

Manual Thermal Mass Flow Meter (KC-2600 Series)



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Thermal Mass Flow Meter(KC-2600Series)

Chapter 1 Overview

Warnings and Cautions

Warning! Agency approval for hazardous location installations varies between flow meter models. Consult the flow meter nameplate for specific flow meter approvals before any hazardous location installation.

Warning! Hot tapping must be performed by a trained professional. U.S. regulations often require a hot tap permit.

The manufacturer of the hot tap equipment and/or the contractor performing the hot tap is responsible for providing proof of such a permit

Warning! All wiring procedures must be performed with the power Off.

Warning! To avoid potential electric shock, follow National Electric Code safety practices or your local code when wiring this unit to a power source and to peripheral devices.

Failure to do so could result in injury or death.

All AC power connections must be in accordance with published CE directives.

Warning! Do not power the flow meter with the sensor jumper wires disconnected.

This could cause over-heating of the sensors and/or damage to the electronics.

Warning! Before attempting any flow meter repair, verify that the line is de-pressurized.

Warning! Always remove main power before disassembling any part of the mass flow meter.

Caution! Before making adjustments to the Smart Electronics device, verify the flow meter is not actively monitoring or reporting to any master control system. Adjustments to the electronics will cause direct changes to flow control settings.

Caution! All flow meter connections, isolation valves and fittings for hot tapping must have the same or higher pressure rating as the main pipeline.

Caution! Changing the length of cables or interchanging sensors or sensor wiring will affect the accuracy of the flow meter. You cannot add or subtract wire length without returning the meter to the factory for re-calibration.

Caution! When using toxic or corrosive gases, purge the line with inert gas for a minimum of four hours at full gas flow before installing the meter.

Caution! The AC wire insulation temperature rating must meet or exceed 71°C (158°F).

Caution! Printed circuit boards are sensitive to electrostatic discharge. To avoid damaging the board, follow these precautions to minimize the risk of damage :

- before handling the assembly, discharge your body by touching a grounded, metal object
- handle all cards by their edges unless otherwise required
- when possible, use grounded electrostatic discharge wrist straps when handling sensitive components

Thermal Mass Flow Meter(KC-2600Series)

Overview

Golden Rule's KC-2600 Series Smart Thermal Mass Flow Meter provides a reliable solution for gas flow measurement applications. Its low-flow sensitivity, fast response, and excellent measurement range make it ideal for many critical gas measurements. For stable and reliable mass flow measurement, the mass flow meter's thermal sensor automatically compensates for gas temperature and pressure variations without the need for separate temperature and pressure transducers. The high-performance, high-accuracy microprocessor converter is designed for easy meter verification and fault diagnosis, including flow range adjustment, output scaling, and zero/span functions. The meter provides current and pulse outputs, and the programmable flow meter can be easily configured via Golden Rule's KC-2600 Series RS-485 or with the four built-in pushbutton switches. The KC-2600 series can be inserted into ducts or pipes from 2 inches to 118 inches in diameter. It combines ease of installation, quick setup, long-term reliability, and accurate flow measurement across a wide range of flow rates and conditions.

How to Use This Manual

This manual provides the necessary information for installing and operating the Smart Insertion Thermal Mass Flow Meter.

The four chapters in this manual cover the following areas:

Chapter 1: Introduction and Product Description

Chapter 2: Installation and Wiring Instructions

Chapter 3: System Operation and Programming Instructions

Chapter 4: Troubleshooting and Repair. Product specifications are included in Appendix A.

For product specifications, please refer to the catalog.

Notes and Safety Information

We use notes, cautions, and warnings throughout this manual to draw your attention to important information.

Thermal Mass Flow Meter(KC-2600Series)

Product Acceptance

Upon receipt of the Golden Rule F Mass Flowmeter, carefully inspect the exterior of the packaging box for any damage incurred during shipping. If the box is damaged, notify the domestic carrier and notify the factory or distributor. Remove the packing list and check that all ordered components are present. Ensure that no spare parts or accessories are discarded along with the packing materials. No product will be returned without first contacting Golden Rule Customer Support.

Technical Support

If a problem is found with your flowmeter, review the installation, operation, and setup instructions for each step. Verify that your settings and adjustments are in accordance with the factory recommendations. For specific information and recommended actions, refer to Chapter 4, Troubleshooting. If the problem persists despite the troubleshooting procedures outlined in Chapter 4, please contact Golden Rule by email or fax. TEL: +82-032-817-1240

When contacting our technical support team, please provide the following information:

- Product serial number and model name (located on the product nameplate)
- The problem and the corrective action taken
- Application information (fluid, pressure, temperature, and piping conditions)

KC 2600 Series Detection Principle



KC-2600Series
Thermal flow sensor

Golden Rule's unique Mass Flow probe ensures exceptional accuracy, robustness, and reliability in industrial flow meters. The Mass Flow sensor consists of two sensing elements: a velocity sensor and a temperature sensor that automatically compensates for gas temperature changes. The new device incorporates two temperature-sensitive platinum resistors on a single chip. The high-ohm resistor measures the reference temperature, while the low-ohm resistor acts as a heater. Using a bridge circuit, the different resistance values of the two elements generate different levels of self-heating. Self-heating depends on the supply voltage, mass flow, and the medium in which the sensor is located. Higher voltage increases self-heating, while higher flow rates increase cooling. If self-heating is continuously maintained by a suitable controller, the voltage will increase with higher flow rates, enabling mass flow measurement.

Thermal Mass Flow Meter(KC-2600Series)

Chapter 2 Installation and Wiring

Installation Overview

The KC-2600 series flowmeters are factory-calibrated for the specified pipe size, as specified on the product's calibration certificate. Factory calibration calculates the average flow rate passing through the pipe to determine the correct insertion depth. Simply insert the meter between the 1/3 point and the centerline of the pipe. (If the pipe size differs from the flowmeter's calibrated size, you will need to re-enter the updated settings.)

When selecting an installation location, please ensure the following:

1. The line pressure and temperature must not exceed the flowmeter's reference values. The temperature should not vary more than 24°C (69.8°F) from the calibrated value, and the pressure should not vary more than 50 psig (3.4 barg) from the calibrated value.
2. The location should correspond to the minimum required straight pipe length upstream and downstream of the sensor head (see Figure 2-1 on the next page).
3. Ensure proper arrangement for safe and easy access. Verify that the gas in the meter installation area is clean or dry and that the meter is calibrated for the gas to be measured.

The flow meter system should also be inspected for the following abnormalities prior to installation:

Leaks.. Valves or other turbulent devices that could cause unexpected flow rates and obstructions to the flow.. Heaters that could cause rapid changes in the measured temperature.



WARNING!

Agency approvals for hazardous area installation vary depending on the flow meter model. Refer to the flow meter nameplate for specific meter approvals before installing in a hazardous area.

Thermal Mass Flow Meter(KC-2600Series)

Requirements for Normal Flow

This flow meter is a mass flow meter using a precision sensor.

Please be careful as it may be affected by impact.

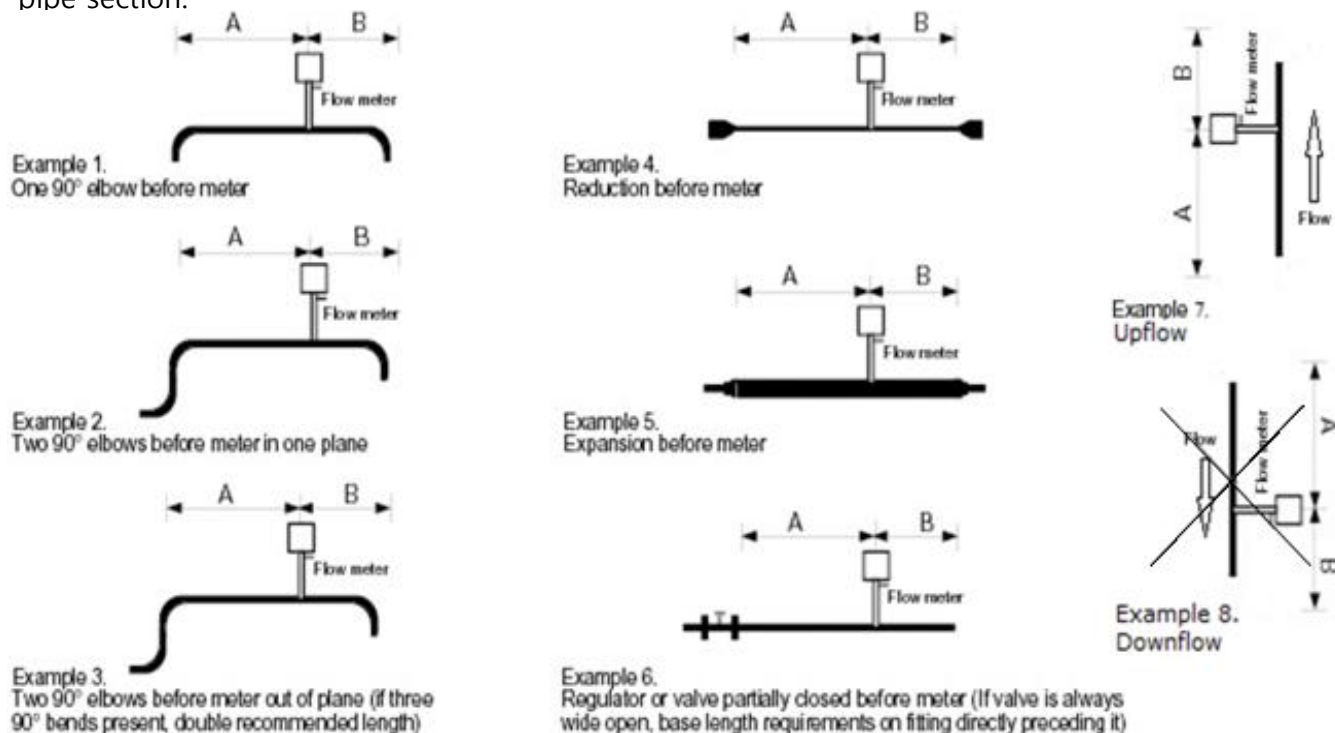
Please ensure the specified distance between the front and rear ends of the flow meter.

