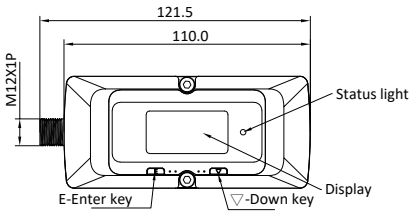
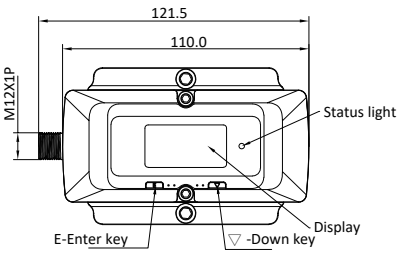
1 Flowmeter specification

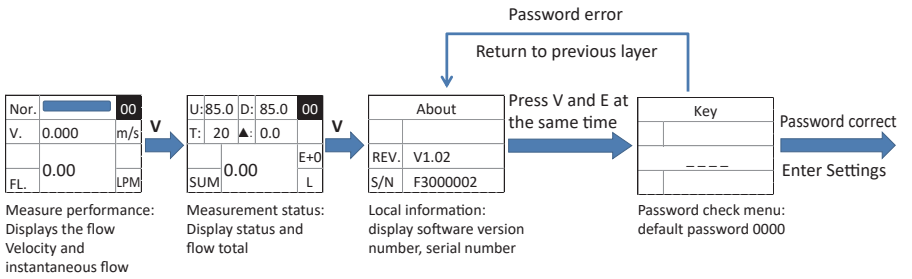


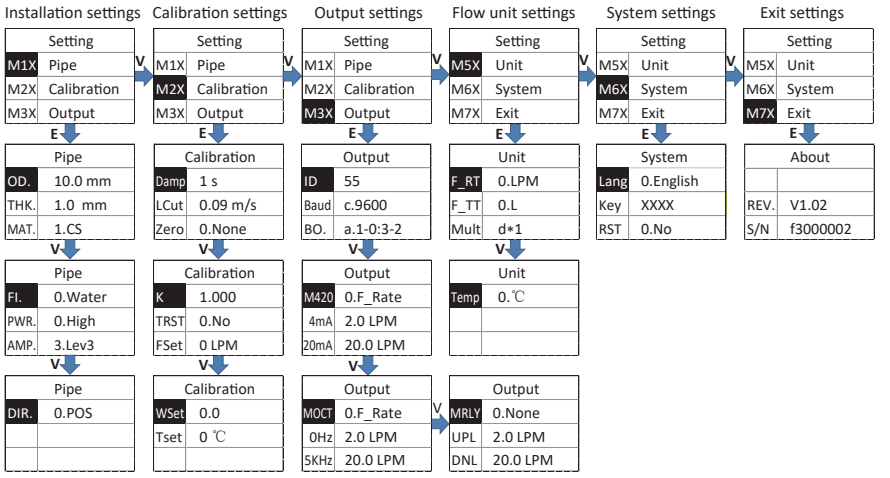
DN10–DN25



DN32–DN40

2 Menu architecture





Menu setting operation: press ∨ to select setting menu, press E to enter menu setting, press ∨ to enter number or option, press E to save and exit setting.

