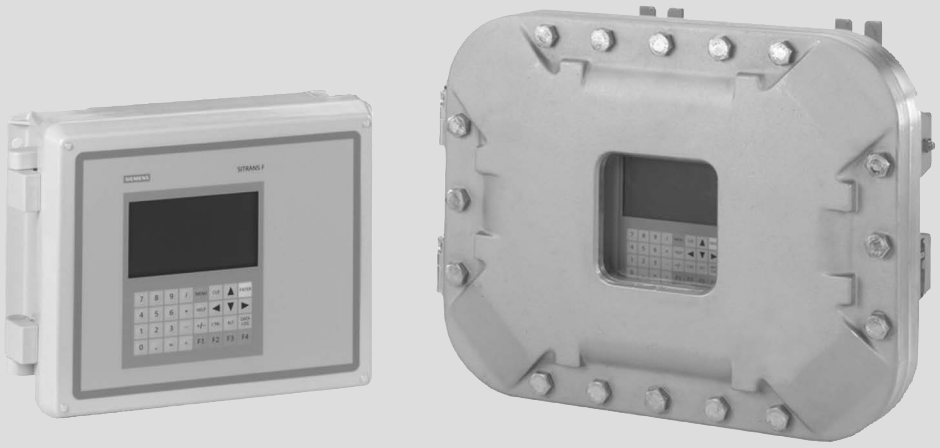
SIEMENS



SITRANS F

SITRANS FUH1010 IP65 NEMA 4X and IP66 NEMA 7
Interface Detector 7ME360x-1, x=0, 3

Operating Instructions

Edition 6/2014

Answers for industry.

SIEMENS

SITRANS F

Ultrasonic Flowmeters FUH1010 IP65 NEMA 4X & IP66 NEMA 7 Interface Detector

Operating Instructions

07/2014

A5E02951504-AC

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Siemens AG
Industry Sector
Postfach 48 48
90026 NÜRNBERG
GERMANY

Order number: A5E02951504
℗ 06/2014 Subject to change

Table of contents

Tables

Figures

Introduction

1

These instructions contain all the information you need for using the device.

The instructions are aimed at persons mechanically installing the device, connecting it electronically, configuring the parameters and commissioning it as well as service and maintenance engineers.

Note

It is the responsibility of the customer that the instructions and directions provided in the operating instructions are read, understood and followed by the relevant personnel before installing the device.

1.1 Items supplied

- SITRANS F Transmitter
- SITRANS F literature CD
- For additional items refer to your packing slip.

Inspection

1. Check for mechanical damage due to possible improper handling during shipment. All claims for damage are to be made promptly to the shipper.
2. Make sure the scope of delivery, and the information on the type plate corresponds to the ordering information.

1.2 History

The contents of these instructions are regularly reviewed and corrections are included in subsequent editions. We welcome all suggestions for improvement.

The following table shows the most important changes in the documentation compared to each previous edition.

Edition	Remarks
05/2011	First edition of Operating Instructions for the SITRANS FUH1010 IP65 NEMA 4X and IP66 NEMA 7 Interface Detector.
01/2013	Second edition of Operating Instructions for the SITRANS FUH1010 IP65 NEMA 4X and IP66 NEMA 7 Interface Detector. The most important changes are as follows: • To use Si-Ware download the program at [http://s13.me/ns/cv] • Expanded I/O Module Installation Wiring Diagram 1010N-7-7 has been updated to Revision 08. • I/O Module Installation Wiring Diagram 1010N-2-7 has been updated to Revision 05. • Analog Input Module Installation Drawing 1010N-5DS2-7 has been updated to Revision 06.
07/2014	3rd Edition of Operating Instructions for the SITRANS FUH1010 IP65 NEMA 4X and IP66 NEMA 7 Interface Detector. This document replaces all previous instructions for use. • To use Si-Ware download the program at: www.siemens.com/siware • Removed all references to Pig (pipe scraper) options.

1.3 Further Information

Product information on the Internet

The Operating Instructions are available on the CD-ROM shipped with the device, and on the Internet on the Siemens homepage, where further information on the range of SITRANS F flowmeters may also be found:

Product information on the internet (http://www.siemens.com/flow)

Worldwide contact person

If you need more information or have particular problems not covered sufficiently by these Operating Instructions, get in touch with your contact person. You can find contact information for your local contact person on the Internet:

Local contact person (http://www.automation.siemens.com/partner)

Safety notes

2

⚠ CAUTION
Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance. Only qualified personnel should install or operate this instrument.

Note

Alterations to the product, including opening or improper modifications of the product, are not permitted.

If this requirement is not observed, the CE mark and the manufacturer's warranty will expire.

2.1 Warning Symbols

Symbol	Explanation
	Consult operating instructions
	Hot surface
	Dangerous electrical voltage
	Corrosive materials
	Toxic materials
	Isolate the device from power using a circuit-breaker
	Protect the device from impact otherwise loss of degree of protection
	Protective insulation; device in protection class II

2.2 Laws and directives

General requirements

Installation of the equipment must comply with national regulations. For example, the National Electrical Codes.

Instrument safety standards

The device has been tested at the factory, based on the safety requirements. In order to maintain this condition over the expected life of the device the requirements described in these Operating Instructions must be observed.

NOTICE
Material compatibility Siemens can provide assistance with the selection of sensor parts. However, the full responsibility for the selection rests with the customer and Siemens can take no responsibility for any failure due to material incompatibility.

CE marked equipment

The CE-mark symbolizes the compliance of the device with the following Directives:

- EMC-Directive 2004/108/EC
- Low voltage Directive 2006/95/EC
- ATEX Directive 94/9/EC

2.3 Lithium batteries

Lithium batteries are primary power sources with high energy content designed to represent the highest possible degree of safety.

⚠ WARNING
Potential hazard Lithium batteries may present a potential hazard if they are abused electrically or mechanically. • Observe the following precautions when handling and using lithium batteries: – Do not short-circuit, recharge or connect with false polarity. – Do not expose to temperature beyond the specified temperature range or incinerate the battery. – Do not crush, puncture or open cells or disassemble battery packs. – Do not weld or solder to the battery's body. – Do not expose contents to water.

2.4 Installation in hazardous area

⚠ WARNING

Explosion Hazard

Equipment used in hazardous areas must be Ex-approved and marked accordingly.

It is required that the special conditions for safe use provided in the manual and in the Ex certificate are followed!

Hazardous area approvals

The device is approved for use in hazardous area and has the following approval:

- FM and CSA certified

- Class I, Division 1, Groups ABCD

- Class II, Division 1, Groups EFG

- ATEX

⚠ WARNING

Explosion Hazard

Devices without the correct hazardous area approval create dangerous environments.

Make sure the hazardous area approval is suitable for the environment in which the device will be installed.

Intrinsically safe data

⚠ WARNING

Explosion Hazard

User must install unit with Siemens drawings. With intrinsically safe circuits, use only certified meters appropriate for the transmitter.

If a non-conforming supply unit is used, the "fail-safe" type of protection will no longer be effective and the approval certification will be invalid.

Hazardous area safety requirements

It is required that:

- Electrical connections are in accordance with EN60079-14 (Installing Electrical Systems in Explosion Hazardous Areas).
- The protective cover over the power supply is properly installed. For intrinsically safe circuits the connection area can be opened.
- Appropriate cable connectors are used for the output circuits:
  - Intrinsically safe: blue
  - Non-intrinsically safe: black
- Sensor and transmitter are connected to the potential equalization.
  For intrinsically safe output circuits potential equalization must be maintained along the entire connection path.
- When protective earth (PE) is connected, no potential difference between the protective earth (PE) and the potential equalization (PA) can exist, even during a fault condition.

⚠ WARNING

Explosion Hazard

"Flameproof enclosure" type of protection

Only open devices with type of protection "Flameproof enclosure" (e.g. FUT1010 NEMA 7) in hazardous areas when the power to the device is turned off, otherwise there is a risk of explosion.

⚠ WARNING

Explosion Hazard

Laying Cables

Cable for use in zone 1 and 2 must satisfy the requirements for having a proof voltage < AC 500 V applied between the conductor/ground, conductor/shield and shield/ground.

Connect the devices that are operated in hazardous areas as per the stipulations applicable in the country of operation, e.g. for Ex "d" and "nA", permanent cables must be laid.

⚠ WARNING

Explosion Hazard

Devices with the common approval "Intrinsically safe" and "Flameproof"

The following is applicable for devices with the common approval "Intrinsically safe" and "Flameproof" (Ex ia + Ex d): Before commissioning, make sure that the type of protection that is not suitable is permanently defaced on the nameplate to avoid improper use.

If a non-conforming infeed is used, the "fail-safe" type of protection will no longer be effective.

2.5 Safety Notes

Safety Information for Hazardous Areas

DANGER

Explosion Hazard

Will Cause Death, Serious Injury or Property Damage.

Restrict use and repair to qualified personnel.

DANGER

Explosion Hazard

Death or severe personal injury and/or equipment and property damage will result if proper Hazardous (Classified) Locations installation precautions are not taken.

Restrict use and repair to qualified personnel.

DANGER

Explosion Hazard

The use of unauthorized parts in the repair of the equipment, tampering by unqualified personnel, or operation with the cover open in a Hazardous (Classified) Location will result in dangerous conditions which will cause death, serious injury, and/or equipment and property damage.

Restrict use and repair to qualified personnel.

Follow all safety instructions contained or referenced herein.

DANGER

Explosion Hazard

Death or severe personal injury and/or equipment and property damage will result due to improper installation or use of this equipment when located in a Hazardous (Classified) Location.

- Install as directed.
- Disconnect power source before servicing.
- Keep cover closed when equipment is operating.

⚠ WARNING

Qualified personnel

This flowmeter system may only be set up and used in conjunction with this document and the instructions on the electronic media provided. Installation, maintenance and operation of the flowmeter system may only be performed by qualified personnel. Within the context of this Document, qualified persons are defined as persons who have the skills and knowledge related to the construction and operation of the electrical equipment and installations and have received safety training to recognize and avoid the potentially explosive hazards involved.

Qualified personnel possess the following qualifications

1. Is trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.
2. Is trained in the proper care and use of protective equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices.
3. Is trained in rendering first aid.

Note

This document does not purport to cover all details or variations in equipment, or to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise, which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens sales office (www.automation.siemens.com/partner). The contents of this Document shall not become part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contact between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties or modify the existing warranty.

Safety Information for Hazardous Areas

Note

Ratings under this heading apply to specific model families.

Check Your Model Number: FUH1010, 7ME3600, 7ME3603.

FM-CSA installation

Read, understand and follow all safety instructions on the electronic media provided. This equipment is rated for use in hazardous (classified) locations as stated below and must be installed according to the 1010-304 installation drawing provided on the media. Failure to install the equipment in the prescribed manner will result in unsafe operation. Follow all local jurisdictional safety codes when operating this equipment. When properly installed the equipment meets the following FM – CSA ratings.

Transmitter

- Intrinsically safe connections Class I and II, Division 1, Groups A, B, C, D, E, F and G;
- Nonincendive for Class I, Division 2, Groups A, B, C and D;
- Suitable for Class II, Division 2, Groups E, F and G outdoor (Type 4X), Class III (CSA only)
- Temperature code T5 at an ambient of 40°C

Sensors

- Intrinsically safe Class I and II, Division 1, Groups A, B, C, D, E, F and G;
- Nonincendive for Class I, Division 2, Groups A, B, C and D;
- Suitable for Class II, Division 2, Groups E, F and G outdoor (Type 4X), Class III (CSA only)
- Temperature code T6 at an ambient of 40°C

ATEX installation

Read, understand and follow all safety instruction on the electronic media provided. This equipment complies with Directive 94/9/EC and is rated for use in potentially explosive atmospheres. The equipment markings are shown and explained below. Equipment must be installed according to the 1010-389 installation drawing provided on the media. Failure to install the equipment in the prescribed manner will result in unsafe operation. Follow all regional safety laws when operating this equipment. When properly installed the equipment meets the following ATEX ratings as stated in EC-Type Examination Certificate KEMA03ATEX1134

Transmitter Markings and Explanations

- ⟨Ex⟩II (1) G [Ex ia] IIC – Transmitter located in the non-hazardous area with intrinsically safe circuits of category Ex ia, which can be connected to Category 1 Sensors
- ⟨Ex⟩II 3 (1) G Ex nC [ia] IIC T5 – Category 3 Transmitter located in Zone 2 potentially explosive atmosphere with intrinsically safe circuits of category Ex ia, which can be connected to Category 1 Sensors in Zone 0
- IP65 – Ingress protection against solid bodies, rating of dust-tight and against liquid, rating of water jets

Sensor Markings and Explanations

- ⟨Ex⟩II 1 G Ex ia IIC T5 – Category 1 Sensors located in Zone 0 potentially explosive atmosphere with intrinsically safe circuits of category Ex ia for use in potentially explosive atmosphere containing gases

Safety Information for Hazardous Areas

Note

Ratings under this heading apply to specific model families.

Check Your Model Number: FUH1010, 7ME3600, 7ME3603

FM-CSA installation

Read, understand and follow all safety instruction on the electronic media provided. This equipment is rated for use in hazardous (classified) locations as stated below and must be installed according to the 1010-443 installation drawing provided on the media. Failure to install the equipment in the prescribed manner will result in unsafe operation. Follow all local jurisdictional safety codes when operating this equipment. When properly installed the equipment meets the following FM – CSA ratings:

Transmitter

- Explosionproof for Class I, Division1, Groups B, C, D;
- Dust-ignitionproof for Class II, Division 1, Groups E, F and G
- Intrinsically safe connections for Class I and II, Division 1, Groups A, B, C, D, E, F and G;
- Nonincendive for Class I, Division 2, Groups A, B, C and D;
- Suitable for Class II, Division 2, Groups E, F and G outdoor (Type 4X), Class III (CSA only)

Sensors

- Intrinsically safe Class I and II, Division 1, Groups A, B, C, D, E, F and G;
- Nonincendive for Class I, Division 2, Groups A, B, C and D;
- Suitable for Class II, Division 2, Groups E, F and G outdoor (Type 4X), Class III (CSA only)
- Temperature code T6 at an ambient of 40°C

ATEX installation

Read, understand and follow all safety instruction on the electronic media provided. This equipment is rated for use in explosive atmospheres as stated below and must be installed according to the 1010-464 installation drawing provided on the media. Failure to install the equipment in the prescribed manner will result in unsafe operation. Follow all regional safety laws when operating this equipment. When properly installed the equipment meets the following ATEX ratings as stated in EC-Type Examination Certificate KEMA03ATEX1134

Transmitter Markings and Explanations

- ⟨Ex⟩II (1) G [Ex ia] IIC– Transmitter located in the non-hazardous area with intrinsically safe circuits of category Ex ia, which can be connected to Category 1 Sensors for use in potentially explosive atmosphere containing gases
- ⟨Ex⟩II 3 (1) G Ex nC [ia] IIC T5 (Tamb = 0° To + 60°C) – Category 3 Transmitter located in Zone 2 potentially explosive atmosphere with intrinsically safe circuits of category Ex ia, which can be connected to Category 1 Sensors in Zone 0 for use in potentially explosive atmosphere containing gases
- ⟨Ex⟩II 2 (1) G Ex d [ia IIC] IIB T5 (Tamb = 0° To + 50°C) – Category 2 Transmitter located in Zone 1 potentially explosive atmosphere with intrinsically safe circuits of category Ex ia, which can be connected to Category 1 Sensors for use in potentially explosive atmosphere containing gases
- ⟨Ex⟩II 2 (1) G Ex d [ia IIC] IIB+H2 T5 (Tamb = 0° To + 50°C) – Category 2 Transmitter located in Zone 1 potentially explosive atmosphere with intrinsically safe circuits of category Ex ia, which can be connected to Category 1 Sensors for use in potentially explosive atmosphere containing gases
- IP66 – Ingress protection against solid bodies, rating of dust-tight and against liquid, rating of heavy seas

Sensor Markings and Explanations

- ⟨Ex⟩II 1 G Ex ia IIC T5 – Category 1 Sensors located in Zone 0 potentially explosive atmosphere with intrinsically safe circuits of category Ex ia for use in potentially explosive atmosphere containing gases

2.6 Certificates

Certificates are posted on the Internet and on the documentation CD-ROM shipped with the device.

See also

Certificates on the Internet (http://www.siemens.com/processinstrumentation/certificates)

Description

3

3.1 FUH1010 features

Description

The Siemens SITRANS FUH1010 IP65 NEMA 4X and IP66 NEMA 7 Interface Detectors achieve highly accurate detection of media owing to the WideBeam ultrasonic transit-time technology. The sensors are mounted on the outside of the pipe, preventing contact with the medium.

The FUH1010 detects interfaces on Multi-Product Pipelines. Clamp-On operation makes this device suitable for new construction, existing pipeline installation and replacement of in-line Densitometers.

The sensor construction makes installation and commissioning of even the largest pipe sizes very straight forward and easy.

Note

This Operating Instructions manual applies to the following FUH1010 IP65 NEMA 4X and IP66 NEMA 7 operating systems: Version 3.02.00 and later and version 5.03.00 and later.

3.2 NEMA 4X & NEMA 7 Transmitters

SITRANS FUH1010 Transmitters

The SITRANS FUH1010 IP65 NEMA 4X and IP66 NEMA 7 series transmitters are available in Single Channel and 2 Channel versions. The transmitters include a graphic display providing diagnostic data and a keypad interface to access on-screen software setup menus. Safety agency approved SITRANS FUH1010 series transmitters have hazardous area certification as indicated in the label examples below.

SITRANS FUH1010 NEMA Transmitter Labels

The transmitter label is located on the right side panel of the unit. The illustration shows a typical label but labels vary depending upon model and installation location.

Figure 3-1 Typical Transmitter Label

SITRANS FUH1010 Model Numbers

The SITRANS FUH1010 IP65 NEMA 4X model numbers:

- Single Channel - 7ME3600-1
- 2 Channel - 7ME3600-2

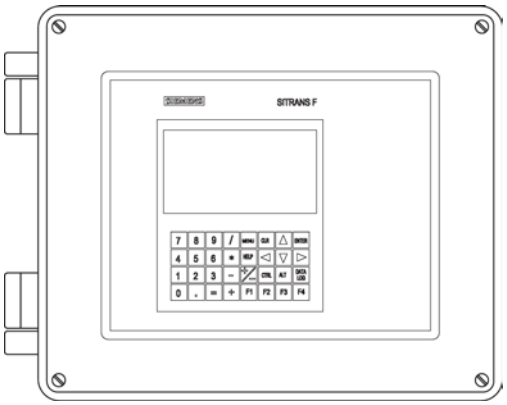


Figure 3-2 NEMA 4X Transmitter Case

The SITRANS FUH1010 IP66 NEMA 7 model numbers:

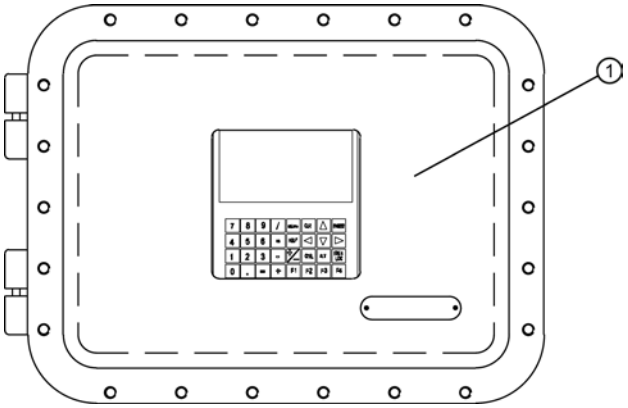
- Single Channel - 7ME3603-1 (Wall Mount with display window)
- 2 Channel - 7ME3603-2 (Wall Mount with display window)

⚠ WARNING

Electrical Shock Hazard

Access to the Graphic display and keypad setup must be done with cover opened exposing high voltage connections.

Consult local codes for permit needed to setup FUH1010 NEMA 7 units using the graphic display and local keypad to avoid injury.



① Case Enclosure

Figure 3-3 NEMA 7 Transmitter Enclosure with graphic display and keypad.

3.3 Applications

Measurement of Liquids

SITRANS F Interface Detectors are designed for measuring a variety of liquids and liquefied gases.

Typical Applications

The typical detection applications are:

- Detection of Gasoline Interfaces
- Multi-Product Interface Detection from Liquefied Gases to Crude Oil
- Product identification
- Quality detection of entrained water and gas in all products
- Hydraulic Oil Leak Detection

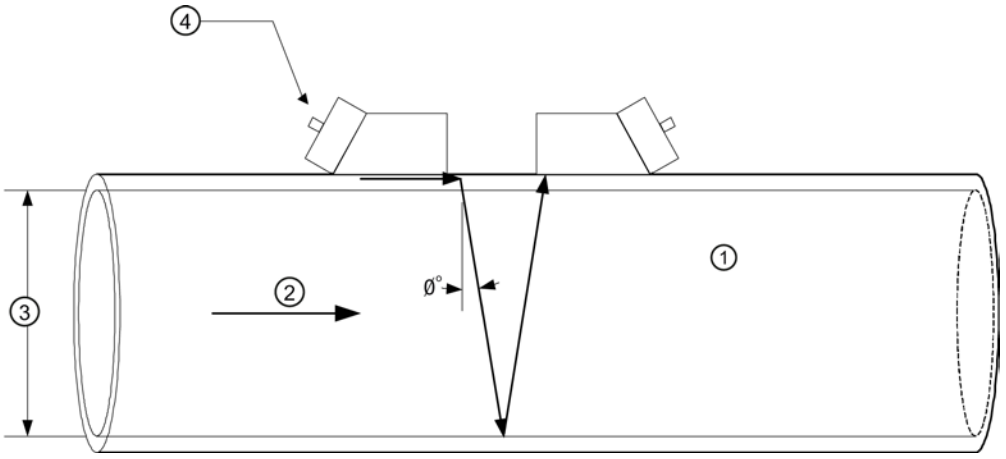
This device is primarily used in the hydrocarbon industry or where any measurement of liquid density is desired to determine a liquid interface within a flowing pipeline.

3.4 Theory of Operation

The transmitter relies on transit-time technology. Ultrasonic sensors transmit and receive to interrogate the liquid flowing within the metering section. The resulting time of arrival for each direction of transmit (upstream and downstream) is then measured using a highly accurate and stable digital signal processing method.

Using this detection scheme, the transmitter is capable of resolving the relative transit-time difference (dT) to within ±100 psec. Considering typical liquid transit-time differences ranging from $1x10^4$ to $1x10^6$ psec, the transmitter is capable of providing an exceptional degree of performance. The ultrasonic sensors are designed with sufficient beam divergence characteristics to insure that the receive sensor will have sufficient signal to maintain operation under conditions of high beam blowing; a condition that occurs under very high flow velocities where the path of the ultrasonic beam is actually blown past the receivable area of the sensor.

With accurate signal arrival time available, the transmitter can compute the velocity of sound for the flowing media.



① Velocity of Sound
② Flow Vector
③ Pipe ID
④ Wide Beam Sensors

With the liquid's velocity of sound known, temperature is used to normalize the measured sound velocity (Vs) to a given reference temperature, typically 15.5°C (60°F). This data is then used to correlate to a density value programmed into the transmitter. As the Vs changes, but not as a result of temperature, the corresponding density changes since the relationship between the normalized sonic velocity and Density is well known.

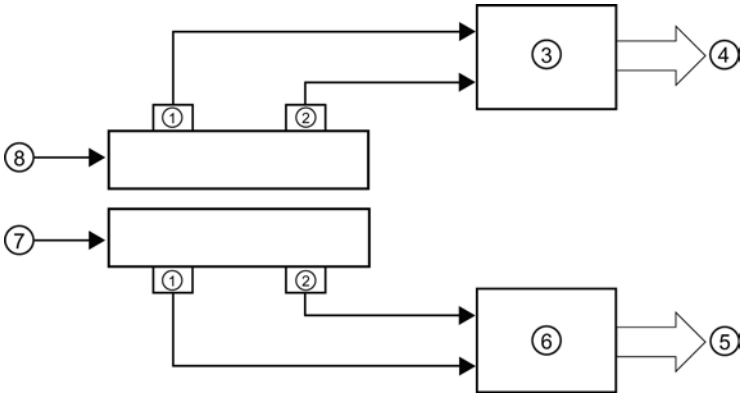
Interface Detector Types

The meter automatically conditions Installation Menu choices to suit the selected meter type. The following paragraphs introduce the available Interface Detector types that include:

- Single Channel
- 2-Channel

2-Channel

2-Channel meters provide two independent measurement channels that operate simultaneously. Depending on the specific model, 2-Channel supports: Clamp-on Transit-time, In-line Transit-time and Reflexor.



①	Upstream Sensors	⑤	Pipe B Output
②	Downstream Sensors	⑥	Channel 2 for Pipe B
③	Channel 1 for Pipe A	⑦	Pipe B
④	Pipe A Output	⑧	Pipe A

Installing/Mounting

4

4.1 Installation safety precautions

⚠ WARNING
High pressure hazard In applications with working pressures/media that can be dangerous to people, surroundings, equipment or others in case of pipe fracture, we recommend that special precautions such as special placement, shielding or installation of a pressure guard or a safety valve are taken when the sensor is mounted.

4.2 Determining a location

⚠ WARNING
Electrical Shock Hazard May cause death or serious personal injury. Disconnect power before working on this product.

Upstream / Downstream

- Avoid long drop lines downstream from the sensor to prevent the meter pipe from draining.
- Avoid installing the sensor upstream of a free discharge in a drop line where possible.

Sensor Location in piping system

The optimum location in the system depends on the application

- For liquid applications the presence of excessive gas or air bubbles in the fluid may result in erroneous measurements. Therefore, it is preferred not to install the sensor at the highest point in the system, where gas / air bubbles will be trapped. For liquids it is advantageous to install the sensor in low pipeline sections, at the bottom of a U-section in the pipeline.

4.3 Application Guidelines

Basic Requirements

- Determine pipe material and dimensions.
- Avoid vertical pipes flowing in a downward direction.
- Avoid installation of sensors on the top and bottom of horizontal pipes, if possible.
- Pipe surface should be smooth and, if necessary, free of paint.
- Avoid pressure reduction components upstream.
- Avoid mounting on or near weld seams.
- Pipe must be full to achieve proper operation.

4.4 Mounting the Transmitter

⚠ WARNING
Hazardous Voltage
May cause death or serious personal injury.
Disconnect power before working on this product.

Wall Mounting

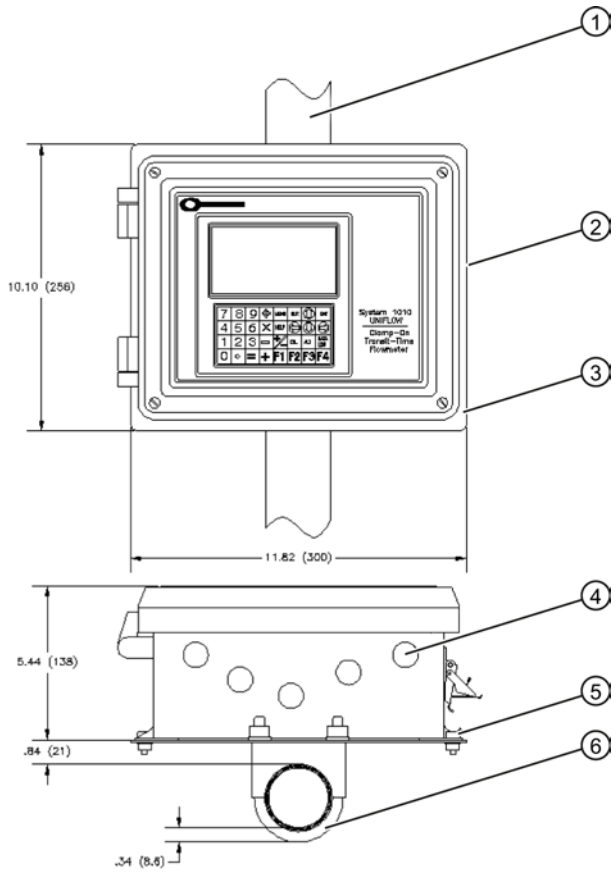
The transmitter can be mounted on any wall surface including wood, metal or concrete. Use the appropriate bolts and screws as needed for your mounting application and adhere to local codes. (See figure below for mounting bracket locations.)

Pipe Mounting

For installation on 2-inch (6 cm) mounting pipe use Pipe Mount Kit CQO:1012NMB-1 (optional - see catalog). See figure below.

Note

Pipe mounting kit CQO:1012NMB-1 is not available for IP66 NEMA 7 enclosures.



①	2-in (6cm) pipe	④	Cable Entry Ports
②	Transmitter	⑤	Mounting Flange (also use for wall mounting)
③	Mounting Plate	⑥	U-Bolt Assembly for standard 2-in (6 cm) mounting pipe

Figure 4-1 Pipe Mounting and Mounting Locations for Transmitter

Note

Use conduit fittings or cable glands on all cables.

NOTICE

Weather Seal Malfunctions

Incorrect installation of weather seals may result in failure to meet to IP65 standards and damage to the equipment.

Install weather tight seals at all unused holes using proper cable conduit and close additional holes to IP65 standards.

Connecting

5

5.1 Safety notes for connecting

Use in hazardous locations

DANGER

Explosion Hazard

Death or severe personal injury and/or equipment and property damage will result if proper Hazardous (Classified) Locations installation precautions are not taken.

Restrict use and repair to qualified personnel. Only qualified personnel may carry out work on the electrical connections.

Before opening the terminal box check that:

- No explosion hazard exists
- Local safety codes and policy requirements have been followed
- All connection leads are potential free

DANGER

Explosion Hazard

"Flameproof enclosure" type of protection

Only open devices with type of protection "Flameproof enclosure" (e.g. FUT1010 NEMA 7) in hazardous areas when the power to the device is turned off, otherwise there is a risk of explosion.

DANGER

Explosion Hazard

Hazardous areas

Observe the type examination certificates or the test certifications applicable in your country if you use transmitters as category 1/2 equipment, otherwise there is a risk of explosion.

DANGER

Explosion Hazard

Intrinsically safe circuits

If a non-conforming supply unit is used, the "fail-safe" type of protection will no longer be effective and the approval certification will be invalid, otherwise there is a risk of explosion.

With intrinsically safe circuits, use only certified meters appropriate for the transmitter.

DANGER

Explosion Hazard

Laying Cables

Cable for use in zone 1 and 2 must satisfy the requirements for having a proof voltage < AC 500 V applied between the conductor/ground, conductor/shield and shield/ground, otherwise there is a risk of explosion.

Connect the devices that are operated in hazardous areas as per the stipulations applicable in the country of operation, e.g. for Ex "d" and "nA", permanent cables must be laid.

DANGER

Explosion Hazard

Devices with the common approval "Intrinsically safe" and "Flameproof"

The following is applicable for devices with the common approval "Intrinsically safe" and "Flameproof" (Ex ia + Ex d): Before commissioning, make sure that the type of protection that is not suitable is permanently defaced on the nameplate to avoid improper use, otherwise there is a risk of explosion.

If a non-conforming infeed is used, the "fail-safe" type of protection will no longer be effective.

WARNING

Electrical Voltage Hazard

Incorrect device connections may result in death or severe personal injury and/or equipment and property damage.

Only commission the device after the device has been properly connected and, if required, closed.

5.2 Transmitter Wiring

5.2.1 Connecting Power

⚠ DANGER

Electrical Shock Hazard

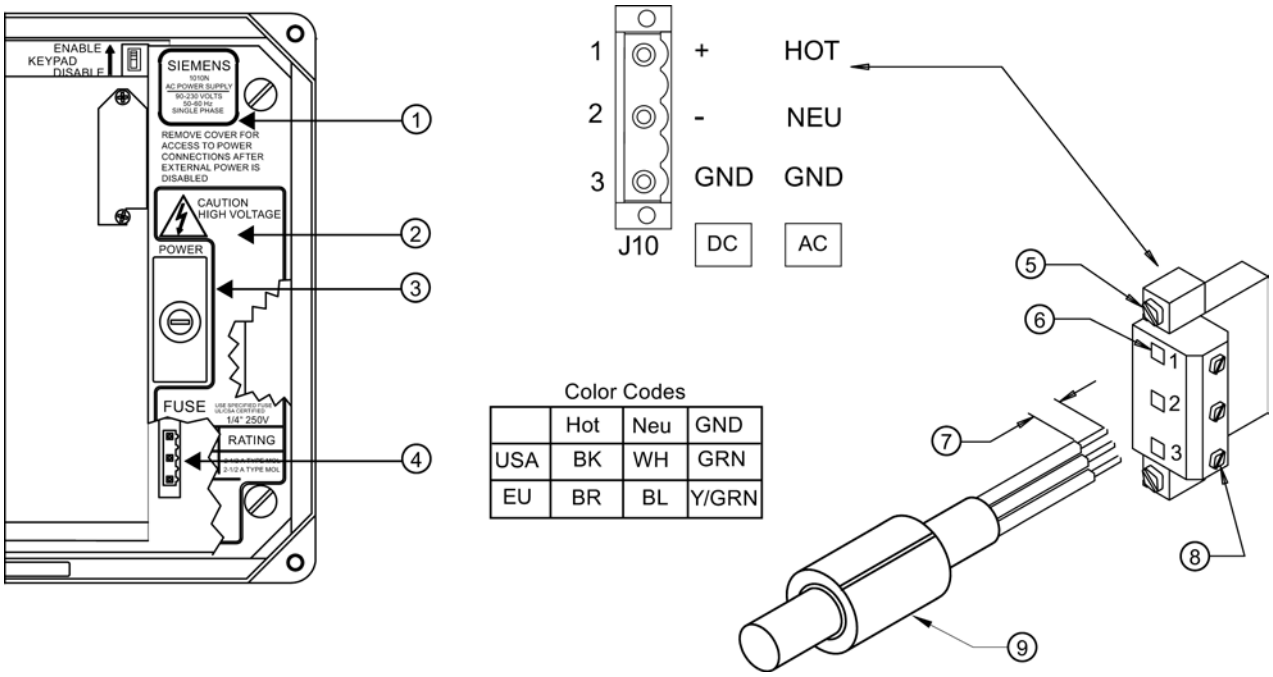
Contact with exposed wiring will lead to fire, electric shock or serious injury

Turn off main power before installing AC connections to the transmitter. .

Note

If the transmitter is not already mounted and cabling has not been run, proceed to Mounting the Transmitter (Page 28) before connecting power.

1. Open the transmitter top cover by releasing the cover latch (for IP66 NEMA 7, remove bolts).
2. Unscrew the two power supply access cover fasteners and remove access cover.
3. Locate power supply connector J10. Using a flat blade screwdriver, remove plug from connector J10. Set aside.



① Power Supply
② Power Supply Access Cover
③ Fuse F1
④ Input Power Conn. J10
⑤ Connector mounting screws
⑥ Wire Entry
⑦ Strip length 8mm (0.31 in)
⑧ Wire Clamp Screws
⑨ Ferrite power cord

Figure 5-1 Input Power (J10) Wiring

4. Pull the desired length of input power wires through a cable gland and into transmitter case.
5. Wire input power connector for AC or DC power depending on power supply provided.

Note

Dress cables and make sure cable length is not excessive as to impede proper replacement of access cover.

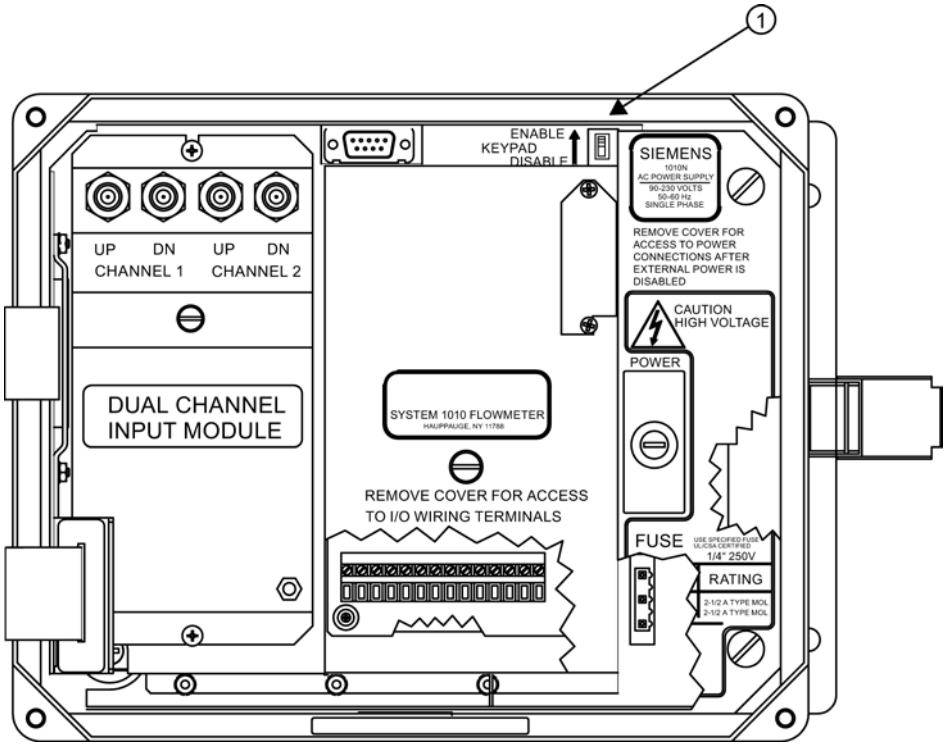
6. Insert wires into wire entry holes and secure by tightening wire clamp screws (see figure above).

Note

Power Supply connector wires should be stripped AWG 12 - 18 stranded wire or solid conductors.

7. Plug input power plug into connector J10 and secure using two captive connector mounting screws.

8. Replace access cover. Make sure Keypad Enable switch is in the "Enable" position (see below).



① Keypad Enable Switch

9. If installing a Temperature Sensor, go to Wiring Temperature Sensor to Transmitter (Page 35)below. If not, proceed to Navigating The Menu (Page 38).

5.2.2 Wiring Temperature Sensor to Transmitter

Wiring Temperature Sensor to the Analog Input Module Sensor

⚠ DANGER

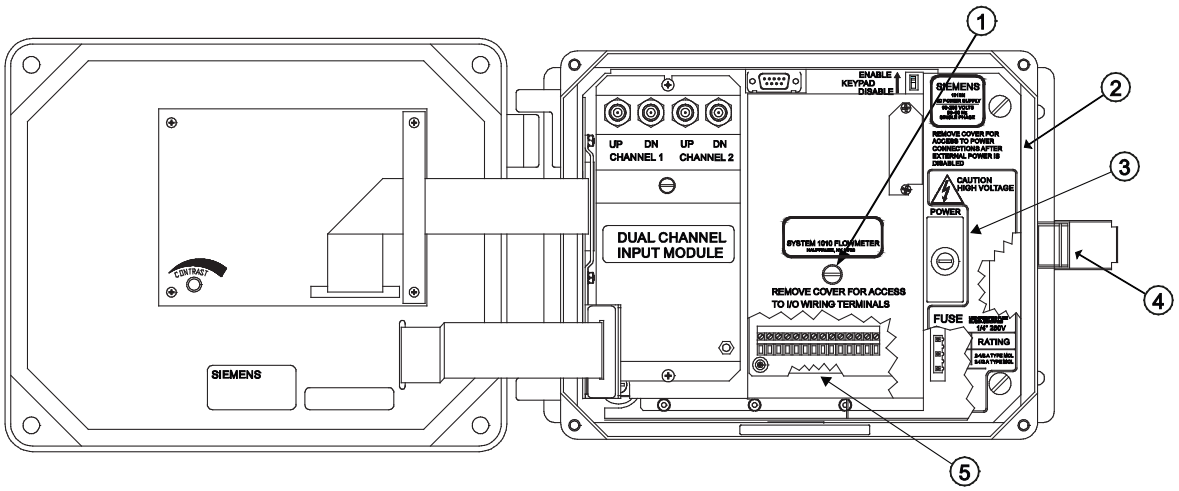
Hazard Voltage

Contact with exposed wiring will lead to fire, electric shock, or serious personal injury.

Set transmitter and instrumentation power to OFF when inserting or removing the Analog Input Module, or when making connections to TB1, TB2, TB3 and TB4.

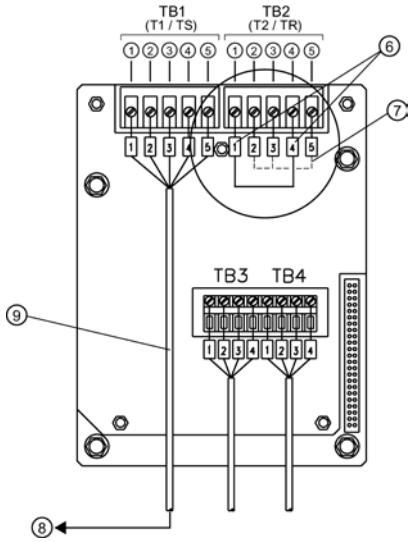
1. Disconnect power to the transmitter.
2. Open the transmitter top cover by releasing the cover latch.

3. Loosen the captive thumbscrew securing the Access Cover and remove Access Cover.
4. Using a flat-blade screwdriver, remove four captive screws securing the I/O board. Remove board and set it aside.



① Access Cover Screw
② Transmitter
③ Fuse
④ Latch
⑤ Access to Analog Input Module

Figure 5-2 Analog Input Module Access



① Black
② Orange
③ Brown
④ Red
⑤ Blue
⑥ Short Terminals 1 and 4 (For FUE1010 - TB2 is used for another Temperature sensor.)
⑦ Ground Terminals 2 and 3 to Terminal 5
⑧ To Sensor
⑨ 7ME39600CR (992EC) Series Cable

Figure 5-3 Single Channel Temperature Sensor Inputs

Wiring Temperature Sensor Board

1. Using a flat-blade screwdriver, loosen Terminal Block TB1 and TB2 screws.
2. Wire the RTD liquid 992EC temperature cable as shown in the table below:

992EC Series Cable	Terminal TB1
Wire #1 (Black)	To TB1--1
Wire #2 (Orange)	To TB1--2
Wire #3 (Brown)	To TB1--3
Wire #4 (Red)	To TB1--4
Wire #5 GND/SHLD (Blue)	*To TB1--5

Note

*For cathodically protected pipes, do not attach blue #5 wire at RTD end of cable.

3. For single channel use, wire TB2 as shown in figure above.
4. For dual channel use, connect Channel 2 temperature sensor to TB2.
5. Replace I/O Board and secure with four captive screws paying careful attention to pin alignment.
6. Replace Access Cover and finger tighten captive thumbscrew.

Note

TB3 and TB4 are also active analog inputs. See wiring table below.

Pin	TB3 Function	TB4 Function	Use	Description	Behavior	Load	Wiring
1	AUX. 1 IN	AUX. 3 IN	Iin1 Input	Analog current input referenced to meter ground.	4 to 20mA	200Ω	1000 ft. Max w/o factory approval
2	AUX. 1 COM	AUX. 3 COM	Iin1 Common				
3	AUX. 2 IN	AUX. 4 IN	Iin2 Input				
4	AUX. 2 COM	AUX. 4 COM	Iin2 Common				

Note

If analog input is used for temperature, this will take priority over clamp-on RTD measurement.

NOTICE

Power Supply Damage

Improper power connections will damage power supply.

Ensure that all AC or DC power supply connections are properly connected to the appropriate power source (100-250 VAC @ 50/60 Hz or 9-36 VDC).

⚠ WARNING

Electrical Shock Hazard

Certain parts inside the device carry dangerous high voltage and may result in electric shock, or serious personal injury.

The transmitter must be grounded and the top cover closed before applying power to the device.

7. Connect power cables to the appropriate power source (90-240 VAC @ 50-60 Hz or 9-36 VDC). Close cover.

5.3 Navigating the Menu

Menu Navigation and Initial Power-up

Before you can navigate the menu you must first power-up the flow meter. Follow the instructions below to ensure safe connection of power to the meter and then proceed to the menu navigation.

NOTICE

Power Supply Damage

Improper power connections will damage power supply.

Ensure that all AC or DC power supply connections are properly connected to the appropriate power source (100-250 VAC @ 50/60 Hz or 9-36 VDC).

WARNING

Electrical Shock Hazard

Certain parts inside the device carry dangerous high voltage that may lead to fire, electric shock or serious injury.

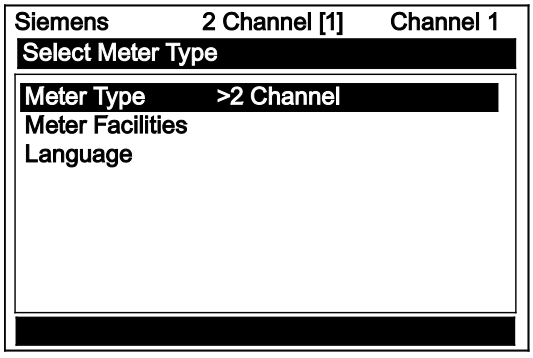
The transmitter must be grounded and the top cover closed before applying power to the device.

