

OUR PRODUCTS:



Website : www.unitechmeter.com

Electromagnetic Flow meter
UPCS MAG-110

Electromagnetic Flowmeter

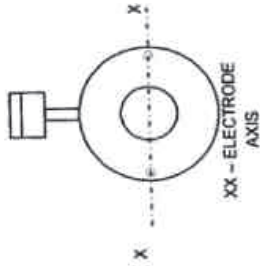
User's Manual

UPCS MAG-110

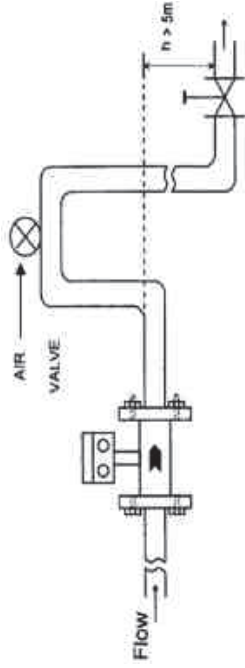


UPC Instruments Pvt. Ltd.

AN ISO 9001:2015 certified company



1. Fit Air Valves as shown if the down pipe is at a height greater than 5 meters to remove vacuum.



- a. Strong Electromagnetic Field should not be located in the immediate vicinity of the flow tube since these could affect the field generated by the coils in flow tube and hence disturb the reading stability and accuracy. Ensure that no magnetic material other the pipe and connecting flanges should come in contact with the flow tube.
- b. Ensure that the minimum conductivity of the fluid under measurement is greater than 5 $\mu\text{seimens/cm}$ are marinated. Ensure that the fluid under measurement does not contain magnetic particles in it other wise it will lead to measurement errors.
- c. Reducer : Reducers should be flanged and generally shall reduce by one size nominal bore otherwise the pressure loss will be high. The table given below is a general guideline Dimensions for reducers

User's Manual

UPCS MAG-110

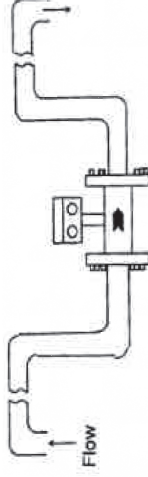


CONTENTS

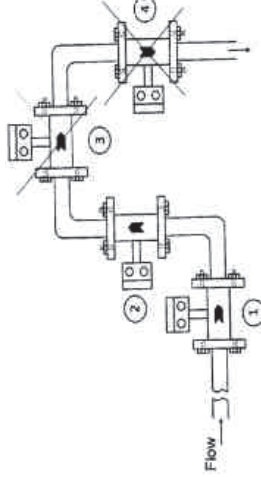
1.	OVERVIEW
1.1	BASIC FUNCTION
1.2	BASIC PARAMETERS AND PERFORMANCE
1.3	DIGITAL COMMUNICATION PORT AND PROTOCOL
1.3.1	MODBUS Protocol
1.3.2	HART protocol
2.	CONVERTER DISPLAY AND KEYS OPERATION
2.1	MEASUREMENT STATE DISPLAY
2.2	KEYS AND DISPLAY
2.2.1	Key Function
2.2.2	Keys Operation Method
2.2.3	Enter Password
2.2.4	Parameters Browse State
2.2.5	Edit State
3.	CONNECTIONS OF SENSOR AND OUTPUT
3.1	UPCS-MAG110 WIRING TERMINAL
3.2	UPCS-MAG110 SUB-BODY TYPE WIRING TERMINAL
3.3	GROUNDING
3.4	FREQUENCY OUTPUT, PULSE OUTPUT, UPPER LIMIT ALARM
3.4.1	Frequency Output Mode
3.4.2	Pulse Output Mode
3.4.3	P/AH for Frequency, Pulse, Upper Limit Alarm output Wiring
3.5	AL FOR LOWER LIMIT ALARM OUTPUT OR FLOW DIRECTION OUTPUT
3.6	CURRENT OUTPUT AND CALCULATE FORMULA
3.6.1	Current Output
3.6.2	Connection of current output:
3.6.3	Current output trim
4.	PARAMETER SETTING AND CONFIGURATION
4.1	CLEAR TOTAL
4.2	PARAMETER SETTING
4.3	CONVERTERS PARAMETERS DESCRIPTION
4.3.1	Language
4.3.2	Instrument Communication Parameter



4. Open Feed or Open Discharge Provide sluice underpass if full pipe cannot be assured. This ensures full pipe under No Flow Condition.

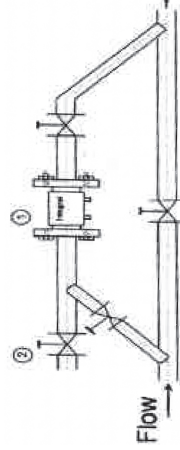


5. Location 1 and 2 are recommended location, Location 3 is the highest point in pipe run. This location is not recommended since air bubbles collect in the metering tube which.



6. In case of heavily contaminated Fluids, the primary flow tube should be installed with a bypass pipeline and isolation valves so that it can be removed for cleaning without interrupting operation.

