BROIL

Electromagnetic
Flow Meter Manual



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1. Overview

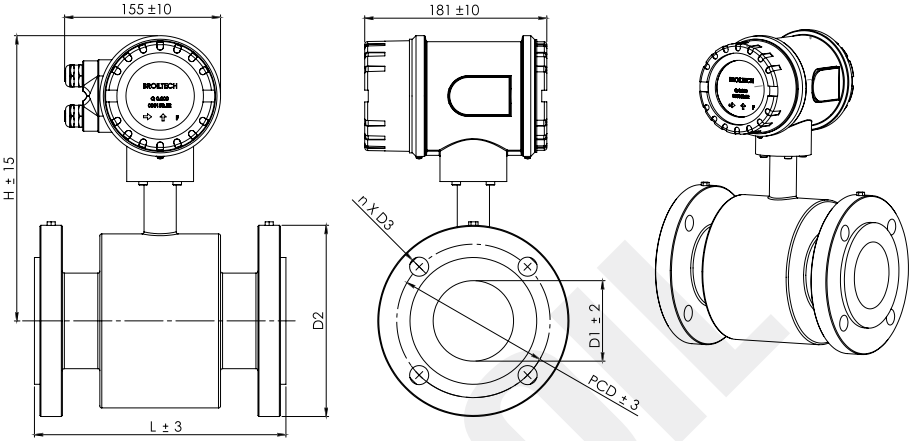
An Electromagnetic flowmeter, also known as a magmeter, Flow meter is a device that measures the flow rate of conductive fluids (liquids or slurries) by inducing a magnetic field and detecting the voltage generated as the fluid passes through it.

It's commonly used in industries such as water and wastewater management, chemical processing, and the food and beverage industry.

2. Flow Range

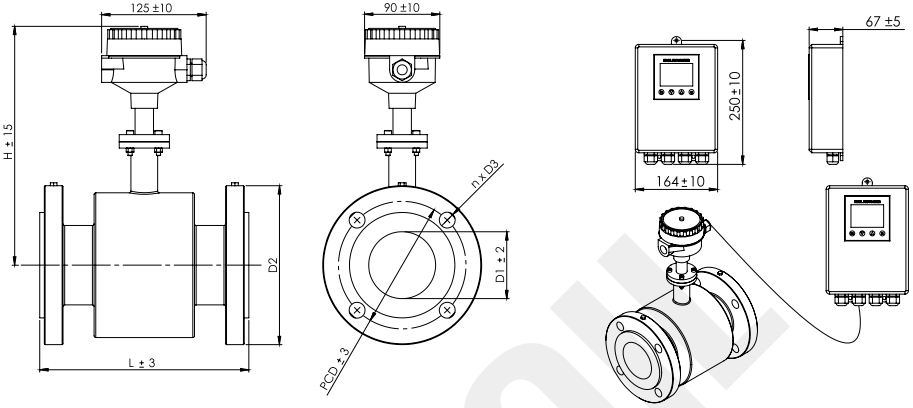
Model Number	Line Size	Range (m^3/hr)
BT-MFT-015	15 MM	0.32 ~ 05.09
BT-MFT-020	20 MM	0.57 ~ 09.05
BT-MFT-025	25 MM	0.88 ~ 17.67
BT-MFT-032	32 MM	1.45 ~ 28.95
BT-MFT-040	40 MM	2.04 ~ 40.83
BT-MFT-050	50 MM	3.53 ~ 70.69
BT-MFT-065	65 MM	5.61 ~ 112.22
BT-MFT-080	80 MM	9.05 ~ 180.96
BT-MFT-100	100 MM	14.14 ~ 282.74
BT-MFT-150	150 MM	33.96 ~ 679.29
BT-MFT-200	200 MM	57.69 ~ 1153.71
BT-MFT-250	250 MM	97.04 ~ 1940.86
BT-MFT-300	300 MM	127.23 ~ 2544.69

3. Dimension



• Integral Display Dimension

Model Number	L	D1	D2	n X D3	PCD	H
BT-MFT-015-R	200	15	90	4 x 16	60.3	256
BT-MFT-020-R	200	20	100	4 x 16	69.9	248
BT-MFT-025-R	200	25	110	4 x 16	79.4	251
BT-MFT-040-R	200	38	125	4 x 16	98.4	262
BT-MFT-050-R	200	50	150	4 x 19	120.7	267
BT-MFT-065-R	250	63	180	4 x 19	139.7	274
BT-MFT-080-R	250	80	190	4 x 19	152.4	284
BT-MFT-100-R	250	100	230	8 x 19	190.5	294
BT-MFT-150-R	300	155	280	8 x 22.3	241.3	321
BT-MFT-200-R	350	202	345	8 x 22.3	298.5	349
BT-MFT-250-R	450	262	405	12 x 25.4	362	384