Power-up Procedure

1. Connect the power cables to the appropriate power source (90-240 VAC @ 50/60 Hz or 9-36 VDC). Close top cover.
2. Apply power.
3. Within 10 seconds of power-up the main display will become active and a typical Siemens graphic will appear briefly. The screen also identifies the software version of the unit as shown below.

① Software Version (x.xx.xx)

4. Press the <MENU> key and the Main Menu will appear.



Installation Menu Navigation

The Installation Menu Chart is a multi-level structure divided into three columns from left to right		
Level A - lists the major menu categories.		
Level B - list the menu cells associated with Level A. You can enter data into Level B menu cells that are display parameters in a column at the right of the screen.		
Level C - lists the Level B data		
Level A	**Level B**	**Level C**
	Recall Site Setup	**Pump 1** **Pump 2**
	Channel Enable	
	Create/Name Site	
	Site Security	
	Delete Site Setup	
	Save/Rename Site	

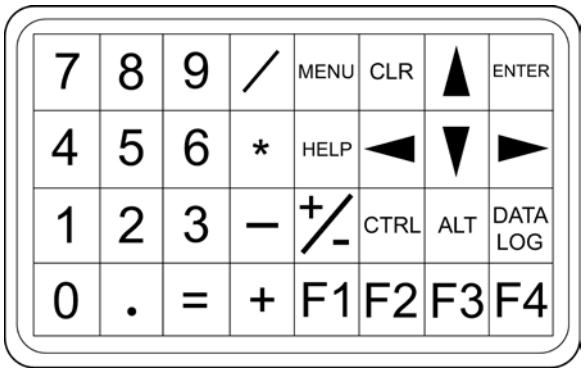


Figure 5-4 Keypad

Table 5- 1 Keypad Function Chart

Keys	Description
MENU	Press to activate the Installation Menu.
ENTER	Store numeric data, select from option lists, etc.
Left / Right Arrows	Menu navigation keys move cursor. Use <Left Arrow> key to return to previous menus.
Up / Down Arrows	Same as <Left> and <Right> arrows. Scrolls option lists and graphic display screen.
CLR	Erases data or selects list options.
Numbers 0 - 9	Use to type numeric data.
Decimal Point	Use for decimal points in numeric data.
Math Operators	4-function math operations in numeric entry cells.
"F" Keys 1, 2, and 3	Used to start/stop/reset Totalizer.
F4	Caution: used during power up for system reset.
CTRL and ALT	Used as shift keys for alternative key functions.
DATALOG	Triggers immediate Datalogger report.
Plus and Minus [+ / -]	Changes the sign of numeric data.

5.4 Programming the Transmitter

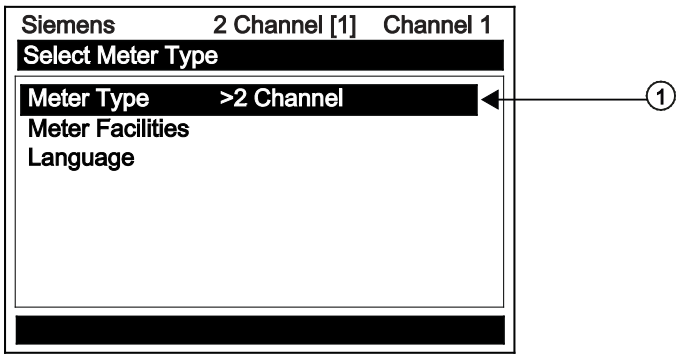
Select Language and Units

Note

Before creating a site select a Language and then English or Metric units from the [Meter Facilities] menu.

Selecting a Meter Type (Required Entry)

1. Press the <MENU> key and select [Meter Type].
2. If English is not the preferred language, scroll to [Language] to change.
3. Scroll to [Meter Type], press the <Right Arrow> and scroll to [2 Channel].
4. Press <ENTER> to select. Press <Right Arrow> to select a different meter function, if available and desired then press <ENTER>.



① Select for measuring two different pipes. (Not available for all models.)

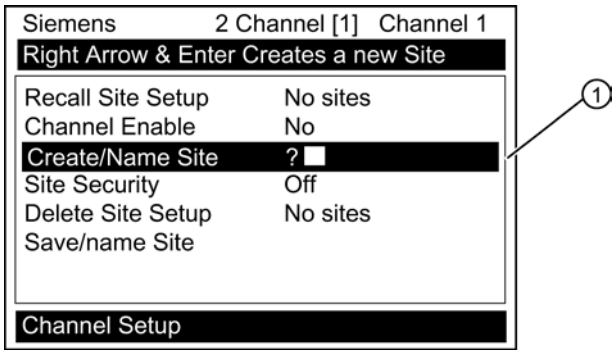
Create a Site (Required Entry)

1. At the [Channel Setup] menu press the <Right Arrow>.

Note

Before proceeding make sure that English or Metric units have been selected.

2. Press the <Down Arrow> to select the [Create/Name Site] and enter a Site name.
3. Press <Right Arrow> to create Site name (e.g., ABC).



① Insert desired name (8 characters max.)

Note

To select letters: Press <Right Arrow> to cursor and then press <Up/Down Arrows> to select letters. Press <ENTER> when done.

4. Press <Left Arrow> and return to the [Channel Setup] menu.

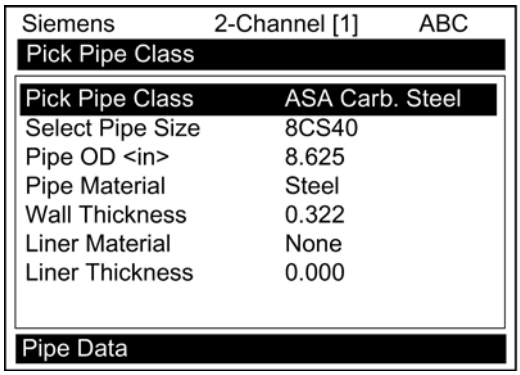
Note

After site configuration procedures that follow are complete the newly created site must be saved again to retain the new site data. Refer to the Save/Rename Site procedure below.

Select Pipe Class

Pipe Class is a pre-loaded set of default pipe sizes for various ASA and metric pipes. If the intended pipe is standard the user may select this function to pre-load necessary pipe data, otherwise enter data manually using [Pipe O.D.], [Pipe Material] and [Wall Thickness].

1. Press the <Right Arrow> to select Pipe Class. Press <Right Arrow> again and scroll to desired Pipe Class.
2. Press <ENTER> to select.



3. Pre-programmed Pipe Size and relevant pipe parameters will appear in menu cells. Press <Right Arrow> and scroll to desired pipe size. Press <ENTER>. Enter dimensions manually if pre-programmed dimensions do not match application.

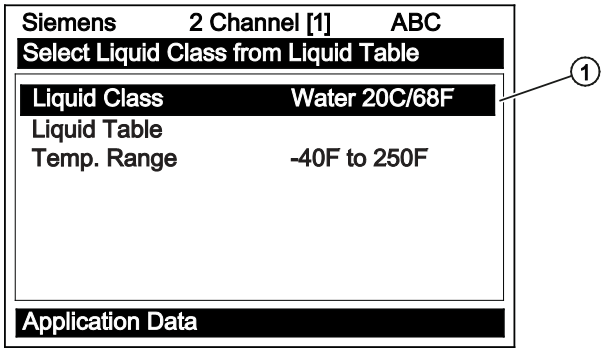
Note

The DN sizes listed in the [Select Pipe Size] menu option list are referenced to DIN Table 2448. After selecting pipe size, check pipe OD and wall thickness for correct dimensions.

4. Press the <Left Arrow> and return to the [Channel Setup] menu.

Select Liquid Class

1. Press the <Down Arrow> and scroll to [Application Data].
2. Press the <Right Arrow> to select [Liquid Class].
3. Press the <Right Arrow> again and scroll to desired liquid.
4. Press <ENTER> to save selection.



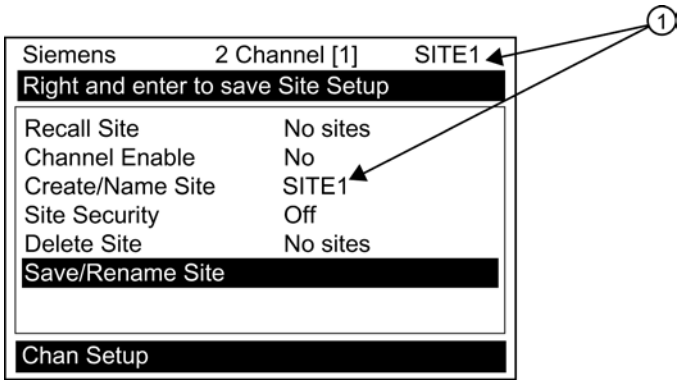
① Select from list.

5. Press the <Left Arrow> and return to the [Channel Setup] menu.

Save/Rename Site procedure

Whenever new parameters are changed or added it is recommended to save the configuration.

1. **To save all programmed data to site**, return to [Channel Setup] menu.
2. Press <Right Arrow> and scroll to [Save/Rename Site].



① The saved site name now appears in the menu screen.

3. Press <Right Arrow> and then <ENTER> to save all programmed data to site.
4. To return to the top menu, continue to press the <Left Arrow> key.

5.5 Sensor Installation

5.5.1 Preliminary Installation Procedures

Reflect and Direct Sensor Mounting

Reflect and Direct mounting modes are supported for clamp-on sensors. The transmitter recommends a mounting mode after analyzing your pipe and liquid data entries.

Note

IMPORTANT

For pipes larger than 30.48 cm (12-inches) sensors should be mounted in Direct mode only.

1. After receiving the spacing index from the Installation Menu, prepare the pipe surface area where the sensors will be mounted. Use the supplied abrasive material to prepare a clean contact surface for the sensors.
2. Make a note of the Number Index displayed in the [Install Sensor] menu. Check to ensure that you have a matched set of sensors. They both should have the same S/N number but marked with either an "A" or "B" (e.g. 100A and 100B).

Mounting Supplies

The following items will be needed to mount the sensors in addition to what is supplied:

- Flat blade screwdriver
- Tape, chalk and a ruler or measuring tape (For Direct mounting)

Mounting Strap Kits

The available Mounting Strap kits are listed below. Each kit comes with bands. Sizes cover designated pipe diameter ranges and a spacing guide for Direct Mount.

Mounting Strap Kits	Pipe Diameter	SAE Band Sizes (Qty.)
7ME396000SM00	2" (50.8mm) to 7" (177.8mm)	#88 (2) #128 (2)
7ME396000SM10	2" (50.8mm) to 13" (330.2mm)	#88 (2) #152 (2)
7ME396000SM20	13" (330.2mm) to 24" (609.6mm	#188 (2) #280 (2)
7ME396000SM30	24" (609.6mm to 48" (1219.2mm)	#152 (4) #312 (4)

Note

Optional larger bands sizes are available for larger pipe diameters.

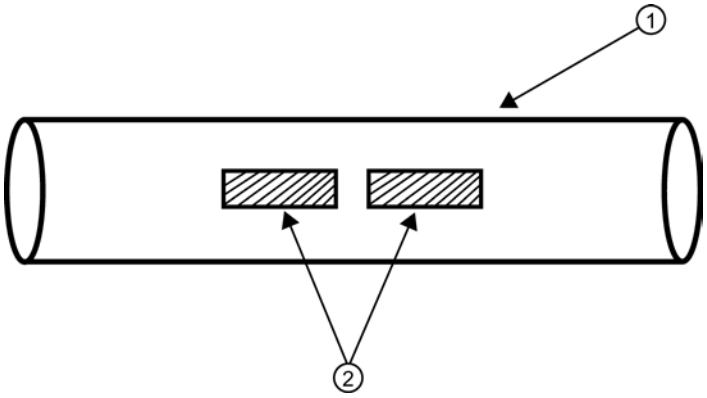
Selecting a location for the sensors

1. The pipe at the mounting location must remain full, even at zero flow to maintain operation.
2. For the purposes of this device any location of straight pipe long enough to physically mount the sensors is adequate. Unlike ultrasonic flow meters, this interface detector does not require lengths of straight run to perform as specified.
3. Avoid, if possible, installing the sensors downstream from a throttling valve, a mixing tank, the discharge of a positive displacement pump or any other equipment that could possibly aerate the liquid causing signal aberrations. The best location will be as free as possible from flow disturbances, vibration, sources of heat, noise, or radiated energy.
4. Do not mount the sensors on a surface aberration (pipe seam, etc.)
5. Do not mount sensors from different ultrasonic meters on the same pipe within reasonable distance. Also, do not run the sensor cables in common bundles with cables from other instrumentation. Sensor cables originating from a common transmitter can be in a single conduit.

6. Always mount sensors on a dry pipe surface. Optional submersible units can be purchased for installation in wet environments and must be installed in accordance with factory instructions.
7. Avoid mounting sensors on the top or bottom of a horizontal pipe. The best placement on a horizontal pipe is either the three o'clock or nine o'clock position. Mounting on a vertical pipe is recommended only if flow is in the upward direction. When mounting on a vertical pipe flowing in a downward direction make sure there is sufficient back pressure in the system to maintain a full pipe.

Preparing the Pipe

Decide on your mounting mode (Direct or Reflect). Choose Direct Mode if your pipe is plastic.



① Pipe
② Cleaned Areas

Figure 5-5 Pipe Surface Preparation

Direct mount provides a shorter sonic beam path. This usually improves signal with sonically attenuative liquids or pipe materials. Direct mount is recommended for plastic pipes. Compared to Direct mounting, Reflect mount requires almost double the amount of mounting length. Therefore, direct mount may be the only option if the availability of mounting space is limited.

Reflect mount is recommended whenever possible because it is the simplest way to mount the sensors.

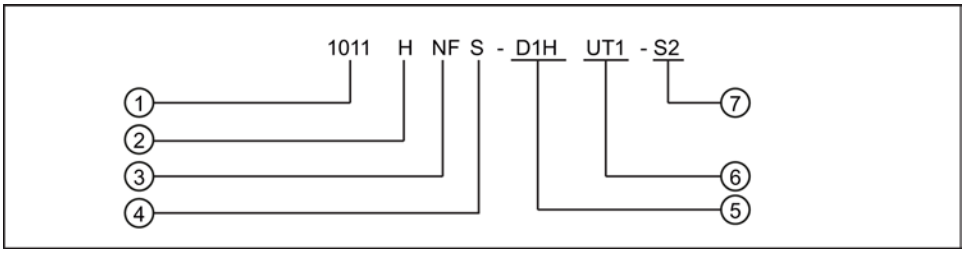
Ltn Menu Cell

The Ltn menu cell is a view only menu cell that shows the distance in inches or millimeters between the front faces of the sensors along the axis of the pipe. If you are mounting the sensors without a track or spacer bar, you have to space them according to this value. Note that Ltn may be a negative number for direct mount on very small pipes where the sensor spacing overlaps.

5.5.2 Sensor Identification and Selection

Sensor identification

The sensor part number located on the front face provides a detailed identification. For example, the Part Number: 1011HNS-D1T1-S2 means:

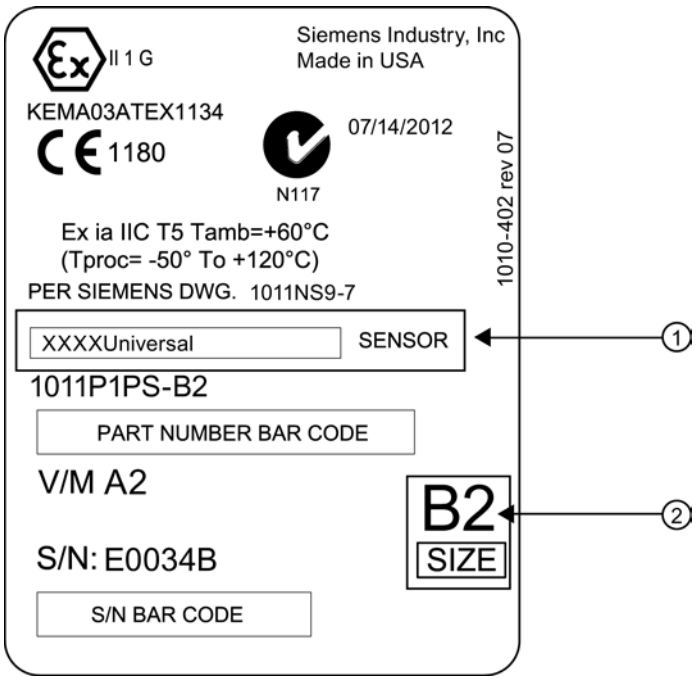


①	Model	⑤	Size
②	Hi Precision	⑥	Temperature
③	NEMA w/F-Conn	⑦	Agency Approved
④	Pipe Material		

Note

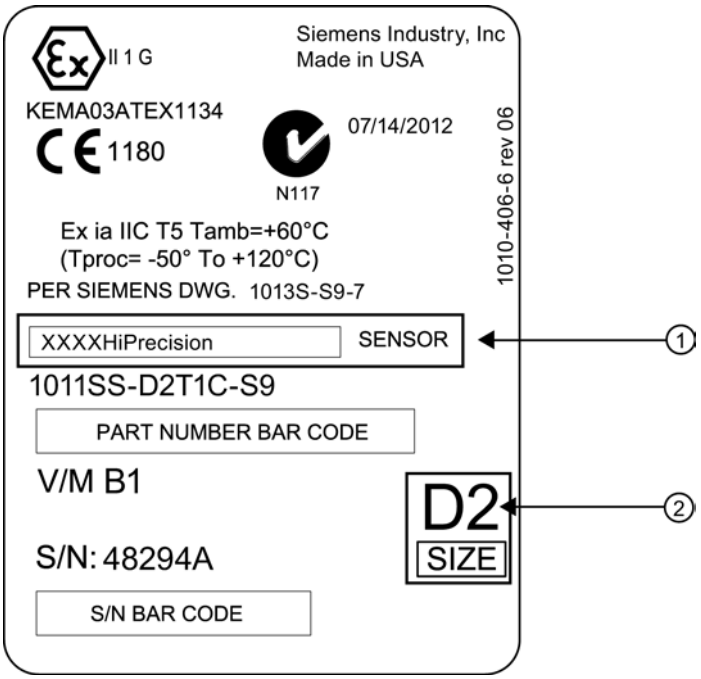
Check to make sure that the sensors are a matched set with the same serial numbers and marked with an "A" and "B" (e.g., 19256A and 19256B).

Typical Sensor Labels



① Universal Sensor model number
② Sensor size

Figure 5-6 Universal Sensor Label



① Hi Precision sensor model number
② Sensor size

Figure 5-7 Hi Precision Sensor Label

Sensor Selection

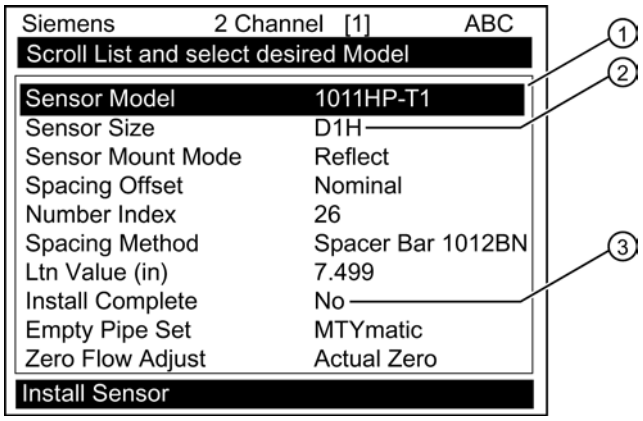
The following is a typical sensor selection procedure.

Note

The transmitter must be powered up before you can select a sensor model. Refer to Transmitter Wiring (Page 33).

1. Press <Left Arrow> to return to main menu. At [Meter Type], press the <Right Arrow> and then <ENTER>.
2. The [Channel Setup] menu will appear.
3. Press the <Down Arrow> to select [install Sensor].
4. Press the <Right Arrow> to [Sensor Model]. Press <Right Arrow> and scroll to select the sensor model number on the sensor label.

5. The drop down menu lists the following sensor selections:
   - 1011 Universal
   - 1011HP-T1 - Usable -40 to 120°C, recommended for Ø Temperature <40°C; Standard.
   - 1011HP-T2 - Usable -40 to 120°C, recommended for Ø Temperature >40°C - <80°C; Named as high temperature.
   - 1011HP-T3 - Usable -40 to 120°C, recommended for Ø Temperature >80°C <120°C; special request.
   - 991 Universal
6. For this example, select the sensor model that appears on the sensor label then press <ENTER>.



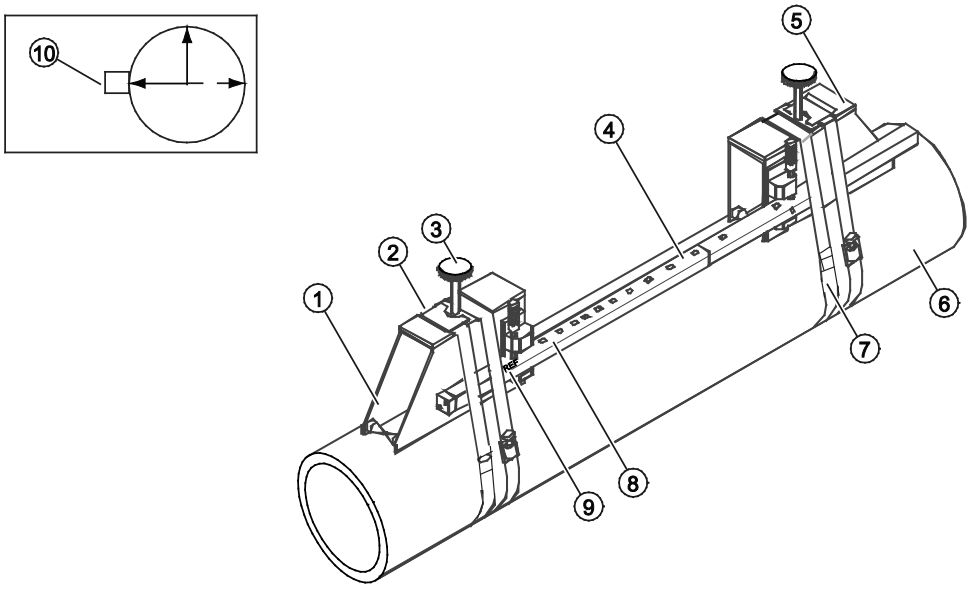
①	Select based on type
②	Select based on size
③	After sensor is mounted select "Install."

7. To select Sensor Size, press <Right Arrow>. Scroll to select the sensor size that matches the size indicated on the sensor label. Press <ENTER>.
8. At [Sensor Mount Mode], press the <Right Arrow>. Scroll to select [Reflect] or [Direct] mount and then press <ENTER>.
9. **IMPORTANT: Record Spacing Method and Number Index. This data will be used to mount the sensors.**
10. Sensors can now be mounted. Refer to Sensor Installation mounting procedures and select the mounting mode desired.
11. **After sensors are mounted scroll to [Install Complete] and select [Install].**

5.5.3 Reflect Mount

Mounting Frame Installation

1. On a flat surface, attach the Spacer Bar to a Mounting Frame so that the Reference Hole on the Spacer Bar fits over the metal post on the platform of the frame. Tighten the clamping screw.
2. Slide the second Mounting Frame onto the other end of the Spacer Bar and align the Number Index Hole with the metal post on the platform. Then tighten the clamping screw. *Ensure that the angled sides of both frames face away from each other.*
3. Wrap a Mounting Strap around the pipe. Make sure to position it so there is easy access to the Mounting Strap Adjusting Screw.
4. At the mounting location, place the Mounting Frame/Spacer Bar Assembly on the pipe so that it rests on the top of the pipe.
5. Engage the end of the Mounting Strap with the Mounting Strap Adjusting Screw.
6. Slide strap under the spring clip of one of the Mounting Frames.
7. Tighten the Mounting Strap Screw enough to take up all of the slack, but not enough to prevent rotation of the assembly. Attach the second mounting strap.
8. Rotate the assembly on the pipe to the final conditioned location, ensuring that it is straight along the pipe axis. (Refer to the sensor orientation diagram)
9. Tighten the mounting straps to seat the assembly firmly on the pipe. Do not over tighten.

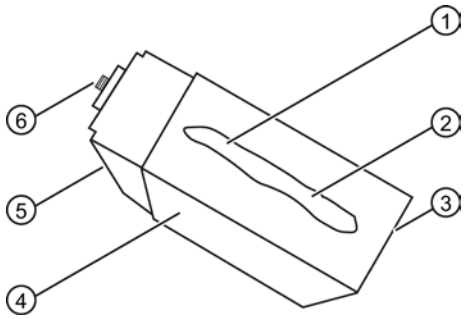


①	Front View	⑥	Pipe
②	Spring Clip (Not present on some models)	⑦	Mounting Strap Note: Optional 2nd Mounting Strap shown. Larger pipes over 76cm (30 inches) may need an additional support.
③	Sensor Clamping Screw	⑧	Spacer Bar Platform and Clamping Screw
④	Spacer Bar	⑨	Spacer Bar Reference Hole
⑤	7ME39600M Mounting Frame	⑩	Orientation for Single Beam Sensor at 9 o'clock position

Figure 5-8 Sensor Installation

Installing the Sensor

1. Take either sensor and apply a continuous lengthwise 3mm (1/8-inch) bead of coupling compound across the center of the sensor emitting surface.



①	Coupling Compound	④	Sensor
②	Emitting Surface	⑤	Angled Edge
③	Back End	⑥	F-Connector

Figure 5-9 Sensor

2. Slide sensor into a mounting frame back end first aligning the angled edge of the sensor with the angled edge of the mounting frame. Keep sensor from making contact with the pipe until it butts up against the mounting frame stop. Push sensor down to mate with pipe.
3. Tighten the sensor clamping screws to hold the sensor firmly in place. *Repeat procedure for the other sensor.*
4. If installing a temperature sensor proceed to Mounting Temperature Sensor (Page 62). If not, proceed to Sensor Wiring (Page 64).

5.5.4 Direct Mount

Sensor Installation using Mounting Frames, Spacer Bar and Spacing Guides

The combination of mounting frames, spacer bar and spacing guides is the recommended way to mount Direct Mode sensors. The mounting frame establishes the axial alignment of the sensors and allows you to remove and replace either sensor while preserving their exact mounting location. This method ensures that sensors will align exactly 180° from each other and remain spaced the proper distance apart.

For Direct Mode mounting, a spacer bar is used to establish the distance between sensors and a spacing guide to locate the sensors at the nine o'clock and three o'clock positions. Should the distance between sensors be beyond the span of a spacer bar, a measuring tape can be used. The Mylar spacing guide comes in various lengths and widths to accommodate most pipe sizes.

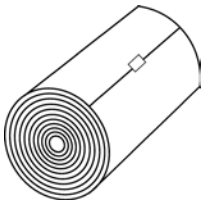
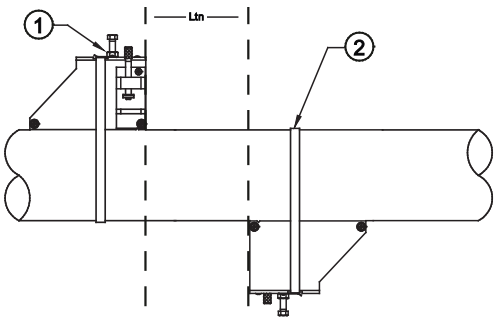


Figure 5-10 Mylar Spacing Guide

1. After receiving the spacing index from the Installation Menu, prepare the pipe surface area where the sensors will be mounted.
2. Make a note of the Number Index displayed in the [Install Sensor] menu. Check to ensure that you have a matched set of sensors. They both should have the same S/N number but marked with either an "A" or "B" (e.g. 100A and 100B).
3. Temporarily install the mounting frames as described in the Reflect Mount (Page 51) section.
4. Wrap the supplied Mylar guide around the pipe along side the outside of the downstream mounting frame noting the point of over lap with a marker.
5. Remove the guide; fold in half at the point of overlap creating a crease in the Mylar at the halfway point. This crease will act as a location point where the sensor will sit centered 180 degrees on the opposite side of the pipe.
6. Re-install the Mylar guide ensuring alignment of the overlap point with the center of the downstream mounting frame.
7. Relocate the downstream mounting frame to the opposite side of the pipe centered at the crease. This method simply transposes the location of the downstream mounting frame at its proper spacing to the same location on the opposite side of the pipe.
8. Install the sensors as described in Installing the Sensor (Page 51).



① Mounting Frame
② Mounting Strap or Chain

Figure 5-11 High Precision Sensor Direct Mounting

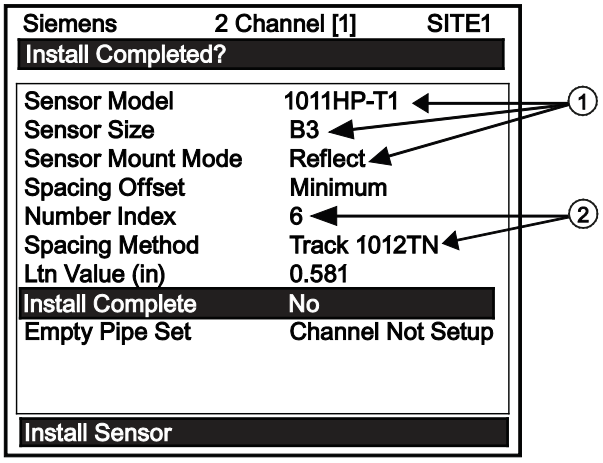
5.5.5 1012T Mounting Tracks

Using 1012T Sensor Mounting Tracks

The 1012TN and 1012TNH Mounting Tracks provide a rigid mounting platform for Series 1011 Universal or high precision size A or B sensors. The mounting tracks service pipe sizes up to a maximum of 140 mm (5.00") outer diameter. The 1012T mounting tracks support both Direct and Reflect mounting modes. The transmitter recommends the appropriate sensors, mounting track and mounting mode, based on the pipe data entries.

Installing a 1012T Mounting Track in Reflect Mode

The sensor installation procedures show how the automatic selection of sensors, mounting mode and spacing method are established. Examine the figure below, which illustrates a typical [Install Sensor] menu screen. Note the automatic assignment of mounting track part number, plus the designation of the number index.



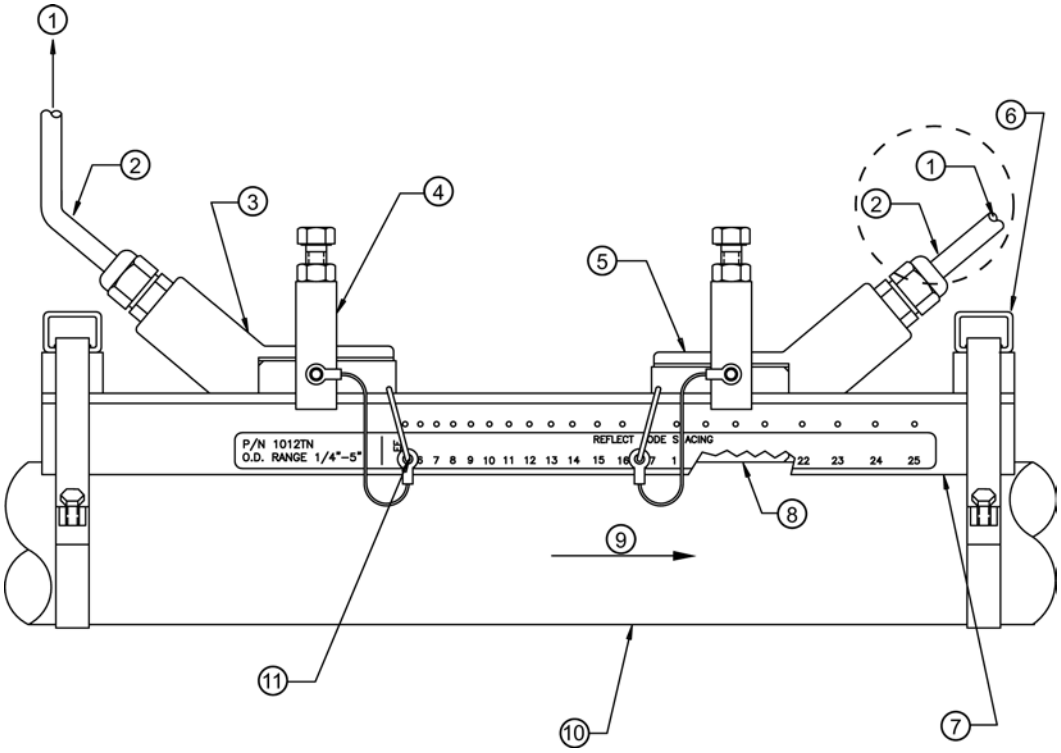
① Sensor type, size and mounting mode selection.

② Automatic selection of mounting track part number and number index.

1. Perform all required menu steps up until the point where you respond to the [Install Complete] prompt.
2. Make note of the Number Index. Check to ensure that you have a matched set of sensors. They both should have the same serial number but marked with either an "A" or "B" (e.g. 100A and 100B).

Note

Index pins are used as stops against each sensor inserted at the reference hole for one sensor and the Number Index hole for the other sensor (see ⑪ in figure below).



①	To SITRANS F 1010 Transmitter	⑥	Mounting Strap Guide
②	7ME39600CK Series Cable (992 CNF)	⑦	7ME39600M Series Mounting Track (1012TN, 1012TNH)
③	7ME3950 Series Sensor Upstream	⑧	Ultrasonic Couplant
④	Sensor Clamp	⑨	Flow direction
⑤	7ME3950 Series Sensor Downstream	⑩	Pipe
		⑪	REF Hole Index Pin

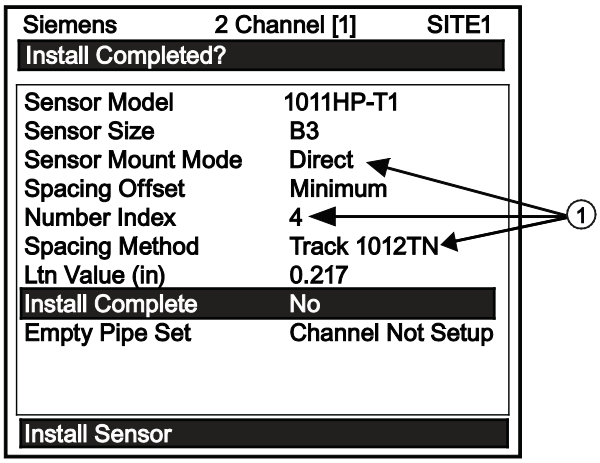
Figure 5-12 Reflect Mount with Model 1012TN Mounting Track (Side View)

3. Place the track rail assembly on the top surface of the pipe at the location where you have determined it would be mounted. Ensure that it is a smooth area without any raised spots or seams.
4. Holding the mounting track assembly in place, loop one of the strap clamps under the pipe, pull it around and maintain tension while slipping a link over the tension screw hook. Tighten the tension screw enough to hold the assembly on the pipe, but still allow rotation. Repeat for the other mounting strap.

5. Rotate the track rail assembly to the intended mounting position on the pipe, then tighten both tension screws just enough to prevent rotation. Do not over tighten.
6. Prepare the sensor location by degreasing the surface, if needed, and removing any grit, corrosion, rust, loose paint or surface irregularities with the abrasive pipe conditioning material provided. Clean the pipe of all debris and abrasive particles.
7. Insert one index pin into the reference hole and one in the Number Index hole previously mentioned.
8. Apply a thin band of supplied couplant compound to the sensor's emitting surface.
9. One at a time, place the sensors between the track rails, slightly behind the pin and under the clamping screw assembly. Slide it forward until it butts up firmly against the reference pin.
10. Once each sensor is in place secure it with the sensor clamping screw. Do not over tighten.
11. Repeat the procedure for the Number Index sensor making sure to insert an index pin into the correct Number Index hole
12. Observing the upstream and downstream orientation, attach the UP (upstream) and DN (downstream) cables to the sensors and make snug. Attach the other ends to the UP and DN terminals of the transmitter.

Installing a 1012T Mounting Track in Direct Mode

The Sensor Installation procedures show how the automatic selection of sensors, mounting mode and spacing method are established. Examine the figure below, which illustrates a typical [Install Sensor] menu screen. Note the automatic assignment of model numbers for the sensor and mounting track, plus the designation of the number index.



① Automatic selection of mounting track part number , mount mode and number index

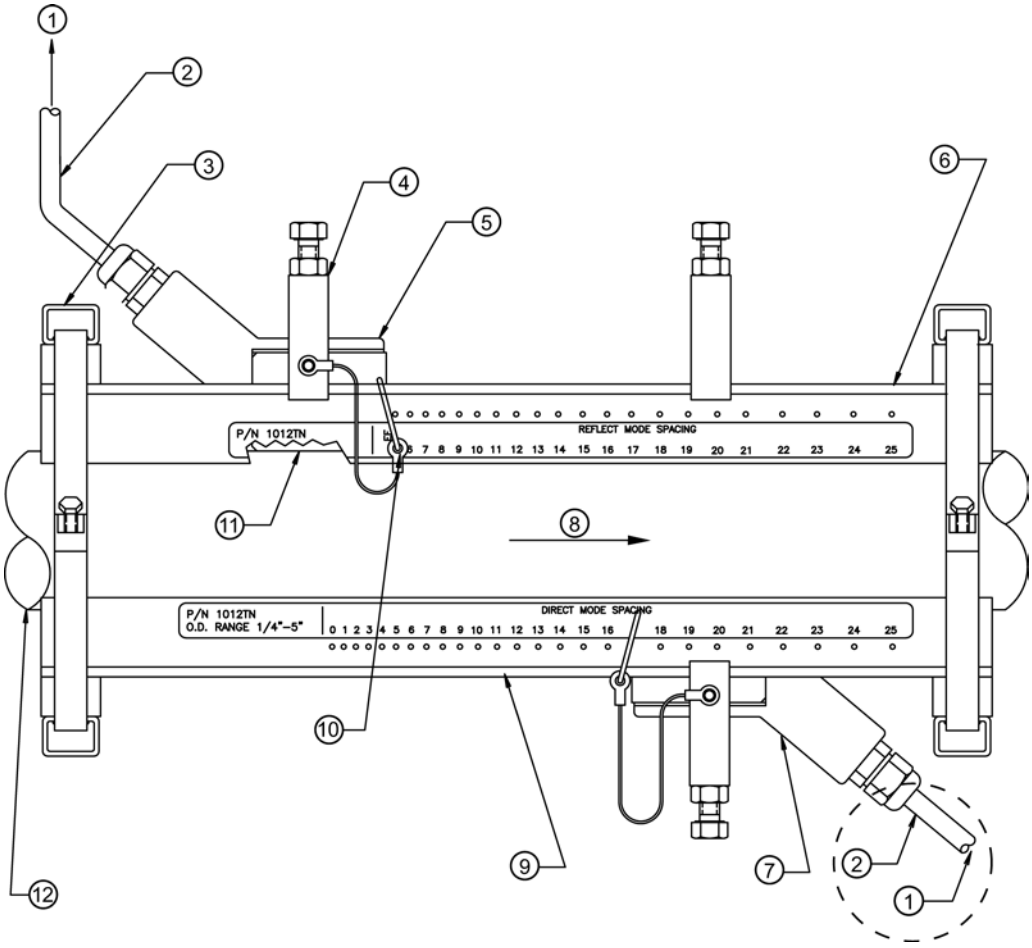
The combination of two Model 7ME39600M (1012TN) Mounting Tracks and a spacer guide is the recommended way to mount sensors in the Direct Mode. This method ensures that sensors will align exactly 180° from each other and remain spaced the proper distance apart.

The Direct Mount configuration uses a set of two track rail assemblies; one for each sensor, installed 180° apart on the pipe. The set includes:

- Direct Mode Track Assembly - This track rail has number index holes for inserting an index pin to position the other sensor.

Note

Index pins are used as stops against each sensor at the reference hole for one sensor, and the Number Index hole for the other sensor (see ⑩ in figure below).



①	To SITRANS F Transmitter	⑦	7ME3950 Series Sensor Downstream
②	7ME39600CK Series Cable (992CNF)	⑧	Flow direction
③	Mounting Strap Guide	⑨	7ME39600M Series Mounting Track (1012TN, 1012TNH)
④	Sensor Clamp	⑩	REF Hole Index Pin
⑤	7ME3950 Series Sensor Upstream	⑪	Ultrasonic Couplant Compound
⑥	7ME39600M Series Mounting Track (1012TN, 1012TNH)	⑫	Pipe

Figure 5-13 Direct Mount 180° opposed with Mounting Tracks

1. Perform all required menu programming steps up until the point where you respond to the [Install Complete] prompt.
2. Make a note of the reported Number Index displayed in the [Install Sensor] menu. Check to ensure that you have a matched set of sensors. They both should have the same serial number but marked with either an "A" or "B" (e.g. 100A and 100B).

Note

Some sensors require a right-angle adapter. This adapter should be installed before placing the sensors in the tracks.

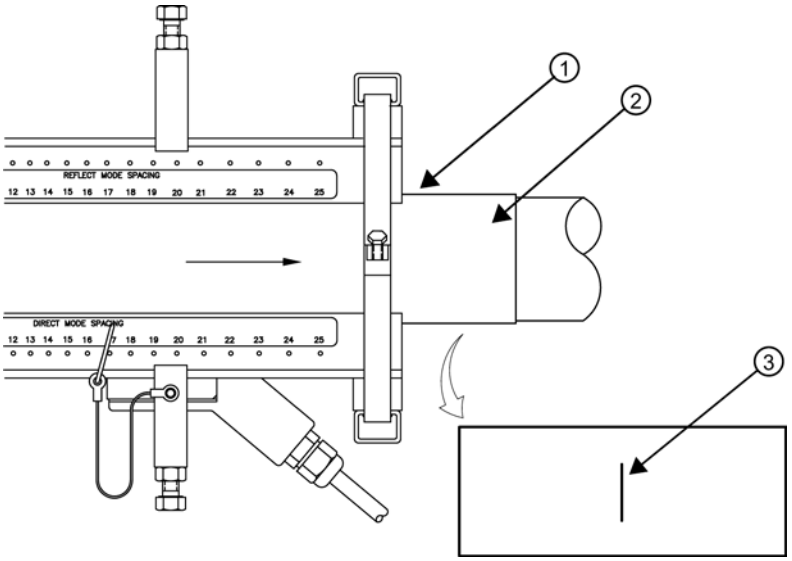
3. Prepare pipe for the track mounts by degreasing the surface, if needed, and removing any grit, corrosion, rust, loose paint or surface irregularities with the abrasive pipe conditioning material provided.
4. Wrap the mounting strap around the pipe and through the strap guide of both tracks.
5. Finger-tighten the chain Tension Screw to secure the strap and tracks to the pipe.

Note

For easier installation, it may be helpful to use a tie, tape or bungee cord to hold the two tracks in place while mounting.

Positioning Track Assemblies

1. Wrap the supplied Mylar guide around the pipe and alongside the track assemblies noting the point of overlap with a marker.
2. Remove the guide; fold in half at the point of overlap creating a crease in the Mylar at the halfway point. This crease will act as a location point where the track will sit centered 180 degrees on the opposite side of the pipe.
3. Re-install the Mylar guide ensuring alignment of the overlap point with the center of one track.
4. Loosen the mounting straps enough to allow you to rotate the track assembly until the center of one track aligns with the center line on the Spacer Guide and the center of the other track aligns at the point where the Spacer Guide ends meet. Use the edge of the Mylar guide to ensure the tracks are parallel. The tracks should now be 180° apart. Tighten both straps (or chains, if provided).

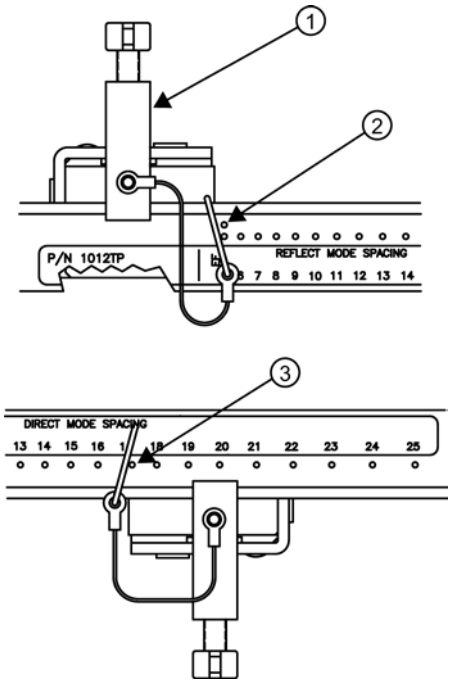


① Align tracks with Spacer Guide edge
② Mylar Spacer Guide
③ Halfway distance of Spacer Guide

Figure 5-14 Track Rail Alignment

Sensor Installation

1. Insert an index pin into the REF hole of the track marked "Reflect Mode Spacing."
2. Take one sensor and apply a 3mm (1/8-inch) continuous bead of couplant compound along the center of the contact surface of the sensor. Insert it between the track rails and to the left of the index pin with the cable connector pointing away from the pin. Move the sensor until the pin stops it. Hold sensor in place. Move sensor clamping screw over the sensor and tighten.



