RIELS®
INSTRUMENTS

RIF100 | RIF110 | RIF120 | RIF130 | RIF140
ELECTROMAGNETIC FLOWMETER

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1. Safety

1.1 General Safety Information

The "safety" chapter provides an overview of safety aspects to be observed for the operation of device. The device is built based on state-of-the-art technology and is operationally safe, it was tested and left the factory in proper state. The requirements in the manual as well as the documentation and certificates must be observed and followed in order to maintain this state for the period of operation.

1.2 Intended use

This device is intended for the following uses:

- To transmit fluid, pulpy or pasty substances with electrical conductivity.
- To measure the flowrate of the operating volume or mass flow units (at constant pressure/ temperature), if a mass engineering unit is selected.

1.3 Improper use

The following uses of the device are prohibited:

- Operation as a flexible adapter in piping, e.g., to compensate for pipe offsets, pipe vibrations, pipe expansions, etc.
- Use as a climbing aid, e.g., for assembly purposes.
- Use as a support for external loads, e.g.,as a support for pipes, etc.
- Material gain, e.g., by painting over the name plate or adding parts by welding/soldering.
- Material loss, e.g. By drilling the housing.

1.4 Allowed Fluids

When measuring fluids, the following points must be observed:

- Fluids may only be used if, based on state-of-the-art technology or the operating experience of the user, it is assured that chemical and physical properties of the components coming into contact with the fluids (signal electrodes, ground electrodes, liners and, possibly, process connections, protective plates or protective flanges) are not affected during the operating life.
- Fluids with unknown properties or abrasive agents may only be used if the operator can perform regular and suitable tests to ensure the safe condition of the device.
- Observe the information on the nameplate.

1.5 Operator Liability

- Before the use of corrosive and abrasive materials to be measured, the operator must clarify the resistance of all parts that come into contact with the materials to be measure. We will gladly support you with the selection, however, cannot accept any liability.
- The operators must strictly observe the applicable national regulations in their countries with regards to installation, function tests, repairs, and maintenance of electrical devices.

1.6 Personnel Qualification

The installation,commissioning and maintenance of the device may only be carried out through trained specialist personnel authorized by the plant operator, the specialist personnel must have read and understood the manual and comply with its instructions.

1.7 Installation safety information

Observe the following instructions:

- The flow direction must correspond to the direction indicated on the device, if labeled.
- Comply with the maximum torque for all flange bolts.
- Install the devices without mechanical tension(torsion, bending).
- Install flange and wafer units with coplanar counter flanges.
- Only install devices for the intended operating conditions and with suitable seals.
- Secure the flange bolts and nuts against pipeline vibrations.

1.8 Electrical installation safety information

The electrical connection may only be performed by authorized specialists according to the electrical plans. Comply with electrical connection information in manual. Otherwise, the electrical protection can be affected. Ground the measurement system according to requirements.

1.9 Operating safety information

During operation with hot fluids, contact with the surface may result in burns. Aggressive fluids may result in corrosion and abrasion of the liner or electrodes. As a result, pressurized fluids may escape prematurely. Due to wear on the the flange seal or process connection gaskets (e.g. Aseptic threaded pipe connections, tri-clamp, etc), a pressurized medium may escape. When using internal flat gaskets, there can become embrittled through CIP/SIP process.

1.10 Maintenance and inspection safety information

Warning -Risk to persons!
When the housing cover is open, EMC and protection against contact are suspend.
There are electric circuits within the housing which pose a contact risk.

Warning-Risk to persons!
The inspection screw (for draining condensate fluid) for devices ≥DN450 can be under pressure. The medium which spurts out can cause severe Injuries.
Depressurize pipes before opening the inspection screw.

2. Transportation

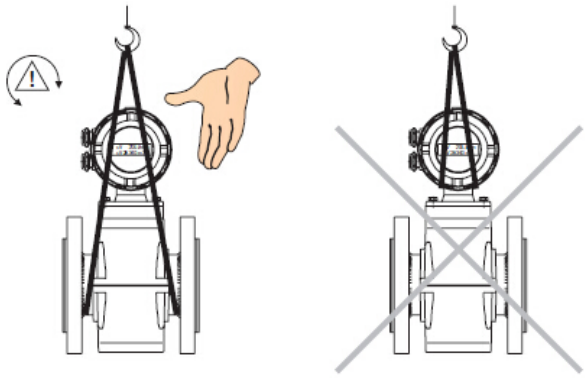
2.1 Transport General

Note during transport of the instrument to the installation location:

- That the center of gravity may be off-center.
- The protection plates or caps mounted on the process connections for PTFE/PFA lined flow meter should only be removed immediately prior to installation.
- Care must be exercised to assure that the liner on the flanges is not cut or damaged in order to prevent possible leaks.
- Flanged flow meter may not be lifted by the converter housing or the connection box.
- When transporting flanged flow meter ≤DN300 (12"), use a sling around the exposed meter pipe at both ends(Fig. 1), Chains should be avoided, they could damage the instrument.

Danger!
The center of gravity of the complete instrument may be higher than the lifting straps. Possible injury may result if the instrument slips or rotates! Care should be exercised to assure that the instrument cannot rotate or slip during transport.

Fig. 1: Transport of Flanged Flowmeters ≤DN300 (12")

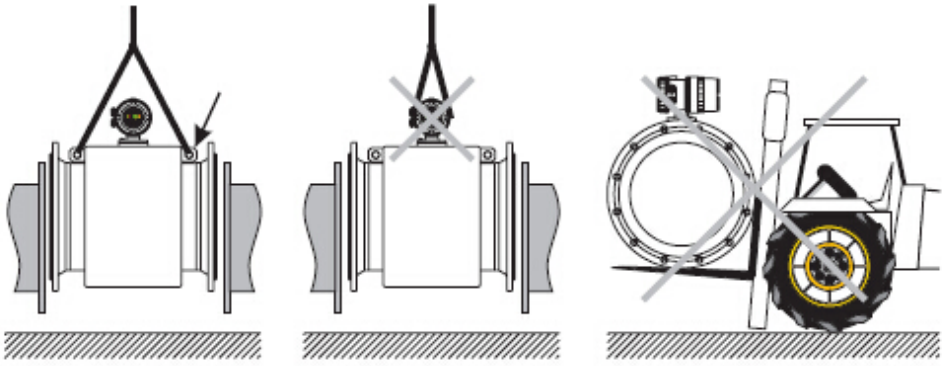


2.2 Transport of Flanged Flowmeters ≥DN350 (14")

Flanged flowmeters may not be lifted by the connection box or the sheet metal enclosure. Use only the eye bolts on the flowmeter for lifting the instrument into the pipeline.

Caution!
Do not use a forklift under the sheet metal enclosure to lift the flowmeter. The enclosure could deform possibly damaging the magnet coils inside.

Fig. 2: Supports for Meter Sizes ≥DN350 (14")



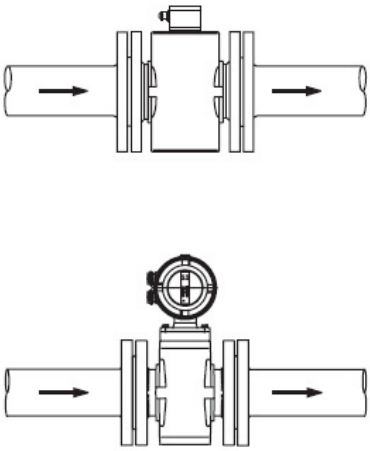
3. Installation

Before installing assure that:

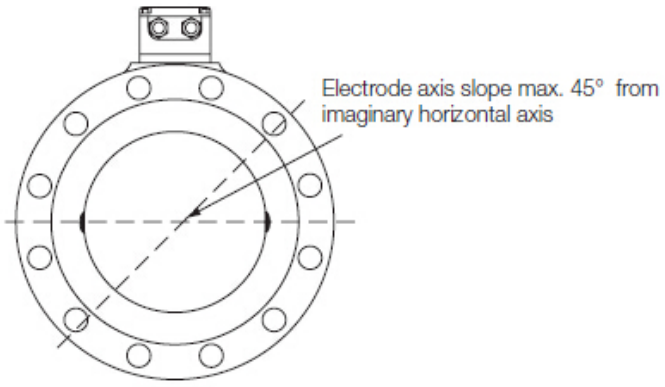
- The flow direction agrees with the direction arrow-if present.
- All flange bolts are tightened to the maximum specified torque value.
- The instrument is installed in a stress free manner(twist, bending) and that flanged and wafer design flowmeter are installed with parallel, concentric mating flanges and that suitable gaskets are used.
- The gaskets do not protrude into the flow stream to prevent possible eddy formation which might affect the accuracy of the instrument.
- The pipeline can not exert any unallowed forces or moments on the instrument.
- The instrument display is positioned for best readability.
- The seal plugs in the cable connectors should only be removed just before the electrical connections are made.
- For the separated converter design, the instrument should be installed in an essentially vibration free location.
- The converter should not be exposed to direct sunlight(use a sun shield if necessary)

3.1 Recommended Installation Conditions

- The meter pipe must always be completely full.
- The device measures the flowrate in both directions, the factory default is forward flow, as shown in Fig.3

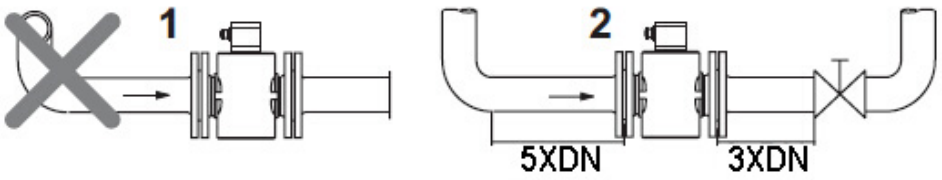


The electrode axis should be horizontal if possible or max. 45°C (Fig.4)

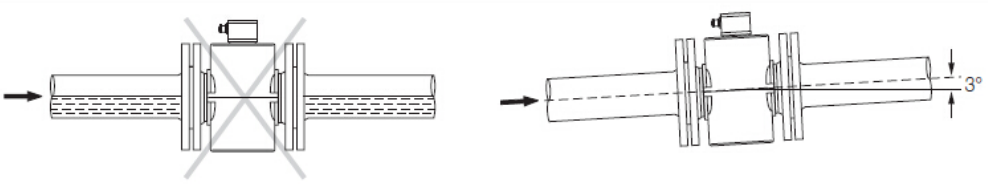


- In-and outlet pipe sections

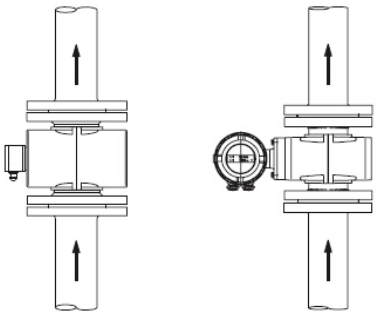
Straight inlet section should ≥5XDN, Straight outlet section should ≥5XDN,
DN = Flowmeter primary size.
Do not install fittings, manifolds,valves etc. Directly in front of the meter tube.(1)
Butterfly valves must be installed so that the valve plate does not extend into the flowmeter primary.
Valves or other turn-off components should be installed in the outlet pipe section(2).
For compliance with the measuring accuracy, observe the inlet and outlet pipe sections.



