

| INSTALLATION & OPERATION MANUAL

MOF 200 Oval Gear Flow Meter



MIAL[®]
INSTRUMENTS PVT. LTD.
Measuring & Beyond

www.mialinstruments.com

MOF 200

OVAL GEAR FLOW METER

PREFACE

- Thank you for purchasing our product.
- This manual is about the various functions of the product, wiring methods, setting methods, operating methods, troubleshooting methods, etc.
- Please read this manual carefully before operation, use this product correctly to avoid unnecessary losses due to incorrect operation.
- After you finish reading, please keep it in a place where it can be easily accessed at any time for reference during operation.



NOTE!

Modification of this manual's contents will not be notified as a result of some factors, such as function upgrading. We try our best to guarantee that the manual content is accurate, if you find something wrong or incorrect, please contact us. The content of this manual is strictly prohibited from reprinting or copying.

About this manual

- Please submit this manual to the operator for reading.
- Please read the operation manual carefully before applying the instrument. On the precondition of full understanding.
- This manual only describes the functions of the product. The MIAL Instruments pvt.ltd. Does not guarantee that the product will be suitable for a particular use by the user.
-

WARNINGS AND SYMBOLS USED



HAZARD!

If not taken with appropriate precautions, will result in serious personal injury, product damage or major property damage.



WARNING!

Pay special attention to the important information linked to product or particular part in the operation Manual



CAUTION!

Disregarding these instructions can result in damage to the device or to parts of the operator's plant.



INFORMATION!

These instructions contain important information for the handling of the device.



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1. INTRODUCTION

1.1 PURPOSE OF THE MANUAL

Overview:

Welcome to the user manual for the Mial MOF 200 – Oval Gear Flow meter. This comprehensive guide is designed to assist operators, maintenance personnel, and system integrators in understanding, installing, operating, and maintaining the Mial MOF 200 – Oval Gear Flow meter effectively.

Objectives:

Clarification of Functionality: This manual aims to provide a clear understanding of the principles and functionality of the Mial MOF 200 – Oval Gear Flow meter. Users will gain insights into its design, components, and how it precisely measures fluid flow.

Guidance for Installation:

Step-by-step instructions and considerations for proper installation are provided to ensure optimal performance. Safety precautions are emphasized to create a secure working environment.

Training and Familiarization:

Users will be guided through the features, controls, and indicators of the flow meter, facilitating efficient operation. This section aims to serve as a valuable training resource for users at various experience levels.

Maintenance and Troubleshooting Assistance:

Learn about routine maintenance procedures and effective troubleshooting techniques. This manual empowers users to address common issues and perform regular maintenance to enhance the longevity of the Mial MOF 200 – Oval Gear Flow meter.

Intended Audience:

This manual is intended for operators, maintenance personnel, and system integrators involved in the installation, operation, and maintenance of the Mial MOF 200 – Oval Gear Flow meter. It is suitable for both novice users seeking basic guidance and experienced professionals looking for specific details.

Important Notes:

Please read through the manual carefully, adhering to safety guidelines and following instructions precisely. If any uncertainties arise during the installation, operation, or maintenance processes, seek assistance from qualified personnel or our customer service / support team.

Reference to Other Documentation:

Refer to the accompanying technical specifications document for in-depth details about the Mial MOF 200 – Oval Gear Flow meter. Additional resources can be found on our website.

Intended use



CAUTION!

Responsibility for the use of the measuring devices with regard to suitability, intended use and corrosion resistance of the used materials against the measured fluid lies solely with the operator.



INFORMATION!

The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose

Certification



The manufacturer certifies successful testing of the product by applying the ISO marking

1.2 OPERATING PRINCIPLE

Oval Gear flowmeters are positive displacement devices where the flow of liquid causes two oval-shaped rotors to rotate within a precisely calibrated measuring chamber. Each rotor revolution displaces a fixed volume of liquid from the meter's inlet to its outlet. The total number of rotor rotations and their speed are conveyed to a counting mechanism or transmitter through a sealed coupling. Magnetic sensors produce electronic pulses corresponding to the rotations, which are then processed by a digital instrument.



The oval gear flowmeter is mainly composed of metering chamber, oval gear rotors, sealing coupling (transmission components), and counting mechanism etc.



1.3 TECHNICAL SPECIFICATION

Operation and performance

Flow measurement

Gear Technology (positive displacement flow meter)

Fluid types

Fuel oil, Petroleum, Petroleum Products, Vegetable Oil, Food, Chemicals

Fluid properties

Fluid with viscosity: 2~10000mPa.s

Pipe sizes

DN 8mm – DN 200mm

Flow accuracy

±0.5%;

Measurement parameters

Instantaneous flow, Totalized Flow

Certification

Calibration certification

Electronics

Transmitter Type

Integral

Enclosure IP rating

IP65

Power supply

24 VDC

Use SMPS when employing AC power

Ambient temperature

32°F to 131°F (0°C to 55°C)

Standard output

Analog output : 4-20mA

Pulse output

Network Connection

Modbus RTU RS 485

Operating Temperature range

Standard : -4°F to 140 °F (-20 °C to 60 °C)

Optional : -4°F to 302 °F (-20 °C to 150 °C)

Nominal Pressure

Standard 1.6 Mpa

Optional : 2.5 Mpa, 4.0 Mpa, 6.4 Mpa

Process connections

ANSI class 150 Flanges

Flow Sensor Materials

Standard: Cast Steel

Optional: Stainless Steel

**Specifications are subject to change without prior notice.*

2. DEVICE DESCRIPTION

2.1 SCOPE OF DELIVERY



INFORMATION!

Do a check of the packing list to make sure that you have all the elements given in the order



INFORMATION!

Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

2.2 NAME PLATES



INFORMATION!

