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ELECTROMAGNETIC WATER METER

Model: CZ-EFM

User manual



SENCE INDUSTRIAL EQUIPMENT CO., LTD

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1. The product function introduction

1.1 Technical specifications

Flange standards	JB / 9248 - 1999			
Available diameters	50,65,80,100,125,150,200			
Pressure drop class	ΔP25(< 0.25 bar)			
Accuracy Class	2			
Normal rated pressure	4.0Mpa	1.6Mpa	1.0Mpa	0.6Mpa
	DN50~DN200	DN50~DN200	DN50~DN200	DN50~DN200
Ambient temperature	Sensor		-40 ~ +80 °C	
	Transducer and intergral type		-15 ~ +50 °C	
Lining material	F4, Polychlorobutadiene rubber, PTFE, F46, Fs, Polyurethane			
Maximum liquid temperature for each material	Intergral type	70°C		
	Remote type	PTFE / F4 liner		100°C; 150°C
		Polychlorobutadiene rubber		80°C; 120°C
		Polyurethane		80°C
		F46		100°C; 150°C
		Fs		80°C
Types of materials of electrical contacts	Stainless steel 00Cr17Ni14Mo, 00Cr18Ni12Mo2Ti, Hastelloy C, Hastelloy B, Titanium, Tantalum, Stainless steel			
Connection flange material	Carbon Steel			
Grounding contact material	Stainless steel			
Flange material is selectable	Stainless steel, Carbon steel			
Watch protection standards	DN50 ~ 200 remote type rubber of polyurethane liner			IP68
	Other sensors and all transducers			IP65
Explosion-proof standards of watches	MD II BT4	Intergral type, IP65, Magnetic key		
		Detachable type, IP65, Magnetic key		
	M II BT4	Remote type, IP65		
Cable length for long distance connection	In general, the probe is no more than 100m away from the sensor; beyond 100m requires special order			

1.2 Flow TABLE

Model	Sensor diameter	FLOW(m3/h				Ratio(Q3/Q1)
		Overl. Q4(m3/h)	Perm. Q3(m3/h)	Trans Q2(m3/h)	Min Q1(m3/h)	
CZ-EFM-50	50	78.7	63.0	2.520	1.575	40
CZ-EFM-65	65	125.0	100.0	4.000	2.500	40
CZ-EFM-80	80	200.0	160.0	6.400	4.000	40
CZ-EFM-100	100	312.5	250.0	10.000	6.250	40
CZ-EFM-125	125	500.0	400.0	16.000	10.000	40
CZ-EFM-150	150	787.5	630.0	25.200	15.750	40
CZ-EFM-200	200	1250.0	1000.0	40.000	25.000	40

1.3 Basicfunction

- Low-frequency square-wave exciting , exciting frequency : 1/16 power frequency 1/20power frequency、1/25 power frequency;
- High-frequency square-wave exciting, exciting frequency : 1/2 power frequency(for grouting liquid measure);
- Exciting current can be selected for 125mA、187.5mA、250mA、500 mA
- No need to add empty pipeline measurement, and can measure continuously, alarm by fixed value;
- Current speed range : 0.1 --- 15m/s, current speed resolution : 0.5mm/s
- AC high-frequency switching power, range of voltage : 85VAC --- 250VAC;
- DC 24V switching power, range of voltage : 20VDC --- 36VDC
- Network function : MODBUS、GPRS、PROFIBUS 、HARTcommunication interface (choose)
- Chinese or English displaying mode, (other languages can be set)
- Three integrator gross inside, respective register: Forward gross, reverse gross and minus value gross.

1.4 Especial function

- Recording time when power turn-off, to record power broken time of instrument system automatically and recruit to count the missing flux
- Recording function of hour gross, to record the flux gross by hour, fit for timed measure;
- Infrared handing telecontrol keyboard , all the functions of far-untouched controlling converter.

1.5 Normal operating conditions

Ambient Temperature Ranges : fission -10~+60°C;
Relative Humidity : 5%~90%;

Power Supply: 85~250V, 45~63Hz (single-phase AC).

Dissipation Power: <20W (After connecting sensor) .

1.6 Type of connecting with sensors

- ☐ The integrated circinal shells: circinal shells, shells connect with the flange directly, explosion-proof;
- ☐ The integrated squared shells: squared shells, shells connect with the flange directly
- ☐ The split squared shells: squared shells (hang on the wall), Signal converters connect with cable of sensor

