and load resistors have to be required

3.6.15 Pulse Fact

Equivalent pulse Unit is referred to one pulse for value of flow. The range of pulse equivalent can be chosen:

Pulse Equivalent	Flow
1	0.001L/cp
2	0.01L/cp
3	0.1L/cp
4	1.0L/cp
5	0.001m^3/cp
6	0.01 m^3/cp
7	0.1 m^3/cp
8	1.0 m^3/cp

Pulse Equivalent	Flow
9	0.001UKG/cp
10	0.01 UKG/cp
11	0.1 UKG/cp
12	1.0 UKG/cp
13	0.001USG/cp
14	0.01 USG/cp
15	0.1 USG/cp
16	1.0 USG/cp

Under the same flow, the smaller pulse, the higher frequency output, and the smaller error will be. The highest pulse output is 100cp/s, and mechanism electromagnetic counter can get 25 frequency/s.

3.6.16 Freque Max

Frequency output range is as the upper limit of flow measure, just the percent flow 100%.
Frequency output upper limit can be selected between 1~5000Hz.
The state of empty pipe can be detected with the function of converter. In the case of Empty Pipe Alarm, if the pipe was empty, the signals of analog output and digital output would be zero and displayed flow would be zero, too.

3.6.17 Mtsnsr Ena

The state of empty pipe can be detected with the function of converter. In the case of Empty Pipe Alarm, if the pipe was empty, the signals of analog output and digital output would be zero and displayed flow would be zero, too.

3.6.18 Mtsnsr Trip

When the pipe is full of liquid (whether flowing or not), the parameter of “Mtsnsr” could be modified more easily.
The parameter displayed upper line is real MTP, and the parameter displayed bellow is the “Mtsnsr trip” that should be set. When setting “Mtsnsr trip”, you could be according to the real MTP, the value that should be set is usually three to five times of real MTP.

3.6.19 Alm Hi Ena

Users can choose “Enable” or “Disable”

3.6.20 Alm Hi Val

The parameter of upper limit alarm is percentage of flow range and can be set in the way of setting one numerical value between 0%~199.9%.When the value of flow percentage is larger than the value of setting value, the converter outputs the alarm signal.

3.6.21 Alm Lo Val

The same as upper limit alarm.

3.6.22 Sys Alm Ena

Selecting Enable will have the function, and selecting Disable will cancel the function.

3.6.23 Clr Sum Key

User use more than 3 byte code to enter, Then set this password in Clr Total Rec.

3.6.24 Snsr Code

It is referred to the produced date of sensor and the serial number of product that can keep the sensors coefficient right and accurate.

3.6.25 Sensor Fact

“Sensor Coefficient” is printed on the Label of the sensor when it is made in factory.
The “sensor coefficient” has to be set into Sensor Coefficient Parameter when it runs with converter.

3.6.26 Field Type

GT300 affords three exciting frequency types: 1/16 frequency (type 1), 1/20 frequency (type 2), 1/25 frequency (type 3).
The small-bore one should use 1/16 frequency, and large-bore one should use 1/20 or 1/25 frequency. When using, please select type 1 first, if the zero of velocity is too high, select the type 2 or type 3.

Note: Demarcate on which exciting type, working on it only.

3.6.27 FwdTotal Lo, Hi

Positive total volume high byte and low byte can change forthcoming and reverse total value, and be used to maintenance and instead.
User use 5 byte code to enter, and can modify the positive accumulating volume (∑+).
Usually, it is unsuitable to exceed the maximum the counter set (999999999)

3.6.28 RevTotal Lo, Hi

User use 5 byte code to enter, and can modify the negative accumulating volume (∑-). Usually, it is unsuitable to exceed the minimum the counter set (999999999).

3.6.29 PlsntLmtEna

For paper pulp, slurry and other serosity, the flow measure will have "cuspidal disturb", because the solid grain friction or concussion the measure electrode. GT300 S200 converters use variation restrain arithmetic to conquer the disturbing by designing three parameters to select disturb character.
Set it "enable", start variation restrain arithmetic; set it "disable", close variation restrain arithmetic.