① Sensor Clamping Screw
② REF hole
③ Number Index hole

Figure 5-15 REF and Number Index Pin Locations

3. Insert the other index pin into the correct Number Index hole on the other track marked "Direct Mode Spacing."
4. Apply a 3mm (1/8-inch) continuous bead of couplant compound along the center of the contact surface of the second sensor.

Note

Remember to install the sensors with the cable connectors facing away from each other.

5. Insert the second sensor into the track rail with its cable connector pointing away from the pin. Move the sensor until it's stopped by the pin. Move sensor clamping screw over the sensor and tighten.
6. Once the sensors are in place, secure with its clamping screws. Do not over tighten.

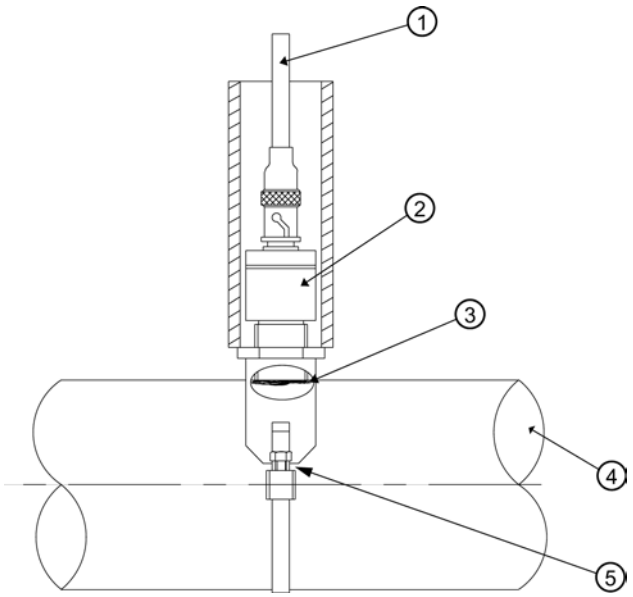
7. Observing the upstream and downstream orientation, attach the UP (upstream) and DN (downstream) cables to the sensors and make snug. Attach the other ends to the UP and DN terminals of the transmitter.
8. Proceed to Commissioning (Page 65).

5.5.6 Mounting Temperature Sensors

Temperature is used to normalize the liquids sonic velocity in order to properly determine interfaces and for density determination. Temperature sensors are available in clamp-on style or in insert (Thermowell) style. Refer to the table below. Both styles incorporate 1000 ohm platinum RTD's for high precision.

Table 5- 2 Temperature Sensors

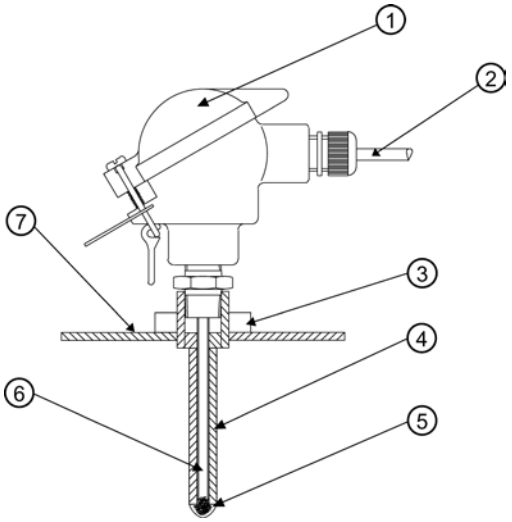
Description	Part Number
Standard clamp-on RTD	7ME39501TA00
Submersible clamp-on RTD	7ME39501TB00
Insertion style RTD (size 1): 140mm (5.5 in)	7ME39501TJ00
Insertion style RTD (size 2): 216mm (8.5 in)	7ME39501TJ01
Insertion style RTD (size 3): 292mm (11.5 in)	7ME39501TJ02
Insertion style RTD (size 4): 368mm (14.5 in)	7ME39501TJ03



① 7ME39600CR (992EC) Series Cable
② Clamp-on Temperature Sensor
③ Thermal Couplant
④ Pipe
⑤ Mounting Assembly

Figure 5-16 Clamp-on Temperature Sensor

Clamp-on style sensors are mounted on the surface of the monitored pipe using series mounting assemblies. Apply a generous quantity of thermal couplant (provided) to the tip of the sensor and attach it securely to the cleaned pipe surface with the proper mounting assembly. Temperature measurement anomalies resulting from variations in the ambient conditions can be minimized by insulating the pipe and sensor after installation.



①	Temperature Sensor Connector Head Assembly	⑤	Thermal Couplant
②	7ME39600CR (992EC) Series Cable	⑥	Spring Loaded Sensing Element
③	Threaded Pipe Fitting	⑦	Pipe Wall
④	Thermowell		

Figure 5-17 Insert Temperature Sensor

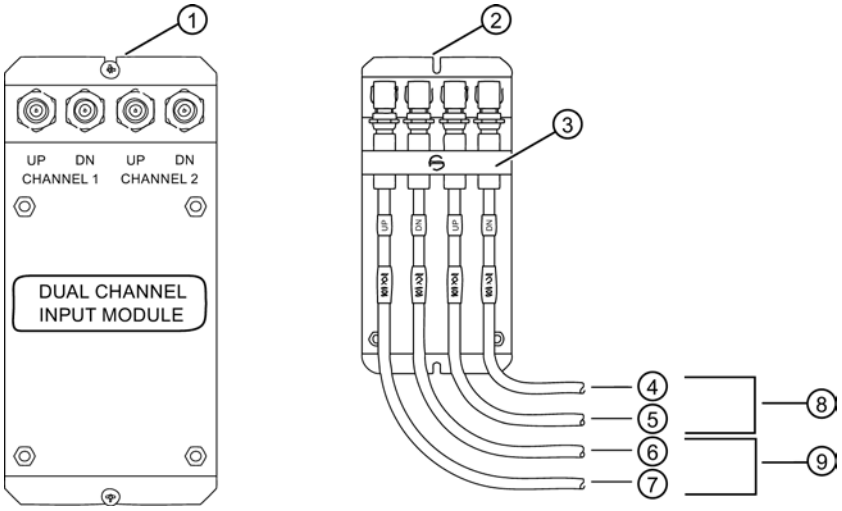
Insert sensors are designed to be used in pipes equipped with Thermowells. Sensors are spring-loaded, 1/4" diameter with 1/2" NPT integral connection heads, available in several lengths to accommodate a range of pipe sizes.

Proceed to Commissioning (Page 65).

5.6 Sensor Wiring

Connecting Sensors to the Transmitter

1. Open the transmitter top cover. Using a flat blade screwdriver, remove the Cable Strain Relief bracket (see figure below).
2. Observing the upstream and downstream orientation, attach the UP (upstream) and DN (downstream) cables to the sensors and make snug. Attach the other ends to the UP and DN terminals of the transmitter (see figure below).
3. Replace the Cable Strain Relief bracket. Close top cover.



①	Transmitter Input Module	⑤	To CH-2 UP
②	Sensor Cables Connected to Transmitter	⑥	To CH-1 DN
③	Cable Strain Relief Bracket	⑦	To CH-1 UP
④	To CH-2 DN	⑧	Channel 2
		⑨	Channel 1

Figure 5-18 Sensor Cable Connections

Commissioning

6

6.1 General requirements

Before commissioning it must be checked that:

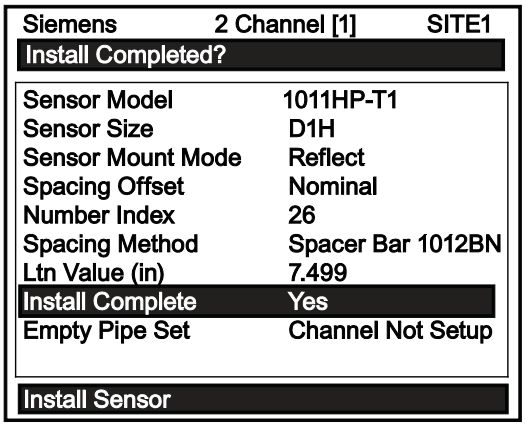
- The device has been installed and connected in accordance with the guidelines provided in chapter 4 "Installing/mounting (Page 27)" and chapter 5 "Connecting (Page 31)"
- Device installed in hazardous location meets the requirements described in "Installation in hazardous location (Page 14)"

6.2 Commissioning

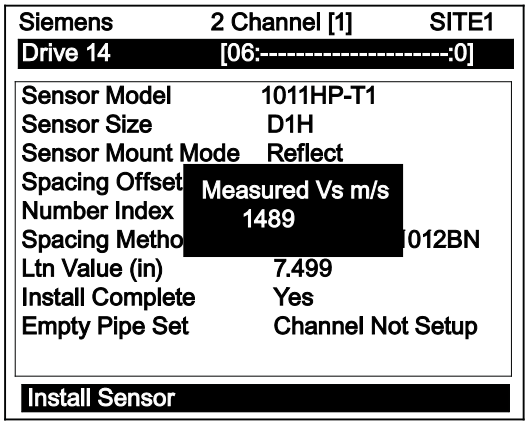
Note

Refer to [Programming the Transmitter] (Page 41) if needed.

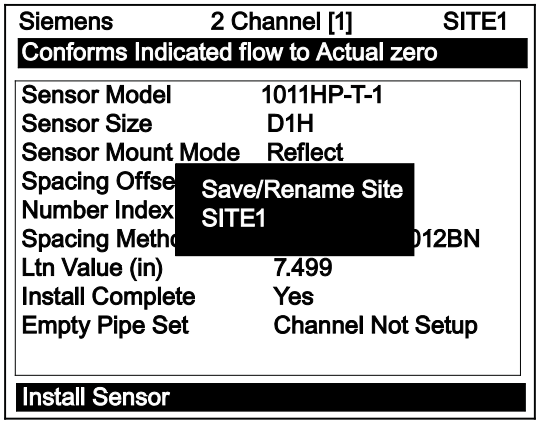
1. Scroll down to [Install Sensor] and press <Right Arrow>.
2. Scroll down to [Install Complete]. Press the <Right Arrow> and select [Install]. Press <ENTER>.



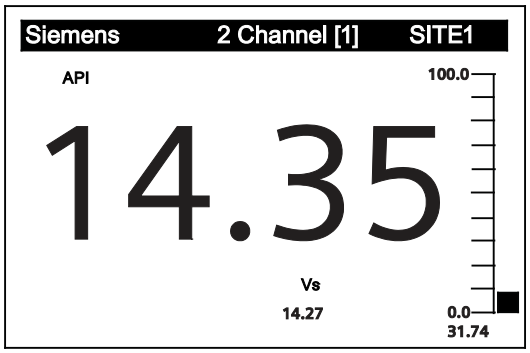
3. The meter will go through the drives.



4. Observe the Measured Vs window and verify a correct sound velocity measurement (if known).
5. Press the <Down Arrow> to accept sound velocity value.
6. Press the <MENU> key.



7. Press the <Right Arrow> and then <ENTER> to save the site data.
8. **The unit is now ready to display data.**



See also

Refer to I/O Connections and Wiring (Page 125) for input/output wiring and Span Data (Page 80) for data spanning procedures.

6.3 Empty Pipe Set

The flow meter performs the MTYmatic routine automatically during its Initial Make-up to establish a standard setting for the Empty Pipe alarm. This process is normally sufficient for setting this parameter. The [Empty Pipe Set] option list allows you to re-invoke MTYmatic, use an Actual MTY routine (if application conditions allow you to empty and refill the pipe) or use the Set Empty routine to set the empty pipe threshold by direct numeric entry.

Actual MTY Command

If application conditions allow you to empty and refill the pipe, then you may choose to perform the Actual Empty procedure; however, it is not required to do so.

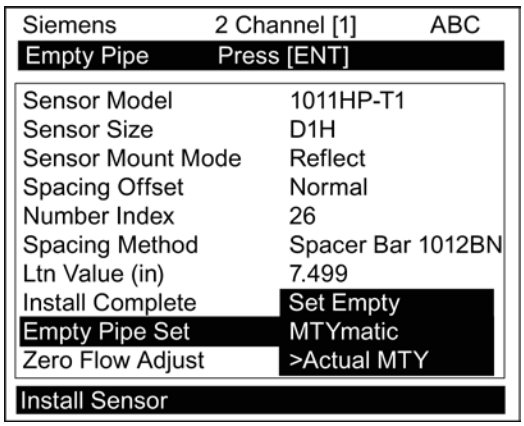
Note

IMPORTANT

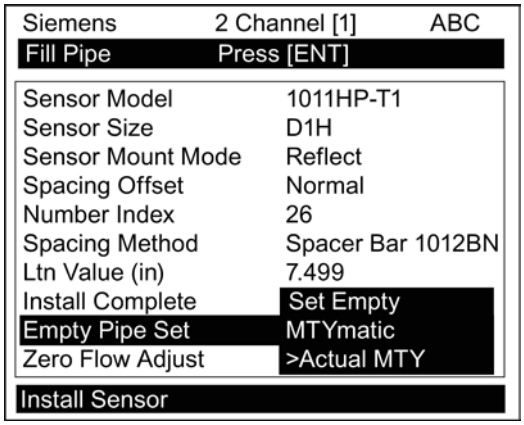
NEVER perform the Actual MTY procedure if the pipe can not be emptied.

To use the Actual MTY command:

1. From [Channel Setup] scroll down to [Install Sensor].
2. Press the <Right Arrow> to access the [Empty Pipe Set] option list.
3. Press the <Down Arrow> to [Actual MTY] then press <ENTER>.
   - **Empty Pipe Press [ENT]** appears on the menu prompt line.



4. Empty the pipe completely, then press <ENTER>.
   - **Fill Pipe Press [ENT]** appears on the menu prompt line.



5. Refill the pipe completely, then press <ENTER>.

Using the MTYmatic command

You can repeat MTYmatic (performed during the Initial Makeup) to correct an inaccurate Actual MTY setting if conditions do not allow you to repeat the Actual Empty procedure.

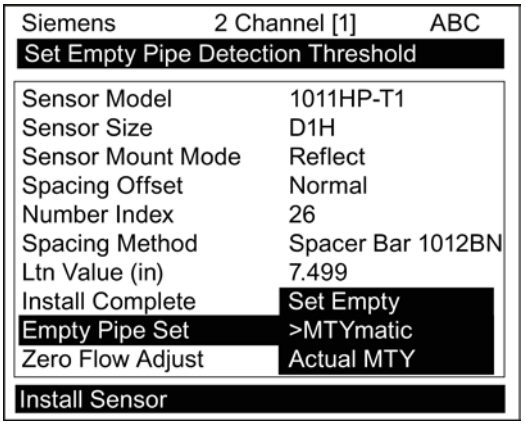
Note

IMPORTANT

Only use the MTYmatic procedure when the pipe is full.

To start MTYmatic:

1. From [Channel Setup] scroll down to [Install Sensor].
2. Press the <Right Arrow> to access the [Empty Pipe Set] option list.



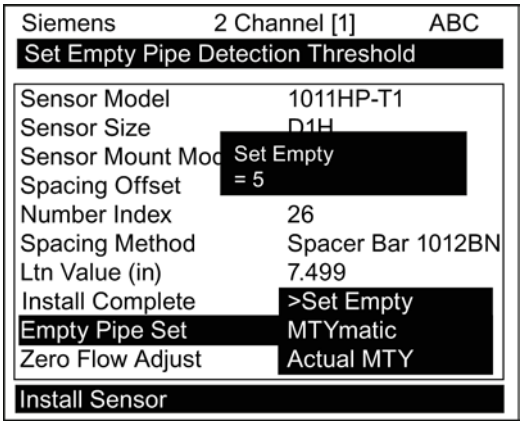
3. Move the cursor next to [MTYmatic] press the <Right Arrow>.
4. To invoke MTYmatic press <ENTER>.

Using the Set Empty command

Use [Set Empty] to enter a number that represents the signal strength level consistent with an empty pipe. [Set Empty] uses non-linear scaling. There is no direct correlation between the number you enter and any standard amplitude unit. If you set the number too low, the meter may not detect a true empty pipe. If you set it too high, it could trigger the empty pipe alarm, suspending flow measurement, even though the liquid is flowing.

To enter an Empty Pipe Alarm Threshold:

1. From [Channel Setup] scroll down to [Install Sensor].
2. Press the <Right Arrow> to access the [Empty Pipe Set] option list.
3. Press <Up Arrow> to move the cursor to [Set Empty].



4. Press <ENTER>. The current empty threshold number appears in a pop-up window.
5. Use the numeric keys to type a new Set Empty number.
6. To store the Set Empty number press <ENTER>

6.4 Installation Menus

FUH1010 Interface Detector Installation Menu Chart

Use <Left>, <Right>, <Up> and<Down> arrow buttons to navigate the menu between levels and sub menus.

For example: To navigate to [Sensor Size]:

1. Press <MENU> to return to Level A.
2. Press <Right Arrow> to Level B (Single Channel) then press <ENTER>.
3. Scroll using <Down Arrow> to [Install Sensor].
4. Press <Right Arrow> to Level D.

5. Scroll using <Down Arrow> to [Sensor Size].
6. Press <ENTER> select size from list.

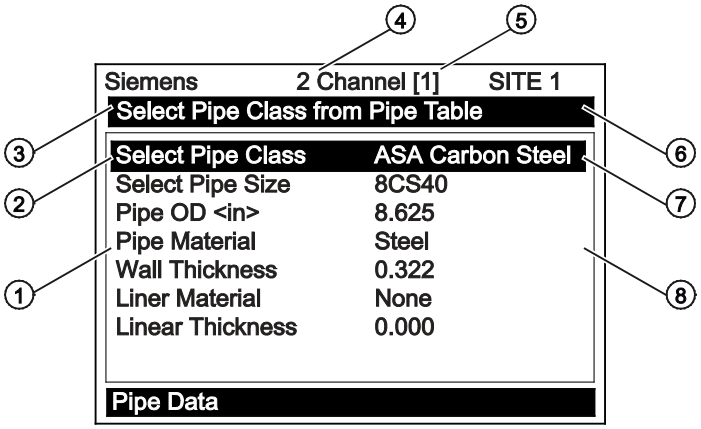
Note

Menu items in bold are required entries to establish operation.

Level A	Level B	Level C	Level D (see manual)	Level E	Level F
Meter Type	**Single Channel (2 Channel)**	Chan/1/2 Clamp-on	Recall Site Setup	Enter From List	
		⇓	Channel Enable	No/Yes	
		Channel Setup ⇒	Create/Name Site	**User entered or enter From List**	
			Site Security	On/Off	
			Delete Site	Enter From List	
			Save/Rename Site	Enter/Clear Site Name	
		Pipe Data	Pick Pipe Class	Enter From List	
			Select Pipe Size	Enter From List	
			Pipe OD (in)	**Numeric Entry**	
			Pipe Material	**Enter From List**	
			Wall Thickness	**Numeric Entry**	
			Liner Material	Enter From List	
			Liner Thickness	Numeric Entry	
		Application Data	Liquid Class	Select Liquid	**Enter From List**
				Estimated Vs M/S	Numeric Entry
				Viscosity <cS>	Numeric Entry
				Density S.G.	Numeric Entry
			Liquid Table	Table Active	Yes/No
				LiquIdent Slope	Numeric Entry
				Pressure Slope	Numeric Entry
				K0	Numeric Entry
				K1	Numeric Entry
				LiquIdent Index	Numeric Entry
					Add index
			Temp. Range	Enter From List	
		Install Sensor	Sensor Model	**Enter From List**	
			Sensor Size	**Enter From List**	
			Sensor Mount Mode	**Enter From List**	
			Spacing Offset	Enter From List	
			Number Index	View Only	
			Spacing Method	View Only	

Level A	Level B	Level C	Level D (see manual)	Level E	Level F
			Ltn Value <in>	View Only	
			Install Complete	No / Install	**Select Install**
			Empty Pipe Set	Enter From List	
		Operation Adjust	Memory/Fault Set	Fault / Memory	
			Memory Delay (s)	N/A	
			SL Rate	Enter From List	
		Span/Set/Cal	Span Data	Enter From List	
			Set Alarm Levels	Enter From List	
			Interface Alarm	ROC Alm Set m/s	Numeric Entry
				Interval Secs	Numeric Entry
				Relay Hold Time	Numeric Entry
				High LiquIdent	Numeric Entry
				Low LiquIdent	Numeric Entry
			Display Setup	Main Data Disp	Enter From List
				Stripchart Data	Enter From List
				Clear Data	Enter From List
				Time Bass	Enter From List
				Stripchart Clear	No/Yes
			Logger Setup	Logger Mode	Enter From List
				Logger Data	Enter From List
				Logger Interval	Enter From List
				Logger Events	Enter From List
				Display Logger	Enter From List
			I/O Data Control	Analog Out Setup	Enter From List
				Relay Setup	Relay 1,2,3,4
				Analog Inp Setup	Enter From List
			Diagnostic Data	Signal Data	Enter From List
				Application Info	Enter From List
				Liquid Data	Enter From List
				Site Setup Data	Enter From List
				Test Facilities	Enter From List
				Print Site Setup	No/Yes
				Site Created:	View Only
Meter Facilities	Preferred Units	English			
		Metric			
	Table Setups	Pipe Table	Create/Edit Pipe	Enter From List	
			Delete Pipe	Enter From List	
		Sensor Type	Enter From List		
	Logger Control	Display Logger	Off/Line Wrap / No Line Wrap		

Level A	Level B	Level C	Level D (see manual)	Level E	Level F
		Output Logger	Yes/No		
		Circular Memory	Yes/No		
		Est LogTime Left	View Only		
		Clear Logger	Yes/No		
	Memory Control	Log Memory Left	View Only		
		Memory Map	Yes/No		
		Defragment	Yes/No		
	Analog Out Trim	Trim Io1	Operate / Trim @ 4mA		
		Trim Io2	Operate / Trim @ 4mA		
		Trim Vo1	Operate / Trim @ 2V		
		Trim Vo2	Operate / Trim @ 2V		
		Trim Pgen1	Operate / Trim @ 1Khz		
		Trim Pgen2	Operate / Trim @ 1Khz		
	RTD Calibrate	RTD1	Factory / User Cal		
		RTD2	Factory / User Cal		
	Clock Set	Date (MM.DD.YY)	Edit Date		
		Time (HH.MM)	Edit Time		
	RS-232 Setup	Baud Rate	Enter From List		
		Parity	Enter From List		
		Data Bits	7/8		
		Line Feed	Yes/No		
		Network ID	Numeric Entry		
		RTS Key Time	Enter From List		
	Backlight	Enter From List			
	System Info	Version	View Only		
		Reset Data/Time	View Only	mm.dd.yy.hh.mm.ss	
		Op System P/N	View Only		
		Checksum	View only		
		Code	View Only		
		System Time	View Only	mm.dd.yy.hh.mm.ss	
Language	Enter From List				



① Menu Cell Data (left-hand column)
② Highlighted Menu Cell
③ Menu Prompt Line (Reverse Video)
④ Current Selected Meter Type
⑤ Current Selected Measurement Channel
⑥ Site Name Identified
⑦ Highlighted Data
⑧ Menu Cell Data (right-hand column)

Figure 6-1 Typical Installation Menu Screen

Functions

7

7.1 Setting Liquid Parameters

Introduction

The Interface Detector measures and reports the flowing liquid's sonic velocity (Vs) and its temperature (T). These components create the liquid's "Vs/T" signature. This signature is a fundamental component of the LiquIdent routine that identifies any liquid monitored by the Interface Detector. Since a temperature change will affect the sonic velocity of the liquid, a method to balance the measured sonic velocity to a fixed reference temperature (15.6ºC/60ºF) is provided. The LiquIdent Slope Factor must be configured to represent the linear change in the liquid's sonic velocity per degree Fahrenheit. The LiquIdent routine uses this slope factor to maintain an accurate liquid identification as the liquid temperature varies.

Note

The LiquIdent Slope Factor for all liquids within a liquid class should be essentially identical, even though their individual sonic velocities may be very different.

This menu cell allows the LiquIdent Slope Factor to be edited for optimal operation. The LiquIdent Slope Factor default is 2.300.

Calculating the LiquIdent Slope Factor

1. Establish the maximum (Tmax) and minimum (Tmin) operating temperatures for all liquids within the Liquid Class. For each liquid, note the measured sonic velocity (located in the Diagnostic Data menu in [Liquid Data]) at Tmax and the sonic velocity at Tmin (in-meters-per-second).
2. Use the following formula to calculate the LiquIdent Slope Factors with the Liquid Class:

$$\text{Liquid Slope Factor} = \frac{(V_s @ T_{min}) - (V_s @ T_{max})}{(T_{max} - T_{min})}$$

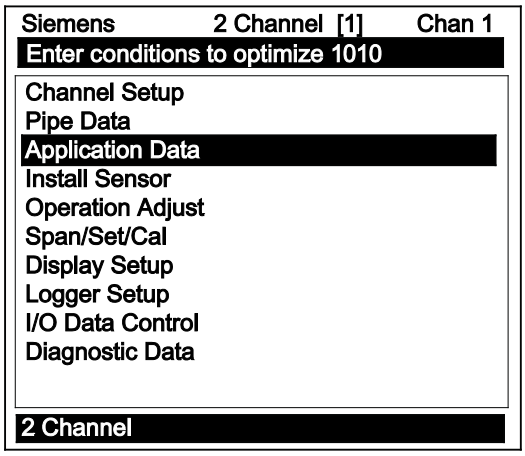
Note

If the Celsius scale is used for Tmax and Tmin, multiply the result by 0.56 to obtain the liquid's LiquIdent Slope Factor.

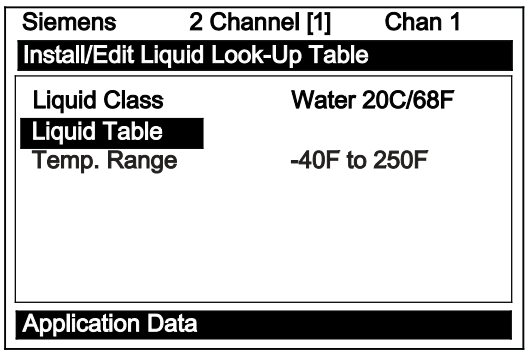
3. Calculate the average of all the LiquIdent Slope Factors with the Liquid Class.

To enter the LiquIdent Slope Factor:

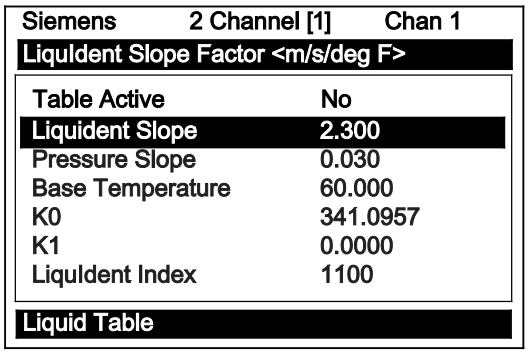
1. From the [Channel Setup] menu scroll down to the [Application Data] menu and press the <Right Arrow> to highlight [Liquid Class].



2. From [Liquid Class] press <Up/Down Arrow> to scroll down to [Liquid Table].



3. Press <Right Arrow> to [Table Active] and scroll down to [LiquIdent Slope].



4. Press <Right Arrow> to enable numeric entry.
5. Use the keypad numeric keys to enter desired LiquIdent Slope factor.
6. To enter the LiquIdent Slope factor press <ENTER>.

Setting the Pressure Slope

The meter measures and reports the flowing liquid's sonic velocity (Vs). Since a pressure change will affect the sonic velocity of the liquid, a method to balance the measured sonic velocity to a fixed reference temperature (15.6ºC/60ºF default) is provided. The Pressure Slope Factor default is 0.030 (m/s per PSI). This pressure slope factor helps maintain an accurate liquid identification to compensate the impact of pressure on the liquid's sonic velocity. Therefore altering this variable is only recommended for pipelines that have pressure variances greater that 100 psi.

The meter has the ability to accept a 4-20mA input for pressure. If used, the meter will process and report pressure data based on the analog input. This is recommended only for pipelines that have liquids with very close densities and additional performance is desired.

To calculate a liquid's Pressure Slope Factor:

1. Establish the maximum (Pmax) and minimum (Pmin) pressures for all liquids within the Liquid Class. For each liquid, note the measured sonic velocity at Pmax and the sonic velocity at Pmin (in-meters-per-second).
2. Use the following formula to calculate the Pressure Slope Factors with the Liquid Class:

$$\text{Pressure Slope Factor} = \frac{(V_s @ P_{min}) - (V_s @ P_{max})}{(P_{min} - P_{max})}$$

3. Calculate the average of all the Pressure Slope Factors within the Liquid Class.

To enter the Pressure Slope Factor

1. From the [Liquid Table] menu cell, press <Up/Down Arrow> to scroll down to [Pressure Slope].
2. Press <Right Arrow> to enable numeric entry.
3. Use the keypad numeric keys to enter the desired Pressure Slope Factor.
4. To enter the Pressure Slope Factor press <ENTER>.
5. This moves the highlight down to [Base Temperature].

Setting the Base Reference Temperature

The meter uses a reference Base Temperature of 15.6ºC (60ºF) for the LiquIdent calculation. Any temperature can be entered and used as the reference Base Temperature (e.g., 20ºC/68ºF).

To enter the Base temperature:

1. From the [Liquid Table] menu cell, press <Up/Down Arrow> to scroll down to [Base Temperature].
2. Press <Right> to enable numeric entry.

3. Use the keypad numeric keys to enter the desired Base Temperature.
4. To enter the Base Temperature press <ENTER>.

Note

Altering the Base Temperature will result in all "Base" outputs and settable items to be referenced to the selected temperature.

Entering K0 and K1 parameters (API thermal expansion coefficients):

The K0 and K1 parameters represent the thermal expansion coefficients. The meter requires these parameters to calculate Density at current operating temperature. These coefficients can be found in the ASTM designation: D1250 or the API standard: 2540. The default K0 and K1 values are 341.0957 and 0.0, respectively. These correspond to Crude Oils. If these values suit the application, these menu cells can be bypassed by pressing the <Down Arrow> twice. The following tables list K0 and K1 values of some common classes of liquids.

Table 7- 1 Common Liquid Classes

Liquid	K0	K1
Crude Oils	341.0957	0.0
Gasoline and Naphthenes	182.4571	0.2438
Jet Fuels and Kerosenes	330.3010	0.0
Diesels, Heating Oils and Fuel Oil	144.0427	0.1896

Setting the LiquIdent Index

A Liquid Class must have an associated LiquIdent Index Scale. The meter uses this scale to compensate its outputs for variations in liquid type, specific gravity, and viscosity. The LiquIdent Index Scale enables positive liquid identification.

A LiquIdent Index is the sonic velocity for the liquid at the Base Temperature, generally 15ºC (60ºF). When a LiquIdent Index is entered for a particular liquid within the Liquid Class, the liquid's specific gravity and its viscosity must also be entered at the LiquIdent Index referenced to their base temperatures.

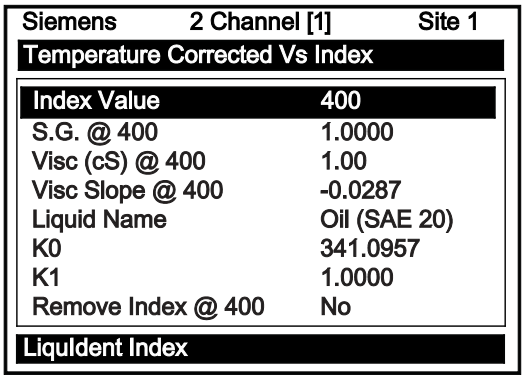
To create a LiquIdent Index Scale for the Liquid Class, a minimum of two LiquIdent Indices are required to be entered. The computer only needs two to establish a linear relationship between LiquIdent and the physical properties of the liquids.

The scale can be fine-tuned by manually adjusting the factors at up to thirty-two separate points. This is useful for precise adjustment for many different liquids or few liquids with closely related Densities.

A default table is installed for finished hydrocarbon products. Fine adjustment to the installed table may be required to "tweak" the Density values to accommodate small Density variations. For crude oil pipelines the table will need to be fully adjusted to the density values of the product(s). Crude oils vary too greatly from region to region to allow the possibility to install a default table.

To enter the LiquIdent Index:

1. From the [Application Data] press <Right Arrow> to highlight [Liquid Class] menu.
2. Scroll down to [Liquid Table] menu and press <Right Arrow>.
3. Press <Up/Down Arrow> to scroll down to [LiquIdent Index].
4. Press <Right Arrow> twice to enable numeric entry [Index Value].
5. Use the keypad numeric keys to enter the desired LiquIdent Index Value.
6. To enter the LiquIdent Index Value press <ENTER>.



Each of the data points of a Site Liquid Table (maximum of 32) may be filled in by the user as indicated in the menu screen shown above.

Index Value

Same as LiquIdent. The temperature-corrected sonic velocity that points to the output variables forming the balance of the table entry. The user may enter the values associated with the measured LiquIdent found in the diagnostic menu area under [Liquid Data].

S.G.

The specific gravity of the liquid at system Base Temperature; usually 15ºC (60ºF).

Viscosity

The kinematic viscosity of the liquid at system Base Temperature (units: centistokes).

Visc Slope

The exponent of the logarithmic expression used to project the liquid viscosity at measured temperature. The default value (-0.0287) has been found to be adequate for many hydrocarbons.

Liquid Name

You may install a name here if you wish to identify the liquid in the meter's datalogger report. To prevent flicker of two names when the LiquIdent is at transition points, you may wish to create ranges of LiquIdent and additional entries in between with no name installed.

Table 7- 2 Example of liquid table (All entries made at Base temperature values)

LiquIdent	S.G	Viscosity	Compressibility	Liquid Name	K0	K1
1100	0.6465	0.15	0.00001	MTBE (Additive for Oxygen)	192.4571	0.2438
1180	0.717	0.6	0.00001	LFP (Lead Free Premium)	192.4571	0.2438
1200	0.733	0.6	0.00001	LR (Leaded Regular)	192.4571	0.2438
1330	0.775	1.0	0.00001	KEROSENE	330.301	0.0
1350	0.818	1.16	0.00001	AVJET (AV Jet Fuel)	330.301	0.0
1380	0.819	1.95	0.00001	HSD (High Sulfur Diesel)	103.872	0.2701
1410	0.885	2.75	0.00001	LSD (Low Sulfur Diesel)	103.872	0.2701
1420	0.959	3.2	0.00001	GASSOIL (Sour Light Cycle Gas Oil)	103.872	0.2701
1490	0.9300	119.00	0.00001	FO (Fuel Oil)	103.872	0.2701
1579	0.9850	1049.00	0.00001	HFO (Heavy Fuel Oil)	103.872	0.2701

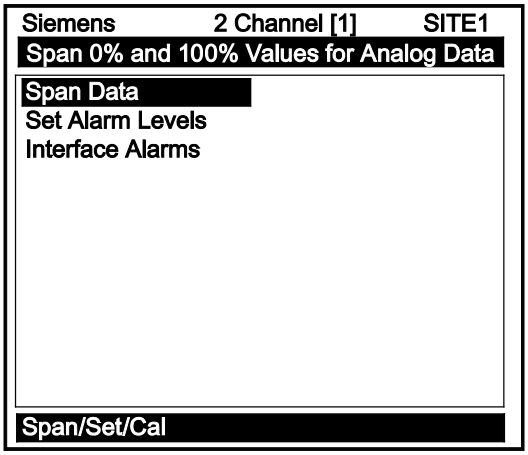
7.2 Span Data

The Span Data menu allows you to set 0% and 100% output range limits for Sonic Velocity (Vs), Specific Gravity (S.G.), Temperature, Viscosity (cS), LiquIdent and API numbers. Each menu cell shows appropriate rate units. If you change rate units after spanning the system, the transmitter automatically updates the output data setup to reflect the change. Span limits apply to both the analog outputs and the on-screen strip chart.

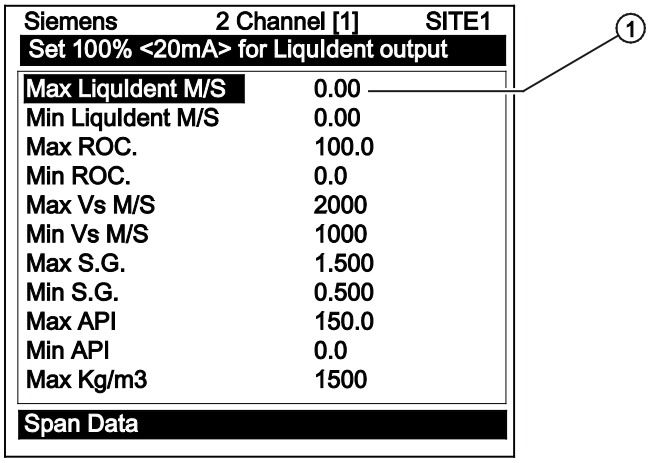
To change the default Span Data settings:

1. At [Meter Type], press <Right Arrow> to [2 Channel] and press <ENTER>.
2. At [Channel Setup] press <Right Arrow> and press <ENTER>.
3. Scroll down to [Span/Set/Cal] and press <Right Arrow>.

4. Highlight [Span Data] and press the <Right Arrow>.



5. Highlight any variable of interest Max value and press <Right Arrow>. Input the value to represent 100% equal to 20mA. Press <ENTER> to store data.



① Input numeric data here

6. Scroll down to Min variable. Press <Right Arrow> to input minimum value for 0% equal to 4mA. Press <ENTER> to store data.

7.3 Logger Control

Logger Control Menu

The [Logger Control] menu in the [Meter Facilities] menu provides the Datalogging controls for the meter measurement channels. This [Logger Control] menu provides global control functions. This means that the settings made here apply to all measurement channels, meter types, operating modes, etc. Individual channel specific logger data is found in the [Span/Set/Cal] subsection of the main menu.

1. From the Meter Facilities menu access the [Logger Control] menu by pressing the <Right Arrow>.
2. Press the <Right Arrow> to access the [Logger Control] menu option list.

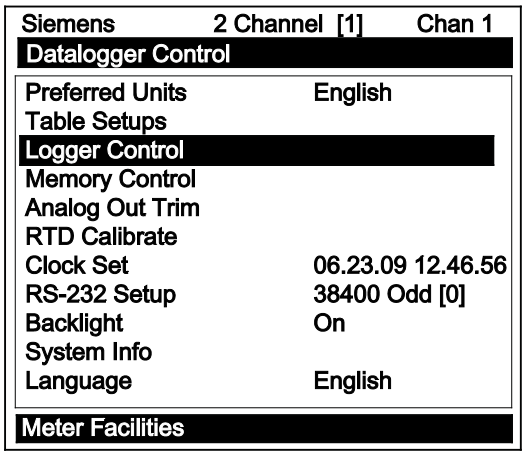


Table 7- 3 Logger Control Menu Option List

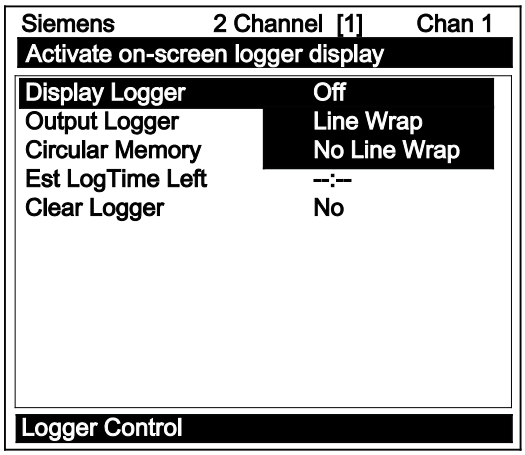
Logger Control	Display Logger	Off Line Wrap No Line Wrap
	Output Logger	No Yes
	Circular Memory (Available for Multi-Path units only)	No Yes
	Est LogTime Left	--:--
	Clear Logger	No Yes

Display Logger

This menu cell allows you to send the Logger contents to the display screen with or without line wrap. Selecting line wrap, forces a line feed after approximately 40 characters. In addition, you have to enable datalogging and then select items in the [Logger Setup] menu. Note that this command transmits the data from both channels in a dual channel system.

To send Logger contents to the display screen:

1. Press <Right Arrow> to access the [Display Logger] option list.



2. Scroll cursor to either [Line Wrap] or [No Line Wrap] by pressing <Up/Down Arrow>.
3. To view Logger contents press <ENTER>.
4. To return to [Logger Control] press <MENU>.

Output Logger

This menu cell allows you to send the Logger contents to an external device (usually a computer or printer) via the RS-232 Serial I/O port of the meter. This command is effective only after a successful install. In addition, you have to enable datalogging and select data items in the [Logger Setup] menu.

The meter interfaces with most serial printers or personal computers for Logger printouts. You must use the proper cabling between the meter and the external device. In addition, you must configure the RS-232 Setup correctly. You should turn off the Logger function before you transmit an extensive printout. This will avoid contaminating the printout with new Logger data. Logger reports are sequential ASCII text files.

To send Logger contents to the RS-232 Serial Port:

1. Check the meter-to-external device connections and your RS-232 Setup parameters (see RS-232 Setup menu).
2. To access the [Output Logger] option list press <Right Arrow>.
3. Scroll the cursor to [Yes] by pressing <Up/Down Arrow>.
4. To transmit Logger contents to external device via the serial port press <ENTER>.
5. To stop printout press <Left Arrow>.

Circular Memory

In its default mode, the Logger collects data until its memory becomes full. At that time the meter suspends datalogging and cannot resume until the Logger memory is cleared (see Clear Logger command). Circular Memory allows the Logger to "'write over" its oldest records when memory reaches full capacity. If you enable [Circular Memory], you are assured of always collecting the most recent data. But also remember that you will lose the oldest Logger reports and that further invoking of [Circular Memory] deletes the current contents of the Logger.

To setup and enable Circular Memory:

1. The Logger Mode menu must have the [Memory] menu cell selected.
2. Logger items must be selected (e.g., Site ID, Date, Time, etc.).
3. All active channels in the Channel Setup menu must be disabled. To disable active channels, select the [Channel Enable] menu cell and then [No].
4. In the Logger Control menu, select [Circular Memory].
5. Press <Right Arrow> to access the [Circular Memory] option list.
6. Move the cursor to [Yes] by pressing <Up/Down Arrow>.
7. To store selection press <ENTER>.
8. Lastly, re-enable the channels that you disabled earlier to begin logging.

Est LogTime Left

Est LogTime Left is a "view-only" menu cell that shows an estimate of the amount of Logger time remaining in hours and minutes. This menu cell data is based on the log interval and data selections made in the Logger Setup.

Clear Logger

The [Clear Logger] command erases ALL stored Logger data. Therefore, you should evaluate the currently stored data, and print any valuable information before using this command.

Note

Saved Sites also consume Logger RAM.

7.4 Analog Output Setup

The device provides current, voltage and pulse-rate analog outputs. The [Analog Out Setup] menu allows you to assign data functions for these signals. The transmitter terminal strip contains the analog output terminals.

Table 7- 4 Analog Outputs

Io (Isolated Current)	4 to 20mA varies in proportion to an assigned data function.
Vo (DC Voltage	0 to 10 VDC varies in proportion to an assigned data function.
Pgen (TTL Logic)	0 to 5000 Hz varies in proportion to an assigned data function.

Table 7- 5 Analog Out Setup Data Categories

LiquIdent m/s	Sonic velocity compensated for temperature.
API	Current liquid API number.
Kg/m^3	Current kilograms per cubic meter.
Base S.G.	Current liquid specific gravity at reference temperature.
Base API	Current system API at reference temperature.
Base Kg/m^3	Current kilograms per cubic meter at reference temperature.
Viscosity	Liquid viscosity.
T1	Current liquid temperature.
ROC	Alarm relay setpoint numerical rate of change in m/s.
Iin1, Iin2	Represents a re-transmit of the analog input signals (e.g., Pressure and Temp inputs can be transmitted on the 4/20mA output).
Vs	Spanned liquid sonic velocity.
Valc	Receive signal amplitude.
Vaer	Relative degree of liquid aeration/cavitation.
Vsg	Current liquid specific gravity.