1.7 Plot of installing measure

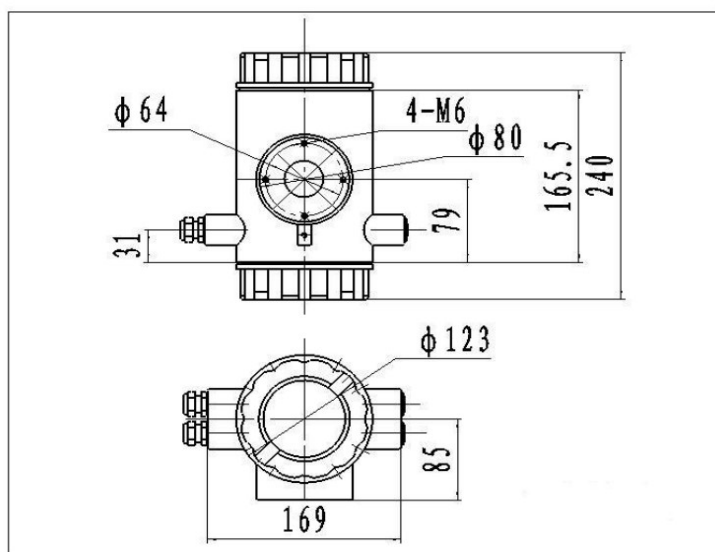


Fig.1 Exterior size of the integrated circinal shells

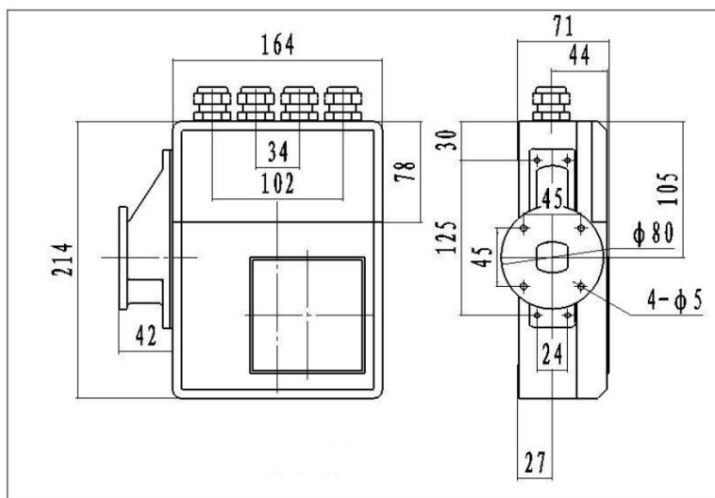


Fig.2 Exterior size of the integrated squared shells

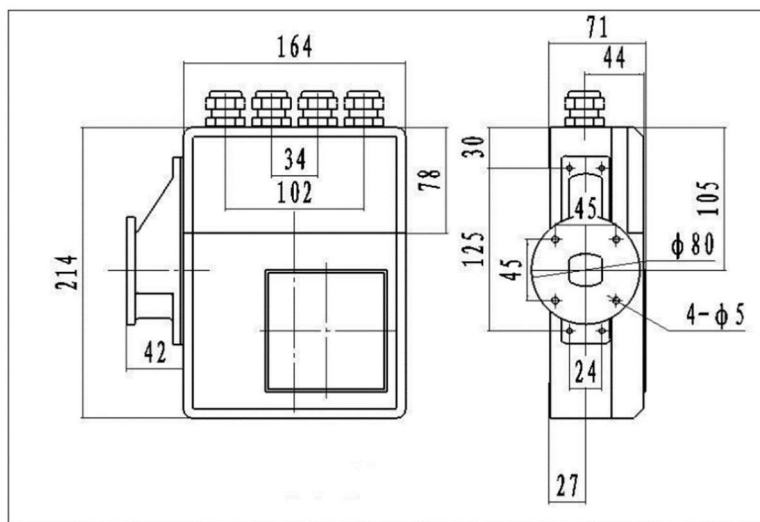


Fig.3 Exterior size of the split squared shells

2. Basic circuit of converter

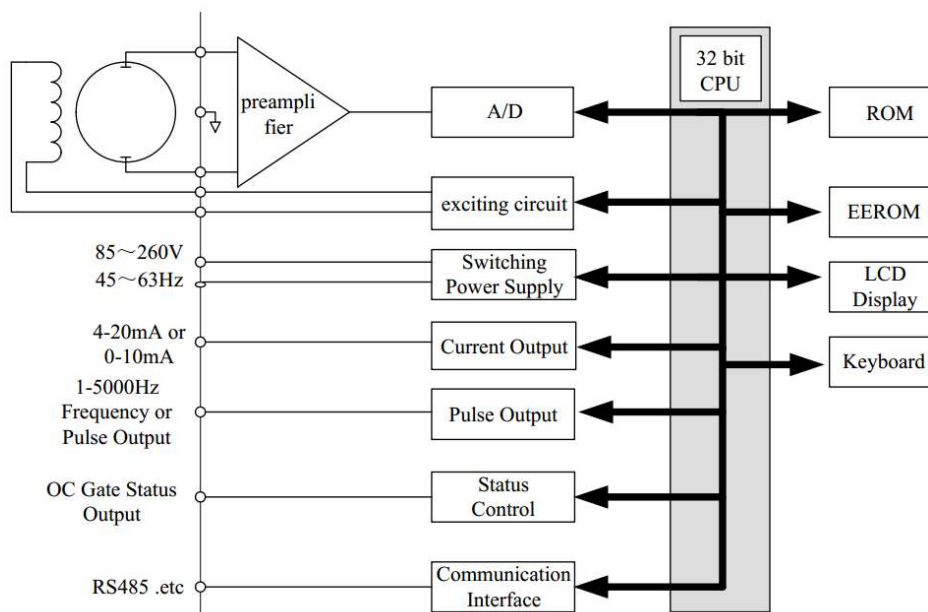


Fig.2. 1 Structure Of Converter's Circuit

The converter can supply exciting current to the coil in the sensor of electronic flowmeters, the head amplifier amplifies the electromotive force from the sensor and converts it into standard signals of current or frequency so that the signals can be used for displaying, controlling and processing. See structure of converter circuit shown in Fig.2.1

