Instruction manual

Smart Thermal
Mass Flow Meter

TYPE : 3000S Series

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Warnings and Cautions

Warning! Agency approval for hazardous location installations varies between flow meter models. For specific details on the approval of the flow meter, refer to the name plate before installing it in a hazardous area.

Warning! Hot tap must be performed by a trained professional. The hot tap maker should specify that it should be installed by a skilled technician and should not be held responsible if such requirement is not observed.

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 and KS directives.

Warning! Remove the pressure on the line before repairing the flow meter.

Warning! Turn power off before disassembling any component of the 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. Adjustment on the electronic part may directly influence flow control setting parameters.

Caution! All flow meter connections, isolation valves and fittings for hot tap 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. Recalibrate the flow meter after changing the length of the cable or replacing the cable.

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
- Keep any electronic board not related to the flow meter away from the flow meter.
- when possible, use grounded electrostatic discharge wrist straps when handling sensitive components

Caution! Before connecting a signal from the flow meter to outside, read pages 17, 18, 19 and 20 carefully and make connection to the right terminal suitable for the site condition.

Chapter 1. Introduction

Series 3000S Smart-IN™ Mass Flow Meters

ientek's Series 3000S Smart Insertion Mass Flow Meter provides a reliable solution for gas flow measurement applications. This model is widely used to measure gas flow for sensitivity to low flow, fast response speed and outstanding measurement range. For stable and reliable measurement of mass flow, the thermal mass sensor automatically compensates for changes in the temperature and pressure of gas without using a separate temperature and pressure transducer.

The multi-function microprocessor-based converter is designed to recognize the function of flow range adjustment, instrument verification and fault diagnosis in both integrated and separate types.

Mass flow rate and totalized flow, as well as other configuration variables are displayed on the meter's optional 2 x 16 LCD display.

The 3000 series is 2 alarm output, voltage and electric current. The programmable transmitter is easily configured via RS-232 and ientek's Smart Interface software or through three push buttons built into the device.

The 3000S series is designed to be inserted in a duct or pipe ranging from 3 to 72 inches.

The 3000S series mass flow meter features accurate flow measurement and convenience with easy installation, quick setup, long-term reliability and wide measurement range.

Using This Manual

This manual provides information needed to install and operate the Smart Insertion mass flow meter.

The five chapters of this manual cover these areas :

- Chapter 1 includes the introduction and product description
- Chapter 2 provides installation and wiring instructions
- Chapter 3 describes system operation and programming
- Chapter 4 3400 Series Stack flow meter
- Chapter 5 covers troubleshooting and repair

For product specifications, please refer to the catalog.

Note and Safety Information

We use alarm signs to arouse attention on important information.

Warning!

This reference represent very important information for prevention to damage of item and human life.

Caution!

This reference represent very important information for protection of performance and item.

Reference!

This reference represent for inform to important detail data.

Receipt of System Components

When receiving a ientek mass flow meter, carefully check the outside packing carton for damage incurred in shipment.

If the carton is damaged, notify the local carrier and submit a report to the factory or distributor.

Remove the packing slip and check that all ordered components are present. Make sure any spare. parts or accessories are not discarded with the packing material.

Consult Ientek before returning the product.

Technical Assistance

If any problem arises with the flow meter, check each step of installation and operation and confirm that you set and adjusted the flow meter according to the guideline of the manufacturer.

For detail information and actions, refer to Chapter 5. Fault Diagnosis of the instruction manual.

If the problem persists in spite of the fault diagnosis procedure in Chapter 5, consult ientek by fax or email (see our website) or call +82-02-2107-7997 from 9AM till 6PM.

When contacting Technical Support, make sure to include this information :

- The flow range, serial number and ientek order number (All marked on the meter nameplate)
- The software version (Visible at start up)
- The problem you are encountering and any corrective action taken
- Application information (Fluid, Pressure, Temperature and piping configuration)

The Series 3000S Flow Sensing Principle

We guarantee outstanding accuracy, robustness and reliability of Ientek industrial flow meter. The mass flow meter consists of two sensing parts; a flow speed sensor and a temperature sensor that automatically compensates for changes in gas temperature.

When power is applied to the flow meter, the transducer electronics heats the velocity sensor to a constant temperature differential above the gas temperature and measures the cooling effect of the gas flow.

The EMF required for maintaining mutual temperature difference is proportional to mass flow.

Both sensors are reference-grade platinum resistance temperature detectors (RTDs).

The wire of the platinum RTD is wound on a ceramic column for robustness and stability and the flow sensors are molded and solidly sealed inside a SS316 cover.

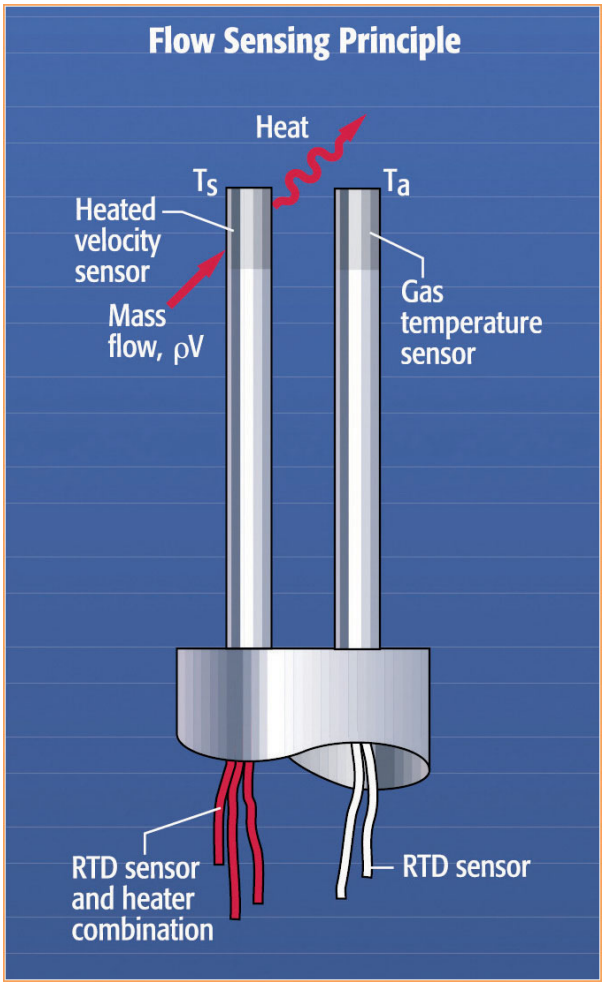


Figure 1-1. ientek 3000S Sensor Assembly

Smart Electronics Function

Instrument Verification

Two simple tests are prepared to check your smart mass flow meter on the site.
The first test functionally checks the electronic part and the microprocessor and confirms that the system provides display and output according to input.
The second test verifies that there has been no error or drift from the actual calibration value in the original sensing element of the instrument and compares the calibration data given to the flow meter from the flow sensors and the resistance measurement of the temperature sensor.
Together, these tests confirm that your meter is working correctly and the calibration variables did not drift, shift or change values.

User Full Scale Flow Rate

Field-configure from 40% to 80% of the factory full scale setting (factory full scale is normally set to 125% of the user-specified maximum flow rate). This adjustment can be made for each flow range.

Alarms

Program high and low or window alarm limits independently for each flow range.
The terminal contacts are isolated with one common.

K-Factor Correction

Change the calibration correction factor to compensate for flow profile disturbances or specific application conditions.
The K-factor is a multiplication factor applied to the linear zed flow signal. You may set the K-factor individually for each flow range.

Output Signals

The smart flow meter provides two separate outputs of 0-10V and 4-20mA proportional to flow.
The 4-20mA output can be loop-powered by the flow meter or externally powered for isolation.

Totalize

With the optional LCD display, actual mass flow appears on line 1 and the totalized flow on line 2 both in the user-specified engineering units. The totalize counts only the selected range and when ranges are switched, the value of the non-selected range is stored in memory.
The buttons on the equipment are used to reset added value.

Zero and Span Outputs

Validate and adjust the settings to ensure output circuits are correct.

Time Response Delay

You select a slow response time for smooth output or a fast response for rapid reading.

Case Options

Flow meter electronics are available mounted directly to the flow body, or remotely mounted up to 200 feet (60 meters) away. The two types of cases for the electronic part are available; one for general purpose and the other for hazardous areas.

The 3000 series consists of an insert type model 3100 and an inline type model 3200. If the last two digits are 10, the case is for general purpose NEMA 4X (IP65) class, and if they are 20, the case is for hazardous areas.

Display

Display selection is shown by 2x16 text screen for mass flow rate and added value.

For site operation and parameter configuration, you can manipulate the instrument by pressing the push buttons under the display or from a PC connected with a RS-232 cable.

For manipulation by RS-232 communication, refer to the smart interface software manual as follows.

The smart electronic part contains non-volatile memory that stores the data of all parameter variables. The memory allows the instrument to function properly as soon as it is powered up.

Smart Interface Software

ientek's Smart Interface Windows™-based software is available for connecting your PC directly to the mass flow meter. An RS-232 serial cable and a CD containing the program and system file are supplied by the manufacturer.

See the Smart Interface User Guide included with the software for operating instructions.

Chapter 2. Installation and connection

Installation Overview

The 3000S series flow meter was calibrated in the factory according to the pipe size and flow speed specified on the calibration test report.
On the calibration test report, the flow speed at a specific point in the pipe is calculated and indicated for the judgment of accurate insertion length.
The position of installation should be at the center of the pipe in principle.
(If the actual pipe size is different from that of calibration, request the manufacturer for recalibration.)

Warning!
Approval on installation in hazardous areas is various according to the flow meter model. Consult the flow meter nameplate for specific flow meter approvals before any hazardous location installation.

Precautions on flow meter installation

1. Line pressure and temperature will not exceed the flow meter rating.
   Temperature should not deviate more than 100℃(200°F) from the calibrated value.
   If pressure deviates 50 PSIG (3.4 bar) or more from the calibrated value, accuracy in flow measurement may be lost.
2. Secure the required length of a straight pipe at the upper and lower stream of the sensor. (Figure 2-1 reference)
3. Select a location which is safe and easy to access and clean the surrounding. Make sure that gas is clean and dry and coincides with the gas calibrated with.
4. When using a CE, KS or EEx approved flow meter, verify that the cable entry into the instrument meets the specific standard required for that approval.
5. Check that the length of the cable provided is sufficient to cover the distance between the sensor and the transmitter case. (Do not extend or cut short the cable provided.)