3.6.30 PlsntLmtVal

This coefficient can disturb the variation of cuspidal disturb, and calculate as percent of flow velocity, thus ten grades: 0.010m/s, 0.020m/s, 0030m/s, 0.050m/s, 0.080m/s, 0.100m/s, 0.200m/s, 0.300m/s, 0.500m/s, 0.800m/s, and the smaller percent, the higher delicacy of cuspidal restrain.

Note: when using it, must test for select by the fact, and sometimes it is not the higher delicacy is good.

3.6.31 Plsnt Delay

This coefficient can select the width of time of restrain cuspidal disturb and the unit is ms. If the duration is shorter than flow change in some time, GT300 will think it is cuspidal disturb, and if it is longer, GT300 will think it is natural. It also needs to select parameter in fact.

3.6.32 Pass Word 1~4

Users can use 5 grades of passwords to correct these passwords.

3.6.33 Analog Zero

When the converters are made in the factory, output current has been calibrated to zero scale, that is, accurate 0mA or 4mA output.

3.6.34 Anlg Range

When the converters is made in the factory, output current have been calibrated to full scale, that is, accurate 10mA or 20mA output.

3.6.35 Meter Fact

This fact is the special one of sensor-made-factory and the factory use this fact to unite GT300_S200 Electromagnetic flowmeters converters to make sure all the instruments can interchange by 0.1%.

3.6.36 MeterCode 1 and 2

Converter code records the date of manufacturing and serial number of converter.

4. Alarm Information

PCB of electromagnetic flowmeters converters uses SMT, so for user, it is unable to service, and cannot open the shell of converter.
Intelligent converters have self-diagnose function. Without trouble of power and hardware circuit, the normal trouble can be alarmed correctly.

This information displays  on the left of LCD. The trouble is like this:

FQH ---- Flow high limit alarm; FQL ---- Flow low limit alarm;

FGP ---- Flow empty pipe alarm; SYS ---- System exciting alarm.

5. Installation

This section covers the steps required to physically install the flow tube.
Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations.
Please refer to the following safety messages before performing any operation in this section.

WARNING

Failure to follow these installation guidelines could result in death or serious injury: Installation and servicing instructions are for use by qualified personnel only.
Performing any servicing other than that contained in this manual may result in death or serious injury.
Do not perform any servicing other than that contained in the operating instructions, unless qualified.

CAUTION

The flow tube liner is vulnerable to handling damage.
Never place anything through the flow tube for the purpose of lifting or gaining leverage.
Liner damage can render the flow tube useless.

CAUTION

To avoid possible damage to the flow tube liner ends, do not use metallic or spiral-wound gaskets. If frequent removal is anticipated, take precautions to protect the liner ends.
Short spool pieces attached to the flow tube ends are often used for protection.

CAUTION

Correct flange bolt tightening is crucial for proper flow tube operation and life.
All bolts must be tightened in the proper sequence to the specified torque limits.
Failure to observe these instructions could result in severe damage to the flow tube lining and possible flow tube replacement.

5.1. Upstream and Downstream Piping

To ensure specification accuracy over widely varying process conditions, install the flow tube a minimum of five straight pipe diameters upstream and two pipe diameters downstream from the electrode plane (see Fig. 10).