3. Operation converter

3.1 Key and display

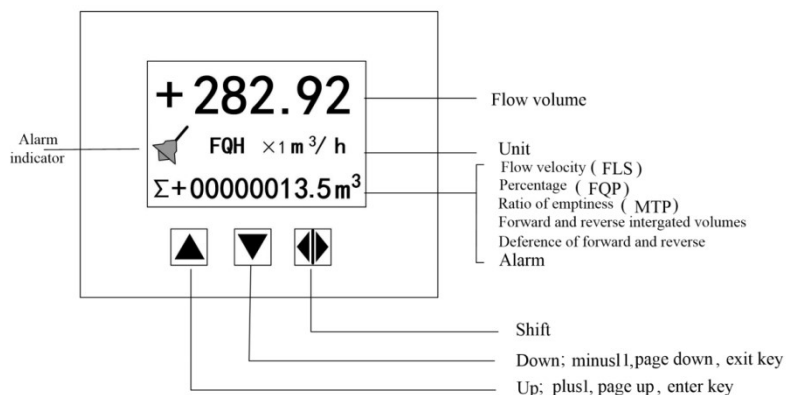


Fig 3.1a Rotundity define keys and LCD screen display

3.2 Rotundity define keys and LCD screen display

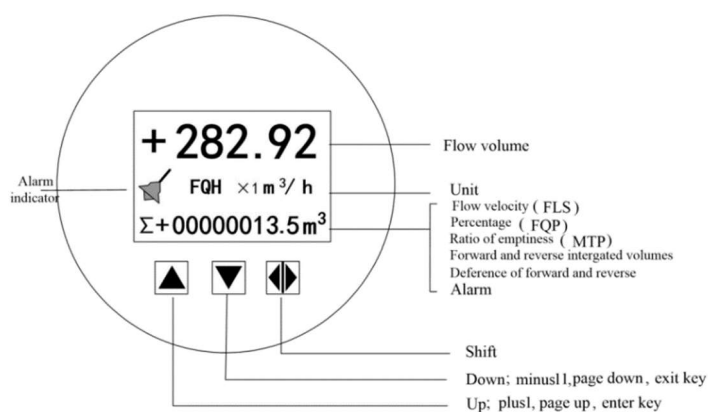


Fig. 3.1b Keys on circinal panel and big LCD display

4. Section picture of conversion

4.1 Photo realistic



Fig.4.1a. Key CZ-EFM



Fig.4.1b. Key CZ-EFM

4.2 Connections of sensor

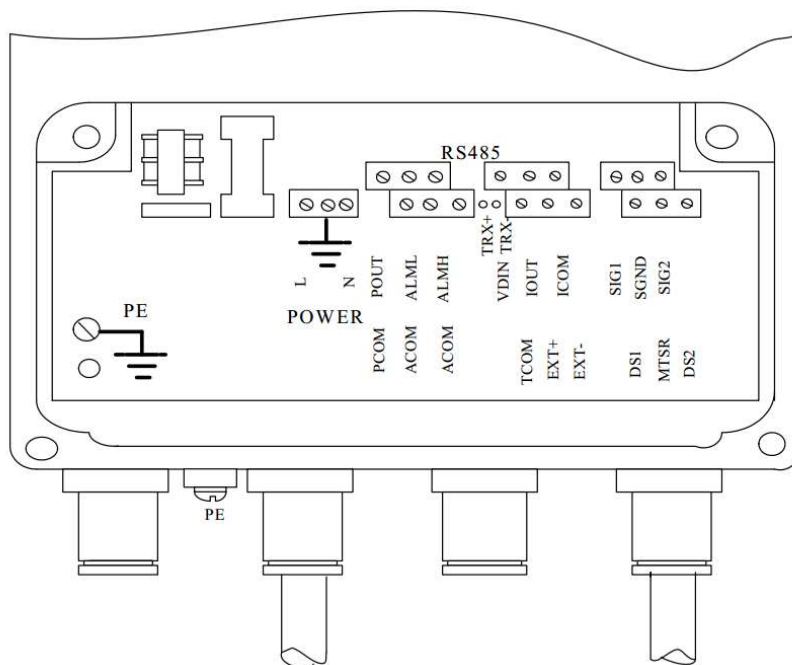


Fig4.2. Connectors for 211B

Labels of connectors in squared model

SIG 1	Signal 1	} To Separate Model Sensor
SGND	Signal Ground	
SIG2	Signal 2	
DS1	Shielded Exciting1	
DS2	Shielded Exciting2	
EXT +	Exciting Current +	
EXT -	Exciting Current -	
VDIN	Current Two lines 24 V Spots	} Analog Current Output
ICOUT	Analog Current Output	
ICCOM	Analog Current Output Ground	
POUT	Flow Frequency (Pulse) Output	} Frequency (Pulse) Output
PCOM	Frequency (Pulse) Output Ground	
ALMH	Upper Limit Alarm Output	} Two Alarm Outputs
ALML	Low Limit Alarm Output	
ALCOM	Alarm Output Ground	
TRX +	Communication Input(RS485-A)	} Communication Input
TRX -	Communication Input(RS485-B)	
TCOM	232 Communication Ground	