3 Menu details

Identification	Codes	Menu Description	Details
M0X	M00	Flow rate	Display range bar, instantaneous flow rate (optional medium temperature switching display), instantaneous flow rate
	M01	Measurement status and Flow total	Display Signal Strength, Transfer Time and Flow total
	M02	Local information	Display the softewate version number and serial number In this interface, press the scroll down key and confirm key at the same time to enter the password menu, factory default password: 0000.
	M03	Password Input and Calibration	If the password is correct, it jumps to the Setup, Calibration menu,otherwise it returns to M02
	M04	Setting the category	Setting menu category display, press down key to browse, press confirm key to enter current category setting menu
M1X (Installation settings)	OD.	Pipe OD setting	Enter the outside diameter of the pipe to be measured
	THK.	Pipe THK setting	Enter the wall thickness of the pipe to be measured
	MAT.	Pipe material setting	Select the type of pipe material you want to measured
	FI.	Media setting	Select the media liquid type to be measured
	PWR.	Working power setting	Selection the transducers' signal power rate, default is high power
	AMP.	Gain setting	Lev0 is the lowest and Lev4 is the highest. The factory default setting option is generally used. It can be adjusted only when the signal strength is insufficient and Q value is 0 after correct installation on site.
	DIR.	Flow direction setting	Select the flow direction, the default meter outlet is upstream, when the actual installation is opposite to the fluid flow direction, select the reverse direction.
M2X (Calibration settings)	DAMP	Damping	nput Damping setting value, the default is 1, increase damping can smooth out the measurement result display fluctuation.
	LCut	Low Flow Cutout	Input the low flow rate cut-off value, below the low flow rate cut-off value, the measurement result will be displayed as 0. The low flow rate cut-off value must be higher than the starting flow rate value of each specification product, otherwise the setting value is invalid. The default starting flow rate value is 0.15m/s.
	Zero	Zero Setting	Used for cutting out the static zero value, which must be carried out while the measured medium remains stationary.
	K	K factor	Input Instrument K-factor for flow measurement calibration.
	TRST	Reset total	Elect whether or not to zero out the current flow rate accumulation value Note: it cannot be restored after zeroing out.
	FSet	Flow offset value Setting	Enter the flow offset value. After setting, the measured flow value = measured value + flow offset value.
	WSet	Filter parameters Setting	Engineer's menu, please confirm with the factory before setting Only used in the some application that some high-temperature occasions or fluid media sound speed and conventional media sound speed difference is huge, the measurement value is not stable DN10-DN20 set value <=3, DN25-DN40 set value<=5. Please communicate with the factory to confirm the specific settings.
	Tset	Temperature offset Setting	This menu is Only available when temperature measurement is selected Enter the flow offset value. After setting, the temperature measurement = measured value+temperature offset value.
M3X-M4X (Output settings)	ID	Communication add	Input the communication address (1-247)
	Baud	Baud rate Setting	Selection the communication baud rate (2400, 4800, 9600, 19200)
	BO.	Byte order Setting	Selection Byte order of integer and floating-point data during communication
	M420	4-20mA mode Setting	Select 4-20mA output mode Corresponds to instantaneous flow rate output; Corresponds to medium temperature output (this option is ONLY valid when temperature measurement is optional)
	4mA	4mA corresponding Setting	Input 4mA correspondence value
	20mA	20mA corresponding Setting	Input 20mA correspondence value
	MOCT	OCT mode Setting	Select OCT Output Mode Corresponds to instantaneous flow output; Corresponds to cumulative flow output
	0Hz	0Hz corresponding Setting	Input 0Hz correspondence value
	5KHz	5KHz corresponding Setting	Input 5KHz Correlation Value
	MRLY	Relay mode Setting	Selection Relay output mode No output; Corresponds to cumulative flow output; Corresponds to alarm output
	UPL	Upper limit alarm Setting	Input Instantaneous flow alarm upper limit
	DNL	Lower limit alarm Setting	Input Instantaneous flow alarm lower limit
M5X (Flow unit settings)	F_RT	Flow rate unit	Selection Instantaneous flow units (LPM, GPM,m^3/h)
	F_TT	Flow total unit	Select Cumulative flow units (L, GAL,m^3)
	Mult	Multiplication factor Setting	Select Cumulative Flow Multiplication Factor
	Temp	Temperature unit	Selection Temperature units (°C, °F) (valid for optional temperature measurement Only)
M6X (System settings)	Lang	Languages	Select the menu to display the language
	Key	Password	Enter the user setup password (factory default setup password: 0000)
	RST	System reset	Select Restore Factory Settings (Note: only setup parameters are reset, K value, zero value, etc. are not restored)

4 Installation point operation instruction 1

1 Pipeline selection

The following should be taken into account when selecting a pipe:

1.1 Installation piping selection

Ultrasonic flowmeter should be installed in the rising pipe or horizontal pipe.
When installing on a horizontal pipe, the installation point of the sensor should be at 3 o 'clock or 9 o 'clock, that is, on both sides of the pipe.
Top and bottom installation of horizontal pipelines is very not recommended, because the top of the pipeline is prone to bubbles, and the bottom is prone to sediment or impurities.

1.2 Installation Environment

it's better to install the flowmeter indoors; if you have to install it outdoors, you should take measures to avoid direct sunlight or rainwater.
The flowmeter shall be installed away from high temperature, thermal radiation from equipment or corrosive gas.
Ultrasonic flowmeters can't be installed nearby motors, transformers or other power sources that are easy to cause electromagnet interference.
DO NOT install ultrasonic flowmeters nearby frequency converters or DO NOT connect it with the distributing cabinet of frequency converters to avoid interference.
In convenience for installation and maintenance, keep sufficient space around the flowmeter.