If there are bends in the pipe, such as valves or elbows,

please allow additional distance. If a flow regulator is built into the flow meter, the required straight pipe section can be reduced.

Check your specified piping conditions, as shown in the example below.

To ensure accurate and repeatable performance, install according to the recommended straight pipe section.



Example	A – Upstream ⁽¹⁾ Requirements	B – Downstream ⁽²⁾ Requirements
1	10 ~ 7D	5 ~ 3D
2	15 ~ 10D	5 ~ 3D
3	20 ~ 15D	10 ~ 5D
4	10 ~ 7D	5 ~ 3D
5	20 ~ 15D	10 ~ 5D
6	20 ~ 15D	5 ~ 3D
7	20 ~ 15D	10 ~ 5D
8	Not	Not

(1) Number of diameters (D) of straight pipe required between upstream disturbance and the flow meter.
(2) Number of diameters (D) of straight pipe required downstream of the flow meter.

<Figure 2-1>

Thermal Mass Flow Meter(KC-2600Series)

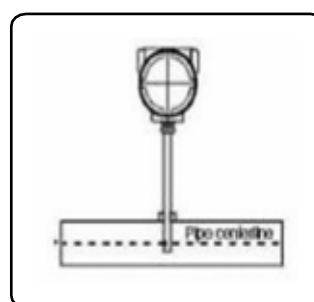
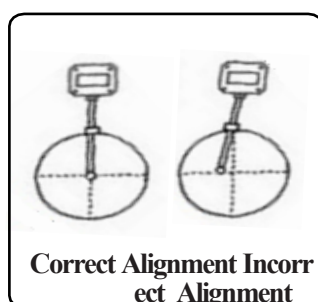
Flow Meter Installation

When securing the flow meter, insert it accurately into the center of the pipe. For proper operation, the flow indicator can be installed in either direction. If the flow meter is not installed correctly, flow measurements will be inaccurate.

Installation of an Insertion-Type Cold Tap

Ensure that the minimum upstream-downstream pipe straight section requirements are met as shown in Figure 2-1.

1. Shut off the process gas flow and ensure the line is not pressurized.
2. Use a sharp cutting tool to cut a tap in the pipe. The pipe insertion hole must be at least 0.88 inches (22.4 mm) in diameter.
3. Clean all lint from the tap. Rough edges can affect the flow meter's accuracy and cause flow distortion. These interferences can also cause damage to the sensor when inserted into the pipe.
4. Install a screw, compression, or flange fitting into the pipe. These connections must be within ± 5 degrees of vertical from the centerline of the pipe, as shown at right.
5. Once installed, check the static pressure at the connection before fully tightening the fitting. If there is pressure loss or leakage, repair and reinstall the connection.
6. Insert the sensor probe into the pipe through the compression fitting or flange, ensuring it is positioned exactly between the centerlines of the pipe. Do not apply excessive force to the pipe.
7. For the flow direction, face the monitor straight ahead as shown in the picture on the right and install the sensor probe into the pipe.
8. Tighten the compression fitting to secure the flow meter in place. If you use a flexible fitting, you can freely change the insertion depth. However, once a compression fitting is tightened, the position is permanent.



Two-way Flow

❖ The flow meter should be installed after the dehumidifier. This may adversely affect the sensor.

When using toxic or corrosive gases, allow the pipe to evacuate for at least 4 hours with an inert gas before installing the flow meter.

❖ After welding the coupling to the pipe, tighten the compression fitting, insert the flow sensor, and determine its location. Finally, tighten the ferrule of the compression fitting with a wrench at least three turns. Be careful not to tighten too loosely, as this can cause leakage.

Thermal Mass Flow Meter(KC-2600Series)

Insertion Hot Tap Installation Instructions

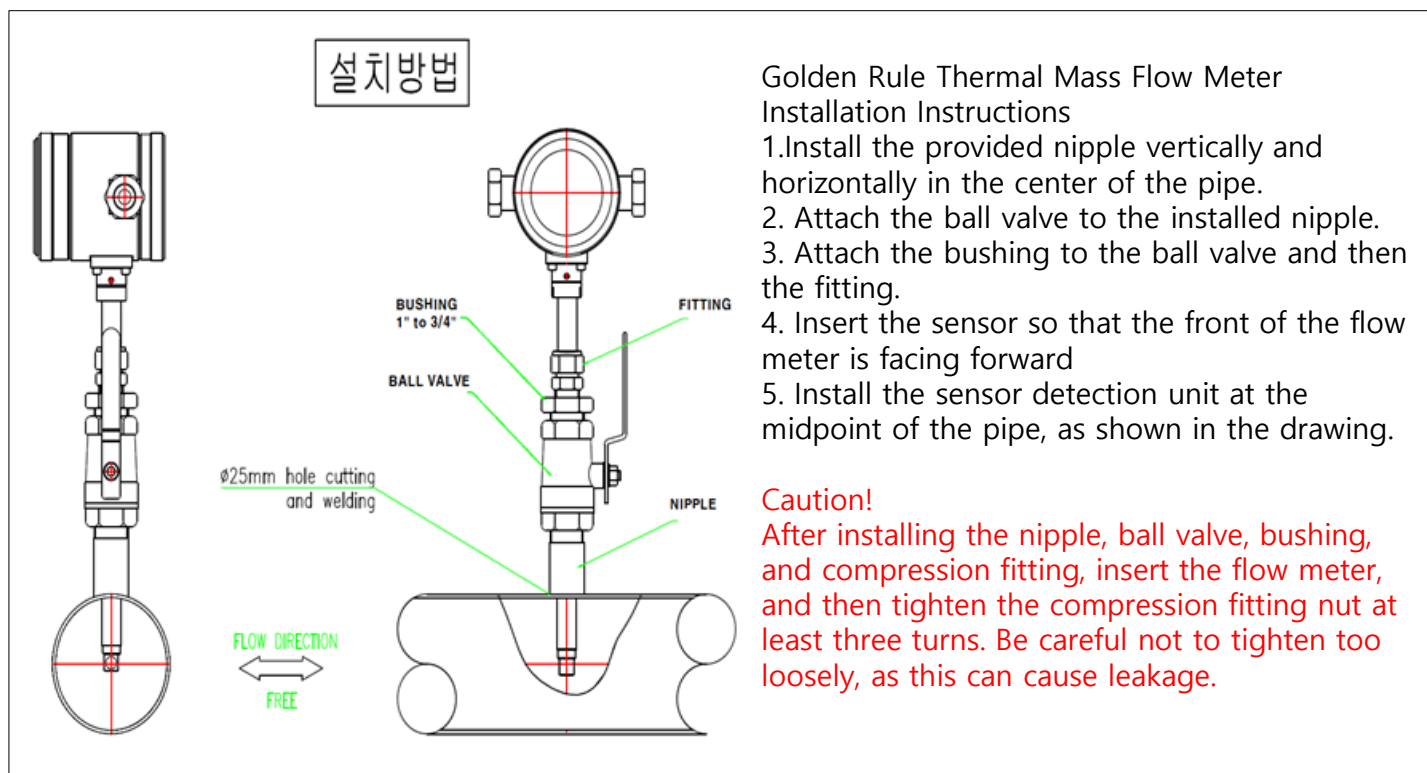
Since the flowmeter probe is bidirectional, ensure proper operation when inserting the flowmeter in the desired location. Low-pressure hot taps cannot exceed a maximum of 100 psig (7 bar). High-pressure hot taps cannot exceed a maximum of 1,000 psig (70 bar). Before performing the following procedures, ensure that the pipe pressure does not exceed these ranges.