Io Output Functions

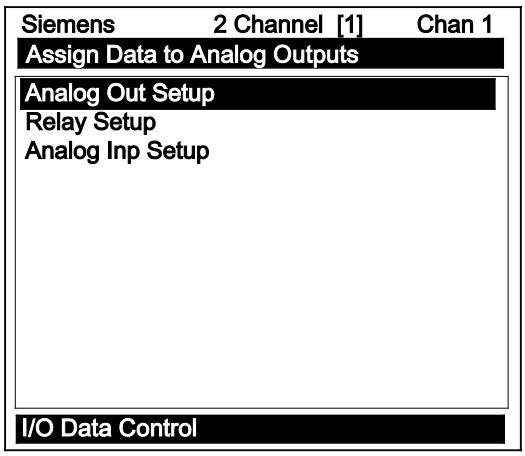
The Io output is a self-powered, isolated 4-20mA DC signal that varies linearly in relation to a selected data function.

4-20mA outputs also provide a fault indication by dropping to 2mA if assigned to flow rate and under fault conditions.

⚠ CAUTION
Avoid Power Loop Connecting the Io current output to a power loop will damage the device and may result in injury to user. Do not connect to a powered loop.

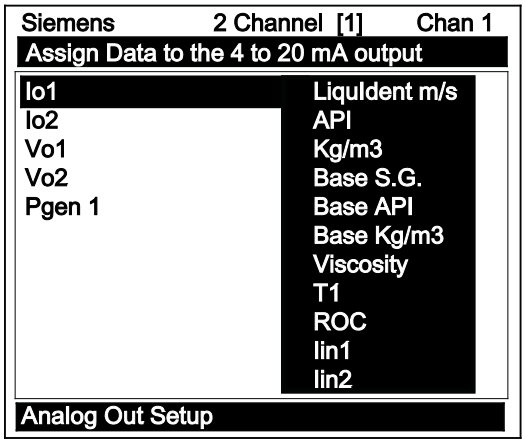
Assigning a variable to an output:

1. From the [Channel Setup] menu scroll to [I/O Data Control].
2. Press <Right Arrow] to highlight the [Analog Out Setup] menu.



3. Scroll to the desired output type.
4. Press <Right Arrow> twice to access the [Io] option list.

5. Move the cursor to the desired data function by pressing <Up/Down Arrow>.



6. To store selection press <ENTER>.

Note

Refer to drawing 1010N-7-7 for Analog output connections.

7.5 Setting Relays

Relay Functions

Use the [Relay Setup] menu to assign a function to channel relays. The meter supports two types of relay outputs, Alarm Relay and Pulse Relay. Alarm Relay outputs operate in "fail-safe" mode. The relay(s) are energized under normal conditions - an alarm condition causes the relay(s) to de-energize until the alarm clears. The Pulse Relay output supports Totalizer and batch relay functions, with an output pulse width of approximately 200 ms; maximum activation rate is 2.5 pulses per sec. If Totalizer pulses exceed this rate, excess pulses are stored in an overflow register. This allows the relay to "catch up" when data rate decreases enough.

Note

Using the <F1> key (Totalizer clear command) also clears all channel Totalizers plus the overflow register described above.

Relay 1, 2, 3, and 4 Function Assignments

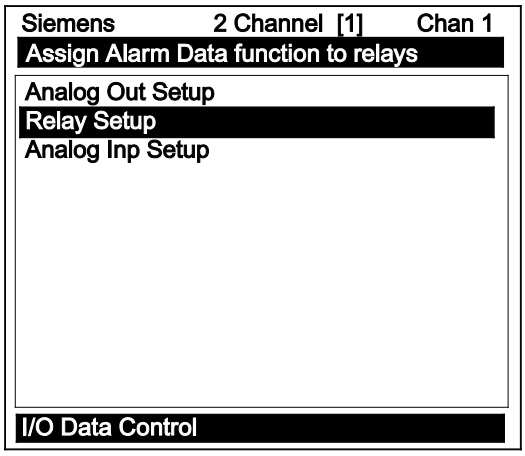
The meter, depending upon the model, provides four alarm relays. Please refer to Appendix A (Page 125) for wiring details. Relays respond to any of the alarm conditions or data functions included on the Relay Option List.

Table 7- 6 Relay Option List

Not Used	Not Active
Power Off	Power Off alarm occurs when power fails.
High LiquIdent	High LiquIdent value relay trip-point.
Low LiquIdent	Low LiquIdent value relay trip-point.
S.G.	Specific Gravity value relay trip-point.
API	API relay trip-point.
Kg/m^3	Relay trip-point for kilograms per cubic meter.
Base S.G.	S.G. value relay trip-point at reference temperature.
Base API	API number relay trip-point at reference temperature.
Base Kg/m^3	Kg/m^3 value relay trip-point at reference temperature.
High Temp	High temperature value relay trip-point.
Low Temp	Low temperature value relay trip-point.
Fault Alarm	System loses receive signal (all paths in fault).
Soft Fault	Fault condition - memory mode active.
Spacing	System sensor spacing needs adjusting.
Empty	Empty pipe alarm.
Aeration	Aeration percentage exceeds alarm set point.
ROC	Alarm relay set point numerical rate of change in m/s.

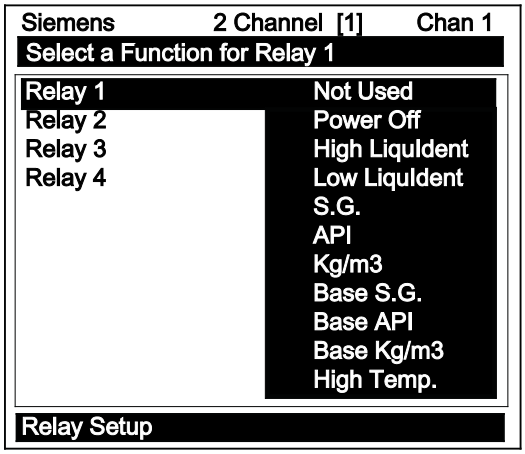
Assigning functions to Relay 1:

1. From the main menu highlight [I/O Data Control].
2. Press <Right Arrow> and scroll down to [Relay Setup].



3. To access the [Relay Setup] option list press <Right Arrow>.

4. Move the cursor to the desired Relay assignment by pressing <Up/Down Arrow>.



5. To store selection press <ENTER>. Repeat procedure for all other relays.

7.6 Analog Input Setup

The optional Analog Input Setup function assigns an active analog input to a measurement channel. The meter provides four DC current input ports for single channel and 2 Channel units. The DC current input ranges from a zero level of 4mA to a full scale of 20mA. The [Analog Inp Setup] menu cell allows you to enable this port and then span it to any desired scaling.

For example, when using the analog input for pressure the numeric variables might be spanned as follows: 4mA=14.7 PSIA and 20mA=1014.7 PSIA. This spanning configuration allows the meter to use this constant numerical change to improve calibration in real time.

The various models allow you to associate the analog input to active systems (see table below).

Note

Refer to Appendix A (Page 125) I/O Connections and Wiring for these inputs and wiring procedures.

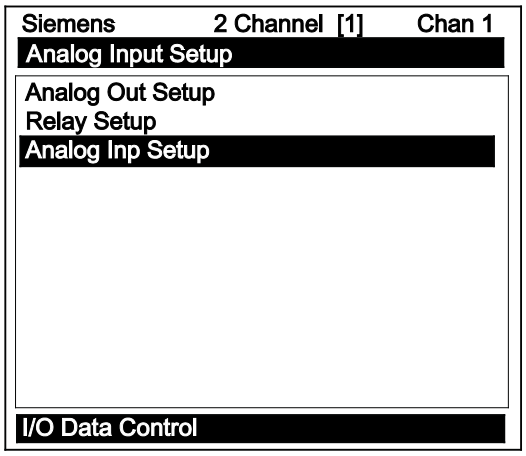
Table 7- 7 I/O Data Control Menu

I/O Data Control	Analog Inp Setup	Iin1	Input	Off Aux S.G. API Kg/m^3 PSIA BARA T1 Deg F T1Deg C
			4 mA 20 mA	Numeric entry Numeric entry
		Iin2	See In1 option list	

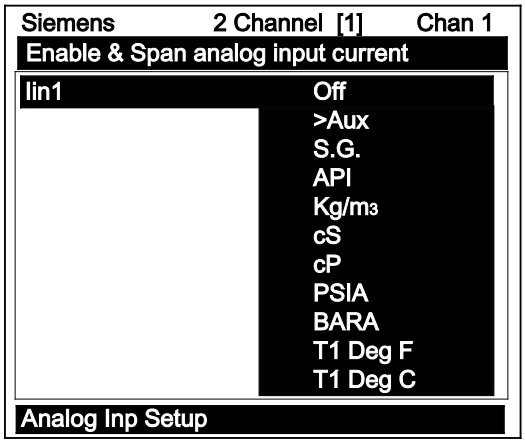
The meter recognizes the first analog input variable that is assigned to any given parameter and ignores any subsequent input with the same assignment. For example, if both Iin1 and Iin2 are assigned to represent pressure (PSIA), the meter will only use the pressure input from Iin1.

Setting the Analog Current Input

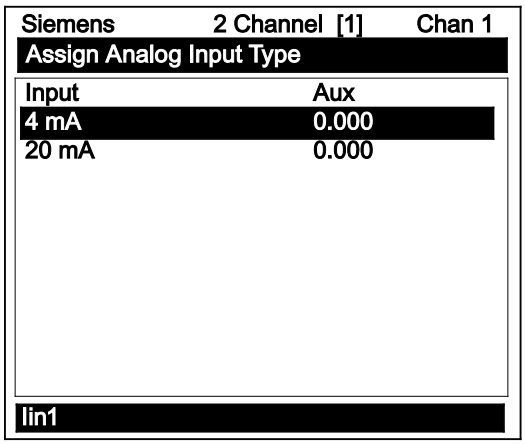
The DC current input port must be enabled first. From the [Analog Inp Setup] menu proceed as follows:



1. Access the [Iin1] option list by pressing the <Right Arrow> twice.



2. Move the cursor down to [Aux] by pressing the <Down Arrow> and then press <ENTER>. This enables the port to receive an input current. The cursor moves to [4 mA].



3. To enable numeric entry, press the <Right Arrow>. Type a numeric value corresponding to a 4mA input signal.
4. To store the data press <ENTER>. This moves the cursor to [20 mA].
5. To enable numeric entry, press the <Right Arrow>. Type the numeric value corresponding to a 20mA input signal.
6. To store the data, press <ENTER>.

7.7 Operation Adjust Menu Settings

Introduction

The Operation Adjust menu becomes available after picking a meter type and measurement channel. It is recommended that you use it after the sensors are installed and operating to "fine-tune" the meter's output characteristics.

Each application presents different data display and output requirements due to unique pipe and liquid conditions. Use the [Operation Adjust] menu to match meter operation to the site.

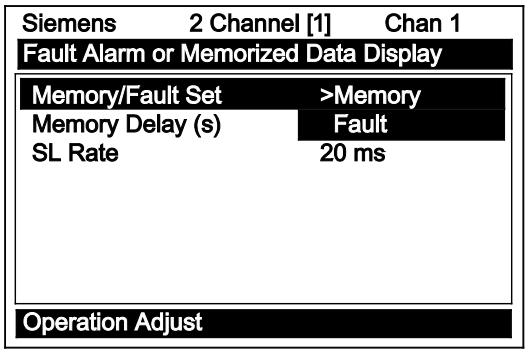
Memory/Fault Set

Certain situations will interrupt data production (e.g. an empty pipe or excessive aeration). Use Memory/Fault Set to select the meter response to such an interruption. The [Fault] setting (default) will zero the output and declare an alarm on the display screen, the Datalogger report and an assigned relay output. The output goes to 2mA and the indication goes to F when the signal is lost.

For some applications, occasional temporary Fault conditions may be a normal part of the process and would not require an alarm response. The meter offers a Memory operating mode to support such an application. [Memory] mode suspends the meter Fault response by preventing the outputs from dropping to zero for the interval specified in the [Memory Delay] menu cell. During the Memory duration, the meter will maintain the last valid reading measured before the onset of the fault condition. The default Memory Delay is 60 seconds. You may select any duration from 3 to 604,800 seconds (one week).

Selecting Memory Mode

1. From the main menu scroll to the [Operation Adjust] menu and press <Right Arrow>.
2. Scroll to the [Memory/Fault Set] and press <Right Arrow> to access option list.



3. Move the cursor to [Memory] by pressing <Up/Down Arrow>.
4. To make selection press <ENTER>.
5. This moves the highlight to [Memory Delay (s)].

Memory Delay (s)

Selecting [Memory Delay (s)] activates the suppressed [Memory Delay] menu cell. It allows you to specify the number of seconds that the meter maintains its last valid flow reading. When the memory delay expires, it triggers the fault alarm response described previously.

Setting Sonilocator SL Rate

The [SL Rate] is an unused variable. Altering the SL rate will have no effect on operation of the device.

7.8 Memory Control

Introduction

Memory Control is a reference menu that shows the amount of bytes of data memory left. The data memory capacity depends on the number and complexity of the site setups stored in memory and the size of the current Datalogger file.

The [Memory Control] menu is located in the [Meter Facilities] menu.

Table 7- 8 Memory Control Menu

Log Memory Left→	XXXXXXX
Memory Map→	No Yes
Defragment→	No Yes

Log Memory Left

This view only menu cell shows the minimum remaining number of characters available for Datalogger and site storage. When the Datalogger is enabled for circular mode, the meter allocates all memory left except for two conventional empty sites required for Datalogger use.

To view the amount of data memory bytes available press <Right Arrow>.

Memory Map

Selecting [YES] for this item enables a snapshot display of current memory usage. In this display, the asterisk indicates a used block, a space indicates a free block, while a dash character indicates unused filler.

Defragment

Selecting [YES] for this item consolidates memory data blocks into contiguous storage; collapsing the filler regions. You may be able to use an additional block for site or Datalogger storage as a result. Use this command if you seem to be out of memory even though the [Log Memory Left] item indicates free capacity.

7.9 Analog Output Trim

Introduction

The Analog Out Trim function allows you to fine-tune the meter's analog voltage and current outputs using an ammeter connected to the output under test. In addition, you can use a frequency counter to fine-tune the meter's pulse rate output.

Note

The current, voltage, and Pgen trimming will be limited by the 12-bit resolution of the meter's D/A Convertor (DAC).

1. From the [Meter Facilities] menu, scroll to the [Analog Out Trim] menu.
2. Press the <Right Arrow> to access the option list.

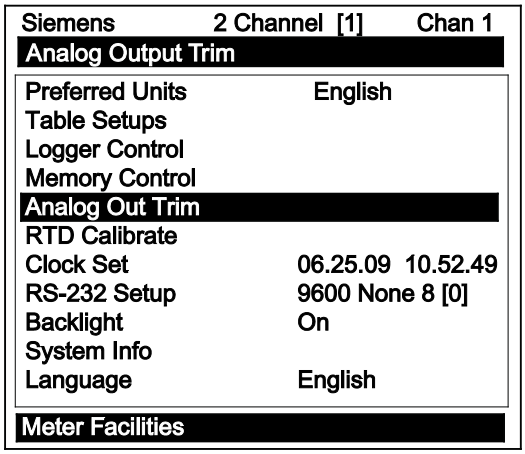


Table 7- 9 Analog Out Trim Menu Structure

Analog Out Trim	Io1 / Io2	Operate Trim@4mA Indicated mA=x.xx
	Vo1 / Vo2	Operate Trim@2V Indicated V=x.xx
	Pgen1 / Pgen2	Operate Trim@1kHz Indicated Hz=x.xx

Trim Analog Outputs

Note

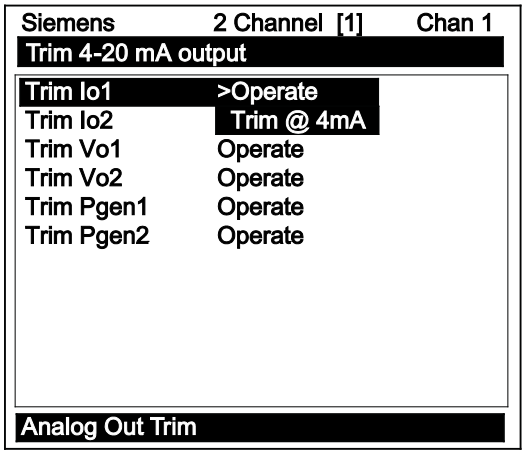
Current can be trimmed to within .005mA of nominal.

Voltage can be trimmed to within.0025 V of nominal.

Pulse can be trimmed to within 1.25 Hz of nominal.

To calibrate an output:

1. Select the output to calibrate (current, voltage or pulse) and connect the appropriate device to the output terminals.
2. Scroll to the desired output and press the <Right Arrow> then press the <Down Arrow> to move the cursor to [Trim@ xx] depending on output selected.



3. Press <ENTER>. This triggers a pop-up window. This triggers a pop-up window representing a value for the output under test. The measurement device should now read the value shown in the pop up window.
4. If the measurement device does not match, use the numeric keys to type in the current reading shown on the measurement device.
5. Press <ENTER> to register setting. This adjusts the meter's DAC (digital-to-analog converter) so that the output corresponds with the reading of the measuring device.
6. Re-check measuring device to make sure that it is now reading the correct value.

7.10 Resistive Temperature Device (RTD) Calibration

Use this menu to calibrate Temperature Sensors to an external standard. It is important to note that Siemens RTD temperature sensors are factory-calibrated for high accuracy. We recommend that before deciding to perform the calibration, check the current RTD reading in the [Diagnostics Data] menu. You may find that you do not need to calibrate the sensor. In any case, make sure that the temperature reading stabilizes before proceeding further. The [RTD Calibrate] menu allows you to perform an external calibration, which can be accomplished either by data entry of the current RTD temperature or by a 0°C (32°F) Ice-Bath procedure. You can switch between the intrinsic and external calibration modes at any time.

Note

If you perform an external temperature calibration, you should mark and record the location of each connector and sensor cable. Once you have re-calibrated the temperature sensors, changing the sensor/connector orientation established during the procedure may void the calibration.

1. From the [Meter Facilities] menu scroll to the [RTD Calibrate] menu.
2. To access the [RTD Calibrate] menu press <Right Arrow>.

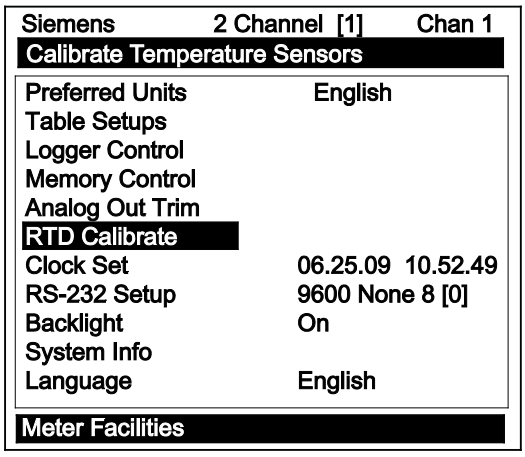


Table 7- 10 RTD Calibrate Menu Structure

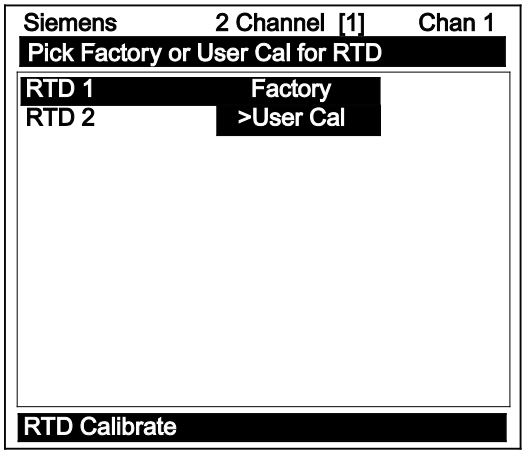
RTD Calibrate	RTD 1→	Factory User Cal
	RTD 2→	Factory User Cal

RTD Calibration by Entry Data

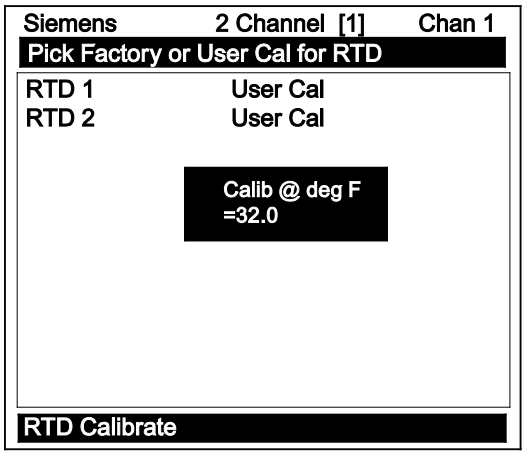
The [RTD Calibrate] menu allows you to adjust the intrinsic RTD reading to match an external reference thermometer by directly entering its reading. Only perform this procedure while the RTD under test is installed and currently measuring temperature.

To enter the current RTD temperature:

1. From the [RTD Calibrate] menu press the <Right Arrow> to access the RTD option list.
2. Press the <Right Arrow> to highlight the RTD you want to calibrate (RTD 1 or RTD 2).
3. Move the highlight to [Factory] or [User Cal] then press <ENTER>.



4. This triggers the pop-up window:



5. To enable numeric entry press the <Right Arrow>, then type in the reading of the reference thermometer (e.g. 72.0).
6. Press <ENTER> to accept data. To verify the calibrated reading, go to the [Diagnostic Data/Liquid Data] menu to check the current RTD output. Make sure that it coincides with the reading of the reference thermometer. Repeat for the other RTD, if necessary.

Note

Factory Calibration provides an additional prompt after a new temperature is entered: [Are you Sure? No Yes]. It is recommended that you use [User Cal] to avoid alteration of preset factory calibration.

Ice Bath RTD Calibration

NOTICE
Sensor Damage If RTD sensor makes direct contact with ice during an ice bath calibration procedure the sensor may be damaged and the calibration results will be incorrect. Do not allow an RTD sensor to make direct contact with ice during an ice bath calibration procedure.

To perform a 0°C (32°F) calibration:

1. Immerse RTD sensor in de-ionized water and ice mixture. Stir the mixture constantly to achieve 0°C (32°F).
2. In the [RTD Calibrate] menu move the highlight by pressing the <Up/Down Arrow> to the RTD you want to calibrate (RTD 1 or RTD 2).
3. To access the RTD option list press the <Right Arrow>. Move the highlight to [User Cal] then press <ENTER>. This triggers the pop-up window.
4. After the RTD sensor reaches equilibrium at 0°C (32°F), press <ENTER> to recalibrate the RTD sensor.
5. To verify the calibrated reading, go to the [Diagnostic Data/Liquid Data] menu to check the current RTD output. Make sure that it coincides with the reading of the reference thermometer. Repeat for the other RTD, if necessary.

Alarm, error, and system messages

8

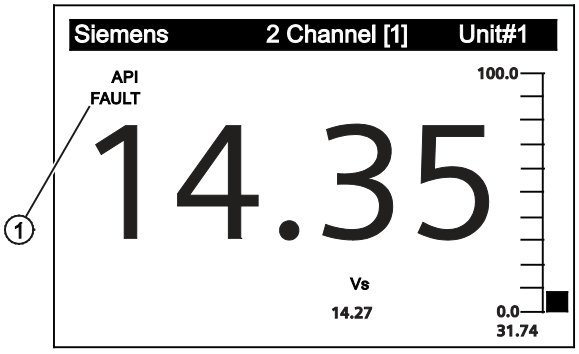
8.1 Alarm Codes

The following alarm codes appear on the main display of the transmitter.

Table 8- 1 Alarm Codes

Letter Codes	Alarm Code	Description
Space	Spacing	Sensor spacing may need adjustment
Empty	Empty	Signal has significantly reduced consistent with an empty pipe
FAULT	Fault	Three continuous seconds without new data update
AER	Aeration	Current aeration percentage exceeds the alarm set point
MEMRY	Memory	Last valid reading for a selected interval during Fault condition
MAKUP	Makeup	In-Process Makeup occurred
The following alarm codes appear in the Datalogger status messages:		
I	Interface	Liquid Vs exceeds interface alarm set point

The display shown below indicates where the Alarm Codes appear on the screen. Press <UP> or <DOWN> arrows to change screen views.



① Alarm Code

8.2 Setting Alarm Levels

Set Alarm Levels Menu

The [Set Alarm Levels] menu allows you to select system alarm functions. Alarms appear locally on the LCD digital display. In addition, you can use the [Relay Setup] menu to assign those functions to the system's relays. You can enable or disable a Makeup Alarm Latch to keep the makeup alarm active until you reset it manually by an <Fn> 6 simultaneous key press.

Interface Alarms Menu

The [Interface Alarms] menu cell is selected to monitor a high/low level point for LiquIdent. If LiquIdent exceeds the value set for High LiquIdent, the alarm will activate. If LiquIdent falls below the value set for Low LiquIdent, the alarm will activate. The alarms appear locally on the LCD digital display, shown in diagnostic and displayed in the data logger message, if selected.

High LiquIdent

Use the [High LiquIdent] menu item to set the numerical high limit span of the LiquIdent function.

Low LiquIdent

Use the [Low LiquIdent] menu item to set the numerical low limit of the LiquIdent function.

ROC Alm Set m/s (Rate of Change)

Use the [Roc Alm Set m/s] menu item to set the desired numerical alarm relay set point in meters per second (m/s) / time. For example, if the alarm relay set point value is set to 5 m/s and the time is set to 10 seconds, and if the LiquIdent varies by more than 5 m/s in 10 seconds, the ROC alarm will be activated.

Interval Secs

The amount of time between LiquIdent comparisons. Used in ROC function.

Relay Hold Time

The [Relay Hold Time] menu item allows the setting of the time in seconds that the alarm relay will stay closed.

Maintenance and service

9

9.1 Maintenance

The device is maintenance-free, however, a periodic inspection according to pertinent directives and regulations must be carried out.

An inspection can include check of:

- Ambient conditions
- Seal integrity of the process connections, cable entries, and cover screws
- Reliability of power supply, lightning protection, and grounds

9.2 Unit repair

NOTICE
Repair and service must be carried out by Siemens authorized personnel only.

Note

Siemens defines flow sensors as non-repairable products.

9.3 Technical support

If you have any technical questions about the device described in these Operating Instructions and do not find the right answers, you can contact Customer Support:

- Via the Internet using the **Support Request:**
  Support request (http://www.siemens.com/automation/support-request)
- Via Phone:
  - Europe: +49 (0)911 895 7222
  - America: +1 423 262 5710 / 1 800 333-7421
  - Asia-Pacific: +86 10 6475 7575

Further information about our technical support is available on the Internet at Technical support (http://support.automation.siemens.com/WW/view/en/16604318)

Service & Support on the Internet

In addition to our documentation, we offer a comprehensive knowledge base online on the Internet at:

Service and support (http://www.siemens.com/automation/service&support)

There you will find:

- The latest product information, FAQs, downloads, tips and tricks.
- Our newsletter, providing you with the latest information about your products.
- Our bulletin board, where users and specialists share their knowledge worldwide.
- You can find your local contact partner for Industry Automation and Drives Technologies in our partner database.
- Information about field service, repairs, spare parts and lots more under "Services."

Additional Support

Please contact your local Siemens representative and offices if you have additional questions about the device

Find your contact partner at:

Local contact person (http://www.automation.siemens.com/partner)

9.4 Transportation and storage

To guarantee sufficient protection during transport and storage, observe the following:

- Keep the original packaging for subsequent transportation.
- Devices/replacement parts should be returned in their original packaging.
- If the original packaging is no longer available, ensure that all shipments are properly packaged to provide sufficient protection during transport. Siemens cannot assume liability for any costs associated with transportation damages.

CAUTION
Insufficient protection during storage The packaging only provides limited protection against moisture and infiltration. • Provide additional packaging as necessary.

Special conditions for storage and transportation of the device are listed in "Technical data".

See also

Technical data (Page 123)

9.5 Return procedures

Enclose the delivery note, the cover note for return delivery and the declaration of decontamination form on the outside of the package in a well-fastened clear document pouch.

Required forms

- **Delivery Note**
- **Cover Note for Return Delivery** with the following information

  Cover note (http://support.automation.siemens.com/WW/view/en/16604370)

  – product (ordering number)

  – number of devices or spare parts returned

  – reason for the return

- **Declaration of Decontamination**

  Declaration of Decontamination (http://pia.khe.siemens.com/efiles/feldg/files/Service/declaration_of_decontamination_en.pdf)

  With this declaration you certify *that the returned products/spare parts have been carefully cleaned and are free from any residues.*

  If the device has been operated together with toxic, caustic, flammable or water-damaging products, clean the device before return by rinsing or neutralizing. Ensure that all cavities are free from dangerous substances. Then, double-check the device to ensure the cleaning is completed.

  We shall not service a device or spare part unless the declaration of decontamination confirms proper decontamination of the device or spare part. Shipments without a declaration of decontamination shall be cleaned professionally at your expense before further proceeding.

You can find the forms on the Internet and on the CD delivered with the device.

9.6 Battery disposal

In accordance with EU directive 2006/66/EC, batteries are not to be disposed of using municipal waste disposal services.

Waste industrial batteries are accepted back by Siemens or by the local Siemens representative. Please talk to your local Siemens contact (http://www.siemens.com/automation/service&support) or follow the return procedures (Page 103).

9.7 Disposal

Devices identified by this symbol may not be disposed of in the municipal waste disposal services under observance of the Directive 2002/96/EC on waste electronic and electrical equipment (WEEE).

They can be returned to the supplier within the EC or to a locally approved disposal service. Observe the specific regulations valid in your country.

Troubleshooting 10

10.1 Troubleshooting

The following is list of troubleshooting tips and messages that you may encounter. They include explanations and, in some cases, a recommended action. If a problem seems unsolvable, contact your local Siemens office or regional Ultrasonic Flow Representative for expert help at: Local Contact Person (http://www.automation.siemens.com/partner)

Table 10- 1 Troubleshooting Tips

Error or Message	Probable Cause	Solution
Memory Full!	Response to an attempt to save site data, when data memory is full.	Delete an obsolete site or clear Datalogger memory to make room for the new data. May need to perform F4 procedure.
Memory Corrupted!	Memory read error occurred while accessing the active site data.	Refer to F4 reset procedure in the Operation Instructions manual.
Chan Not Setup	Response to an attempt to invoke an operation that requires a channel to be enabled.	Enable the channel [Channel Setup - Channel Enable - Yes]. Note that a channel cannot be enabled until an "Install" operation is completed..
Clr Active Memory?	Response to pressing the F4 key.	Use the F4 function to restore operation if a severe event (e.g. a violent power surge) disrupts system operation.
Clr Saved Data?	[Clr Saved Data?] only appears after pressing the <Down Arrow> in response to [Clr Active Memory?].	Answering [Yes] to [Clr Saved Data?] will erase **ALL** saved data. To invoke in RS-232 serial mode, type @@@ and then press <ENTER>.
<EOT>	Response to a request to output Datalogger data to the printer or the Graphics screen when no Datalogger data exists.	Set up the Datalogger.
No Sites - Press <ENTER>	Response while trying to recall/delete a site setup when no sites are stored.	Create site.
Security	Response upon changing previously entered data when security switch is in [Disable] position or security code has been entered.	• Change switch position to [Enable]. • Enter previously set security code.
RTC Error	Component level problem.	• Meter requires service. Request RMA.
- - -F- - - Fault Alarm	• Loss of signal strength (ALC) • Change of Rx signal location (Beam Blowing)	• Recouple sensors with fresh couplant. • Install sensors in Direct mount mode. • Note: If problem persists call Tech support.

Error or Message	Probable Cause	Solution
Re-space Index	The measured liquid sonic velocity (Vs) is more than +/- 25% of the average Vs range.	• Assure proper pipe dimensions and/or Liquid data entries are correct. • Properly enter correct Sensor Size into the meter [Install Sensor] menu. • Confirm sensor spacing is correct by checking [Install Sensor] menu spacing parameters.
Invalid Setup (use Direct Mode)	During the Initial Makeup the system detects invalid sensor spacing, erroneous liquid pipe parameters, or some other factor that prevents it from completing the Initial Makeup.	This may be due to one of the following: • An out-of-range data entry. • An invalid condition (e.g., overlapping sensors in Reflect Mode). If selecting Direct Mode does not resolve, review all site setup and sensor installation choices particularly data entered for pipe and liquid. • In Reflect Mode the meter detects that the pipe wall signal may impinge upon the liquid signal. Use Direct Mode instead. • Press <ENTER>, <Up Arrow>, <Down Arrow>, or <Left Arrow> to abort install routine. Continue programming other site data in anticipation of resolving the difficulty later. Call technical support for help if necessary.
Low Signal - Press <ENTER>	During the Initial Makeup the meter decides that the level of the receive signal is insufficient for proper operation.	Some reasons for low signal are: • Invoking [Install Complete] on an empty pipe. • Coupling compound insufficient; not applied or evaporated. • A disconnected or broken sensor cable. • The pipe needs to be conditioned at the mounting location. • Flush out large air bubbles. • The sensor cables are defective or not connected to the correct channel. • The Set Empty routine performed when pipe was NOT actually empty. If you locate and correct the improper condition immediately, press <ENTER> to resume the installation procedure. Otherwise, press the <Left Arrow> to abort the installation and conduct a thorough investigation.
Detection Fault	If it appears that the meter cannot complete an Initial Makeup it means that the pipe and/or liquid conditions do not permit a receive signal that meets the flow detection standards. The system will not operate.	Attempt to improve operating conditions by reinstalling the sensors at a different spacing offset, or even at a different location on the pipe. Switching from Reflect to Direct Mount may solve the problem. However, operation may not be possible if there is poor liquid or pipe wall sonic conductivity.

Note

If you receive a Detection Fault message, it is strongly recommended that the Technical Service Department (http://www.automation.siemens.com/partner) be contacted.

10.2 F4 Reset Procedure

You may encounter an operating problem that blocks access to the Diagnostics Menu, or the flow meter may operate erratically after exposure to a power transient or some other traumatic event. These cases may require use of the F4-reset sequence to restore operation.

The F4-Reset sequence operates on two levels:

- Clear Active Memory

The first F4-Reset deletes all the data currently in Active Memory, but leaves Datalogger data and all stored Site Setups intact. This is the most desirable method since all you have to do to restore operation is reload a saved Site Setup.

- Clear All Saved Memory

If the first sequence fails then you have to resort to the second level of the F4 sequence, which allows you to clear ALL Saved Memory. **Be aware that this erases all saved Site Setups (including flow calibrated sites), Datalogger Data and user-defined pipe and sensor tables.** This will require you to completely re-install the system and repeat all desired default settings, custom pipe tables, etc. The table below shows the sequence of the [F4] routine:

[Power On/Off + F4]⇒	[Clr Active Memory?]⇒ ⇑ ⇓ [Clr Saved Data?]⇒	⇒No ⇒Yes ⇒No ⇒Yes

Clearing only Active Memory

1. Turn off power (if it is currently on). Press <F4> and keep it pressed while you turn on power. The prompt: [Clr Active Memory? No] appears at the top of the screen.
2. Press <Right Arrow> to access F4 Reset option list. Press <Down Arrow> to switch the option list to [Clr Active Memory? Yes]. Press <ENTER> to clear all Active Site Data (but not saved Site Setups).
3. To restore operation, press <MENU> to access the installation menu. Create a new site setup or recall a stored site setup.
4. Re-select any Meter Facilities menu items (e.g. RS-232 setup parameters).

Clearing All Saved Data

1. Turn off power (if it is currently on).
2. Press <F4> and keep it pressed while you turn on power. The prompt: [Clr Active Memory? No] appears at the top of the screen. Press the <Down Arrow>. Note that the prompt switches to [Clr Saved Data? No].
3. To access the F4 Reset option list press the <Right Arrow>. Press the <Down Arrow> to switch the option list to [Clr Saved Data? Yes].

NOTICE
Loss of RAM Data Before proceeding further it is essential to understand that this function eliminates ALL data stored in RAM. This means that all saved site setups including the site data of a flow-calibrated site will be erased! In addition, the entire Datalogger file plus any custom factory or user-created pipe or sensor tables will be eliminated. The impact of this is such that we strongly recommend that you consult Technical Services before continuing with this procedure. Be aware that you will have to create a new Site Setup, re-enter all site specific parameters including pipe or sensor tables, plus all desired Meter Facilities menu entries.

4. To clear all Saved Memory press <ENTER>.
5. Create a Site Setup before attempting to access other menu items.
6. To restore operation, press <MENU> to access the installation menu. Create a new site setup and complete the installation procedure.
7. Re-select desired Meter Facilities menu items (e.g. RS-232 setup parameters).

10.3 Test Facilities Graph Screen

When operating in the transit time mode the Test Facilities Graph Screen is an exceptional diagnostic tool for troubleshooting problem applications or simply determining Receive signal quality. The primary function of this screen is to display the digitized receive signal waveform with the similar appearance and function of a digital oscilloscope. This screen also allows the user to override some of the flow meter default settings by permitting adjustment to the measured transit time, the digital averaging and the zero crossover used in the measurement of the up/down transit time difference. The figure shown below is a representation of the diagnostic graph.

Note

The Test Facilities Graph Screen requires significant CPU overhead. The flow meter should not be left in this mode during normal operation where the Datalogger is the primary output or during calibration work.

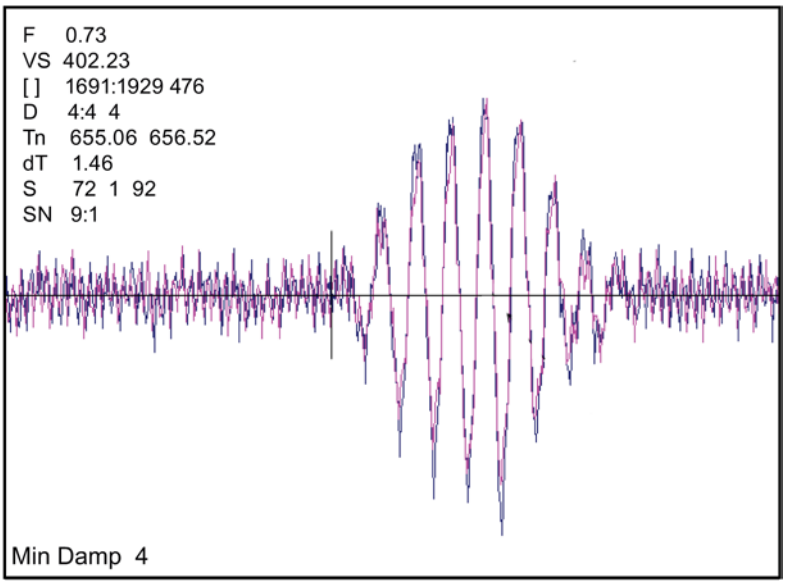


Figure 10-1 Test Facilities Graph Screen

Entering the Diagnostic Graph Screen

Before you can view the Diagnostic Graph Screen the flow channel must first be properly installed and operating in a non-empty condition. If a previously installed channel is in a "Fault" condition, but not reporting "Empty", you can still access the Graph Screen to aid in troubleshooting the cause of the failure to measure flow.

To view the Graph Screen first enter the [Test Facilities] menu, which is a submenu of the main [Diagnostic Data] menu.

1. Pressing the <Up/Down Arrows>, scroll to the [Graph] menu item.
2. Press the <Right Arrow> to enter the [Graph] menu and scroll to highlight the [Yes] item in the option list.
3. Now press the <ENTER> key to access the Graph Screen.
4. To exit the Graph Screen and return to the main menu, press the <MENU> key once.

Diagnostic Text Display

The text to the upper left-hand corner of the screen represents diagnostic items which can be individually turned on or off to reduce unnecessary clutter on the screen. This text display can be modified by pressing the <ENTER> key and scrolling up or down through the various parameters that appear in the Graph Display menu. Pressing the <ENTER> key will select the highlighted parameter (a "+" sign appears next to selected items) and pressing <CLR> will deselect the item. Pressing the <Left Arrow> will return you to the graph screen with the selected parameters appearing at the top left corner of the screen. (The sample graph above is shown with all diagnostics items selected).

Table 10- 2 Description of Graph Screen Text Display Parameters

Screen Text Parameters	Menu List Item	Description
F	Flow	Measured flow rate in selected flow units.
VS	Vs m/s	Sound Velocity in meters per second.
[ ]	Display Metrics	Represents the digital sample position of the receive window.
	Correlated plot	Displays the receive waveform in its proper superposition or registration. The true delta time will be displayed by NOT selecting "Correlated Plot".
	Centroid Mark	Indicates with a large vertical marker the peak energy of the receive waveform.
D	Damping	Displays the minimum and maximum digital damping exponent along with the active damping exponent.
Tn	Tn (usec)	Receive signal transit time in microseconds.
dT	DeltaT (nsecs)	Transit time delta (difference) in nanoseconds.
S	Signal Strength	Displays %Valc (amplitude), %Vaer (aeration factor) and numeric ALC.
SN	Signal-to-Noise Ratio	Indicates the signal to noise ratio of the receive signal. Increased damping will increase the S/N ratio as the asynchronous noise reduces.
	Envelope	Percentage change of the signal from Initial Makeup conditions.

Time Base Control

The digitized receive signal can be moved either to the left or right on the screen by pressing the <Left> or <Right> keypad arrows. The direction of the arrow actually represents the direction in which the Receive "window" will move, thereby causing the receive signal to shift in the opposite direction on the screen (e.g., Pressing the <Left Arrow> moves the signal to the right).

The digitized receive signal can be expanded or contracted in the time domain by pressing the <+> or <-> keys on the keypad. This allows you to see the entire contents of the receive window, or zoom in to see greater detail. Pressing the <CLR> key once will automatically center the receive signal on the screen. When expanding the Receive signal small vertical "tick" marks will eventually appear. These marks represent the time at which the receive signal is digitally sampled.

Correlated Plot

During conditions of flow, the actual transit time delta (difference) can be observed in the displayed receive signal waveform when the [Correlated Plot] menu parameter is not selected. To observe this time difference simply depress the <+> key (to see greater signal detail) until the individual up and down receive signals are clearly discernible. To verify that the flow meter signal processing algorithms are properly correlating the up and down stream receive signals, select the [Correlated Plot] option from the display menu list.

Return to the graph screen and observe the relative position of the up and down waveforms. In a properly correlated receive signal the two images should be nearly superimposed on top of each other, even during high flow conditions. In the unlikely situation where the two images appear to be offset by one or more receive cycles then the flow readings should be considered questionable.

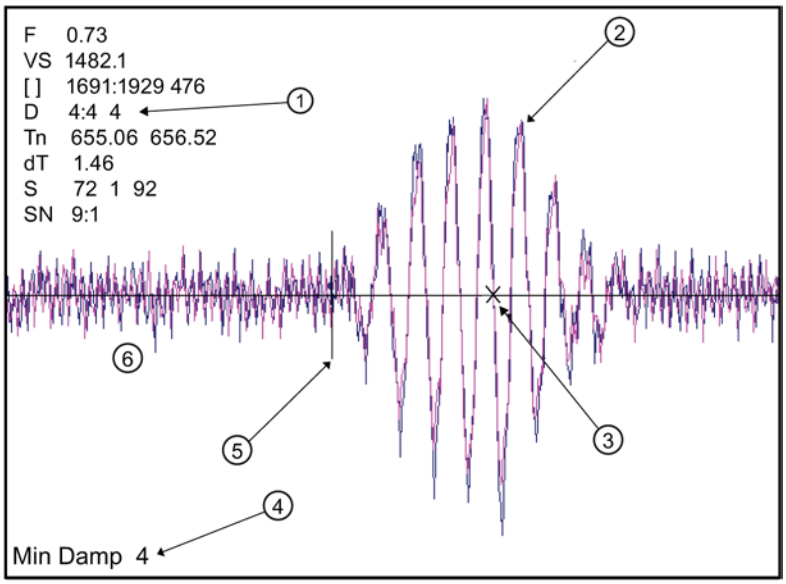
Command Modes

Although the flow meter signal processing algorithms are capable of accommodating a very wide range of signal conditions, it may be desirable to override these default settings under extremely difficult operating conditions. The following functions are available for this purpose.

Digital Damping Control: (Hot Key 1 and 2)

The Graph Screen includes the capability to access a set of command codes, which enable a user to override a number of default meter settings. The most important parameter is the digital damping control, which can be accessed by pressing number <1> or <2> on the keypad while in the Signal Graph Screen mode.

The meter permits user modification of the digital averaging used by the signal processing routines. In general, the default damping values selected by the flow meter will provide optimal performance over a wide range of transit time applications. However, in extreme cases of unstable flow, pulsating flow, low signal levels or high electronic noise it may be necessary to override these default settings to permit uninterrupted and reliable flow measurement.



①	Damping Factors	④	Min Damping Factor (Hot Key 1)
②	Digitized Receive Signal	⑤	TN Marker
③	Crossover Marker	⑥	High Baseline Noise

[MinDamp #] Command

Pressing the <1> key will cause [MinDamp #] to appear on the command line at the lower left-hand corner of the screen. The number listed to the right of the command code represents the exponent in the meter exponential averaging routine, where the larger the number the greater the digital averaging. Pressing the <+> key will increase the damping value. Likewise, pressing the <-> key will decrease the damping value.