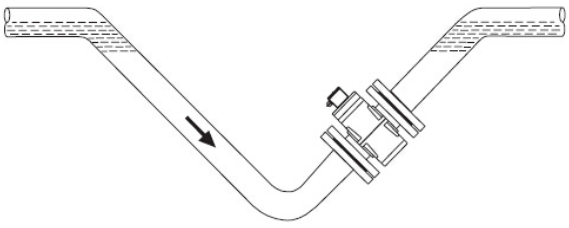
- A slight slope in the pipeline aids in degassing see Fig. 5



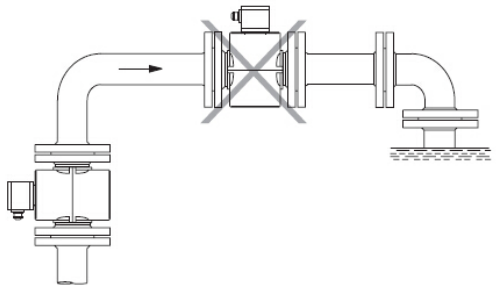
- Install vertically for abrasive fluids, flow upwards through flow meter,max.3 m/s. See Fig. 6



- Valves and shut off devices should be installed downstream from the flowmeter.
- Free in -or outflow. Provide an invert, to assure that the meter pipe is always full(Fig.7)

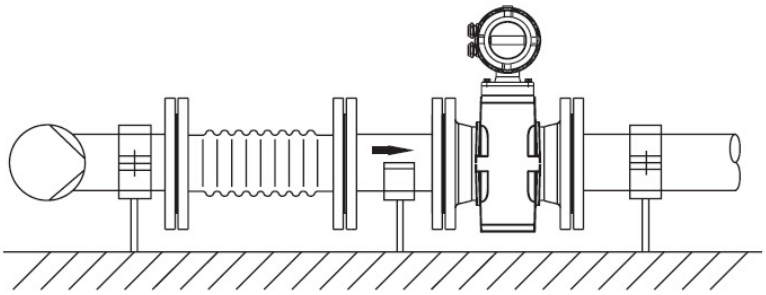


- For a free outflow applications do not install flowmeter at the highest point in the pipeline(meter pipe may empty,air bubbles. (Fig.8)



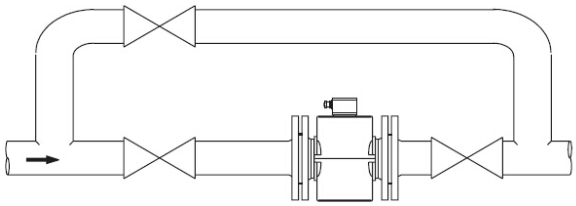
- Installation in the vicinity of pumps

For flowmeter primaries which are to be installed in the vicinity of pumps or other vibration generating equipment, the utilization of mechanical snubbers is advantageous. Fig. 9



Be installed downstream.

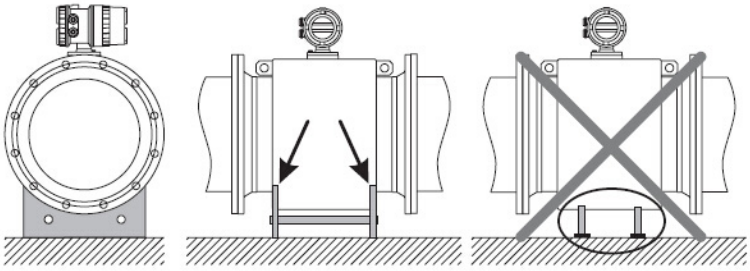
For highly contaminated fluids a bypass line Fig.10 is recommended so that the during mechanical cleaning system operation need not be interrupted.



3.2 Supports for meter size larger than DN400

Warning - potential damage to parts!

Imporper support for the device may result in deformed housing and damage to internal magnet coils.
Pls the supports at the edge of the housing (see arrows in the figure).
Devices with meter sizes larger than DN400 must be mounted with support on a sufficiently strong foundation.



3.3 General Information on Installation

The following points must be observed during installation:
3.3.1 The measuring tube must be full at all times.
3.3.2 The flow direction must correspond to the indicated direction, if labeled.
3.3.3 You must comply with the maximum torque for all flange connections.
3.3.4 Install the devices without mechanical tension(torsion, bending).
3.3.5 Install the flange and wafer units with coplanar counter flanges and use only appropriate gaskets.
3.3.6 Use only gaskets made from a compatible material for the fluid and fluid temperatures.
3.3.7 Gaskets must not extend into the flow area since possible turbulence could influence the device accuracy.
3.3.8 The pipeline may not cause any unallowable forces or torques on the device.
3.3.9 Do not remove the plugs in the cable connection until you are ready to install the electrical cable.
3.3.10 A separate transmitter must be installed at a largely vibration-free location.
3.3.11 Do not expose the transmitter to direct sunlight, Provide appropriate sun protection as necessary.
3.3.12 When selecting the installation site, make sure that moisture cannot penetrate the terminal housing or transmitter compartment.

3.4 Mounting the measuring tube

The device can be installed at any location in a pipeline under consideration of the installation conditions.

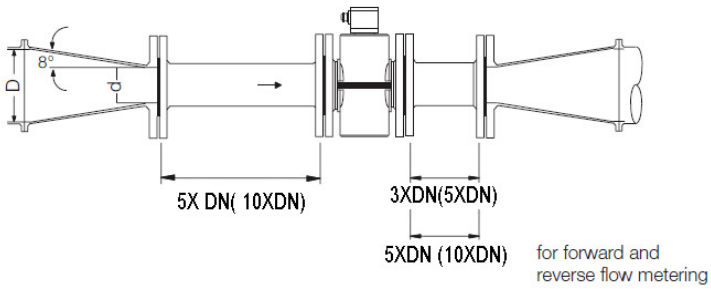
WARNING- Potential damage to device!
Use of graphite with the flange or process connection gaskets is prohibited. In some instances, an electrically conductive coating may form on the inside of the measuring tube.
Vacuum shocks in the pipelines should be avoided to prevent damage to the liners(PTFE). Vacuum shocks can destroy the devices.

1. Remove the protective plates, if present, to the right and left of the measuring tube. To prevent possible leakage, make sure that the liner on the flange is not cut or damaged.
2. Position the measuring tube coplanar and centered between the pipes.
3. Install gaskets between the surfaces.

Note:
For best results, make sure the flowmeter primary gaskets fit concentrically with the measuring tube.
4. Use the appropriate bolts for the flanges.
5. Slightly grease the threaded nuts.

4. Installation Requirements for Volume Flow Integrators

The following installation requirements are to be observed:
For “Cold water and Waste water” a straight pipeline section with a length of at least 5 times the flowmeter size must be installed upstream of the flowmeter and a section 3 times the flowmeter size downstream, for “Liquids other than water”(milk, beer, wort, brine) the values shown in parentheses in below FIG apply. For flow metering in both directions(forward and reverse) the straight pipeline sections installed on both sides of the flowmeter must be at least 5 times the flowmeter size for “Cold water and Waste water” approvals and at least 10 times the flowmeter size for “Liquids other than water” approvals. The pipeline system must always be completely filled with fluid. The signal cable length may not exceed 50m.



5. The product function introduction

5.1 Basic function

- 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 0.5 mm/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, HART communication interface (choose);
- Italian and English: displaying mode, (other languages can be set);
- Three integrator gross inside, respective register: Forward gross, reverse gross and minus value gross.

5.2 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.

5.3 Normal operating conditions

Ambient Temperature Ranges: fission –10°C+60°C
Relative Humidity: 5÷90%
Power Supply: 85÷250Vac - 50/60Hz (single-phase AC)
Dissipation Power: <20W (After connecting sensor)