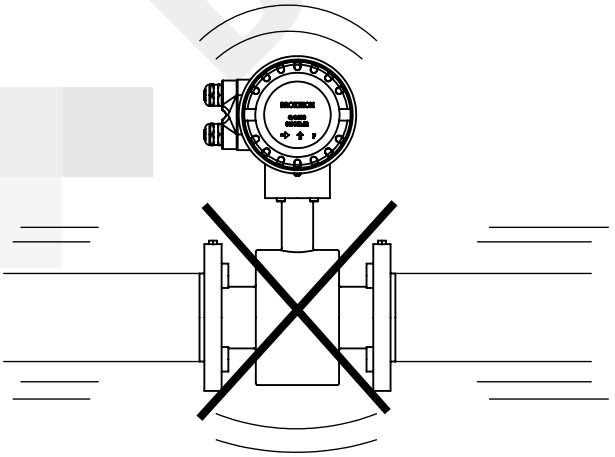
• Remote Display Dimension

Model Number	L	D1	D2	n X D3	PCD	H
BT-MFT-015	200	15	90	4 x 16	60.3	258
BT-MFT-020	200	20	100	4 x 16	69.9	250
BT-MFT-025	200	25	110	4 x 16	79.4	253
BT-MFT-040	200	38	125	4 x 16	98.4	264
BT-MFT-050	200	50	150	4 x 19	120.7	269
BT-MFT-065	250	63	180	4 x 19	139.7	276
BT-MFT-080	250	80	190	4 x 19	152.4	286
BT-MFT-100	250	100	230	8 x 19	190.5	296
BT-MFT-150	300	155	280	8 x 22.3	241.3	323
BT-MFT-200	350	202	345	8 x 22.3	298.5	351
BT-MFT-250	450	262	405	12 x 25.4	362	386

4. Installation

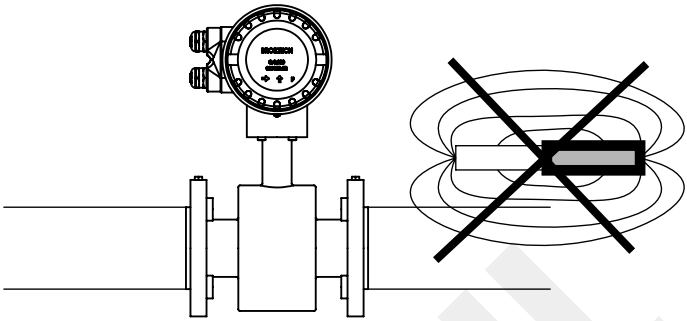
- Ensure there is a sufficient straight run of pipe upstream and downstream of the meter (typically 5-10 pipe diameters upstream and 2-5 pipe diameters downstream) to ensure a stable flow profile.
- Ensure the power supply is stable and free from electrical noise.
- Install the magmeter in a position where it will always remain full of fluid, typically in a horizontal orientation.
- Ensure there is sufficient space around the meter for installing and removing the sensor or transmitter.
- Protect the signal converter from direct sunlight by installing a sun shade if necessary.
- Ensure the power supply is stable and free from electrical noise.
- Install the magmeter in a position where it will always remain full of fluid, typically in a horizontal orientation.
- Ensure there is sufficient space around the meter for installing and removing the sensor or transmitter.
- Protect the signal converter from direct sunlight by installing a sun shade if necessary.