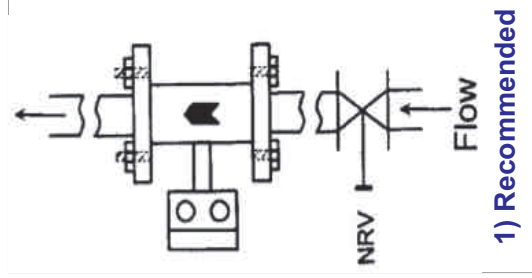
1. Primary Flow tube,
2. Isolation valve and pipeline for draining and cleaning



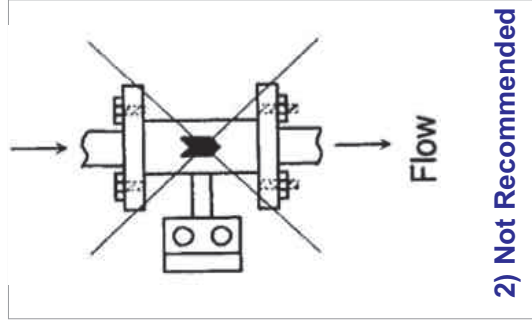
7. For Horizontal Installations the measuring electrode axis should always lie in horizontal plane to prevent contamination on electrodes and avoid loss of contact of electrodes with fluid because of gas bubbles, if present.



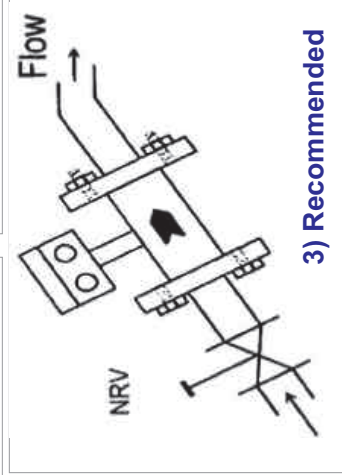
3. Ensure that primary flow tube remains completely filled by the fluid under measurement even under no flow condition. This ensures trouble free and reliable operation of the flow meter. Select a location on the pipe, which will always run full of liquid. For vertical installations the direction of flow against Gravity ensure full pipe. Some of the recommended installation are as under.



1) Recommended



2) Not Recommended



3) Recommended



4.3.3	Sensor Size
4.3.4	Instant Flow Unit
4.3.5	Flow Display Decpoint
4.3.6	Meter Flow Range
4.3.7	Flow Rspns: Damping time
4.3.8	Flow Direction Point
4.3.9	Flow Zero Correction
4.3.10	Flow Cutoff
4.3.11	Total Unit
4.3.12	Sigma_NEna
4.3.13	Analog Type
4.3.14	P/AH Function Select
4.3.15	AL function Select
4.3.16	Empty Pipe Alarm
4.3.17	Upper and Lower Limit Alarm
4.3.18	Excitation alarm
4.3.19	Clr Sum Key
4.3.20	Sensor Parameter
4.3.21	Excitation Type Select
4.3.22	Forward / Reverse total volume
4.3.23	Variation restrain
4.3.24	User's password 1~4
4.3.25	Current output correct
4.3.26	Meter factor
4.3.27	Flow collect mode
4.3.28	Backup/ Restore Instrument Parameter
4.3.29	Data Export and Import
4.3.30	Meter Code 1 and 2
4.3.31	Nonlinear correction function
5.	TROUBLESHOOTING
5.1	NO DISPLAY
5.2	EMPTY PIPE ALARM
5.3	EXCITING ALARM
5.4	MEASURE FLOW DISALLOW
6.	APPENDIX: THE FLOW AND THE FLOW RATE CORRESPONDING TABLE



Electromagnetic Flow meter Converter User's Manual

1. Overview

Basic Function

- ◆ Low-frequency square-wave exciting, exciting frequency, 1/10 power frequency, 1/16 power frequency, 1/25 power frequency;
- ◆ Exciting current: 125mA
- ◆ No need to add additional electrode for empty pipeline measurement;
- ◆ Current speed range: 0.1 --- 15m/s, current speed resolution, 1mm/s;
- ◆ AC liner power, range of voltage: 220VAC(±10%);
- ◆ DC power: DC24V(±10%);
- ◆ Communication function: MODBUS RTU protocol (RS-232 or RS-485) standard; Or HART communication option;
- ◆ Analog output: 0~10mA or 4~20mA;
- ◆ Equivalent pulse output can be set;
- ◆ Three integrator gross inside, respective register, Forward integrated flow, reverse integrated flow, difference integrated flow.
- ◆ Alarm functions: support excitation, pipes empty, Upper and lower alarm;
- ◆ Small flow linear correction functions: Support small flow four-point linear correction;
- ◆ Data back up and restore: manufacturer original information backup and restore;
- ◆ Data export and import: use of external EEPROM can import, export the instrument parameters (except converter parameters) and accumulation.