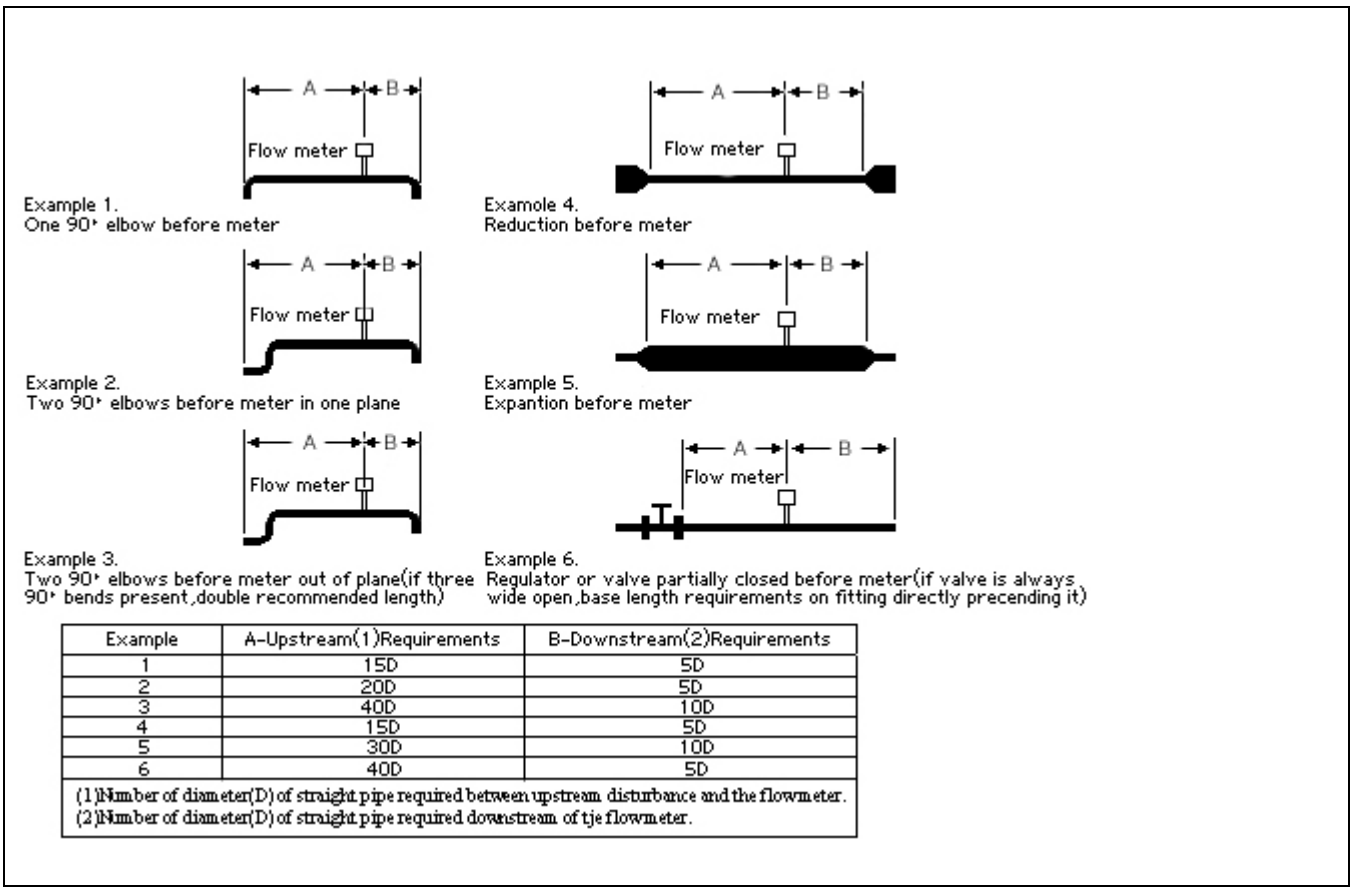
Check the instrument to prevent abnormality as follows before installation.

- Leaks
- Valves or restrictions in the flow path that could create disturbances in the flow profile that might cause unexpected flow rate indications.
- Heaters that might cause rapid excursions in the measured temperature.

Requirements for smooth flow

Select a location where obstruction to flow is minimized. Valves, elbows, control valves and other piping components may cause flow disturbances.

Check piping on the site as shown in the drawing below. In order to accurate and repeatable performance, secure the recommended length of a straight pipe at the upper and lower stream of the sensor.



Example	A-Upstream(1)Requirements	B-Downstream(2)Requirements
1	15D	5D
2	20D	5D
3	40D	10D
4	15D	5D
5	30D	10D
6	40D	5D

(1)Number of diameter(D) of straight pipe required between upstream disturbance and the flowmeter.
(2)Number of diameter(D) of straight pipe required downstream of tje flowmeter.

Figure 2-1. Recommended Pipe Length Requirements for Installation

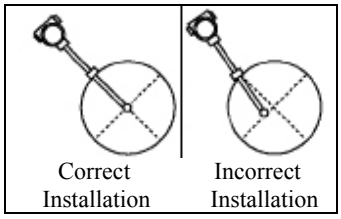
Installing the Flow Meter

When setting the direction of flow, refer to the direction mark on the probe. Make sure that the meter is installed in such a way the mark faces the downstream direction. If you install it the other way, you cannot secure flow measurement accuracy.

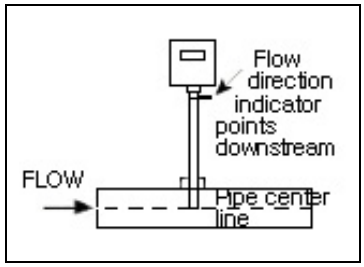
Insertion Type(General type) Installation Method

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 flow meter.

1. Confirm that the installation site meets the minimum upstream and downstream pipe diameter requirements shown in Figure 2-1.
2. Turn off the flow of process gas. Verify that the line is not pressurized.
3. To open a tap or a hole on the pipe, use a sharp cutting tool and a cutting torch.
   The pipe opening must be at least 0.78 inches in diameter.
   (If you attempt to insert the probe into too small a hole by force, the sensor may be damaged.)



4. Smoothen the neighborhood of the hole. If the area of the hole is left rough, the accuracy of the flow meter may be affected and stream of flow may be distorted.
   Also, obstructions could damage the sensor assembly when inserting into the pipe.
5. Mount the compression or flange fitting on the pipe. Such a connection should be within ±5° variation as shown in the right-hand side drawing.
6. Tighten the fitting after installation. Check pressure at the connecting part. If there is pressure loss or leakage, check the connecting part and re-install the probe.
7. Insert the sensor probe through the compression or flange fitting into the pipe. The correct insertion depth places the sensor at the pipe's centerline. Do not force into the pipe.



8. Set the flow direction mark face downstream and arrange it to be parallel with the direction of piping.
9. Tighten the fitting to lock the flow meter in position.
   (If you tighten the compression fitting without using Teflon tape, you cannot reuse the compression ring and thus cannot readjust the position.)

Insertion Type (Hot tap) Installation Method

When selecting the position to insert the flow meter, refer to the direction the direction mark indicates and set it to face downstream. If you install it the other way, flow measurement will be inaccurate. Low pressure hot taps cannot exceed 100 psig (7 barg) maximum.

High pressure hot taps cannot exceed 1000 psig (70 barg) maximum.

Before you perform the following procedure, make sure that pressure in the pipe does not exceed such a range.

Warning!
Hot tap must be performed by a trained professional.

1. Confirm that the installation site meets the minimum upstream and downstream pipe diameter requirements shown in Figure 2-1.
2. Calculate the flow meter insertion depth as shown in Figure 2-2 for a low pressure tap or Figure 2-3 for a high pressure tap.
3. Weld the process connection on the pipe.
   Make sure the process connection is within ± 5° perpendicular to the pipe centerline (see ten page).
   The pipe opening must be at least 0.88 inches (22 mm) in diameter.
4. Bolt an isolation valve on the process connection. The valve's full open bore must be at least 0.88 inches (22 mm) in diameter.
5. Hot tap the pipe.
6. Close the isolation valve. Run a static pressure.
   Check pressure at the connecting part. If there is pressure loss or leakage, check the connecting part and re-install the probe.
7. Insert the sensor probe through the isolation valve into the pipe with the flow direction indicator parallel to the pipe pointing downstream in the direction of flow.
   Insert it into the center line of the pipe.
   Do not apply excessive force into the pipe.
8. Tighten the fittings to lock the flow meter in position.

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

< Calculating Insertion Depth for a Low Pressure Hot Tap >

Variables
L = Nominal probe length
D = Pipe O.D.
C = Pipe 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.)

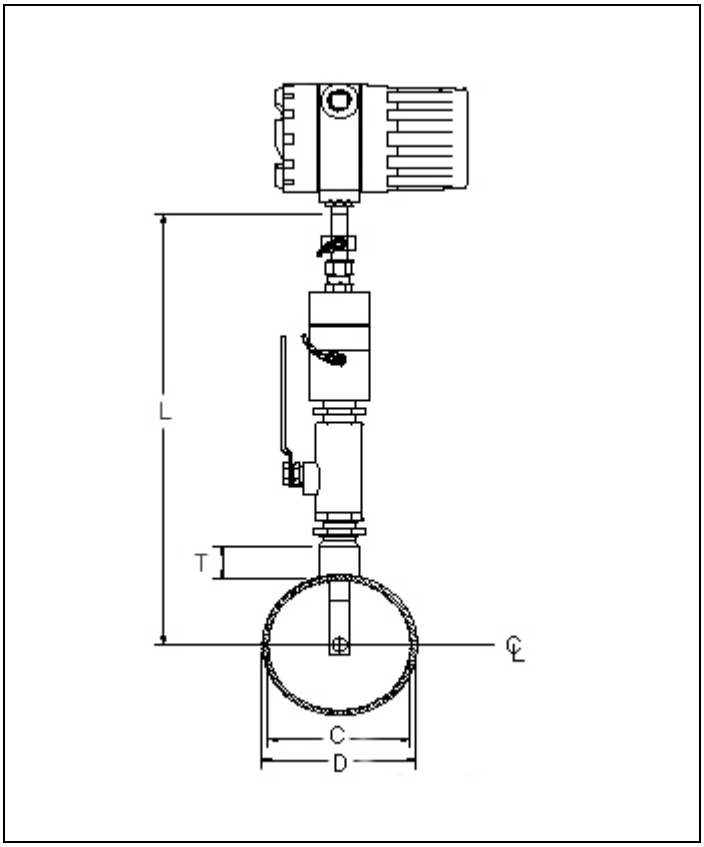


Figure 2-2. Low Pressure Hot Tap Insertion Depth

< Calculating Insertion Depth for a High Pressure Hot Tap >

Variables
S = Distance from face of mounting flange to outside of duct
D = Pipe O.D.
P = Minimum probe length
T = Minimum probe length
R = Allowable probe length
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 – [actual probe length – S – (D/2)] (must be greater than or equal to T)
4) IN = (actual probe length + 2) – (5.5 + S + D/2)
5) RE = IN + T
(All dimensions in inches.)