➢ Vibrations



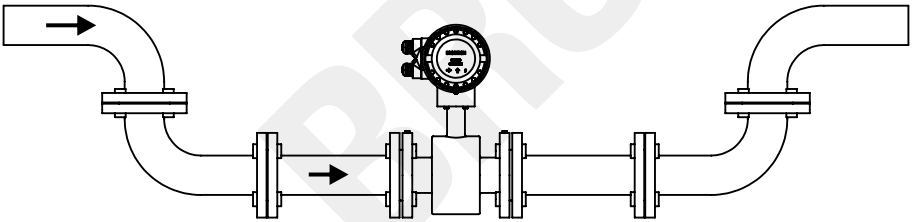
Avoid Vibration

➢ Magnetic Field



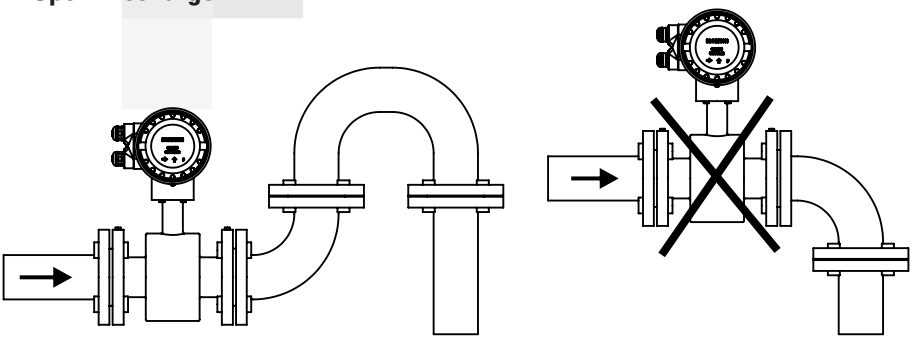
Avoid Magnetic Field

➢ U-Bend



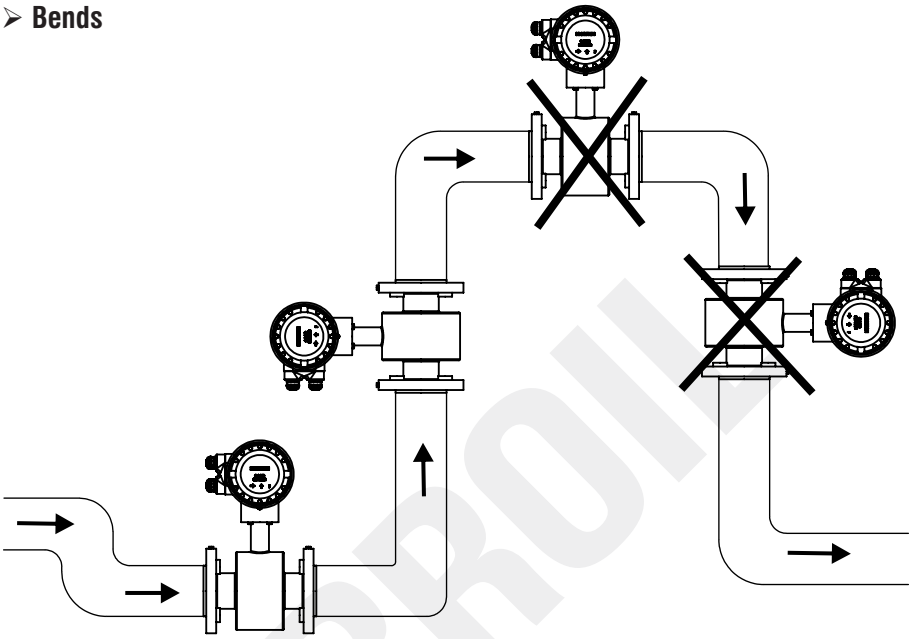
U-Bend

➢ Open Discharge

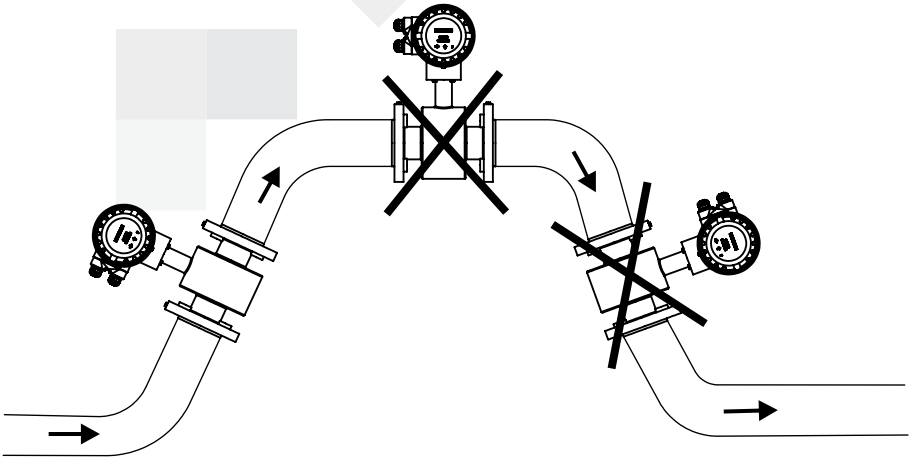


Open Discharge

➢ Bends

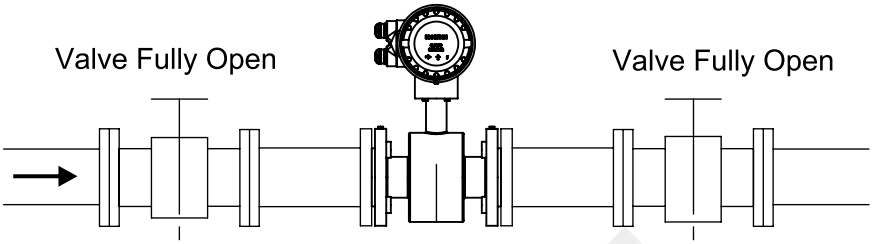


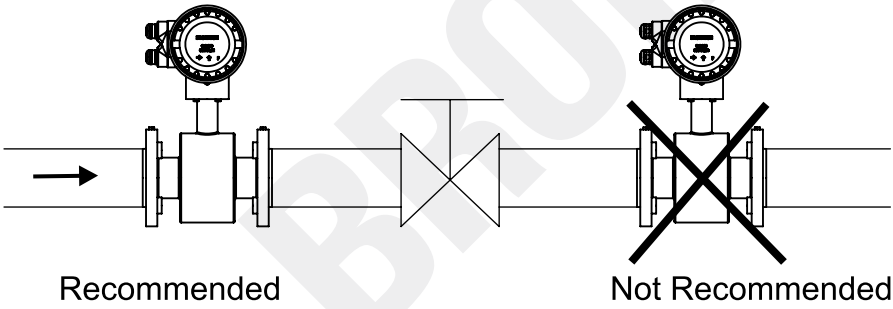
- Avoid installing the meter at the highest point of the piping system or in a downward flow where air bubbles can accumulate.