Basic parameters and performance

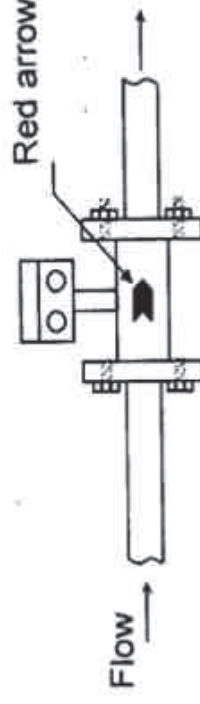
- ◆ Operating temperature: -20°C to +180°C
 - ◆ Relative Humidity: 5% ~ 90%
 - ◆ Analog current output
 - Load resistor: 0~1200Ω for 0~10mA
 - 0~600Ω for 4~20mA,
 - Accuracy: 0.1%±10(μ)-Micro A
 - ◆ Digital frequency output
 - Frequency output range: 1~5000Hz
 - Output electric isolate: Photoelectric isolate. Isolate voltage: > 1000VDC;
 - Frequency output: Internal pull up resistor of 1500Ω the drive current 8mA.
- The highest voltage is 24VDC for external power supply, and the maximum



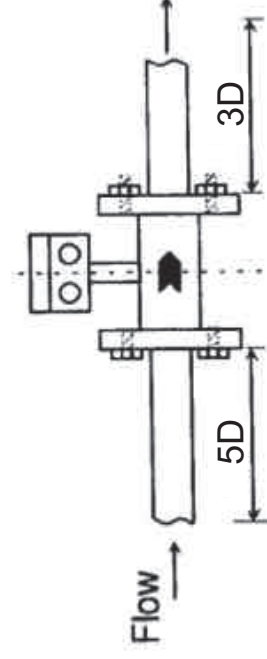
SURGE PROTECTION :

SECTION 'B' INSTALLATION B : HOW TO INSTALL UPCS MAG-110

- 1) Flow meter can be installed in any position either vertical or Horizontal
 - 2) Select a Pipe Location which will always fun of Liquid. Vertical installation with flow from down to top assures full pipe condition.
 - 3) For Horizontal installation, the electrode axis should always be in horizontal plane.
 - 4) Flow meter is no be installed in such a way that flow is always in the Direction pointed by red arrow on the instrument.
 - 5) Suitable gasketing can prevent leakages from near the flanges. The Primary Flow Tube can be installed at any point in the pipe run either horizontal or vertical provided the following conditions are met;
1. The direction of flow though the pipe is same as indicated on the Primary flow tube by a red arrow.



1. Straight lengths of maximum 10D on upstream and minimum 10D on Down-stream as shown. If disturbances like cork screwing or vortex flow condition is increased or flow straightness should be used be arranged at a distance of at least 10D downstream of primary flow tube.





Size **M3/hr.** **LPM** **LPS** **USGPM**

DN in mm	Min.	Max.	Min	Max	Min.	Max	Min.	Max
15	0.13	7.63	2.12	127.21	0.04	2.11	0.56	33.61
20	0.23	13.56	3.77	226.15	0.06	3.77	1.00	59.75
25	0.35	21.19	5.89	353.36	0.10	5.88	1.56	93.35
32	0.58	34.91	9.65	578.96	0.16	9.65	2.55	152.95
40	0.90	54.28	15.08	904.63	0.25	15.07	3.98	238.98
50	1.41	84.82	23.56	1413.49	0.39	23.56	6.22	373.40
65	2.39	143.28	39.82	2389.20	0.66	39.80	10.52	631.06
80	3.62	217.08	60.31	3618.55	1.01	60.30	15.93	955.92
100	5.65	339.24	94.23	5653.99	1.57	94.22	24.89	1493.63
125	8.84	530.16	147.24	8834.38	2.45	147.24	38.90	2333.80
150	12.72	763.32	212.03	12721.50	3.53	212.02	56.01	3360.66
200	22.60	1356.00	376.93	22616.00	6.28	376.93	99.58	5974.51
250	35.20	2112.00	588.96	35337.50	9.82	588.96	155.59	9335.18
300	50.89	3053.16	848.10	50886.00	14.14	848.10	224.04	13442.65
350	69.26	4155.72	1154.36	69261.50	19.24	1154.36	304.95	18297.00
400	90.46	5427.84	1507.73	90464.02	25.13	1507.74	398.30	23898.12
450	114.49	6869.64	1908.40	114503.76	31.81	1908.43	504.10	30246.00
500	141.35	8481.00	2355.83	141350.03	39.26	2355.85	622.35	37340.76
600	203.54	12212.52	3392.40	203544.04	56.54	3392.42	896.18	53770.68
700	277.04	16622.40	4618.08	277084.68	76.96	4617.47	1219.90	73193.88
800	365.44	21976.40	6090.65	365439.00	101.51	6090.48	1593.20	95592.24
900	457.98	27478.80	7633.87	458032.32	127.23	7634.04	2016.79	121007.52
1000	568.16	34089.60	9469.50	568169.76	157.82	9469.44	2489.38	149362.92
1200	814.18	48850.80	13569.60	814176.12	227.27	13636.44	3584.74	215084.16
1400	1108.18	66490.80	18471.94	1108316.28	307.88	18472.68	4880.30	292818.24
1600	1447.42	86845.20	24125.37	1447522.44	402.08	24124.68	6372.82	382369.20
1800	1831.90	109914.00	30809.45	1848566.76	513.50	30810.12	8139.39	488363.16
2000	2261.60	135696.00	37880.56	2272833.60	631.34	37880.52	9957.53	597451.80
2700	4121.76	247305.96	68696.11	4121766.82	114.94	68696.64	181475.99	1088855.99



load current is 100mA.

Pulse output width: Square wave output, and the maximum high level is 50ms.

Pulse output isolate: Photoelectric isolate. Isolate voltage: > 1000VDC;

Pulse output: Internal pull Up resistor of 1500Ω, the drive current 8mA.

The highest voltage is 24VDC for external power supply, and

the Maximum load current is 100mA.

