

Electromagnetic Flow Meter

Electromagnetic Flow Meter Operation Manual



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HARDWARE

1. GENERAL INFORMATION

This manual will assist you in installing, using and maintaining Electromagnetic Flow meter. It is your responsibility to make sure that all operators have access to adequate instructions about safe operating and maintenance procedure.



Warning

For your safety, review the major warnings and cautions below before operating your equipment.

1. Use only fluids that are compatible with the housing material and wetted components of your Electromagnetic Flow Meter.
2. When handling hazardous liquids, always exercise appropriate safety precautions.
3. When measuring flammable liquids, observe precautions against fire or explosion.
4. When working in hazardous environments, always exercise appropriate safety precautions.
5. Handle the sensor carefully. Even small scratches or nicks can affect accuracy.
6. For best results, calibrate the meter at least 1 time per year.
7. Do not purge the flow meter with compressed air.
8. During Electromagnetic Flow Meter removal, liquid may spill. Follow the manufacturer's safety precautions for clean up of minor spills

1.1 Product Description

Electromagnetic flow meters are intended for fluid measurement in most industries including water, wastewater, food and beverage, pharmaceutical and chemical.

There are two basic components of SURE electromagnetic flow meter: 1) The Detector, which includes the flow tube, isolating liner and measuring electrodes, and 2) The Converter, which is the electronic device responsible for signal processing, flow calculation, display and output signals.

The materials of construction of the wetted parts (liner and electrodes) should be appropriate for the specifications on the intended type of service. Review of the compatibilities consistent with the specifications is recommended.

Our's electromagnetic flow meters are factory tested and calibrated. A calibration certificate is included in the shipment of each meter.

1.2 Unpacking and Inspection

Upon receipt, examine your meter for visible damage. The meter is a precision measuring instrument and handled carefully. Remove the protective plugs and caps for a thorough inspection. If any items are damaged or missing, contact us.

Make sure the flow meter model meets your specific needs. For your future reference, it might be useful to record this information on nameplate in the manual in case it becomes unreadable on the meter.

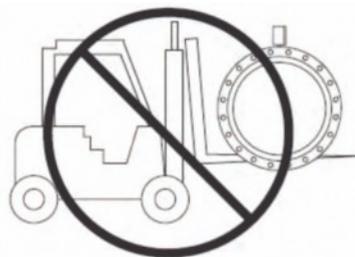
Transportation and Handling

Do not lift the detector from the Converter housing, the junction box or the connecting cable. Use lifting lugs for larger sizes is recommended. Very large meter sizes are packed and crated with the meter laying on its side for shipping safety and stability reasons. In order to lift the meter in vertical position, it's recommended to use a sling rigged method as shown below.



Warning: NEVER introduce the forklift, chains, wire slings or any other sharp object inside the flow tube for lifting or handling purpose. This could permanently damage the isolating liner and could render the meter inoperable.

If using a forklift, do not lift the detector from its body between the flanges. The housing could be accidentally dented and permanent damage could be caused to the internal coil assemblies.



2. TECHNICAL DATA

Measuring System

Measuring Principle	Faraday's Law
Application range	Electrically conductive fluids
Measured Value	
Primary measured value	Flow velocity
Secondary measured value	Volume flow

Design

Features	Fully welded maintenance-free sensor
	Flange version with full bore flow tube
	Standard as well as higher pressure ratings
	Large diameter range from DN25...3000 with rugged liners approved for drinking water
	Industry specific insertion lengths
Modular Construction	The measurement system consists of a flow sensor and a signal converter. It is available as compact and as remote version.
Compact Version	With 511B converter: 110-240V AC Power
	With 521B converter: 18-36V DC Power
	With W800L/W800W: Battery Power
Remote Version	In wall mount version with 211B converter (110-240V AC) or 221B converter (18-36V DC)
	With W800F converter: Battery Power
Measurement Range	0.3...+10 m/s

Measuring Conditions

Reference Conditions	Flow conditions similar to EN 29104
	Medium: Water
	Electrical conductivity: $\geq 20 \mu\text{s/cm}$
	Temperature: $+10\dots+50^\circ\text{C}$ ($+50^\circ\text{F} \dots +120^\circ\text{F}$)
	Inlet section: $\geq 5\text{DN}$
Flow Meter Accuracy	Operating pressure: 1 bar (14.5 psig)
	Standard: $\pm 0.5\%$ of rate
	Optional: $\pm 0.2\%$ of rate