4.3 Signal lines and labels in squared model

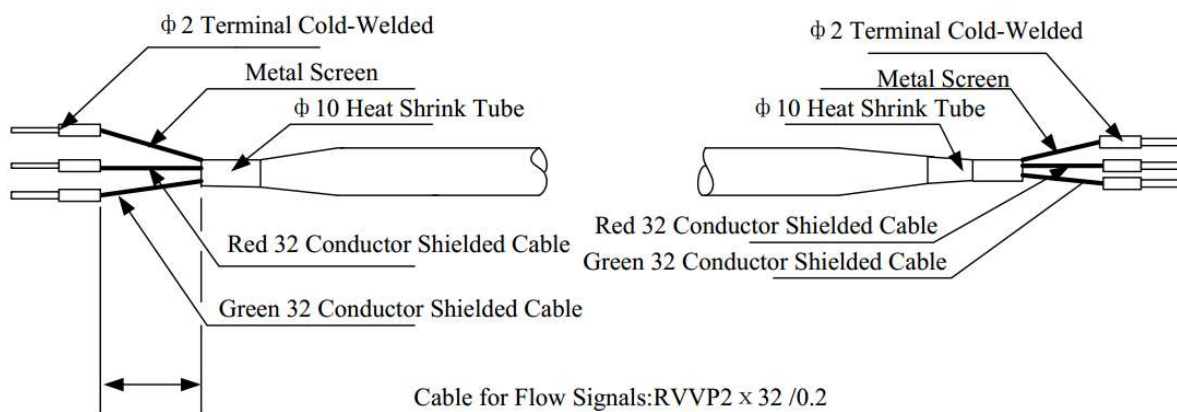


Fig4.3. Connection and labels of signal lines in squad model

4.4 Links and labels of connectors in Circinal Model

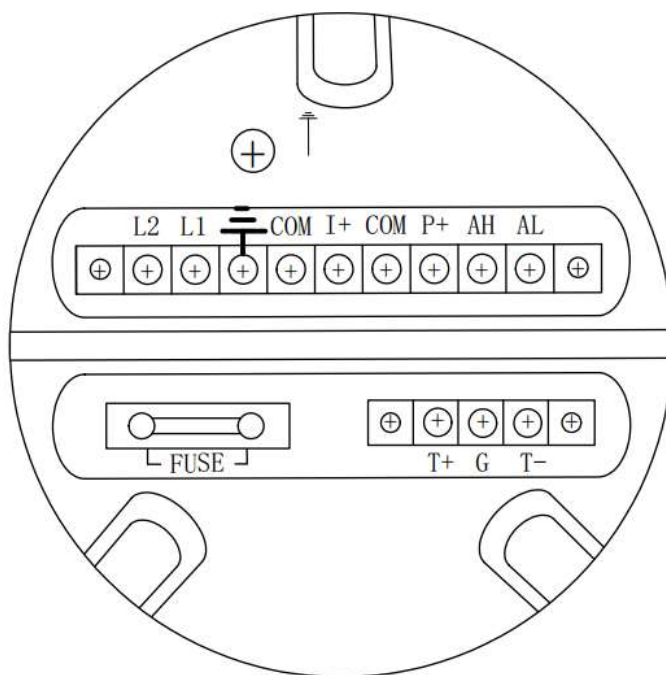


Fig4.4 Connectors in circinal model

Symbols and Description of Connectors in Circinal Pane

I+ :	Output Current for Flow Measurement
COM :	Output Current (Ground) for Flow Measurement
P+ :	Frequency(Pulse) Output for Bi-directional Flow

COM :	Frequency (Pulse) Output (Ground)
AL :	Alarm Output for Low Limit
AH :	Alarm Output for Upper Limit
COM :	Alarm Output (Ground)
FUSE :	Fuse for Power Supply
T+ :	+Communication Input Signal(RS485-A)
T- :	-Communication Input Signal(RS485-B)
G	RS232 Communication Ground
L1 :	220V (24V) Power Supply
L2 :	220V (24V) Power Supply

4.5 Labels and connection of signal lines in circinal model

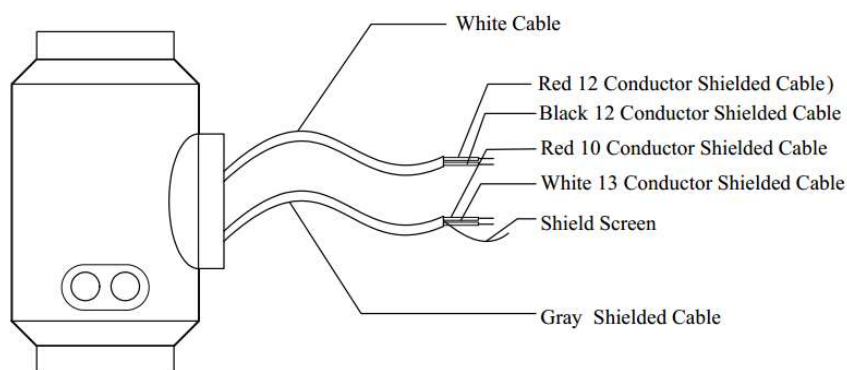


Fig4.5 Labels and connection of signal lines in circinal model

White twisted-pair cable (for exciting current):

12 Conductors (Red)

12 Conductors (Black)

Gray shielded twisted-pair cable:

10 Conductors (Red) connected to “Signals 1”

13 Conductors (White) connected to “Signals 2”

Shielded Conductor connected to “Signal Ground”

5 . Characteristic and connection of cable

5.1 Flux signal line

When separated models of converters are assembled with sensors for measuring flow of fluid

which conductivity is larger than $50\mu\text{S}/\text{cm}$, PVVP 2*0.2 mm model cable (metal shielded signal cable covered with PVC) can be used as communication cable for flow signals. The length of signal cable should be less than 100 m. Signal cables have to be connected to sensors that were assembled by producers. Connections of signal cables are shown in Fig.4.3 for squire-shaped models and Fig.4.3(d) for circle-shaped models, respectively. The converter can output equivalent level of shielded exciting signal voltage so that interference to flow measurement signals can reduced by means of lowering the distributed capacitance of communication cable. When measured conductivity is less than $50\mu\text{S}/\text{cm}$ or signals are transferred in remote distances, double-conductor and double-shielded signal cable at equivalent level of voltage can be used. For example, special STT3200 cable or BTS model signal cable (triple-shielded) can be used for signal communication.

5.2 Exciting current cable

Two conductor and insulating rubber- covered cables can be used as exciting current cables. Suggested model is RVVP2*0.3mm. Length of exciting current cable should be equal to that of signal cable. When the model STT3200 cables are used for exciting current and signals, two cables can be put together as one cable.

5.3 Output and power line

All cables for signals transferring and power supply have to be prepared by users. However, it should be careful to choose the cables that meet the upper limit load of consuming current. Note: When DIP switch next to terminal is set to ON places, the converter from its inside can provide +28V power supply and up-pull $10\text{k}\Omega$ resistance to output Frequencies (PUL) to isolated OC gate, Alarm Output (ALMH.ALML), and Status Control (INSW) .Therefore, when converter has frequency output and works with sensor together, DIP switch can be set as ON getting frequency signals from POUT and PCOM terminals

Pulse current output, alarm current output and external power supply can be seen in Fig 5.1. When inductive load is connected to converter, diode should be used as in Fig 5.2