◆ Measure precision for assembly

Diameter(mm)	Range(m/s)	Accuracy
3 ~20	<0.3	±0.25%FS
	0.3~1	±1.0R
	1~15	±0.5%R
25 ~600	0.1~0.3	±0.25%FS
	0.3~1	±0.5%R
	1~15	±0.3%R
700~3000	<0.3	±0.25%FS
	0.3~1	±1.0%R
	1~15	±0.5%R
%FS: for relative ranges;		
%R: for relative value of measurement		

Digital Communication Port and Protocol

MODBUS Protocol :

Physical interface RS-485, electric isolate, format of RTU.

You can use Modbus-Config-Tool software to set parameters, or read real-time flow, totalized flow value, etc.

HARTprotocol :

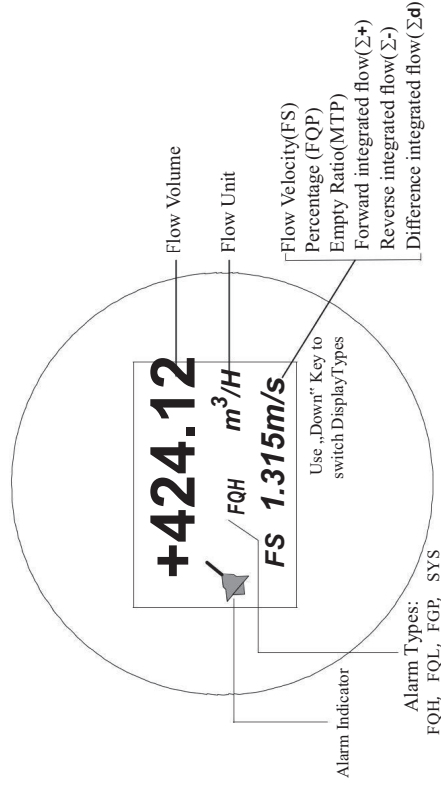


The standard HART of communication protocol, you can use the HART-Config-Tool software, or HART handheld, to set parameters, or read real-time flow, totalized flow value, etc.

2. Converter display and keys operation

Measurement State Display

The measuring data and status display as flows:



Note: When there more than one alarm, the alarm status display cycle.

FQH --- Flow high limit alarm

FGP --- Flow empty pipe alarm

FQL --- Flow low limit alarm

SYS --- System exciting alarm

The converter contains four key: Complex key, Up key, Down key and Enter key On measuring state display, the keys functions are:

- Push"Downkey"to change line3 displaying value. Cycle display flow rate, percentage flow, empty ratio, forward integrated flow, reverse integrated flow and difference integrated flow.
- Push"Complex key + Up key", LCD screen contrast increases
- Push"Complex key + Down key",LCD screen contrast decrease
- Push "Complex Key + Enter", enter into "Password"interface.



We can enable nonlinear correction function to achieve higher accuracy. Selects four points correction, and the correction points and coefficient is calculated in the following table:

	Correction point (m/s)	correction flow velocity
1	0.300	1.0 (must 1.0 ! ! !)
2	0.225	1.018 (0.225 / 0.221 = 1.018)
3	0.150	1.034 (0.150 / 0.145 = 1.034)
4	0.075	1.087 (0.075 / 0.069 = 1.087)

5. Troubleshooting

No display

- 1) Check the power supply connection;
- 2) Check the power fuse;
- 3) Check the power voltage;

Empty pipealarm

- 1) Check if the signal cable is ok
- 2) If measured fluid full of testing pipe of sensor
- 3) Short circuit SIG 1, SIG 2, SGND of converter, if 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 are set wrongly. Then increases the empty pipe threshold until the empty pipe alarm disappear.
- 4) Check if the electrode-poles are ok or not. Resistances of SIG1 to SIGGND and SIG2 to SIGGND are all less than 50kΩ (conductivity of water) during measurement operation.
- 5) The DC voltage should be less than 1V between DS1 and DS2. Test the voltage by voltmeter. If DC voltage is larger than 1V, the electro poles of sensor were polluted that have to be cleaned.

Exciting alarm

- 1) Check if exciting cables is ok.
- 2) Check if the sensor electrode wiring is ok
- 3) If 1,2,are OK, the converter is failed

Measure flowdisallow

- 1) Check if the ground is ok;
- 2) Check if the signal cable is ok
- 3) If measured fluid full of testing pipe of sensor
- 4) Check the sensor fact coefficient and sensor zero coefficient whether set as the sensor scutcheon.



4.3.29 Nonlinear correction function

Nonlinear correction function is used for line regulation of flow which under 0.3m/s. This function is designed to four segments, and includes four flow velocity points and four correction factors. Nonlinear correction coefficient works on the basis of the original transducer calibration coefficient, so please turn off nonlinear correction function before calibrating the coefficient.

Flow correction coefficient calculated as:

Correction coefficient = actual flow / measured flow

Correction coefficient > 1.0 is positive correction (increase flow), correction coefficient

<1.0 is negative correction (decrease flow). The correction points should keep the following relationship:

15.0m/s=> Correction point1> Correction point2> Correction point3> Correction point4> 0 Nonlinear correction points (flow rate) and correction coefficient corresponding relationship as shown in the following table:

Original flow velocity	coefficient
15.0m/s ≥ Flow rate ≥ Correction point 1	Correction coefficient 1
Correction point 1 > Flow rate ≥ Correction point 2	Correction coefficient 1 and 2 linear interpolation
Correction point 2 > Flow rate ≥ Correction point 3	Correction coefficient 2 and 3 linear interpolation
Correction point 3 > Flow rate ≥ Correction point 4	Correction coefficient 3 and 4 linear interpolation
Correction point 4 > Flow rate ≥ 0.00m/s	Correction coefficient 4

Note:

In order to ensure that the flow between the correction point 1 and 15m /s is not effect by the correction coefficient, the correction coefficient must is 1.000!!!