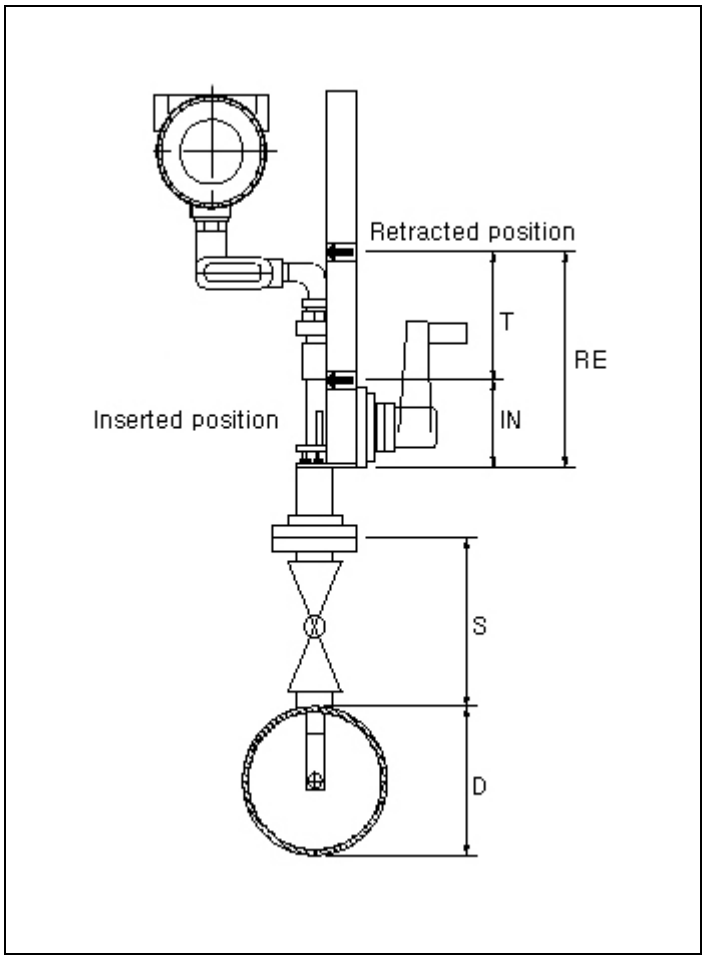


Figure 2-3. High Pressure Hot Tap Insertion Depth

Wiring Connections

In NEMA 4X type case of the 3000 series, use TB2 for connection to power supply and signal and TB1 for connection to the sensor.
(Terminal numbers are shown on label attached to the inside of the cover.)

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.
Otherwise, injury or death may result. In any connection to power supply, you must observe electric safety regulations.

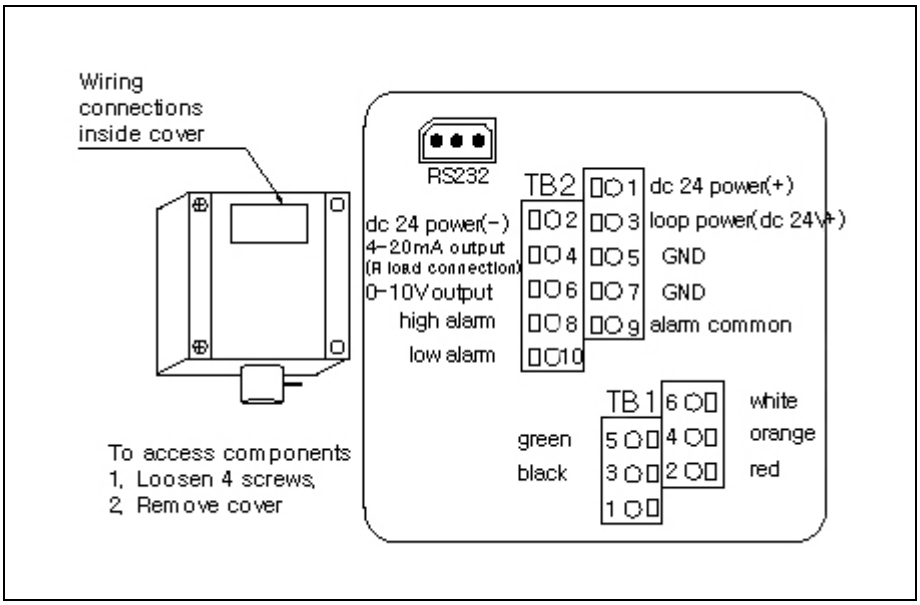


Figure 2-4. Wiring Access 3110S Enclosures

For connection to the EEx type case of the 3000 series, use the terminal block located on the rear side of the case. (Terminal numbers are shown on label attached to the inside of the cover.) In order to observe all electric safety regulations, follow the method of AC connection described on next page.

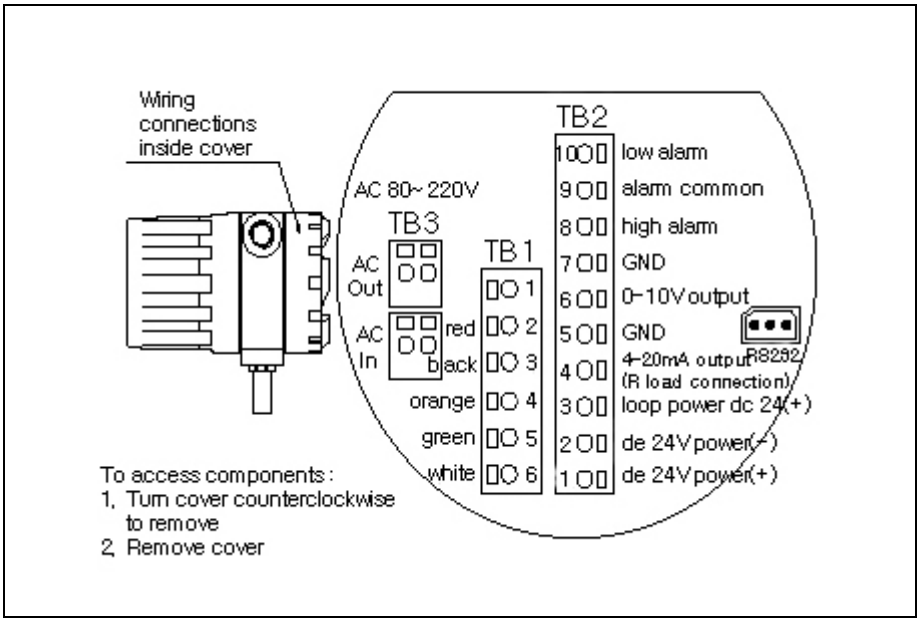


Figure 2-5. Wiring Access Hazardous-Area Enclosures (EEx Type)

AC Power Wiring Method

The AC power wire size must be 26 to 16 AWG with the wire stripped 1/4 inch (6 mm). Connect 240 VAC (1000 mA load, maximum) to the Neutral and Line terminals on the small, two-position terminal block. Connect the ground wire to the safety ground lug.
Torque all connections to 4.43 to 5.31 in-lbs (0.5 to 0.6 Nm).

To eliminate the possibility of noise interference use a separate cable entry for the AC power and signal lines.

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

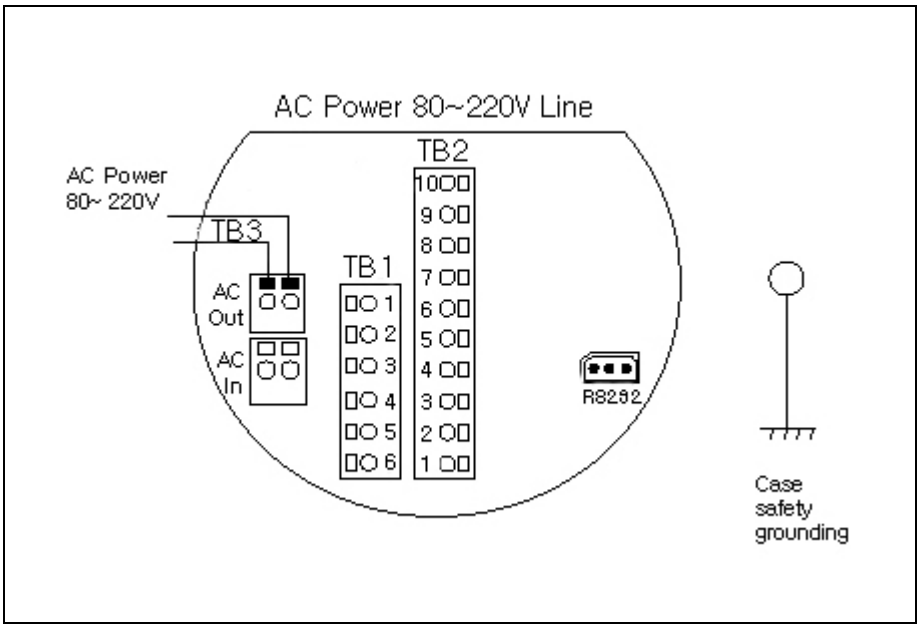


Figure 2-6. AC Input Power Connections (EEx Type)

DC Power Wiring Method

The DC power wire size must be 26 to 16 AWG with the wire stripped 가
1/4 inch (6 mm). Connect 24 VDC (625 mA load, maximum) to the terminals marked DC POWER(+) and DC POWER(–) on the terminal block. Torque all connections to 4.43 to 5.31 in-lbs (0.5 to 0.6 Nm).

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

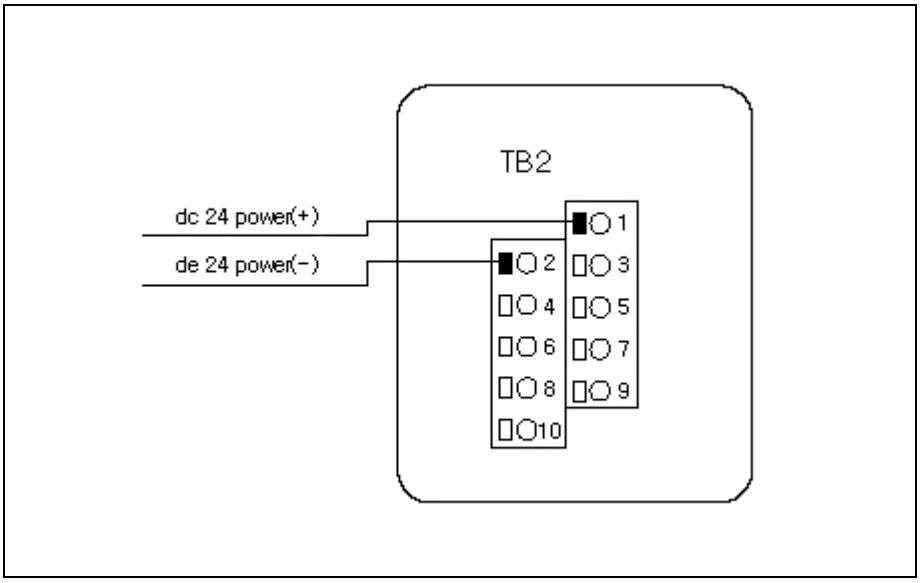


Figure 2-7. DC Input Power Connections (NEMA 4X Type)

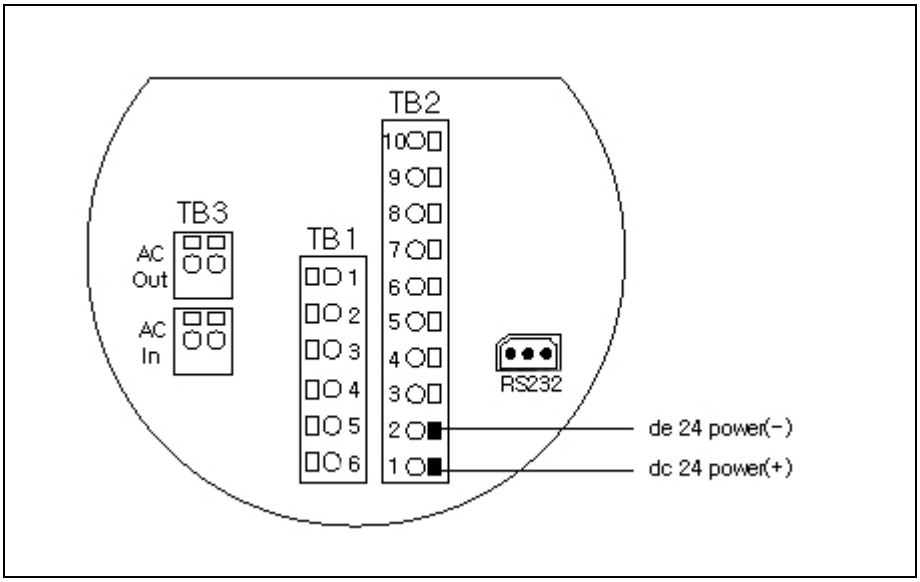


Figure 2-8. DC Input Power Connections (EEx Type)

Output Signal Wiring Method

Output signal cable should be completely screened with a 100% shield.