5.4 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

5.5 Plot of installing measurew

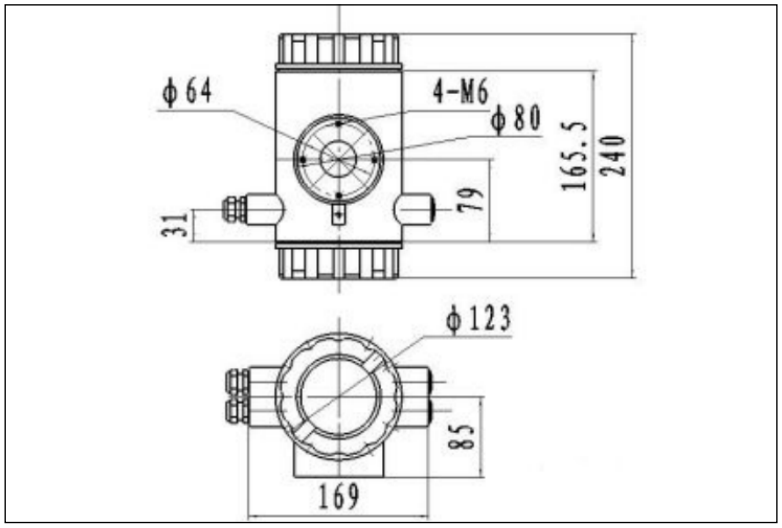


Fig.11 Exterior size of the integrated circinal shells

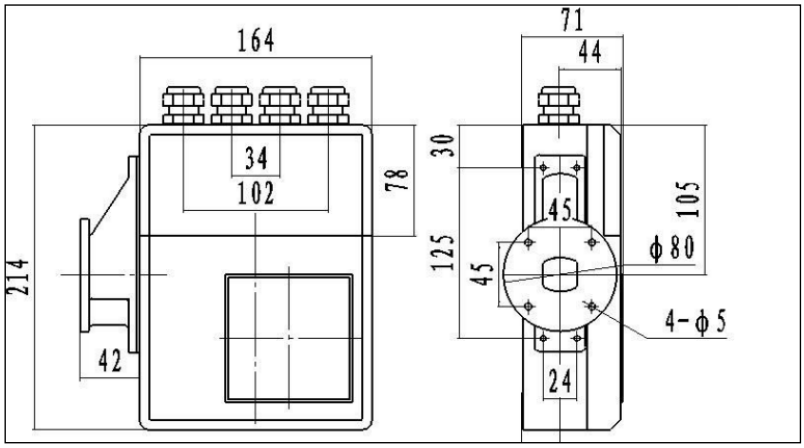


Fig.12 Exterior size of the integrated squared shells

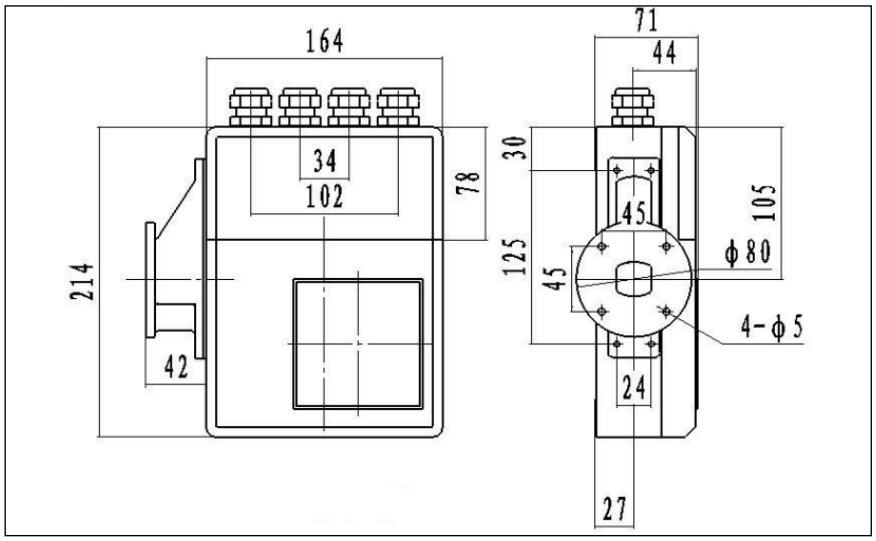


Fig.13 Exterior size of the split squared shells

6. Basic circuit of converter

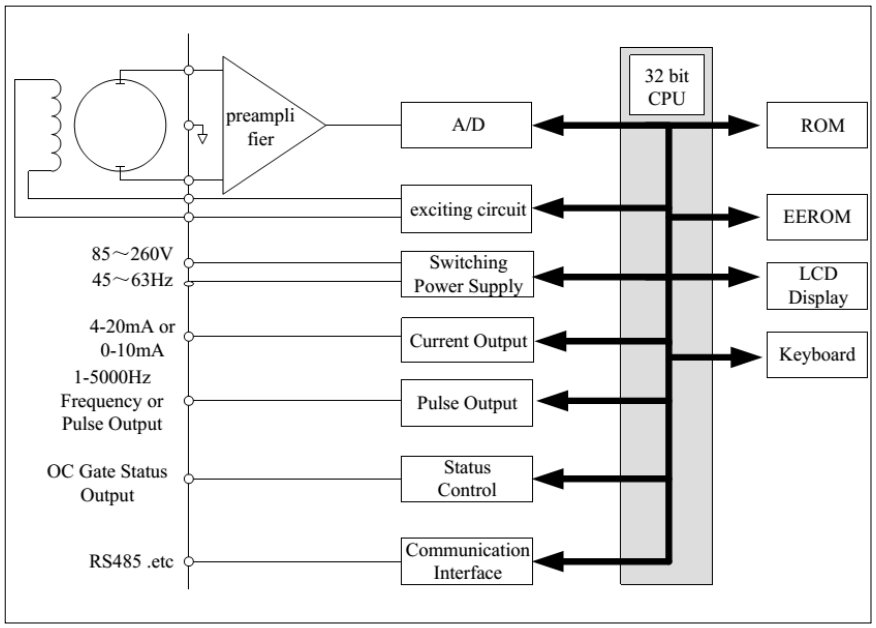


Fig. 14 Structure Of Converter's Circuit

The converter can supply exciting current to the coil in the sensor of electronetic 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.14.

7. Index of technical performance

7.1 Standard of implement

The design, production and instrument of RIF100 Electromagnetic Flowmeter Converter implement [JJG-1033-2007] Electromagnetic Flowmeters.

7.2 Basic parameters and performance index

7.2.1 Pipe's inside diameter of relative sensor (mm):
3, 6, 10, 15, 20, 25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000, 1200, 1400, 1600, 1800, 2000, 2200, 2400, 2500, 2600, 2800, 3000.

7.2.2 Request of relative sensor
Sensitivity of sensor signal: under 1m/s, output 150μV...200μV;

For RIF100 electromagnetic flowmeter signal converters, there are two currents of 125mA in exciting loop, which make up of 250mA, and every 125mA is controlled by one 10Ω exact resistance. So user can choose different exciting current by changing the number of exact resistance.
The current will be 250mA when the signal converters leave factory, as such, if there are three 20Ω exact resistance or one 20Ω and one 10Ω exact resistance, the current will be 187.5 mA; if two 20Ω, 125mA.

Resistance of sensor exciting coil:
500mA exciting current 20 ~ 30Ω;
250mA exciting current 50 ~ 60Ω;
187mA exciting current 60 ~ 80Ω;
125mA exciting current 100 ~ 120Ω;

7.2.3 Measure precision for assembly

Table 1 VS: Setting measurement range (m/s)

Diameter	Range (m/s)	Accuracy
3÷20	≤0,3	±0.25% FS
	0,3÷1	±1.0% R
	1÷15	±0.5% R
25÷600	0.1÷0.3	±0.25% FS
	0.3÷1	±0.5% R
	1÷15	±0.3% R
700÷3000	≤0.3	±0.25% FS
	0.3÷1	±1.0% R
	1÷15	±0.5% R

%FS: for relative ranges;
%R: for relative value of measurement.

7.2.4 Simulated current output

Load resistor: 0~1.5kΩ (0~10mA); 0~750Ω (4~20mA).
Basic Errors: 0.1%±10μA.

7.2.5 Digital frequency output

Frequency output range: 1÷5000Hz;
Output electric isolate: Photoelectric isolate. Isolate voltage: > 1000VDC;
Frequency output drive: output by field-effect transistors, the highest subjected voltage is 36VDC; maximum of output current is 250 mA.

7.2.6 Digital pulse output

Pulse output range: 0÷100 pulse/s; (When higher than upper limit, pulse will lose);
Pulse output value: 0.001÷1.000 m3/cp - 0.001÷1.000 Lt/cp
Pulse output width: 50ms;
Pulse output isolate: photo electricity isolate. Isolate voltage: > 1000VDC;
Pulse output drive: output by field-effect transistors, the highest subjected voltage is 36VDC; maximum of output current is 250 mA.

7.2.7 Alarm output

Alarm output junction: ALMH: upper limit; ALML: lower limit;
Output isolate: photo electricity isolate. Isolate voltage: > 1000VDC;
Alarm output drive: output by Darlington pipe, the highest subjected voltage is 36VDC; maximum of output current is 250 mA.

7.2.8 Digital communication port and protocol

MODBUS interface: format of RTU.
HART interface: designed by standard of HART , if you choose our hand held unit , you can display themeasure value on line,and setting the parameters.

7.2.9 Electric isolate

Insulated voltage between simulated input and simulated output should be higher than 500V;
Insulated voltage between simulated input and alarm power supply should be higher than 500V;
Insulated voltage between simulated input and AC power supply should be higher than 500V;
Insulated voltage between simulated output and AC power supply should be higher than 500V;
Insulated voltage between simulated output and earth should be higher than 500V;
Insulated voltage between pulse output and AC power supply should be higher than 500V;
Insulated voltage between pulse output and earth should be higher than 500V;
Insulated voltage between alarm output and AC power supply should be higher than 500V;
Insulated voltage between alarm output and earth should be higher than 500V;

8. Operation converter

8.1 RIF10 Keys and display

Squared define keys and LCD screen display

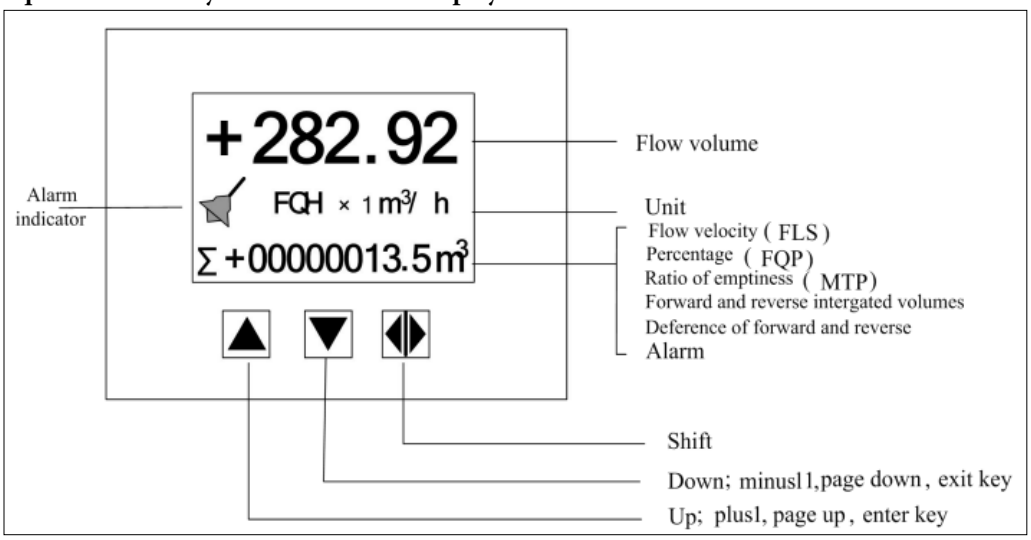


Fig.15 Keys on squared panel and large LCD display:

Rotundity define keys and LCD screen display

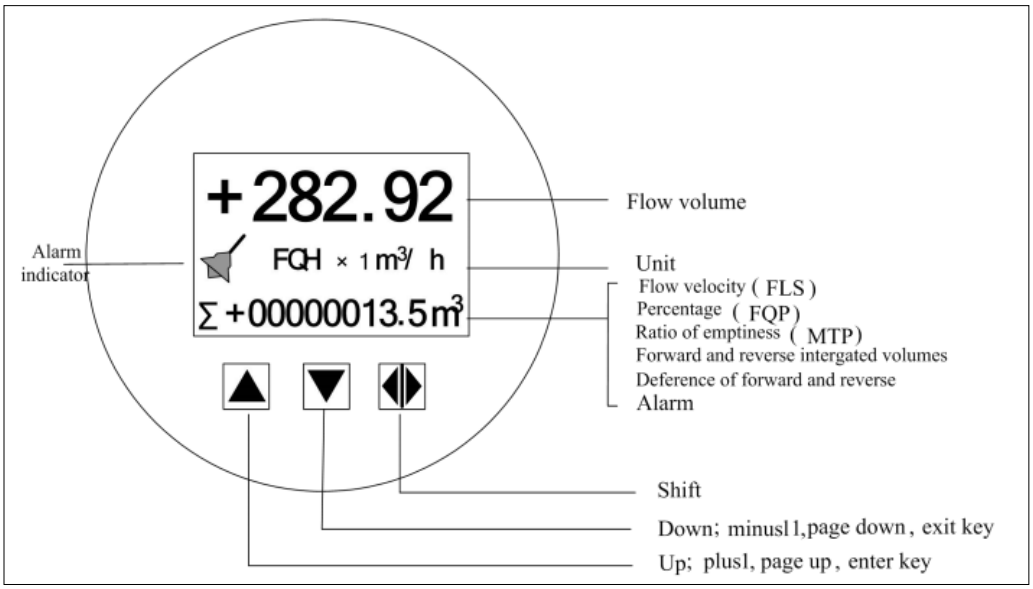


Fig. 16 Keys on circinal panel and big LCD display

Note: When measuring, pushing down “Compound Key + Enter” will appear password of changing state, base on distinction of secrecy, and change the password as we provide. Then pushing “Compound Key + Enter” again, and you can inter the state of setting parameter. If want to return to the running state, push “Enter” for several seconds.