1. Verify that the minimum upstream-downstream pipe straight run requirements are met as shown in Figure 2-1.
2. Calculate the insertion depth of the flowmeter for either low-pressure or high-pressure hot taps, as shown in Figure 2-2.
3. Weld the process connection to the pipe. Make sure that this connection is within ± 5 degrees of vertical from the center of the pipe. (See previous page) The pipe insertion hole must be at least 0.88" or 1" in diameter.
4. Install an isolation valve to the process connection. The opening must be at least 0.88" (22.4mm) when fully open.
5. Install the hot-tap pipe.
6. After closing the isolation valve, check the static pressure at the connection. If there is pressure loss or leakage, repair and reinstall the connection.
7. Insert the sensor probe into the pipe through the isolation valve. Insert it into the centerline of the pipe at the correct insertion depth. Do not force the probe into the pipe.
8. Tighten the fitting to secure the flow meter in place.

WARNING!

Hot tapping must be performed by a trained technician. The person performing the hot tapping is responsible for ensuring compliance with the regulations and providing proof of permitting, if required.

Caution! All hot-tapping connections, isolation valves, and fittings must be rated for the same or higher pressure as the main line.



Thermal Mass Flow Meter(KC-2600Series)

Calculating the insertion depth of a pressure tap for low pressure

Variables

L = Nominal probe length

D = Duct O. D.

C = Duct I. D.

T = Height of "Thread let" or customer provided "Weld let"

Formula

$$L \geq 12 + D/2 + T$$

L must be equal or greater than 12 inches plus the height of the "Thread let" plus half the duct O. D.(All dimensions in inches)

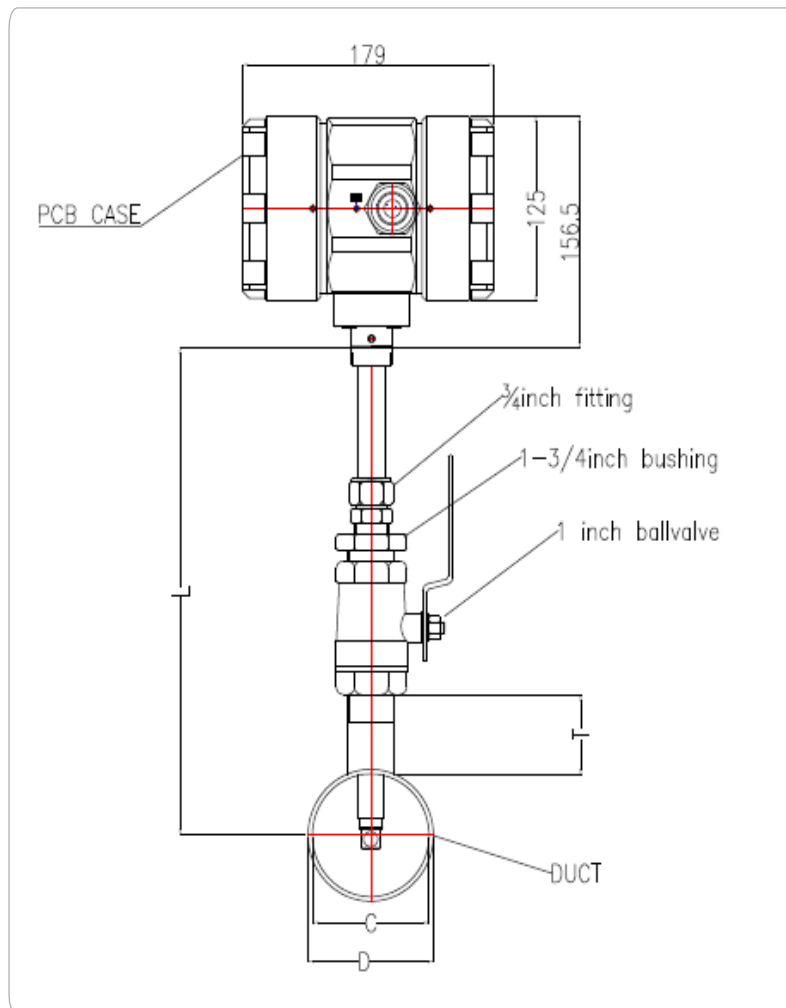


Figure 2-2. Low Pressure Tap InsertionDepth

Thermal Mass Flow Meter(KC-2600Series)

Pressure Tap Insertion Depth Calculation Method for High Pressure Applications

Variables

S = Distance from face of mounting flange to outside of duct

D = Duct O. D.

P = Minimum probe length

T = Minimum probe travel

R = Allowable probe travel

IN = Inserted position (marker location)

RE = Retracted position (marker location)

Formulas

1) $P = D/2 + S + 6.75$ (minimum probe length – use next longer whole number length probe)

2) $T = D/2 + 0.54$

3) $R = 28.2 - [\text{actual probe length} - S - (D/2)]$ (must be greater than or equal to T)

4) $IN = 9(\text{actual probe length} + 2) - (5.5 + S + D/2)$

5) $PE = IN + T$

(All dimensions in inches)

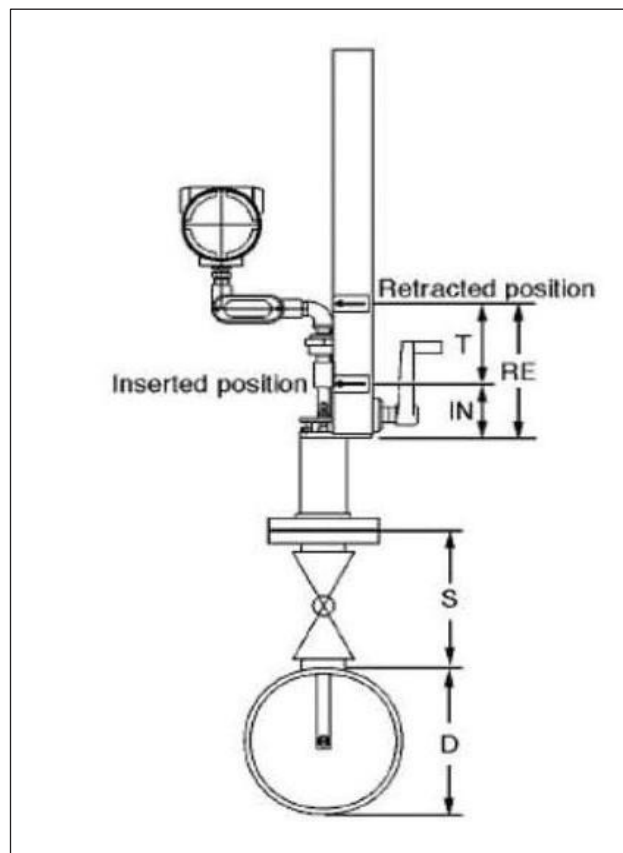


Figure 2-3. High Pressure Tap Insertion Depth

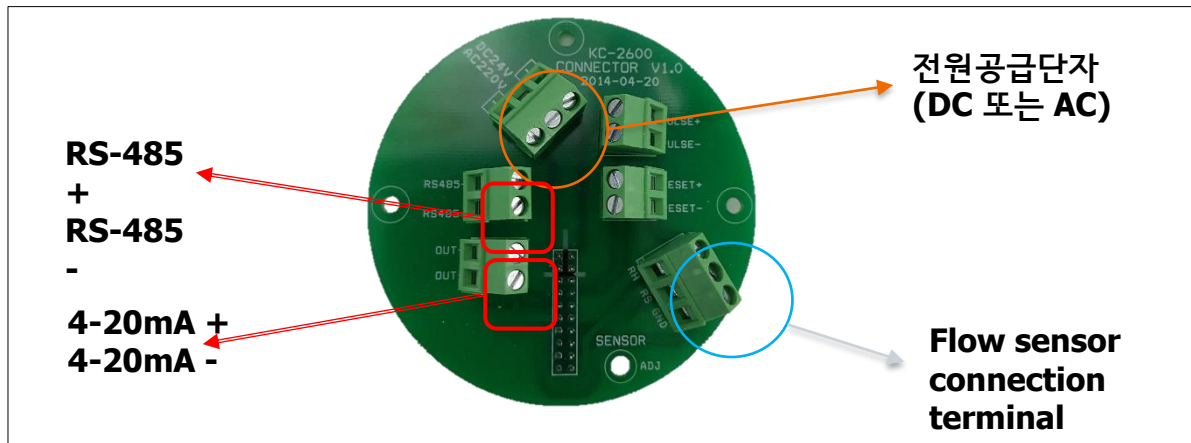
Thermal Mass Flow Meter(KC-2600Series)