You must use metal cable glands that provide cable screen clamping.

The cable screen should be connected to the gland and shielded at both ends over 360 degrees.

This shield should be connected to ground finally.

In all 3000S series, select a calibrated 0-10 VDC or a calibrated 4-20mA output signal.

This linear output signal represents 0-100% of the user flow range of the meter.

DC Output Wiring

The 0-10 VDC signal can drive a minimum load of 1000 Ohms.

For 0-10 VDC connections, connect to the terminals marked Vout (+) and Vout (–) as shown below.

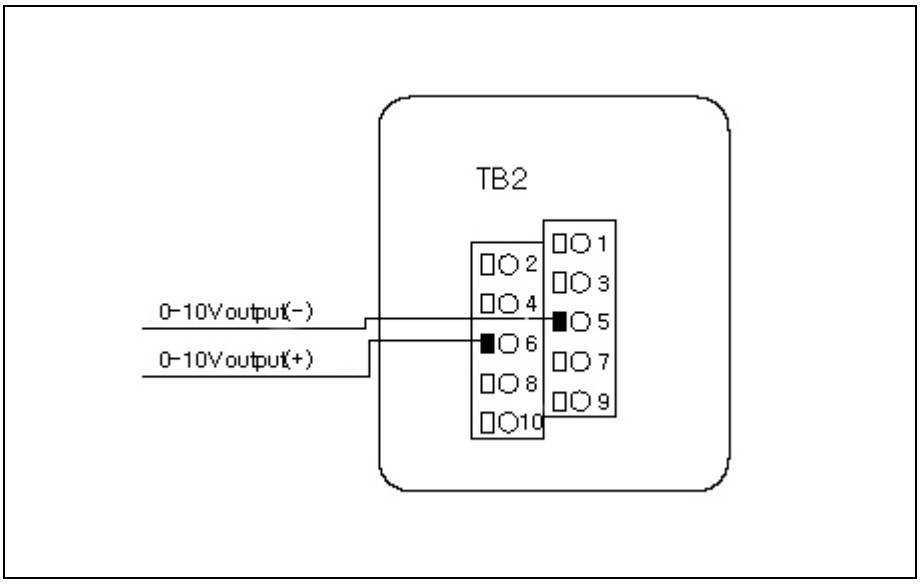


Figure 2-9. DC Output Signal Connections (NEMA 4X Type)

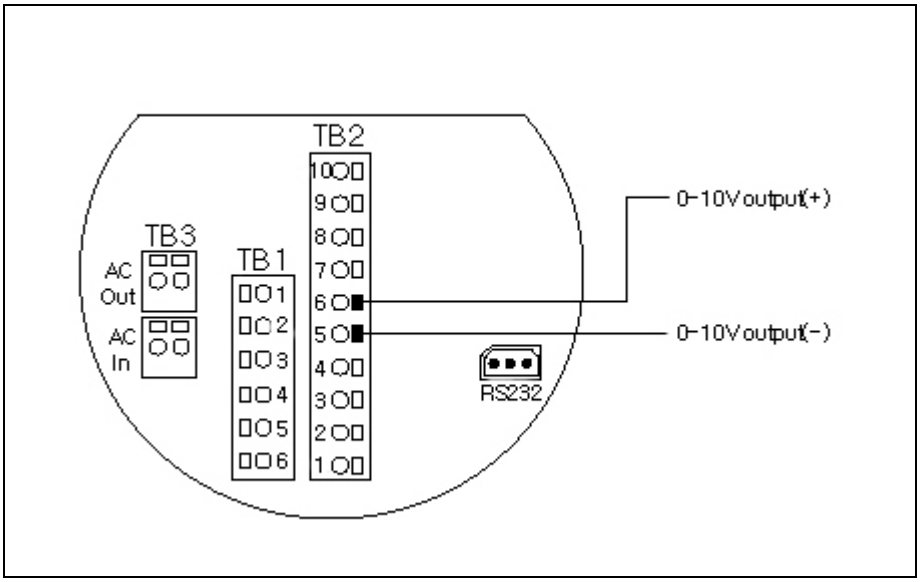


Figure 2-10. DC Output Signal Connections (EEx Type)

4-20 mA Output Wiring

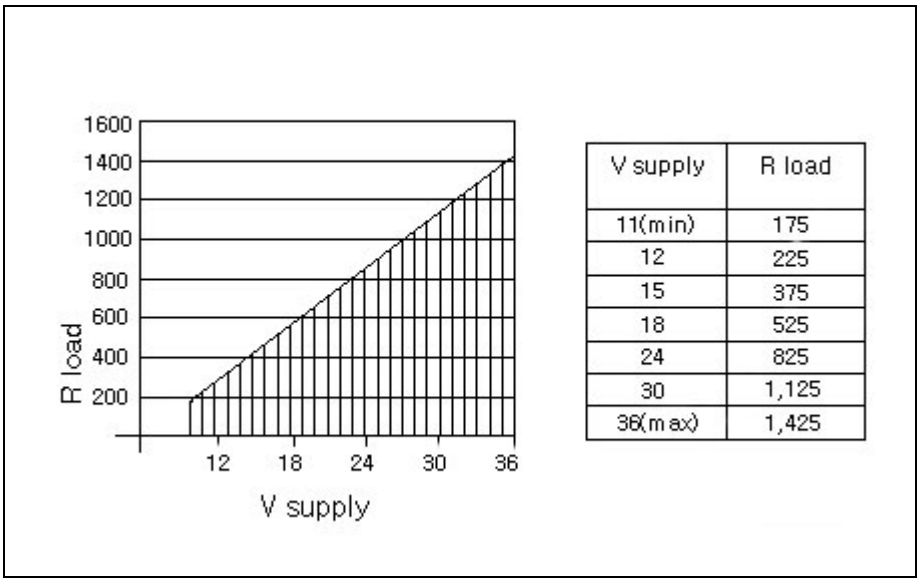
The 4-20 mA current loop output can be self-powered (non-isolated) or externally powered (isolated). To use the 4-20 mA isolated output, an external 24VDC ±10% power supply is required. With regard to the two types of current loop outputs, the maximum loop resistance (load) is as per Figure 2-11.

R_{load} is the total resistance in the loop, including the wiring resistance.

To calculate R_{max}, the maximum R_{load} for the loop, use the maximum loop current, 20 mA. The voltage drop in the loop due to resistance is 20 mA times R_{load} and this drop is subtracted from the input voltage.

Thus: R_{max} the maximum load resistance = 50 * (V_{supply} – 7.5V)

In order to use external power for isolated 4-20mA output, make connection as shown in Figure 2-12 and 2-14. For non-isolated 4-20mA output, make connection as shown in Figure 2-13 and 2-15.



V supply	R load
11(min)	175
12	225
15	375
18	525
24	825
30	1,125
36(max)	1,425

Figure 2-11. Load Resistance Versus Input Volta

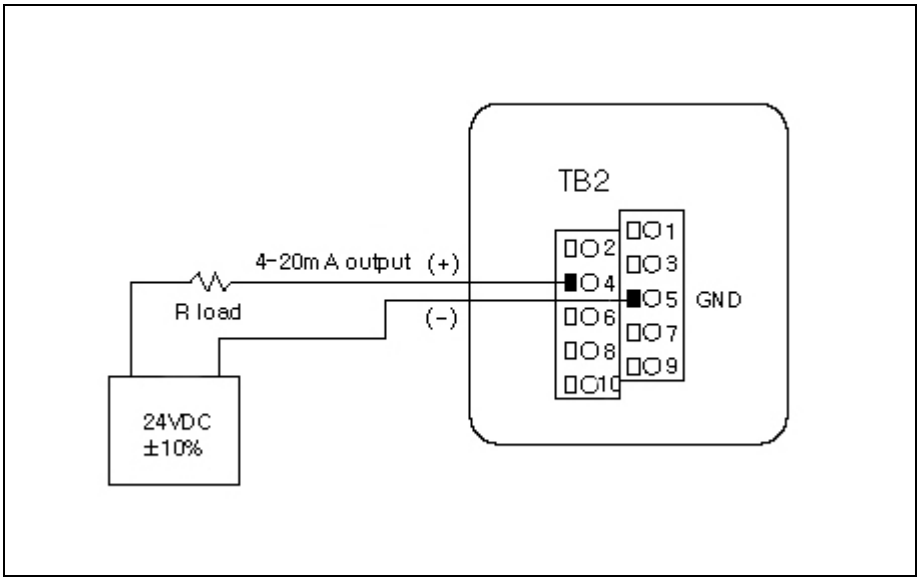


Figure 2-12. Isolated 4-20 mA Current Loop Connections (NEMA 4X Type)

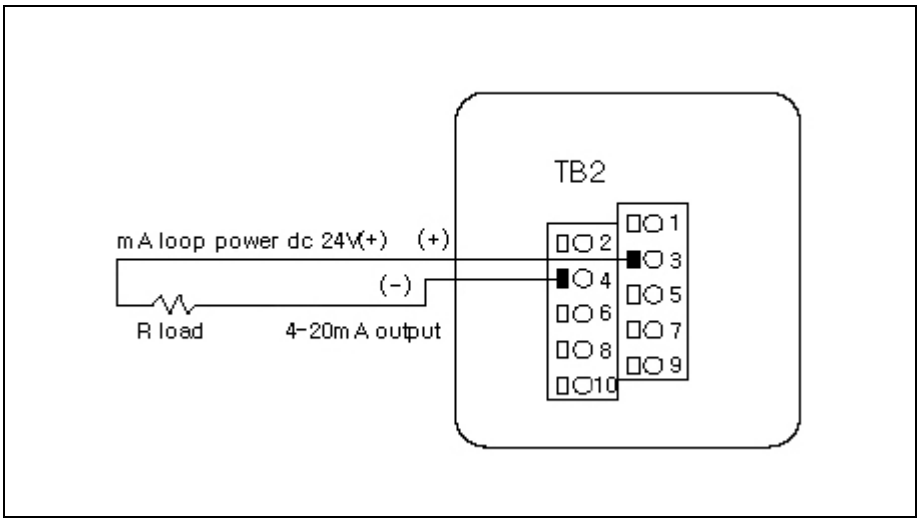


Figure 2-13. Non-Isolated 4-20 mA Current Loop Connections (NEMA 4X Type)