8.2 Section picture of conversion

8.2.1 RIF10 Keys Series

RIF10C Compact Vers. Converter	RIF10W Wall Vers. Converter
	

8.3 Connections of sensor

8.3.1 Connectors and labels for the squared

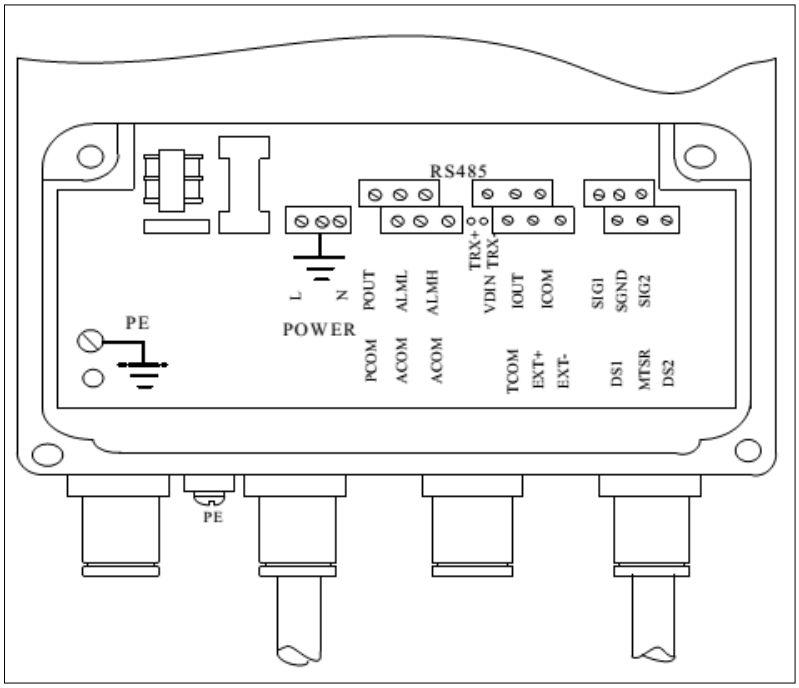


Fig.17 Connectors for RIF10W

Labels of connectors in squared model

SIG1	Signal 1	
SGND	Signal ground	
SIG2	Signal 2	
DS1	Shielded Exciting 1	To separate model sensor
DS2	Shielded Exciting 2	
EXT +	Exciting Current +	
EXT -	Exciting Current -	
VDIN	Current two lines 24V Spots	
ICOUT	Analog Current Output	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	
ALML	Low Limit Alarm Output	Two Alarm Output
ALCOM	Alarm Output Ground	
TRX +	Communication Input (RS485-A)	
TRX -	Communication Input (RS485-B)	Communication Input
TCOM	232 Communication Ground	

8.3.2 Signal lines and labels in squared model

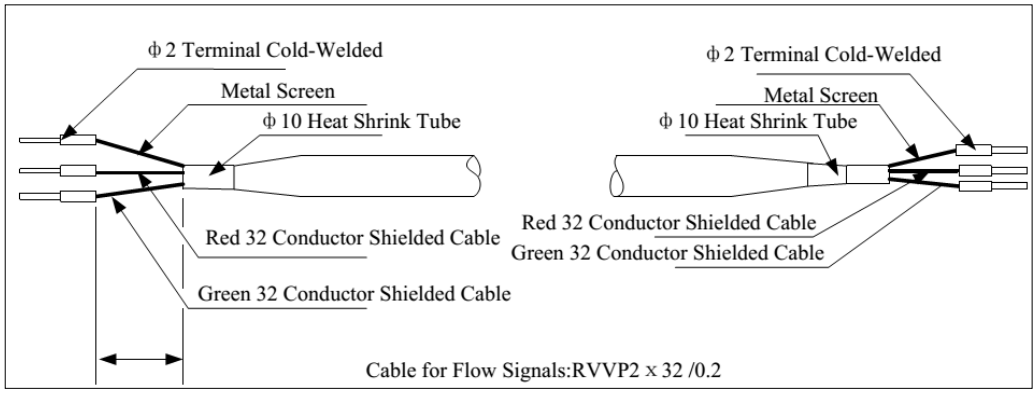


Fig.18 Connection and labels of signal lines in squad model

8.3.3 Links and labels of connectors in Circinal Model

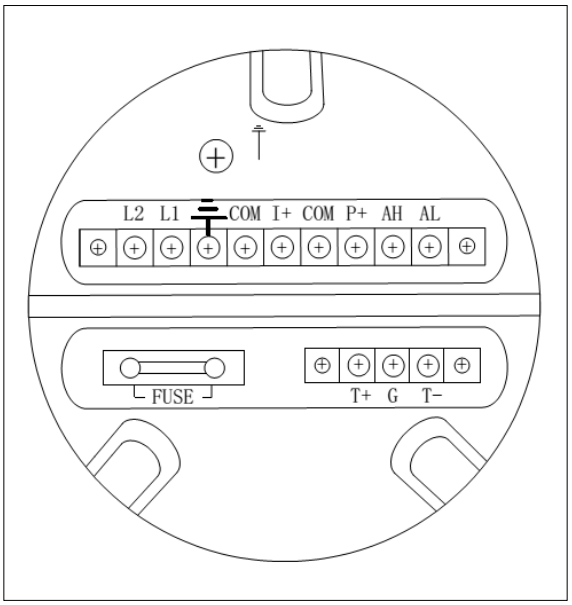


Fig.19 Connectors in circinal model

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
L_1	220V / 24V Power Supply
L_2	220V / 24V Power Supply

8.3.4 Labels and connection of signal lines in circinal model

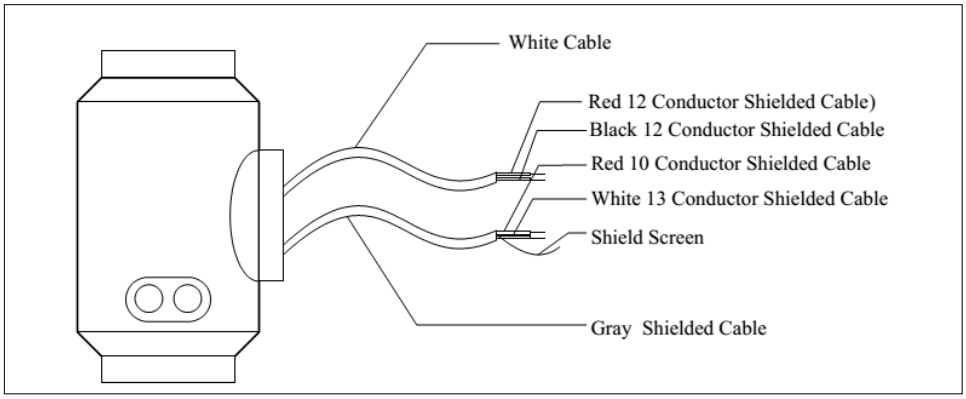


Fig.20 Labels and connection of signal lines in circinal model

Signal lines labels 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”

8.4 Characteristic and connection of cable

8.4.1 Flux signal line

When separated models of converters are assembled with sensors for measuring flow of fluid which conductivity is larger than 50μS/cm, PVVP 2*0.2 mm2 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.18 for squire-shaped models and Fig.20 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 50μS/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.

8.4.2 Exciting current cable

Two conductor and insulating rubber- covered cables can be used as exciting current cables. Suggested model is RVVP2*0.3mm2 . 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.

8.4.3 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 +28Vpower supply and up-pull 10kΩ 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.21. When inductive load is connected to converter, diode should be used as in Fig.22.

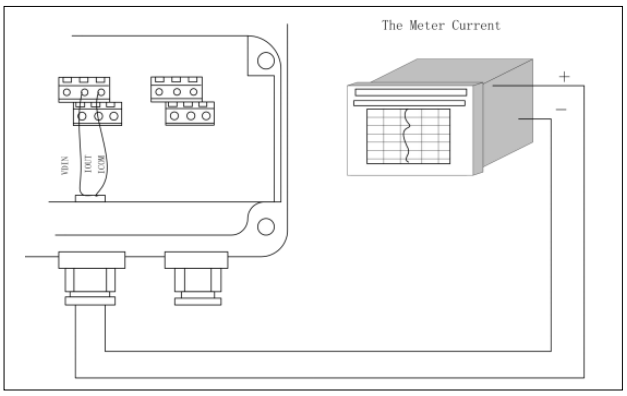


Fig.21 Output current circuit

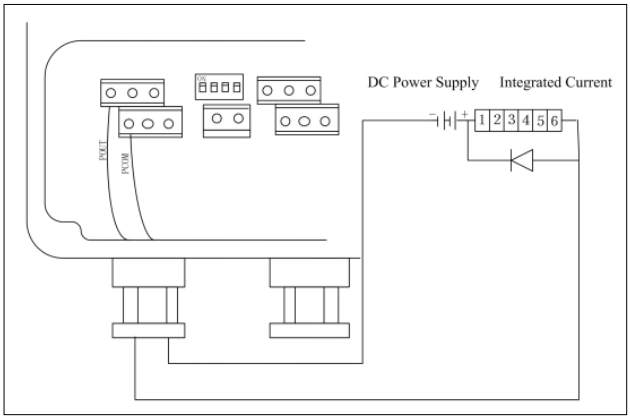


Fig.22 Connection of electro-magnet counter

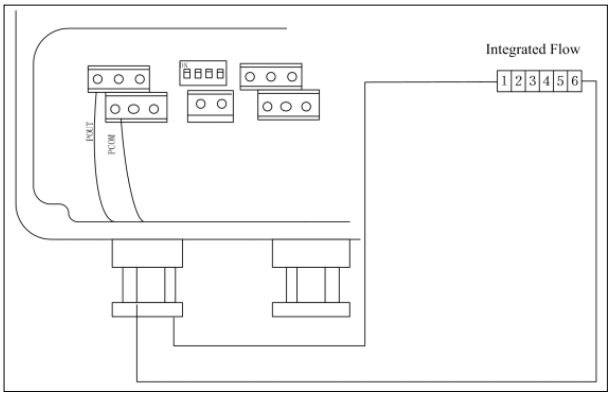


Fig.23 Connection of electronic counte

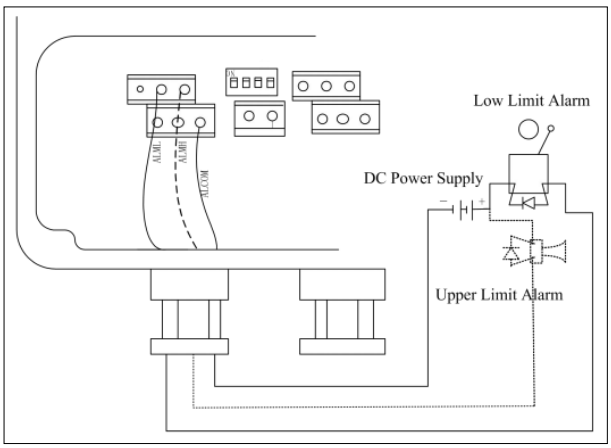


Fig.24 Connection of alarm output

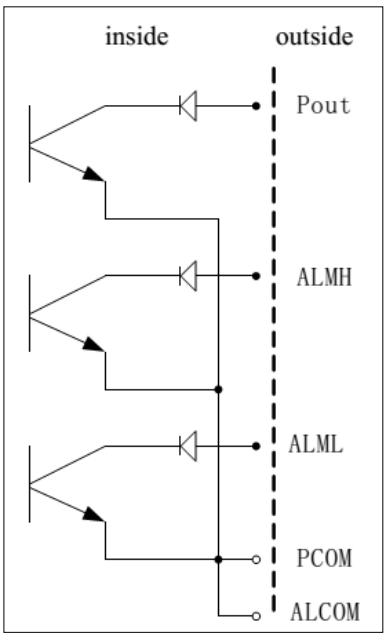


Fig.25 Connection of OC gate

8.5 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.