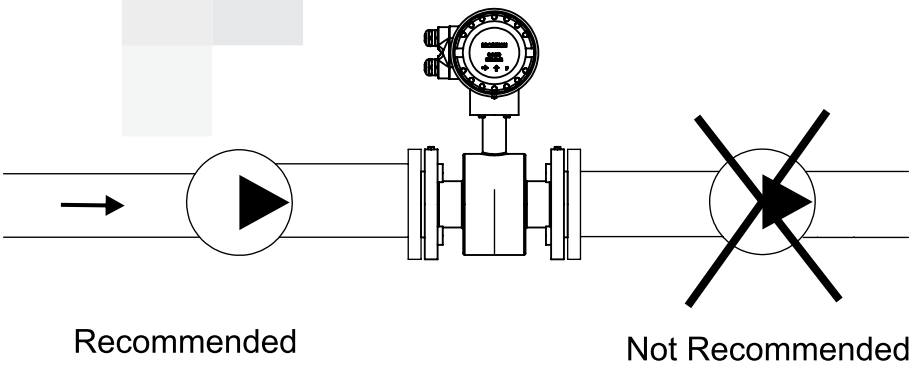
- Vertical installation on a descending slope in a pipeline is only recommended when the backpressure is effectively controlled.

➢ **Control valve**





➢ **Pump**



5. Display

The electromagnetic flowconverter entries into the automatic measurement status after power on. All ofmeasurement functions are ready and measurement data is displayed.

6. Keyboard

The transmitter enters theautomatic flow measurement mode after power on. All of measurement functionsare ready and measurement data are displayed. The parameters can be setup anddisplayed by pressing four keys: Upkey, Down key, Function key, and Enter key.


Up Key


Down Key



Function Key



Enter Key

Up key	Plus 1 for the selected digit, or go back to the previous item
Down key	Minus 1 for the selected digit, or enter the next item
Function key + Up key	Move cursor to right
Function key +Down key	Move cursor to left
Function key +Enter key	Select the password menu, enter the password, then go to the lower submenu, and save parameters
Enter key	Go back to upper submenu. Pressing and holding for more than two seconds, then releasing it at level One menu can active the flow meter automatically go to the measurement mode

7. Password

- The converter has three level passwords.
- The level one password: only can modify the password of level one.
- The level two passwords: can modify the password of level one and level two, also have authority to view password of level one
- The level three password: can modify the password of level one, level two and Level three; also have authority to view password of level one and level two;
- The level one default password is ”10000”, and the level two default password is **“40000”**
- The level three default password is “****”, this password should only be used by flow meter Manufacture. if user require please contact to Producer or distributor.

8. Menu List

The menu list is using structured design. It has reasonable classification, and has very clear hierarchy, also convenient to operate.

The menu list is shown below.

Tab.1 Converter description abbreviation

Abbreviation	Description	Abbreviation	Description
BLKT	Back Light	**EXT**	Excitation
NEGF	Negative Flow	**POSF**	Positive Flow
CAL	Calibration	**FREQ**	Frequency
COEF	Coefficient	**ALMH**	High Limit Alarm
COD	Code of production	**INIT**	Initialization
DEC	Decimal	**ALML**	Low Limit Alarm
DIR	Direction	**MAINT**	Maintenance
DOD	Date of Production	**PF**	Power Frequency
EPD	Empty Pipe Detection	**THD**	Threshold

Tab.1 Converter description abbreviation

First Level Menu	Second Level Menu	Third Level Menu
Parameter Setting	DIAMETER	3mm～ 3000mm
	DAMPING TIME	0～50 Sec.
	FLOW UNIT	L/h, L/m, L/s, m^3/h, m^3/m, m^3/s
	VOLUME UNIT	0.001m^3,0.01m^3, 0.1m^3, 1m^3, 0.001L,0.1L,1L
	MEASURE RANGE	Setting
	EXT FREQ	1/2, 1/4, 1/8, 1/16, 1/20(PF)
	EXT CURRENT	20%, 50%, 80%, 100%
	LIQUID DENSITY	Setting