Wiring Connection

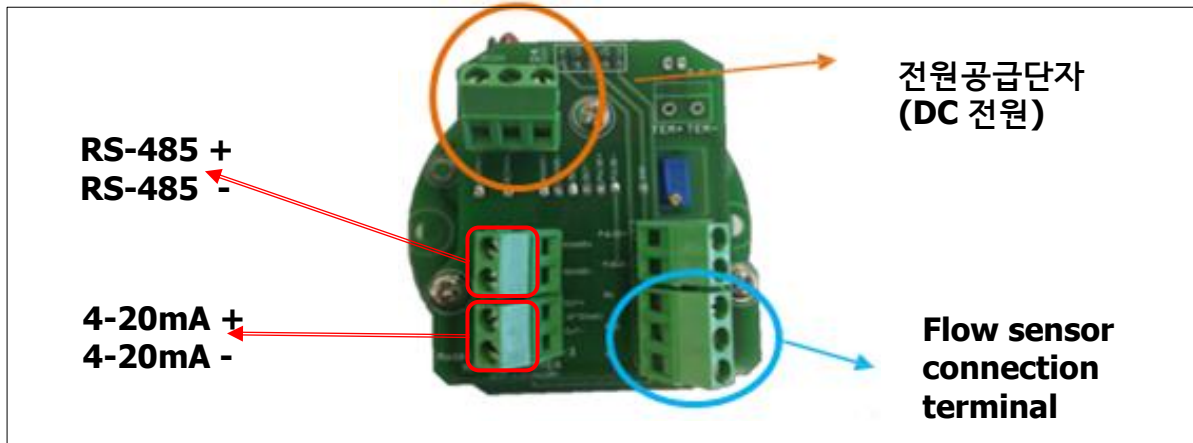
The KC-2600 enclosure uses the DC terminal for power connection, and the 4-20mA OOU+ and OUT- terminals for signal connection. Complies with all KC or CE standards.

WARNING!
To avoid potential electric shock, follow NEC safety guidelines and applicable codes when connecting the flowmeter to power or peripheral devices. Failure to do so could result in injury or death. All power connections must comply with CE regulatory guidelines.

Standard terminal block



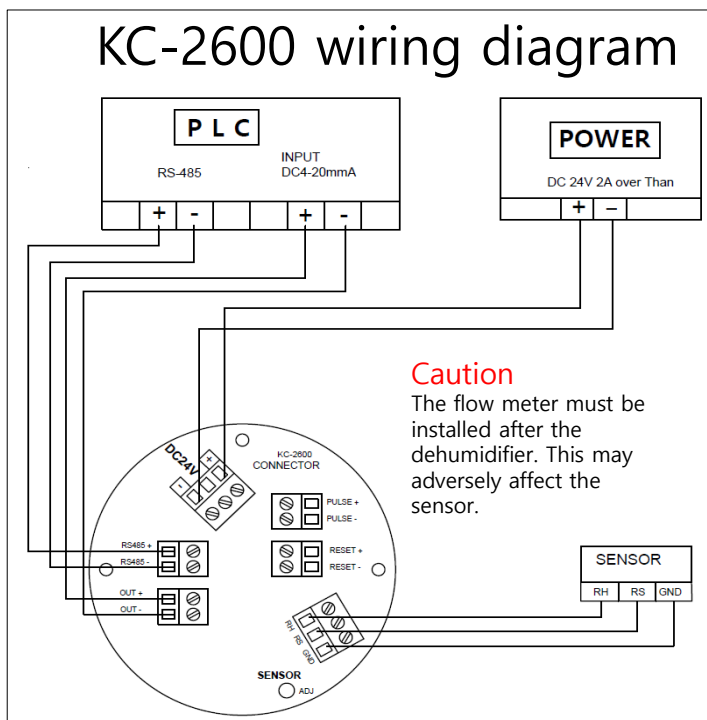
Explosion-proof terminal block



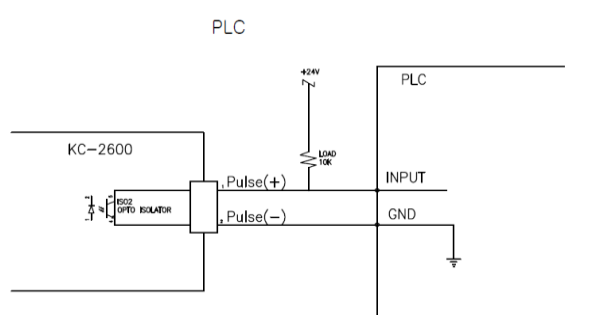
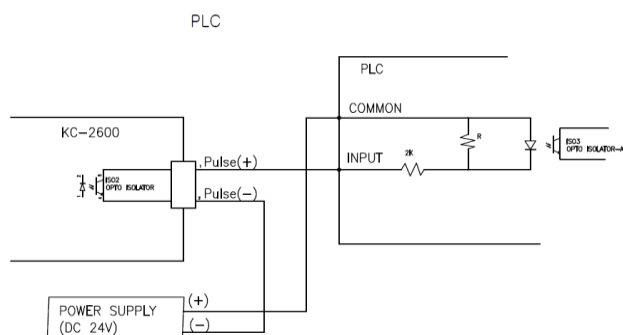
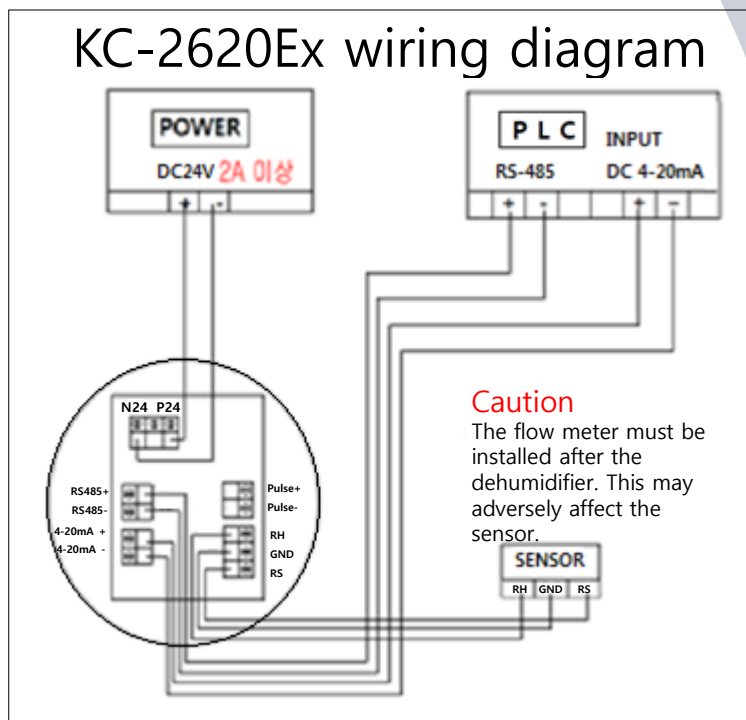
1. P24V : Power input terminal
2. N24V : Power input terminal
3. RS485+ : When MOD-BUS RS485 communicates, DATA +terminal
4. RS485- : When MOD-BUS RS485 communicates, DATA – terminal
5. OUT+ : Analog 4-20mA Current +terminal
6. OUT- : Analog 4-20mA Current - terminal
7. PULSE + : Pulse output + terminal
8. PULSE- : Pulse output - terminal

Thermal Mass Flow Meter(KC-2600Series)

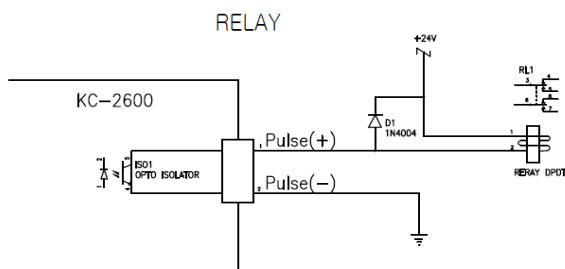
KC-2600 wiring diagram



KC-2620Ex wiring diagram



Pulse wiring diagram



주의 사항

1. RELAY COIL 전류는 25mA 이내의 RELAY를 사용해야 함.
2. RELAY COIL 에 반드시 DIODE(1N4004)를 부착해야 함.

Caution!

1. When wiring the power supply, the flow meter must be supplied with a separate power supply.
2. When wiring the output, use shielded wires. Noise may occur.

Thermal Mass Flow Meter(KC-2600Series)

Chapter 3: Operation

This chapter covers programming the flowmeter and monitoring its progress. All programming instructions are provided using the LCD screen.