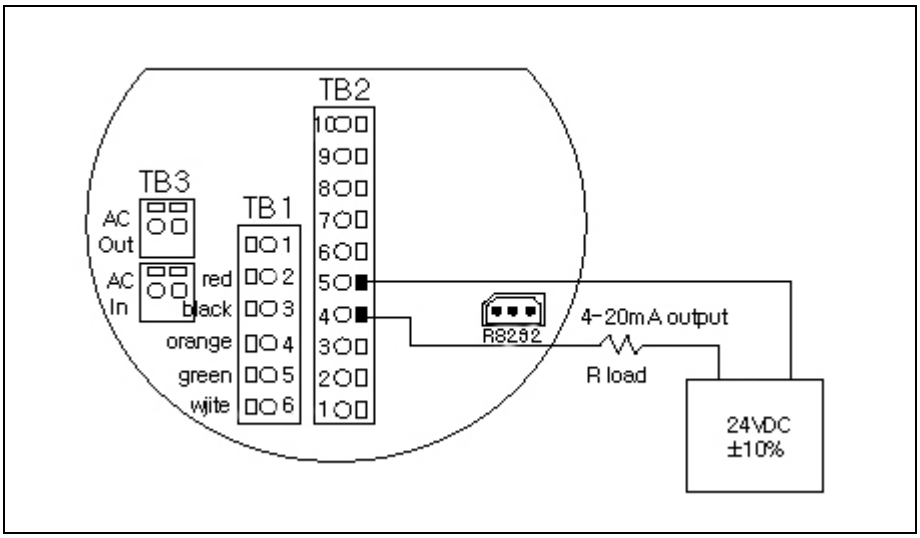


Figure 2-14. Isolated 4-20 mA Current Loop Connections (EEx Type)

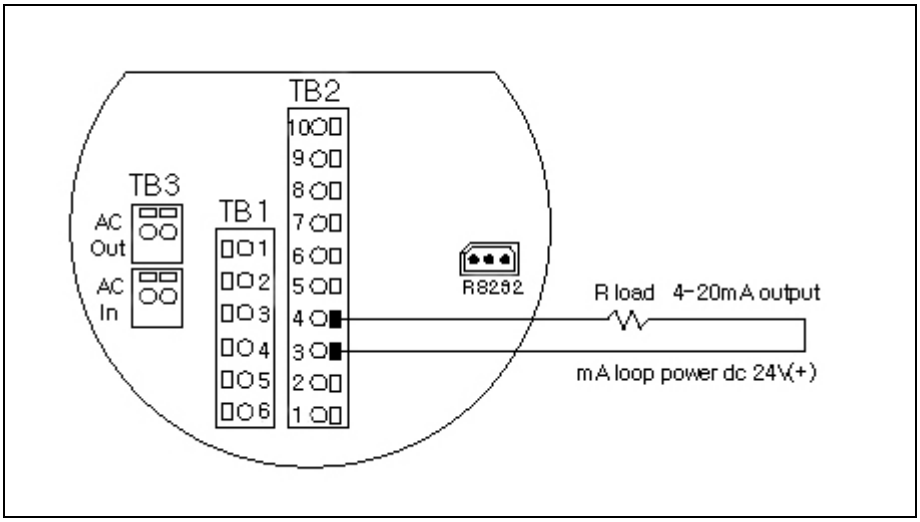


Figure 2-15. Non-Isolated 4-20 mA Current Loop Connections (EEx Type)

Alarm Output Wiring Method

Two alarm outputs are included on the flow meter terminal block.
The alarm outputs use optical relays that are normally-open single-pole relays with one common connection.
Exterior power is used for connection as in the following diagram.

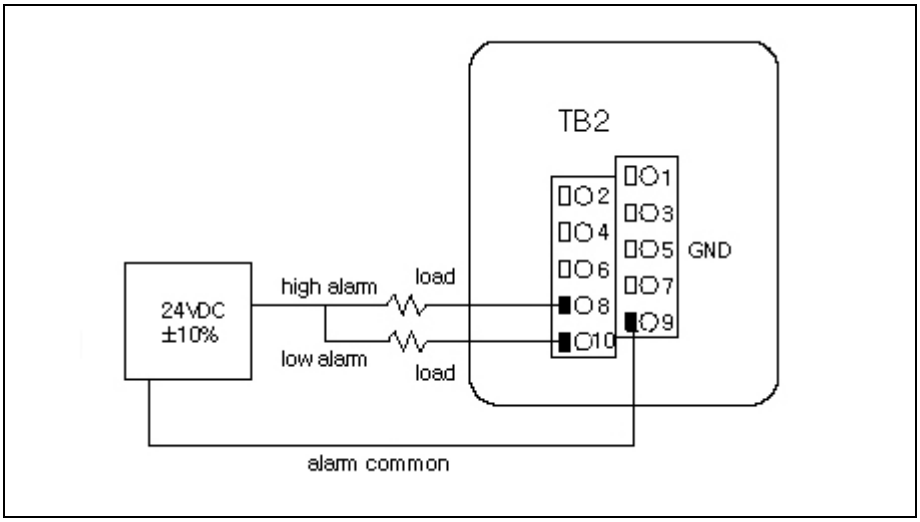


Figure 2-16. Isolated Alarm Output Connections (NEMA 4X Type)

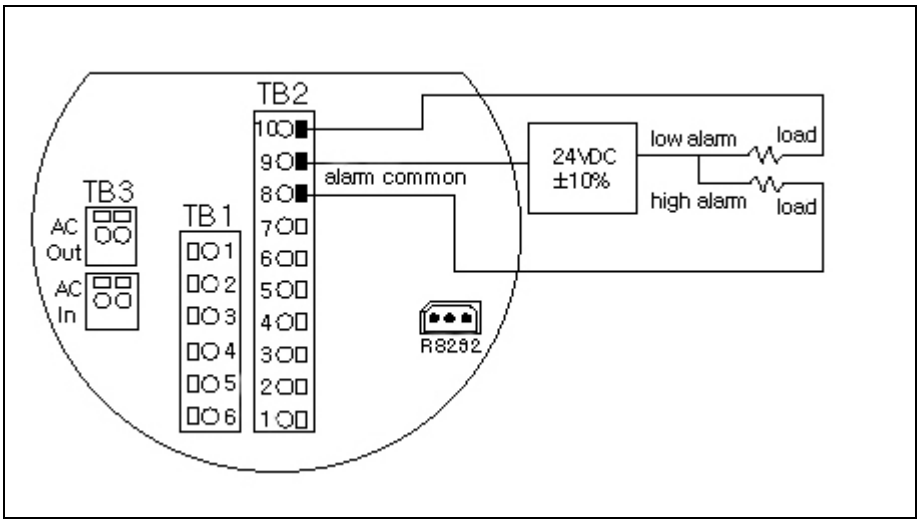


Figure 2-17. Isolated Alarm Output Connections (EEx Type)

Remote Sensor Probe Wiring Method

When connecting the sensor probe to a remotely mounted flow meter enclosure, use only factory supplied cables.

The cable provided by Ientek for connection between the sensor and the transmitter is the one that was used in the calibration of the mass flow meter with the length of the cable taken into consideration.

To connect the sensor probe to a remotely mounted electronics enclosure, see Figure 2-18 and 2-19.

Caution!
Changed or branched of electric wire's length have a effect to reliability of flow meter.
If you wish to extend or cut short the cable, return the flow meter to the manufacturer.

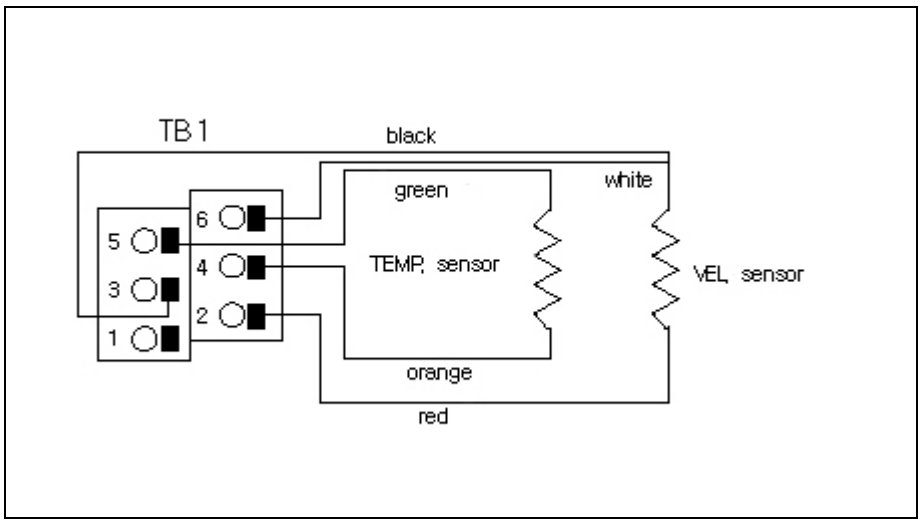


Figure 2-18. Remote Electronics Enclosure to Sensor Connections (NEMA 4X)

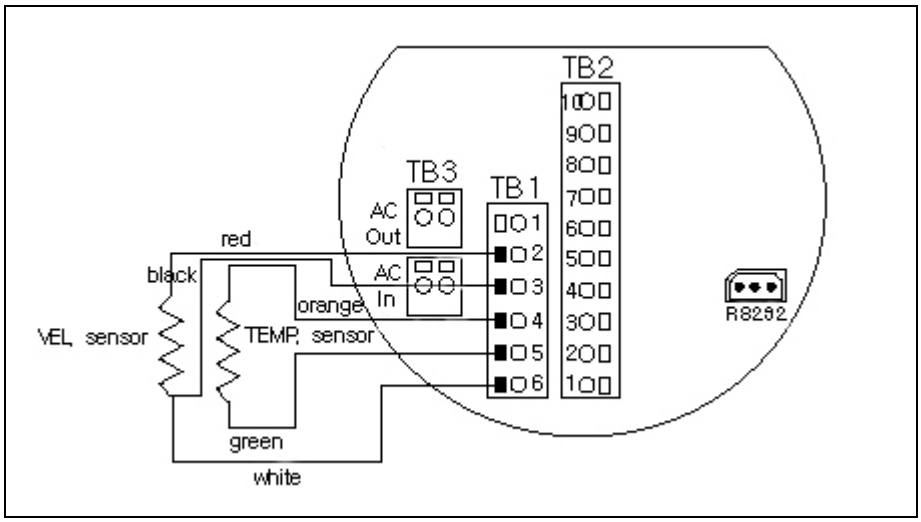


Figure 2-19. Remote Electronics Enclosure to Sensor Connections (EEx Type)

Chapter 3. Operation

This chapter covers flow meter operation, programming and instrument validation procedures. All explanation on programming proceeds on the LCD display or on the monitor of a PC connected by RS-232 communication.