8.6 Digital output and calculate

Digital output means frequency output and pulse output, and both of them use the same output point, so user can choose only one type of them but not both.

8.6.1 Frequency output

Frequency output range is 0÷5000HZ, and corresponding the percent of flux.

F= Full scale value /Measure value . frequency range

The up limit of frequency output can be adjusted. It can be chosen from 0 ~ 5000HZ, and also can be chosen low frequency: such as 0÷1000HZ or 0÷5000HZ.

Frequency output mode general can be used in control application, because it responses the percent flux. Users can choose pulse output when the equipment is applied to count.

8.6.2 Pulse output mode:

Pulse output mainly applies in count mode. A pulse output delegates a unit flux, such as 1L or 1M3 etc. Pulse output unit divide into0.001L, 0.01L, 0.1L, 1L, 0.001M3, 0.01M3, 0.1M3, 1 M3 .When users choose the pulse unit, they should notice the match of the flux range of flowmeter and pulse unit. For volume flux, count formula as follows:

QL= 0.0007854 .D2.V (L/S)
Or QM= 0.0007854.D2.V.10-3 (M3/S)

Note:
D-nozzle (mm)
V-velocity of flow (m/s)

The oversize flux and too small pulse unit will be made the pulse output over the up limit. Generally, pulse output should be controlled below 3000P/S. However, the too small flux and too large pulse unit will be made the instrument exports a pulse long time.

Otherwise, pulse output is different from frequency output. When pulse output cumulates a pulse unit, it exports a pulse. Therefore, pulse output is not equality.
Generally, measure pulse output should chooseto count instrument, but not frequent instrument.

8.6.3 The connection of digital output

Digital output has tow connected points: digital output connected point, digital ground point, and symbol as follows:
POUT digital output point;
PCOM digital ground point;
POUT is collector plough output, user may refer to next circuit to connect.

8.6.4 The connection of digital voltage output

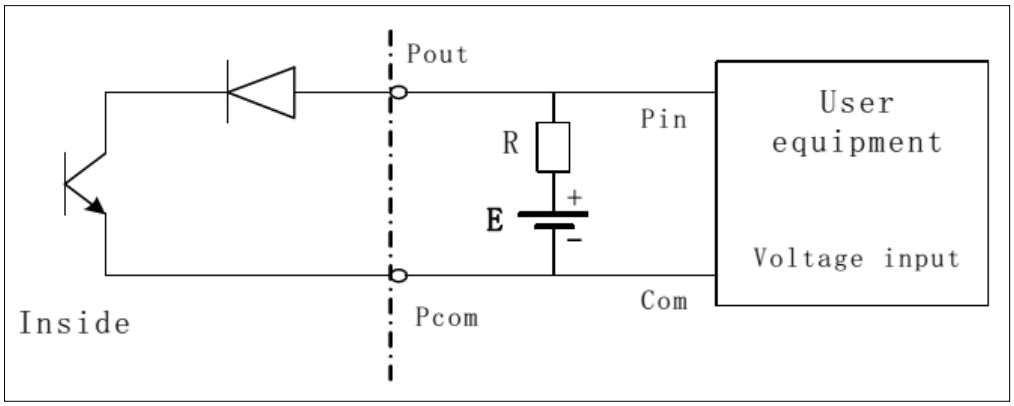


Fig.26 The connection of digital voltage output

8.6.5 Digital output connect photoelectricity coupling (PLC etc.)

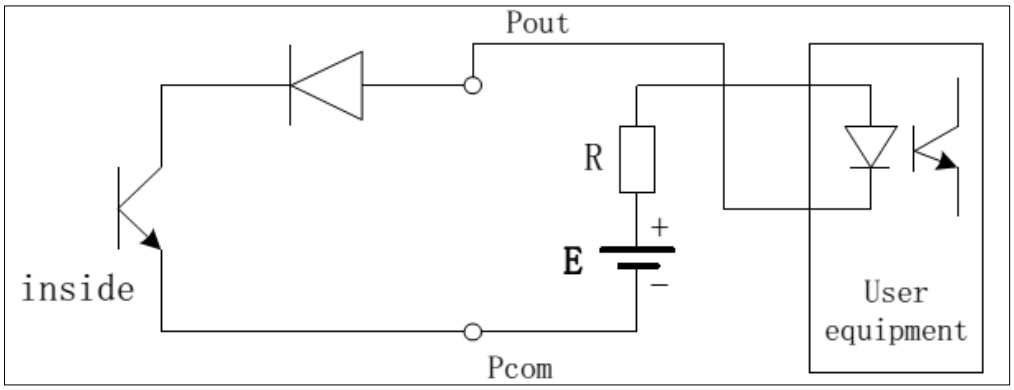


Fig.27 Digital output connect photoelectricity coupling

Commonly user's photoelectricity coupling current is about 10mA, so about E/R=10mA, E=5÷24V.

8.6.6 Digital output connect relay

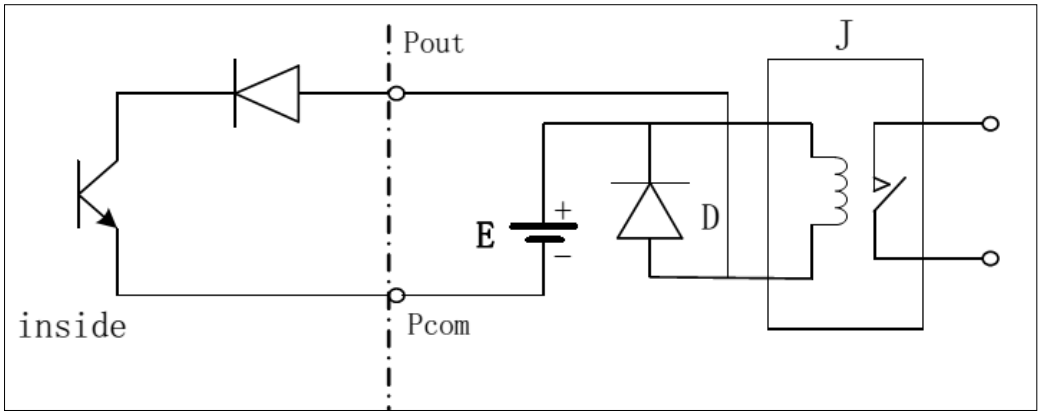


Fig.28 Digital output connect relay

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	Unit
Voltage	IC=100 mA	3	24	36	V
Current	Vol≤1.4V	0	300	350	mA
Frequency	IC=100mA Vcc=24V	0	5000	7500	Hz
High Voltage	IC=100mA	Vcc	Vcc	Vcc	V
Low Voltage	IC=100mA	0.9	1.0	1.4	V

8.7 Simulation signal output and calculate

8.7.1 Simulation signal output

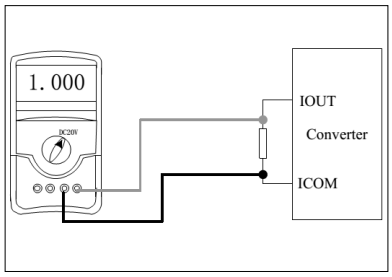
There are two signal system: 0÷10mA and 4÷20mA, user can select from parameter setting.
Simulation signal output inner is 24V under0~20mA, it can drive 750Ω resistance.
The percent flux of simulation signal output:

I0= Full scale value／ Measure value . the scale of current + (the zero point of current)

The current zero is 0 when 0÷10mA, and the current zero is 4mA when 4÷20mA.
It can be advanced simulation signal output distinguish.
User can select the range of measure.
The manufacture's parameter have been adjusted, it can't need adjust.
If have abnormity, it can consult 8.6.2.

8.7.2 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 4mA(±0.004mA).

(3)The full scale current correct
To select "Anlg Range" to enter.Adjust the converter parameter make amperemeter is 20mA(±0.004mA) 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%.

(4) Current line degree checking
You can place the standard signal source in 75%, 50%, 25%,and check the line degree of current output.

8.7.3 RIF10 electromagnetic flowmeter converter's connection of current output:

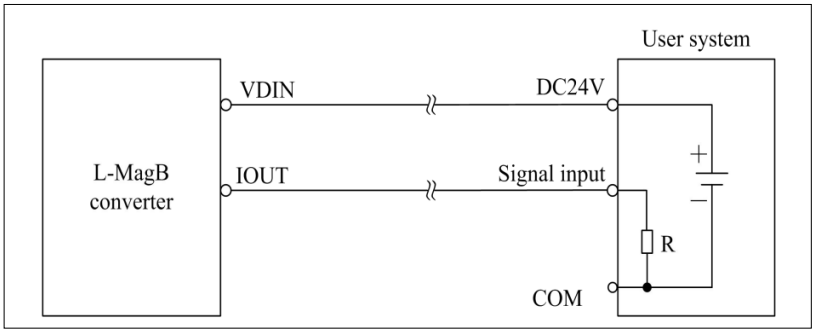


Fig.29 RIF10 two connection

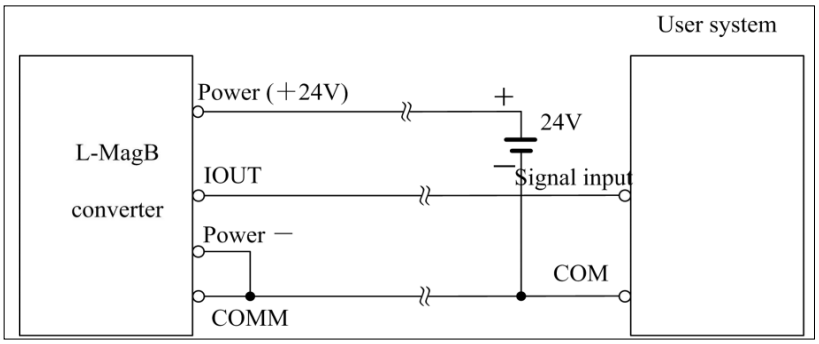


Fig.30 RIF10 tree connection (power supply and current output are not insulated)

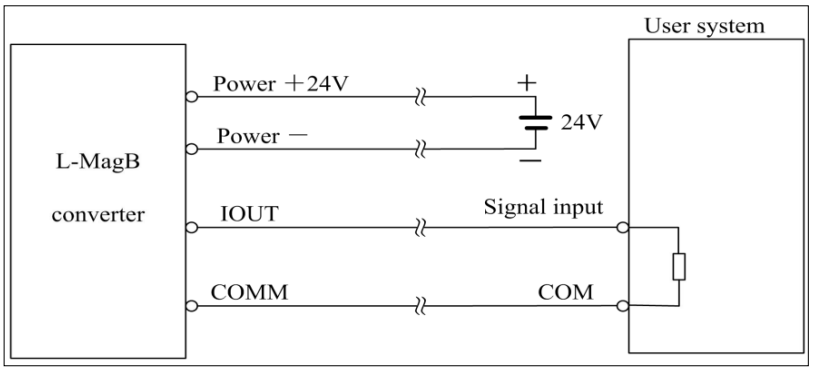


Fig.31 RIF10 four connection (power supply and current output are not insulated)

9. Setting parameters

After L_MagB electromagnetic flowmeter 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).