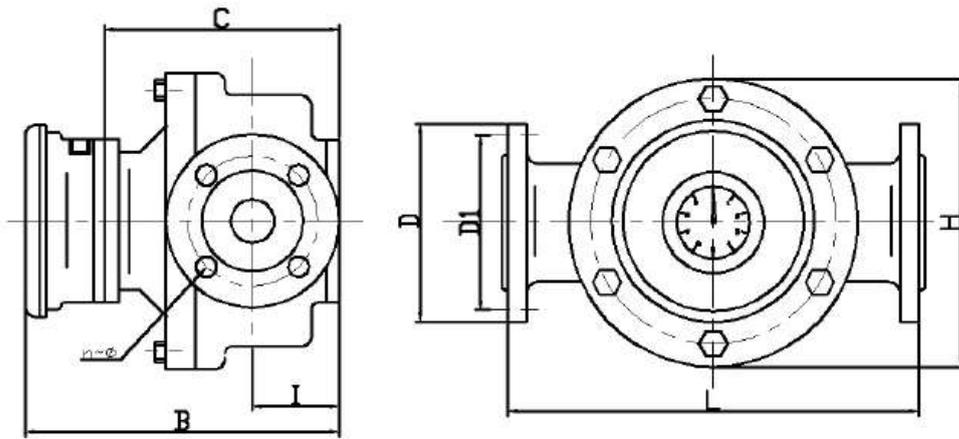
Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate

EXAMPLE OF NAMEPLATE FOR THE TRANSMITTER

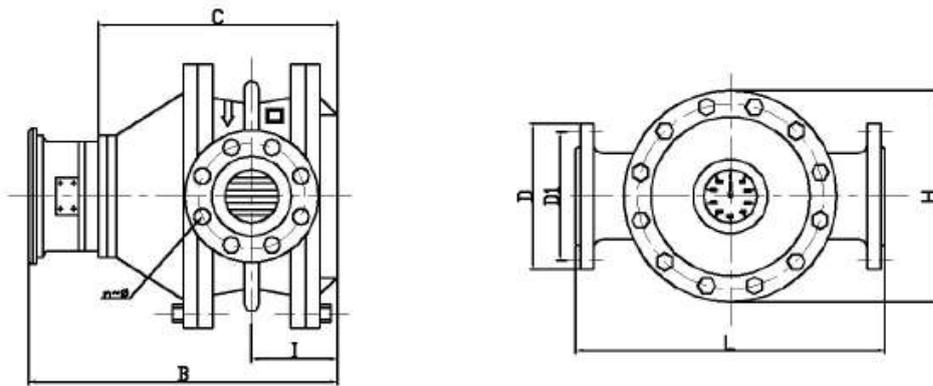
Oval Flow Meter	
Type : _____	Flow Range: _____
Temp : _____	Viscosity : _____
Sizes : _____	Accuracy : _____
Press : _____	No : _____

2.3 STRUCTURE DIAGRAM

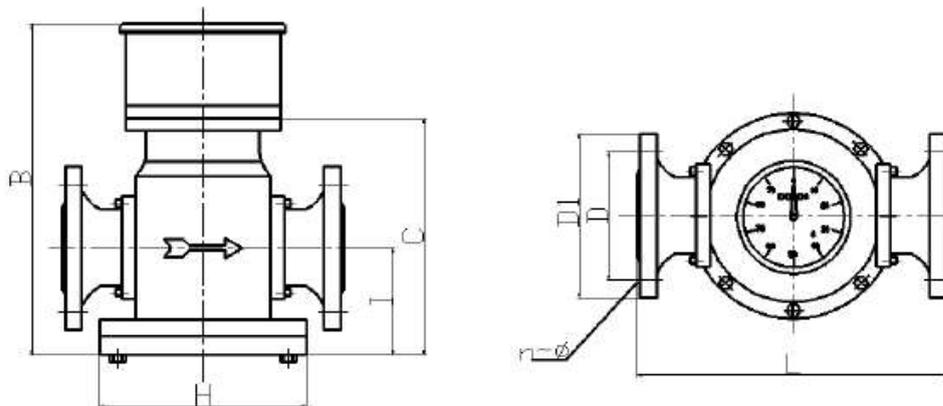
The oval gear flowmeter is mainly composed of metering chamber, oval gear rotors, sealing coupling(transmission components), and counting mechanism etc.



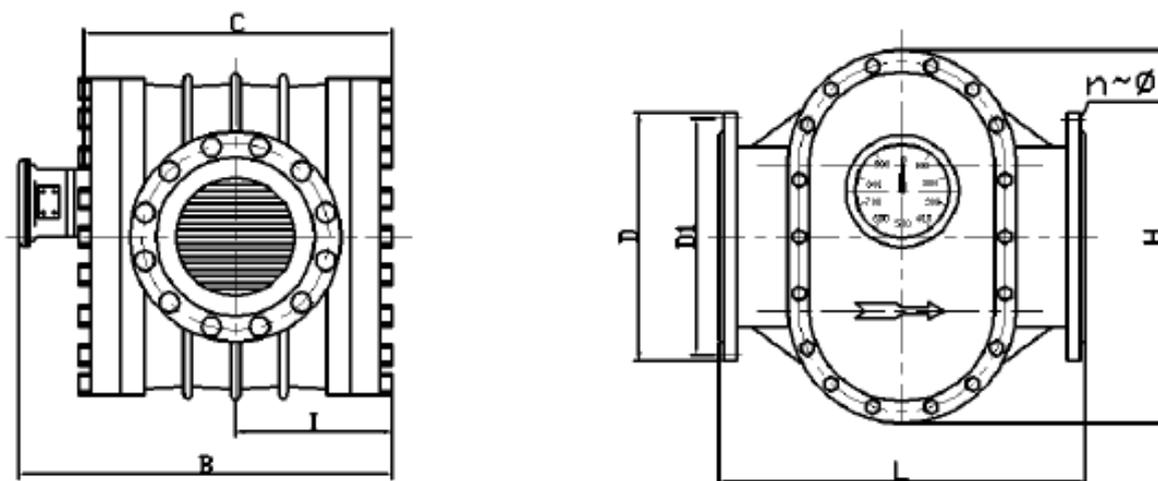
DN10~DN50 (light type)



DN50 (heavy type)~DN100



DN65/DN80 (light type)



DN150~DN200

OVAL GEAR FLOWMETER OF CAST IRON TYPE

10	150	100	210	120	45	90	60	4	14
15	170	118	226	136	48	95	65	4	14
20	200	150	238	148	53	105	75	4	14
25	260	180	246	156	60	115	85	4	14
40	245	180	271	181	77	145	110	4	18
50 (light type)	290	218	310	220	80	160	125	4	18
50 (heavy type)	340	250	372	230	88	160	125	4	18
65	325	245	320	220	90	180	145	4	18
80 (light type)	325	245	320	220	90	195	160	8	18
80 (heavy type)	420	325	433	253	118	195	160	8	18
100	515	418	458	278	131	215	180	8	18
150	540	515	557	377	210	280	240	8	23
200	650	650	624	444	247	335	295	12	23