Application example:

Assuming the meters test the four small flow points when the nonlinear correction function is not turned on, the data is in the table below, you can see the flow rate of 4 points has bias:

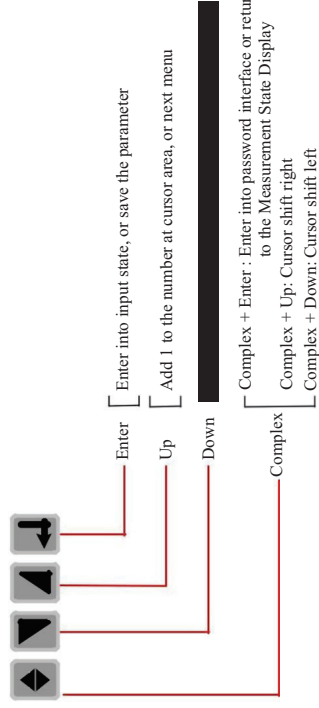
Actual flow (m/s)	measured flow (m/s)
0.225	0.221
0.150	0.145
0.075	0.069



Keys And Display

Key Function

The basic function of keys as follow:



Keys Operation Method

1) Single Key Operation

Operation method: Push the key, then lift. The single keys operation function as follow:

- Enter key: Enter or exit submenu.
- Up key: Add 1 to the number at cursor area, or next menu.
- Down key: Subtract 1 to the number at cursor area, or previous menu.

2) Combination Key Operation

Use the Complex Key and other keys perform the operation. Operation method: Hold down the Complex Key, then push another key.

- Complex Key + Up Key: Cursor shift right.
- Complex Key + Down Key: Cursor shiftleft.
- Complex Key + Enter Key: Enter into password interface or return to the Measurement State Display.



Enter Password

To enter the password for example, illustrate the keys operation process:

- 1) When the display on measurement state (Normal Display State), meanwhile push "Complex key "+" "Enter key", will enter into "Set Param 0000" Input the passwords (The password and the level, please refer the "parameter set" part, the second level password of
- 2) Push "Complex key", cursor will move to the digital area, prompt can input the digital?
- 3) Then push "Up key" to add 1 to the number at cursor area; And push "Down Key" to subtract 1 to the number at cursor area.
- 4) Meanwhile push "Complex key + Down key", cursor shift right; And meanwhile push "Complex key + Up key", cursor shift left.
- 5) To finish input, push "Enter key", if password is correct, then enter into the parameter setting.

Note: Press for three seconds under any state and will return to automate measure way.

Parameters Browse State 1)

Browse State Display

Parameter browse state is used to view various types of parameter values, LCD display sup to four lines, as shown below:

Flow zero correct	Parameter name
Error	Error prompt
13.000	Current value
FS	Real-time flow rate
0.063	

Error: When the parameter value error display;

The fourth line real-time flow rate: Flow rate value displayed when browser zero flow correction coefficient, the factory calibration coefficients, flow correction coefficient 1, flow correction coefficient 2, flow correction coefficient 3, flow correction coefficient 4.



Meter Factor

This factor is the special one of sensor-made-factory and the factory use this fact to unite E8000 electromagnetic flow meters converters to make sure all the instruments can interchange by 0.1%.

Meter factor calculate formula:

Meter factor= actual flow (rate) / instrument measured flow (rate)

Note: Please disable "Line CRC Ena" to turn off the non-linear correction function before you calibrate the sensor parameter, otherwise the calibration will be inaccurate.

Flow Collect Mode

There are many ways of Flow collection: the way from 1 to10 are available. The way 1 is fit for most occasions; only when the measured liquid containing particles cause measurement instability, it is recommended to use way 10.

Backup/ Restore Instrument Parameter

Backup instrument parameter means store instrument parameter and converter factor data to EEPROM. Users have 5-6 grade have the rights to backup parameters.

Restore instrument parameter means read instrument parameter and converter factor data from

EEPROM to make the converter return to previous backup status. Users have 2-6 grade have the rights to restore parameters. The restored parameters are different for different user grade.

Recovery range is the same as access range. As show in table 4-2.

Suggestion: Manufacturers should backup instrument parameters, if users make error for parameters, they can restore parameters.

Data Export and Import

The upcs-110 converter provides a pluggable external EEPROM for instrument parameters export and import.

Export instrument parameter mean that export the instrument parameters of 1 50 and total volume parameter to external EEPROM, when the convert was damaged, users only need replace a new converter, and import instrument parameter from the external EEPROM. The parameter can be set to the new converter and the forward/ reverse total volume will continue accumulate.

4.3.38 Meter Code 1 and 2.

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



Forward / Reverse total volume

Forward total volume high byte and low byte can change forthcoming and reverse total volume, and be used to maintenance and instead.

Users who use 5 grade access authority have rights to modify the forward and reverse total volume ($\Sigma +$ and $\Sigma -$). The setting value should not exceed the maximum value (999999999).