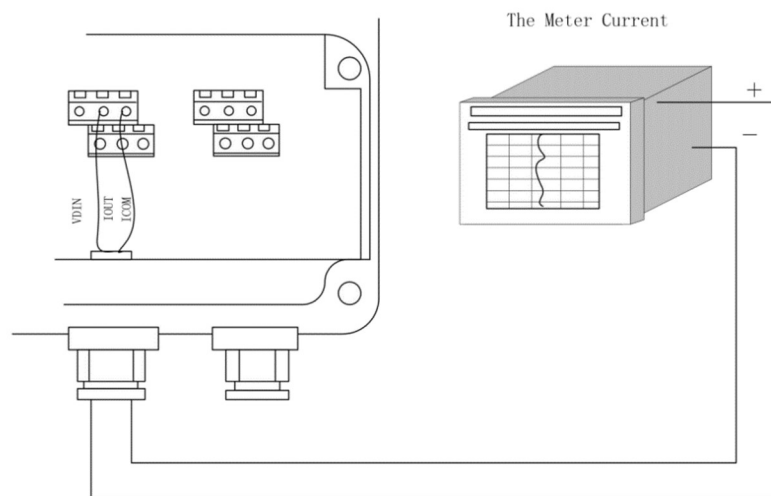


Fig5.1 Output current circuit

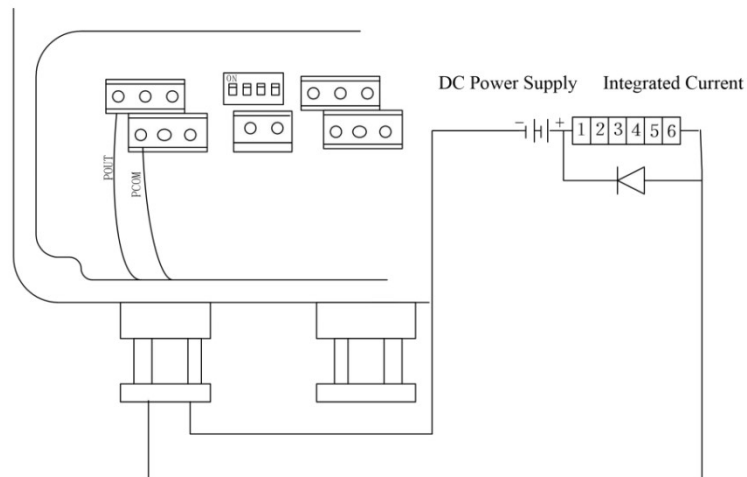


Fig5.2 Connection of electro-magnet counter

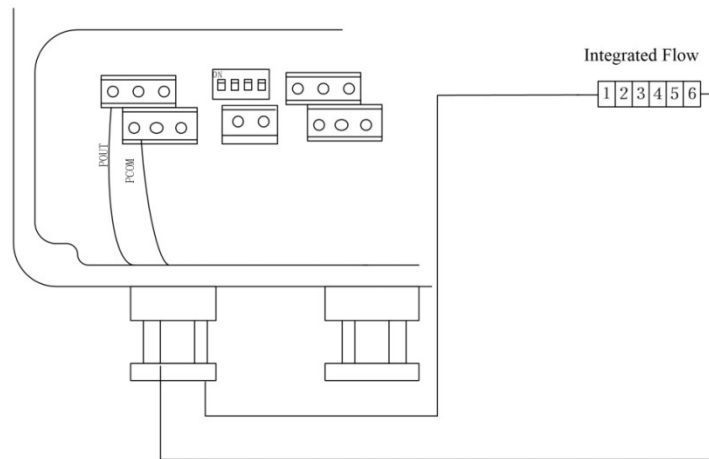


Fig5.3 Connection of electronic counter

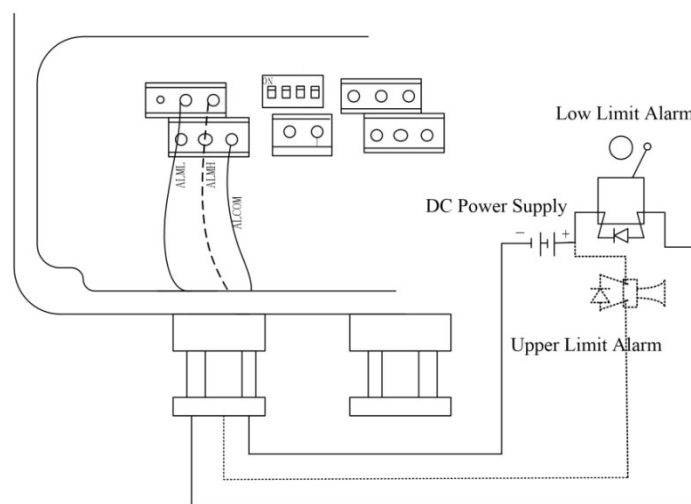


Fig5.4. Connection of alarm output

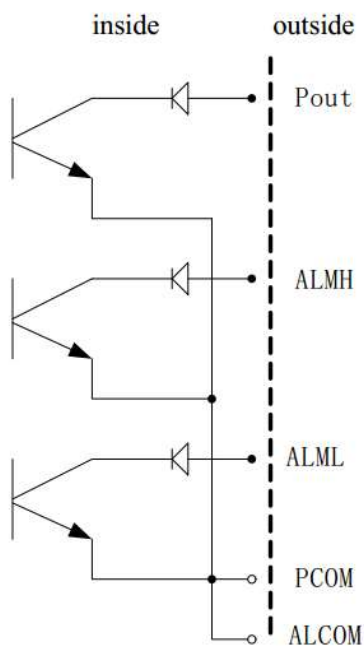


Fig5.5 Connection of OC gate

5.4 Grounding

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

6 Digital output and calculate

6.1 The connection of digital voltage output

POUT ----- digital output point;

PCOM ----- digital ground point;

POUT is collector plough output, user may refer to next circuit to connect.