OVAL GEAR FLOWMETER OF CAST STEEL TYPE

DN(mm)	L(m m)	H(m m)	B(m m)	C(m m)	I(m m)	D(mm)	D ₁ (m m)	N	φ (m m)
10	150	100	212	120	45	90	60	4	14
15	200	138	232	142	53	95	65	4	14
20	250	164	250	150	63	105	75	4	14
25	300	202	252	162	68	115	85	4	14
40	300	202	293	203	83	150	110	4	18
50 (light type)	320	220	325	235	85	160	125	4	18
50 (heavy type)	384	262	394	394	88	160	125	4	18
65	350	260	365	275	100	180	145	4	18
80 (light type)	350	260	365	275	100	200	160	8	18
80 (heavy type)	450	337	452	272	118	200	160	8	18
100	555	442	478	298	131	220	180	8	18
150	540	510	557	377	210	285	240	8	23
200	650	650	624	436	247	340	295	12	23

Note:

1. Physical dimensions of high-temperature oval gear flowmeter:
2. For Size DN50 (light) and below, dimension of "B" plus 100mm (cooling fin). For Size DN50(heavy) and above, dimensions of " B" plus 160mm (cooling fin). The remaining dimensions correspond to the above table.
3. Above oval gear flow meter drawing is based on DIN PN16 flange, other standards can be provided on request



3. INSTALLATION

3.1 SITE SELECTION

A flow direction arrow is marked on the flowmeter body, indicating the required flow direction. Ensure the flowmeter is installed according to this indicated direction. When installed according to the arrow, For flowmeters below DN40: Remove the 4 M4 nuts connecting the counter to the main body, then adjust the direction.

- For flowmeters above DN50: Remove the 4 M6 external hexagonal screws connecting the counter to the main body, then adjust the direction.



ELECTRONIC TYPE LCD

The flowmeter's cavity contains two rotating oval gears. Welding slag from new pipes or rust particles from oil tanks can obstruct these gears, causing the flowmeter to malfunction. Therefore, it is essential to remove any welding slag and rust particles.

To address this, you can replace the flowmeter and filter with a straight pipe section and flush the system with oil for a period of time before reinstalling the flowmeter. Alternatively, use a bypass to divert flow away from the flowmeter and filter during the oil flushing process.

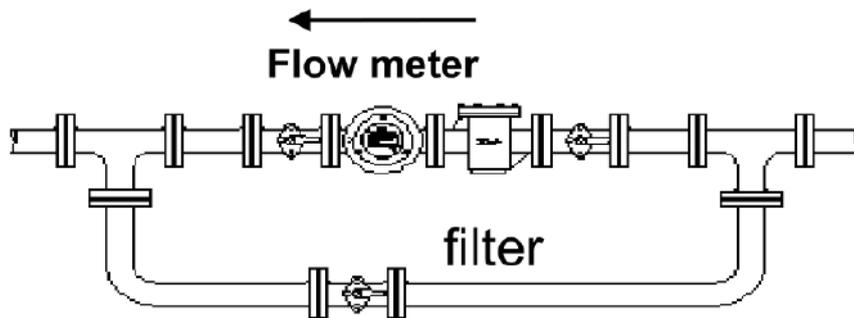
- ❖ Before installing the flowmeter, ensure its mechanical rotation is intact. Remove the plugs from both ends of the flange. At one end, use a flat-head screwdriver to gently push the gear inward. For large-diameter flowmeters (DN80 or above), apply a bit more force to move the gear. Note: Use a strong, durable flat-blade screwdriver. (Residual diesel may be present in the flowmeter when it leaves the factory.)
- One or more filters must be installed before the flow meter. Filter requirements:
 - Below DN50: 60 mesh (2.4/mm)
 - DN80 and above: 40 mesh (1.6/mm)
 - The filter should be inspected and replaced regularly.
 - For continuous use, install the flow meter with a bypass.
- Ensure the flow meter is coaxial with the front and rear pipes. Do not use a crowbar to pry the flange hole during installation, as this can break or crack the flange. Avoid applying excessive force to the flowmeter.
- Sudden starts and stops can cause water hammer, which can damage the flow meter. When using the flow meter for the first time, slowly open the valve in front of the flow meter to fill it with liquid, then gradually open the valve behind the flow meter. It is best to operate the flow meter at 70 to 80% of its maximum flow rate.
- ❖ Before installing the flowmeter, ensure its mechanical rotation is intact. Remove the plugs from both ends of the flange. At one end, use a flat-head screwdriver to gently push the gear inward. For large-diameter flowmeters (DN80



or above), apply a bit more force to move the gear. Note: Use a strong, durable flat-blade screwdriver. (Residual diesel may be present in the flowmeter when it leaves the factory.) One or more filters must be installed before the flow meter. Filter requirements:

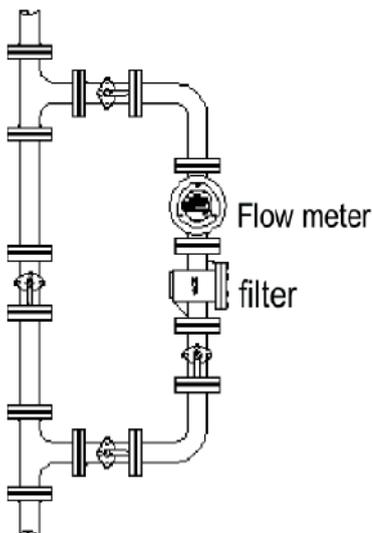
- Below DN50: 60 mesh (2.4/mm)
- DN80 and above: 40 mesh (1.6/mm)
- Inspect and replace the filter regularly.
- For continuous use, install the flow meter with a bypass.
- Ensure the flow meter is coaxial with the front and rear pipes. Do not use a crowbar to pry the flange hole during installation, as this can break or crack the flange. Avoid applying excessive force to the flowmeter.
- - Sudden starts and stops can cause water hammer, which can damage the flow meter. When using the flow meter for the first time, slowly open the valve in front of the flow meter to fill it with liquid, then gradually open the valve behind the flow meter. It is best to operate the flow meter at 70 to 80% of its maximum flow rate.