1.3 Support of Flow Meter

Avoid installing the flowmeter on pipes with mechanical vibrations. If you have to install it there, DO take shock absorption measure. You could install a hose for transition, or set support points with absorbing pads on the pipe at 2DN in both upstream and downstream of the flowmeter.
Try not to install the flowmeter on the longer overhead pipes because the sagging of pipes would cause leakage between the flowmeter and the flanges. If you have to do it, you must set support points on the pipe at 2DN in both upstream and downstream of the flowmeter.

1.4 Requirements on Liquid-receiving Material

The ultrasonic flowmeter could measure single-medium liquid flow; The same medium could be divided into three specifications (low temperature, high temperature and superhigh temperature), different flowmeters should be used for different temperatures.

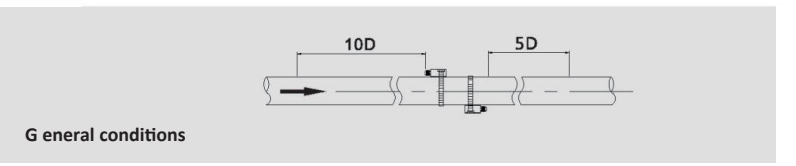
Caution!

Be sure to ensure that the liquid is full of the tube, do not make the liquid straight down, otherwise it is easy to produce bubbles.

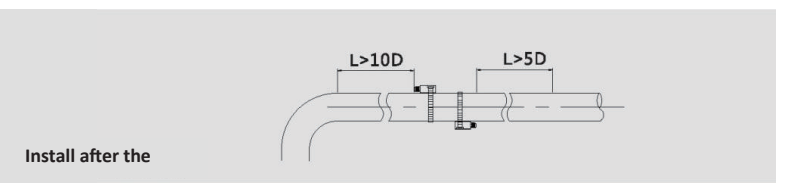
Caution!

To ensure measurement accuracy of the flowmeter, try to satisfy the following requirements on the length of straight pipe sections installed nearby the flowmeter: upstream >20D, downstream >10D.

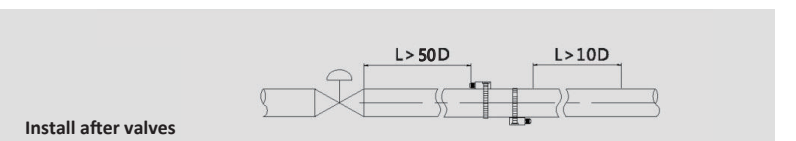
Try not to disturb the upstream flow distribution. Ensure no valves, elbows or triplets; try to install the control devices or throttles in the downstream if any, so as to ensure sufficient pipe flow at the measurement point, details are shown below:



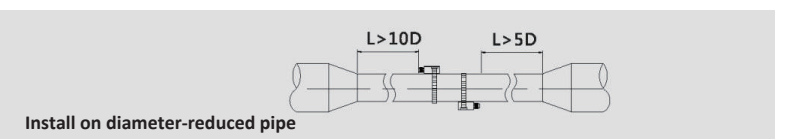
G eneral conditions



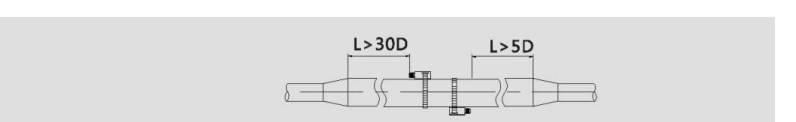
Install after the



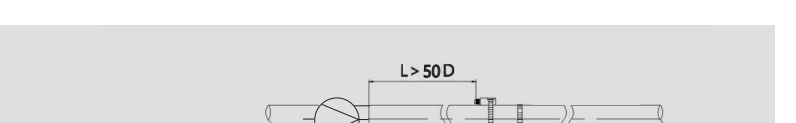
Install after valves



Install on diameter-reduced pipe



Install on diameter-expanded pipe

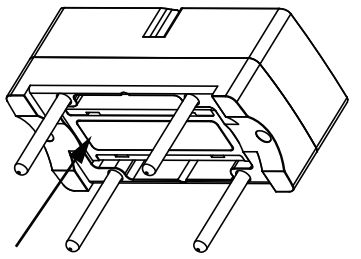


Install after pump

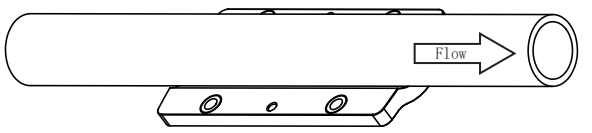
4 Installation point operation instruction 2