6.2 The connection of digital voltage output

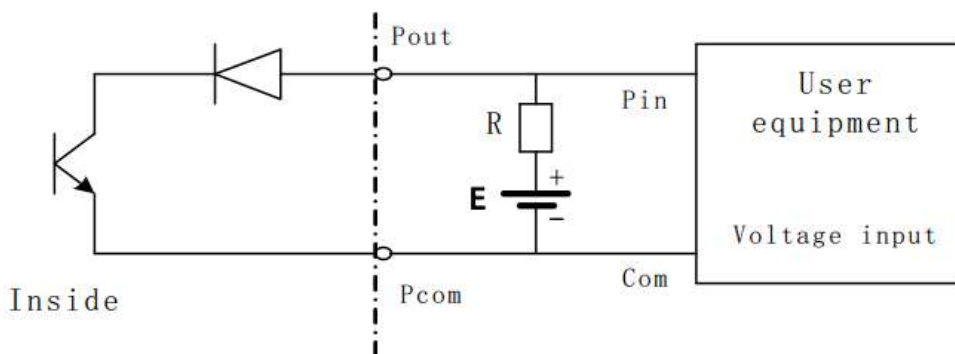


Fig 6.1 The connection of digital voltage output

6.3 Digital output connect photoelectricity coupling (PLC etc.)

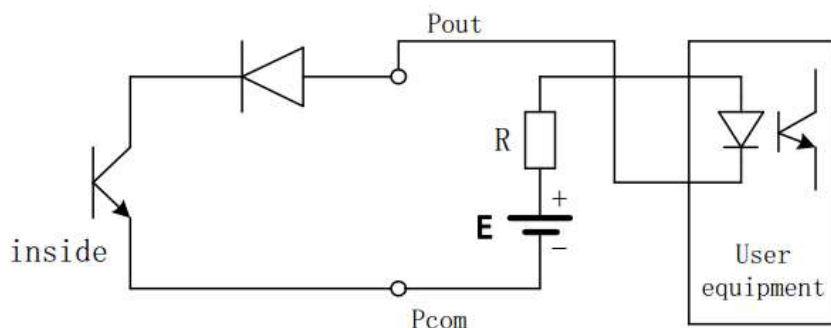


Fig 6.2 Digital output connect photoelectricity coupling

Commonly user's photoelectricity coupling current is about 10mA, so about $E/R=10\text{mA}$, $E=5 \sim 4\text{V}$.

6.4 Digital output connect relay

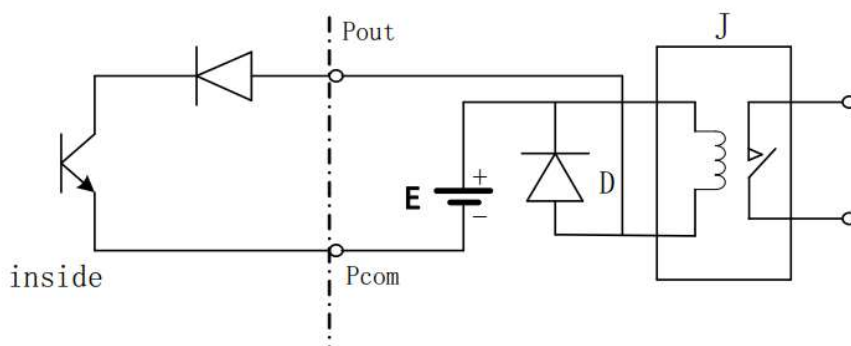


Fig 6.3 Digital output connect relay

Commonly relay needs E as 12V or 24V. D is extend diode, now most middle relays has this diode inside. If not have, user can connect one outside.

Table of digital output parameter:

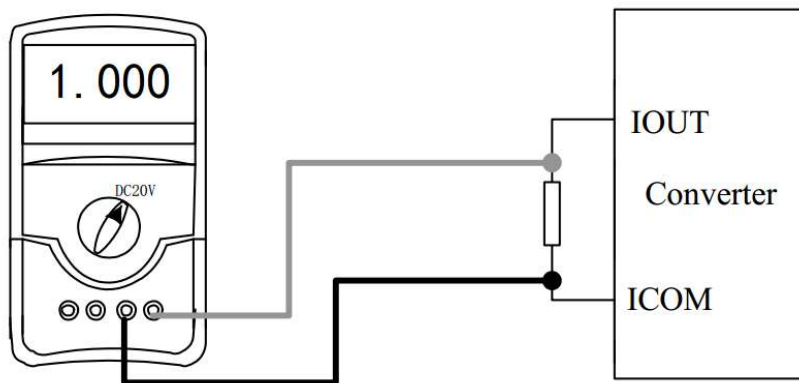
Parameter	Test condition	Mini	Typical	Max	Unid
Volatge	$I_C=100\text{ mA}$	3	24	36	V
Current	$V_{ol} \leq 1.4\text{V}$	0	300	350	mA
Frequency	$I_C=100\text{mA}$ $V_{cc}=24\text{V}$	0	5000	7500	Hz
High voltage	$I_C=100\text{mA}$	V_{cc}	V_{cc}	V_{cc}	V
Low voltage	$I_C=100\text{mA}$	0.9	1.0	1.4	V

6.5 Simulation Signal Output Adjust

(1) The Converter adjust preparative

When the converter is running 15 minutes, the inner of converter becomes stabilization.

Preparative 0.1% amperemeter or 250Ω 、0.1% voltage instrument.



(2) Current zero correct

When the converter getting into parameter setting, selecting to “Analog Zero” and enter to it.

The standard of signal fountain getting to “0”. Adjust parameter make amperemeter is $4\text{mA}(\pm 0.004\text{mA})$.

(3) The full scale current correct

To select “Anlg Range” to enter. Adjust the converter parameter make amperemeter is $20\text{mA}(\pm 0.004\text{mA})$

Adjust the current zero and the full range, the current function of the converter reached exactness. The line degree of current output of conversion should be controlled within the scope of 0.1%

7 Setting parameters

After CZ-EFM Electromagnetic Water meters converter and sensor connect to the pipe (no matter demarcate or use), may do the next work first:

- ☐ Connect the pipe fore-and-aft the sensors tighten.
- ☐ Make sure the sensor connects the earth.
- ☐ Make sure the liquid stillness when regulating zero of the instrument.
- ☐ Make sure the oxidation velum of sensor makes steadily (electrode and liquid contact continuously about 48 hours).