Operating Conditions

Temperature	
Process Temperature	Hard rubber liner: $-5\dots+60^\circ\text{C}$ or 90°C
	Polypropylene liner: $-5\dots+90^\circ\text{C}$
	PTFE liner: $-5\dots+120^\circ\text{C}$; PFA: 180°C
Ambient Temperature (all versions)	Standard (with aluminum converter housing)
	$-20\dots+60^\circ\text{C}$ (Protect electronics against self-heating with ambient temperatures above 55°C)
Storage Temperature	$-20\dots+70^\circ\text{C}$
Pressure	
EN 1092-1	DN2200...DN3000: PN2.5
	DN1200...DN2000: PN 6
	DN200...DN1000: PN10
	DN65...DN150: PN 16
	DN10...DN50: PN 40
	Other pressures on request
ASME B16.5	1/2"...8": 150 lb RF
	Other pressures on request
JIS	1/2"...8": 10 K
	Other pressures on request
Pressure Drop	Negligible

Physical condition	Conductive liquids
Electrical conductivity	$\geq 20\mu\text{s/cm}$
Permissible gas content (volume)	$\leq 5\%$
Permissible solid content (volume)	$\leq 30\%$

Installation Conditions

Installation	Take care that flow sensor is always fully filled
	For detailed information see chapter "Cautions for Installation"
Flow Direction	Forward and reverse
	Arrow on flow sensor indicates positive flow direction
Inlet Run	$\geq 5 \text{ DN}$
Outlet Run	$\geq 2 \text{ DN}$

Materials

Sensor Housing	Sheet steel, Polyurethane coated
	Other materials on request
Measuring Tube	Austenitic stainless steel
Flanges	Carbon steel; Polyurethane coated
	Other materials on request
Liner	Standard
	DN10...40 : PTFE
	DN50 ...300: PTFE or Hard Rubber
	DN300 ...2200 : Hard Rubber or PTFE Option
Connection Box (only remote versions)	Standard : Polyurethane coated die-cast aluminum
Measuring Electrodes	Standard : Stainless steel 316L
	Option: Hastelloy C, Titanium, Tantalum
	Other materials on request
Grounding Rings	Standard: Stainless steel
Grounding Electrodes (option)	Same material as measuring electrodes

Process Connections

Flange	
EN 1092-1	DN4...300 in PN6...40
ASME	1/6"...120" in 150 lb RF
JIS	10...1000 in 10...20K
Design of gasket surface	RF
	Other sizes or pressure ratings on request

Flow Range

Diameter				
6	1/4"	0.0306	0.611	1.018
10	3/8"	0.0849	1.696	2.827
15	1/2"	0.1909	3.817	6.362
20	3/4"	0.3393	6.786	11.31
25	1"	0.5301	10.60	17.67
32	1-1/4"	0.8686	17.37	28.95
40	1-1/2"	1.357	27.14	45.24
50	2"	2.121	42.14	70.69
65	2-1/2"	3.584	71.68	119.5
80	3"	5.429	108.6	181.0
100	4"	8.482	169.6	282.7
125	5"	13.25	265.1	441.8
150	6"	19.09	381.7	636.2
200	8"	33.93	678.6	1131
250	10"	53.01	1060	1767
300	12"	76.34	1527	2545
350	14"	103.9	2078	3465
400	16"	135.7	2714	4524
450	18"	171.8	3435	5726
500	20"	212.1	4241	7069
600	24"	305.4	6107	10179
700	28"	415.6	8310	13850
800	32"	542.9	10860	18100
900	36"	662.8	13740	22900
1000	40"	848.2	16962	28270