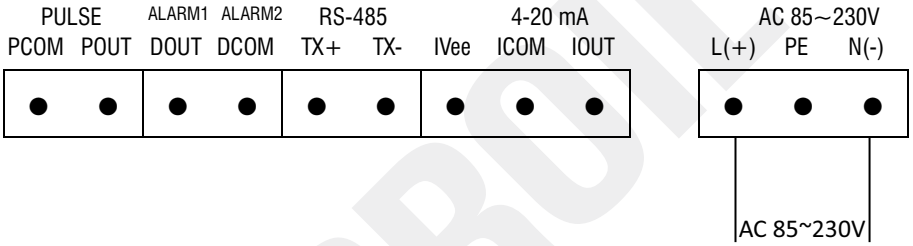
Function Setting	MEASURE DIR	FORWARD/BACKWARD	
	NEGF MEASURE	ON/OFF	
	NEFG OUTPUT	ON/OFF	
	LOW FLOW CUTOFF	ON/OFF	
	LOW FLOW VALUE	Setting	
	SMART FILTER	ON/OFF	
	PEAK LIMIT THD	Setting	
	METER ALARM	ON/OFF	
	EXT ALARM	ON/OFF	
	EPD ALARM	ON/OFF	
	EPD ALARM THD	Setting	
	ALMH ALARM	ON/OFF	
	ALMH ALARM THD	Setting	
	ALML ALARM	ON/OFF	
	ALML ALARM THD	Setting	
	BAT ALARM	ON/OFF	
	BAT VALUE	Value	
First Level Menu	**Second Level Menu**	**Third Level Menu**	
Communication Setting	MODBUS	BUS ADDRESS	
		BAUDRATE	300,600,1200,2400,4800, 9600,19200,38400
Output Setting	OUTPUT MODE	FREQ/PULSE	
	PULSE UNIT	0.001M3,0.01M3, 0.1M3, 1M3,0.001L, 0.01L,0.1L,1L.	
	PULSE WIDTH	Setting	
	FREQ RANGE	1～10000Hz	
Diagnostic Test	4-20 mA TEST	Setting	
	FREQ TEST	Setting	
	PULSE TEST	Setting	

System Setting	LANGUAGE	ENG	
	LCD CONTRAST	Setting	
	LCD BKLT	Open/Close	
	LCD BKLT TIME	1/5/10/30/60 min	
	POSF SUM PRESET	Setting	
	NEGF SUM PRESET	Setting	
	FLOW SUM RESET	Total cumulative Flow to be Cleared	
	SHOW PASSWORD	Including three level password	
	PASSWORD SET	Including three level password	
	SYSTEM DATE	Display Date (Adjustable)	
	SYSTEM TIME	Display Time (Adjustable)	
	SENSOR DATE	Display Sensor Production Date (Adjustable)	
	SENSOR CODE	Display Sensor production Code (Adjustable)	
	METER DATE	Display Meter production Date (Adjustable)	
	METER CODE	Display Meter production Code (Adjustable)	
	LAST CAL DATE	Display the Last Calibration Date (Adjustable)	
	LAST MAINNT DATE	Display the Last Maintenance Date (Adjustable)	
First Level Menu	**Second Level Menu**	**Third Level Menu**	
Calibration Setting	ZERO CORRECT	Setting	
	SENSOR COEF	Setting	
	FLOW CORRECT	FLOW CORRECT UNIT	m/s, m3/h
		CORRECT POINT 1	Setting
		CORRECT COEF 1	Setting
		CORRECT POINT 2	Setting
		CORRECT COEF 2	Setting
		CORRECT POINT 3	Setting
		CORRECT COEF 3	Setting
		CORRECT POINT 4	Setting

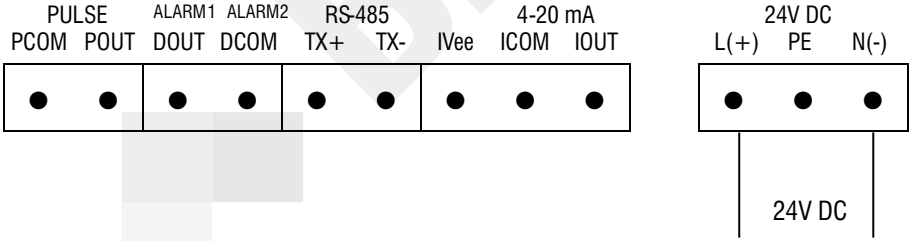
		CORRECT COEF 4	Setting
		CORRECT POINT 5	Setting
		CORRECT COEF 5	Setting
	CORRECT SET	ON/OFF	
	NORMALIZED COEF	Setting	