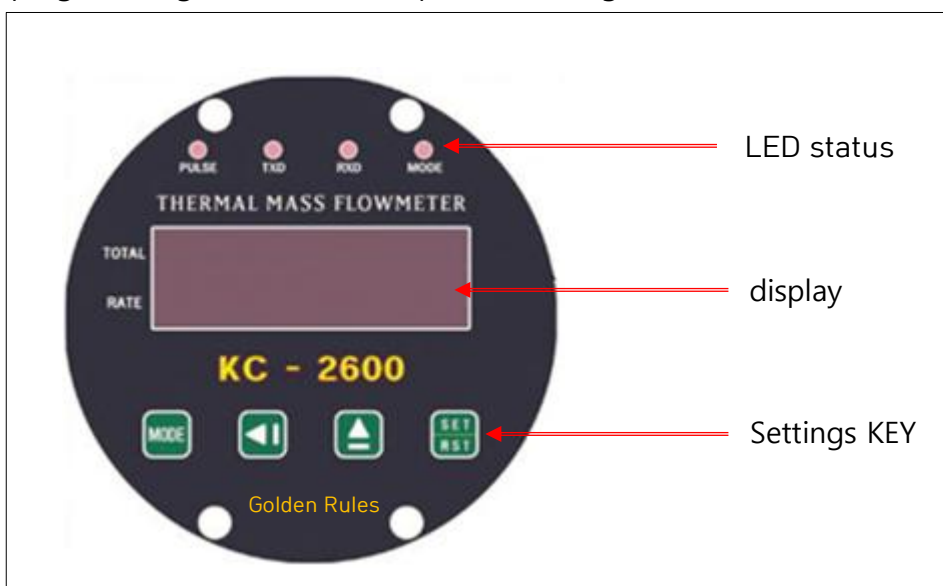


Figure 3-1. Smart Electronics DeviceLocations

How to Use Basic Specifications

The following basic input methods are described for this specification.

1) LED Status

PULSE: Lights when pulse output is ON

TXD: Data transmission LED for RS-485 communication

RXD: Data reception LED for RS-485 communication

MODE: Sensor error detection LED (LED blinks when an error is detected)

2) Setting Key

MODE: Changes the setting digit when setting a parameter

Left Arrow: Increases the value of the setting digit when setting a parameter

Up Arrow: Enters the setting mode or saves the setting value when setting a parameter

SET RST: Used as a Total Count Reset key in Normal mode

Thermal Mass Flow Meter(KC-2600Series)

3) Measurement Value Display Window

① Normal State

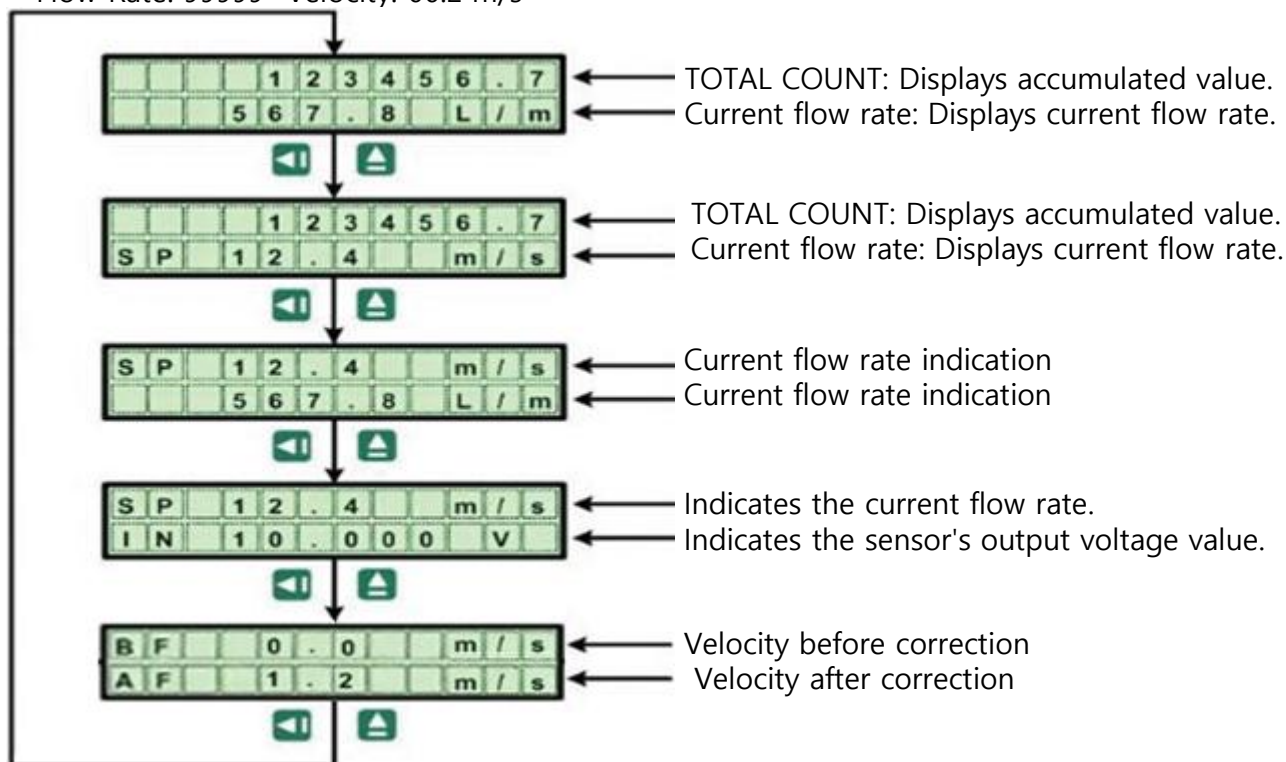
a. Press the key once to select and view the four display modes below.

b. Maximum Measurement Value

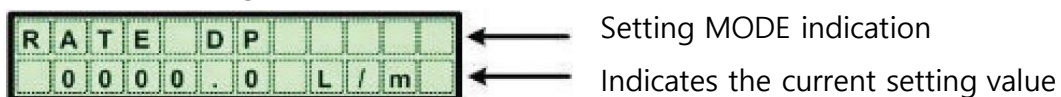
- TOTAL COUNT

- Accumulated Value: 4999999999

- Flow Rate: 99999- Velocity: 66.2 m/s



② PARAMETER Setting Status



4) TOTAL COUNT Accumulated Value Reset Method

1> RESET using the Front RESET Key

① In NORMAL mode, press the **SET RST** key for approximately 3 seconds. **CNT RESET→** will appear at the top of the LCD screen. Pressing the **SET RST** key again will reset the TOTAL COUNT accumulated value.

② The **CNT RESET→** message will appear for 3 seconds. Resetting is only possible when the **SET RST** key is pressed while this message is displayed.

2> RESET via RS-485 Communication

① Sending 1 to MOD-BUS ADDRESS 40016 resets the TOTAL COUNT accumulated value.

Thermal Mass Flow Meter(KC-2600Series)

How to Set Parameters

In NORMAL mode,   pressing the KEYS simultaneously will display the current firmware version. Opening the KEYS will allow you to set parameters.