3. MODEL AND SELECTION

3.1 Flange Type / battery Powered

Standard - without Communication



RS485 (Modbus) Communication

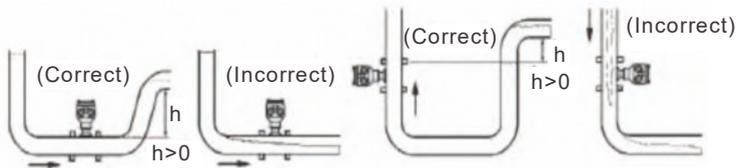


Model	Suffix Code	Description
Type	LDG	Electromagnetic Flowmeter
	BAT	Battery driven version
Diameter	XXXX	Stand for diameter 0004: DN4; 0015: DN15 0100: DN100; 2200: DN2200
	Structure	S
L		Remote Type; 10 meters cable default
Electrode Material	M	SS316L
	T	Titanium
	D	Tantalum
	H	Hastelloy Alloy C
	P	Platinum-Iridium
Signal Output	0	No Output
	1	4-20mA / Pulse
Liner Material	X	Hard Rubber
	P	Propylene Oxide
	F	PTFE
	A	PFA
Power Supply	-2	Battery Power Supply
Communication	0	No Communication
	1	Modbus RS485
	3	GPRS
Sensor Grounding	0	No Grounding
	1	Grounding Ring
	2	Grounding Electrode
Connection	DXX	D16: DIN PN16 Flange ; D25: DIN PN25 Flange...
	AXX	A15: ANSI150# Flange; A30: ANSI 300# Flange...
	JXX	J10: JIS 10K Flange; J20: JIS 20K Flange...
	XXX	On request
Body Material	CS	Carbon Steel
	S4	Stainless Steel 304
	S6	Stainless Steel 316

4. CAUTIONS FOR INSTALLATION

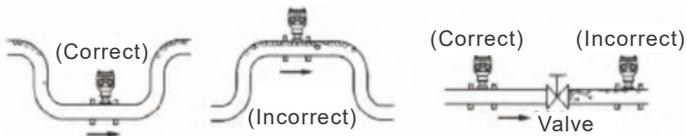
4.1 Mounting Positions

- ★ Pipes must be fully filled with liquids. It is essential that pipes remain fully filled at all times, otherwise flow rate indications may be affected and measurement errors may be caused.



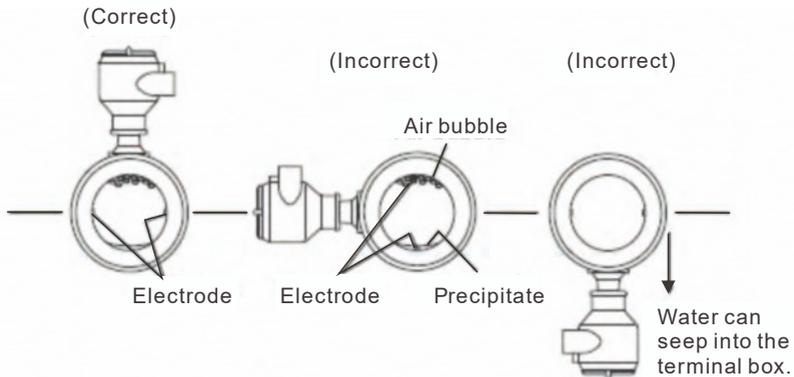
Mounting Positions

- ★ Avoid Air Bubbles. If air bubbles enter a measurement pipe, flow rate indications may be affected and measurement errors may be caused.



Avoiding Air Bubbles

- ★ If the electrodes are vertical to the ground, air bubbles near the top or precipitates at the bottom may cause measurement error. Ensure that the terminal box is mounted above the piping to prevent water from entering them.