To exit this mode, press the <0> key on the keypad.

[MaxDamp #] Command

Pressing the <2> key will bring up the [MaxDamp #] command. The function of this parameter is similar to the [MinDamp #] command described above; however, the two parameters interact in the following manner. The MinDamp value must not exceed the MaxDamp value; therefore increasing the MinDamp value above the previous MaxDamp value will set both parameters to the same value. In most cases, it is preferred that both damping parameters be set to the same value, however, in cases where rapid response to changes in liquid sound velocity for flow rate is required, the two values may be set differently. In this situation the meter will use the MaxDamp value when conditions are stable, but then switch to a faster damping value (limited by MinDamp) when a significant change in sound velocity or flow rate is perceived.

To exit this mode, press the <0> key on the keypad.

To access the Digital Damping Control using the Test Facilities Graph Screen, proceed as follows:

Note

To use the Test Facilities Graph Screen you must have a working site.

To INCREASE the Digital Damping:

Setting the Digital Damping Factor to a value HIGHER than the default value of 4 may be necessary in cases where the signal-to-noise ratio (SN) is found to be unacceptably low (<15:1), but only if the noise is determined to be asynchronous (i.e., not associated with the transmit or flow meter timing circuitry) as shown in the signal example above, where the baseline noise has a higher frequency than the true liquid signal.

The following application conditions may require a higher Digital Damping Factor:

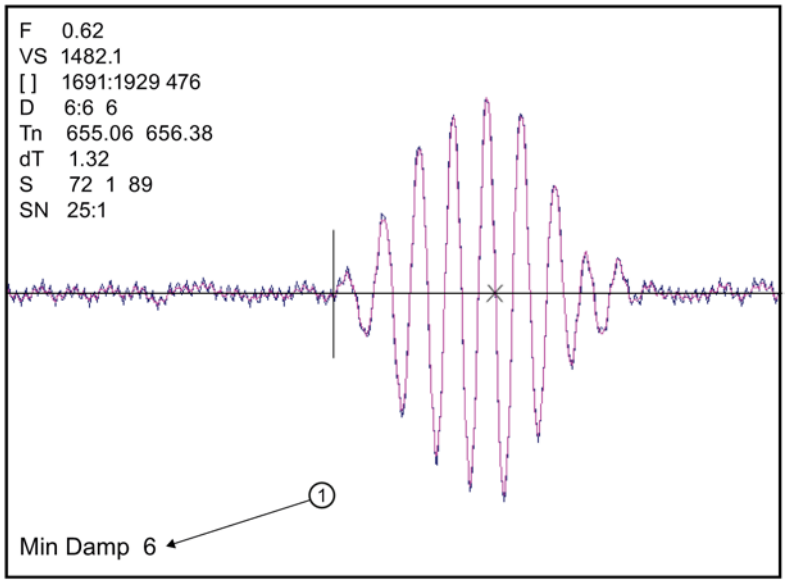
- Close proximity to pressure control valves which may generate in-band acoustic noise
- High un-dissolved gas solids content in liquid.
- High electronic noise from variable frequency drives or other external equipment.

1. Press the <1> key while viewing the Test Facilities Graph Screen as shown above. The damping control [MinDamp #] will appear on the command line at the lower left-hand corner of the screen.

Note

The number listed to the right of the command code on the screen represents the exponent in the exponential averaging routine (digital damping), where the larger the number represents the greater the digital averaging. Setting this exponent higher than 7 is generally not recommended.

2. Pressing the <+> key will increase the MinDamp Factor by one unit for each key press. To exit this mode, press the <0> key on the keypad.



① Increased Damping Factor

Figure 10-2 Setting the MinDamp Factor

The above example shows that increasing the Digital Damping reduces asynchronous noise.

To DECREASE the Digital Damping:

Setting the Digital Damping factor to a value LOWER than the default value of 4 may be justified in cases where pulsating flow is present (such as from a reciprocating pump) or for the purpose of diagnosing transient signal behavior. A pulsating flow condition that generates more than +/- 45 degrees of phase jitter will generally cause signal correlation problems when any digital averaging is used. In this case it may be necessary to completely eliminate the digital averaging by reducing the Digital Damping Factor to 0.

1. Press the <2> key while viewing the Test Facilities Graph Screen. The damping control [MaxDamp #] will appear on the command line at the lower left-hand corner of the screen.
2. Pressing the <-> key will decrease the MaxDamp Factor by one unit for each key press. To exit this mode, press the <0> key on the keypad.

Transit Time Adjustment: (Hot Key 3)

Observe the short vertical marker at the beginning of the receive signal in the Graph Screen above. This line represents the position in time (Tn) where the flow meter perceives the arrival of the ultrasonic signal. There are actually two Tn markers, one for the upstream arrival time and one for the downstream arrival time. For proper liquid sound velocity measurement these Tn markers should be positioned near the beginning edge of the receive waveform envelope (as shown), however, in cases of poor signal conditions it is possible for this measurement to be off by several receive waveform cycles.

1. To adjust the Tn mark position press the <3> key on the keypad to bring up the [TnSet #] command.
2. Pressing the <+> or <-> keys will cause the Tn marker to move later or earlier, respectively. As you adjust the Tn marker, both Tn and Vs (liquid sound velocity) will change accordingly.
3. To exit this mode, press the <0> key on the keypad.

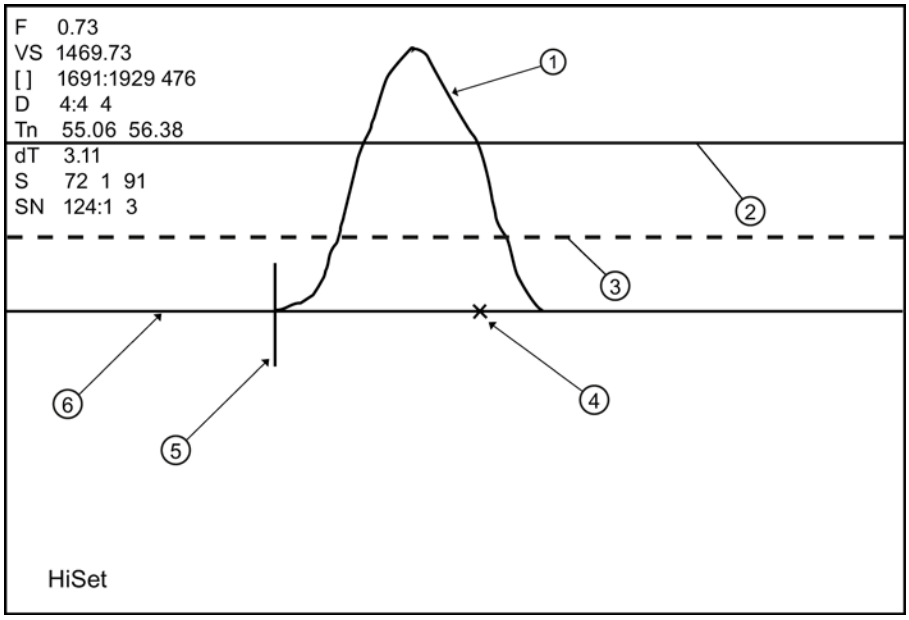
Zero Crossover Adjustment: (Hot Key 4)

Observe the small "X" mark located on the zero crossing line near the middle of the receive signal in the Graph Screen above. This "X" indicates the central crossover which the flow meter is using to measure the transit-time delta. This crossover will generally be close to the peak of the Receive signal with at least one well formed (non-aberrated) receive cycle on each side of the crossover.

1. If it appears that the placement of this crossover is unsatisfactory then it can be adjusted by pressing the <4> key on the keypad, which will invoke the [ZCO Set #] command. The crossover point can then be moved in either direction on the waveform using the plus <+> or minus <-> keys. The change from the default value (in receive cycles) will appear in the number to the right of the command.
2. To exit this mode, press the <0> key.

Envelope Threshold Adjustment: (Hot Key 5 & 6)

Pressing the <=> key causes the graph to toggle between the default signal waveform screen and the signal envelope screen (see example below). This envelope screen can aid in the diagnosis of Tn errors caused by unusual receive waveform distortion. Signal distortion is sometimes caused by poor sensor selection or poor pipe wall conditions, which may result in an incorrectly measured fluid sound velocity. To improve the automatic measurement of Tn, the envelope threshold limit can be adjusted to exclude portions of the envelope, which may be causing the Tn detection problem.



①	Envelope Signal	④	Crossover Marker
②	HiSet Envelope Threshold	⑤	TN Marker
③	LoSet Envelope Threshold	⑥	Zero Baseline

Figure 10-3 Envelope Threshold Adjustment

1. If it appears that the default placement of the Tn marker is incorrect or unstable, it can be adjusted by pressing the <5> key on the keypad to invoke the [Hi Set #] command or by pressing the <6> key to invoke the [Low Set #] command (while viewing the envelope screen). A horizontal line representing the envelope threshold level will appear along with a number indicating the percentage level. The High and Low thresholds can then be moved either up or down on the envelope using the <+> or <-> keys. While viewing the Tn marker position, adjust the thresholds so that they are well above the baseline "noise" level but below the first major peak.
2. To exit this mode, press the <0> key.

Signal Masking Function: (Hot Key 7)

Under conditions of extremely low signal amplitude, a noise spike associated with the flow meter receive signal window may be present on the extreme left side of the graph display. If this spike is large enough it may interfere with the signal detection routines.

1. To eliminate this noise from the signal processing routines, press the <7> key to invoke the [Mask Set #] command, then press the <+> key until the noise is no longer present in the receive waveform.
2. Press <0> to exit this command.

Hold Set Function: (Hot Key 8)

The [Hold Set #] command is used to set the Hold Set number higher if intermittent mis-registration occurs. Press the <8> key on the keypad to invoke this function.

Table 10- 3 Hot Key Summary

Key	Command Line	Description
<+>		Expands (magnifies) waveform to view more detail.
<->		Contracts waveform to view more of the waveform.
<Left Arrow>		Shifts receive window to the left (waveform to the right).
<Right Arrow>		Shifts receive window to the right (waveform to the left).
<CLR>		Brings waveform to the center of the screen.
<ENTER>		Calls up Text Display menu items. <Left Arrow> to return to graph.
<MENU>		Exits the Graph Screen and returns to the main menu.
<1>	MinDamp	Minimum damping exponent control (+ or - to increase or decrease).
<2>	MaxDamp	Maximum damping exponent control (+ or - to increase or decrease).
<3>	TnSet	Transit time adjustment (use + or - to move Tn marker).
<4>	ZCOSet	Zero Crossover adjustment (use + or - to move crossover marker).
<5>	HiSet	Signal envelope threshold level (use + or - to move threshold). Note: Signal envelope screen must be activation. Press = sign to activate
<6>	LoSet	Signal envelope threshold level (use + or - to move threshold). Note: Signal envelope screen must be activation. Press = sign to activate
<7>	MaskSet	Leading edge masking functions (use + or - to alter number of samples masked).
<8>	Hold Set	Set this number higher if intermittent mis-registration occurs.
<0>		Exits the command line.
<=>		Toggle graph between receive waveform and envelope waveform.

Downloading Signal Graph Data

DP n Command

To download the Signal Graph data use either the Si-Ware or Windows HyperTerminal program.

Note
Si-Ware

The following Signal Graph Data download procedure uses the Si-Ware program.

1. Open Si-Ware and select [Terminal Mode].
2. To start Signal Data Graph download: Type: DP<Space><Path #>. For example: DP 1.
3. Import downloaded Signal Graph data to MS Excel.
4. Select [Space] delimited Data in the Text Import Wizard to distribute data in columns.
5. Use the Excel Chart Wizard to graph columns 2 and 3 and produce the Signal Graph.

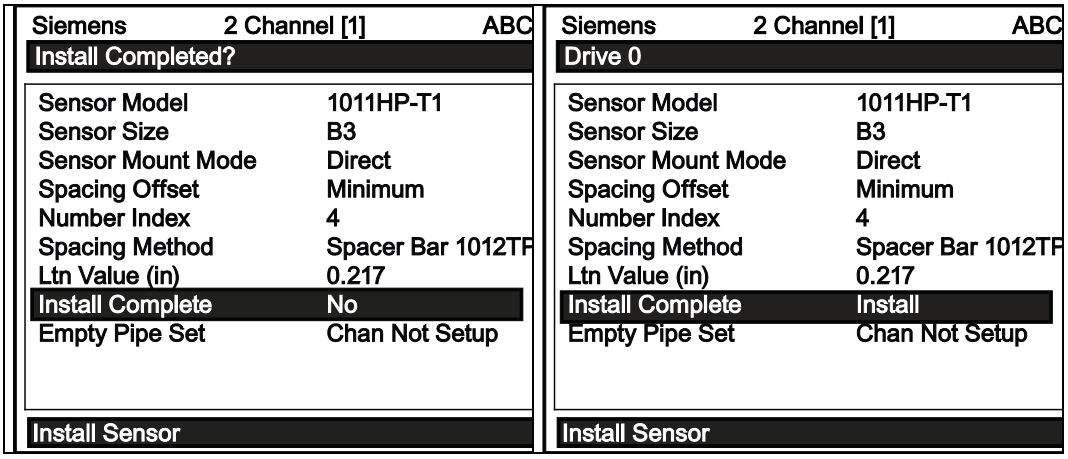
10.4 Force Transmit

NOTICE
Incorrect Diagnostic Procedures The Force Transmit and Force Frequency diagnostic procedures are preconfigured at the factory and should only be implemented by approved Siemens personnel.

This diagnostic software routine allows the user to "force" a transmitting condition that can be used to search for an amplitude level (ALC) when Detection Fault or Low Signal alarms are present. The routine forces the meter to generate constant transmit bursts while reporting current receive signal strength for the user. To initiate the Force Transmit function, refer to the example shown below.

Setting a Force Transmit condition

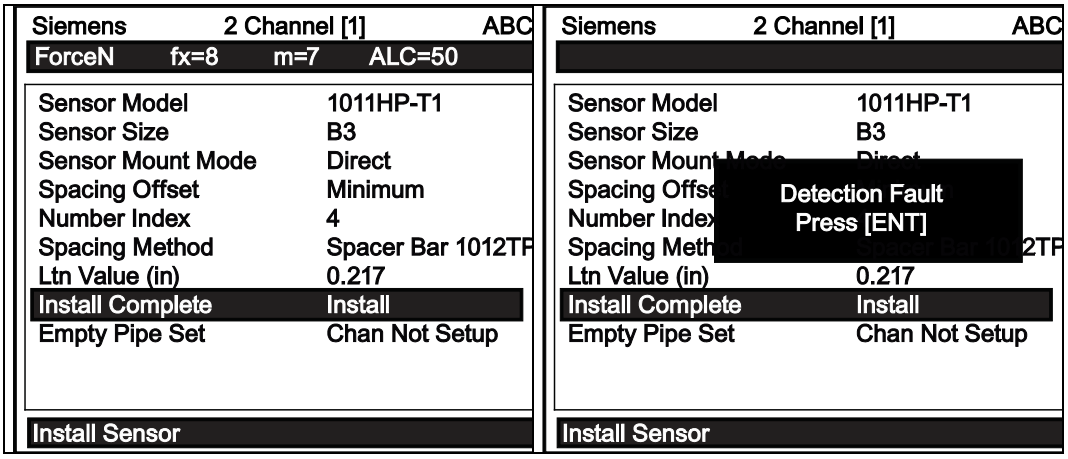
1. After the [Install] command is invoked, and while the meter is going through the drive selections, press the <ENTER> key again.



Note

The <ENTER> keys must be pressed before the meter scans through all the drives, or the <Install Complete> function must be initiated again.

2. A typical menu screen will appear and indicate the current ALC (e.g., 50) as shown below. This ALC number indicates the current receive signal strength and can be used for further diagnostic purposes



3. To exit Force Transmit, press the <Left Arrow> and a Detection Fault prompt will appear (see above).
4. Press the <Left Arrow> again and the meter will return to the [Install Sensor] menu and highlight the [Empty Pipe Set] menu cell.

Setting a Forced Frequency

1. To force a frequency, repeat steps 1 and 2 above, but press <Right Arrow>. The following typical display line will appear: **Drive =0**
2. Using numeric keys enter the frequency and press <ENTER>.
3. To complete the [Install] process after mounting the transducers press <ENTER>.
4. If the Force Transmit diagnostic procedure is not used, the normal [Install Complete] function occurs.

Technical data

11

Transmitter

- Operating Temperature Range: -18°C to 60°C (0°F to 140°F)
- Storage Temperature Range: -20°C to 93°C (-4°F to 200°F)

Degree of Protection

- Wall mount enclosure: IP65 (NEMA 4X)
- Wall mount explosion proof: IP66 (NEMA 7)

Accuracy

- Accuracy: ± 0.05 of API number
- Repeatability: ± 0.01 of API number
- Data refresh rate; 5 Hz

Power Supply

- IP65 (NEMA 4X) and IP66 (NEMA 7) Wall Mount - 90 to 240 VAC @50 or 60 Hz 30 VA / 9 to 36 VDC, 12 Watts

Sensor

- Type: Nonintrusive, externally mounted
- Temperature Range: -40°C to +120°C (-40°F to +250°F)

Dimensions

- 23.6 cm (9.31 in) x 28.7 cm (11.31 in)
- Net weight: 4.1 kg (9.0 lbs.) maximum

Liquid Temperature

- Standard: -40°C to +120°C (-40°F to +250°F)
- Optional: -40°C to +230°C (-40°F to +450°F)
- Ambient: -18°C to 60°C (0°F to 140°F)

Liquid Type

- Water
- Multiple Crude Oils
- Light Crude only
- Heavy Crude only
- Multiple Finished Products
- Gasolines Only
- Kerosene
- Jet Fuel
- Diesel
- Multiple Fuel Oils
- Heavy Fuel Oils
- Liquefied Gases
- Other (Define Liquid name and Vs)

Unit Repair and Excluded Liability

All changes and repairs must be done by qualified personnel, applicable safety regulations must be followed. Please note the following:

- The user is responsible for all changes and repairs made to the device.
- All new components must be provided by Siemens Industry, Inc.
- Restrict repair to faulty components only.
- Do not re-use faulty components.

Appendix A

A.1 Ordering

In order to ensure that the ordering data you are using is not outdated, the latest ordering data is always available on the Internet: Catalog process instrumentation (http://www.siemens.com/processinstrumentation/catalogs)

See also

Process instrumentation catalog (http://www.siemens.com/processinstrumentation/catalogs)

A.2 I/O Connections and Wiring

Terminal Block Wiring - 7ME39400AL00 and 7ME39400AL01 I/O Module

(Refer to manual drawing 1010N-2-7 sheet 2 of 2)

These connection diagrams apply to the part numbers listed below.

Table A- 1 Connection Diagrams and Part Numbers

1010N-2-7 (Sheet 2 of 2) Drawing	
FUH1010	7ME3600, 7ME3603

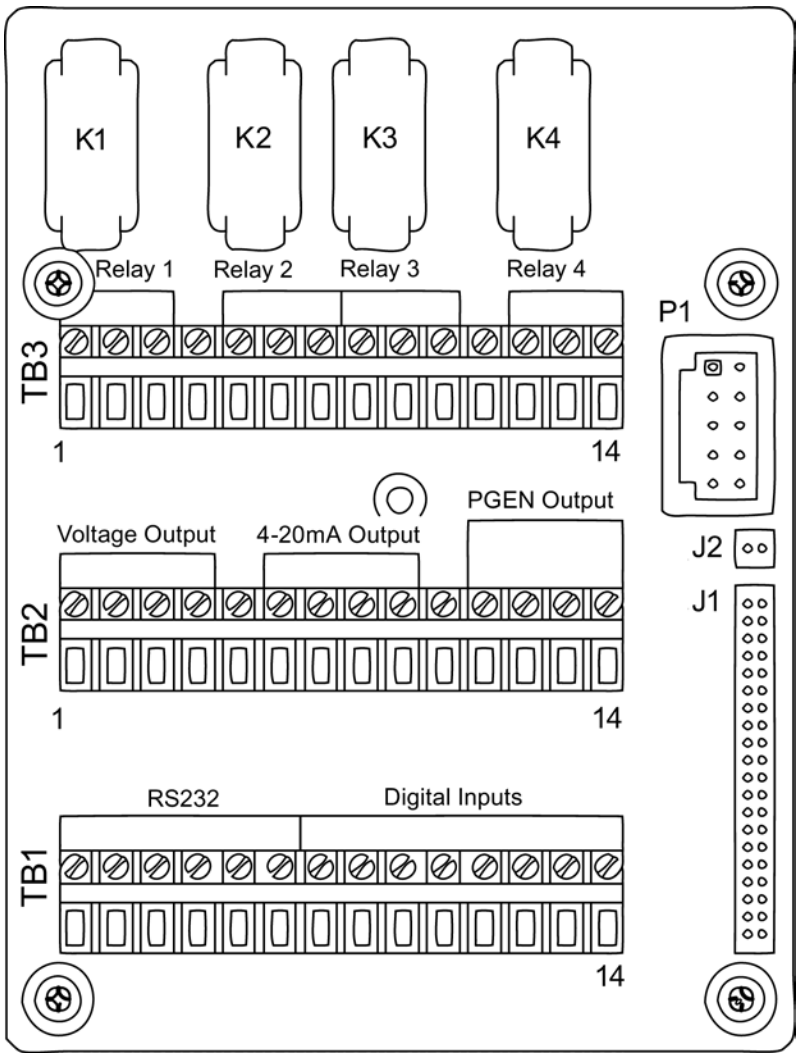
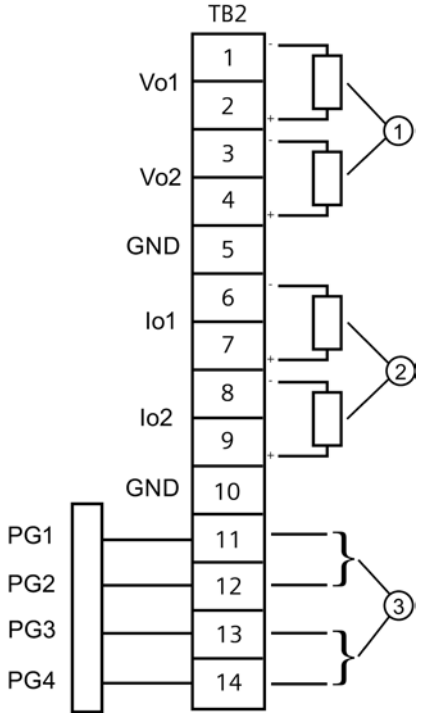


Figure A-1 7ME39400AL00 and 7ME39400AL01 I/O Module

Table A- 2 Input/Output Wiring (TB2) - 7ME39400AL00 and 7ME39400AL01 I/O Module (Single Channel, 2-Channel and Dual Path)

Pin#	Signal	Definition	Description	Function Single and 2-Channel
1	Vo1+	0-10 Volt Analog Output	Meter process variables are assigned to individual outputs under menu control. 4-20mA outputs also provide a fault indication by dropping to 2 mA if assigned to flow rate and under fault conditions.	System outputs assignable and scalable to flow related parameters. CGND is for cable shield terminations.
2	Vo1-	Ref. Ground		
3	Vo2+	0-10 Volt Analog Output		
4	Vo2-	Ref. Ground		
5	CGND	Chassis GND		
6	Io1+	4-20mA Output 1		
7	Io1-	Isolated Return		
8	Io2+	4-20mA Output 2		
9	Io2-	Isolated Return		
10	CGND	Chassis GND		
11	PG1	Frequency Output 1	0 -5000 Hz Frequency output; assignable.	5V TTL Signal
12	PG2	GND		GND
13	PG3	Frequency Output 2		5V TTL Signal
14	PG4	GND		GND



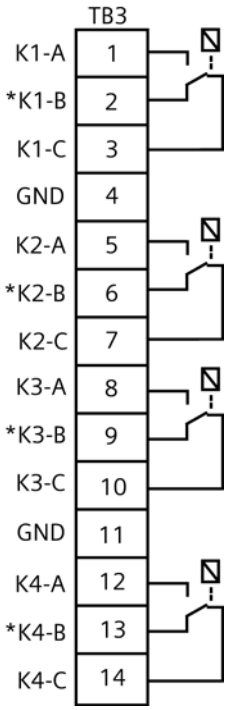
① 0-10Vdc Output, Load 10KV (min)

② 4-20 mA Output, Load 1KV (max)

③ TB2-11 - 5V TTL Signal
TB2-12 - GND
TB2-13 - 5V TTL Signal
TB2-14 - GND

Table A- 3 Input/Output Wiring (TB3) - 7ME39400AL00 and 7ME39400AL01 I/O Module

Pin#	Signal	Definition	Description	Function Single Channel	Function Dual Channel	Function Dual Path
1	K1 A	Relay 1 Normally Open	Relay 1	Alarm or control functions set by CH 1	Alarm or control functions set by CH 1	Alarm or control functions set by CH 3
2	K1 B	Relay 1 Normally Closed (7ME39400AL01 only)				
3	K1 C	Relay 1 Common				
4	GND	Digital Return [GND]	GND	GND	GND	GND
5	K2 A	Relay 2 Normally Open	Relay 2	Alarm or control functions set by CH 1	Alarm or control functions set by CH 1	Alarm or control functions set by CH 3
6	K2 B	Relay 2 Normally Closed (7ME39400AL01 only)				
7	K2 C	Relay 2 Common				
8	K3 A	Relay 3 Normally Open	Relay 3	Alarm or control functions set by CH 1	Alarm or control functions set by CH 2	Alarm or control functions set by CH 3
9	K3 B	Relay 3 Normally Closed (7ME39400AL01 only)				
10	K3 C	Relay 3 Common				
11	GND	Digital Return [GND]	GND	GND	GND	GND
12	K4 A	Relay 4 Normally Open	Relay 4	Alarm or control functions set by CH 1	Alarm or control functions set by CH 2	Alarm or control functions set by CH 3
13	K4 B	Relay 4 Normally Closed (7ME39400AL01 only)				
14	K4 C	Relay 4 Common				



Note

Relays shown in Power OFF position, which is the same as the alarm assertion position.

*7ME39400AL00 Mercury Relay only available with Normally Open.

Terminal Block Wiring - 7ME39400AL03 and 7ME39400AL04 Expanded I/O Module

(Refer to manual drawing 1010N-7-7 sheet 2 of 2)

These connection diagrams apply to the part numbers listed below.

Table A- 4 Connection Diagrams and Part Numbers

1010N-7-7 (Sheet 2 of 2) Drawing	
FUH1010	7ME3600, 7ME3603

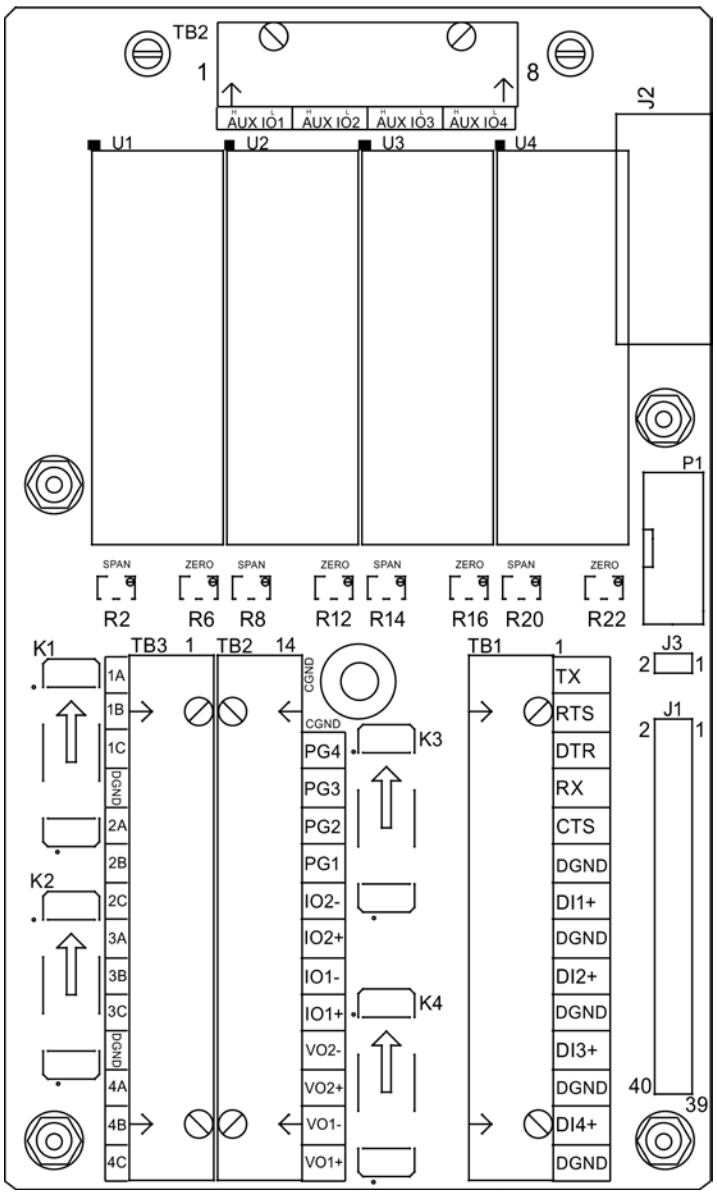
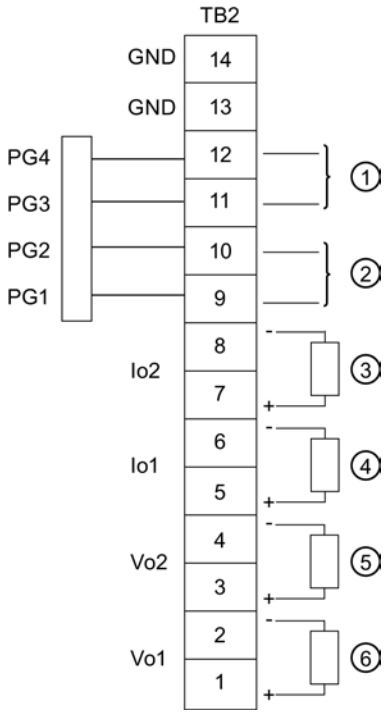


Figure A-2 7ME39400AL03 and 7ME39400AL04 Expanded I/O Module

Table A- 5 Input/Output Wiring (TB2) - 7ME39400AL03 and 7ME39400AL04 Expanded I/O Module

Pin#	Signal	Definition	Description	Function Single Channel	Function Dual Channel	Function Dual Path
14	CGND	Chassis Ground	Chassis Ground	Cable Shield Terminations	Cable Shield Terminations	Cable Shield Terminations
13	CGND	Chassis Ground	Chassis Ground	Cable Shield Terminations	Cable Shield Terminations	Cable Shield Terminations
12	PG4	GND	0-5000 Hz frequency output , assignable	GND	GND	GND
11	PG3	Frequency Out 2		5V TTL Signal	5V TTL Signal	5V TTL Signal
10	PG2	GND		GND	GND	GND
9	PG1	Frequency Out 1		5V TTL Signal	5V TTL Signal	5V TTL Signal
8	Io2 (-)	Isolated Return	Meter process variables assigned to individual outputs under menu control. 4-20mA outputs also provide a fault indication by dropping to 2 mA if assigned to flow rate and under fault conditions.	System outputs assignable & scalable to flow related parameters	System outputs assignable & scalable to flow related parameters	System outputs assignable & scalable to flow related parameters.
7	Io2 (+)	4-20mA Output 2				
6	Io1 (-)	Isolated Return				
5	Io1 (+)	4-20mA Output 1				
4	Vo2-	Ref. Ground				
3	Vo2+	0-10 Volt Output				
2	Vo1-	Ref. Ground				
1	Vo1+	0-10 Volt Output				



① TB2-11 - 5V TTL Signal
TB2-12 - GND

② TB2-9 - 5V TTL Signal
TB2-10 - GND

③ 4-20 mA Load 1K ohm (max)

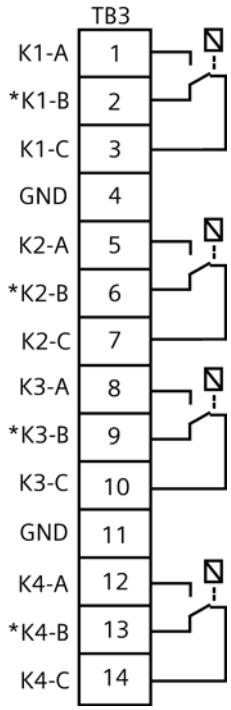
④ 4-20 mA Load 1K ohm (max)

⑤ 0-10V Load 10K ohm (min)

⑥ 0-10V Load 10K ohm (min)

Table A- 6 Input/Output Wiring (TB3) - 7ME39400AL03 and 7ME39400AL04 Expanded I/O Module

Pin#	Signal	Definition	Description	Function Single Channel	Function Dual Channel	Function Dual Path
1	K1 A	Relay 1 Normally Open	Relay 1	Alarm or control functions set by CH 1	Alarm or control functions set by CH 1	Alarm or control functions set by CH 3
2	K1 B	Relay 1 Normally Closed (7ME39400AL04 only)				
3	K1 C	Relay 1 Common				
4	GND	Digital Return [GND]	GND	GND	GND	GND
5	K2 A	Relay 2 Normally Open	Relay 2	Alarm or control functions set by CH 1	Alarm or control functions set by CH 1	Alarm or control functions set by CH 3
6	K2 B	Relay 2 Normally Closed (7ME39400AL04 only)				
7	K2 C	Relay 2 Common				
8	K3 A	Relay 3 Normally Open	Relay 3	Alarm or control functions set by CH 1	Alarm or control functions set by CH 2	Alarm or control functions set by CH 3
9	K3 B	Relay 3 Normally Closed (7ME39400AL04 only)				
10	K3 C	Relay 3 Common				
11	GND	Digital Return [GND]	GND	GND	GND	GND
12	K4 A	Relay 4 Normally Open	Relay 4	Alarm or control functions set by CH 1	Alarm or control functions set by CH 2	Alarm or control functions set by CH 3
13	K4 B	Relay 4 Normally Closed (7ME39400AL04 only)				
14	K4 C	Relay 4 Common				



Note

Relays shown in Power OFF position, which is the same as the alarm assertion position.

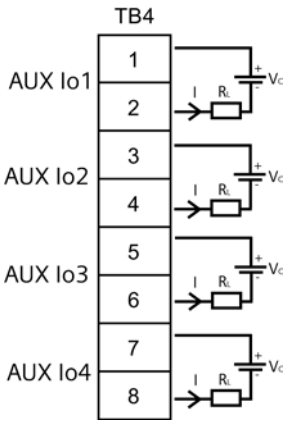
*7ME39400AL03 Mercury Relay only available with Normally Open.

Table A- 7 Input/Output Wiring (TB4) -7ME39400AL03 and 7ME39400AL04 Expanded I/O Module

Pin#	Signal	Definition	Description	Single CH Function	2-CH Function	Dual Path Function
1	AUX I01+	Isolated Loop Supply Io1	Io1 External Power	+30V max. supply voltage allowed		
2	AUX I01-	Io1 4-20mA Output	Io1 Signal	Same output assignment as TB2-9		
3	AUX I02+	Isolated Loop Supply Io2	Io2 External Power	+30V max. supply voltage allowed		
4	AUX I02-	Io2 4-20mA Output	Io2 Signal	Same output assignment as TB2-11		
5	AUX I03+	Isolated Loop Supply Io3	Io3 External Power	System outputs assignable and scalable to flow related parameters. 4-20mA outputs also provide a fault indication by dropping to 2 mA if assigned to flow rate and under fault conditions.		
6	AUX I03-	Io3 4-20mA Output	Io3 Signal			
7	AUX I04+	Isolated Loop Supply Io4	Io4 External Power			
8	AUX I04-	Io4 4-20mA Output	Io4 Signal			

Note

Auxiliary 4-20mA loops are assigned and spanned under menu control of Vo and PGEN outputs.



Vc: 24 VDC typical (+15VDC to 30VDC max) Loop Supply

R_L: 1000 ohms max, = Loop wire resistance plus user's input load resistance

I: 4-20 mA

A.3 Liquid Tables

Reference Tables

The following tables provide reference data that may be required during a Site Setup.

Table A- 8 Sonic Velocity (m/s) for common liquids @ 20°C (68°F)

Liquids/Oils	Vs (m/s)	Liquids/Oils	Vs (m/s)
Acetate, Butyl (n)	1270	Ethanol	1180
Acetate, Ethyl	1180	Ethylene Glycol	1620
Acetate, Methyl	1150	Gasoline	1250
Acetate, Propyl	1180	Glycerine	1920
Alcohol	1440	Linalool	1400
Alcohol, Butyl (n)	1270	Linseed Oil	1770
Alcohol, Ethyl	1180	Methylethyl Ketone	1210
Alcohol, Methyl	1120	Motor Oil (SAE 20/30)	1487
Alcohol, Propyl (i)	1170	Paraffin Oil	1420
Alcohol, Propyl (n)	1220	Pentane	1010
Benzene	1330	Petroleum	1290
Benzol, Ethyl	1340	Tichlorethylene	1050
Butyrate, Ethyl	1170	Transformer Oil	1390
Carbon Tetrachloride	938	Turpentine	1280
Diethyl Ketone	1310		

Table A- 9 Example Liquid Table

LiquIdent	S.G.	Viscosity	Compressibility	Liquid Name
1100	0.6465	0.15	0.00001	MTBE (Additive for Oxygen)
1180	0.717	0.6	0.00001	LFP (Lead Free Premium)
1200	0.733	0.6	0.00001	LR (Leaded Regular)
1330	0.775	1.0	0.00001	Kerosene
1350	0.818	1.16	0.00001	AVJET (AV Jet Fuel)
1380	0.819	1.95	0.00001	HSD (High Sulfur Diesel)
1410	0.885	2.75	0.00001	LSD (Low Sulfur Diesel)
1420	0.959	3.2	0.00001	GASSOIL (Sour Light Cycle Gas Oil)
1490	0.9300	119.00	0.00001	FO (Fuel Oil)
1579	0.9850	1049.00	0.00001	HFO (Heavy Fuel Oil)

A.4 RS-232 Connection

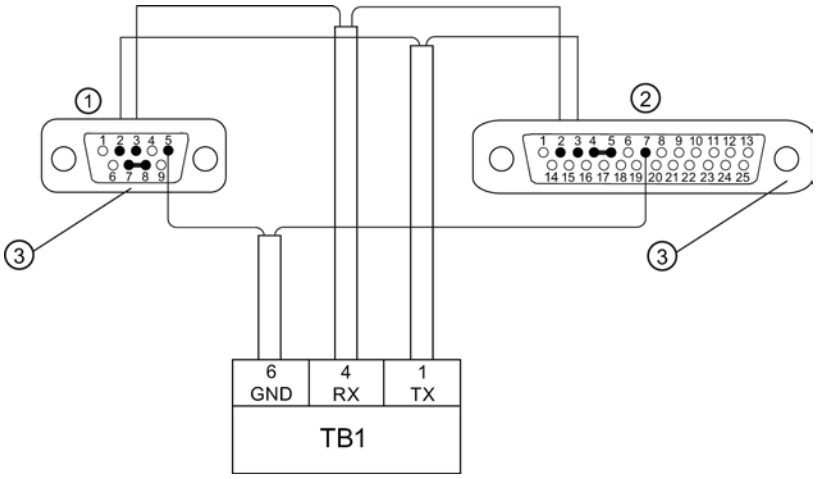
The optionally serial interface cable includes 9-pin and 25-pin connectors to accommodate both types of IBM-compatible serial ports. A PC communication program such as Siemens Si-Ware (download program at: www.siemens.com/siware) or HyperTerminal (Windows 95/98/NT/2000/XP) serves as the data entry interface. These programs reproduce the menu screens that would appear on the system's graphic screen. Once the serial interface is established you can choose to program a graphic display system using a PC and a communications program.

Note

Many newer laptop PCs are not equipped with serial ports and only have USB ports. These PCs will require a USB RS-232 adaptor that can be purchased commercially.

The RS-232 Interface Cable

The physical connection between the device and your PC is accomplished using a serial interface cable, part number: 1015CPC-N. The schematic below shows the configuration of the cable. Each wire is labeled to identify the correct terminal pin on TB1.



① 9-Pin Connector
② 25-Pin Connector
③ Solder side shown

Figure A-3 1015CPC-N Serial Interface Cable

Meter Type	Cable Type	Siemens Part Number	Notes (Meter P/N)
All NEMA 4X	DB-9F - 3 Wire	CQO:1015CPC-N	For 7ME3600, 7ME3603
NEMA 4X with Expanded I/O Module	DB-9F - DB-9F	CQO:1015CPC-P	For 7ME600*C, 7ME3603*C

Also, in most computer stores or online, you will be able to find or you may already have a serial "LapLink" cable or "Null Modem" cable. These cables can be used to communicate with the 1010P/DP systems.

If you prefer to construct your own cable, the following conventions apply in the table:

- FUS1010 NEMA 4X includes all models (7ME3600). Termination is made to the 7ME39400AL00 or 7ME39400AL01 I/O Data Module. Meter end of cable is un-terminated wire.
- FUS1010 NEMA 4X with Enhanced I/O option: Termination is made to the 7ME39400AL03 or 7ME39400AL04 Enhanced I/O Data Module. These modules have a female DB-9 connector for RS-232 communication.

Signal Name	Computer DB-9 Terminal	7ME39400AL03 7ME39400AL04	7ME39400AL00 7ME39400AL01
Ground	Pin 5	Pin 5	TB1- pin 6
Tx	Pin 2	Pin 3	TB1-pin 1
Rx	Pin 3	Pin 2	TB1 pin-4

Communicating with SITRANS F 1010 Systems via the RS-232 Interface

The following sections assume that you are familiar with the basics of using Windows 95/98/NT/2000/XP based communications program. Most computers provide at least one serial port using either a 9-pin or 25-pin D-type connector. The port designation can be either COM 1 or COM 2. Usually, when a computer includes two serial ports, COM 1 will be the 9-pin connector and COM 2 will be the 25-pin connector. However, port designations can vary from manufacturer to manufacturer, so you will have to positively identify the COM port you wish to use for the meter interface. Connect the cable between the meter and your PC using the 25-pin, 9-pin or USB to RS-232 adapter connector, depending upon the port's architecture.

How to use the Windows HyperTerminal Program

Note

Si-Ware

If you want to use the Si-Ware program instead of HyperTerminal, download the program at [http://s13.me/ns/cv] and follow the setup instructions.

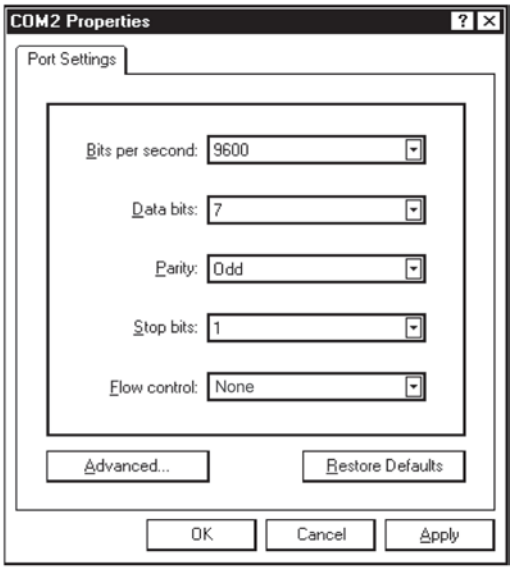
Windows provides a communication program called HyperTerminal, which is ideal for interfacing your computer with the meter. The following typical example explains how to set up HyperTerminal.

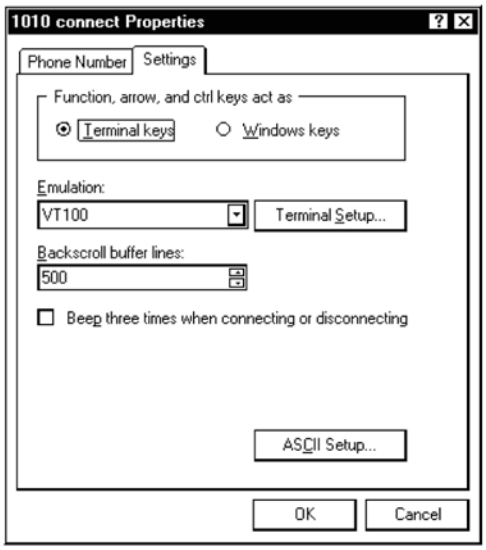
Note

Depending upon the Windows applications being used this setup procedure may vary.

1. Invoke HyperTerminal.
2. Set Com port to port that is designated for use (COM 1).
3. Confirm port settings match the RS-232 setting in the meter.