NORMAL
condition

Set the flow
decimal point

Flow rate LOW
SCALE

Flow rate HIGH
SCALE

Set flow unit

Flow
compensation
factor

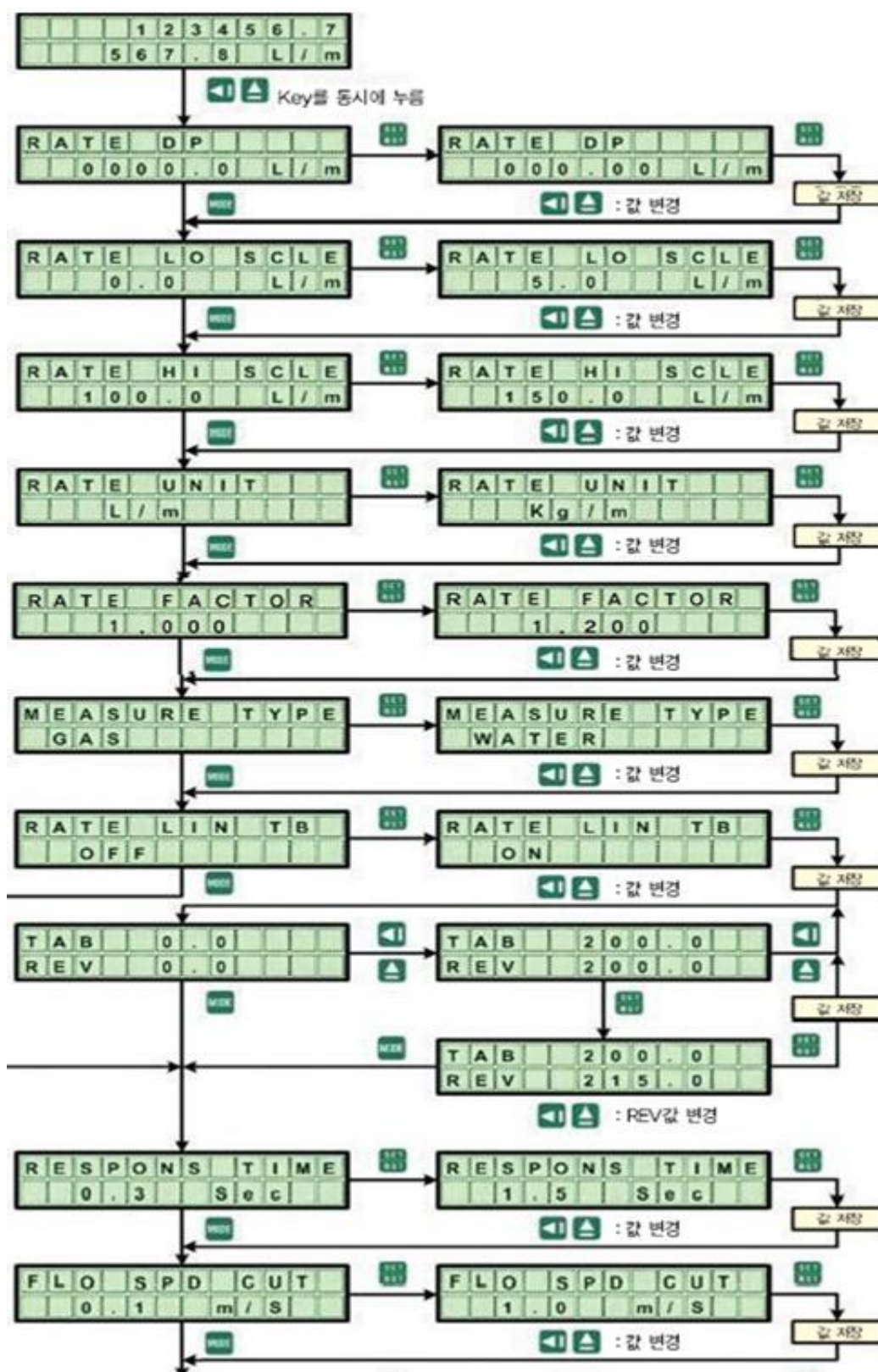
Fluid
Measurement
TYPE

Flow LINEAR
TABLE ON/OFF

Change the flow
rate LINEAR
TABLE value

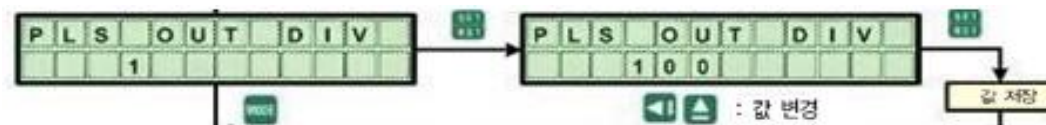
Response time
setting

Flow rate LOW
CUT

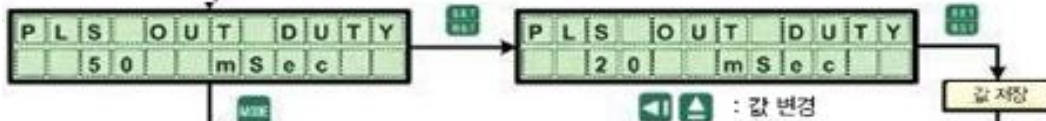


Thermal Mass Flow Meter(KC-2600Series)

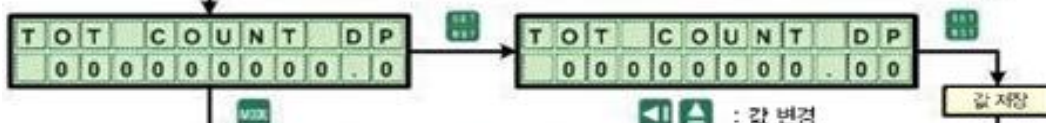
PULSE OUTPUT
DIVIDE Setting



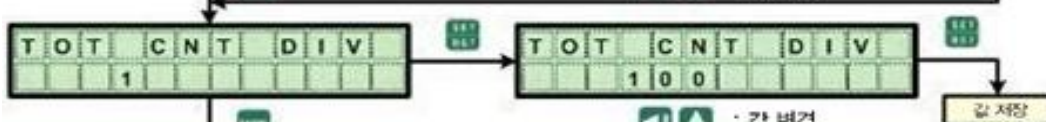
PULSE OUTP
UTDUTY Setting



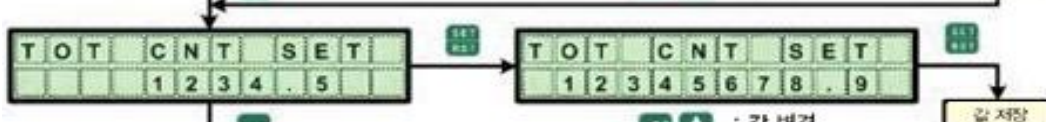
TOTAL COUNT
Accumulated Value
Decimal Point Setting



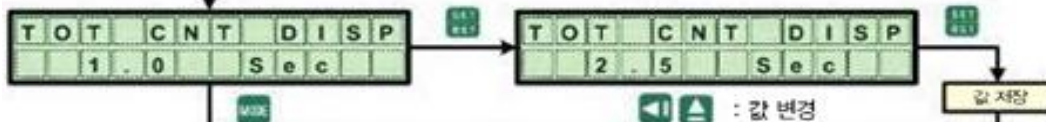
TOTAL COUNT
Accumulated Value Divide
Setting