2 Transducer Installation

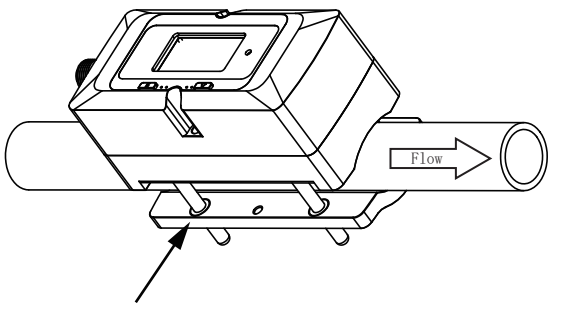
2.1 Remove the "transparent" protective film attached to the coupling pad.



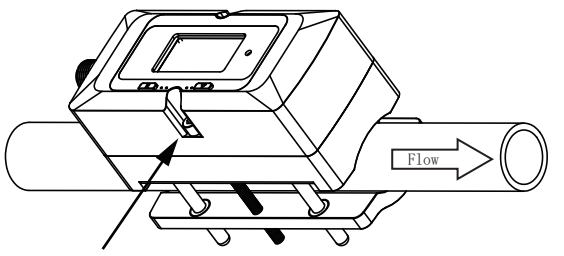
2.2 Make the bottom instructional part fit to the pipe.



2.3 Screw/Insertion the Guide shaft to make the top and bottom modules together.

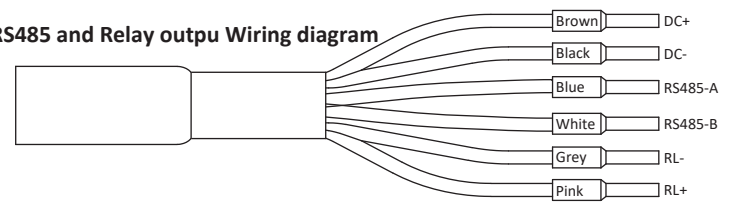


2.4 Lock screws to fix the host, do not over lock, to avoid damage to the Coupling pad.

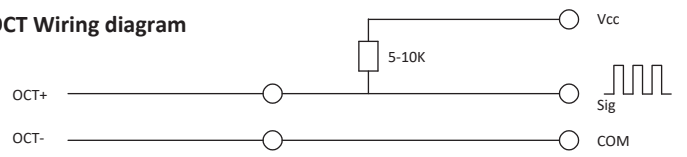


5 Connection/ Wiring 2

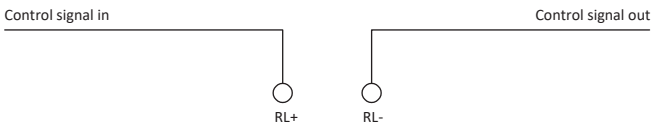
RS485 and Relay outpu Wiring diagram



OCT Wiring diagram



Relay Wiring diagram



6 Communication protocol 1

This MODBUS-I Protocol uses RTU transmission mode. The Verification Code uses CRC-16-MODBUS (polynomial is X16+X15+X2+1) which is gained by the cyclic redundancy algorithm method.

MODBUS-I RTU mode uses hexadecimals to transmit data.

1. MODBUS-I Protocol Function Code and Format

The flow meter protocol supports the following two-function codes of the MODBUS:

Function Code	Performance data
0x03	Read register
0x06	Write single register

2. MODBUS Protocol function code 0x03 usage

The host sends out the read register information frame format:

Slave Address	Operation Function Code	First Address Register	Register Number	Verify Code
1 byte	1 byte	2 bytes	2 bytes	2 bytes
0x01 ~ 0xF7	0x03	0x0000 ~ 0xFFFF	0x0000 ~ 0x7D	CRC (Verify)

5 Connection/ Wiring 1

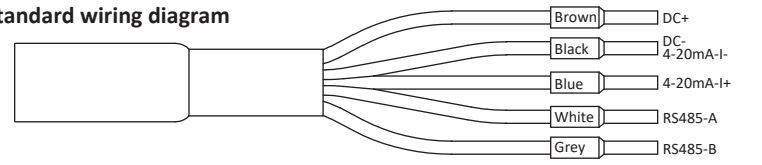
Connection/ Wiring type :