Flow Meter Start Up

When applying power to a flow meter equipped with the optional LCD display you will see the product name, the software version, unit serial number, the range number, the user full scale (UFS), the current flow rate and the totalized flow. Any active alarm will flash on the screen every few seconds.

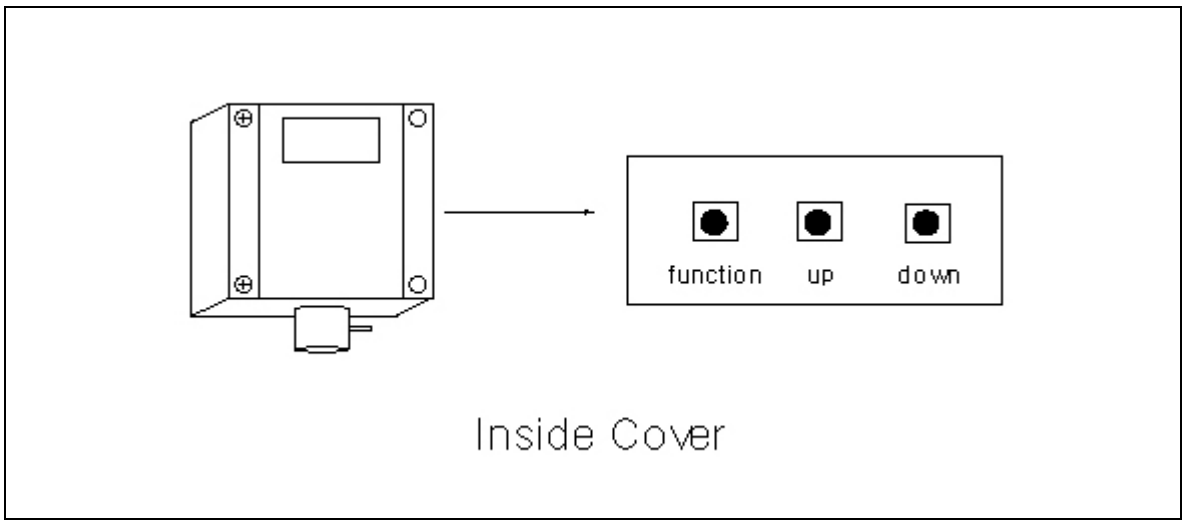


Figure 3-1. Smart Electronics Device Locations (NEMA 4X)

How to configure an explosive-proof instrument with a display.

You can configure an explosive-proof instrument with a display using a bar magnet without opening the cover. (Optional)

Process set up by bar magnet

1. Bar magnet attach position to FUNCTION, UP, DOWN (on LED lamp)
2. Until show reading that you want reading, attach position bar magnet

caution- on a bar magnet, to start that change slowly, after 3 minute that change fast

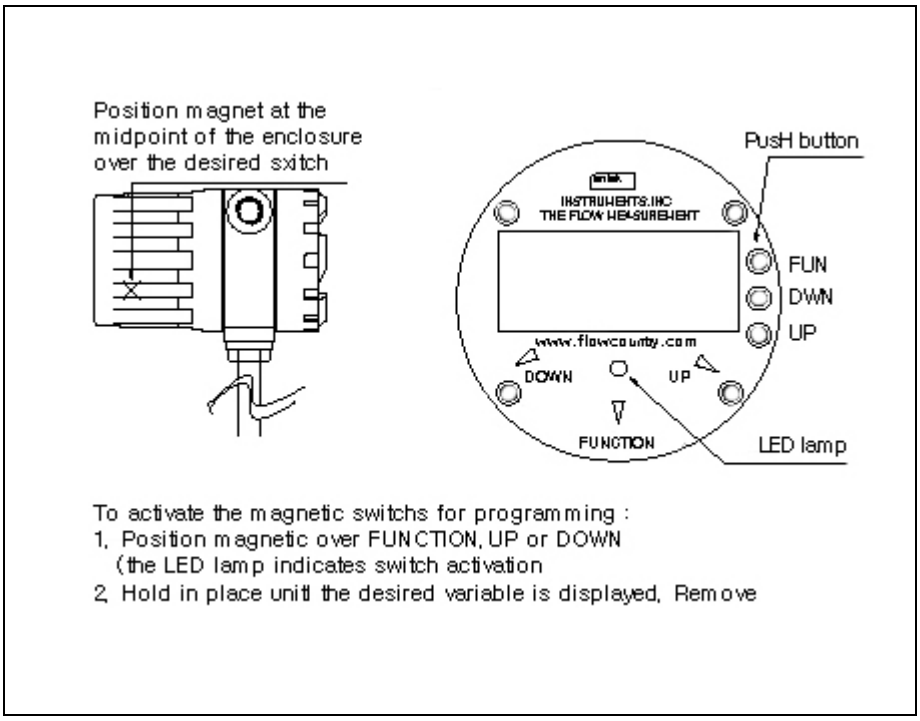


Figure 3-2. Magnetic Switch Operation

Using the Basic Specifications

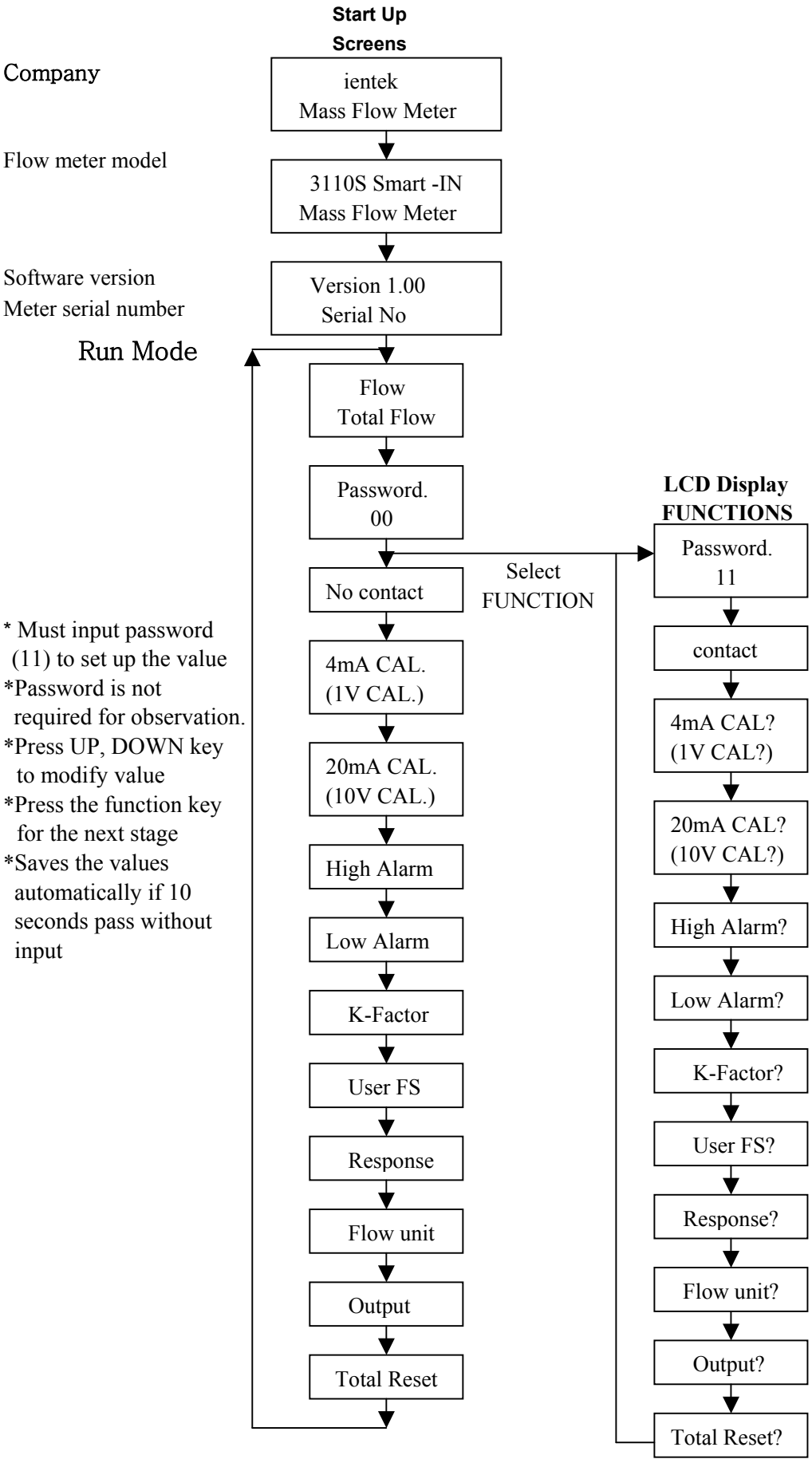
This section covers the basic features of the Smart electronics and includes instructions on :

- alarm setting up
- setting the user measurement range
- setting the K-factor
- the time response setting
- resetting the totalize

Note: when programming the instrument, after 10 seconds of no activity the meter returns to the Run Mode with any new settings immediately in effect.

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

How to configure an instrument programming order with a display.



Alarm Setting

Entering a K-factor adjusts the meter's output signal without affecting the Use the High Alarm and Low Alarm function to set or adjust alarm trip points. The alarm is set up within the range set by the user (USER FS value) Input is available from 0~100%.

Caution!
The flow meter must not be reporting or measuring gas flow during adjustments.

The gap between high-alarm and low-alarm should be at least 10% or higher. If you choose not to use the high alarm for a specific alarm function, ientek recommends that you set the high alarm at 100% of the user full scale setting which creates an "over-range" indicator.
If you set a high alarm to indicate "over" at 100% flow or more, the instrument will give a high alarm when flow actually exceeds the range during operation.

Entering Alarms using the LCD Display

The user FS value in percentage should be input for the alarm value.

1. Select the desired range. Select FUNCTION, enter the password (11). Select FUNCTION again until High Alarm or Low Alarm appears on the display.
2. Press UP and DOWN to input percentage of USER FS value for high and low alarm.
3. Select FUNCTION to advance to the next option, or after 10 seconds of non-activity the meter returns to the Run Mode and the new parameters are in effect.

K-Factor Adjustment

Entering a K-factor adjusts the meter's output signal without affecting the factory calibration curve. Use the K-factor calibration offset for additional flow profile compensation (Flow initially indicated on the flow meter is the flow that came through calibration by the manufacturer.)

Caution!
The flow meter must not be reporting or measuring gas flow during adjustments.

Entering a K-factor using the LCD Display

K-Factor 1.000 is a default value and represents actual output without affecting default parameters of the manufacturer. You may enter any number from 0.001 to 5.000.