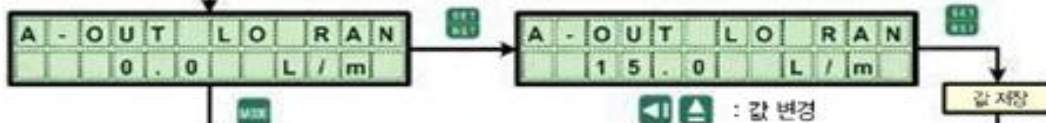
TOTAL COUNT
Accumulated Value
Setting



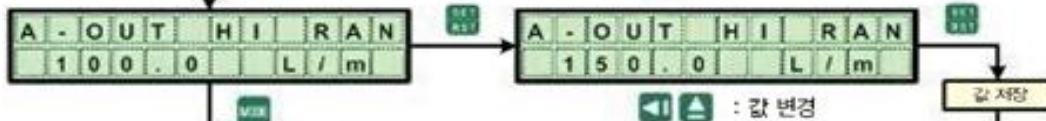
TOTAL COUNT
DISPLAY Speed Setting



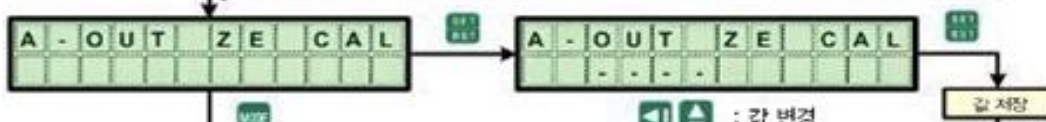
ANALOG OUT
LOW RANGE



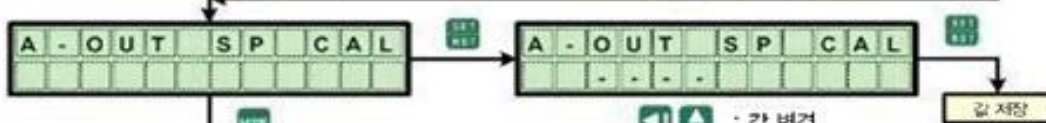
ANALOG OUT
HIGH RANGEAN



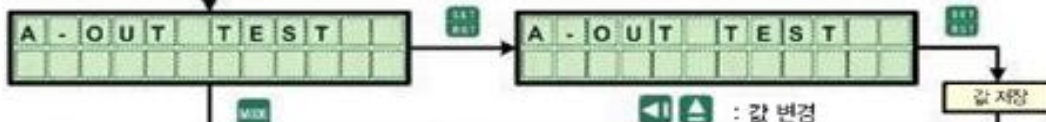
ALOG OUT
ZERO Calibration



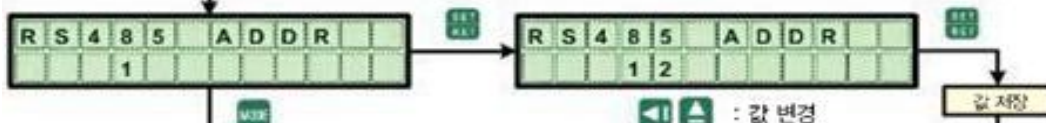
ANALOG OUT
SPAN Calibration



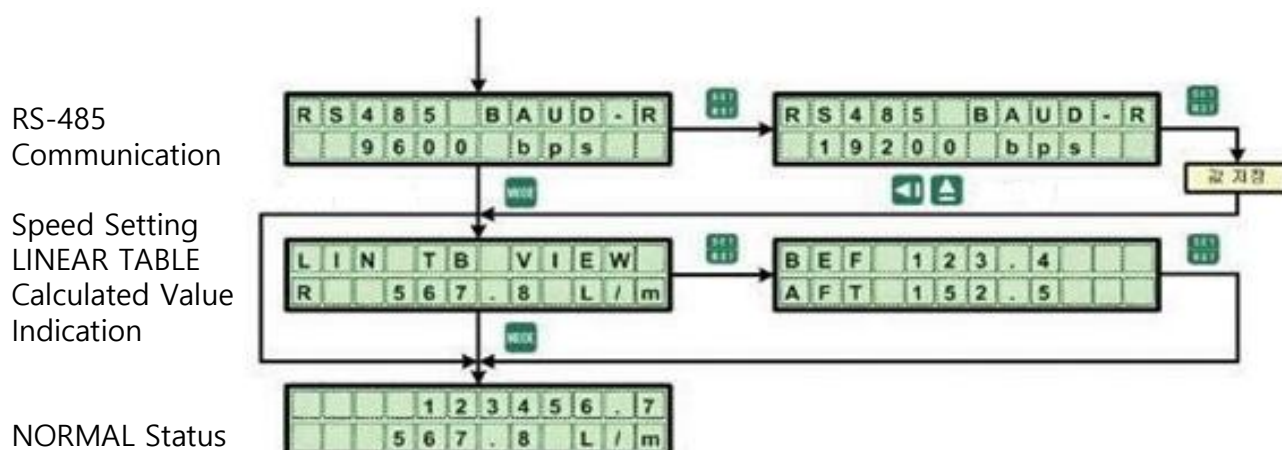
ANALOG OUT TESTR



S-485 ADDRESS



Thermal Mass Flow Meter(KC-2600Series)



▲ PARAMETER SETTING MODE DESCRIPTION

1) Flow Decimal Point

Description: Sets the decimal point position for the flow rate.

Setting Range (Selection/User Entry): 00.0 or 000 Factory Setting: 00.0

2) Flow Low Scale

Description: Sets the flow rate value at a flow rate of 0 m/s.

Setting Range (Selection/User Entry): 0.0 ~ 99999 Factory Setting: 0.0

3) Flow High Scale Description: Sets the flow rate value at a flow rate of 66.2 m/s.

Setting Range (Selection/User Entry): 0.0 ~ 99999 Factory Setting: 0.0

4) Flow Unit

Description: Sets the flow rate display unit. Setting range

(Selection/User entry): 0: Nm³/h, 1: Nm³/m, 2: Nm³/s, 3: kg/h, 4: kg/m, 5: kg/s, 6: NL/h, 7: NL/m, 8: NL/s, 9: Ncc/h, 10: Ncc/m, 11: Ncc/s, 12: m³/h, 13: m³/m, 14: m³/s, 15: L/h, 16: L/m, 17: L/s, 18: cc/h, 19: cc/m, 20: cc/s, 21: Nml/h, 22: Nml/m, 23: Nml/s, 24: mL/h, 25: mL/m, 26: mL/s, 27: Nm/h, 28: Nm/m, 29: Nm/s, 30: Ton/h, 31: Ton/m, 32: Ton/s

Factory setting: NL/m

5) Flow rate correction factor

Description: Enter the factor according to the fluid. See "Gasfactor" on page 11. Setting range (Selection/User entry): 0.001 ~ 9.999 Setting default: 1.0006

Description: Select GAS or Water.

Setting range (Selection/User entry): Gas, Water.

Factory setting: Gas.

Thermal Mass Flow Meter(KC-2600Series)

7) Flow Velocity Value Correction Mode Using Linear Table

Description: Set this mode to correct the flow velocity in the indicated area.

The factory default for Linear Table is OFF. When set to ON, the area can be divided into 1 m/sec increments and adjusted up to 30 m/sec.

8)Response Time

Description: Set the measurement response time.

Setting Range (Selection/User Entry): 0.2 ~ 19.9 sec

Factory Setting: 1.0 sec

9)Flow Velocity Low Cut

Description: This setting ignores flow velocities below the set value and treats them as 0 m/s. Setting

Range (Selection/User Entry): 0 ~ 66 m/s

Factory Setting: 0 m/s

10) Pulse Output Divide

Description: This setting outputs a pulse when the totalized value reaches the set value.

Setting Range (Selection/User Entry): 1, 10, 100, 1000Factory Setting: 1

11) ~ Pulse Output Duty

Description: This setting sets the high level hold width of the output pulse.

Setting Range (Selection/User Entry): 10 ~ 990 ms

Factory Setting: 50 ms

12) Totalization Decimal Point

Description: This setting sets the decimal point for the totalized value display. Setting

Range (Selection/User Entry): 00.0 or 000Factory Setting: 00.0

13) Totalization Divide

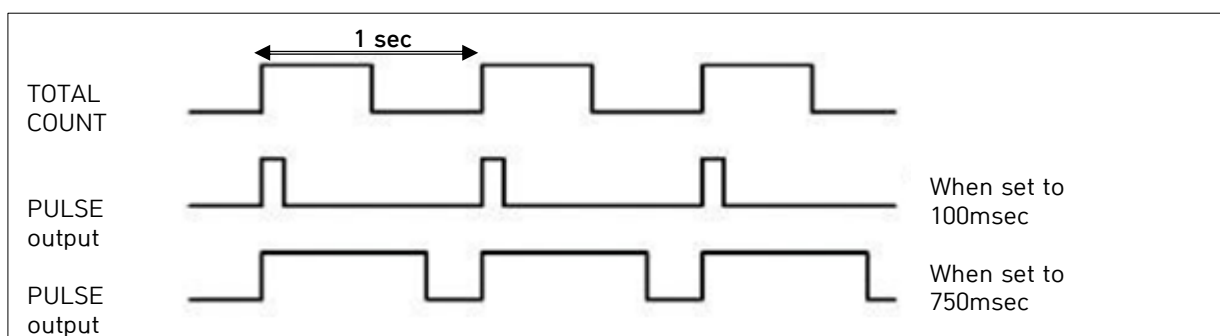
Description: This setting increases the totalization value by the flow rate / totalization divide.

Setting Range (Selection/User Entry): 1, 10, 100, 1000 (0~3)Factory Setting: 1

14) Totalization Value

Description: Sets the totalization value.

Setting Range (Selection/User Entry): 0 ~ 2,000,000,000Factory Setting:



Thermal Mass Flow Meter(KC-2600Series)

15) TOTAL COUNT DISP TIME Setting

Description: Sets the speed at which the totalized value is displayed.

Setting Range (Selection/User Entry): 0.1 ~ 99.9 sec Factory Setting: 1.0 sec

16) ANALOG OUT LOW RANGE Setting

Description: Sets the flow rate for a 4mA current output.

Setting Range (Selection/User Entry): 0.0 ~ 99999

Factory Setting: 0.017) ** ANALOG OUT HIGH RANGE Setting

Description: Sets the flow rate for a 20mA current output. Setting Range

(Selection/User Entry): 0.0 ~ 99999 Factory Setting: 150.0

18) ANALOG OUT ZERO Calibration

Description: Calibrates the 4mA current output.

19) ANALOG OUT SPAN Calibration

Description: Calibrates the 20mA current output. 20**) ANALOG OUT TEST MODE

Description: Tests the current output. 0% (4mA), 25% (8mA), 50% (12mA), 75% (16mA), 100% (20mA)

21) RS485 Address

Description: Sets the RS485 address. Setting Range (Selection/User Entry): 1 ~ 255

Factory Setting: 1

22) RS485 Baud Rate

Description: Sets the RS485 communication speed.

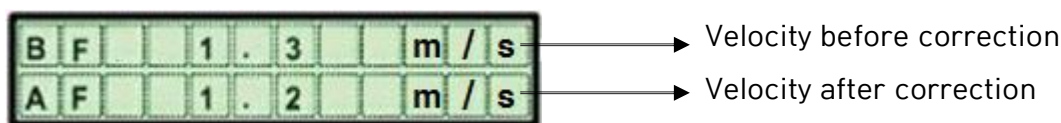
Setting Range (Selection/User Entry): 2400, 4800, 9600, 14400, 19200, 38400, 57600

Factory Setting: 9600 BPS

23) LINEAR TABLE Calculated Value Indication

Description: This indication is only displayed when LINEAR TABLE Compensation Mode (Item 7) is turned ON.