Mounting Orientation

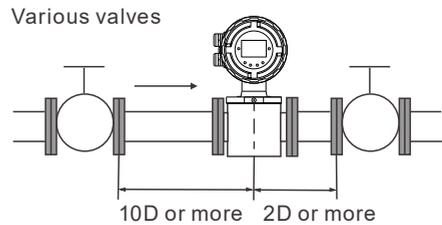
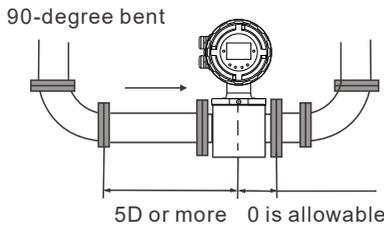
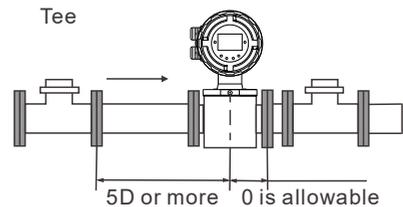
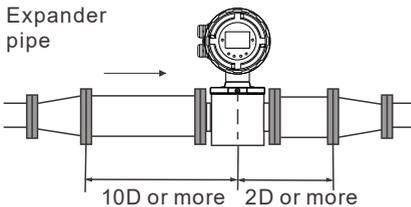
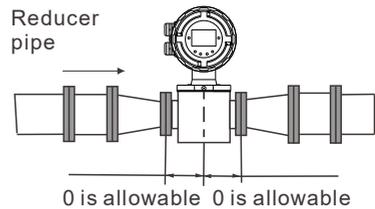
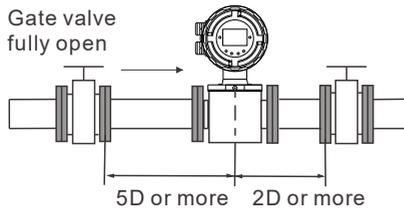
- ★ Avoid all pipe locations where the flow is pulsating, such as in the outlet side of piston or diaphragm pumps.
- ★ Avoid locations near equipment producing electrical interference such as electric motors, transformers, variable frequency, etc.
- ★ Install the meter with enough room for future access for maintenance purposes.
- ★ The magnetic meter isolating liner, whether if it is PTFE or Rubber, is not intended to be used as gasket material. Standard gaskets (not provided) should be installed to ensure a proper hydraulic seal. When installing the gaskets, make sure they are properly centered to avoid flow restriction or turbulence. Do not use graphite or any electrically conductive sealing compound to hold the gaskets in place during installation. This could affect the reading accuracy of the measuring signal.



Warning: Precaution for direct sunshine and rain when the meter is installed outside.

4.2 Required Lengths Of Straight Runs

For optimum accuracy performance, it is required to provide sufficient inlet and outlet straight pipe runs. An equivalent to 3 diameters of straight pipe is required on the inlet side, and 2 diameters on the outlet side. There are no special requirements for standard concentric pipe reducers. See diagram1 for required straight runs when there is altering device.



Note: D: Flowtube Size

Diagram 1. Required straight runs



Special Notice

When the meter contains removable coverplates, leave the coverplate installed unless accessory modules specify removal. Don't remove the coverplates when the meter is

4.3 Grounding

In this section the term “grounding” will be defined as: the arrangement of process wetted metal materials (piping, ground rings, ground electrodes), cabling (ground straps, ground wires), and connections to stable references (often, but not always earth ground) required to achieve satisfactory operation of a magnetic flowmeter. As such, it applies to the instrumentation aspect of grounding, rather than to “safety grounding”.

Proper installation and grounding of magnetic flowmeter is important for accurate, reliable measurement performance. Stray AC or DC currents through the fluid or instrument can produce noise signals that may in turn interfere with the relatively low flow signals generated in today's modern pulsed DC magmeter.

Manufacturers provide a variety of elements (ground straps, ground electrodes, ground rings) and directions for the standard grounding of the magmeter.

Applications exist in which the user can not or should not make use of the traditional grounding connection to adjacent piping or to earth ground. These flow measurement applications are frequently encountered in electrolytic processes. In this case, the fluid passing through the magmeter flow tube may be at a potential significantly higher or lower than earth ground, and a connection to earth ground may be detrimental to the performance and even the reliability of the magmeter. These applications are typically compounded by the use of non-conductive or lined pipe and may feature acid or caustic flows which may necessitate the use of expensive wetted electrodes and grounding materials such as titanium, platinum, or tantalum.

4.4 Connections

Use a gasket between the meter flange and mating flange. Determine the material of the gasket based on the operating conditions and type of fluid.

Note: Do not over tighten the flange bolts. This may cause the gasket to be compressed into the flow stream and may decrease the accuracy of the meter.

4.5 Installation Dimensions

See Figure 1, Figure 2 and Table 2 for detailed dimensions.

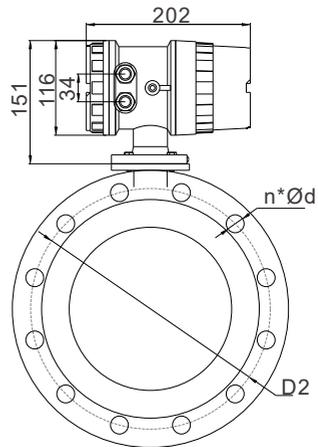
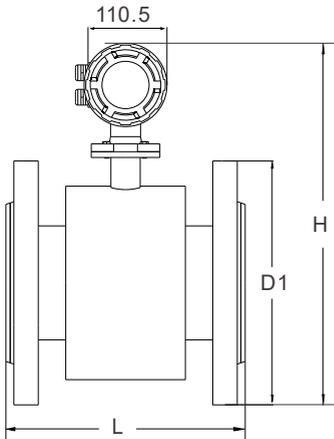