7.1 CZ-EFM key parameters and setting

When electrify, the instrument comes into measure way automatically, and under this way it can do all the functions and display data. Under the parameter setting way, user can set the parameter by the three keys.

7.2 Keys function

a) Keys' function in self- testing way

“Down” key: Selecting displayed data on lower line in turn;

“Enter” key: Press it to come into the interface of select function.

“Shift” key: Press it to move the cursor.

Under the measure, adjust of the LCD contract: push “Down” Key and “Shift” key or

“Down” Key and “Enter” key.

b) Function keys for parameters setting

“Down” key: Subtract 1 from the number at cursor area;

“Up” key: Plus 1 to the number at cursor area;

Push “Shift” key to move the cursor to “Up” key, push “Up” key to the submenu;

Push “Shift” key to move the cursor to “Down” key, push “Down” key return to the father menu.

7.3 Function keys for setting parameters

To set or correct working parameters, the converter should be running in parameters setting way instead of measuring status. In measuring status, push “Enter” key getting to the select of parameter and transfer password (0000), and then correct the password with one of the new passwords that are provided by manufacturer. Finally, push the “Enter” key to work in Parameters Setting Way.

Basis to the level of secrecy, amend according to the passwords we give. Then push “Enter” key to the interface needed.

There are 6 Passwords in design and among them 4 for deferent operators in secret and 2 are fixed passwords for system operation.

7.4 Functions select menu

Push “Enter” key to the functions select menu, push “Enter” key to select, there are three functions:

Code	Functions	Notes
1	Parameters Set	Select this function; It can be entering the picture of parameter.
2	Clear Total Rec	Select this function , It can be gross reset operation
3	Fact Modif Rec	Select this function, It can be check the factor ‘s modif Record

7.5 Setting Parameters in Menu

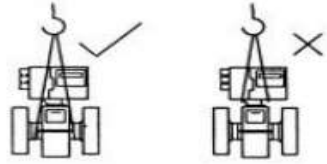
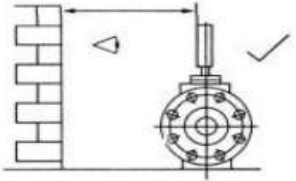
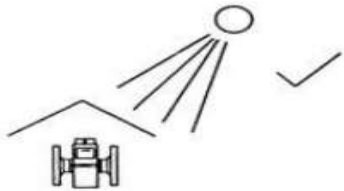
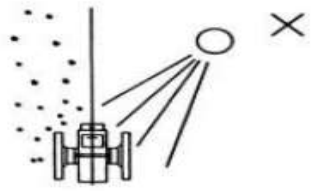
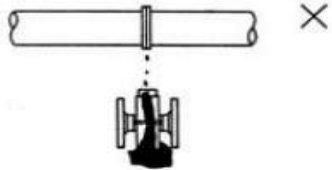
There are 49 parameters of CZ-EFM, user can set every parameter. The List of Parameters is shown below: Setting Parameters in Menu

Code	Parameter words	Setting Way	Grades	Range
1	Language	Select	2	English
2	Commandress	Set count	2	0~99
3	Baud rate	Select	2	300~38400
4	Snsr size	Select	2	3~3000
5	Flow unit	Select	2	L/h,L/m,L/s,m ³ /h,m ³ /m,m ³ /s
6	Flow range	Set count	2	0~99999
7	Damp	Select	2	1~50
8	Flow direct	Select	2	Plus/ Reverse

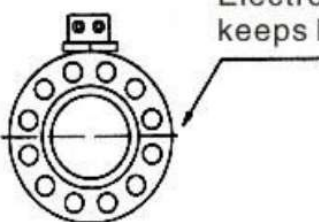
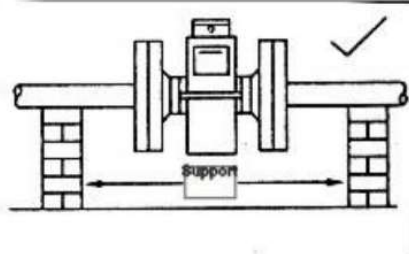
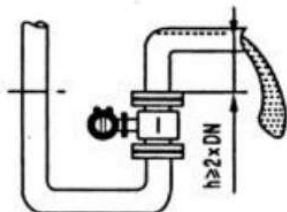
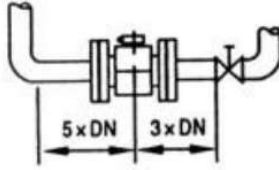
9	Flow zero	Set count	2	0~-9999
10	Flow cutoff	Set count	2	0~599,99%
11	Cutoff ena	Select	2	Enable/Disable
12	Total unit	Select	2	0.001m3~1m3, 0.001L~1L
13	Segman enb	Select	2	Enable/Disable
14	Analog type	Select	2	0~10mA or 4~20mA
15	Pulse type	Select	2	Freque / Pulse
16	Pulse fact	Select	2	0.001m3~1m3; 0.001L~1L
17	Freque max	Select	2	1~5999Hz
18	Mtsnsr ena	Select	2	Enable/Disable
19	Mtsnsr trip	Set count	2	59999%
20	Alm enb	Select	2	Enable/Disable
21	Alm hi val	Set count	2	000.0~599.99%
22	Alm low val	Select	2	Enable/Disable
23	Coil alm enb	Set count	2	000.0~599.99%
24	Coil alm val	Select	2	Enable/Disable
25	Clr sum key	Set count	3	0~99999
26	Field type	Select	4	Type1,2,3
27	Linear correct	User Set	4	Enable/Disable
28	Sensor fact	Select	4	0.0000~5.9999
29	Correct fact0	User Set	4	0.0000~1.9999
30	Correct valu0	User Set	2	Set Velocity
31	Correct fact1	User Set	4	0.0000~1.9999
32	Correct valu1	User Set	4	Set Velocity
33	Correct fact2	User Set	4	0.0000~1.9999
34	Correct valu2	User Set	4	Set Velocity
35	Correct fact3	User Set	4	0.0000~1.9999
36	Correct valu3	User Set	4	Set Velocity
37	Correct fact4	User Set	4	0.0000~1.9999
38	Fwd total	Correctable	5	00000~99999
39	Rev total	Correctable	5	00000~9999
40	Analog zero	Set count	5	0.0000~1.9999
41	Analog range	Set count	5	0.0000~3.9999
42	Meter fact	Factory set	5	0.0000~5.9999
43	Flow amp	Select	3	Enable/Disable
44	Measuring mode	Select	3	0.010~0.800m/s
45	Set density	Select	3	400~2500ms
46	Remote enable	User Set	5	00000~99999
47	Remote ip	User Set	5	00000~99999
48	Remote interval	User Set	5	00000~99999
49	Contrast	User Set	5	00000~99999