9. The Wiring of Power Supply (Round Display)

1. AC Power Supply

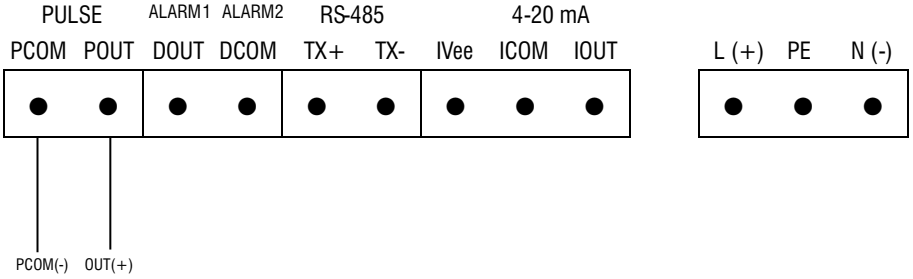


2. DC Power Supply

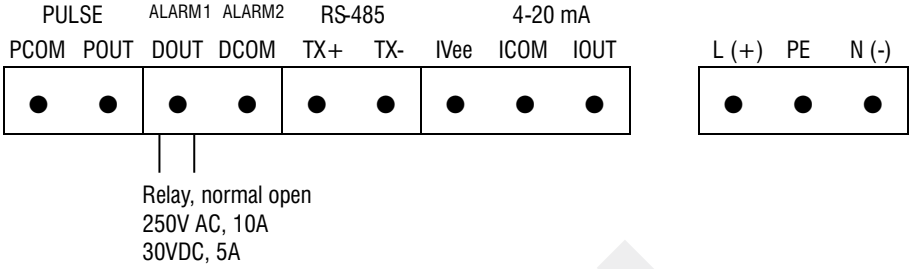


3. The Wiring of Output

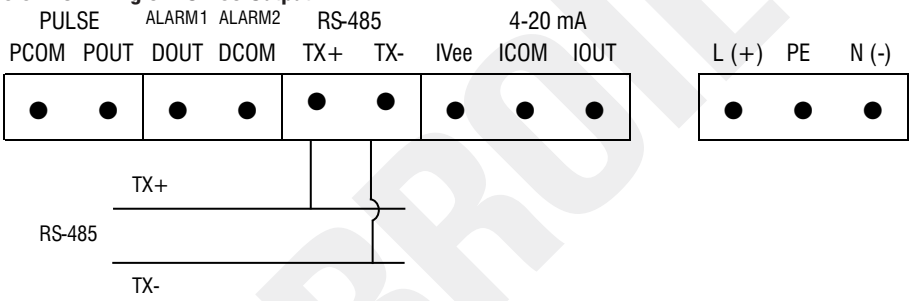
3.1 The Wiring of Pulse Output



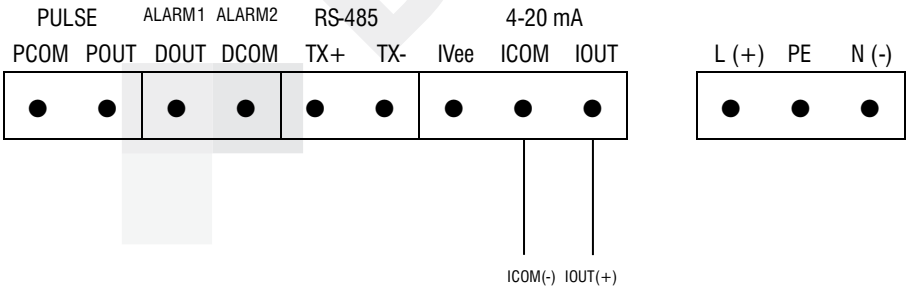
3.2 The Wiring of Alarm Output



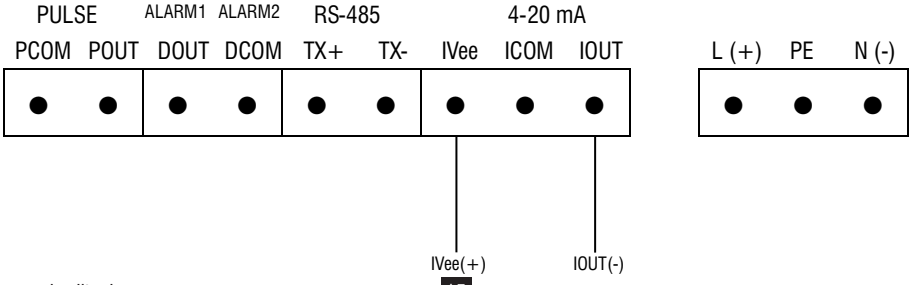
3.3 The Wiring of RS-485 Output



3.4 The Wiring of 4-20mA Output (Internal Power Supply Mode)



3.5 The Wiring of 4-20mA Output (External Power Supply Mode)



Appendix 1: Basic Parameters
1. PARAMETER SETTING

➢ **DIAMETER**

The converter can be equipped with different sensor that have different diameter of measuring pipes from 3mm to 3000.

➢ **DAMPING TIME**

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 flow display and output digital, and fits for gross add up to pulse flow: the short one means fast respond rate, and fits for production control.

➢ **FLOW UNIT**

The flow unit can choose from the parameters (L/m, L/h, m3/s, m3/m, m3/h), and the user can choose the proper unit according to the technological requirement and using habit.

➢ **VOLUME UNIT**

Converter display is counter with 9 bits, and the max is 99999999.

Integrator units are L, m3(liter, stere). It is accordant with flow unit and is set Automatically.

This is the same to flow unit. When the flow unit is L/h, L/m and l/s the integrator unit is Liter, when the flow unit is m3/h, m3/m and m3/s the integrator unit is stere.