Figure 1 Drawings of Compact Electromagnetic Flow Meter

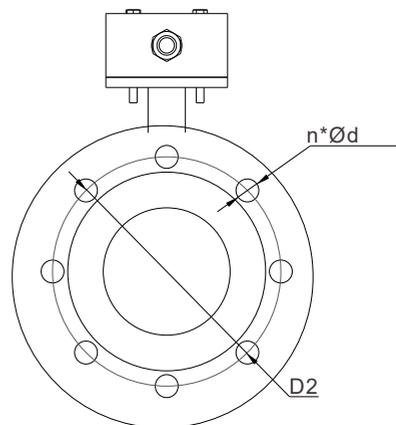
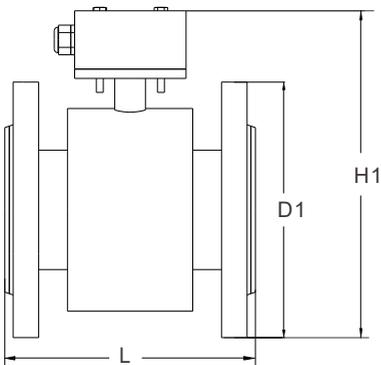
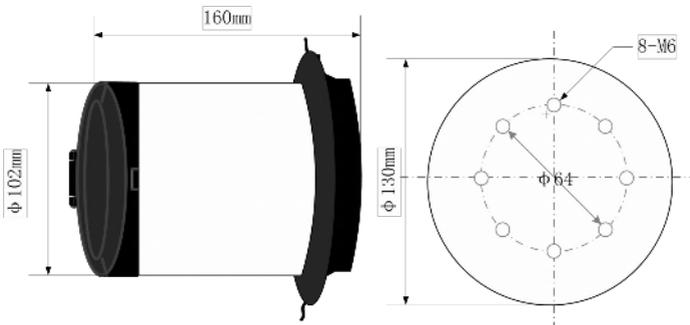


Figure 2 Drawings of Remote Electromagnetic Flow Meter

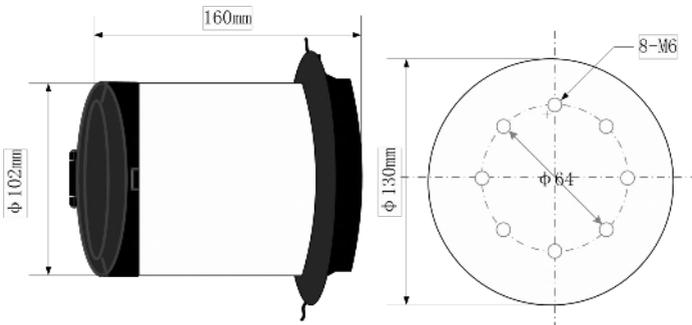
Table 1. Dimensions (DIN PN16, JIS 10K, ANSI 150#; Unit: mm)

2.1 Flange: DIN PN16								
Diameter DN	B Type L(mm)		H (mm)	H1 (mm)	D (mm)	D1 (mm)	D2 (mm)	n × Φ d (mm)
10		120	360	220	90	60	41	4×14
15	160/120	200	360	220	95	65	45	4×14
20	160/120	200	360	220	105	75	58	4×14
25	200	200	360	220	115	85	68	4×14
32	200	200	370	235	140	100	78	4×18
40	200	200	370	235	150	110	88	4×18
50	200	200	385	242	165	125	102	4×18
65	250	200	400	256	185	145	122	4×18
80	250/200	200	415	275	200	160	138	8×18
100	250/200	250	435	295	220	180	158	8×18
125	250	NA	465	325	250	210	188	8×18
150	300	NA	497	355	285	240	212	8×22
200	350	NA	550	410	340	295	268	12×22
250	450	NA	610	488	405	355	320	12×22
300	500	NA	660	520	460	410	375	12×22