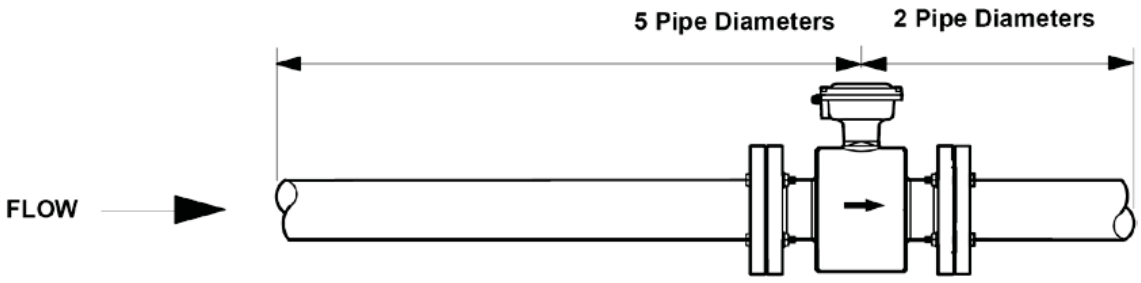


Fig. 10: Upstream and Downstream Straight Pipe Diameters

5.2 Flow tube Orientation

The flow tube should be installed in a position that ensures the flow tube remains full during operation. Horizontal or inclined positions are preferred. Fig. 11, Fig 12, and Fig. 13 show the proper flow tube orientation for the most common installations. The following orientations ensure that the electrodes are in the optimum plane to minimize the effects of entrapped gas. As illustrated in Fig. 12B and Fig. 13B, avoid downward flows where back pressure does not ensure that the flow tube remains full at all times.

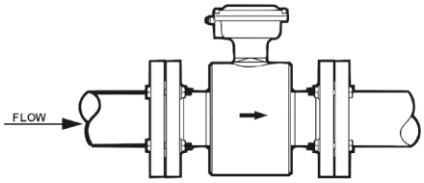


Fig. 11: *Horizontal Flow tube Orientation*

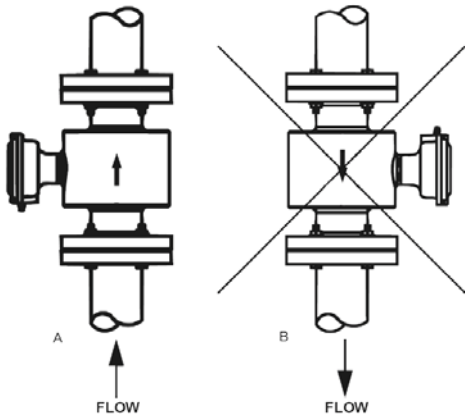


Fig. 12: *Vertical Flow tube Orientation*

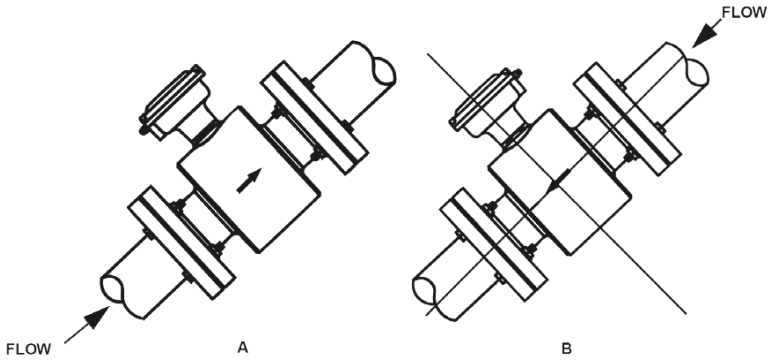


Fig. 13: *Incline or Decline Orientation*

5.3 Flow Direction

The flow tube should be mounted so that the FORWARD end of the flow arrow, shown on the flow tube identification tag, points in the direction of flow through the tube (see Figure 14).
In this mounting configuration, the conduit ports point upstream.

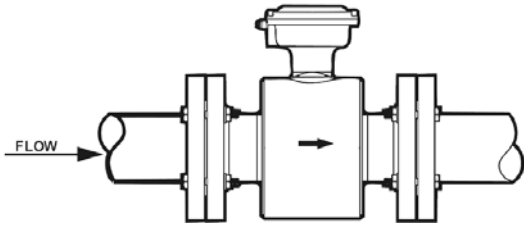


Fig. 14: *Flow Direction*

5.4 Grounding

Grounding the flow tube is one of the most important details of flow tube installation.
Proper grounding ensures that only the voltage induced in the magnetic field of the flow tube is measured.
Use Table 5 to determine which grounding option to follow for proper installation.
Attached grounding rings should be grounded equivalently to non-attached grounding rings.
The flow tube case should always be grounded in accordance with national and local electrical codes.
Failure to do so may impair the protection provided by the equipment.
The most effective grounding method is direct connection to earth ground with minimal impedance.