HORIZONTAL



Horizontal mounting: Install from left to right or right to left, but ensure the flow direction matches the indication on the meter.

VERTICAL



When mounted vertically, the liquid should flow from bottom to top for optimal performance. Install the meter in the bypass pipe to prevent impurities from entering the flow meter.



- A matching filter should be installed before the flowmeter, with the filter outlet connected to the flowmeter inlet. Ensure the arrows on both bodies align with the liquid flow direction.
- If the liquid contains gas, install a gas elimination filter before the flowmeter.
- Regardless of vertical or horizontal pipeline installation, the oval gear in the flowmeter must be horizontal (i.e., the gauge disc should be perpendicular to the ground).
- If the flowmeter is properly installed but difficult to read, rotate the counter 180 degrees or 90 degrees.
- Before installation, push the elliptical gear of a new flowmeter several times from the exit with a bamboo stick. If it doesn't move, soak it in diesel oil (to avoid sediment from factory checks).
- Install a flow control valve at the flowmeter inlet and an open/close valve at the outlet. When using the open/close valve, start slowly to prevent the "water hammer" phenomenon.
- Before installing the flowmeter on a new pipeline, flush the pipeline and use a straight pipe section in place of the flowmeter to prevent welding slag and debris from entering the flowmeter.
- Do not test flow meters made of cast iron and cast steel with water.
- The flow rate should not exceed the maximum range specified in the technical specifications.
- If the measured liquid is chemically corrosive, select a flowmeter made of stainless steel.



4. ELECTRICAL CONNECTIONS

4.1 SAFETY INSTRUCTIONS



DANGER!

Only when power is switched off, can we do all the work about electrical connections. Please pay all attention to the power supply on the name plate!



DANGER!

Observe the national regulations for electrical installations!



DANGER!

For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.



WARNING!

Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.



INFORMATION!

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.



INFORMATION!

Connect the cable on connector with similar numeral marking

4.2 WIRING

Terminal 1: connect to DC24V or DC12V power+

Terminal 2: connect to DC24V or DC12V power- (when two-wire system

4~20mA, 1,2 are not connected)

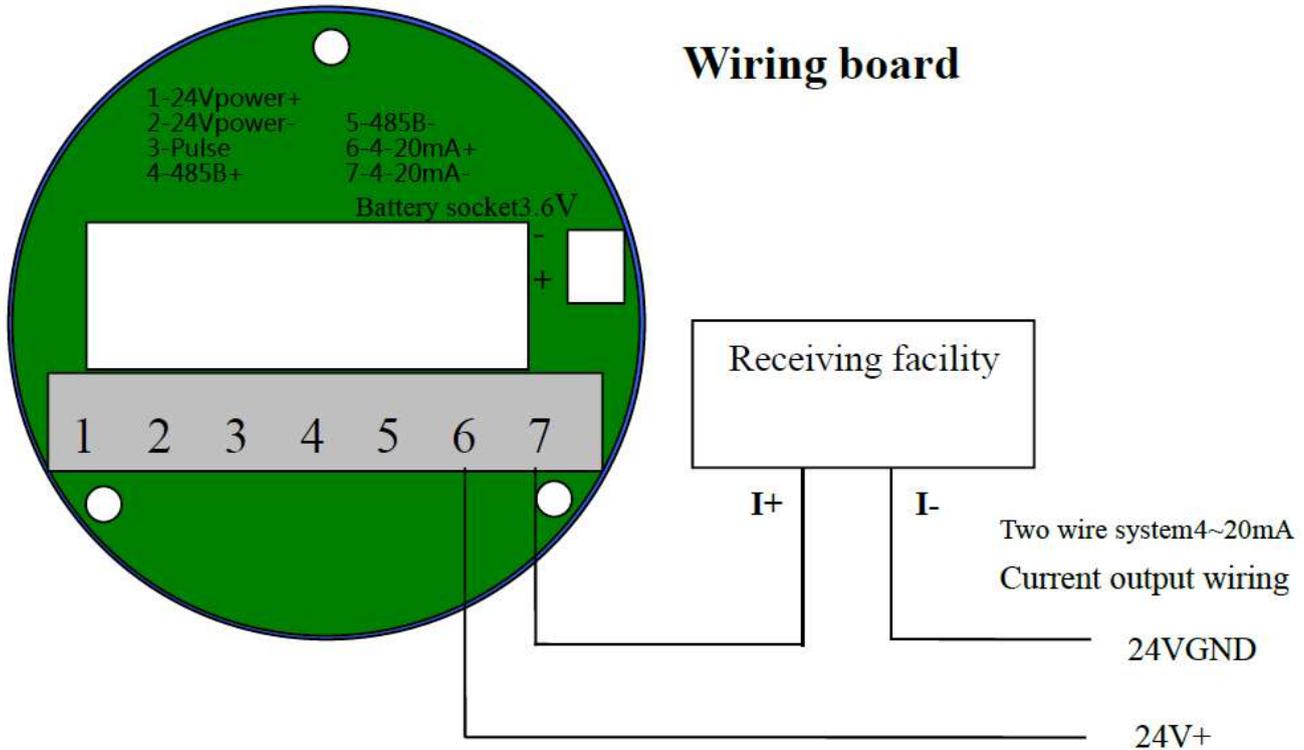
Terminal 3: pulse voltage signal output

Terminal 4: communication RS485A+

Terminal 5: communication RS 485BTerminal

6 : two-wire system 4~20mA +

Terminal 7 : two-wire system4~20mA -



MOF 200 type electronic meter communication protocol

Transport: the Mod-Bus RTU mode

Communication parameters: the baud rate 9600 BPS (optional 4800 BPS, 19200

BPS),

Data frame: 8 bits of data, one stop bit and parity bit: no

Host query command sent

01	instrument address
03	Function code
00	The first address
00	
00	The length
0A	0A Words
C5CD	Check code



Flow meter Response:

01	address
03	Function code
14	The length
00000001	High amount of a single byte, converted to decimal number by 1000, Unit L
028A0640	Low amount of a single byte, converted to decimal number Divided by 10000 The high byte + low byte = flow meter single cumulative
00000001	Total cumulative high byte, Unit: m ³
028A0640	Total cumulative low byte, After converted to a decimal number Divided by 100000000
00000000	Instantaneous flow, After converted to a decimal number Divided by 1000
271F	Check code

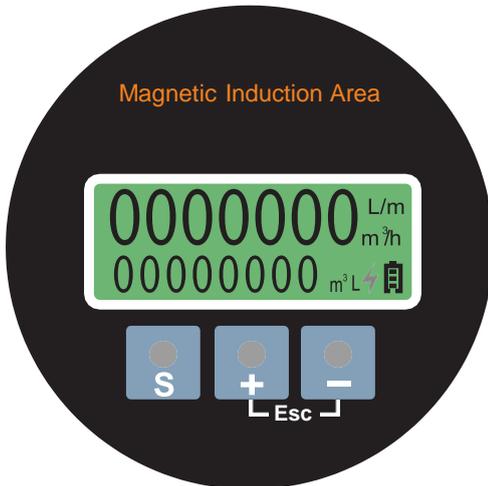
Guide To Use:

- 1). First, Set electronic address and baud rate meter
P23 - address 1 to 16
P24 - baud rate 0 = 2400, 1 = 4800, 2 = 9600
- 2). DC24V or vehicle with DC12V power supply only
- 3) Open the serial port in accordance with the "send"



5. OPERATION

5.1 LCD DISPLAY



Instrument Display:

Double-row LCD display, the default display mode is as follows:

Upper XXXXXXX seven-bit instantaneous flow (m³/h or L/m)

Lower XXXXXXXX eight-bit cumulative flow (m³ or L)



External power supply mode



Internal battery level display

Press [S] to switch between total accumulation and single accumulation

The display unit m³ is the total cumulative cubic meter, the display E XXX.XX L is the total cumulative cubic meter, the total cumulative cubic meter and the total cumulative cubic meter will be dynamically switched, and the two parts together will be the complete cumulative volume reading.

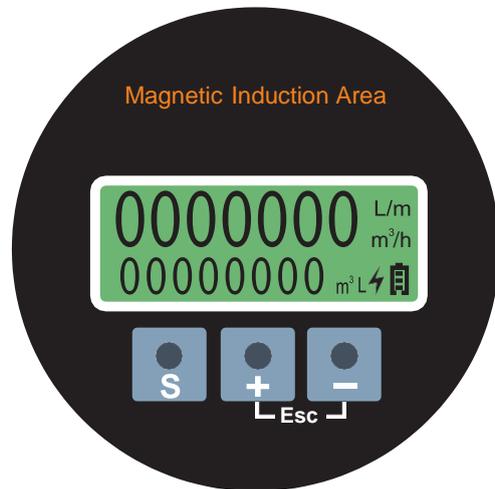
Unit display L is single accumulation.

Press [S]+[-] to switch the instantaneous quantity in m³/h or L/m

Scribe the magnetic steel above the magnetic induction area and switch the display of the instrument contents (such as total accumulation and single accumulation).



5.2 KEYBOARD DESCRIPTION



The instrument has three physical keys [S] [+] [-], and each key has two key modes: short press and long press.

Short press

release immediately after pressing

Long press

press and hold until the display changes and then release



Switch between single quantity and cumulative quantity (short press) under operation status. (Long press) Clear the single quantity. In the setting state, (short press) move the flashing bit (i.e., modify the bit)



In the running state, (press and hold) clear the zero cumulative measurement
In the setting state, (short press) the flashing bit plus 1 (i.e. the modification bit)



In the setting state, (short press) the flashing bit plus 1 (i.e. the modification bit)



5.3 PARAMETER SETTING

Operation Steps	Display	Parameters	Note
1) Long Press 【-】Key			
2) Press 【+】 key			Enter the factory default password 1, if the user changes the factory password, you need to enter the user's modified password
3) Long press 【-】 ke	 L00 (flashing)	L00 flow meter coefficient 0 (Important parameters)	1. [S] key shifts, [+] and [-] modify the number, and then press [S] key to move to L00 (flashing) 2. If you enter Table 2 parameters, press and hold the [-] key; 3. Press the [+] and [-] keys together, and the instrument displays SAUEd, if you need to save, press and hold the [-] key to save the parameters and exit the setting, or press the [S] key to exit the setting without saving
4) Press 【+】 Key	 L01	L01 Flow meter coefficient 1	Operation is the same as above Flow meter coefficient used in flow segmentation Valid when L9=0000001
5) Press 【+】 Key	 L02 (flashing)	L02 Flow meter coefficient 2	Operation is the same as above Valid when L9=0000001
6) Press 【+】 Key	 L03 (flashing)	L03 Flow meter coefficient 3	Operation is the same as above Valid when L9=0000001



Operation Steps	Display	Parameters	Note
7) Press 【+】 Key	 L04 (flashing)	L04 Flow meter coefficient 4	Operation is the same as above Valid when L9=0000001
8) Press 【+】 Key	 L05 (flashing)	L05 First segment value	Operation is the same as above When instantaneous quantity \leq L05, count with L00 coefficient Note: This parameter of the instrument with relay output function is the set value of flow switch alarm
9) Press 【+】 Key	 L06 (flashing)	L06 Second segment value	Operation is the same as above When L05 < instantaneous quantity \leq L06, use L01 coefficient to count
10) Press 【+】 Key	 L07 (flashing)	L07 The third segment value	Operation is the same as above When L06 < instantaneous quantity \leq L07, use L02 coefficient to count
11) Press 【+】 Key	 L08 (flashing)	L08 The third segment value	Operation is the same as above When L07 < instantaneous quantity \leq L08, use L03 coefficient to count When instantaneous quantity > L08, use L04 coefficient to count
12) Press 【+】 Key	 L09 (flashing)	L09 The last digit of the flowmeter section switch is 0: No segmentation, 1: Segmentation	Operation is the same as above When the flowmeter is not segmented, the flowmeter uses the flowmeter coefficient 0 to count (main coefficient), and L1~L8 parameters do not work. Press [+] to return to L00 parameter; Press and hold the [-] key to enter the