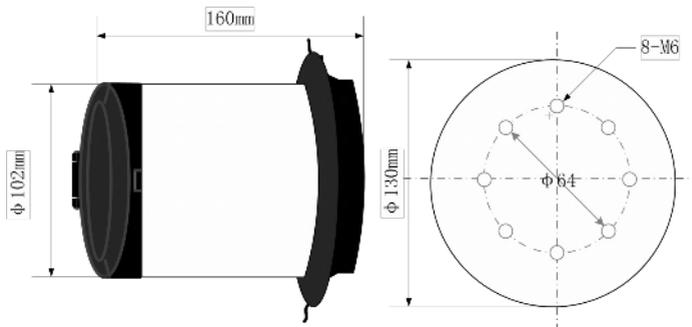
2.2 Flange: JIS 10K

	B Type L(mm)	T Type L(mm)	H (mm)	H1 (mm)	D (mm)	D1 (mm)	D2 (mm)	n × Φ d (mm)
	160/120	120	360	220	90	64	46	4×15
15	160/120	200	360	220	95	70	52	4×15
20	160/120	200	360	220	100	75	58	4×15
25	200	200	360	220	125	90	70	4×19
32	200	200	370	235	135	100	76	4×19
40	200	200	370	235	140	105	85	4×19
50	200	200	385	242	155	120	100	4×19
65	250	200	400	256	175	140	120	4×19
80	250/200	200	415	275	185	150	130	8×19
100	250/200	250	435	295	210	175	155	8×19
125	250	NA	465	325	250	210	185	8×23
150	300	NA	497	355	280	240	215	8×23
200	350	NA	550	410	330	290	265	12×23
250	450	NA	610	488	400	355	325	12×25
300	500	NA	660	520	415	400	370	16×25



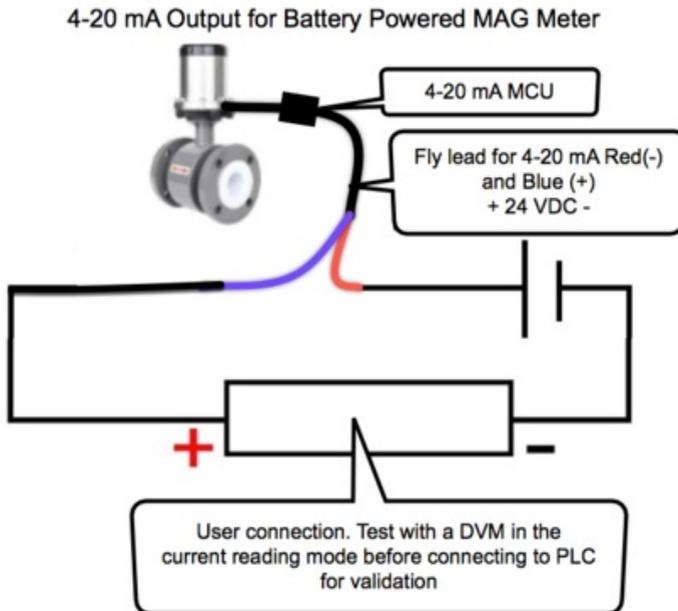
2.3 Flange: ANSI 150#

Diameter DN	B Type L (mm)	T Type L (mm)	H (mm)	H1 (mm)	D (mm)	D1 (mm)	D2 (mm)	n × Φ d (mm)
15	160/120	200	360	220	90	60	40	4 × 15
20	160/120	200	360	220	98	70	43	4 × 15
25	200	200	360	220	108	79.5	51	4 × 15
40	200	200	370	235	127	98.5	73	4 × 15
50	200	200	385	242	152	120.5	92	4 × 19
65	250	200	400	256	178	139.5	105	4 × 19
80	250/200	200	415	275	190	152.5	127	4 × 19
100	250/200	250	435	295	229	190.5	157	8 × 19
125	250	NA	465	325	254	216	186	8 × 23
150	300	NA	497	355	279	241.5	216	8 × 23
200	350	NA	550	410	343	298.5	270	8 × 23
250	450	NA	610	488	406	362	324	12 × 25
300	500	NA	660	520	483	432	381	12 × 25



5. ELECTRICAL WIRING

Use the separate manual for Battery Powered transmitter.



6. OPERATION AND SETUP

Use the separate manual for Battery Powered transmitter.