9.1 RIF10 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 four keys.

9.1.1 Keys function

a) Keys' function in self- testing way
"Down" key: Selecting displayed data on lower line in turn;
"Up" key: Selecting displayed data on higher line in turn;
"Compound" key + "Enter" key: Come into parameter setting
"Enter" key: Press it to come into the picture of select function.
Under the measure, adjust of the LCD contract is used "Compound" key + "Up" key or "Compound" key + "Down" key for several seconds;

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;
"Compound" key + "Down" key: Cursor turns left;
"Compound" key + "Up" key: Cursor turns right; "Enter" key: In/Out submenu;
"Enter" key: Press for two seconds under any state and will return to automate measure way.

Note:
(1) When use "Compound" key, you should press "Compound" key and "Up" or "Down" both;
(2) It will return to the measure way automatically after 3 minutes when under the parameter setting way;
(3) Direct select of zero correction about the flow, you can move the cursor to the left + or - , and use "Down" or "Up" to switch;

9.1.2 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 "Compound"+"Enter" keys 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 "Compound"+"Enter" keys to work in Parameters Setting Way.

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

9.1.3. Functions select menu

Push "Compound"+"Enter" keys to the functions select menu, push "Up" or "Down" keys to select, there are three functions:

Code	Function	Notes
1	Parameters Set	Select this function; It can be entering the picture of parameter.
2	Cls 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

9.1.3.1 Parameters setting

Press “Compound”+“Enter” key, it displays “Parameters Set” function. Input password. Press “Compound”+“Enter” key, it getting to Parameters Setting status.

9.1.3.2 Clr Total Rec

To push “Compound”+“Enter” keys getting to the select of parameter, then push “Up” key to “Clr Total Rec”, input the passwords. When the passwords becomes “00000”, this function is done, the gross is 0 in the instrument.

9.1.3.3 Fact Modif Rec

To push “Compound”+“Enter” keys getting to the select of parameter, then push “Up” key to “Fact Modif Rec” (Detail consult the AppendixFive)

9.1.4 Setting Parameters in Menu

There are 54 parameters of RIF10, user can set every parameter. The List of Parameters is shown below:

Sensore	Parameter words	Setting Way	Grades	Range
1	Language	Select	2	English
2	Comm Addres	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	Flow Rspns	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	0.001m^3 ÷ 1m^3; 0.001L÷1L
13	SegmaN Ena	Select	2	Enable/Disable
14	Analog Type	Select	2	0÷10mA /4÷20mA
15	Pulse Type	Select	2	Freque / Pulse
16	Pulse Fact	Select	2	0.001m^3÷1m^3 ; 0.001L÷1L
17	Freque Max	Select	2	1÷5999 Hz
18	Mtsnsr Ena	Select	2	Enable/Disable
19	Mtsnsr Trip	Set count	2	59999%
20	Alm Hi Ena	Select	2	Enable/Disable
21	Alm Hi Val	Set count	2	000,0÷599,99%
22	Alm Lo Ena	Select	2	Enable/Disable
23	Alm Lo Val	Set count	2	000,0÷599,99%
24	Sys Alm Ena	Select	2	Enable/Disable
25	Clr Sum Key	Set count	3	0÷99999
26	Snsr Code1	User set	4	Finished Y M
27	Snsr Code2	User set	4	Product number
28	Field Type	Select	4	Type1,2,3
29	Sensor Fact	Set count	4	0.0000÷5.9999
30	Line CRC Ena	Select	2	Enable/Disable
31	Lineary CRC1	User set	4	Set Velocity
32	Lineary Fact 1	User set	4	0.0000÷1.9999

Sensore	Parameter words	Setting Way	Grades	Range
33	Lineary CRC2	User set	4	Set Velocity
34	Lineary Fact 2	User set	4	0.0000÷1.9999
35	Lineary CRC3	User set	4	Set Velocity
36	Lineary Fact 3	User set	4	0.0000÷1.9999
37	Lineary CRC4	User set	4	Set Velocity
38	Lineary Fact4	User set	4	0.0000÷1.9999
39	FwdTotal Lo	Correctable	5	00000÷99999
40	FwdTotal Hi	Correctable	5	00000÷9999
41	RevTotal Lo	Correctable	5	00000÷99999
42	RevTotal Hi	Correctable	5	00000÷9999
43	PlsntLmtEna	Select	3	Enable/Disable
44	PlsntLmtVal	Select	3	0.010÷0.800m/s
45	Plsnt Delay	Select	3	400÷2500ms
46	Pass Word 1	User correct	5	00000÷99999
47	Pass Word 2	User correct	5	00000÷99999
48	Pass Word 3	User correct	5	00000÷99999
49	Pass Word 4	User correct	5	00000÷99999
50	Analog Zero	Set count	5	0.0000÷1.9999
51	Anlg Range	Set count	5	0.0000÷3.9999
52	Meter Fact	Set count	5	0.0000÷5.9999
53	MeterCode 1	Factory set	6	Finished Y /M
54	MeterCode 2	Factory set	6	Product Serial No

Parameters of converters can decide the running status, process and output ways as well as state of output. Correct option and setting of parameters can keep the converters running optimally and get higher accuracies of output bother in display and in measurement.

There are 6 grades of passwords for setting parameters function. Grades 1 to grade 5 of passwords are for users and grade 6 of password is for manufacturer. Users can reset their passwords of grades 1~4 in grade 5.

Users can check converters parameters in any grade of password. However, if users want to change parameters pf converters, deferent grade of parameters have to be used by the users.

Grade 1 of password (set by manufacturer as 00521): users can only read parameter.
Grade 2 of password (set by manufacturer as 03210): users can change 1~24 parameters.
Grade 3 of password (set by manufacturer as 06108): users can change 1~25parameters.
Grade 4 of password (set by manufacturer as 07206): users can change 1~38parameters.
Grade 5 of password (Fixed): users can change 1~52 parameters.

Password Grade 5 can be set by skilled users. Grade 4 is mainly used for resetting total volume in password. Grades 1~3 can be set by any one who can be chosen by users.

9.2 Details Parameters

9.2.1 Language
There are 2 languages for RIF10 converter operation. They can be set by users according to the users needs.

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

9.2.3 Baud Rate
300, 1200, 2400, 4800, 9600, 38400, baud rate.

9.2.4 Snsr Size
RIF10 converters can be equipped with some deferent sensors that have deferent diameter of measuring pipes. The pipes in deferent diameters from 3mm to 3000mm can be chosen in relative table.

9.2.5 Flow unit
The flow unit can choose form the parameters (L/s; L/m; L/h; m^3/s; m^3/m; m^3/h),and the user can choose the proper unit according to the technological requirement and using habit.

9.2.6 Flow Range
Flow range means upper limit value, and lower limit value is set "0" automatically. So, it makes the range, and makes the relation of percent display, frequency output and current output with flow:

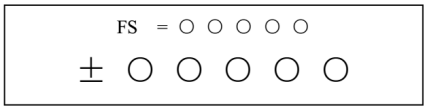
Percent display = (Flow measure/measure range) · 100 %;
Frequency output = (Flow measure/measure range) · frequency full;
Current output = (Flow measure/measure range) · current full + base point;

Pulse output will not affect.

9.2.7 Flow Rspns
It means time of filter measure value. The long one can enhance the stability of flow display and output digital, and fits for gross add up of pulse flow; the short one means fast respond rate, and fits for production control. It is set by select.

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

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



Converter's zero-flow correction displays like this:
Upper small words: FS means measure value of zero;
Lower large words: correction value of zero.

When FS is not "0", make FS = 0.
Note: if change the value on next line and FS increases, please change the "+, -" to correct FS to zero.

Flow zero is the compound value of the sensor, and should be recorded in sensor list and band.
The unit will be mm/s, and the sign will be opposite with correction value.

9.2.10 Flow cutoff
Flow cutoff is set in percentage of Upper Limit Range of flow, and users can delete all Negligible Small Signals of flow volume, velocity and percentage out of displaying and outputting them.

Sometimes user can delete output of current output signal and frequency (pulse) output signal only to have flow, velocity and percentage being displayed.

9.2.11 Total Unit

Converter display is counter with 9 bits, and the max is 999999999.
Integrator units are L, m3 (liter, stere,).
Flow integrator value:

0.001L	0.010L	0.100L	1.000L
0.001m3	0.010m3	0.100m3	1.000m3

9.2.12 SegmaN Ena

When "SegmaN Ena" is "enable", if the flow flows, the sensor will export pulse and current.
hen it is "disable", the sensor will export pulse as "0" and current as "0"(4mA or 0mA) for the flow flows reversals.

9.2.13 Output currents

Output current types can be chosen by users as 1~10mA or 4~20mA practically.

9.2.14 Pulse Type

Two kinds of Pulse Outputs are can be chosen: Frequency Output and Pulse Output.
Frequency Output is continuous square waveform and Pulse output is a serial wave of square wave.
Frequency output is mainly used for instant flow and total integrated flow in short time measurement. Frequency output can be chosen in equivalent frequency unit and volume of integrated flow can be displayed. Frequency Output can be used in long time measurement for total integrated flow with volume units. Frequency output and pulse output are usually from OC gates so that DC power supplies and load resistors have to be required (See Part 8.5).

9.2.15 Pulse Fact

Equivalent pulse Unit is referred to one pulse for value of flow. The range of pulse equivalent can be chosen:

Pulse Equivalent	Flow	Pulse Equivalent	Flow
1	0.001L/cp	5	0.001m^3/cp
2	0.01L/cp	6	0.01m^3/cp
3	0.1L/cp	7	0.1m^3/cp
4	1.0L/cp	8	1.0m^3/cp

Under the same flow, the smaller pulse, the higher frequency output, and the smaller error will be. The highest pulse output is 100cp/s, and mechanism electromagnetic counter can get 25 frequency/s.