1. Select the desired range. Select FUNCTION, enter the password (11). Select FUNCTION again until K-factor appears on the display.
2. Use UP or DOWN to enter the desired K-factor value in engineering units.
3. Select FUNCTION to advance to the next option, or after 10 seconds of non-activity the meter returns to the Run Mode and the new K-factor is in effect.

User Full Scale Adjustment

The user full scale (UFS) feature adjusts the flow meter output range anywhere within 40% to 80% of the factory full scale (FFS). This feature allows you to re-range the voltage or current output of the meter to accommodate different flow rates.

Caution!
The flow meter must not be reporting or measuring gas flow during adjustments.

Changing the User Full Scale using the LCD Display

The flow range by the manufacturer is set at the 125% of the maximum value required by the user.

If you want to use 50% of FFS, adjust the display to read 50% of the FFS.

1. Select the desired range. Select FUNCTION, enter the password (11). Select FUNCTION again until User Full Scale appears on the display.
2. Use UP or DOWN to enter the desired UFS value in engineering units.
3. Select FUNCTION to advance to the next option, or after 10 seconds of non-activity the meter returns to the Run Mode and the new UFS is in effect

Time Response Delay Adjustment

Changing the Time Response Delay using the LCD Display

1. Select the desired range. Select FUNCTION, enter the password (11). Select FUNCTION again until Time Response appears on the display.
2. Use UP or DOWN to adjust the time response delay from 1.0 to 9.9 seconds.
3. Select FUNCTION again to advance to the next option, or after 10 seconds of non-activity the meter returns to the Run Mode and the new time response setting is in effect.

Totalize Reset

Reset the Totalize using the LCD Display

1. Select the desired range. Select FUNCTION, enter the password (11). Select FUNCTION again until Total Reset? appears on the display.
2. Select DOWN button, and then UP button to reset the added value. “cleared” is indicated at the time.

Voltage Zero Adjustment

If necessary it is possible to adjust 0-10 V output using the zero adjustment function.
Since the value at 0V is inaccurate, the instrument is adjusted at 1V and 10V.

1. Set the DVM to voltage mode and connect between Vout+ and Vout–.
2. Select FUNCTION input password (11) and select function until 1V CAL? shows.
   Press UP and DOWN to input the indicated value on the voltage meter, ad the calculation is done automatically.
3. After 10 seconds of non-activity, the meter returns to the Run Mode and the new parameter is in effect.

Caution!
The flow meter must not be reporting or measuring gas flow during adjustments.

Voltage Span Adjustment

If necessary it is possible to adjust 0-10 V output using the span adjustment function.

1. Set the DVM to voltage mode and connect between Vout+ and Vout–.
2. Select FUNCTION input password (11) and select function until 10V CAL? shows.
   Press UP and DOWN to input the indicated value on the voltage meter, ad the calculation is done automatically.
3. After 10 seconds of non-activity, the meter returns to the Run Mode and the new parameter is in effect.

caution : you should fix the electric current on 4mA, when you control 0 point.
In the addition, the control of SPAN should be fixed at 20 mA.
I suggest that you will write the current result before you change zero point and SPAN.

Current Zero Adjustment

If needed, adjust zero for 4-20 mA to fix to 4 mA.

1. Connect with the electric current line as explained previously and then the voltage meter.
2. Select FUNCTION input password (11) and select function until 4mA CAL? shows.
   Press UP and DOWN to input the indicated value on the voltage meter, ad the calculation is done automatically.
3. After 10 seconds of non-activity, the meter returns to the Run Mode and the new parameter is in effect. Reconnect wires as before.

Current Span Adjustment

If needed, adjust zero for 4-20 mA to fix to 4 mA.

1. Connect with the electric current line as explained previously and then the voltage meter.
2. Select FUNCTION input password (11) and select function until SPAN 20mA CAL? shows.
   Press UP and DOWN to input the indicated value on the voltage meter, ad the calculation is done automatically.
3. After 10 seconds of non-activity, the meter returns to the Run Mode and the new parameter is in effect. Reconnect wires as before.

Changing unit

Unit can be changed if necessary.

The user setup range (USER FS value) can be changed if the unit is changed.

There is no difference if the existing unit's UFS value is within the range of 40~80% of factory setup, but if it is lower or higher, the value changes automatically to 40%, or 80% of FFS value.

*** FACTORY FULL SCALE (FFS) unit of flow meter and velocity meter is fixed to nm3/h and nm/s respectively. ***

1. Select FUNCTION input password (11) and select function until flow unit? shows.
   Press UP and DOWN to input the indicated value on the voltage meter, ad the calculation is done automatically.
2. After 10 seconds of non-activity, the meter returns to the Run Mode and the new parameter is in effect. Reconnect wires as before.

Changing output form

You can change the output, if is

1. Select FUNCTION input password (11) and select function until analog output? shows.
   Press UP and DOWN to can change the output, if is.
2. After 10 seconds of non-activity, the meter returns to the Run Mode and the new parameter is in effect. Reconnect wires as before.

Chapter 4. 3400 Series Stack Flow Meter

Since Chapter 1, 2, 3, and 5 contain common information on the 3000 series, users of the stack instrument should study the contents as well. Chapter 4 contains specific information on the stack instrument and should be studied by users of the stack instruments carefully.

Stack Diameter According to Sensing Point

Duct (Stack) Diameter	Sensing Point	Sensor Probe OD”
8 – 18″	2	3/4
18 – 24″	4	3/4
24 – 36″	4	3/4
36 – 60″	8	3/4

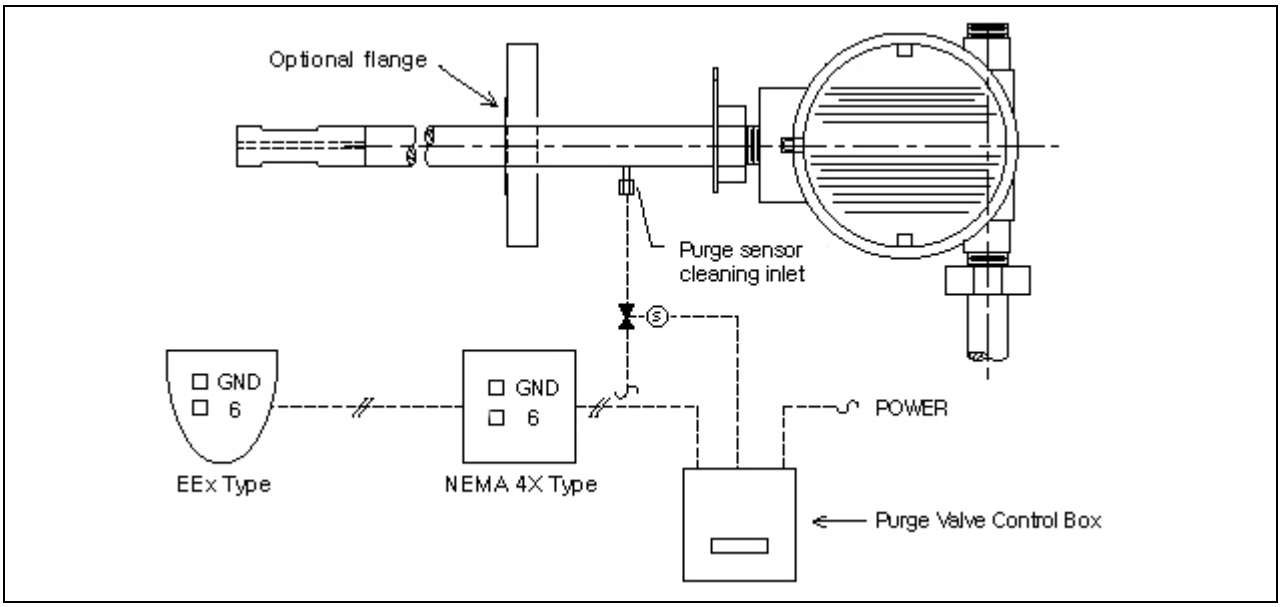
Air Purge System

① Purge time holding wiring

The 3400 series thermal mass flow meter for stack use may collect impurities like dust from the fluid it measures. Therefore you should purge the sensor with compressed air to remove impurities around the sensor.

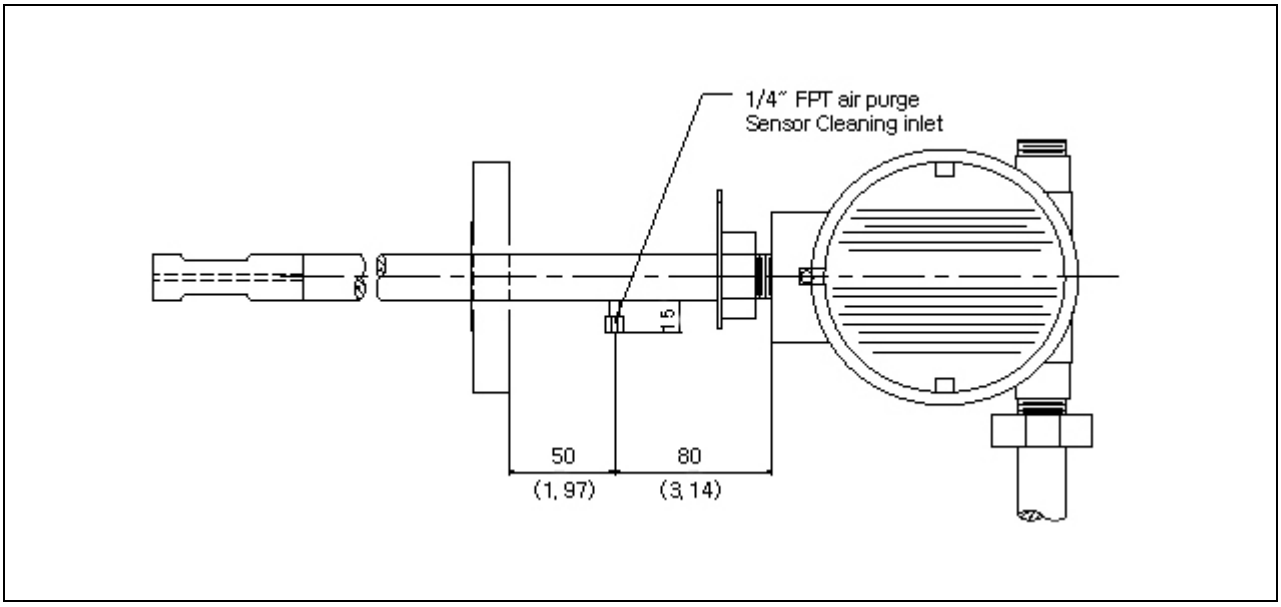
While purging with compressed air, the flow meter may measure an excessively high value.

In order to have the instrument stop measurement and hold the last good value, additional wiring as follows is required.