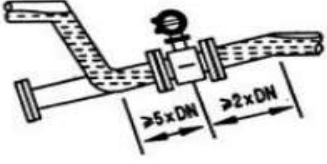
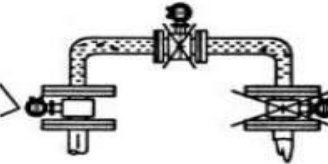
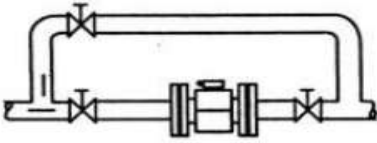
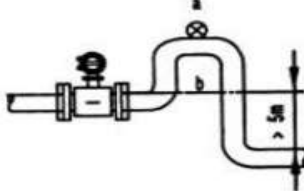
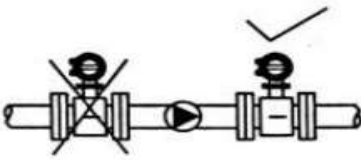
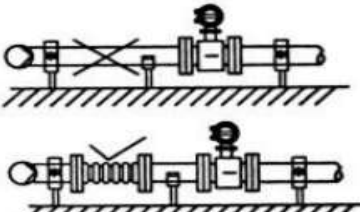
8. Instructions on how to install

The installation of water meter is shown as

 Appropriate Overhang	 Convenient For Reading
 Strong Sunshine Prevention	 Great Temperature Difference Avoidance
 Keeping Away From Leaking	 Keeping Far Away From Fire

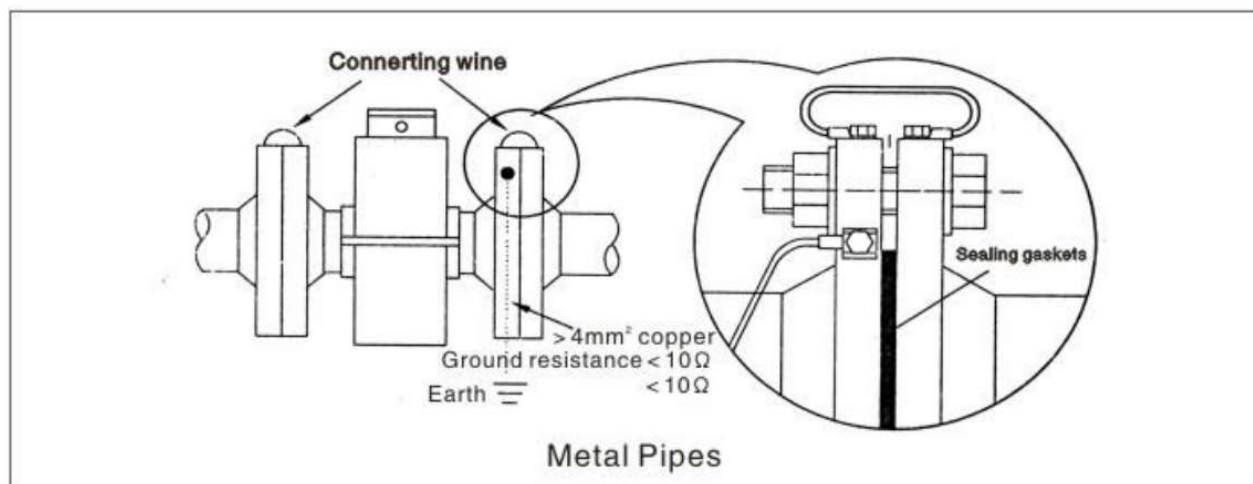
The correct installation Water meters

 Electrode axial keeps horizontal Level Installation	 Reasonable support
 Full Of Pipe	 Ensure the requirement of the straight pipe section

 Measurement Of The Precipitable	 Bubble Avoidance
 Easy To Maintenance And Clean-up	 Negative pressure and non-filled pipe avoidance
 Not Installed In Front Of The Inlet Of Pump	 Strong Shake Avoidance

9. WIRING

9.1 Grouding



10. Dimensions of design drawings

DN	a	D	Do	n*A
10	230	90	60	4*14
15	230	95	65	4*14
20	230	105	75	4*14
25	230	115	85	4*14
32	230	140	100	4*18
40	230	150	110	4*18
50	200	165	125	4*18
65	200	175	145	4*18
80	250	200	160	8*18
100	250	220	180	8*18
125	280	250	210	8*18
150	280	285	240	8*22
200	310	340	295	8*22
250	360	395	350	12*22
300	460	445	400	12*22
350	460	505	460	16*22
400	460	565	515	16*26
450	460	615	565	20*26
500	600	670	620	20*26
600	600	780	725	20*30
700	700	895	840	24*33
800	800	1015	950	24*33
900	900	1115	1050	28*33
1000	1000	1230	1160	28*36
1200	1200	1405	1340	32*33
1400	1400	1630	1560	36*36
1600	1600	1830	1760	40*36
1800	1800	2045	1970	44*39
2000	2000	2265	2180	48*42
2200	2200	2405	2315	52*45

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