9.2.16 Freque Max

Frequency output range is as the upper limit of flow measure, just the percent flow 100%.
Frequency output upper limit can be selected between 1÷5000Hz.
The state of empty pipe can be detected with the function of converter.
In the case of Empty Pipe Alarm, if the pipe was empty, the signals of analog output and digital output would be zero and displayed flow would be zero, too.

9.2.17 Mtsnsr Ena

The state of empty pipe can be detected with the function of converter.
In the case of Empty Pipe Alarm, if the pipe was empty, the signals of analog output and digital output would be zero and displayed flow would be zero, too.

9.2.18 Mtsnsr Trip

When the pipe is full of liquid (whether flowing or not), the parameter of "Mtsnsr" could be modified more easily. The parameter displayed upper line is real MTP, and the parameter displayed bellow is the "Mtsnsr trip" that should be set. When setting "Mtsnsr trip", you could be according to the real MTP, the value that should be set is usually three to five times of real MTP.

9.2.19 Alm Hi Ena

Users can choose "Enable" or "Disable".

9.2.20 Alm Hi Val

The parameter of upper limit alarm is percentage of flow range and can be set in the way of setting one numerical value between 0%~199.9%.When the value of flow percentage is larger than the value of setting value, the converter outputs the alarm signal.

9.2.21Alm Lo Val

The same as upper limit alarm.

9.2.22 Sys Alm Ena

Selecting Enable will have the function, and selecting Disable will cancel the function.

9.2.23 Clr Sum Key

User use more than 3 byte code to enter ,Then set this password in Clr Total Rec.

9.2.24 Snsr Code

It is referred to the produced date of sensor and the serial number of product that can keep the sensors coefficient right and accurate.

9.2.25 Sensor Fact

“Sensor Coefficient” is printed on the Label of the sensor when it is made in factory. The “sensor coefficient” has to be set into Sensor Coefficient Parameter when it runs with converter.

9.2.26 Field Type

RIF10 affords three exciting frequency types:
1/16 frequency (type 1);
1/20frequency (type 2);
1/25 frequency (type 3);

The small-bore one should use 1/16 frequency, and large-bore one should use 1/20 or 1/25 frequency.
When using, please select type 1 first, if the zero of velocity is too high, select the type 2 or type 3.
Note: Demarcate on which exciting type, working on it only.

9.2.27 FwdTotal Lo -hi

Positive total volume high byte and low byte can change forthcoming and reverse total value, and be used to maintenance and instead.
User use 5 byte code to enter, and can modify the positive accumulating volume (Σ+). Usually, it is unsuitable to exceed the maximum the counter set [999999999].

9.2.28 RevTotal Lo-hi

User use 5 byte code to enter, and can modify the negative accumulating volume (Σ-). Usually, it is unsuitable to exceed the minimum the counter set [999999999].

9.2.29 PlsntLmtEn

For paper pulp, slurry and other serosity, the flow measure will have "cuspidal disturb", because the solid grain friction or concussion the measure electrode. RIF10 converters use variation restrain arithmetic to conquer the disturbing by designing three parameters to select disturb character.
Set it "enable", start variation restrain arithmetic; set it "disable", close variation restrain arithmetic.

9.2.30 PlsntLmtVl

This coefficient can disturb the variation of cuspidal disturb, and calculate as percent of flow velocity, thus ten grades: 0.010m/s, 0.020m/s, 0030m/s, 0.050m/s, 0.080m/s, 0.100m/s, 0.200m/s, 0.300m/s, 0.500m/s, 0.800m/s, and the smaller percent, the higher delicacy of cuspidal restrain.

Note: when using it, must test for select by the fact, and sometimes it is not the higher delicacy is good.

9.2.31 PlsntDelay

This coefficient can select the width of time of restrain cuspidal disturb and the unit is ms. If the duration is shorter than flow change in some time, L_MagB will think it is cuspidal disturb, and if it is longer, RIF10 will think it is natural. It also needs to select parameter in fact.

9.2.32 User's password 1~4
Users can use 5 grades of passwords to correct these passwords.

9.2.33 Analog Zero
When the converters are made in the factory, output current has been calibrated to zero scale, that is, accurate 0mA or 4mA output.

9.2.34 Anlg Range
When the converters is made in the factory, output current have been calibrated to full scale, that is, accurate 10mA or 20mA output.

9.2.35 Meter Fact
This fact is the special one of sensor-made-factory and the factory use this fact to unite RIF10 electromagnetic flowmeters converters to make sure all the instruments can interchange by 0.1%.

9.2.36 MeterCode 1 and 2
Converter code records the date of manufacturing and serial number of converter.

10. Infrared telecontrol function keys

The operation of the infrared-hand-remote control keyboard is the same with the operation of the instrument. When use it, please keep the infrared transmitter of the infrared-hand-remote control keyboard and the receiver of the instrument parallel, with the distance of about one meter.

Concrete operation referring to the figure:

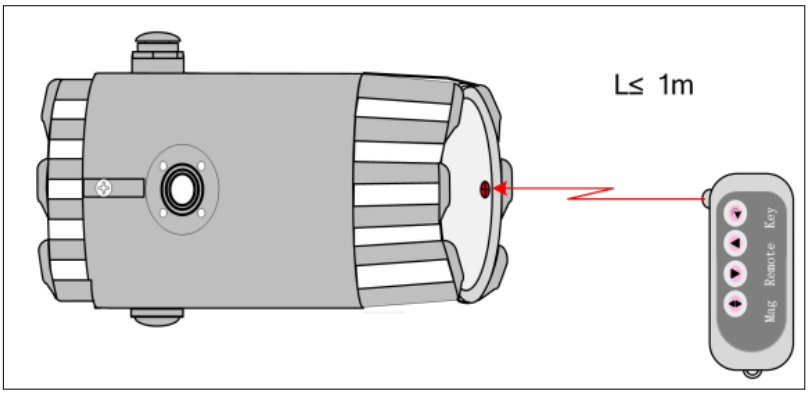


Fig6.32: The communication figure of the infrared-hand-remote control keyboard and the instrument

11. Alarm information

PCB of electromagnetic flowmeters converters uses SMT, so for user, it is unable to service, and cannot open the shell of converter.

RIF10 series Intelligent converters have self-diagnose function.
Without trouble of power and hardware circuit, the normal trouble can be alarmed correctly. This information displays on the left of LCD.

The trouble is like this:
FQH ➡ Flow high limit alarm;
FQL ➡ Flow low limit alarm;
FGP ➡ Flow empty pipe alarm;
SYS ➡ System exciting alarm.
UPPER ALARM ➡ Flow high limit alarm;
LOWER ALARM ➡ Flow empty pipe alarm;
LIQUID ALARM ➡ Flow empty pipe alarm;
SYSTEM ALARM ➡ System exciting alarm.

12. Troubleshooting

12.1 No display:

a) Check the power supply connection;
b) Check the power fuse to see for OK;
c) Check the contrast of LCD and regulate it to working state;

12.2 Exciting alarm

a) Check if the exciting cables EX1 and EX2 did not connected;
b) Check if the total resistance of sensor's exciting coil resistances less than 150Ω;
c) If a) and b) are OK, the converter is failed.

12.3 Empty pipe alarm

- If measured fluid full of testing pipe of sensor;
- When shorting circuit three connectors SIG 1, SIG 2, SGND of converter, and no "Empty Alarm" displayed then the converter works OK. In this case, it is possible that conductivity of measured fluid may be small or empty threshold of empty pipe and range of empty pipe are set wrongly.
- Check if the signal cable is OK;
- Check if the electro-poles are OK or not. Let the flow is zero, then the displayed conductivity should be less than 100%. Resistances of SIG1 to SGND and SIG2 to SGND are all less than 50kΩ (conductivity of water) during measurement operation. (It is better to test the resistances by means of multimeter with pointer to see the charging process well.)
- The DC voltage should be less than 1V between DS1 and DS2 testing the voltage by means of multimeter. If DC voltage is larger than 1V, the electro poles of sensor were polluted that have to be cleaned.

12.4 Measure flow disallow

- If measured fluid full of testing pipe of sensor;
- Check if the signal cable is OK;
- Check the sensor modulus and sensor zero whether set as the sensor escutcheon or leave factory checkout.

13. RIF10 encasement and reserve

13.1 L_MagB encasement

RIF10 electromagnetic flowmeter converter is packed as vacuum, and can insulate wet. The bag is RIF10's appropriative one, if the bag is open, it will not product of original factory.
Installation Manual, Certificate of Product and Packing List are all with the RIF10 converter.

13.2 Shipping and storage

To prevent the product from damage during shipping, keep the original package of manufacturer. The products should be stored in storehouse that meets following conditions:

a) Keep off raining and moisture;
b) Keep off heavy vibration, and strike;
c) Ambient temperature -20°C...+60°C;
d) Humidity less than 80%.

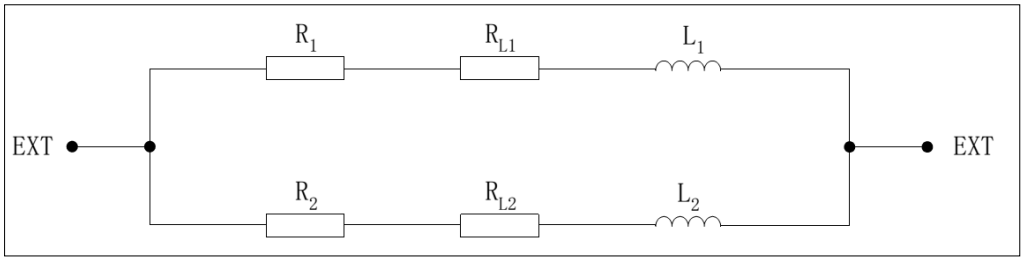
Appendix One: Selection of exciting frequency (re.)

RIF10_ afford three exciting frequency types: 1/16 frequency (type 1), 1/20frequency (type 2), 1/25 frequency (type 3).
The small-bore one should use 1/16 frequency, and large-bore one should use 1/20 or 1/25 frequency.
When using, please select type 1 first, if the zero of velocity is too high, select the type 2 or type 3.
In the user's sensor that RIF10_ gives, often the sensor is not fit for the RIF10_ converters, at this time can do like this:

(1) Small exciting loop resist
If the exciting loop resist is smaller than the sensor's request, can series resist to get the total value. The series resist's power should be more than one time of fact, for example, series 10Ω on 250mA current, the power will be 3W.

(2) Large exciting loop resist (change exciting current) If the exciting loop resist is larger than the sensor's request, can change the exciting current, for example, if exciting loop resist is 70Ω, for 250mA this is larger, so can change the current to 187mA.