4. Establish a connection.





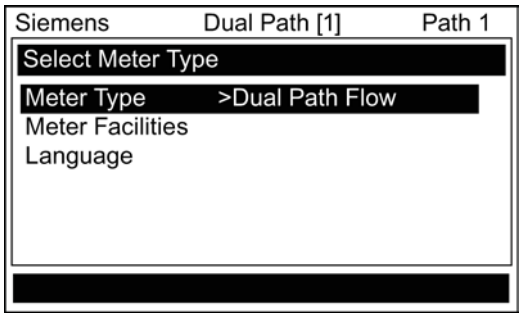
5. You are now ready to communicate with the meter. But first, save your settings by moving the mouse cursor to [File], sliding the cursor to [Save], and then clicking [OK] on the Save dialog box.

Accessing the Installation Menu

Once the parameters are set, HyperTerminal automatically initiates Command mode and you will see a blank screen.

1. Press <Enter> key a few times until you see [? For Help] on the screen.
2. Type: ? (question mark) and then press <Enter> key to see a list of the available commands.

Use the MENU command (type [Menu] and then press <Enter>) to access the top level of the Installation Menu. You will see a screen similar to the example below.

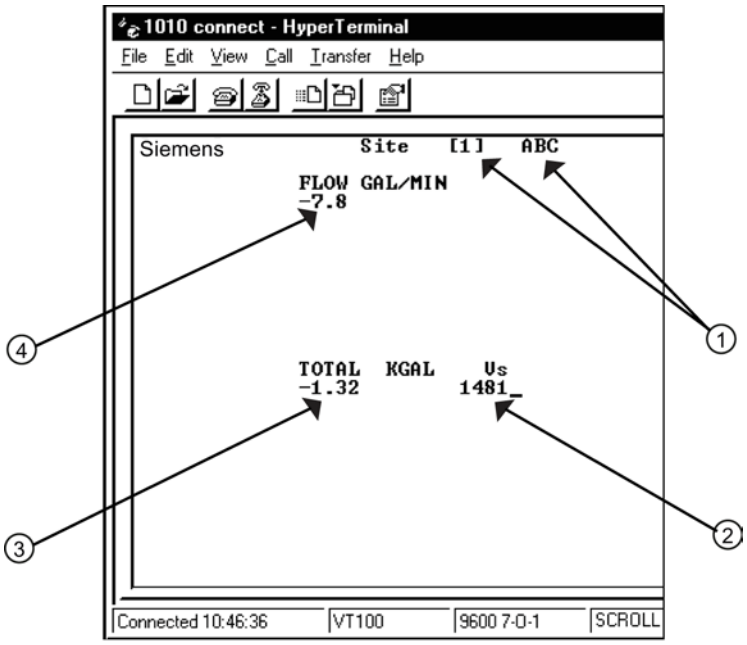


Note

To facilitate connecting through modems, the [Menu] command times out after three minutes of inactivity. To maintain a longer connection type: Menu 1000 and press <Enter>. The optional number is the amount in minutes that the connection will be maintained. Typing [Menu 1000] essentially keeps the interface active for a prolonged period of time.

Data Display Mode

After you complete the installation, you can toggle between Installation Menu mode to Data Display mode. This is the same as using the <MENU> key on the keypad (see Operating Instructions manual). The PC keyboard equivalent key to the keypad <MENU> key is <CTRL> + <L>. Note that the RS-232 interface does not support graphics. Therefore, when you use HyperTerminal to view the data display screens, you will see the same data in alphanumeric form only (as shown below). You can still use the <Up Arrow> and <Down Arrow> to switch between available display screens.



① Current active site setup name. The [1] indicates that the measurement channel is active.

② The current measured liquid sonic velocity.

③ The flow Total display.

④ The current flow reading and flow units.

Navigating through the Installation Menu

After accessing the Installation Menu, you can begin to setup your meter according to the instructions in this manual. The chart below shows the PC keyboard equivalents to the keypad keys while you are in the menu.

SITRANS F 1010 Keypad	PC Keyboard	Description
<Up Arrow>	<Up Arrow>	Move up 1 menu cell (or Flow Display screen)
<Down Arrow>	<Down Arrow>	Move down 1 menu cell (or Flow Display screen)
<Right Arrow>	<Right Arrow>	Move right 1 menu cell (or Flow Display screen)
<Left Arrow>	<Left Arrow>	Move left 1 menu cell (or Flow Display screen)
<MENU>	^L (Ctrl L)	Toggle between Menu and Flow Display
<DATALOG>	^D (Ctrl D)	Generate Datalogger report
<CLR>	<Backspace> or <DEL>	Deselect list selection
<ALT+Up Arrow>	^U (Ctrl U)	Logger Display Page Advance
<+/-> (chg sign)	| (bar, shift + backslash)	Change numeric sign. Can also type (-) key
<Enter>	<Carriage Return>	Enter Key
Digits	Digits	Numerals zero through 9
/	/	Divide by
X	* (upper case 8)	Multiply by
+	+	Plus
-	-	Minus
=	=	Equals
.	.	Decimal Point

Terminal Mode Menu Commands

In addition, the following commands (followed by the <ENTER> key) can be used to control the meter while in Terminal Mode.

Note

The "n" refers to the meter Channel number. For a 2-Channel Arithmetic site (Ch1 + Ch2 or Ch1 – Ch2) the virtual Channel is number 3.

Logger

Invokes the download of all data stored in the Datalogger. Note that the Datalogger data is not erased from the meter memory when it is downloaded. It is recommended to capture this information into a file with a "csv" extension, which can be easily imported into MS Excel.

SITE

Invokes a full site download for a single channel or multi-path meter.

SITE "n"

Invokes a site download for channel "n", where "n" = the Channel # (1, 2, 3, 4, etc.).

DP "n"

Commands the meter to download the digitized receive signal data for Channel or Path "n".

CLRTOT

Clears the Totalizer for a single channel or multi-path meter.

CLRTOT "n"

Clears the Totalizer for Channel "n" of a multi-channel meter.

Lf on

Turns on the Line Feed at the end of any text string sent by the meter.

Lf off

Turns off the Line Feed at the end of any text string sent by the meter.

?

Provides a list of available Terminal Mode meter commands.

Transferring information from the meter to a PC

With HyperTerminal active:

1. Point to [Transfers], and click.
2. Select [Capture Text].
3. Select desired drive path or directory, enter a file name, and click the Start button.
4. Use the following conventions for data file names:
   - For site data or Wave shape data: filename.txt
   - For Datalogger data: filename.csv
5. On PC type the proper command for the data desired (Logger, Site, or DP) and then press [Enter] key.
6. The data should begin streaming on the HyperTerminal screen.

7. Wait for EOT (End Of Transmission) to be displayed.
8. Close the file by pointing to Transfer, drag to Capture Text and click Stop button.

Closing the Terminal or HyperTerminal Program

You may now close the Terminal program. The file(s) you have downloaded are now saved in the location you selected. You may now import the file you have saved into the appropriate program (i.e. MS Word for site data, or MS Excel for Datalogger or wave shape data for graphing or analysis).

The Datalogger contains data that has its fields separated by commas. By using the file extension ".csv" (comma separated values) suggested earlier, the data will import directly into MS Excel without any further modification. For the wave shape data, the fields are separated by spaces, therefore, it is best to save those files as .txt and then use the MS Excel Import Wizard to select "Space Delimiters" for importation of the data.

Site data is downloaded in plain text and can be imported directly into MS Word.

Reset Procedure using RS-232 port

SITRANS F 1010 systems allow you to perform a system reset via the RS-232 interface. The following instructions require the meter to be connected serially to a PC.

Note

Custom RS-232 settings for baud rate, parity and data bits may not be preserved. Therefore, be prepared to set your communications program back to the default (9600, Odd, 7) settings.

To Clear Active Memory using the RS-232 Interface

1. Turn off power (if it is currently on). Turn power on. As soon as you apply power, immediately type the @ character three times. The prompt: **[Clr Active Memory? No]** appears at the top of the screen.
2. Press the <Right Arrow> and then the <Down Arrow> to switch the option list to: **[Clr Active Memory? Yes]** Press <ENTER> to clear all Active Site Data (but not saved site setups).
3. To restore operation, press <MENU> to access the Installation Menu. Create a new site setup or recall a stored site setup. Re-select any Meter Facilities items (e.g., RS-232 setup parameters).

To Clear All Saved Data using the RS-232 Interface

NOTICE
Loss of RAM Data Before proceeding further it is essential to understand that this function eliminates ALL data stored in RAM. This means that all saved site setups including the site data of a flow-calibrated site will be erased! In addition, the entire Datalogger file plus any custom factory or user-created pipe or sensor tables will be eliminated. The impact of this is such that we strongly recommend that you consult Technical Services before continuing with this procedure. Be aware that you will have to create a new Site Setup, re-enter all site specific parameters including pipe or sensor tables, plus all desired Meter Facilities menu entries.

1. Turn off power (if it is currently on).
2. Turn the power on. As soon as you apply power, type the @ character three times.
   – The prompt: **[Clr Active Memory?]** appears at the top of the screen. Press the <Down Arrow>.

   Note

   Note that the prompt switches to **[Clr Saved Data? No].**
3. Press the <Right Arrow> and then the <Down Arrow> to switch the option list to: **[Clr Saved Data? Yes]**.
4. Press <ENTER> to clear all Saved Site Data, Datalogger Data, user created Pipe Data and Sensor Data.
5. To restore operation, press <MENU> to access the Installation Menu. Create a new site setup or recall a stored site setup. Reselect any Meter Facilities items (e.g., RS-232 setup parameters).

Appendix B

B.1 Installation/Outline Drawings

The following are the installation and outline drawings for the SITRANS FUH1010 Interface Detector.

1010NS2-7 Rev D - Installation Drawing, 1010 Series Flow Computer, Agency Approved

1010N-7-7 Rev 08 - Installation Wiring, Expanded I/O Module

1010N-2-7 Rev 05 - Installation Wiring, I/O Module

1010N-5S2-7 Rev D - Installation Drawing, Analog Input Module

1010N-5DS2-7 Rev 06 - Installation Drawing, Analog Input Module

1010N-8MS2-7 Rev 03 - Installation Wiring, I/O Module

1010-304 Rev 14 - Connection Diagram for Hazardous Area Use, Agency Approved, 1010NS2/1010MNS2 Series Flow Computer

1010WX-S2-7 Rev A - Installation Drawing, 1010 Series Single/Dual Channel Flow Computer, Agency Approved

1010MNS2-7 Rev C - Installation Drawing, 1010 Series Multi-Channel Flow Computer, Agency Approved

1010MWX-S2-7 Rev A - Installation Drawing, 1010 Series Multi-Channel Flow Computer, Agency Approved

1010-443 Rev 05 - Connection Diagram for Hazardous Area Use, Agency Approved, 1010WX-S2 Series Flow Computer

1010NS9-7 Rev A - Installation Drawing, 1010 Series Flow Computer, Agency Approved

1010MNS9-7 Rev A - Installation Drawing, 1010 Series Multi-Channel Flow Computer, Agency Approved

1010-389 Rev 05 - Connection Diagram, Agency Approved for Hazardous Area Use, 1010NS9/1010MNS9 Series Flow Computer

1010-391 Rev C - Connection Diagram, Agency Approved for Zone 2 Connections, 1010NS9 Flow Computer System

1011NS2-7 Rev D - Installation Guide, Connection Diagram Selection, Agency Approved, 1011N Series Transducers

1011NS9-7 Rev C1 - Installation Guide, Connection Diagram Selection, Agency Approved, 1011N Series Transducers

1011NFPS-7 Rev 003 - Installation Drawing, 1011NPFS Series dedicated Plastic Body Transducer

1011HNS2-7 Rev D - Installation Guide, Connection Diagram Selection, Agency Approved, 1011HN Series Transducers

1011HNS9-7 Rev C1 - Installation Guide, Connection Diagram Selection, Agency Approved, 1011HN Series Transducers

1011HNFS-7 Rev 004 - Installation, 1011HNFS Series Dedicated Plastic Body Transducer

1012F-DB-7 Rev 002 - Installation Drawing, Dual Path Transducer Set w/Mounting Frames

1012MS-8 Rev 003 - Installation/Outline, Adjustable Mounting Strap

1012TN-7 Rev A - Installation Drawing, 1010 Series Transducers and Mounting Tracks

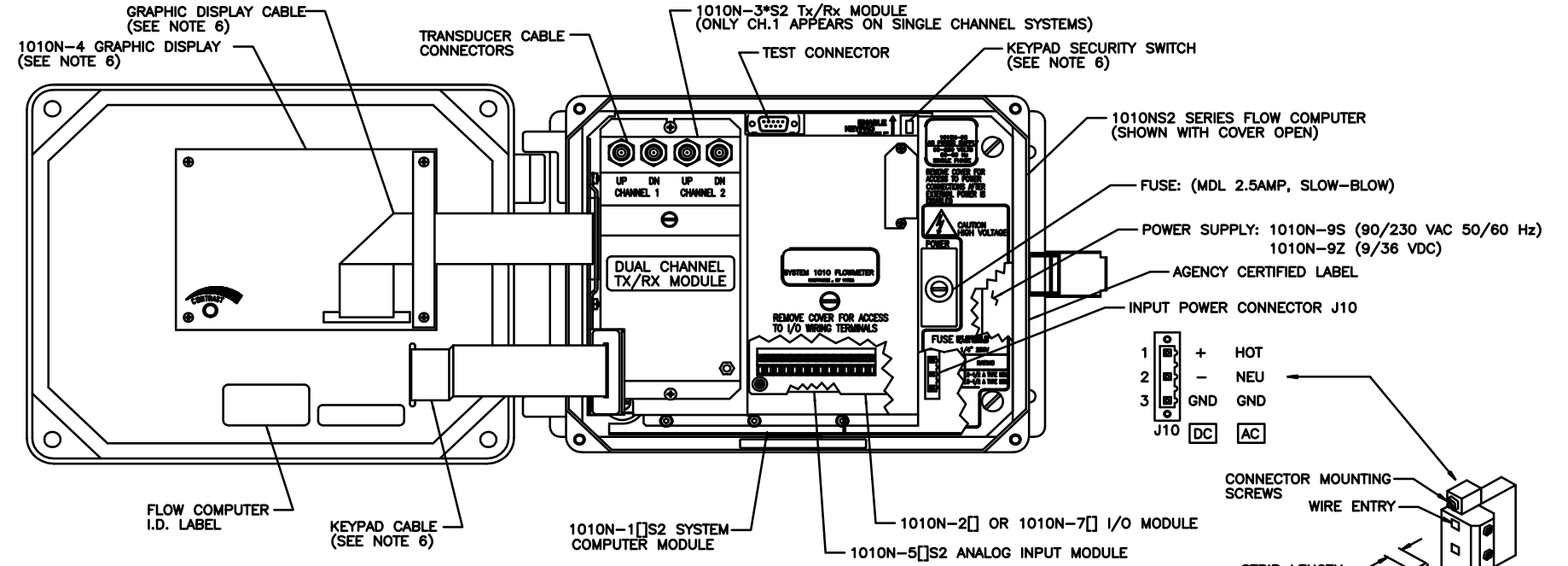
1012TNH-7 Rev A - Installation Drawing, 1010 Series Transducer and Mounting Tracks

991TS2-7 Rev 03 - Installation Drawing, Temp. Sensor, Dedicated NEMA 4, Pipe O.D. 1 1/4" - 48" (32-1220mm)

991TDS2-7 Rev 03 - Installation Drawing, 991TD Temperature Sensor, Submersible, Agency Approved

990TDMVH-7B Rev F - Installation Drawing, 990 Series Transducer, Direct Mode, Very High Temp.

990TRMVH-7B Rev F - Installation Drawing, 990 Series Transducer, Reflect Mode, Very High Temp.



THE INPUT POWER CONNECTOR IS A PLUGGABLE, LUG-LESS WIRE CLAMP TYPE, PROVIDING RELIABLE TERMINATION OF STRIPPED STRANDED OR SOLID CONDUCTORS AWG.12-18 SECURE WITH SCREWS AFTER MATING CONNECTOR.

NOTES:

1. SEE DRAWING 1010NS2-8 FOR OUTLINE DIMENSIONS.
2. SEE 1010 FIELD MANUAL AND APPROPRIATE TRANSDUCER INSTALLATION DRAWINGS FOR MOUNTING PROCEDURE.
3. DISABLE INSTRUMENT POWER BEFORE SERVICING POWER SUPPLY, POWER SWITCH / CIRCUIT BREAKER OR INPUT POWER CONNECTOR.
4. ALL TRANSDUCER CABLES ORIGINATING AT THE SAME FLOW COMPUTER MAY SHARE THE SAME CONDUIT. NO OTHER CABLES SHOULD BE HOUSED IN THE TRANSDUCER CABLE CONDUITS. CONNECT METALLIC CONDUITS TO EARTH GROUND.
5. OBSERVE FOLLOWING LIMITS WHEN INSTALLING TRANSDUCER CABLES IN CONDUIT:
   MAX. PULL TENSION: 80 lbs.
   MIN. BEND RADIUS: 2-1/2 INCHES
6. OPTIONAL DISPLAY AND KEYPAD APPEAR ON MODELS WITH GRAPHIC DISPLAY ONLY.
7. SEE DRAWING 1010N-2-7, 1010N-7-7 OR 1010N-8MS2-7 FOR USER I/O WIRING CONNECTIONS.
8. SEE DRAWING 1010N-5S2-7 OR 1010N-5DS2-7 FOR USER ANALOG INPUT WIRING CONNECTIONS.

CONTROLLED DRAWING
CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND TOLERANCES ON-

INCHES	(MM)
± .1	± 2

CONTRACT NO.

DR	H.J	DATE 4/22/98
CHK		DATE
ENG		DATE
PROD		DATE
APPD		DATE

CERTIFIED

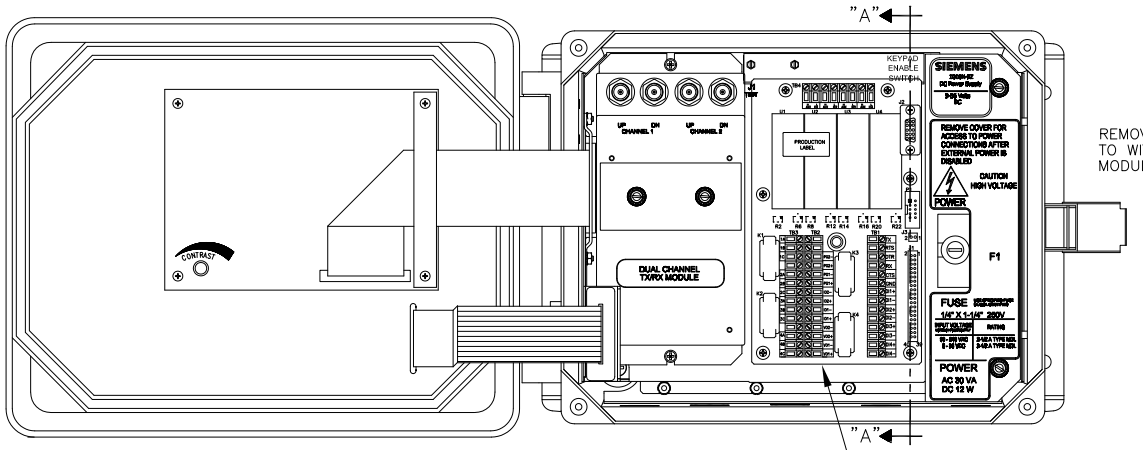
DATE

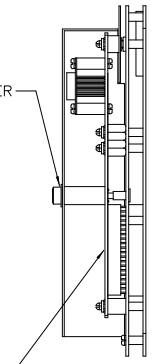
SIEMENS
Siemens Energy & Automation, Inc.
Process Instrumentation Business Unit
CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788

INSTALLATION DRAWING
1010 SERIES FLOW COMPUTER
AGENCY APPROVED

SIZE	CODE IDENT NO.		REV.
C	21614	1010NS2-7	D
SCALE: NONE	WT.	SHEET 1 OF 1	

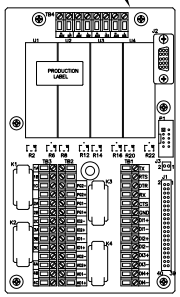
CN#5160, #5269

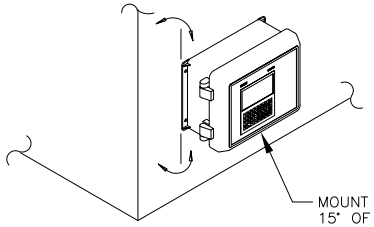




VIEW "A-A"

1010N–7[]S2 I/O MODULE
INSTALLED IN 1010DN SERIES FLOWMETER
(SHOWN WITH COVER REMOVED)
SEE APPROPRIATE FLOWMETER OUTLINE
DRAWING FOR OTHER CONFIGURATIONS





MODULE MARKING	ORDERING PN	RELAY TYPE
1010N–7K2–OR–CQO:1010N–7AK2S2–5	7ME3940–0AL03	Hg WETTED, FORM 1A
1010N–7K3–OR–CQO:1010N–7AK3S2–5	7ME3940–0AL04	DRY REED, FORM 1C

NOTES:

1. TERMINAL BLOCK TB1, TB2, TB3 AND TB4 ARE LUG–LESS WIRE CLAMPS FOR STRIPPED STRANDED WIRE, AWG. #14–24.
2. RELAY TYPE VARIES WITH MODULE PART NUMBER. SEE TABLE, ZONE B4.
3. RELAY CLOSURES ARE USER PROGRAMMABLE THROUGH THE FUS/FUH/FUG/FUE/FUT 1010 INSTALLATION MENU. SEE THE ASSOCIATED FIELD MANUAL AND SHT.2 FOR LIST OF ASSIGNABLE FUNCTIONS.
4. SET METER AND INSTRUMENTATION POWER TO OFF WHEN INSERTING OR REMOVING THE MODULE OR WHEN MAKING CONNECTIONS TO TB1, TB2, TB3 AND TB4.
5. REFER TO THE APPROPRIATE FIELD MANUAL FOR ADDITIONAL INSTALLATION INFORMATION.
6. WHEN SUPPLIED WITH MERCURY WETTED RELAYS (MODULE PART NO. 1010N–7K2 –OR– CQO:1010N–7AK2S2–5) MOUNT FLOW COMPUTER WITHIN 15° OF VERTICAL, BOTH PLANES, FOR PROPER RELAY OPERATION. (SEE ZONE B2).
7. LOAD CAPABLITY VARIES WITH SUPPLIED VOLTAGE. MAXIMUM LOAD FIGURES INCLUDE WIRING.

TABLE LEGEND:

N.O. = NORMALLY OPEN
N.C. = NORMALLY CLOSED
DGND = DIGITAL GROUND
GND = GROUND, SAME AS DGND
OC = OPEN COLLECTOR

SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

INSTALLATION WIRING EXPANDED I/O MODULE

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-
FRACTIONS ± 1/64" DECIMAL XX±0.01 XXX±0.005 ANGLES ±0°30' HOLES ±.003

SAP MATERIAL NO.		REV
ITEM NO.		AS
DOCUMENT NO.	1010N-7-7	DS 08
DRAWN BY: H.Jenkins	DATE: 8/30/00	SCALE: NONE SHEET 1 OF 2

TERMINAL BLOCK WIRING CONNECTIONS

METER PN'S AND OPERATING SYSTEMS →	"7ME350*a SITRANS FUE1010 OP SYSTEMS: 5EN02−−>5EN04 7ME353*a SITRANS FUS1010 OP SYSTEMS: 5N04 7ME360*a2 SITRANS FUH1010 OP SYSTEMS: *a = 0, 2 or 3, Indicating enclosure type."	"7ME360*a [FUH1010] 5PVN03 5DVN03 7ME361*a [FUG1010] 5GN05"	"7ME360*a [FUH1010] 5PVN04 5DVN04 7ME361*a [FUG1010] 5GN07"

METER INSTALLATION CONFIGURATION →					FUE SINGLE CHANNEL ONLY	DUAL CHANNEL	DUAL PATH	DUAL PATH ONLY	QUAD PATH ONLY				
TB1	PIN #	SIGNAL	DEFINITION	DESCRIPTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	LOAD	WIRING	CABLE LENGTH	NOTES
RS232 DIAGNOSTIC PORT	1	Tx	TRANSMIT	EIA/TIA−232E STANDARD SIGNALS	RS232 COMMUNICATIONS PORT	RS232 COMMUNICATIONS PORT	RS232 COMMUNICATIONS PORT	RS232 COMMUNICATIONS PORT	RS232 COMMUNICATIONS PORT	PER EIA/TIA−232E STANDARD	SHIELDED DATA CABLE, 24 AWG MINIMUM	DEFINED BY EIA/TIA−232 STANDARD [2500pF MAX ~50 FEET]	
	2	RTS	REQUEST TO SEND										
	3	DTR	DATA TERMINAL READY										
	4	Rx	RECEIVE										
	5	CTS	CLEAR TO SEND										
	6	GND	GROUND [GND]	DGND	RS232 GROUND	RS232 GROUND	RS232 GROUND	RS232 GROUND	RS232 GROUND				
TOTALIZER CONTROL INPUTS	7	D1+	DIGITAL INPUT 1	CH1 NOTOT	STOPS CH1 TOTAL	STOPS CH1 TOTAL	STOPS CH3*b TOTAL	STOPS CH3*b TOTAL	STOPS CH5*b TOTAL	ACTIVE LOW; TTL	SHIELDED INSTRUMENT CABLE, 24 AWG MINIMUM	1000 FEET MAXIMUM, WITHOUT FACTORY APPROVAL	CH1 NOTOT AND CLRTOT LINES ALSO CONTROL DUAL & QUAD BEAM SYSTEM TOTALIZER FUNCTIONS *b CH3−or−CH5 IS THE SYSTEM CHANNEL
	8	D1−	DIGITAL RETURN [GND]	DGND	GND	GND	GND	GND	GND				
	9	D2+	DIGITAL INPUT 2	CH2 NOTOT	NOT USED	STOPS CH2 TOTAL	NOT USED	NOT USED	NOT USED	ACTIVE LOW; TTL			
	10	D2−	DIGITAL RETURN [GND]	DGND	GND	GND	GND	GND	GND				
	11	D3+	DIGITAL INPUT 3	CH1 CLRTOT	RESET CH1 TOTAL	RESET CH1 TOTAL	RESETS CH3*b TOTAL	RESETS CH3*b TOTAL	RESETS CH5*b TOTAL	ACTIVE LOW; TTL			
	12	D3−	DIGITAL RETURN [GND]	DGND	GND	GND	GND	GND	GND				
	13	D4+	DIGITAL INPUT 4	CH2 CLRTOT	NOT USED	RESET CH2 TOTAL	NOT USED	NOT USED	NOT USED	ACTIVE LOW; TTL			
	14	D4−	DIGITAL RETURN [GND]	DGND	GND	GND	GND	GND	GND				

METER INSTALLATION CONFIGURATION →					SINGLE CHANNEL	DUAL CHANNEL	DUAL PATH	DUAL PATH ONLY	QUAD PATH ONLY				
TB2	PIN #	SIGNAL	DEFINITION	DESCRIPTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	LOAD	WIRING	CABLE LENGTH	NOTES
ANALOG OUTPUTS	1	Vo1+	0−10 VOLT OUTPUT	METER PROCESS VARIABLES ARE ASSIGNED TO INDIVIDUAL OUTPUTS; UNDER MENU CONTROL.	SYSTEM OUTPUTS ASSIGNABLE & SCALABLE TO FLOW RELATED PARAMETERS.	SYSTEM OUTPUTS ASSIGNABLE & SCALABLE TO FLOW RELATED PARAMETERS.	SYSTEM OUTPUTS ASSIGNABLE & SCALABLE TO FLOW RELATED PARAMETERS.	SYSTEM OUTPUTS ASSIGNABLE & SCALABLE TO FLOW RELATED PARAMETERS.	SYSTEM OUTPUTS ASSIGNABLE & SCALABLE TO FLOW RELATED PARAMETERS.	10KΩ MINIMUM	SHIELDED INSTRUMENT CABLE 24 AWG MINIMUM	1000 FEET MAXIMUM, WITHOUT FACTORY APPROVAL	TB2 4−20mA OUTPUTS ARE METER POWERED, DO NOT CONNECT TO EXTERNAL POWER SUPPLY TTL; MIN RESISTOR=4.7K *c FOR 7ME360a2; THIS IS AN OPEN COLLECTOR SIGNAL *d USE TB2−2 OR TB2−4 AS GND CONNECTIONS
	2	Vo1−	REF. GROUND							GND			
	3	Vo2+	0−10 VOLT OUTPUT							10KΩ MINIMUM			
	4	Vo2−	REF. GROUND							GND			
	5	Io1+	4−20mA OUTPUT 1							1000 Ω MAXIMUM			
	6	Io1−	ISOLATED RETURN							RETURN FOR 4−20mA OUT 1			
	7	Io2+	4−20mA OUTPUT 2							1000 Ω MAXIMUM			
	8	Io2−	ISOLATED RETURN							RETURN FOR 4−20mA OUT 2			
PULSE OUTPUT	9	PG1	FREQUENCY OUT 1	0 TO 5000Hz FREQUENCY OUTPUT,	5V TTL SIGNAL*c	5V TTL SIGNAL*c	5V TTL SIGNAL*c	NEG [−] TOTAL OC*d	NEG [−] TOTAL OC*d	TTL−OR−OPEN COLLECTOR 28V MAX			
	10	PG2	SEE FUNCTION COLUMN→		GND	GND	GND	NEG [−] TOTAL TTL*d	NEG [−] TOTAL TTL*d	TTL SQ WAVE−OR−GND			
	11	PG3	FREQUENCY OUT 2		5V TTL SIGNAL*c	5V TTL SIGNAL*c	5V TTL SIGNAL*c	POS [+] TOTAL OC*d	POS [+] TOTAL OC*d	TTL−OR−OPEN COLLECTOR 28V MAX			
	12	PG4	SEE FUNCTION COLUMN→		GND	GND	GND	POS [+] TOTAL TTL*d	POS [+] TOTAL TTL*d	TTL SQ WAVE−OR−GND			
	13	CGND	CHASSIS GROUND	ASSIGNABLE CHASSIS GROUND	CABLE SHIELD TERMINATIONS	CABLE SHIELD TERMINATIONS	CABLE SHIELD TERMINATIONS	CABLE SHIELD TERMINATIONS	CABLE SHIELD TERMINATIONS	CHASSIS GND			
	14	CGND	CHASSIS GROUND							CHASSIS GND			

METER INSTALLATION CONFIGURATION →					SINGLE CHANNEL	DUAL CHANNEL	DUAL PATH	DUAL PATH ONLY	QUAD PATH ONLY				
TB3	PIN #	SIGNAL	DEFINITION	DESCRIPTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	LOAD	WIRING	CABLE LENGTH	NOTES
OUTPUT RELAY CONTROL	1	K1 A	RELAY 1 N.O.	RELAY 1	ALARM OR CONTROL SIGNALS SET BY CH1	ALARM OR CONTROL SIGNALS SET BY CH1	ALARM OR CONTROL SIGNALS SET BY CH3*b	ALARM OR CONTROL SIGNALS SET BY CH3*b	ALARM OR CONTROL SIGNALS SET BY CH5*b	MODULE CQ0:1010N−7AK2−5 50VA CONTACT RATING 70VDC OR PEAK AC 0.5A MAX	WIRING AS REQUIRED FOR APPLICATION CIRCUIT	1000 FEET MAXIMUM, WITHOUT FACTORY APPROVAL	RELAY ASSIGNED ALARMS ARE ENERGIZED WHEN NO ALARM EXISTS. COUNT RELAYS ARE ENERGIZED FOR 200mS FOR EACH TOTALIZER INCREMENT. SEE NOTE 7. NO N.C. RELAY ON 1010N−7AK2S2−5 *b CH3 / CH5 IS THE SYSTEM CHANNEL
	2	K1 B	RELAY 1 N.C.[−7AK3 ONLY]										
	3	K1 C	RELAY 1 COMM										
	4	GND	DIGITAL RETURN [GND]	GND	GND	GND	GND	GND	GND				
	5	K2 A	RELAY 2 N.O.	RELAY 2	ALARM OR CONTROL SIGNALS SET BY CH1	ALARM OR CONTROL SIGNALS SET BY CH1	ALARM OR CONTROL SIGNALS SET BY CH3*b	ALARM OR CONTROL SIGNALS SET BY CH3*b	ALARM OR CONTROL SIGNALS SET BY CH5*b				
	6	K2 B	RELAY 2 N.C.[−7AK3 ONLY]										
	7	K2 C	RELAY 2 COMM										
	8	K3 A	RELAY 3 N.O.	RELAY 3	ALARM OR CONTROL SIGNALS SET BY CH1	ALARM OR CONTROL SIGNALS SET BY CH2	ALARM OR CONTROL SIGNALS SET BY CH3*b	ALARM OR CONTROL SIGNALS SET BY CH3*b	ALARM OR CONTROL SIGNALS SET BY CH5*b	MODULE CQ0:1010N−7AK3−5 3VA CONTACT RATING 30VDC PEAK 0.25A MAX			
	9	K3 B	RELAY 3 N.C.[−7AK3 ONLY]										
	10	K3 C	RELAY 3 COMM										
	11	GND	DIGITAL RETURN [GND]	GND	GND	GND	GND	GND	GND				
	12	K4 A	RELAY 4 N.O.	RELAY 4	ALARM OR CONTROL SIGNALS SET BY CH1	ALARM OR CONTROL SIGNALS SET BY CH2	ALARM OR CONTROL SIGNALS SET BY CH3*b	ALARM OR CONTROL SIGNALS SET BY CH3*b	ALARM OR CONTROL SIGNALS SET BY CH5*b				
	13	K4 B	RELAY 4 N.C.[−7AK3 ONLY]										
	14	K4 C	RELAY 4 COMM										

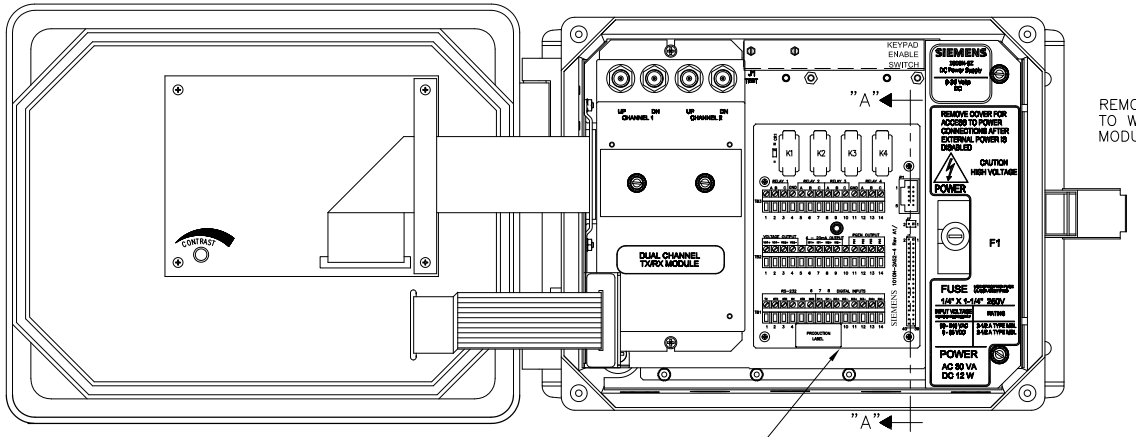
					FUE SINGLE CHANNEL ONLY	DUAL CHANNEL	DUAL PATH	DUAL PATH ONLY	QUAD PATH ONLY				
TB4	PIN #	SIGNAL	DEFINITION	DESCRIPTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	LOAD	WIRING	CABLE LENGTH	NOTES
ISOLATED 4−20mA OUTPUTS	1	Aux IO1+	Isolated Loop Power IO1	IO1 External Power	+30V Maximum Supply Voltage Allowed			NOT USED	NOT USED	1000 Ω MAXIMUM, WHEN USING EXTERNAL 24Vdc POWER SUPPLY	WIRING AS REQUIRED FOR APPLICATION CIRCUIT	1000 FEET MAXIMUM, WITHOUT FACTORY APPROVAL	FULLY ISOLATED, EXTERNALLY POWERED 4−20mA CONTROL SIGNALS, ASSIGNED TO PARAMETERS BY METER TYPE & METER SETUP
	2	Aux IO1−	IO1 4−20mA Output	IO1 Signal	Same Output Assignment as TB2−9								
	3	Aux IO2+	Isolated Loop Power IO2	IO2 External Power	+30V Maximum Supply Voltage Allowed								
	4	Aux IO2−	IO2 4−20mA Output	IO2 Signal	Same Output Assignment as TB2−11								
	5	Aux IO3+	Isolated Loop Power IO3	IO3 External Power	SYSTEM OUTPUTS ASSIGNABLE & SCALABLE TO FLOW RELATED PARAMETERS.			+30V Max	+30V Max				
	6	Aux IO3−	IO3 4−20mA Output	IO3 Signal				Same as TB2−1	Same as TB2−1				
	7	Aux IO4+	Isolated Loop Power IO4	IO4 External Power				+30V Max	+30V Max				
	8	Aux IO4−	IO4 4−20mA Output	IO4 Signal				Same as TB2−3	Same as TB2−3				

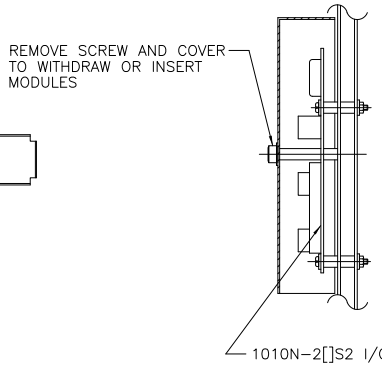
SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-
FRACTIONS ± 1/64" DECIMAL XX±0.01 XXX±0.005 ANGLES ±0°30' HOLES ±.003

INSTALLATION WIRING EXPANDED I/O MODULE

SAP MATERIAL NO.			REV
ITEM NO.			AS
DOCUMENT NO.	1010N-7-7		DS 08
DRAWN BY: H.Jenkins	DATE: 8/30/00	SCALE: NONE	SHEET 2 OF 2





SECTION "A-A"

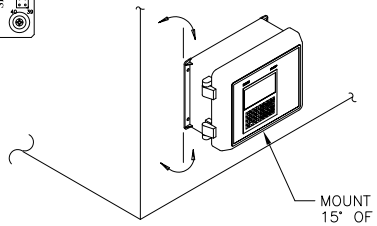
MODULE MARKING	ORDERING PN	RELAY TYPE
1010N-2K2-OR-CQO:1010N-2AK2S2-5	7ME3940-0AL00	Hg WETTED, FORM 1A
1010N-2K3-OR-CQO:1010N-2AK3S2-5	7ME3940-0AL01	DRY REED, FORM 1C

NOTES:

1. TERMINAL BLOCK TB1, TB2 AND TB3 ARE LUG-LESS WIRE CLAMPS FOR STRIPPED STRANDED WIRE, AWG. #14-24.
2. RELAY TYPE VARIES WITH MODULE PART NUMBER. SEE TABLE, ZONE C4.
3. RELAY CLOSURES ARE USER PROGRAMMABLE THROUGH THE FUS/FUH/FUG/FUE/FUT 1010 INSTALLATION MENU. SEE THE ASSOCIATED FIELD MANUAL AND SHT.2 FOR LIST OF ASSIGNABLE FUNCTIONS.
4. SET METER AND INSTRUMENTATION POWER TO OFF WHEN INSERTING OR REMOVING THE MODULE OR WHEN MAKING CONNECTIONS TO TB1, TB2 AND TB3.
5. REFER TO THE APPROPRIATE FIELD MANUAL FOR ADDITIONAL INSTALLATION INFORMATION.
6. WHEN SUPPLIED WITH MERCURY WETTED RELAYS (MODULE PART No. 1010N-2K2 OR CQO:1010N-2AK2S2-5) MOUNT FLOW COMPUTER WITHIN 15° OF VERTICAL, BOTH PLANES, FOR PROPER RELAY OPERATION. (SEE ZONE B2).
7. LOAD CAPABLITY VARIES WITH SUPPLIED VOLTAGE. MAXIMUM LOAD FIGURES INCLUDE WIRING.