Variation restrain

Such as pulp or mud liquids, solid particles in the fluid shock measuring electrode will form a "peak noise", in order to overcome such interference, converter using the rate of change suppression algorithm, converter design has three parameters : spike suppression allowed, spike suppression coefficient, spike suppression time, the rate of change suppression characteristics for selection.

- 1) Variation restrainenable
Set it "enable", then start variation restrain arithmetic.

- 2) Variation restrain factor
This coefficient setting the rate of change of peak interference suppression, its value is flow rate and the unit is m/s. There are ten grades: 0.010m/s, 0.020m/s, 0.030m/s, 0.050m/s, 0.080m/s, 0.100m/s, 0.200m/s, 0.300m/s, 0.500m/s, 0.800m/s. The smaller grade, the higher sensitivity of interference suppression.

Note: In the practical application, you can based on the actual situation try to multiple choices, the higher sensitivity not means the better you choose.

- 3) Variation restrain time
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, converters will think it is cuspidal disturb, and if it is longer, converters will think it is natural. It also needs to select parameter infact.

User's password 1~4

Users have 5 grades of passwords have rights to correct these passwords.

Current output correct

Current output of converter had been modified at factory. Users can re-calibrate the current output refer part 3.

Note: Type 0-10mA output without calibrate after calibrate 4~20mA.



2) Key Operation on Browse State

Down key : Previous menu

Up key : Next menu

Enter key : Enter into parameter editing state if have rights, or keep browse state. Complex key + Enter key : return to the previous menu.

More than 10 minutes without push any key, or push 3 seconds the "Enter Key", direct return to automate measurement state.

Edit State

1) Edit State Display

Users can modify the parameter values in edit mode, the LCD displays:

<i>Flow zero correction</i>	<i>Parameter name</i>
<i>+0.063</i>	<i>Set value</i>
<i>FS.c 0.063</i>	<i>Flow rate before corrected</i>

The third line displays the flow rate which without any adjustment. It will shows when edit zero, sensor coefficient value, etc.

2) Key Operation on EditState

Up key : Add 1 to the number at cursor area.

Down key : Subtract 1 to the number at cursor area.

Enter key : Save the new parameter and return to browse state. If the parameter unreasonable, will prompt "fault".

Complex key + Up key: Cursor shift right.

Complex key + Down key: Cursor shift left.

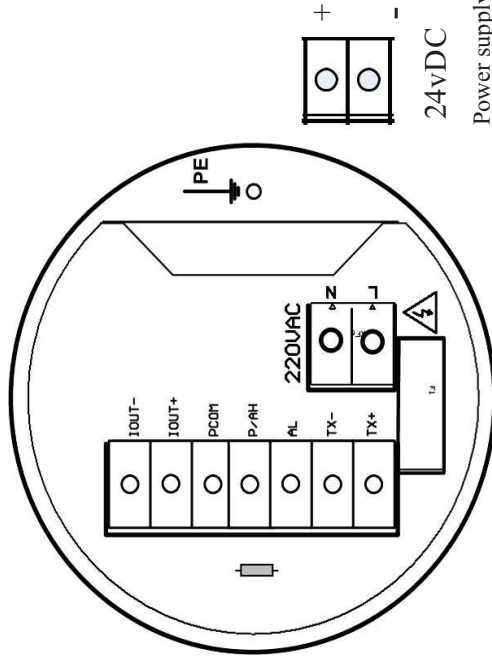
Complex key + Enter key: Return to browse state.

More than 10 minutes without push the key, or push 3 seconds the "Enter Key", direct return to automatic measure state



3. Connections of sensor and output UPCS-MAG110 Wiring Terminal

Remove the bottom cover of the converter, and you can see the terminal board.



Power supply: 24V
converter terminal

Symbols and description of connectors:

IOUT- :	4~20mA/0~10mA Output Current Ground
IOUT+ :	4~20mA/0~10mA Output Current Positive
PCOM :	Frequency (Pulse) Output Ground/Upper And Lower Alarm Ground
P/AH :	Frequency (Pulse) Output Ground /Upper Alarm Output
AL :	Alarm Output for Low Limit / Flow Direction Output
TX - :	Communication Input Signal, RS485 B
TX + :	Communication Input Signal, RS485 A
L : (+)	220V Power Supply L. (24V Power Supply +)
N : (-)	220V Power Supply N. (24V Power Supply -)



Upper and Lower Limit Alarm

- 1) Enable Upper and Lower Limit Alarm
Users can choose "Enable" or "Disable" upper and lower limit.
- 2) Upper and Lower Alarm Value

The parameter of Upper limit alarm is percentage of flow range and can be set in the way of setting one numerical value between -200.0%~200.0%.When the value of flow percentage is larger than the value of setting value, the converter outputs the alarm signal and alarm instruction FGP.

If P/AH and AL set the alarm output, then output corresponding alarm status.

Excitation Alarm

When the converter is not contacted the excitation coil, or when the excitation coil is open, will lead to excitation alarm. The excitation alarm signalSYSand will be displayed, andthe output flow is 0.

Excitation alarm function can be "Enable" or "Disable".

Clr Sum Key

This menu set the clear total password, users have more than 3 grade can set this password.

Sensor Parameter

- 1) Sensor 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.
- 2) Sensor Fact coefficient
"Sensor Fact Coefficient" is printed on the Label of the sensor when it is made in factory.
The "Sensor Fact Coefficient" has to be set into Sensor Coefficient Parameter when it runs with converter.