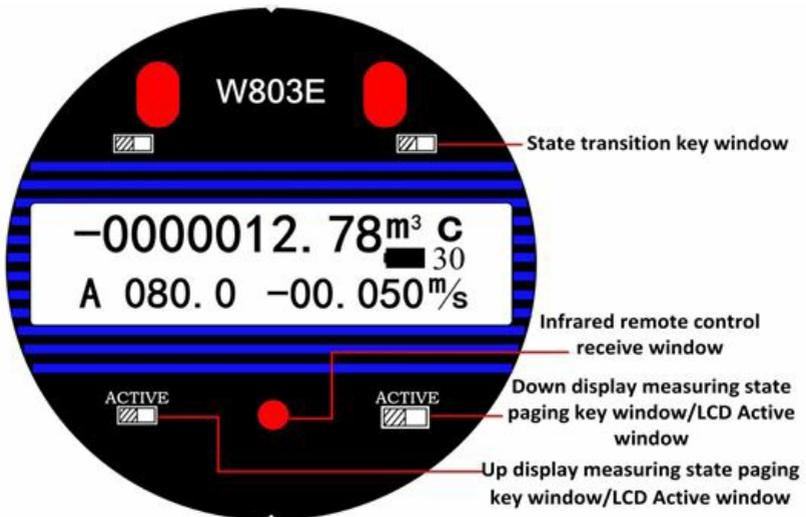


Fig. 3.2 W803E magnetic key operational position

7. TROUBLESHOOTING

Symptom	Probable Cause	Solution
Measurement is not accurate	1. Parameter wrong	Check the parameters (Transmitter, K-factor and size)
	2. Pipe is not fully filled	Check if meter is fully filled
Flow rate indication is unstable	1. Grounding issue	(1) Make sure meter is properly grounded to a good earth grounding (2) Please use grounding ring when the pipe is not conductive, such as PVC or other plastic pipe
	2. Air	Make sure fluid does not contain air bubbles
	3. Converter location outside electrical interference	Make sure converter is not too close to sources of electrical interference
No Display	1. No power	Apply correct power
	2. Incorrect power	Check power supply
	3. Wiring connections	Check power input/output connections
	4. Fuse blown	Replace fuse
	5. Contrast of LCD is too low	Increase the contrast
Empty Pipe Alarm	1. Fluid is not full filled the pipe	Increase the flow rate
	2. Electrode was polluted	Clean the electrode if voltage of Ds1 and DS2>1V
	3. Fluid's conductivity is too small	If connect three terminals SIG 1, SIG 2, SGND and the alarm disappears, which means the fluid's conductivity is small. Replace other kind of flowmeter

8.Limited Warranty Policy

We hereby provides a limited warranty against defects in materials and workmanship. This product includes a 1-year warranty. The warranty period shall begin on the date of the original new equipment purchase. Warrantor's obligation hereunder shall be limited to repairing defective workmanship or replacing or repairing any defective parts.

In the event purchaser believes the product is defective, the product must be returned to us, transportation prepaid by Purchaser, within the appropriate warranty period relative to the product. If our's inspection determines the workmanship or materials are defective and the required maintenance has been performed and, has been properly installed and operated, the product will be either repaired or replaced, at our's sole determination, free of additional charge, and the goods will be returned, transportation paid by us, using a transportation method selected by us.

Prior to returning the product to us, Purchaser must obtain a Returned Material.

Authorization (RMA) Number from our' s Customer Service Department within 30 days after discovery a purported breach of warranty, but not later than the warranty period; otherwise, such claims shall be deemed waived.

If our' s inspection reveals the product to be free of defects in material and workmanship or such inspection reveals the goods were improperly used, improperly installed, and/or improperly selected for service intended, we will notify the purchaser in writing and will deliver the goods back to Purchaser upon receipt of Purchaser's written instructions and agreement to pay the cost of transportation. If Purchaser does not respond within thirty (30) days after notice from us, the goods will be disposed of in our's discretion.

We do not warrant the product to meet the requirements of any safety code or other jurisdiction, and Purchaser assumes all risk and liability whatsoever resulting from the use thereof, whether used singlely or in combination with other machines or apparatus.

This warranty shall not apply to any our product or parts thereof, which have been repaired outside our's factory or altered in any way, or have been subject to misuse, negligence, or accident, or have not been operated in accordance with our's printed instructions or have been operated under conditions more severe than, or otherwise exceeding, those set in the specifications.

FOR NON-WARRANTYA repairs or calibrations, consult us for current repair/ calibration charges. Have the following information available BEFORE contacting us:

1. P.O. number to cover the COST of the repair/calibration,
2. Model and serial number of the product.
3. Repair instructions and/or specific problems relative to the product.

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