M12-A five-pin aviation plug (RS485 and Relay outputs are 6 cores)

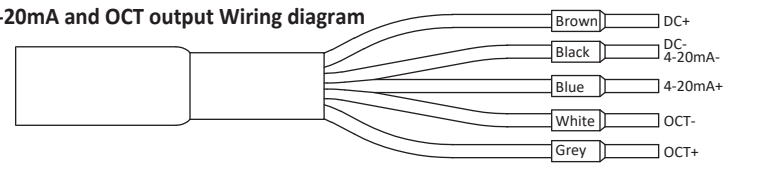
Connection/wiring definition

Color	Definition	Mark
Brown	DC+	Power in +
Black	DC- 4-20mA-I-	Power in -/ 4-20mA OUT -
Blue	4-20mA-I+	4-20mA OUT +
White	A	RS485
Grey	B	

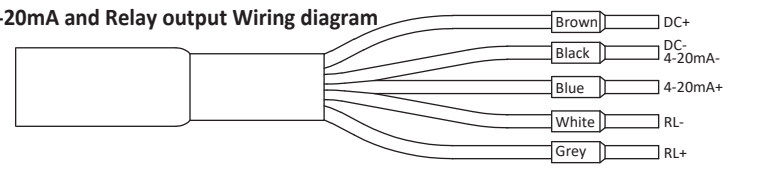
Standard wiring diagram



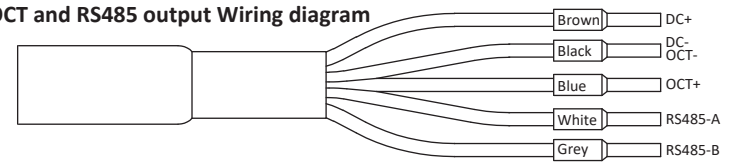
4-20mA and OCT output Wiring diagram



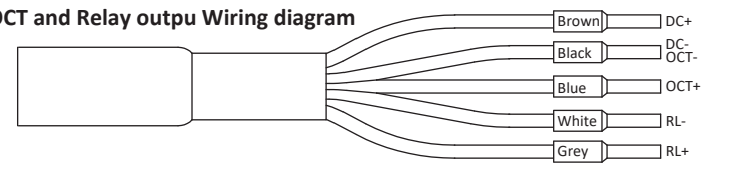
4-20mA and Relay output Wiring diagram



OCT and RS485 output Wiring diagram



OCT and Relay outpu Wiring diagram



6 Communication protocol 2

The slave returns the data frame format:

Slave Address	Read Operation Function Code	Number of Data Bytes	Data Bytes	Verify Code
1 byte	1 byte	1 byte	N*x2 byte	2 bytes
0x01 ~ 0xF7	0x03	2xN*	N*x2 (Data)	CRC (Verify)

N* = Data register number

3. MODBUS Protocol function code 0x06 usage

The host sends a command to write a single register information frame format (function code 0x06):

Slave Address	Operation Function Code	Register Address	Register Data	Verify Code
1 byte	1 byte	2 bytes	2 bytes	2 bytes
0x01 ~ 0xF7	0x06	0x0000 ~ 0xFFFF	0x0000 ~ 0xFFFF	CRC (Verify)

The slave returns the data frame format (function code 0x06):

Slave Address	Operation Function Code	Register Address	Register Data	Verify Code
1 byte	1 byte	2 bytes	2 bytes	2 bytes
0x01 ~ 0xF7	0x06	0x0000 ~ 0xFFFF	0x0000 ~ 0xFFFF	CRC (Verify)

4. MODBUS Register Address List

The flow meter MODBUS Register has a read register and a write single register.

a) Read Register Address List (use 0x03 function code to read)

PDU Address	Address	Register	Type	Number	No. registers*
$0004	40005	Flow/h-low word	32 bits real	2	
$0005	40006	Flow/h-high word			
$0006	40007	Velocity-low word	32 bits real	2	
$0007	40008	Velocity-high word			
$0008	40009	Positive total-low word	32 bits real	2	
$0009	40010	Positive total-high word			
$000A	40011	Positive total-exponent	16 bits int	1	

b) Single Write Register Address List (use 0x06 performance code to write)

PDU Address	Register	Description	Type	Number	No. registers*
$1030	44145	Communication Baud Rate 0 = 2400,1 = 4800, 2 = 9600, 3 =19200	16 bits int.	1	
$1031	44146	Flow meter address (1- 247)	16 bits int.	1	