Flow integrator value:0.001L, 0.010L, 0.100L, 1.000L, 0.001m3, 0.010m3, 0.100m3, 1.000m3;

➢ **MEASURE 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.

➢ **EXT FREQ**

This function enables customer to select the frequency for the excitation coil.

Normally 1/8 or 1/16 (of power frequency) is selected.

➢ **EXT CURRENT**

This function enables customers to select the current to the excitation coil.

2. FUNCTION SETTING

➢ **MEASURE DIR:**

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

➢ **LOW FLOW CUTOFF:**

This function is selectable: ON/OFF

In “ON” mode, when flow ratio is less than the low flow cut-off value, it will be cut off and the LCD display indicates “0”.

In “OFF” mode, no matter what the flow ratio is, no any flow value is cut off.

➢ **LOW FLOW VALUE**

This function serves user to set the minimum flow that the flow meter will react on.

It is express in percentage, such as 0.5%, 2%, 5%, etc.

➢ **SMART FILTER**

This function is selected: ON/OFF

IN “ON” mode, the flowmeter automatically starts the built-in smart judgment algorithm, making the flow measurement with better stability. We recommend set it up under the guidance of the manufacturer.

➢ **METER ALARM**

In “ON” mode, the flowmeter works according to all alarm setting status;

In “OFF” mode, the flowmeter turns off all alarm status.

➢ **EPD ALARM THD**

In “ON” mode, the user should setup the threshold value so that the flowmeter can detect the empty pipe status.

Keep liquid full of the pipe

Keep liquid with no movement

Base on the record of previous settings

Setup a new threshold value

3. COMMUNICATION SETTING

➢ **MODBUS**

➢ **BUS ADDRESS:**

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

➢ **BAUD RATE:**

Baud rate: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400.

4.OUTPUT SETTING:

➢ **OUTPUT MODE:**

Two types of outputs can be chosen: Frequency Output and Pulse 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.

➢ **PULSE UNIT:**

Pulse unit is referred to one pulse for value of flow.

Under the same flow, the smaller pulse the higher frequency output, and the smaller error will be.

➢ **PULSE WIDTH:**

Set the Pulse width from 0.1ms to 100ms.

➢ **FREQ RANGE:**

Frequency output range is as the upper limit of flow measure, just the percent flow 100%. Frequency output upper limit can be selected between 1～10000Hz.

5. DINGNOSTIC TEST:

- 4-20 mA TEST
- FREQ TEST
- PULSE TEST
- SPEED TEST

6. CALIBRATION SETTING

➢ **ZERO CORRECT:**

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

Converter's zero-flow correction displays like this:

± 0 0 0 0 0 mm/s
FS= ± 0 0 0 0 0 mm/s

Upper large words: Correction value of zero

Lower small words: F5 means measures value of zero;

Note: - Just make the Upper words equal to the lower words with different direction.

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.

➢ **SENSOR COEF:**

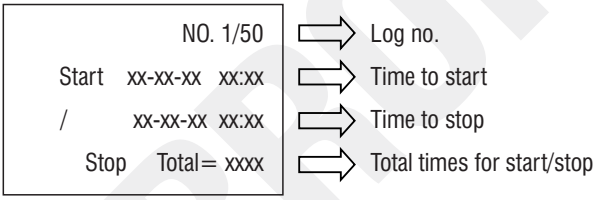
"Sensor Coefficient" is printed on the label of the sensor when it is made in factory. The "sensor coefficient" has to be set into sensor coefficient parameter when it runs with converter.

Appendix 2: Flow data-logging

A. Start/stop data logging

The transmitter can store the latest 50 history record for "Start/stop data-logging". It's convenient for users to view. The specific methods of operation are as follows:

In the Measurement mode, go to the enquiry menu first and then go to the "start/stop setings" sub-menu, you'll brows the "Start/ stop" records.



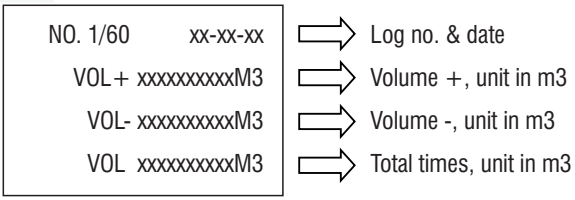
Note: The data logging number displays up to 50 records from No.1 to No.50. The User can browse through the arrow keys. The time format is "YY-MM-DD hr: mi". The

total "start/stop" records are up to 9999.

B. Daily data logging for volume

The transmitter can store the latest 60 history records for "Daily data logging for volume". It's Convenient for users to view. The specific method of operation are as follows:

In the measurement mode, go to the enquiry menu first and then go to the "Daily data logging for volume" sub-menu, you"ll browse the "Daily data logging for volume" records.