② Purge System of Compressed Air Pipe

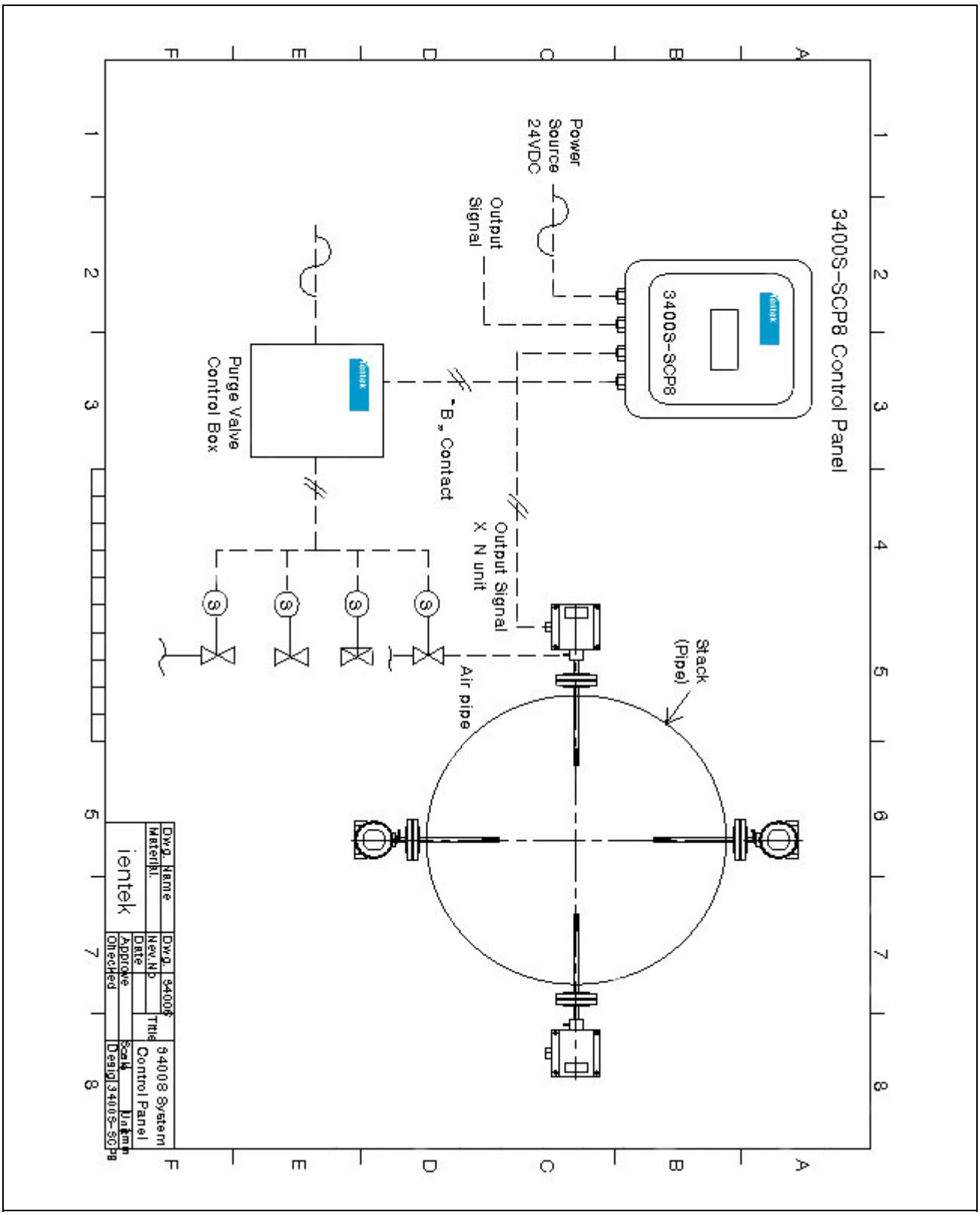
For the 3400 series thermal mass flow meter for stack use, it is required to connect a compressed air pipe and purge the thermal sensor periodically.

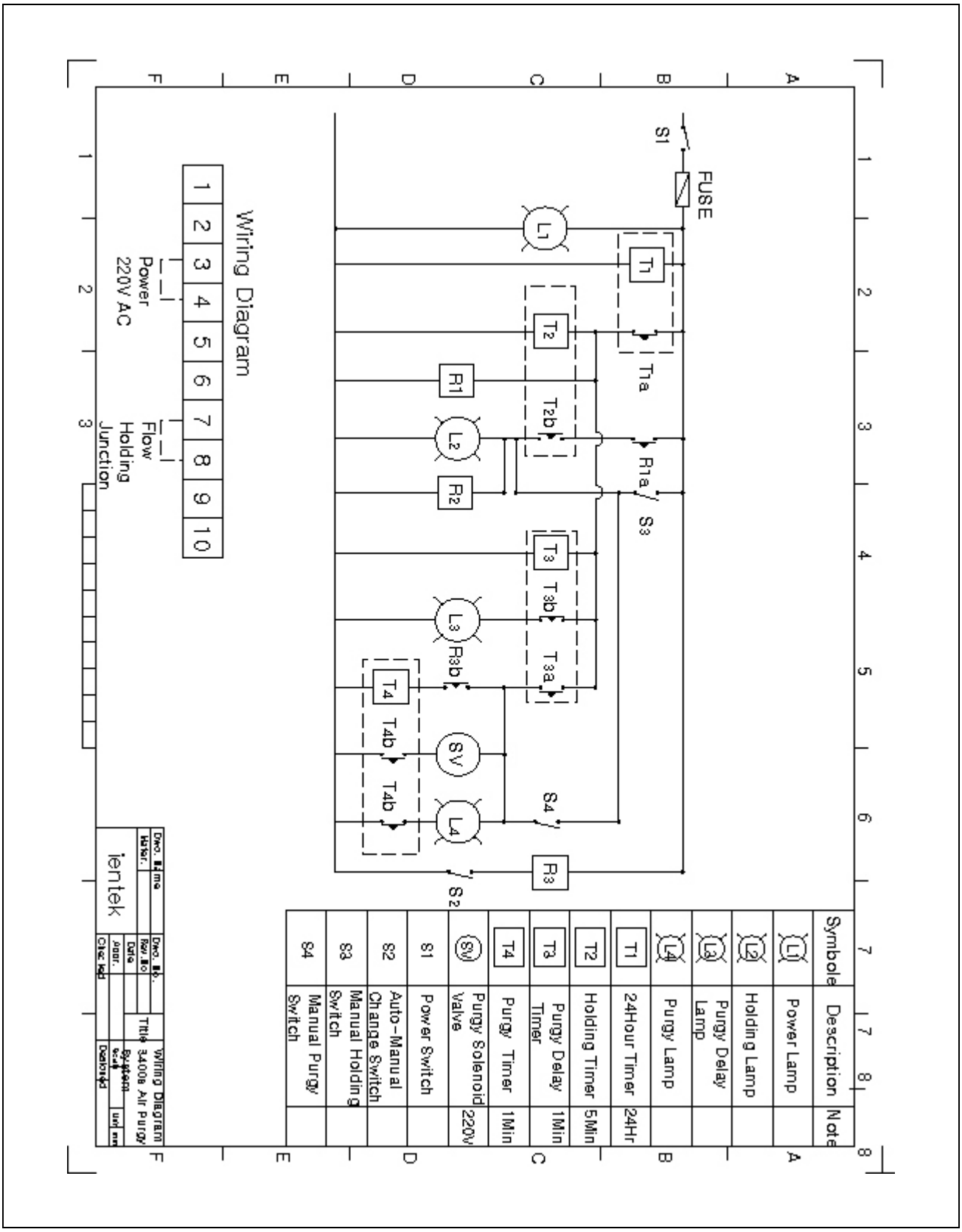


3400 Series System Control Panel

The 3400 series thermal mass flow meter for stack use is formed up in multiple units in most cases to calculate average flow speed (flow quantity) and send the result to the main control panel. In such a case, a separate system control panel, 3400-SCP8, is required.

3400S-SCP8 can take 8 input signals. If any of the inputs is not provided for unit replacement or other reasons, it calculates average flow speed (flow quantity) from valid inputs alone, and displays or outputs the result. (Refer to 3400S-SCP8.)




Wiring Diagram
FUSE
S1
L1
T1
T2
T1a
T2b
R1
L2
R2
R1a
S3
T3
T3b
L3
R3b
T3a
T4
T4b
SV
T4b
L4
S4
R3
S2
1 2 3 4 5 6 7 8 9 10
Power
220V AC
Flow
Holding
Junction
Symbole
Description
Note
L1 Power Lamp
L2 Holding Lamp
L3 Purgy Delay Lamp
L4 Purgy Lamp
T1 24Hour Timer 24Hr
T2 Holding Timer 5Min
T3 Purgy Delay Timer 1Min
T4 Purgy Timer 1Min
SV Purgy Solenoid Valve 220V
S1 Power Switch
S2 Auto-Manual Change Switch
S3 Manual Holding Switch
S4 Manual Purgy Switch
ientek
Wiring Diagram
3400a Air Purgy

Chapter 5. Troubleshooting and Repair

Warning!
Remove the pressure on the line before repairing the flow meter.

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

Troubleshooting the Flow Meter

Begin hardware troubleshooting by verifying the following facilities issues are correct.

These areas impact system operation and must be corrected prior to performing any flow meter inspections.

1. Verify the incoming power to the flow meter is present and of the correct voltage and polarity.
2. Check the flow meter wiring for correct connections as described in Chapter 2.
3. Check the upper and lower stream distance of the flow meter and the pipe diameter, referring to Figure 2-1 on page 9.
4. Verify the flow direction indicator is correctly aligned pointing downstream of flow.
5. Make sure there are no leaks in the line being measured.

   Check the above points, perform measures on next page and consult the manufacturer if necessary.

Problem	Possible Cause	Solution
Velocity measurement is erratic or fluctuating	Very erratic or non-uniform flow	Follow installation requirements shown in Chapter 2 (Page 8)
	Flow meter installed with less than required minimum pipe diameters upstream and downstream of the sensor	Follow installation requirements shown in Chapter 2 (Page 8)
	Insertion sensor probe not mounted securely	Sensor probe must be mounted securely without vibration
	Sensor component broken	Return to factory for replacement
	Malfunction in system electronics	Return to factory for evaluation
	Ground loop	Check wiring, see Chapter 2
	Moisture present in gas flow	Install a water trap or filter upstream of the flow the flow sensor
Velocity measurement seems too high or low	Sensor assembly not aligned correctly to flow	Correct alignment with the flow indicator pointing downstream in the direction of flow
	Sensor probe not inserted to the proper depth	Verify sensing point is located on the centerline of the pipe
No response to flow from sensor assembly	No power	Turn on power to the flow meter
	Low flow cutoff too high	Correct low flow cutoff programming using the Smart Interface software.
	Flow rate below meter's minimum flow rating	Contact factory for instructions
	Flow has exceeded the maximum range of the flow meter	Set the user full scale to equal the factory full scale
		Reduce flow below the maximum range shown on the meter's nameplate or contact the factory for re-calibration advice
	Flow profile distortions	Try to find another location for the meter
	Extremely turbulent flow	Do not place the meter near a ventilator, static mixer or valve
	Sensor failure	Return to factory for evaluation
	Printed circuit assembly defective	Return to factory for evaluation

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http:// www.flowcountry.com , E-mail : master@flowcountry.com

When returning a component, make sure to include the completed Calibration/Repair Data Sheet with the shipment.