Sensor factor calculate formula:

Sensor factor = actual flow (rate) / instrument measured flow (rate)

Note: Please disable "Line CRC Ena" to turn off the non-linear correction function before you calibrate the sensor parameter, otherwise the calibration will be inaccurate.

Excitation Type Select

Instrument provides three exciting frequency types: 5Hz (1/10 frequency, type 1), 3.125Hz (1/16 frequency, type 2), 2Hz (1/25 frequency, type 3). The small-bore one should use 1/10 frequency, and large-bore one should use 1/16 or 1/25 frequency.

Demarcate on which exciting type, working on it only. You should demarcate the converter again when you modified the ways of excitation.



Analog Type

converter output current can be chosen by 0~10mA or 4~20mA.

P/AH Function Select

Upper limit alarm output, frequency output and pulse output share the same wiring terminal of P/AH, you can choose the type of the current output signal by setting the output mode.
For more details, please check the 3rd section.

AL function Select

Lower limit alarm output and flow direction output share the same wiring terminal of AL, you can choose the type of the current output signal by setting the output mode.
For more details, please check the 3rd section

Empty Pipe Alarm

- 1) Enable Empty Pipe Alarm
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. The flow empty pipe alarm signal FGP and will be displayed.
- 2) Empty Pipes Alarm Threshold
When empty pipe alarm is not accurate, the user can reset the empty pipe alarm thresholds to achieve the empty pipe alarm recalibration. Please ensure full pipe before calibration (with or without the flow rate may be), otherwise the calibration will be inaccurate.
Enter into "Empty Pipes Alarm Threshold" the LCD will display empty ratio in line 3 behind FS.c. The line 2 is empty ratio threshold setting by user. Please wait the pipes alarm threshold is stable, can set the empty pipes alarm threshold, otherwise pipes alarm correction will be not accurate. Empty pipes alarm threshold set is actual empty pipes value 10 times higher than FS.c, the recommended minimum is set to 100. If the threshold setting is too small, it may lead to mis information.

Empty pipes alarm threshold

+ 5 0.0

FS.c 1.000

Second line: the user input empty pipes alarm threshold.
Third line: FS.c indicate the current pipe sampling value.



Grounding

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

Frequency Output, Pulse Output, Upper Limit Alarm

The frequency output, pulse output and upper limit alarm output share the same wiring terminal of P/AH. Set as follow:

P/AH Function	Function Description	P/AH Output
Frequency Output	Frequency Mode	Frequency Output Range is 0 ~5000HZ, and corresponding the percent of flow
Pulse Output	Pulse Mode	Equivalent Pulse
Upper Alarm	Upper Alarm Output	P/AH Output Low: Upper Alarm Limit P/AH Output High: No Upper Alarm Limit

Frequency output mode general can be used in control application, because it responds the percent of flow. Users can choose pulse output when the equipment is applied to count.

Frequency Output Mode

Frequency output range, 0 ~5000Hz, and corresponding the percent of flow.

$$F = \frac{\text{Measure value}}{\text{Full scale value}} \times \text{frequency range}$$

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 ~2000HZ etc.

Pulse Output Mode

Pulse output mainly applies in count mode. A pulse output delegates a unit flow, such as 1L or 1M3 etc. Pulse output unit divide into 0.001L, 0.01L, 0.1L, 1L, 0.001M3, 0.01M3, 0.1M3, 1 M3 Users should select the appropriate pulse unit according the flow range of flowmeter. For



volume flow, count formula as follows:

$$QL=0.0007854 \times D^2 \times V \quad (L/S)$$

$$\text{Or } QM=0.0007854 \times D^2 \times V \times 10^{-3} \quad (M^3/S)$$

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 3000 Plus/Second. However, the too small flow 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.

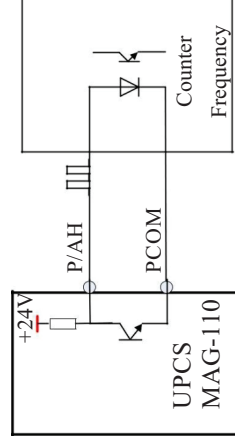
P/AH for Frequency, Pulse, Upper Limit Alarm output Wiring

Frequency/pulse digital output has 2 connected points: output connected point, ground point, the symbols as follows

P/AH Output
PCOM Ground

Frequency, equivalent pulse output wiring ways:

User equipment connected between P / AH and PCOM. The converter has a pull-up resistor inside to limit the current to user equipment, and the voltage of pulse output is 24V.



Flow Zero Correction

Make sure the sensor is full of flow, and the flow is 0 (stillness). If the measurement value is not zero, users can set the flow rate to 0 through the flow zero correction.

Flow zero is shown as flow rate, m/s. Converter's zero-flow correction displays like this:

Flow zero correction
±0.063
FS.c0.063

The third line displays the flow rate which without adjustment, the unit is m/s. Correction method: Input the value behind FS.c to line 2.

Note: Flow zero correction value is a signed value, it should have same sign with line 3.

Flow Cut off

Flow cut off is set in percentage of Upper Limit Range of flow, and users can delete all negligible small signals of flow volume. If the flow lower than flow cutoff setting, then it will be set to 0, and the corresponding percentages, the current output signal frequency (pulse) output signal is also 0.

Note: Flow cutoff does not affect flow rate value.