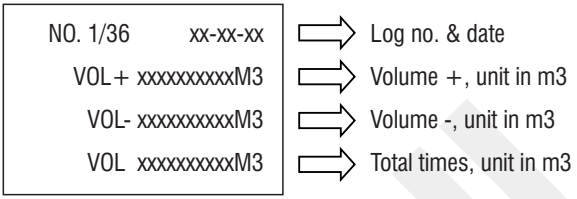
Note: The data logging number displays up to 60 records from No.1 to No.60.

The use can browse through the arrow keys. The time format is "YY-MM-DD".

C. Monthly data logging for volume

The transmitter can store the latest 36 history records for “Monthly data logging for volume”. It’s convenient for users to view. The specific methods of operation are as follows:

In the measurement mode, go to Enquiry menu first and then go to the “Monthly data logging for volume” sub-menu, you”ll browse the “Monthly data logging for volume” records.



Note: The data logging number displays up to 36 records from No.1 to No.36.

The use can browse through the arrow keys. The time format is “YY-MM-DD”.

10. Ordering Code

BT-MFT	1100	050	P3	OP1	C1	B1	W1	F2	H1	T1	N	C2	A1		DISCRIPTION
Type	1100														Inline
	2200														Remote
	3300														Insertion
	4400														Other
Line Size		XXX													DN15 ~ DN2000 15, 20, 25 , 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000, 1200, 1400, 1600, 1800, 2000.....
Power Supply			P1												230V AC
			P2												24V DC
			P3												Battery Operated
			P4												Other
Output				OP1											4-20 mA + Pulse
				OP2											4-20 mA + Relay 1 No
				OP3											4-20 mA + Relay 2 Nos
				OP4											4-20 mA + Pulse + High and Low Alarm Output
				OP5											Other

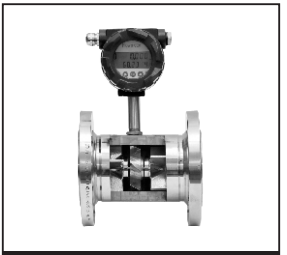
Communication Interface	C1										No Communication
	C2										RS-485
	C3										HART
	C4										Telemetric System
	C5										Other
Coil Housing		H1									SS304
		H2									SS316
		H3									Carbon Steel
		H4									Other
Connection Type			F1								ANSI #150 Flange End
			F2								ANSI #300 Flange End
			F3								DIN PN16 Flange End
			F4								Thread End
			F5								Tri Clover
			F6								As Per Customer Advice
Connection Material				M1							Carbon Steel
				M2							Stainless Steel
				M3							SS316
				M4							As Per Customer Advice
Lining					L1						Polyfluoroprene rubber
					L2						Polyurethane rubber
					L3						PTFE
					L4						PFA
					L5						As Per Customer Advice
Electrode						E1					SS316
						E2					Hastelloy B
						E3					Hastelloy C
						E4					Titanium
						E5					Tantalum

	E6					Platinum
	E7					As Per Customer Advice
Flow Tube Material		T1				SS304
		T2				SS316
		T3				SS202
		T4				As Per Customer Advice
Grounding			G1			Grounding Electrode
			G2			Stainless Steel Grounding Ring - 1 Side
			G3			Stainless Steel Grounding Ring -2 Side
			G4			As Per Customer Advice
Cable				C1		10 Meter
				C2		15 Meter
				C3		30 Meter
				C4		50 Meter
				C5		No Cable
				C6		As Per Customer Advice
Accessories					A1	Not required
					A2	Mating Flange
					A3	Mating Flange + Gasket + Nut Bolt
					A4	As Per Customer Advice

Products Portfolio



Helical Rotor Flow Meter



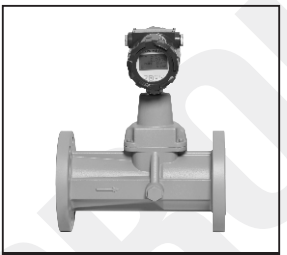
Turbine Flow Meter



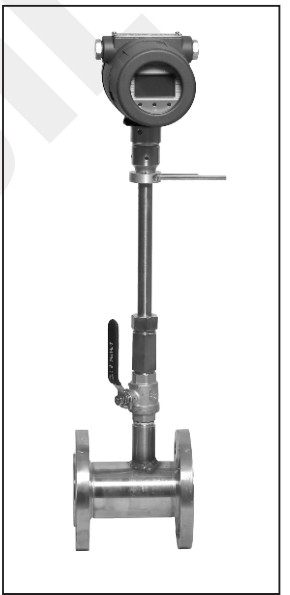
Oval Gear Flow Meter



Vortex Flow Meter



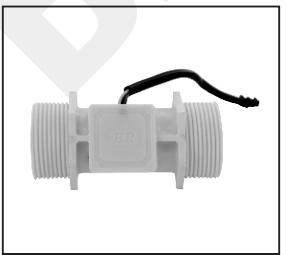
Swirl Flow Meter



Thermal Mass Flow Meter



Electromagnetic Flow Meter



Plastic Helical Flowsensor



Mechanical Oval Gear Flow Meter



Fuel Consumption Meter

BROIL



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