You can view the flow rate values before and after LINEAR TABLE compensation.



Thermal Mass Flow Meter(KC-2600Series)

❖ KC-2600 Series protocol Map

- * Interface: 2-Wire RS-485
- * Communication Speed: 240 ~ 57,600 bps
- * Communication Address: 1~255
- Data Length: 8 bits* Parity: None parity
- Stop bit: 1 stop bit
- Protocol: Mod-Bus RTU Slave Protocol
- FORMAT

- 1) Command 03 : Read holding registers
- 2) Command 04 : Read input register
- 3) Command 06 : Write single register
- 4) Command 16 : Write multiple register

1. Read holding Registers (command 03)

This command reads the KC-2600's settings.

Request :

<KC-2600 Address> <Command code = 03> <Register start address high>
 <Register start address low> <Register count high> <Register count low> <CRC high>
 <CRC low>

Response :

<KC-2600 Address> <Command code = 03> <Byte count> <Data high> <Data low>
 <Data high> <Data low> <CRC high> <CRC low>

Example :

Requesting only one data register starting from address 0x0000.

Request

<0x01> <0x03> <0x00> <0x00> <0x00> <0x01> <0x0a> <0x84>

Response

<0x01> <0x03> <0x02> <xx> <xx> <CRC high> <CRC low>

Thermal Mass Flow Meter(KC-2600Series)

Register Address	Modbus Address	explanation	note
0x00	40001	Flow rate decimal point	0 : 00. , 1 : 0.0
0x01	40002	Flow unit	See menu
0x02	40003	Measurement type	0 : Gas, 1 : Water
0x03	40004	Flow Cut	Just divide by 10.
0x04	40005	Response time	Just divide by 10.
0x05	40006	Pulse Divide	
0x06	40007	Pulse Duty	
0x07	40008	Cumulative value decimal point	
0x08	40009	Cumulative Divide	0 : 0.01, 1 : 0.1, 2 : 1, 3 : 10, 4 : 100, 5 : 1000
0x0b	40012	Cumulative value display speed	Just divide by 10.
0x0c	40013	RS485 Address	
0x0d	40014	RS485 communication speed	

2. Read input register (command 04)

This is a command to read the measurement values of KC-2600..

Request :

<KC-2600 Address> <Command code = 04> <Register start address high>
<Register start address low> <Register count high> <Register count low> <CRC high> <CRC low>

Response :

<KC-2600 Address> <Command code = 04> <Byte count> <Data high> <Data low>
<Data high> <Data low> <CRC high> <CRC low>

Register Address	Modbus Address	explanation	note
0x00 & 0x01	30001 & 30002	Flow rate value	It is a value with one decimal place. It uses 2Ward and is (the value of 30001 X 65536) + 30000.
0x02	30003	Flow unit	See menu
0x03	30004	Flow rate	The value is in one decimal place. The unit is m/s.
0x04 & 0x05	30005 & 30006	Accumulated value	If the value of 30007 is 1, divide it by 10.
0x06	30007	Accumulated value hydrogen point digit	The range is 0 or 1 (0: no decimal point, 1: 1 decimal place)

Thermal Mass Flow Meter(KC-2600Series)

3. Write single register (command 06)

This command writes the KC-2600's single register settings.

Request :

<KC-2600 Address> <Command code = 06> <Register address high>
<Register address low> <Register data high> <Register data low> <CRC
high> <CRC low>

Response :

<KC-2600 Address> <Command code = 06> <Register address high>
<Register address low> <Register high data> <Register low data> <CRC
high> <CRC low>

Register Address	Modbus Address	explanation	note
0x00	40001	Flow rate decimal point	0 : 00. , 1 : 0.0
0x01	40002	Flow unit	See menu
0x02	40003	Measurement type	0 : Gas, 1 : Water
0x03	40004	Flow Cut	Send the value multiplied by 10.
0x04	40005	Response time	Send the value multiplied by 10.
0x05	40006	Pulse Divide	0 : 1, 1 : 10, 2 : 100, 3 : 1000
0x06	40007	Pulse Duty	10 ~ 9999ms and set to 10ms step
0x07	40008	Cumulative value decimal point	0 : 00. , 1 : 0.0
0x08	40009	Cumulative Divide	0 : 0.01, 1 : 0.1, 2 : 1, 3 : 10, 4 : 100, 5 : 1000
0x0b	40012	Cumulative value display speed	Send the value multiplied by 10.
0x0c	40013	RS485 Address	1 ~ 255
0x0d	40014	RS485 communication speed	0 : 2400bps, 1 : 4800bps, 2 : 9600bps, 3 : 19200bps, 4 : 38400bps, 5 : 57600bps
0x0f	40016	Total count Reset	1 : Reset

Thermal Mass Flow Meter(KC-2600Series)

4. Write multiple register (command 16)

This is a command that writes the multiple register settings of KC-2600.

Request :

<KC-2600 Address> <Command code = 16> <Register start address high>
<Register start address low> <Register count high = 0x00> <Register count low = 0x02>
<data byte size = 0x04> <High register high data> <High register Low data>
<Low register high data> <Low register Low data> <CRC high> <CRC low>

Response :

<KC-2600 Address> <Command code = 16> <Register start address high>
<Register start address low> <Register count high = 0x00> <Register count low = 0x02>
<data byte size = 0x04> <High register high data> <High register Low data>
<Low register high data> <Low register Low data> <CRC high> <CRC low>

Register Address	Modbus Address	explanation	note
0x10 & 0x11	40017 & 40018	Flow rate Low Scale	Enter only integer values.
0x12 & 0x13	40019 & 40020	Flow rate High Scale	
0x14 & 0x15	40021 & 40022	Current Output Low Range	
0x16 & 0x17	40023 & 40024	Current Output High Range	
0x18 & 0x19	40025 & 40026	Accumulated value	

Thermal mass flow meter (KC-2600 series) field current (4-20mA) adjustment method

1. Press the MODE + UP + SET keys simultaneously.
2. Press the SHIFT key twice and the UP key once. The password will be 10. Then, press the SET key.
3. Press the MODE key until the A-OUT ZE CAL menu appears, then press SET.
4. Use the SHIFT and UP keys to accurately set the output to 4mA.
5. The A-OUT SP CAL adjusts the output to 20mA. If this is incorrect, correct it using the same method as above.
6. When A-OUT TEST appears on the screen, press the SET key and then the UP key to confirm that the output is 4mA at 0%, 8mA at 25%, 12mA at 50%, 16mA at 75%, and 20mA at 100%.
7. Press the MODE key until MODE END appears, then press SET to exit the settings.

Chapter 4: Diagnosis and After-Sales Service of Failures

Flow Meter Troubleshooting

Troubleshooting begins with the following simple checks:

1. Verify that the current voltage and polarity are correct for the flow meter.
2. Refer to Chapter 2 to verify the correct wiring.
3. Check the distances before and after the flow meter and the pipe diameter.
4. Verify that the sensor is aligned with the pipe.
5. Ensure that the measuring line is free of leaks.
6. After checking the above, refer to the following troubleshooting instructions and, if necessary, contact the factory.

Symptoms	Possible causes	action
The flow rate readings are incorrect or fluctuate significantly.	abnormal flow	See Installation Conditions in Chapter 2
	The diameter of the front and rear pipes of the sensor is smaller than the required specifications.	
	The insert sensor is not firmly attached.	Secure the sensor firmly in a vibration-free location
	Damage to the sensor components	Exchange or factory repair
	Electronic department malfunction	
	poor grounding	See Chapter 2 Finals
	Gas contains moisture	Install a moisture remover or filter at the front end of the sensor
The measurement is too high or too low	The sensor is not installed in the correct direction of fluid flow.	Install the sensor with the monitor facing forward.
	The sensor was not inserted at the correct depth.	Adjust the measurement point so that it is centered on the pipe.
No response from the sensor	The power is off.	Turn on the power
	The low-speed removal value was set too high (FLO SPD CUT 0.7 m/s)	Reset the low-speed removal function correctly (0.3 m/s)
	Exceeds the low flow measurement limit below the instrument's minimum measurement range	Reset the user-defined rangeExpand the pipe below the maximum measuring range on the instrument nameplate or contact the factory
Pulse output does not work	Relay coil current capacity is insufficient	Relay coil current must be within 25mA.
	Twist of the instrument's exterior	Relocation of installation to another location
	Severe eddy currents	Install a blower, idle mixer, or valve away from the instrument
Sensor failure	Sensor failure	Check for faultsRH - GND $\pm$ 48 Ω RS - GND $\pm$ 1,280 Ω

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goldenrules2014@naver.com

A-1805, Songdo Mirae-ro 30, Yeonsu-gu, Incheon (Songdo Smart Valley)

GOLDEN RULES Co.,Ltd