Total Unit

Converter display is counter with 9 bits, and the max is 999999999.

Total units are 0.001L, 0.010L, 0.100L, 1.000L, 0.001m3, 0.010m3, 0.100m3, 1.000m3. Users

Electromagnetic Flow meter

should select the appropriate unit based on the actual flow.

Total units for display are L or m3. The display unit and the decimal digits represent the real total unit.

Example: The forward integrated flow is 1000.12345, and total unit is 0.001m3, the third line will display:

$$\Sigma + 1000.123 \text{ m}^3$$

Sigma_NEna

When "Sigma_NEna" is "enable", if the flow is reverse, the sensor will export pulse and current. When it is "disable", the sensor will export pulse as "0" and current as "0V"(4mA or 0mA) for the reverse flow.



Converters Parameters Description

Instrument Communication Parameter
Upcs-mag110 electromagnetic flow transmitter support RS-232/RS-485, Modbus-RTU protocol.
Communication Address : 01 247 , The factory default address 1.
Baud Rate: 600, 1200, 2400, 4800, 9600, 19200bps and the factory default 9600bps.

Instant Flow Unit

Instant flow unit has six options : L/s, L/m, L/h, m³/s, m³/m, m³/h.

Flow Display Decpoint

Flow display decpoint is used to set the decimal digits of instantaneous flow five figures are optional after the decimal point.

Meter 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 + current zero
Note: pulse output will not affect.

Flow Rspns: Damping time

It means time of filter measure value. The values range from 0 to 50 seconds. 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.

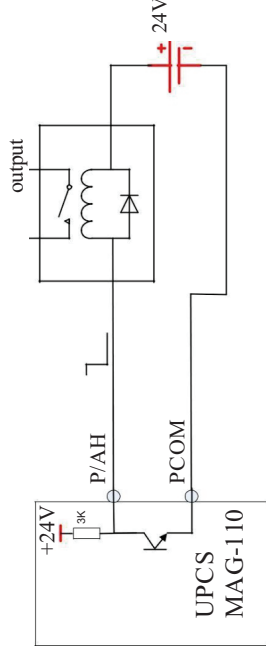
Flow Direction

If users think the direct and design are differ, just change the direct parameter is OK, and do not need to change exciting or signal



Alarm output mode of connection:

The converter can add relay to output alarm signal:



AL for Lower Limit Alarm output or Flow Direction Output

The lower limit alarm output and flow direction output share the same wiring terminal of AL. Set as follow:

AL selection	function	AL output state	Show state
Lower alarm		Low level	No Lower Limit Alarm
flow direction		High level	Lower Limit Alarm
		low level	Flow is reverse
		high level	Flow is forward

The lower alarm output and flow direction output wiring way is same to P/AH.

Current Output and Calculate Formula

Current Output

There are two analog output mode: 0 10mA and 4 20mA, the inner voltage is 24V. When select 4~20mA, it can drive 600Ω resistance.

The percent flow of simulation current output:

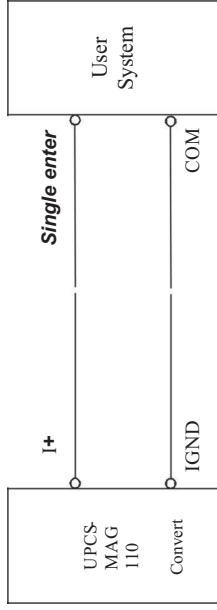
$$I_o = \frac{\text{Measure value}}{\text{Full scale value}} \bullet \text{the scale of current} + \text{the zero point of current}$$

The manufacture 's parameter has been adjusted, and it need not adjust.



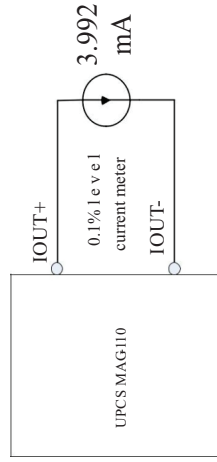
Connection of current output:

Connection of current output as follow:



Current output

- 1) Instrument timing prepare
Preparative ampere meter. The accuracy should be better than 0.1%.



2) Current Zero Correction

Through the key, Enter the "current zero correction" parameter edit mode, LCD display as shown

below.

At this point the converter outputs 4mA, the user only needs to input actual current value measured by the current meter, then push the "Enter Key" to complete 4mA corrected.

Current zero correction

3.610



3) Current Full correction

Through the key, Enter the "Current full correction" parameter edit mode,

At this point the converter outputs 20mA, the user only need to input actual current value measured by the current meter, then push the "Enter Key" to complete 20mA corrected.

Current full correction

19.510

4. Parameter setting and configuration

Clear Total

Push "Complex + Enter" to Enter into "Set Param 0000" page, then push "Up" key or "Down" key, to switch to the "Clear Total 0000" page.

Enter the clear total password, and push "Enter" key to clear forward integrated flow, reverse integrated flow, difference integrated flow.

Parameter setting

There are 59 parameters of -converter as is shown in Table. Before use the instrument, the user should be setting the parameters according to the particular cases. Make sure the parameters running status, data processing algorithms, output ways as well as work ways

In order to prevent parameters are free to modify, there are 6 grades of passwords for setting parameters function, Corresponding 6-levels permissions user. 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 1-6 grade of password. However, users can only modify the parameters corresponding to own password (rights).

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 any one who can be chosen by users.