5.4 FUNCTION PARAMETER

Operation Steps	Display	Parameters	Note
		F00 max flow of flowmeter	<p>1.[S] key shift, [+], [-] modify the number, press [S] key to move to F00 (flashing) after modification</p> <p>2. If you enter Table 2 parameters, press and hold the [-] key;</p> <p>3. Press the [+] and[-] keys together, and the instrument displays SAUEd, if you need to save, press and hold the [-] key to save the parameters and exit the setting, or press the [S] key to exit the setting without saving.</p>
1) Press 【+】 key		F01 Min Flow	Operation same as above. Automatically set to 1 if 0
2) Press 【+】 key		F02 4mA reference value, adjust 4Ma size.	Operation same as above, and the calculation formula: F02 shows the value ± () mA × one thousand × 4.096 For example, 4mA is adjusted to 4.1mA: 8 1 9 2 + 0 . 1 × o n e
3) Press 【+】 key		F 0 3 2 0 m A reference value, adjust 20mA size	Operation same as above, and the calculation formula: F03 shows the value ± () mA × one thousand × 4.096; For example, 20mA is adjusted to 20.1mA: 16384+0.1 × one thousand × 4.092=16793.2, enter 16793
4) Press 【+】 key		F04 Pulse output mode 0: modulated pulse output, 1: real-time pulse output	Operation same as above
5) Press 【+】 key		F05 Pulse output high level width (unit: ms)	Operation same as above



Operation Steps	Display	Paramet	Note
6) Press 【+】 key	 F06 (flashing)	F06 Flow coefficient when modulating pulse output	Operation same as above
7) Press 【+】 key	 (F07 (flashing))	F07 Commissioning by the manufacturer	Operation same as above
8) Press 【+】 key	 F08 (flashing)	F08 Flowmeter sensor type 0: Wigan sensor 1: Hall sensor or various types of pulse type transmitter	Operation same as above Note: The coefficient of 0 (main coefficient) is used when the section is not divided. Press [+] to return to F00 parameter Press and hold the [-] key to enter the parameters in Table 3
9) Press 【+】 key	 F09		Operation same as above, The last digit is valid 1: Output 8mA; 2: Output 12mA 3: Output 16mA; 4: Output 20mA This parameter cannot be saved. Exit the parameter to automatically cancel debugging current output



TABLE 3 COMMUNICATION PARAMETERS

Operation Steps	Display	Parameters	Note
	 C00 (flashing)	C00 instrument communicati on address, default address is 1	1. [S] key shifts, [+] and [-] modify the number, and then press [S] key to move to C00 (flashing) 2. If you enter Table 2, press and hold the [-] key; 3. At the same time, press [+] + [-] to display SAUEd. If you need to save, press and hold [-] to save the parameter and exit the setting. If you do not save, press [S] to exit the setting
1) Press 【+】 key	 C01 (flashing)	C01 Baud rate 0: 2400 1: 4800 2: 9600 Defaulted 3: 19200	Operation same as above
2) Press 【+】 key	 C02 (flashing)	C02 Communicati onmode setting The sixth and seventh digits arevalid	Operation is the same as above C02 The 6th digit: communication protocol selection =0 New communication protocol for instrument =1 Use the old communication protocol C02 7th digit: check bit selection =0 No verification, =1 odd check, =2 parity check Press [+] to return to C00 parameter Press and hold the [-] key to enter the parameters in Table 4



5.5 COMMUNICATION EXAMPLE

If the communication address of the flowmeter is C00=0000001, then, Host Query Command sending 01 03 00 0000 08 44 0C

01	Meter
03	Function Code
00	
00	Head Address
00	
08	08 byte (data
44 0C	Check code

The flowmeter response is: 01 03 10 00 14 AD 5C 00 BC 61 B2 00 01 3E C0 00 00 6B 22 21 CF

01	Meter
03	Function Code
10	Data Length
00 14 AD 5C	Single quantity 4 bytes 3 decimal (1355.100 L)
00 BC 61 B2	total cumulative higher 4 bytes(12345778
00 01 3E C0	Total cumulative lower 4 bytes and 3 decimal (81.600 L)
00 00 6B 22	Instantaneous quantity cubic 4 bytes 3 decimal (274.26
21 CF	CRC Check Code

The Data Read Out is:

1355.100 L for a single time

Total accumulated: 12345778.081600

Instantaneous quantity:

274.26Zeroing single

quantity:

the host sends 01 10 00 00 00 02 04 CC 33

C3 3C crcTotal accumulation of clearing:

the host sends 01 10 00 04 00 02 04 CC 33 C3 3C crc



5.6 METHOD OF FLOW SEGMENTATION

The flow coefficient of the flowmeter is different at different flow rates, especially at the minimum flow rate, which has a large difference, thus affecting its range ratio.

The electronic meter head can be effectively overcome by the comparison of flow segments, as follows: When the actual instantaneous flow is $\leq L05$, use L00 as the pulse equivalent

When $L05 < \text{actual instantaneous flow} \leq L06$, use L01 as pulse equivalent

When $L06 < \text{actual instantaneous flow} \leq L07$, use L02 as pulse equivalent

When $L07 < \text{actual instantaneous flow} \leq L08$, use L03 as pulse equivalent

When the actual instantaneous flow is greater than L08, L04 pulse equivalent is used.

If you do not use the flow segmentation function and only use one pulse equivalent, you only need to set L09 to 0. At this time, the instrument uses L00 as pulse equivalent no matter what flow rate.

5.7 ALARM OUTPUT

(1) When the instantaneous flow of the instrument is less than or equal to L05, K1 and K2 are closed; When greater than L05, K1 and K2 are disconnected.

(2) If the logical relationship of alarm output needs to be changed, please declare it when ordering.