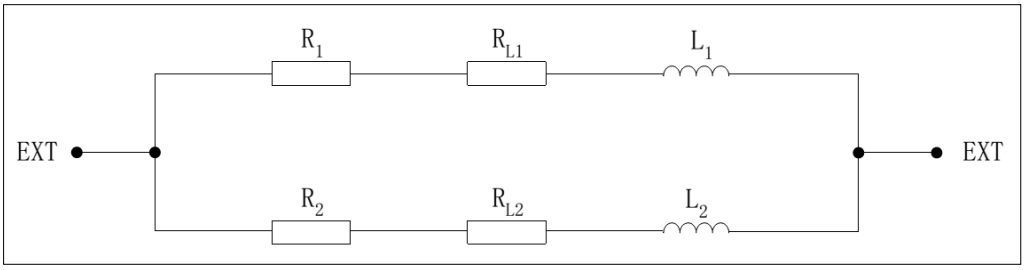
(3) Large exciting loop resist (change loop connect)
If the exciting loop resist is larger than the sensor's request, can change the connect of loop, for example, if exciting loop resist is 200Ω, every exciting loop resist is 100Ω, parallel connection the upper and lower loop is OK.
According the analysis, change the connect of exciting loop, measure from either head of exciting loop, Total resist = (R1 + RL1) parallel connection (R2 + RL2) ≤ 120Ω; (As the Fig. R1, R2----addition resists; RL1, RL2----exciting resists)



Total resist = (R1 + RL1) parallel connection (R2 + RL2) ≤ 120Ω;
(as the Fig. R1, R2 ➡ addition resists; RL1, RL2 ➡ exciting resists)

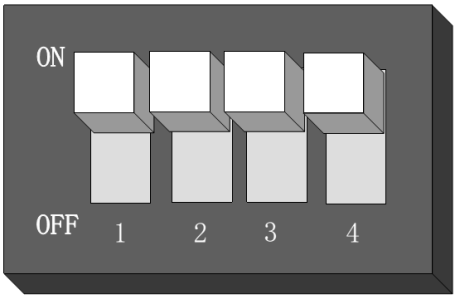
(4) Sensor exciting current steady time so long (inductance is too large)
For this question, firstly changing exciting type, select 1/16 or 1/25 frequency. If cannot content, change connect of exciting loop. Exciting current transition time τ = L / R
L ➡Exciting loop inductance; R ➡ exciting loop resist. So decrease L and increase R both can decrease τ.

According the analysis, change the connect of exciting loop, measure from either head of exciting loop,



Total resist = (R1 + RL1) parallel connection (R2 + RL2) ≤ 120Ω;
(As the Fig. R1, R2 addition resists; RL1, RL2 exciting resists)

Appendix Two ON/OFF Switch Diagram



Key 1: ON: Supply up power (24V) for ALML output.
OFF: No connection.

Key 2: ON: Pulse output to OC gate when flow verification was taken. Connect pull -up resistor.
OFF: No connection.

Key 3: ON: Supply up power (24V) for ALMH output.
OFF: No connection.

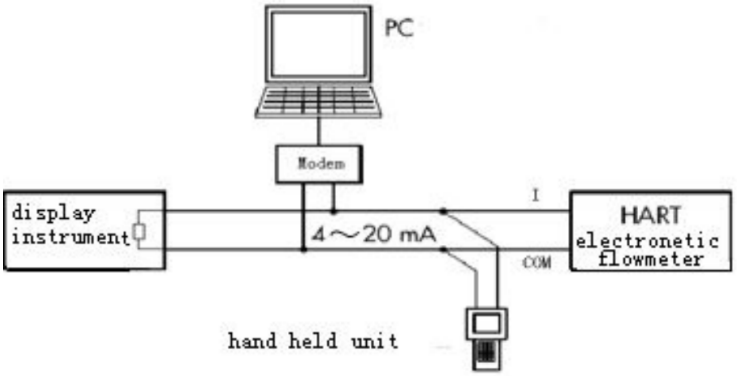
Key 4: ON: Connected to RS485 terminal resistor for communication
OFF: No connection.

Note: Terminal used for far communication only.

Appendix Three: HART function explaination

1. HART Bus network fig

HART Bus transfers data-signal through signal line which value is from 4 to 20mA.For this reason,it can save local data communication line and implement data communication.Its adaptive for local using. The local network fig composed by HART Bus is as follows:



2. Instruction for setting of the converter

1. If you use the handset of our company, you need to set the meter address to 1 and set the baud rate to 4800;
2. If you use other handset such as 375 or 275, you need to set the meter address to 2 and set the baud rate to 4800;
3 If the communication mode, the address or the baud rate of the meter is not set correctly, the handset can't set the parameters.

3.Matters need attention of HART using function meter

1) Load which is parallel connection between electrical flowmeter and Hand held uint and HARTMODEM is on polarity.
2) Resistance of circuit should be greater than 200Ω,less than 500Ω.
3) Hand held uint and HARTMODEM shouldn't be connection in series in current circuit.

Appendix Four: RIF10_ with non linear amendment function Additional

Instruction

Non linear amendment function, in principle is used for line regulation of low flow which under 0.3m/s. The function is designed to four amendments, and divided into four flow velocity points and four correction factors. Nonlinear amendment coefficient works on the basis of the original transducer calibration coefficient, so please close nonlinear amendment function before calibrating the transducer coefficient, and open the function to realize nonlinear amendment after calibrating. Set correction points and correction factors according to the nonlinear segment of transducer, if be the appropriate settings, do not have to recalibration.

As a rule, the flow velocity which calculated form transducer coefficient is called original flow velocity, and the other which gained from non-linear amendment is called correction flow velocity.

The relationship between them is shown as following:

a. Correction point 1 > Original flow velocity ≥ Correction point 2:
Correction flow velocity = Correction coefficient 1 × Original flow velocity

b. Correction point 2 > Original flow velocity ≥ Correction point 3:
Correction flow velocity = Correction coefficient 2 × Original flow velocity

c. Correction point 3 > Original flow velocity ≥ Correction point 4:
Correction flow velocity = Correction coefficient 3 × Original flow velocity

d. Correction point 4 > Original flow velocity ≥ 0:
Correction flow velocity = Correction coefficient 4 × Original flow velocity

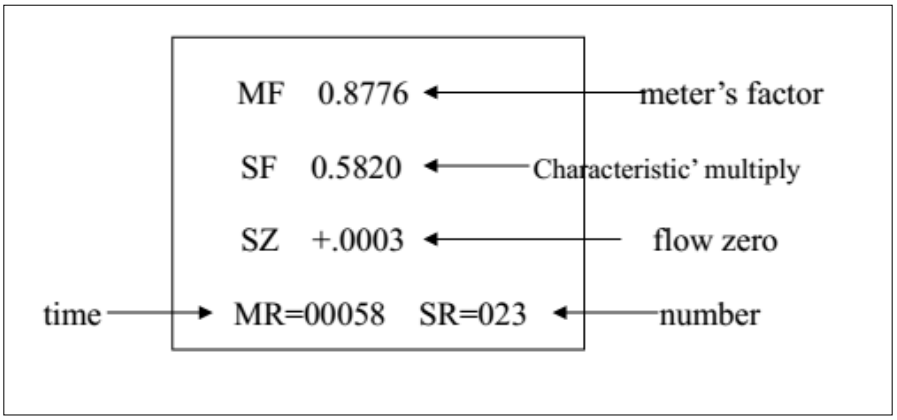
Notice: Correction points must satisfy the following relationship:

Correction point 1> Correction point 2 > Correction point 3 > Correction point 4

The intermediate value of correction coefficient is 1.0000, when bigger than it is considered as positive coefficient (increase), and smaller is considered as negative coefficient (decrease).

Appendix Five: The function of protecting the Characteristic Flow Factor

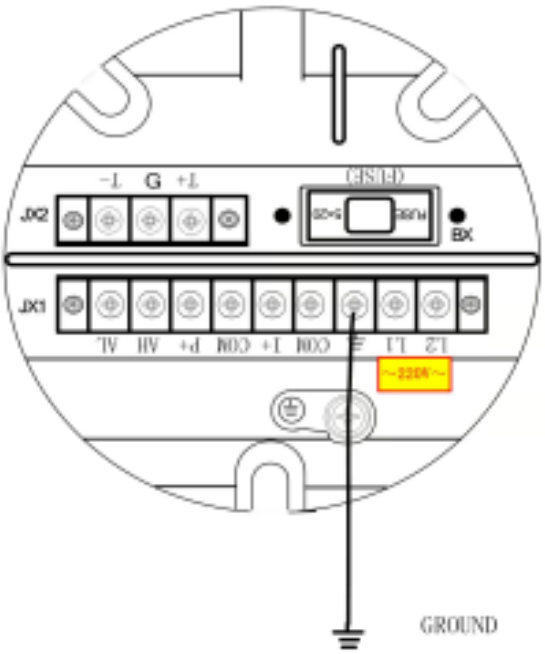
RIF10_ converter has a function of protecting the Characteristic Flow Factor.
The key content is that the factor could not be modified easily.
RIF10_ converter increases a new function to record the modified procedure and modified times of flow zero, sensor factor, and meter factor, any change of these three factors could be recorded.
The sensor factor and modifying times could be recorded in Test Report, and when next time testing the factor in Test Report and factor in the convertor are compared to check whether the Characteristic Flow Factor has been changed.
The detail about the Characteristic Flow Factor protection function can be found in the appendix.

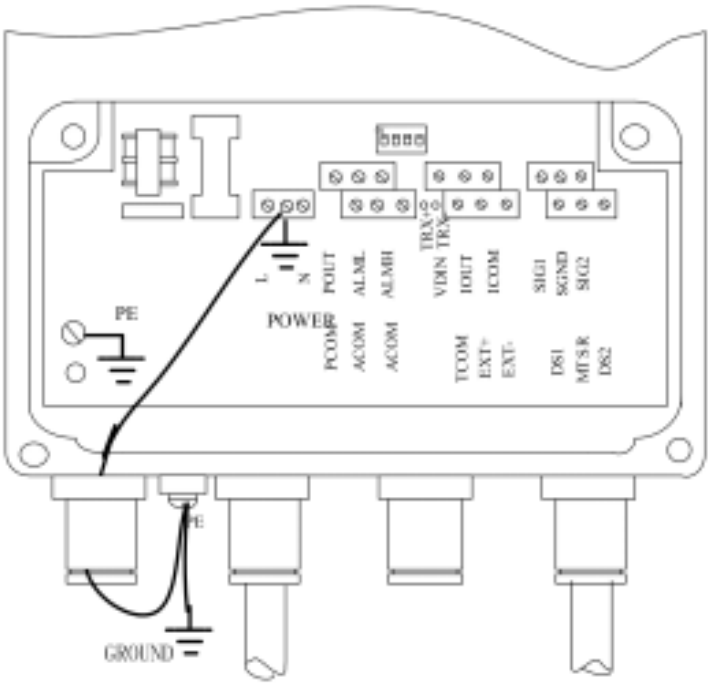


Attention!
The last record is displayed when this item is first entered, if you want to browse the history records press "down key", and could search for the last record to the thirty-two record ahead. Finally the times of record modified (MR) should be written down on the paper before next time test.

Appendix six: Lightning protection notes

When installing, users must connect the converter's earthing terminal with the shell, and then earthing them reliably, because the electrical current can be put into the earth through the shell by the gas discharger of lightning protection. If the shell has not been earthing reliably, once lightning, it may cause a personal accident when there is somebody operating the converter. The specific details, you can see the connection diagram.





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