Type of Pipe	Grounding of Options		
	No Grounding Options	Grounding Rings	Lining Protectors
Conductive Unlined Pipe	See Fig. 15	Not Required	See Fig. 16
Conductive Lined Pipe	Insufficient Grounding	See Fig. 16	See Fig. 16
Non-Conductive Pipe	Insufficient Grounding	See Fig. 17	See Fig. 17

Table 5: *Grounding Installation*

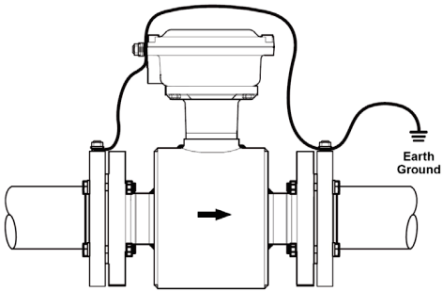


Fig. 15: *No Grounding Options or Grounding Electrode in Lined Pipe*

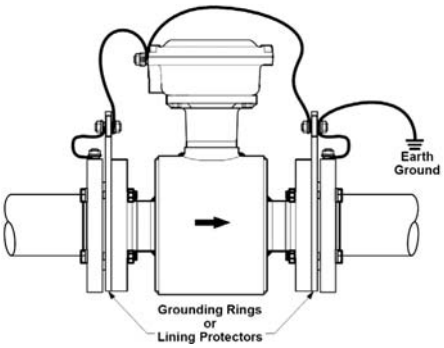


Fig. 16: *Grounding with Grounding Rings or Lining Protectors*

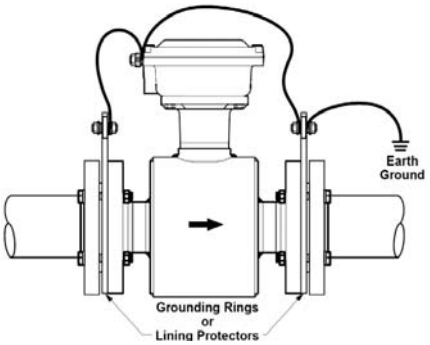


Fig. 17: *Grounding with Grounding Rings or Lining Protectors*

6. Troubleshooting

1) No Display:

a) Check the power supply connection;
b) Check the power fuse to see for OK;
c) Check the contrast of LCD and regulate it to working state;

2) Exciting Alarm

a) Check if the exciting cables EX1 and EX2 did not connected;
b) Check if the total resistance of sensor's exciting coil resistances less than 150Ω;
c) If a) and b) are OK, the converter is failed.

3) Empty Pipe Alarm

a) If measured fluid full of testing pipe of sensor;
b) When shorting circuit three connectors SIG 1, SIG 2, SIGGND of converter, and no "Empty Alarm" displayed then the converter works OK. In this case, it is possible that conductivity of measured fluid may be small or empty threshold of empty pipe and range of empty pipe are set wrongly.
c) Check if the signal cable is OK;
d) Check if the electro-poles are OK or not.
- Let the flow is zero, then the displayed conductivity should be less than 100%.
- Resistances of SIG1 to SIGGND and SIG2 to SIGGND are all less than 50kΩ (conductivity of water) during measurement operation. (It is better to test the resistances by means of multi meter with pointer to see the charging process well.)

e) The DC voltage should be less than 1V between DS1 and DS2 testing the voltage by means of multi meter.
If DC voltage is larger than 1V, the electro poles of sensor were polluted that have to be cleaned.

4) Incorrect Measurement of Flow

a) Check if the fluid full of testing pipe;
b) Check if the signal cable connection is right;
c) Check if the sensor coefficient and zero settings are no deferent from the data on the labels of product that are calibrated by manufacturer.