APPENDIX -1 FLOW RANGE TABLE

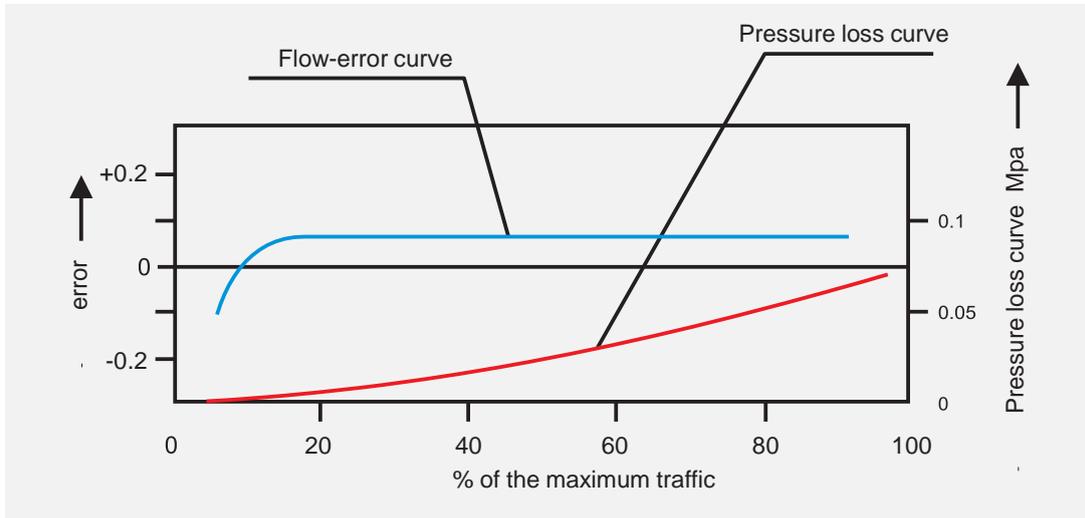
Flow Range As Below (unit: m³/h)

Temperature Range	Mechanical: -20°C~+80°C std, +200°C opt. Digital display: -20°C~+60°C std, +150 opt							
Pipe Diameter (mm)	Viscosity (mpa.s)							
		0.6~2	2~200		200~1000		1000~2000	
10		0.2-0.4 m ³ /h	0.2-0.4 m ³ /h	0.08-0.4 m ³ /h	0.08-0.3 m ³ /h	0.04-0.3 m ³ /h	0.06-0.2 m ³ /h	0.03-0.2 m ³ /h
15		0.6-1.5 m ³ /h	0.5-1.5 m ³ /h	0.3-1.5 m ³ /h	0.3-1.0 m ³ /h	0.2-1.0 m ³ /h	0.2-0.7 m ³ /h	0.1-0.7 m ³ /h
20	1.5-3 m ³ /h	0.8-3 m ³ /h	1-3 m ³ /h	0.6-3 m ³ /h	0.6-2.1 m ³ /h	0.4-2.1 m ³ /h	0.5-1.5 m ³ /h	0.25-1.5 m ³ /h
25	3-6 m ³ /h	1.2-6 m ³ /h	1.2-6 m ³ /h	0.8-6 m ³ /h	1-4.2 m ³ /h	0.6-4.2 m ³ /h	0.8-3 m ³ /h	0.6-3 m ³ /h
40	8-15 m ³ /h	5-15 m ³ /h	5-15 m ³ /h	3-15 m ³ /h	3-10.5 m ³ /h	2.1-10.5 m ³ /h	2-7.5 m ³ /h	1.0-7.5 m ³ /h
50	12-24 m ³ /h	6-24 m ³ /h	8-24 m ³ /h	4-24 m ³ /h	4-16.8 m ³ /h	2.4-16.8 m ³ /h	3-12 m ³ /h	2-12 m ³ /h
65	20-40 m ³ /h	10-40 m ³ /h	10-40 m ³ /h	8-40 m ³ /h	8-28 m ³ /h	6-28 m ³ /h	6-20 m ³ /h	4-20 m ³ /h
80	20-40 m ³ /h	10-40 m ³ /h	10-40 m ³ /h	8-40 m ³ /h	8-28 m ³ /h	6-28 m ³ /h	6-20 m ³ /h	4-20 m ³ /h
80 (heavy type)	30-60 m ³ /h	15-60 m ³ /h	15-60 m ³ /h	10-60 m ³ /h	10-42 m ³ /h	8-42 m ³ /h	8-30 m ³ /h	6-30 m ³ /h
100	40-100 m ³ /h	30-100 m ³ /h	20-100 m ³ /h	15-100 m ³ /h	15-70 m ³ /h	10-70 m ³ /h	12-50 m ³ /h	10-50 m ³ /h
150	90-190 m ³ /h	45-190 m ³ /h	56-190 m ³ /h	34-190 m ³ /h	34-133 m ³ /h	27-133 m ³ /h	30-95 m ³ /h	19-95 m ³ /h
200	170-340 m ³ /h	68-340 m ³ /h	68-340 m ³ /h	56-340 m ³ /h	56-238 m ³ /h	48-238 m ³ /h	50-170 m ³ /h	34-170 m ³ /h
Accuracy class	0.2	0.5	0.2	0.5	0.2	0.5	0.2	0.5

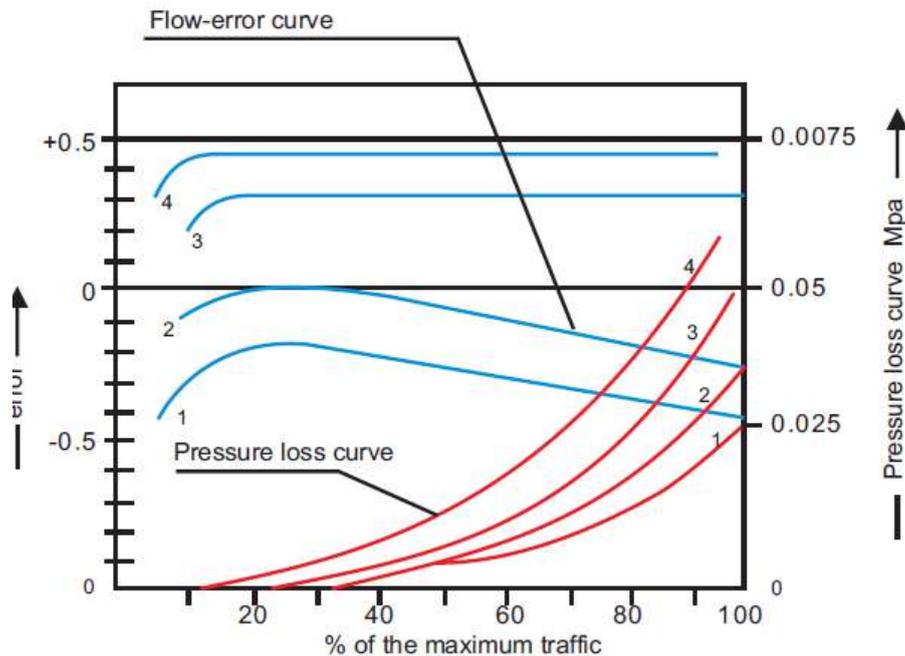
NOTE: WHEN THE VISCOSITY OF THE MEASURED LIQUID EXCEEDS 2000MPA.S, THE FLOW METER ADOPTS A HIGH VISCOSITY STRUCTURE, WHICH CAN BE USED FOR 20000MPA.S OR HIGHER. PLEASE CONTACT US FOR FLOW RANGE OR PARAMETER



APPENDIX -2 FLOW RANGE TABLE PERFORMANCE (ERROR AND PRESSURE LOSS CURVE)



0.2% ACCURACY FLOW METER ERROR AND PRESSURE LOSS CURVE



0.5% ACCURACY FLOW METER ERROR AND PRESSURE LOSS CURVE

Explanations:

THE ABOVE ACCURACY CURVE SHOWS THE METER ERROR WHEN THE METERED LIQUIDS HAVE DIFFERENT VISCOSITIES, AND THE METER ERROR CAN BE ADJUSTED UP AND DOWN THE AXIS 0 BY THE PRECISION ADJUSTING DEVICE.

UNDER THE CONDITION OF REDUCING THE FLOW RANGE RATIO OF ANY LIQUID, THE PRECISION OF THE FLOWMETER CAN BE IMPROVED BY USING THE PRECISION ADJUSTING DEVICE.



APPENDIX -3 SITE COMMISSIONING

BUMPING OR IMPROPER STORAGE DURING TRANSPORTATION MAY CAUSE DAMAGE OR FAILURE. PLEASE CHECK AND TEST BEFORE INSTALLATION.

- **INSPECTION AFTER UNPACKING**

After unpacking, check whether the instrument and accessories are complete, whether the instrument is damaged, and whether the function label of the instrument terminal is consistent with the function purchased by the user according to the packing list.

- **STATIC TEST**

After the power is turned on, check whether the display of the instrument is normal, check whether the keys and magnetic induction keys are normal, and the instantaneous value of the instrument should be zero when it is not working.

- **DYNAMIC TEST**

The instrument shall be well grounded after installation. The instantaneous flow of the instrument shall be zero before the valve is opened, and the flow shall be adjusted after the valve is opened. The steady change of the instantaneous flow of the instrument with the liquid flow indicates that the instrument works normally.



APPENDIX -4 SITE COMMISSIONING

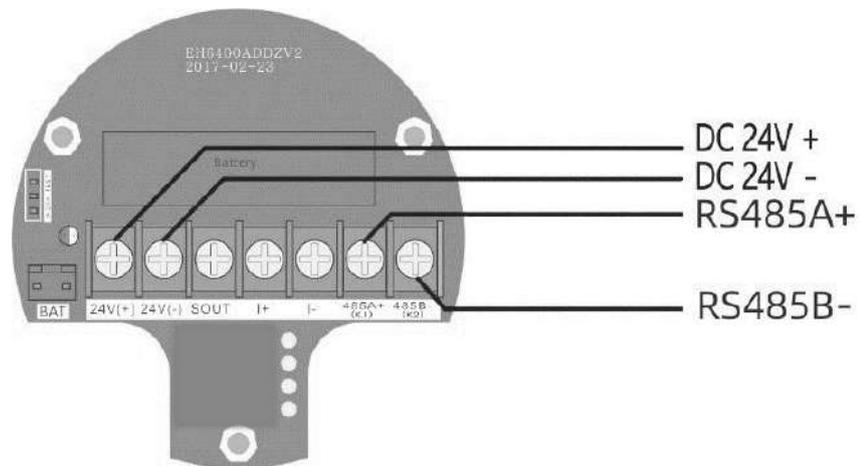
COMMON FAULTS, CAUSES AND TROUBLESHOOTING METHODS

Fault phenomenon	Causes	Measures	Notes
Oval gear does not rotate	1. There are sundries in the pipeline 2. The liquid tested contains more debris; the filter is damaged; the sundries enter the meter and the gear is blocked.	Remove the instrument and pipeline and repair the filter	
Leakage of axial sealing coupling	Sealing filler wears or lacks seal oil	Tighten gland or replace packing, fill sealing oil	
Unstable pointer rotation	Pointer and washer are loose or rotating parts are dumb	Re-tighten to eliminate inflexibility	
Small flow error is too negative	Elliptical gear collides with the wall of the measuring box due to wear of the bearing or deformation of the measuring cavity	Replace the bearings, repair the metering cavity and gear at the deformed place, make the rotation flexible and ensure the required clearance	Calibrate after repair
Error changes a lot	Large or gaseous flow pulsation	Reduce pulsation and add gas separator	
Error is too large but not more than $\pm 1\%$.	Changes in service life or clearance after maintenance	Re-calibrate and adjust it	For 0.2 accuracy flow meter, the maximum and minimum change does not exceed $\pm 0.17\%$
No signal when transmitting	The position of transmitting block is improper The polarity is reverse	Re-adjust position, move left and right Re-wire it (+ is connected to red wire, - is connected to black wire)	



APPENDIX -5 MODBUS CONFIGURATION DETAILS

MOF – 200 OVEL GEAR FLOW METER WIRING DIAGRAM



MOF-200 MODBUS Configuration details of Gear Flow meter to BMS

Function Code	Details	Register Address	Modbus Register	Register Type
Holding Register	Flow Total	02	40002	Decimal /integer
	Flow Rate	08	40008	Decimal /integer

Note: 40002: Displayed value / 1000 Unit in liters, 40008: Displayed value / 1000 Unit in m³/h

Function	Terminals	Wiring Mode
Power Supply	24 V (+)	24VDC +
	24 V (-)	24VDC -
Pulse Out	S OUT	Pulse Out
loop-powered 4-20 mA analog output	I +	24VDC +
	I -	4-20 mA +
RS-485 Modbus	485 A +	+
	485 B -	-
Earth Ground	Body Ground Terminals	



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