TABLE LEGEND:

N.O. = NORMALLY OPEN
N.C. = NORMALLY CLOSED
DGND = DIGITAL GROUND
GND = GROUND, SAME AS DGND
OC = OPEN COLLECTOR



SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-
FRACTIONS DECIMAL ANGLES HOLES
± 1/64" XX±0.01 ±0°30' ±.003
XXX±0.005

INSTALLATION WIRING I/O MODULE

SAP MATERIAL NO.		REV.___
ITEM NO.		AS ___
DOCUMENT NO.	1010N-2-7	DS 05
DRAWN BY: H.Jenkins	DATE: 2/20/98	SCALE: NONE SHEET 1 OF 2

TERMINAL BLOCK WIRING CONNECTIONS

METER PN'S AND OPERATING SYSTEMS →	"7ME350*a SITRANS FUE1010 OP SYSTEMS: 5EN01−−>5EN04 7ME353*a SITRANS FUS1010 OP SYSTEMS: 5N01−−>5N04 7ME360*a2 SITRANS FUH1010 OP SYSTEMS: 5BN01−−>5BN02 *a = 0, 2 or 3, Indicating enclosure type.*	"7ME360*a [FUH1010] 5PVN01 & 5PVN02 5DVN01 & 5DVN02 7ME361*a [FUG1010] 5GN03 & 5GN04"	

METER INSTALLATION CONFIGURATION →				SINGLE CHANNEL	DUAL CHANNEL	DUAL PATH	DUAL PATH ONLY				
TB1	PIN #	SIGNAL	DEFINITION	DESCRIPTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	LOAD	WIRING	CABLE LENGTH	NOTES
RS232 DIAGNOSTIC PORT	1	Tx	TRANSMIT	EIA/TIA−232E STANDARD SIGNALS	RS232 COMMUNICATIONS PORT	RS232 COMMUNICATIONS PORT	RS232 COMMUNICATIONS PORT	RS232 COMMUNICATIONS PORT	"PER EIA/TIA−232E STANDARD "	SHIELDED DATA CABLE, 24 AWG MINIMUM	DEFINED BY EIA/TIA−232 STANDARD [2500pF MAX ~50 FEET]	
	2	RTS	REQUEST TO SEND									
	3	DTR	DATA TERMINAL READY									
	4	Rx	RECEIVE									
	5	CTS	CLEAR TO SEND									
	6	GND	GROUND [GND]	GND	RS232 GROUND	RS232 GROUND	RS232 GROUND	RS232 GROUND				
TOTALIZER CONTROL INPUTS	7	D1+	DIGITAL INPUT 1	CH1 NOTOT	STOPS CH1 TOTAL	STOPS CH1 TOTAL	STOPS CH3*b TOTAL	STOPS CH3*b TOTAL	ACTIVE LOW; TTL	SHIELDED INSTRUMENT CABLE, 24 AWG MINIMUM	1000 FEET MAXIMUM, WITHOUT FACTORY APPROVAL	CH1 NOTOT AND CLRTOT LINES ALSO CONTROL DUAL BEAM SYSTEM TOTALIZER FUNCTIONS *b CH3 IS THE SYSTEM CHANNEL
	8	D1−	DIGITAL RETURN [GND]	GND	GND	GND	GND	GND				
	9	D2+	DIGITAL INPUT 2	CH2 NOTOT	NOT USED	STOPS CH2 TOTAL	NOT USED	NOT USED	ACTIVE LOW; TTL			
	10	D2−	DIGITAL RETURN [GND]	GND	GND	GND	GND	GND				
	11	D3+	DIGITAL INPUT 3	CH1 CLRTOT	RESETS CH1 TOTAL	RESETS CH1 TOTAL	RESETS CH3*b TOTAL	RESETS CH3*b TOTAL	ACTIVE LOW; TTL			
	12	D3−	DIGITAL RETURN [GND]	GND	GND	GND	GND	GND				
	13	D4+	DIGITAL INPUT 4	CH2 CLRTOT	NOT USED	RESETS CH2 TOTAL	NOT USED	NOT USED	ACTIVE LOW; TTL			
	14	D4−	DIGITAL RETURN [GND]	GND	GND	GND	GND	GND				

METER INSTALLATION CONFIGURATION →				SINGLE CHANNEL	DUAL CHANNEL	DUAL PATH	DUAL PATH ONLY				
TB2	PIN #	SIGNAL	DEFINITION	DESCRIPTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	LOAD	WIRING	CABLE LENGTH	NOTES
ANALOG OUTPUTS	1	Vo1+	0−10 VOLT OUTPUT	METER PROCESS VARIABLES ARE ASSIGNED TO INDIVIDUAL OUTPUTS; UNDER MENU CONTROL.	SYSTEM OUTPUTS ASSIGNABLE & SCALABLE TO FLOW RELATED PARAMETERS. CGND IS FOR CABLE SHIELD TERMINATIONS.	SYSTEM OUTPUTS ASSIGNABLE & SCALABLE TO FLOW RELATED PARAMETERS. CGND IS FOR CABLE SHIELD TERMINATIONS.	SYSTEM OUTPUTS ASSIGNABLE & SCALABLE TO FLOW RELATED PARAMETERS. CGND IS FOR CABLE SHIELD TERMINATIONS.	SYSTEM OUTPUTS ASSIGNABLE & SCALABLE TO FLOW RELATED PARAMETERS. CGND IS FOR CABLE SHIELD TERMINATIONS.	10KΩ MINIMUM	SHIELDED INSTRUMENT CABLE 24 AWG MINIMUM	1000 FEET MAXIMUM, WITHOUT FACTORY APPROVAL	TB2 4−20mA OUTPUTS ARE METER POWERED, DO NOT CONNECT TO EXTERNAL POWER SUPPLY TTL; MIN RESISTOR = 4.7KV *c FOR 7ME360a2; THIS IS AN OPEN COLLECTOR SIGNAL *d USE TB2−2 OR TB2−4 AS GND CONNECTIONS"
	2	Vo1−	REF. GROUND						GND			
	3	Vo2+	0−10 VOLT OUTPUT						10KΩ MINIMUM			
	4	Vo2−	REF. GROUND						GND			
	5	CGND	CHASSIS GND						CHASSIS GND			
	6	Io1+	4−20mA OUTPUT 1						1000 Ω MAXIMUM			
	7	Io1−	ISOLATED RETURN						RETURN FOR 4−20mA OUT 1			
	8	Io2+	4−20mA OUTPUT 2						1000 Ω MAXIMUM			
	9	Io2−	ISOLATED RETURN						RETURN FOR 4−20mA OUT 2			
	10	CGND	CHASSIS GND						CHASSIS GND			
PULSE OUTPUT	11	PG1	FREQUENCY OUT 1	0 TO 5000Hz FREQUENCY OUTPUT, ASSIGNABLE	5V TTL SIGNAL*c	5V TTL SIGNAL*c	5V TTL SIGNAL*c	NEG [−] TOTAL OC*d	TTL −OR− OPEN COLLECTOR, 28V MAX			
	12	PG2	SEE FUNCTION COLUMN??		GND	GND	GND	NEG [−] TOTAL TTL*d	TTL SQ WAVE −OR− GND			
	13	PG3	FREQUENCY OUT 2		5V TTL SIGNAL*c	5V TTL SIGNAL*c	5V TTL SIGNAL*c	POS [+] TOTAL OC*d	TTL SQ WAVE −OR− OPEN COLL, 28V MAX			
	14	PG4	SEE FUNCTION COLUMN??		GND	GND	GND	POS [+] TOTAL TTL*d	TTL SQ WAVE −OR− GND			

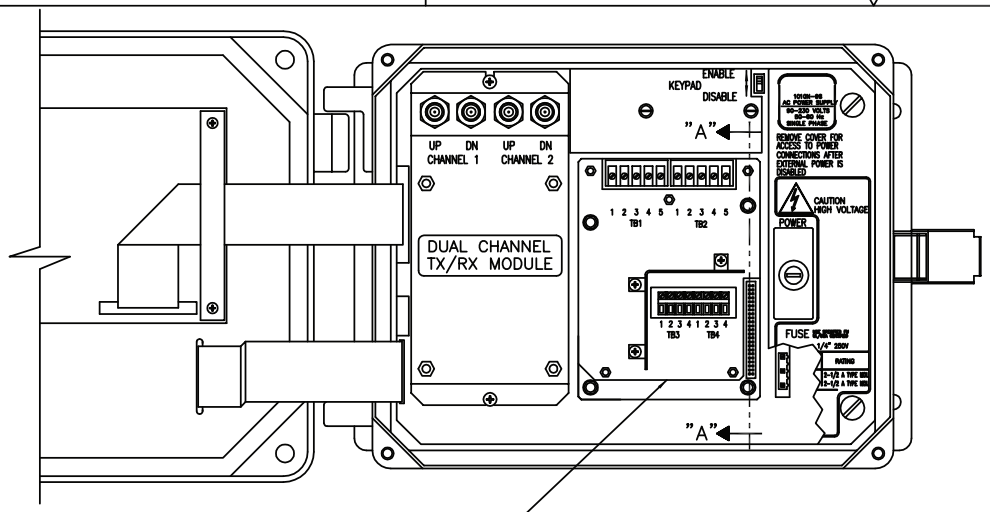
METER INSTALLATION CONFIGURATION →				SINGLE CHANNEL	DUAL CHANNEL	DUAL PATH	DUAL PATH ONLY				
TB3	PIN #	SIGNAL	DEFINITION	DESCRIPTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	LOAD	WIRING	CABLE LENGTH	NOTES
OUTPUT RELAY CONTROL	1	K1 A	RELAY 1 N.O.	RELAY 1	ALARM OR CONTROL SIGNALS SET BY CH1	ALARM OR CONTROL SIGNALS SET BY CH1	ALARM OR CONTROL SIGNALS SET BY CH3*b	ALARM OR CONTROL SIGNALS SET BY CH3*b	MODULE CQO:1010N−2AK2−5: 50VA CONTACT RATING 70VDC OR PEAK AC 0.5A MAX MODULE CQO:1010N−2AK3−5: 3VA CONTACT RATING 30VDC PEAK 0.25A MAX	WIRING AS REQUIRED FOR APPLICATION CIRCUIT	1000 FEET MAXIMUM, WITHOUT FACTORY APPROVAL	RELAY ASSIGNED ALARMS ARE ENERGIZED WHEN NO ALARM EXISTS. COUNT RELAYS ARE ENERGIZED FOR 200mS FOR EACH TOTALIZER INCREMENT. SEE NOTE 7. NO N.C. RELAY ON 1010N−2AK2S2−5 *b CH3 IS THE SYSTEM CHANNEL
	2	K1 B	RELAY 1 N.C. [−2AK3 ONLY]									
	3	K1 C	RELAY 1 COMMON									
	4	GND	DIGITAL RETURN [GND]	GND	GND	GND	GND	GND				
	5	K2 A	RELAY 2 N.O.	RELAY 2	ALARM OR CONTROL SIGNALS SET BY CH1	ALARM OR CONTROL SIGNALS SET BY CH1	ALARM OR CONTROL SIGNALS SET BY CH3*b	ALARM OR CONTROL SIGNALS SET BY CH3*b				
	6	K2 B	RELAY 2 N.C. [−2AK3 ONLY]									
	7	K2 C	RELAY 2 COMMON									
	8	K3 A	RELAY 3 N.O.	RELAY 3	ALARM OR CONTROL SIGNALS SET BY CH1	ALARM OR CONTROL SIGNALS SET BY CH2	ALARM OR CONTROL SIGNALS SET BY CH3*b	ALARM OR CONTROL SIGNALS SET BY CH3*b				
	9	K3 B	RELAY 3 N.C. [−2AK3 ONLY]									
	10	K3 C	RELAY 3 COMMON									
	11	GND	DIGITAL RETURN [GND]	GND	GND	GND	GND	GND				
	12	K4 A	RELAY 4 N.O.	RELAY 4	ALARM OR CONTROL SIGNALS SET BY CH1	ALARM OR CONTROL SIGNALS SET BY CH2	ALARM OR CONTROL SIGNALS SET BY CH3*b	ALARM OR CONTROL SIGNALS SET BY CH3*b				
	13	K4 B	RELAY 4 N.C. [−2AK3 ONLY]									
	14	K4 C	RELAY 4 COMMON									

SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

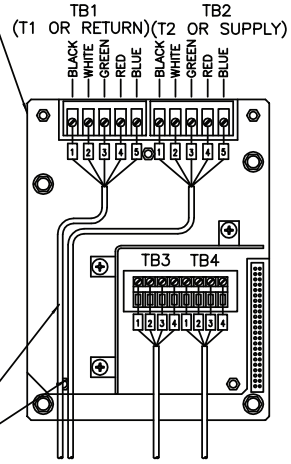
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-
FRACTIONS DECIMAL ANGLES HOLES
± 1/64" XX±0.01 ±0°30' ±.003
XXX±0.005

INSTALLATION WIRING I/O MODULE

SAP MATERIAL NO.			REV.
ITEM NO.			AS
DOCUMENT NO.	1010N-2-7		DS 05
DRAWN BY: H.Jenkins	DATE: 2/20/98	SCALE: NONE	SHEET 2 OF 2

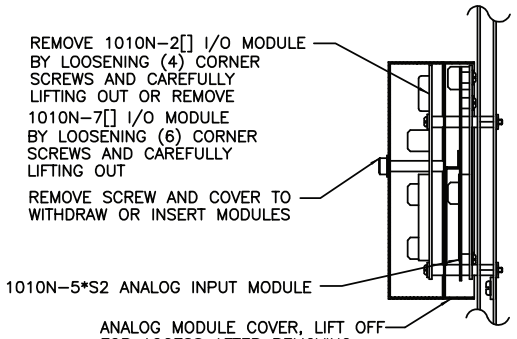


1010N–5*S2 ANALOG INPUT MODULE
(SHOWN WITH SCREW, COVER AND
I/O MODULE 1010N–2[] REMOVED)



1012EC SERIES
CABLES

ALTERNATE COLOR CODE FOR CERTAIN 1012EC CABLES:
WHITE = ORANGE
GREEN = BROWN



SECTION "A–A"

TB1 WIRING

PIN	COLOR	FUNCTION SEE NOTE 4	DESCRIPTION	WIRING	CABLE LENGTH	NOTES
1	BLACK	RTD CURRENT HIGH	RTD TEMPERATURE MEASUREMENT CHANNEL 1, T1 OR RETURN TEMP. REFERENCE CC#1012EC CABLE	AWG.14–24	1000 FT. MAX. WITHOUT FACTORY APPROVAL	SEE NOTE 3
2	WHITE	RTD VOLTAGE HIGH				
3	GREEN	RTD VOLTAGE LOW				
4	RED	RTD CURRENT LOW				
5	BLUE	GROUND				

TB2 WIRING

PIN	COLOR	FUNCTION SEE NOTE 4	DESCRIPTION	WIRING	CABLE LENGTH	NOTES
1	BLACK	RTD CURRENT HIGH	RTD TEMPERATURE MEASUREMENT CHANNEL 2, T2 OR SUPPLY TEMP.	AWG.14–24	1000 FT. MAX. WITHOUT FACTORY APPROVAL	SEE NOTE 3
2	WHITE	RTD VOLTAGE HIGH				
3	GREEN	RTD VOLTAGE LOW				
4	RED	RTD CURRENT LOW				
5	BLUE	GROUND				

TB3 WIRING

PIN	FUNCTION SEE NOTE 4	USE	DESCRIPTION	BEHAVIOR	LOAD	WIRING	CABLE LENGTH	NOTES
1	AUX.1 IN	Iin1 INPUT	ANALOG CURRENT INPUT REFERENCED TO METER GROUND	4 TO 20 mA	200 Ω	AWG.14–24	1000 FT. MAX. WITHOUT FACTORY APPROVAL	SEE NOTES 3, 5
2	AUX.1 COM	Iin1 COMMON						
3	AUX.2 IN	Iin2 INPUT						
4	AUX.2 COM	Iin2 COMMON						

TB4 WIRING

PIN	FUNCTION SEE NOTE 4	USE	DESCRIPTION	BEHAVIOR	LOAD	WIRING	CABLE LENGTH	NOTES
1	AUX.3 IN	Iin1 INPUT	ANALOG CURRENT INPUT REFERENCED TO METER GROUND	4 TO 20 mA	200 Ω	AWG.14–24	1000 FT. MAX. WITHOUT FACTORY APPROVAL	SEE NOTES 3, 5
2	AUX.3 COM	Iin1 COMMON						
3	AUX.4 IN	Iin2 INPUT						
4	AUX.4 COM	Iin2 COMMON						

CONTROLLED DRAWING
CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL

NOTES:

1. TERMINAL BLOCK TB1, TB2 , TB3 AND TB4 ARE LUG–LESS WIRE CLAMP TYPE, PROVIDING RELIABLE CONNECTION TO STRIPPED STRANDED WIRE, AWG. #14–24.
2. SET METER AND INSTRUMENTATION POWER TO OFF WHEN INSERTING OR REMOVING THE MODULE OR WHEN MAKING CONNECTIONS TO TB1, TB2 , TB3 AND TB4.
3. REFER TO THE 1010 FIELD MANUAL FOR ADDITIONAL INSTALLATION INFORMATION.
4. USE 1012ECN SERIES CABLES TO CONNECT BETWEEN TEMPERATURE SENSOR INPUT WIRING TERMINALS TB1 AND TB2 AND 991T OR 1011T SERIES TEMPERATURE SENSORS. NOTE SUPPLY AND RETURN TEMPERATURE SENSOR DESIGNATIONS WHEN USED WITH A 1010E SERIES ENERGY FLOW COMPUTER.
5. NET LOAD IS 335 OHMS WHEN SAFETY BARRIERS ARE USED.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON–

INCHES	(MM)
± .1	± 2

MATERIAL:

FINISH:

CONTRACT NO.

DR	H.J	DATE 7/18/98
CHK		DATE
ENG		DATE
PROD		DATE
APPD		DATE

CERTIFIED

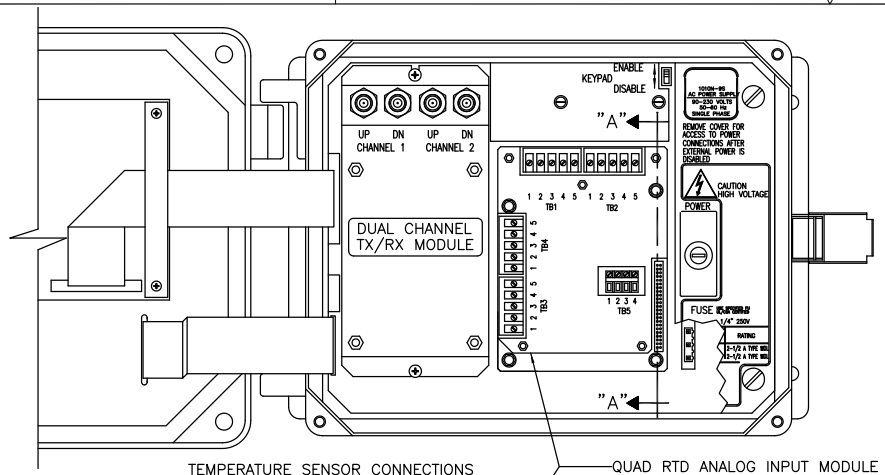
DATE

SIEMENS
Siemens Energy & Automation, Inc.
Process Instrumentation Business Unit
CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788

INSTALLATION DRAWING ANALOG INPUT MODULE

SIZE	CODE IDENT NO.		REV.
C	21614	1010N-5S2-7	D
SCALE: NONE	WT.	SHEET 1 OF 1	

CN#5160, #5269



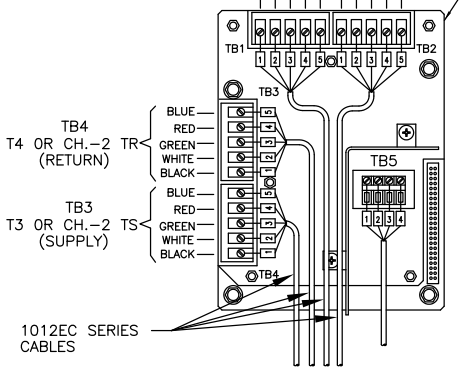
QUAD RTD ANALOG INPUT MODULE (SHOWN WITH SCREW, COVER AND I/O MODULE 1010N–2[] REMOVED)

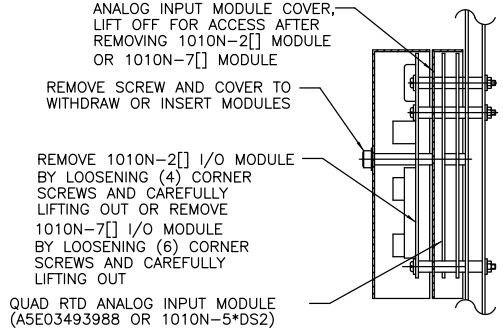
TEMPERATURE SENSOR CONNECTIONS (SEE NOTE 4)

TB1 T1 OR CH.–1 TS (SUPPLY)

TB2 T2 OR CH.–1 TR (RETURN)

ALTERNATE COLOR CODE FOR CERTAIN 1012EC CABLES:
WHITE = ORANGE
GREEN = BROWN





SECTION "A–A"

TB1 WIRING

PIN	COLOR	FUNCTION SEE NOTE 4	DESCRIPTION	WIRING	CABLE LENGTH	NOTES
1	BLACK	RTD CURRENT HIGH	RTD TEMPERATURE MEASUREMENT T1 OR CHANNEL–1 TS (SUPPLY TEMPERATURE)	AWG.14–24	1000 FT. MAX. WITHOUT FACTORY APPROVAL	SEE NOTE 3
2	WHITE	RTD VOLTAGE HIGH				
3	GREEN	RTD VOLTAGE LOW				
4	RED	RTD CURRENT LOW				
5	BLUE	GROUND				

TB2 WIRING

PIN	COLOR	FUNCTION SEE NOTE 4	DESCRIPTION	WIRING	CABLE LENGTH	NOTES
1	BLACK	RTD CURRENT HIGH	RTD TEMPERATURE MEASUREMENT T2 OR CHANNEL–1 TR (RETURN TEMPERATURE)	AWG.14–24	1000 FT. MAX. WITHOUT FACTORY APPROVAL	SEE NOTE 3
2	WHITE	RTD VOLTAGE HIGH				
3	GREEN	RTD VOLTAGE LOW				
4	RED	RTD CURRENT LOW				
5	BLUE	GROUND				

TB3 WIRING

PIN	COLOR	FUNCTION SEE NOTE 4	DESCRIPTION	WIRING	CABLE LENGTH	NOTES
1	BLACK	RTD CURRENT HIGH	RTD TEMPERATURE MEASUREMENT T3 OR CHANNEL–2 TS (SUPPLY TEMPERATURE)	AWG.14–24	1000 FT. MAX. WITHOUT FACTORY APPROVAL	SEE NOTE 3
2	WHITE	RTD VOLTAGE HIGH				
3	GREEN	RTD VOLTAGE LOW				
4	RED	RTD CURRENT LOW				
5	BLUE	GROUND				

TB4 WIRING

PIN	COLOR	FUNCTION SEE NOTE 4	DESCRIPTION	WIRING	CABLE LENGTH	NOTES
1	BLACK	RTD CURRENT HIGH	RTD TEMPERATURE MEASUREMENT T4 OR CHANNEL–2 TR (RETURN TEMPERATURE)	AWG.14–24	1000 FT. MAX. WITHOUT FACTORY APPROVAL	SEE NOTE 3
2	WHITE	RTD VOLTAGE HIGH				
3	GREEN	RTD VOLTAGE LOW				
4	RED	RTD CURRENT LOW				
5	BLUE	GROUND				

TB5 WIRING

PIN	FUNCTION SEE NOTE 4	USE	DESCRIPTION	BEHAVIOR	LOAD	WIRING	CABLE LENGTH	NOTES
1	AUX.1 IN	Iin1 INPUT	ANALOG CURRENT INPUT REFERENCED TO METER GROUND	4 TO 20 mA	200 Ω	AWG.14–24	1000 FT. MAX. WITHOUT FACTORY APPROVAL	SEE NOTES 3, 5
2	AUX.1 COM	Iin1 COMMON						
3	AUX.2 IN	Iin2 INPUT						
4	AUX.2 COM	Iin2 COMMON						

NOTES:

1. TERMINAL BLOCK TB1, TB2, TB3, TB4 AND TB5 ARE LUG–LESS WIRE CLAMP TYPE, PROVIDING RELIABLE CONNECTION TO STRIPPED STRANDED WIRE, AWG. #14–24.
2. SET METER AND INSTRUMENTATION POWER TO OFF WHEN INSERTING OR REMOVING THE MODULE OR WHEN MAKING CONNECTIONS TO TB1, TB2, TB3, TB4 AND TB5
3. REFER TO THE 1010 FIELD MANUAL FOR ADDITIONAL INSTALLATION INFORMATION.
4. USE 1012ECN SERIES CABLES TO CONNECT BETWEEN TEMPERATURE SENSOR INPUT WIRING TERMINALS TB1 THRU TB4 AND 991T OR 1011T SERIES TEMPERATURE SENSORS. NOTE SUPPLY AND RETURN TEMPERATURE SENSOR DESIGNATIONS WHEN USED WITH A 1010E SERIES ENERGY FLOW COMPUTER.
5. FOR INSTALLATION IN HAZARDOUS AREAS SEE CONTROL DRAWING REFERENCED ON TRANSMITTER NAMEPLATE.

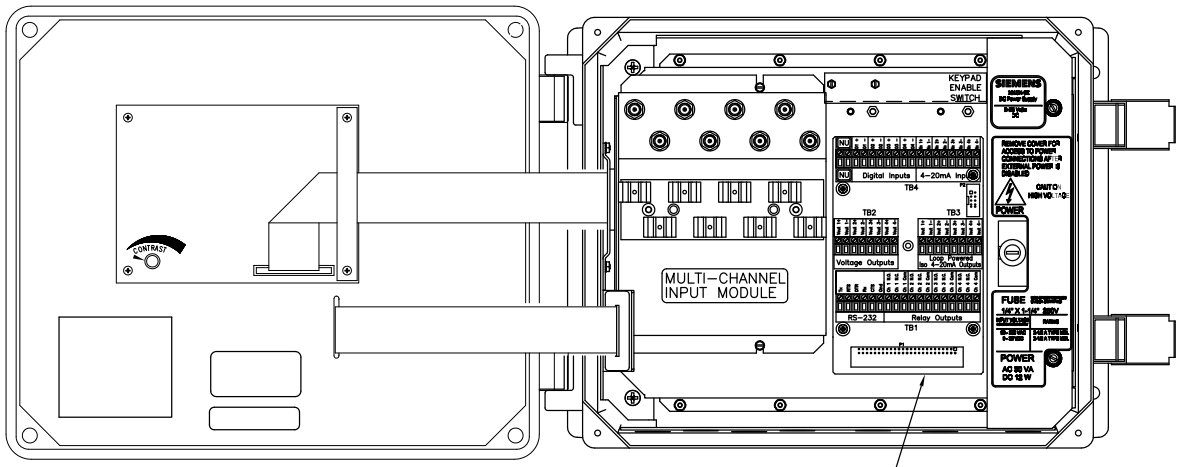
CONTROLLED DRAWING
CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL

SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

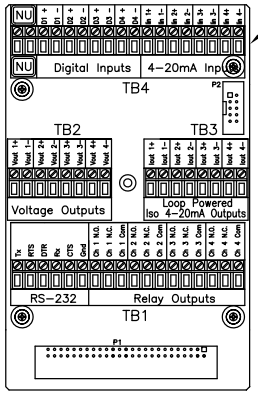
INSTALLATION DRAWING ANALOG INPUT MODULE

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON–
FRACTIONS DECIMAL ANGLES HOLES
± 1/64" XX±0.01 ±0°30' ±.003
XXX±0.005

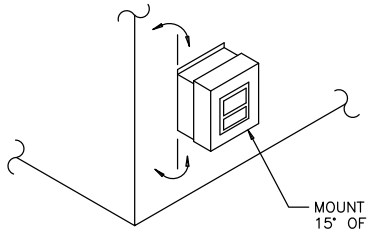
SAP MATERIAL NO.		REV
ITEM NO.		AS
DOCUMENT NO.	1010N - 5DS2 - 7	DS 06
DRAWN BY: H.Jenkins	DATE:7/18/98	SCALE: NONE SHEET 1 OF 1



1010N-8*MS2 I/O MODULE
(SHOWN WITH COVER REMOVED)
(SEE NOTE 3)



RELAY OUTPUTS OPTIONS	FDC RELAY OPTION CODE
MERCURY WETTED, FORM 1A	K1
DRY REED, FORM 1C	K



MOUNT FLOW COMPUTER WITHIN
15° OF VERTICAL IF MERCURY WETTED
RELAY OPTION IS INCLUDED
(SEE NOTE 6)

NOTES: (CONT'D ON SHT. 2)

1. TERMINAL BLOCKS TB1, TB2, TB3 AND TB4 ARE LUG-LESS WIRE CLAMP TYPE, PROVIDING RELIABLE CONNECTION TO STRIPPED STRANDED WIRE, AWG. #14-24.
2. RELAY TYPE VARIES WITH FLOW COMPUTER OPTION CODE. SEE TABLE, ZONE B4.
3. RELAY CLOSURES AND ANALOG OUTPUTS ARE USER PROGRAMMABLE THROUGH THE 1010 INSTALLATION MENU. SEE THE 1010 FIELD MANUAL AND SHT.2 FOR LIST OF ASSIGNABLE FUNCTIONS.
4. SET METER AND INSTRUMENTATION POWER TO OFF WHEN INSERTING OR REMOVING THE MODULE AND MAKING CONNECTIONS TO TB1, TB2, TB3 AND TB4.
5. REFER TO THE 1010 FIELD MANUAL FOR ADDITIONAL INSTALLATION INFORMATION.
6. WHEN SUPPLIED WITH MERCURY WETTED RELAYS, MOUNT FLOW COMPUTER WITHIN 15° OF VERTICAL, BOTH PLANES, FOR PROPER RELAY OPERATION. (SEE ZONE B2).

RELATED DRAWING
CHANGES TO THIS DRAWING REQUIRE CERTIFICATION OF CONFORMANCE WITH RELATED CONTROLLED DRAWINGS

SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-
FRACTIONS ± 1/64" DECIMAL XX±0.01 XXX±0.005 ANGLES ±0°30' HOLES ±.003

INSTALLATION DRAWING I/O MODULE

SAP MATERIAL NO.			REV —
ITEM NO.			AS —
DOCUMENT NO.	1010N-8MS2-7		DS 03
DRAWN BY: H.Jenkins	DATE: 1/14/2012	SCALE: NONE	SHEET 1 OF 2

TB1 - RS232 / RELAY OUTPUTS

PIN #	SIGNAL	FUNCTION	DESCRIPTION	USE	LOAD	WIRING	CABLE LENGTH	NOTES
1	Tx	RS232 TRANSMIT	STANDARD RS232 SIGNALS	STANDARD RS232 COMMUNICATION PORT		SHIELDED DATA CABLE 24 GA. MINIMUM	50 FT. MAX. AS PER EIA RS232 FOR GREATER RANGE, CONSULT FACTORY, SEE NOTE 7	
2	RTS	RS232 REQUEST TO SEND						
3	DTR	RS232 DATA TERM. READY						
4	Rx	RS232 RECEIVE						
5	CTS	RS232 CLEAR TO SEND						
6	GND	GROUND						
7	CH.1 A	RELAY 1 NORMALLY OPEN	ASSIGNMENT OF RELAY FUNCTIONS IS UNDER 1010 MENU CONTROL	ALARM OR CONTROL	DRY REED RELAY 3VA 30VDC .25A MAX. NON-INDUCTIVE	AS REQ'D	AS REQ'D	ALL RELAYS ASSIGNED AS ALARMS ARE ENERGIZED WHILE NON-ALARMED STATUS EXISTS. COUNT RELAYS ARE ENERGIZED FOR 200MS FOR EACH TOTALIZER INCREMENT. SEE NOTE 8 FLOW COMPUTERS WITH MERCURY WETTED RELAYS INCLUDE NORMALLY OPEN RELAY FUNCTION ONLY. (NOTE 10)
8	CH.1 B	RELAY 1 NORMALLY CLOSED						
9	CH.1 C	RELAY 1 COMMON						
10	CH.2 A	RELAY 2 NORMALLY OPEN						
11	CH.2 B	RELAY 2 NORMALLY CLOSED						
12	CH.2 C	RELAY 2 COMMON						
13	CH.3 A	RELAY 3 NORMALLY OPEN						
14	CH.3 B	RELAY 3 NORMALLY CLOSED						
15	CH.3 C	RELAY 3 COMMON						
16	CH.4 A	RELAY 4 NORMALLY OPEN			MERCURY WETTED RELAY 50VA 70VDC (PEAK AC) 0.5A MAX. NON-INDUCTIVE			
17	CH.4 B	RELAY 4 NORMALLY CLOSED						
18	CH.4 C	RELAY 4 COMMON						

TB2 - VOLTAGE OUTPUTS

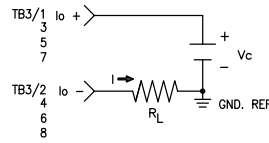
PIN #	SIGNAL	FUNCTION	DESCRIPTION	USE	LOAD	WIRING	CABLE LENGTH	NOTES
1	Vout 1+	0-10 VOLT ANALOG OUTPUT	Vo1 THROUGH Vo4 ARE VOLTAGE DRIVE SIGNALS FOR Io1 THROUGH Io4 RESPECTIVELY (SEE TB3)	SYSTEM ANALOG VOLTAGE OUTPUTS	10KΩ MIN.	24 GA. MIN.	1000 FT. MAX. WITHOUT FACTORY APPROVAL	ASSIGNABLE TO SYSTEM VARIABLES VIA MENU CONTROL OVER Io ASSIGNMENTS.
2	Vout 1-	REF. GROUND						
3	Vout 2+	0-10 VOLT ANALOG OUTPUT						
4	Vout 2-	REF. GROUND						
5	Vout 3+	0-10 VOLT ANALOG OUTPUT						0 TO 10 VDC NORMAL -.3 TO 0 VOLT UNDER FAULT CONDITIONS
6	Vout 3-	REF. GROUND						
7	Vout 4+	0-10 VOLT ANALOG OUTPUT						
8	Vout 4-	REF. GROUND						

TB3 - ISO 4-20mA OUTPUTS

PIN #	SIGNAL	FUNCTION	DESCRIPTION	USE	LOAD	WIRING	CABLE LENGTH	NOTES
1	Iout 1+	ISOLATED LOOP SUPPLY	4-20mA PROPORTIONAL TO SPANNED, SELECTED VARIABLE (LOOP POWER)	ASSIGNABLE (AND SPANNABLE) TO ALL SYSTEM VARIABLES UNDER MENU CONTROL	1000Ω MAX. WHEN USING 24VDC LOOP SUPPLY 320 omhs MAX. WHEN SAFETY BARRIERS USED PER 1010-304	SHIELDED 24 GA. INSTRUMENT CABLE	1000 FT. MAX. WITHOUT FACTORY APPROVAL	REF. SCHEMATIC "A" CONNECT USER LOOP SUPPLY TO +24 VDC (NOTE 9)
2	Iout 1-	ISOLATED LOOP RETURN						
3	Iout 2+	ISOLATED LOOP SUPPLY						
4	Iout 2-	ISOLATED LOOP RETURN						
5	Iout 3+	ISOLATED LOOP SUPPLY						
6	Iout 3-	ISOLATED LOOP RETURN						
7	Iout 4+	ISOLATED LOOP SUPPLY						
8	Iout 4-	ISOLATED LOOP RETURN						

TB4 - ANALOG/DIGITAL INPUTS

PIN #	SIGNAL	FUNCTION	DESCRIPTION	USE	LOAD	WIRING	CABLE LENGTH	NOTES
1	———	NO CONNECTION						
2	———	NO CONNECTION						
3	DI 1 +	DIGITAL INPUT	CHANNEL 1 NOTOT	SUSPENDS CHANNEL TOTALIZATION	SHORT TO RETURN OR LOGIC LOW TO ACTIVATE	24 GA. MIN.	1000 FT. MAX. WITHOUT FACTORY APPROVAL	LOGIC LEVEL STATES: HIGH: 5 TO 3 VOLTS LOW: 0 TO 1 VOLT
4	DI -	RETURN	COMMON					
5	DI 2 +	DIGITAL INPUT	CHANNEL 2 NOTOT					
6	DI 2 -	RETURN	COMMON					
7	DI 3 +	DIGITAL INPUT	CHANNEL 3 NOTOT					
8	DI 3 -	RETURN	COMMON					
9	DI 4 +	DIGITAL INPUT	CHANNEL 4 NOTOT					
10	DI 4 -	RETURN	COMMON					
11	Iin 1+	AUX.1 IN	4-20mA ANALOG CURRENT INPUT REFERENCED TO SYSTEM GROUND (NON ISOLATED)	USER ASSIGNABLE DEPENDING ON FLOW COMPUTER MODEL	200Ω RESISTIVE, APPLIED VOLTAGE MAY NOT BE NEGATIVE OR GREATER THAN +15VDC ABOVE SYSTEM GROUND 335Ω WHEN SAFETY, BARRIERS USED PER 1010-304	24 GA. MIN.	1000 FT. MAX. WITHOUT FACTORY APPROVAL	REF. SCHEMATIC "B"
12	Iin 1-	AUX.1 RETURN						
13	Iin 2+	AUX.2 IN						
14	Iin 2-	AUX.2 RETURN						
15	Iin 3+	AUX.3 IN						
16	Iin 3-	AUX.3 RETURN						
17	Iin 4+	AUX.4 IN						
18	Iin 4-	AUX.4 RETURN						



Vc: 24VDC (USER SUPPLY)

I = 4-20mA

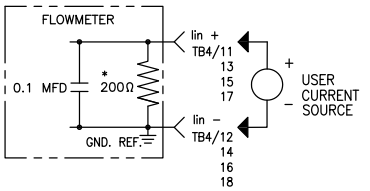
MAXIMUM R_L: $\frac{Vc - 4}{0.02}$ Ω

R_L:1000Ω max.

WHEN CONNECTED PER 1010-304 SAFETY BARRIER RESISTANCE OF 680Ω NET REDUCES R_L MAX. TO 320Ω

R_L = LOOP WIRE RESISTANCE PLUS USER'S INPUT LOAD RESISTANCE

SCHEMATIC "A"
ISOLATED 4-20mA OUTPUT



DO NOT EXCEED +15 VDC OR REVERSE POLARITY

*WHEN CONNECTED PER 1010-304, SAFETY BARRIER INCREASES SERIES RESISTANCE TO 335Ω TOTAL

SCHEMATIC "B"
4-20mA ANALOG INPUT

NOTES: (CONT'D FROM SHT. 1)

7. RS-232 RANGE CAN BE INCREASED BY:
   a) USE OF SHORT HAUL MODEMS.
   b) USE OF SPECIAL DATA CABLES AND/OR SLOWER DATA RATES.
   c) USE OF TELEPHONE LINE MODEM.

8. LOAD CAPABLITY VARIES WITH SUPPLIED VOLTAGE. MAXIMUM LOAD FIGURES INCLUDE WIRING.

9. RELAY VOLTAGE CURRENT LIMITED WHEN SAFETY BARRIERS USED PER 1010-304.

RELATED DRAWING
CHANGES TO THIS DRAWING REQUIRE CERTIFICATION OF CONFORMANCE WITH RELATED CONTROLLED DRAWINGS

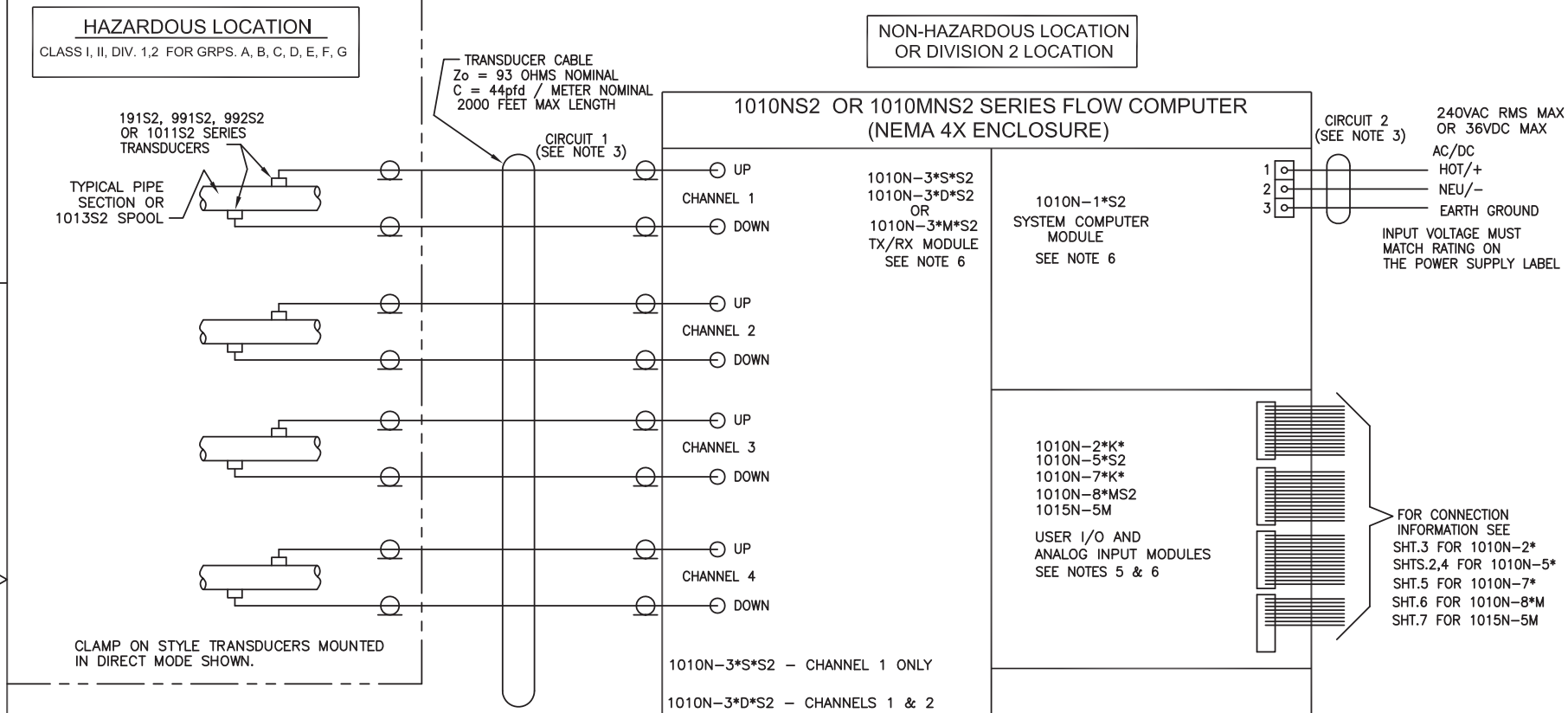
SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-
FRACTIONS ± 1/64" DECIMAL XX±0.01 XXX±0.005 ANGLES ±0°30' HOLES ±.003

DRAWN BY: H.Jenkins

INSTALLATION DRAWING I/O MODULE

SAP MATERIAL NO.	———	REV —
ITEM NO.	———	AS —
DOCUMENT NO.	1010N-8MS2-7	DS 03
DATE: 1/14/2012	SCALE: NONE	SHEET 2 OF 2



NOTES:

1. WARNING: SUBSTITUTION WITH UNSPECIFIED COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
   1.1. MODEL –S2 TRANSDUCERS ARE RATED:
   INTRINSICALLY SAFE FOR CL I, II, DIV 1, GROUPS A, B, C, D, E, F, G
   NON–INCENDIVE FOR CL I, DIV 2, GROUPS A, B, C, D
   SUITABLE FOR CL II, DIV 2, GROUPS E, F, G
   1.2. MODEL 1010NS2 AND 1010MNS2 FLOW COMPUTERS ARE RATED:
   AEx [ia] AND CLASS I, ZONE 2, AEx nC [ia] IIC T5
   ASSOCIATED EQUIPMENT, INTRINSICALLY SAFE CONNECTIONS FOR CL I, DIV 1, GPS A,B,C,D, CL II, DIV 1 GPS E,F,G
   SUITABLE FOR CL I, DIV 2, GPS A,B,C,D AND CL II, DIV 2, GPS E,F,G
2. USE 1010N MANUALS FOR OPERATION AND MAINTENANCE INSTRUCTIONS.
3. CIRCUITS 1, 2, AND 3 MUST BE IN SEPARATE CONDUIT.
4. ALL CASE CONDULET OPENINGS ARE TO USE WEATHER PROOF SEALS.
5. DATA/CONTROL SIGNAL CONNECTIONS ARE MADE ON 1015N–5M, 1010N–2*K*, 1010N–7*K* OR 1010N–8*MS2 MODULES. 1015N–5M IS ORDERED SEPARATELY, OTHER INCLUDED MODULES VARY WITH FLOW COMPUTER MODEL.
6. MODULE PART NUMBER SUFFIX (*) MAY VARY DEPENDING ON FLOW COMPUTER MODEL.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON–
FRACTIONS– +/– 1/16
DECIMALS– XX+/–0.01 XXX+/–0.005
ANGLES– +/–0°30'

MATERIAL:

FINISH:

CONTROLLED DRAWING
CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL

DR	H.J	DATE 3/30/05
CHK		DATE
ENG		DATE
PROD		DATE
APPD		DATE

CERTIFIED

DATE

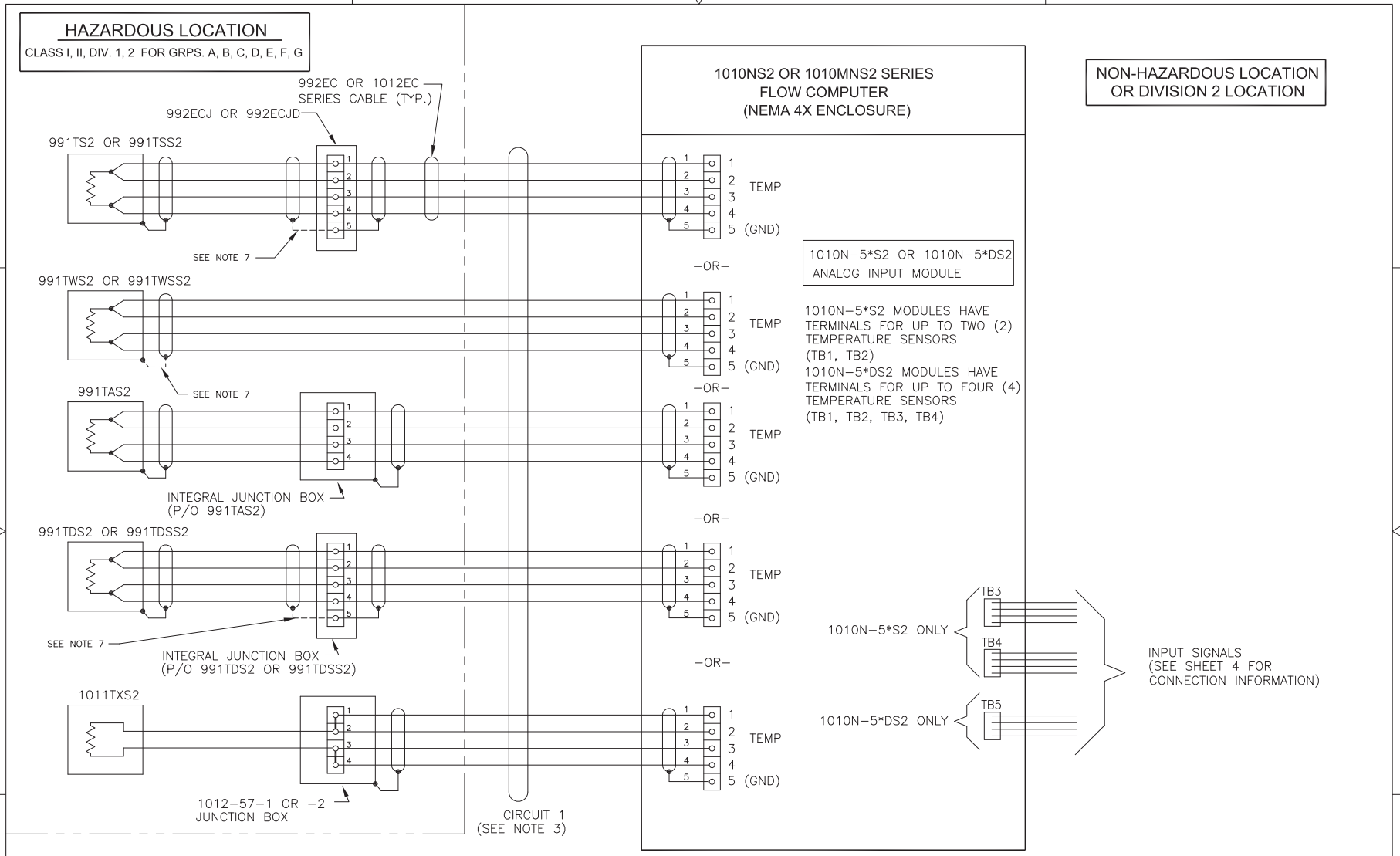
SIEMENS
Siemens Energy & Automation, Inc.
Process Instrumentation Business Unit
CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788

CONNECTION DIAGRAM
AGENCY APPROVED FOR HAZARDOUS AREA USE
1010NS2/1010MNS2 SERIES FLOW COMPUTER

SIZE	CODE IDENT NO.		REV.
C	21614	1010-304	14

SCALE: WT. SHEET 1 OF 7

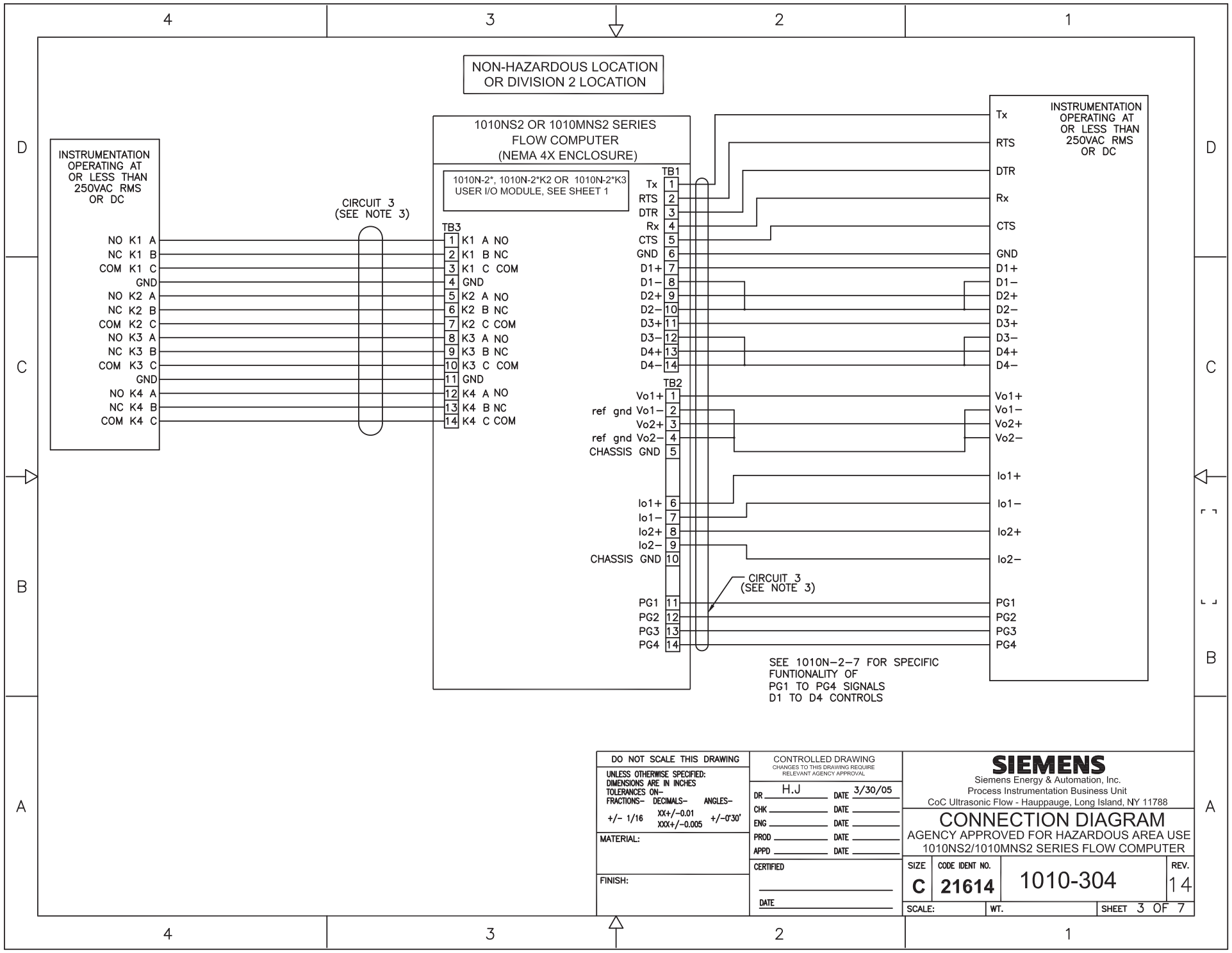
EC#79C13894



NOTES:

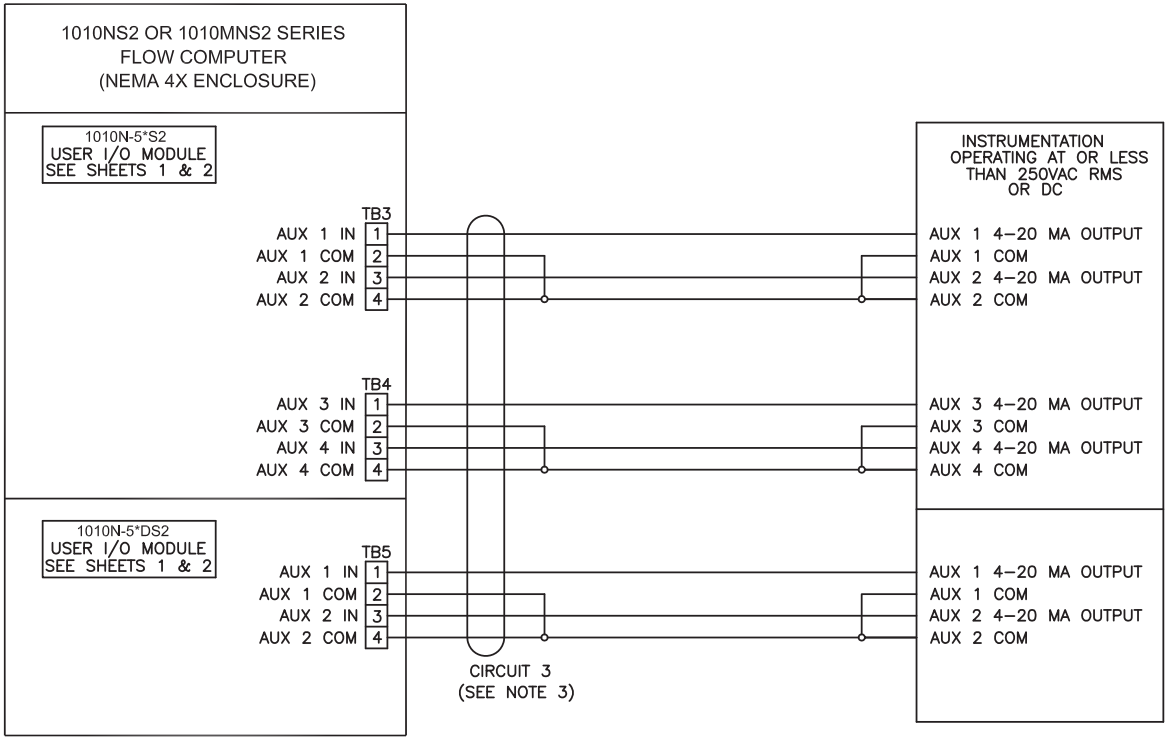
7. INDICATED SHIELD CONNECTIONS ARE OPTIONAL AND DO NOT AFFECT SAFETY.

DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON- FRACTIONS- DECIMALS- ANGLES- +/- 1/16 XX+/-0.01 +/-0°30' XXX+/-0.005 MATERIAL: FINISH:	CONTROLLED DRAWING CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL DR H.J DATE 3/30/05 CHK DATE ENG DATE PROD DATE APPD DATE CERTIFIED DATE	SIEMENS Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788 CONNECTION DIAGRAM AGENCY APPROVED FOR HAZARDOUS AREA USE 1010NS2/1010MNS2 SERIES FLOW COMPUTER SIZE C · CODE IDENT NO. 21614 · 1010-304 · REV. 14 SCALE: NONE · WT. · SHEET 2 OF 7

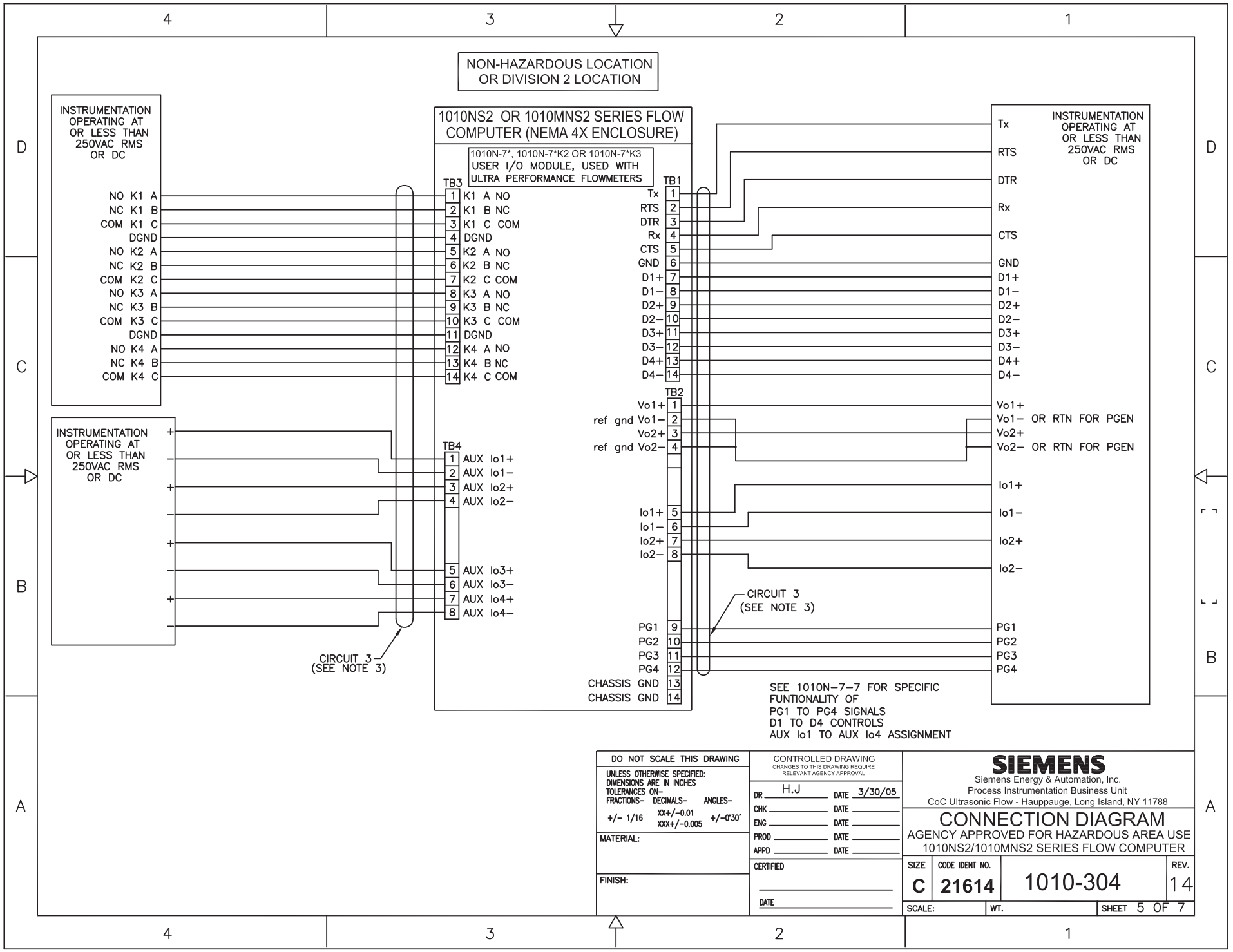


DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON— FRACTIONS— DECIMALS— ANGLES— +/- 1/16 XX+/−0.01 +/−0°30' XXX+/−0.005 MATERIAL: FINISH:	CONTROLLED DRAWING CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL DR H.J DATE 3/30/05 CHK DATE ENG DATE PROD DATE APPD DATE CERTIFIED DATE	SIEMENS Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788 CONNECTION DIAGRAM AGENCY APPROVED FOR HAZARDOUS AREA USE 1010NS2/1010MNS2 SERIES FLOW COMPUTER	
		SIZE C	CODE IDENT NO. 21614
		1010-304	REV. 14
		SCALE:	WT.
		SHEET 3 OF 7	

NON-HAZARDOUS LOCATION
OR DIVISION 2 LOCATION

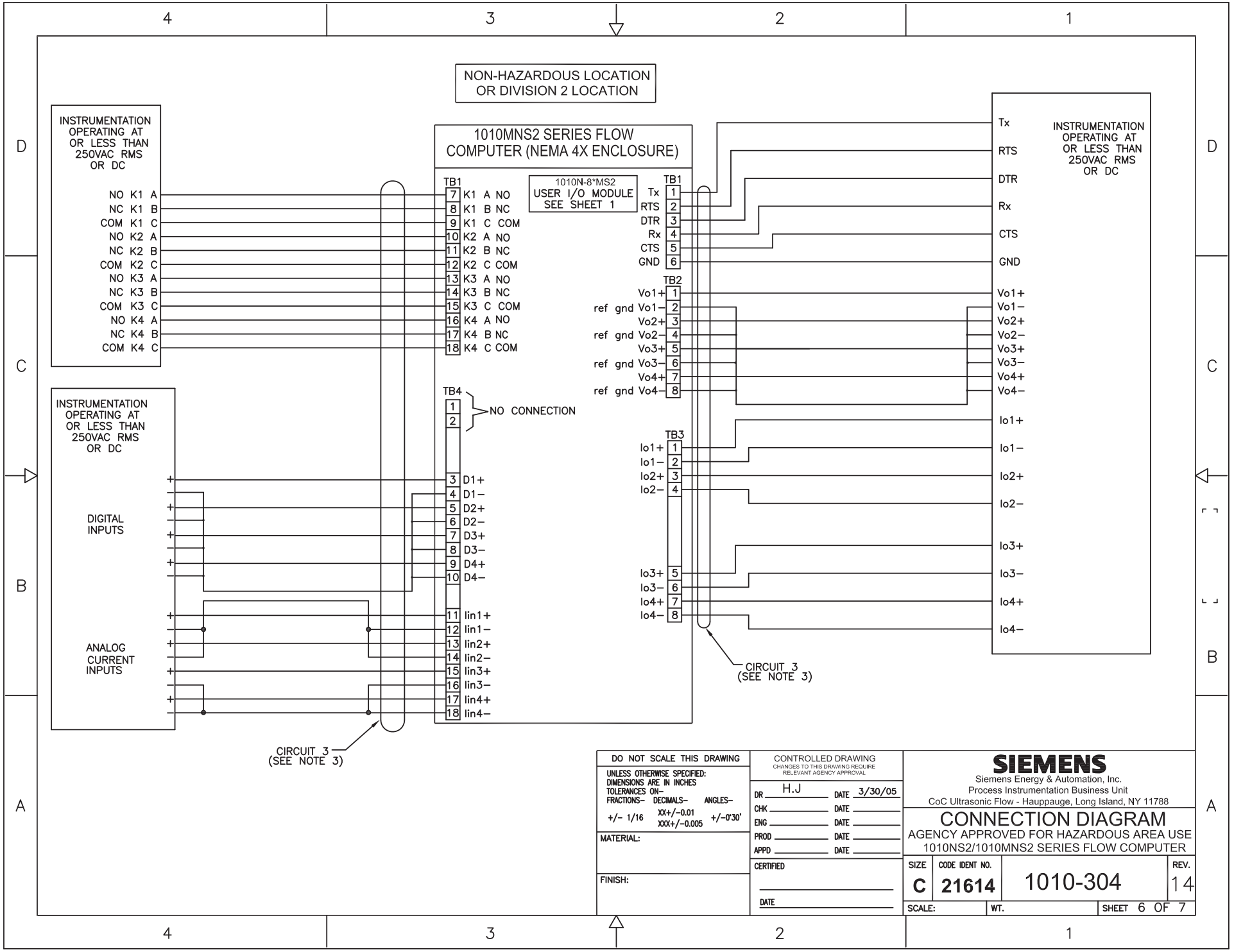


DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON– FRACTIONS– DECIMALS– ANGLES– +/– 1/16 XX+/–0.01 +/–0°30' XXX+/–0.005 MATERIAL: FINISH:	CONTROLLED DRAWING CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL DR H.J DATE 3/30/05 CHK DATE ENG DATE PROD DATE APPD DATE CERTIFIED DATE	**SIEMENS** Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788 CONNECTION DIAGRAM AGENCY APPROVED FOR HAZARDOUS AREA USE 1010NS2/1010MNS2 SERIES FLOW COMPUTER SIZE C · CODE IDENT NO. 21614 · 1010-304 · REV. 14 SCALE: · WT. · SHEET 4 OF 7

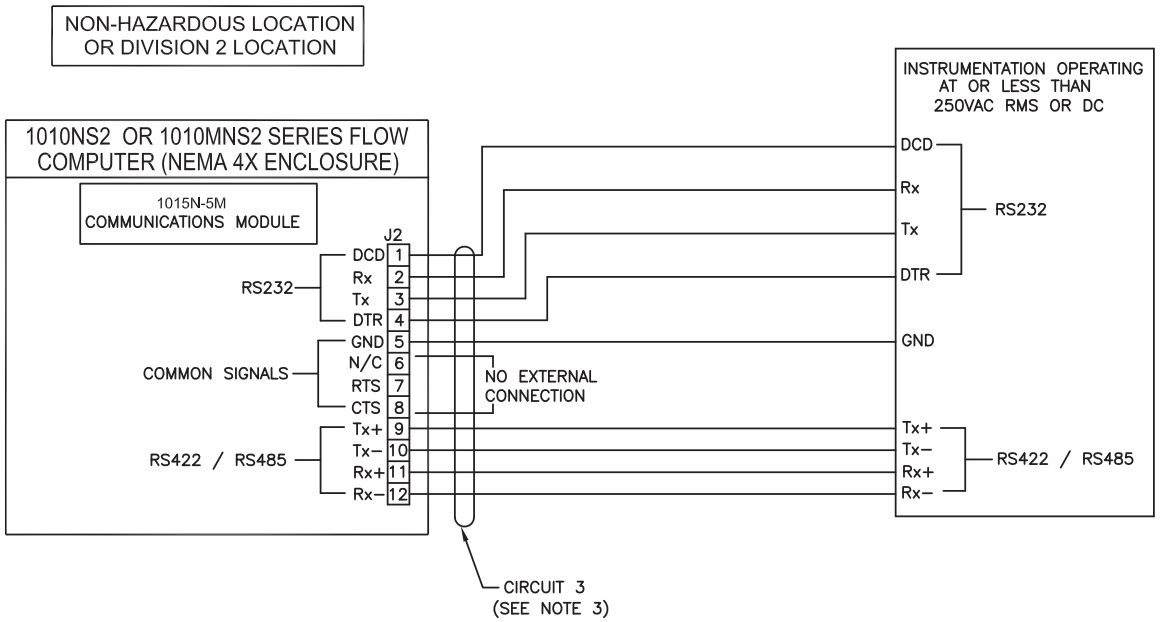


DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON– FRACTIONS– +/– 1/16 DECIMALS– XX+/–0.01 XXX+/–0.005 ANGLES– +/–0°30' MATERIAL: FINISH:	CONTROLLED DRAWING CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL DR H.J DATE 3/30/05 CHK DATE ENG DATE PROD DATE APPD DATE CERTIFIED DATE	**SIEMENS** Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788 CONNECTION DIAGRAM AGENCY APPROVED FOR HAZARDOUS AREA USE 1010NS2/1010MNS2 SERIES FLOW COMPUTER

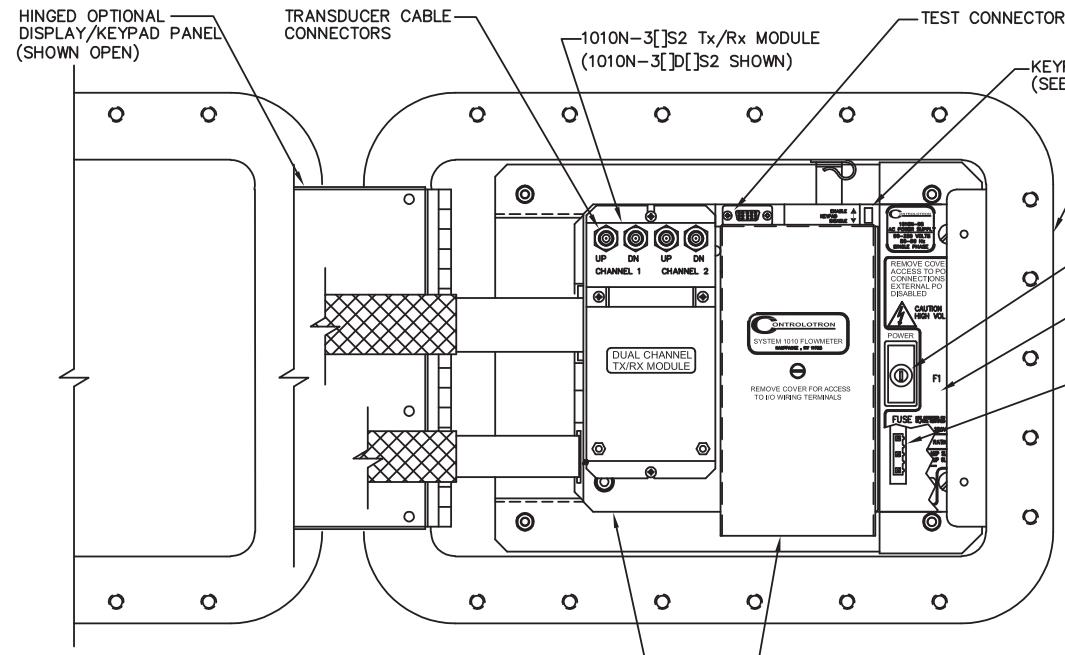
SIZE	CODE IDENT NO.		REV.
C	21614	1010-304	14
SCALE:	WT.	SHEET 5 OF 7	

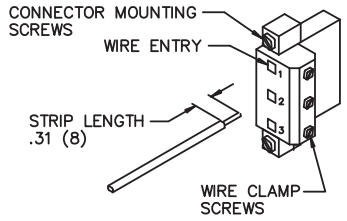


DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON– FRACTIONS– DECIMALS– ANGLES– +/– 1/16 XX+/–0.01 +/–0°30' XXX+/–0.005 MATERIAL: FINISH:	CONTROLLED DRAWING CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL DR H.J DATE 3/30/05 CHK DATE ENG DATE PROD DATE APPD DATE CERTIFIED DATE	**SIEMENS** Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788 CONNECTION DIAGRAM AGENCY APPROVED FOR HAZARDOUS AREA USE 1010NS2/1010MNS2 SERIES FLOW COMPUTER SIZE C · CODE IDENT NO. 21614 · 1010-304 · REV. 14 SCALE: · WT. · SHEET 6 OF 7

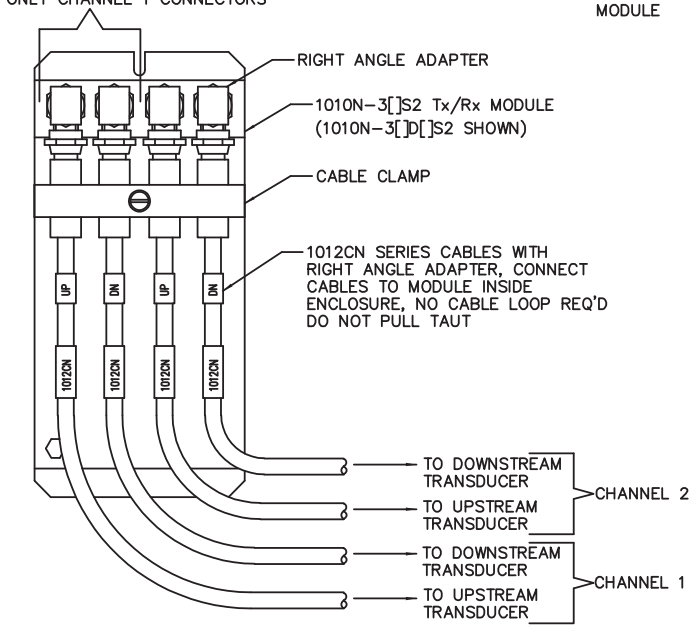


DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON– FRACTIONS– DECIMALS– ANGLES– +/– 1/16 XX+/–0.01 +/–0°30' XXX+/–0.005 MATERIAL: FINISH:	CONTROLLED DRAWING CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL DR H.J DATE 3/30/05 CHK DATE ENG DATE PROD DATE APPD DATE CERTIFIED DATE	**SIEMENS** Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788 CONNECTION DIAGRAM AGENCY APPROVED FOR HAZARDOUS AREA USE 1010NS2/1010MNS2 SERIES FLOW COMPUTER SIZE C · CODE IDENT NO. 21614 · 1010-304 · REV. 14 SCALE: · WT. · SHEET 7 OF 7





THE INPUT POWER CONNECTOR IS A PLUGGABLE, LUG–LESS WIRE CLAMP TYPE, PROVIDING RELIABLE TERMINATION OF STRIPPED STRANDED OR SOLID CONDUCTORS AWG.12–18 SECURE WITH SCREWS AFTER MATING CONNECTOR.



NOTES:

1. SEE DRAWING 1010WX–S2–8 OR 1010WXC5–S2–8 FOR OUTLINE DIMENSIONS.
2. SEE 1010 FIELD MANUAL AND APPROPRIATE TRANSDUCER INSTALLATION DRAWINGS FOR MOUNTING PROCEDURE.
3. DISABLE INSTRUMENT POWER BEFORE SERVICING POWER SUPPLY, POWER SWITCH / CIRCUIT BREAKER OR INPUT POWER CONNECTOR.
4. ALL TRANSDUCER CABLES ORIGINATING AT THE SAME FLOW COMPUTER MAY SHARE THE SAME CONDUIT. NO OTHER CABLES SHOULD BE HOUSED IN THE TRANSDUCER CABLE CONDUITS. CONNECT METALLIC CONDUITS TO EARTH GROUND.
5. OBSERVE FOLLOWING LIMITS WHEN INSTALLING TRANSDUCER CABLES IN CONDUIT:
   MAX. PULL TENSION: 80 lbs.
   MIN. BEND RADIUS: 2–1/2 INCHES
6. OPTIONAL DISPLAY AND KEYPAD APPEAR ON MODELS WITH GRAPHIC DISPLAY ONLY. KEYPAD SECURITY SWITCH CONTROLS ACCESS TO USER SELECTABLE PARAMETERS.

CHANGES TO THIS DOCUMENT REQUIRE SAFETY AGENCY APPROVAL

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON–

INCHES	(MM)
± .1	± 2

CONTRACT NO.

DR	H.J	DATE 4/14/05
CHK		DATE
ENG		DATE
PROD		DATE
APPD		DATE

CERTIFIED

DATE

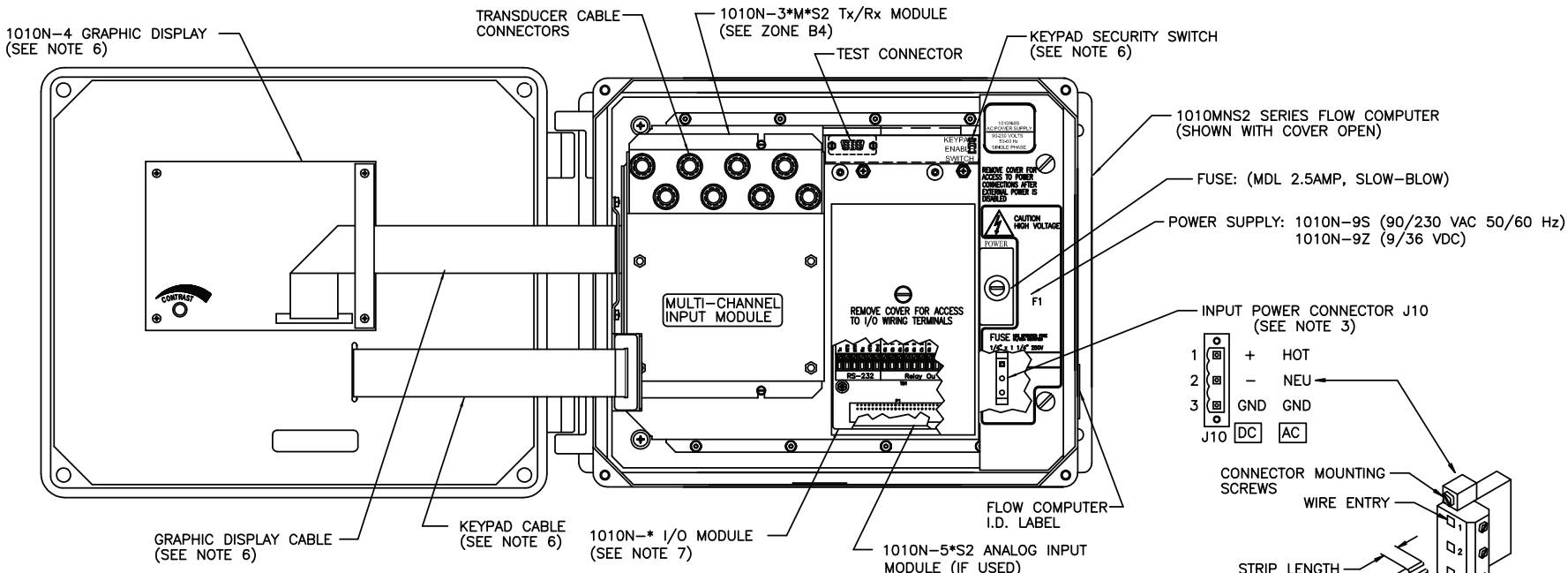
CONTROLOTRON
HAUPPAUGE , NY 11788

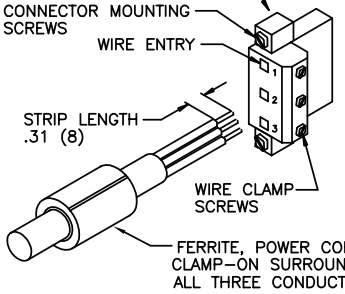
INSTALLATION DRAWING
1010 SERIES SINGLE/ DUAL CHAN. FLOW COMPUTER, AGENCY APPROVED

SIZE	CODE IDENT NO.		REV.
C	21614	1010WX-S2 - 7	A

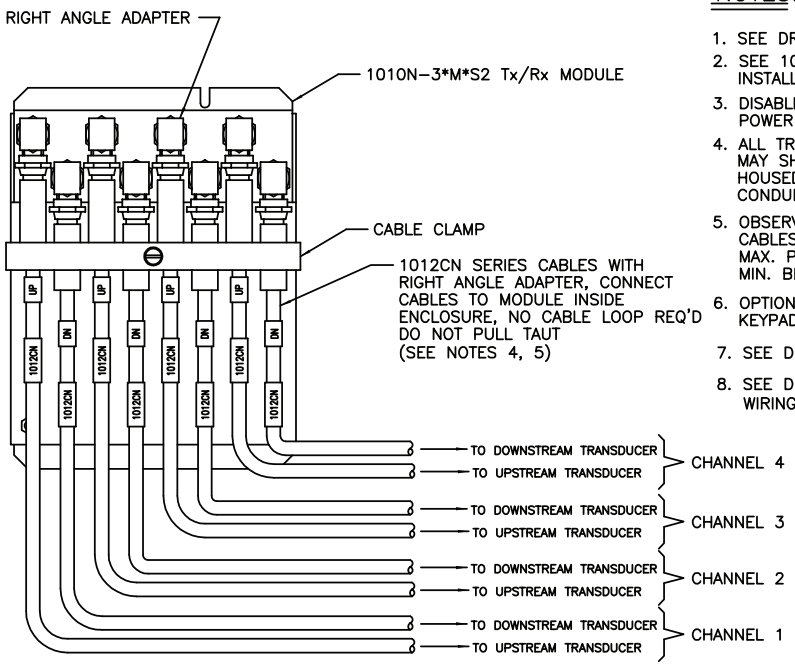
SCALE: NONE | WT. | SHEET 1 OF 1

FILE No: 1010WX–S2–7 rev.A
ER#1839





THE INPUT POWER CONNECTOR IS A PLUGGABLE, LUG–LESS WIRE CLAMP TYPE, PROVIDING RELIABLE TERMINATION OF STRIPPED STRANDED OR SOLID CONDUCTORS AWG.12–18 SECURE WITH SCREWS AFTER MATING CONNECTOR.



NOTES:

1. SEE DRAWING 1010MNS2–8 FOR OUTLINE DIMENSIONS.
2. SEE 1010 FIELD MANUAL AND APPROPRIATE TRANSDUCER INSTALLATION DRAWINGS FOR MOUNTING PROCEDURE.
3. DISABLE INSTRUMENT POWER BEFORE SERVICING POWER SUPPLY, POWER SWITCH / CIRCUIT BREAKER OR INPUT POWER CONNECTOR.
4. ALL TRANSDUCER CABLES ORIGINATING AT THE SAME FLOW COMPUTER MAY SHARE THE SAME CONDUIT. NO OTHER CABLES SHOULD BE HOUSED IN THE TRANSDUCER CABLE CONDUITS. CONNECT METALLIC CONDUITS TO EARTH GROUND.
5. OBSERVE FOLLOWING LIMITS WHEN INSTALLING TRANSDUCER CABLES IN CONDUIT:
   MAX. PULL TENSION: 80 lbs.
   MIN. BEND RADIUS: 2–1/2 INCHES
6. OPTIONAL DISPLAY AND KEYPAD APPEAR ON MODELS WITH GRAPHIC DISPLAY ONLY. KEYPAD SECURITY SWITCH CONTROLS ACCESS TO USER SELECTABLE PARAMETERS.
7. SEE DRAWING 1010N–2–7, 1010N–7–7 OR 1010N–8MS2–7 FOR USER I/O WIRING CONNECTIONS.
8. SEE DRAWING 1010N–5S2–7 OR 1010N–5DS2–7 FOR USER ANALOG INPUT WIRING CONNECTIONS.

CONTROLLED DRAWING
CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON–
INCHES (MM)
± .1 ± 2

CONTRACT NO.

DR H.J DATE 9/6/01
CHK DATE
ENG DATE
PROD DATE
APPD DATE

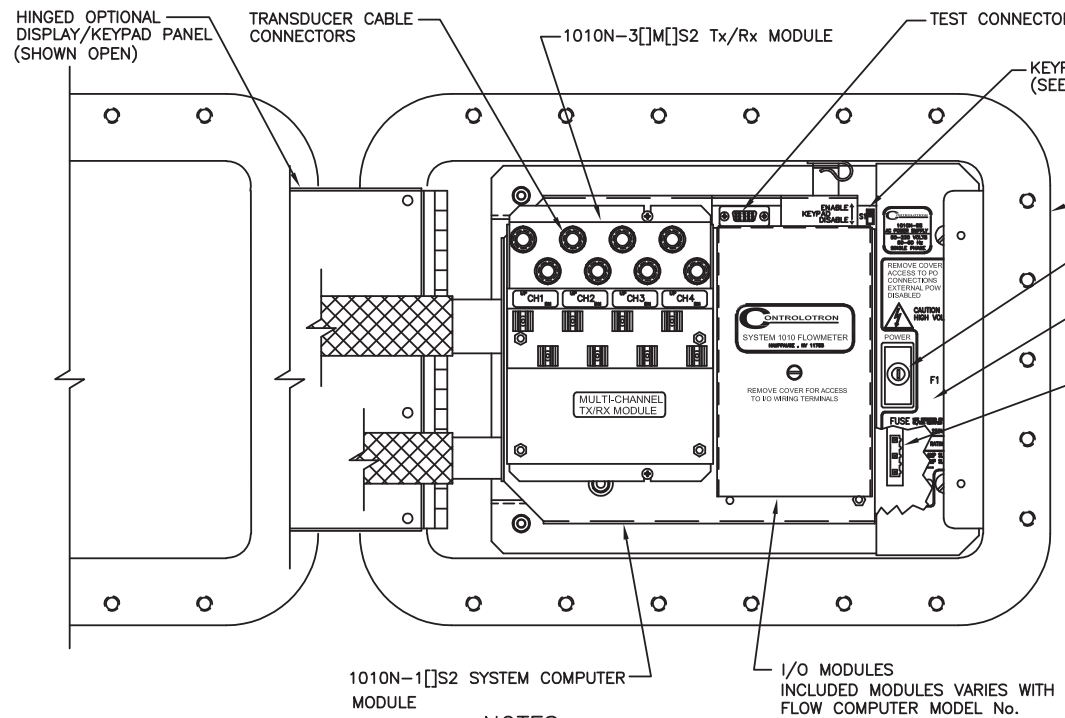
CERTIFIED
DATE

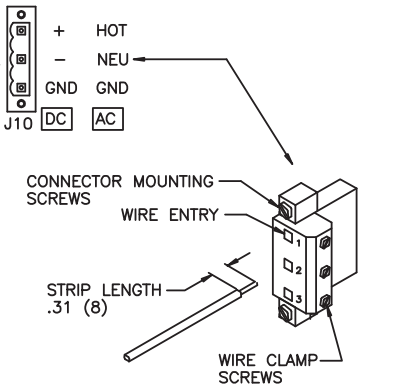
SIEMENS
Siemens Energy & Automation, Inc.
Process Instrumentation Business Unit
CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788

INSTALLATION DRAWING
1010 SERIES MULTI- CHANNEL
FLOW COMPUTER, AGENCY APPROVED

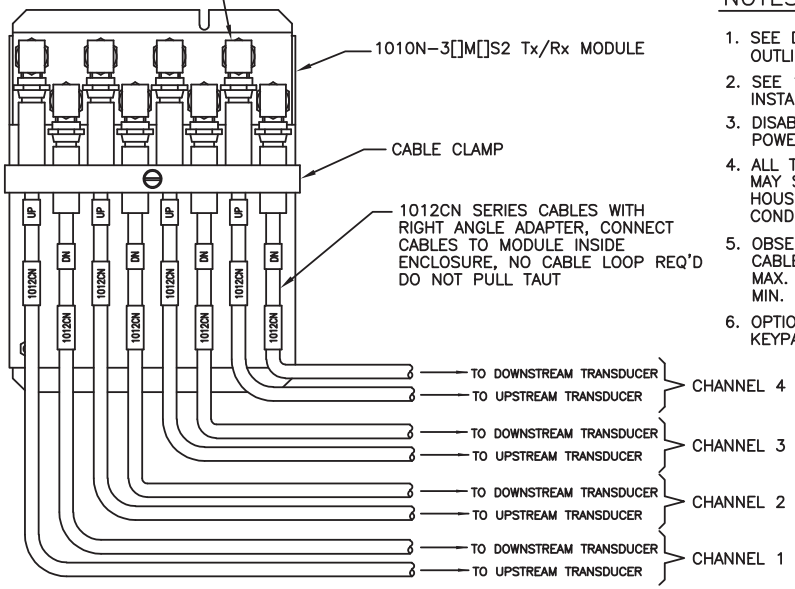
SIZE	CODE IDENT NO.		REV.
C	21614	1010MNS2 - 7	C
SCALE: NONE	WT.	SHEET 1 OF 1	

CN#5160, #5269





THE INPUT POWER CONNECTOR IS A PLUGGABLE, LUG–LESS WIRE CLAMP TYPE, PROVIDING RELIABLE TERMINATION OF STRIPPED STRANDED OR SOLID CONDUCTORS AWG.12–18 SECURE WITH SCREWS AFTER MATING CONNECTOR.



NOTES:

1. SEE DRAWING 1010WX–S2–8 OR 1010WXC5–S2–8 FOR OUTLINE DIMENSIONS.
2. SEE 1010 FIELD MANUAL AND APPROPRIATE TRANSDUCER INSTALLATION DRAWINGS FOR MOUNTING PROCEDURE.
3. DISABLE INSTRUMENT POWER BEFORE SERVICING POWER SUPPLY, POWER SWITCH / CIRCUIT BREAKER OR INPUT POWER CONNECTOR.
4. ALL TRANSDUCER CABLES ORIGINATING AT THE SAME FLOW COMPUTER MAY SHARE THE SAME CONDUIT. NO OTHER CABLES SHOULD BE HOUSED IN THE TRANSDUCER CABLE CONDUITS. CONNECT METALLIC CONDUITS TO EARTH GROUND.
5. OBSERVE FOLLOWING LIMITS WHEN INSTALLING TRANSDUCER CABLES IN CONDUIT:
   MAX. PULL TENSION: 80 lbs.
   MIN. BEND RADIUS: 2–1/2 INCHES
6. OPTIONAL DISPLAY AND KEYPAD APPEAR ON MODELS WITH GRAPHIC DISPLAY ONLY. KEYPAD SECURITY SWITCH CONTROLS ACCESS TO USER SELECTABLE PARAMETERS.

CHANGES TO THIS DOCUMENT REQUIRE SAFETY AGENCY APPROVAL

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON–
INCHES (MM)
± .1 ± 2

CONTRACT NO.

DR H.J DATE 4/14/05
CHK DATE
ENG DATE
PROD DATE
APPD DATE

CERTIFIED
DATE

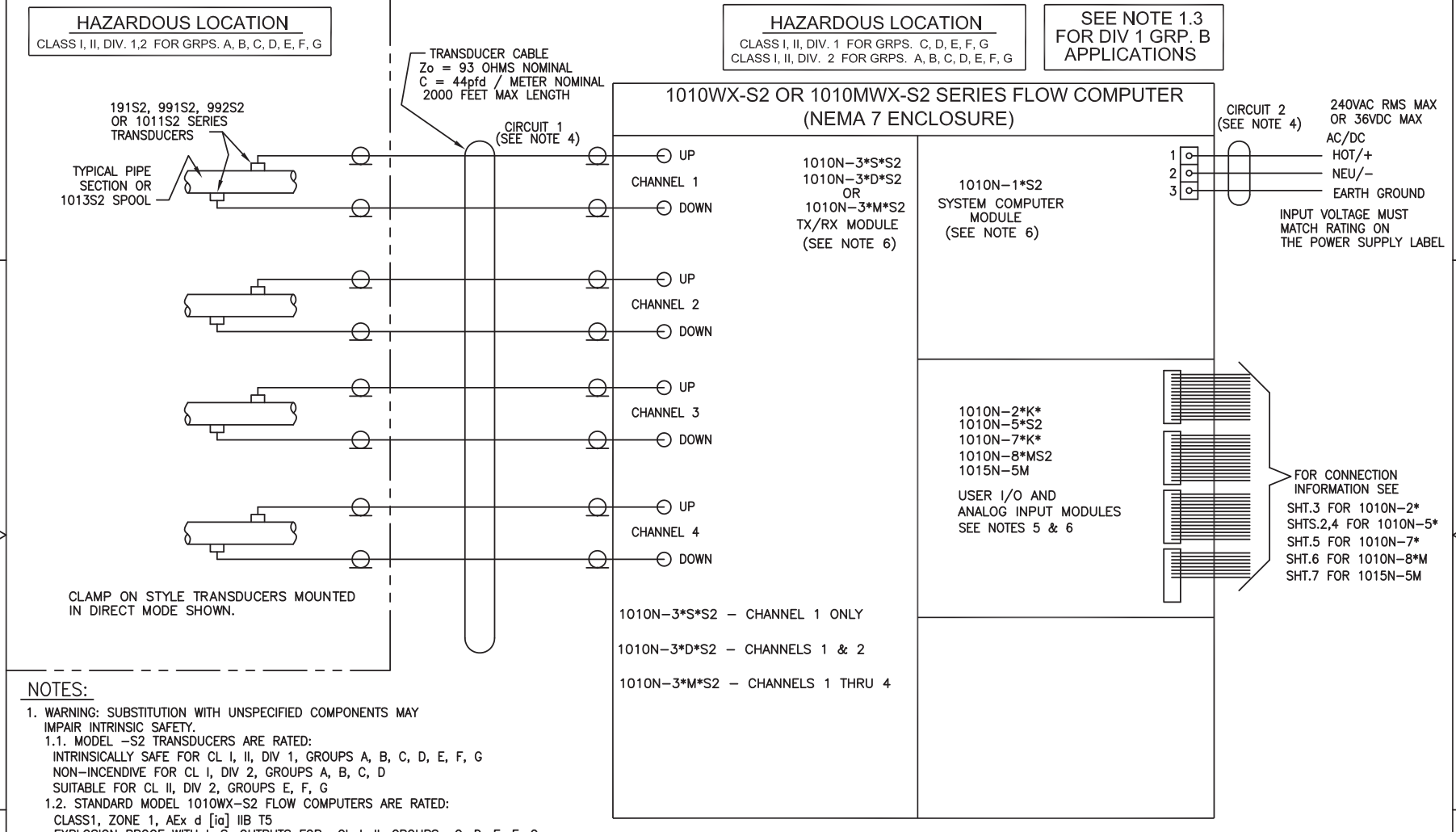
CONTROLOTRON
HAUPPAUGE , NY 11788

INSTALLATION DRAWING 1010 SERIES MULTI-CHANNEL FLOW COMPUTER, AGENCY APPROVED

SIZE	CODE IDENT NO.		REV.
C	21614	1010MWX-S2-7	A

SCALE: NONE | WT. | SHEET 1 OF 1

FILE No: 1010MWX–S2–7 rev.A
ER#1839

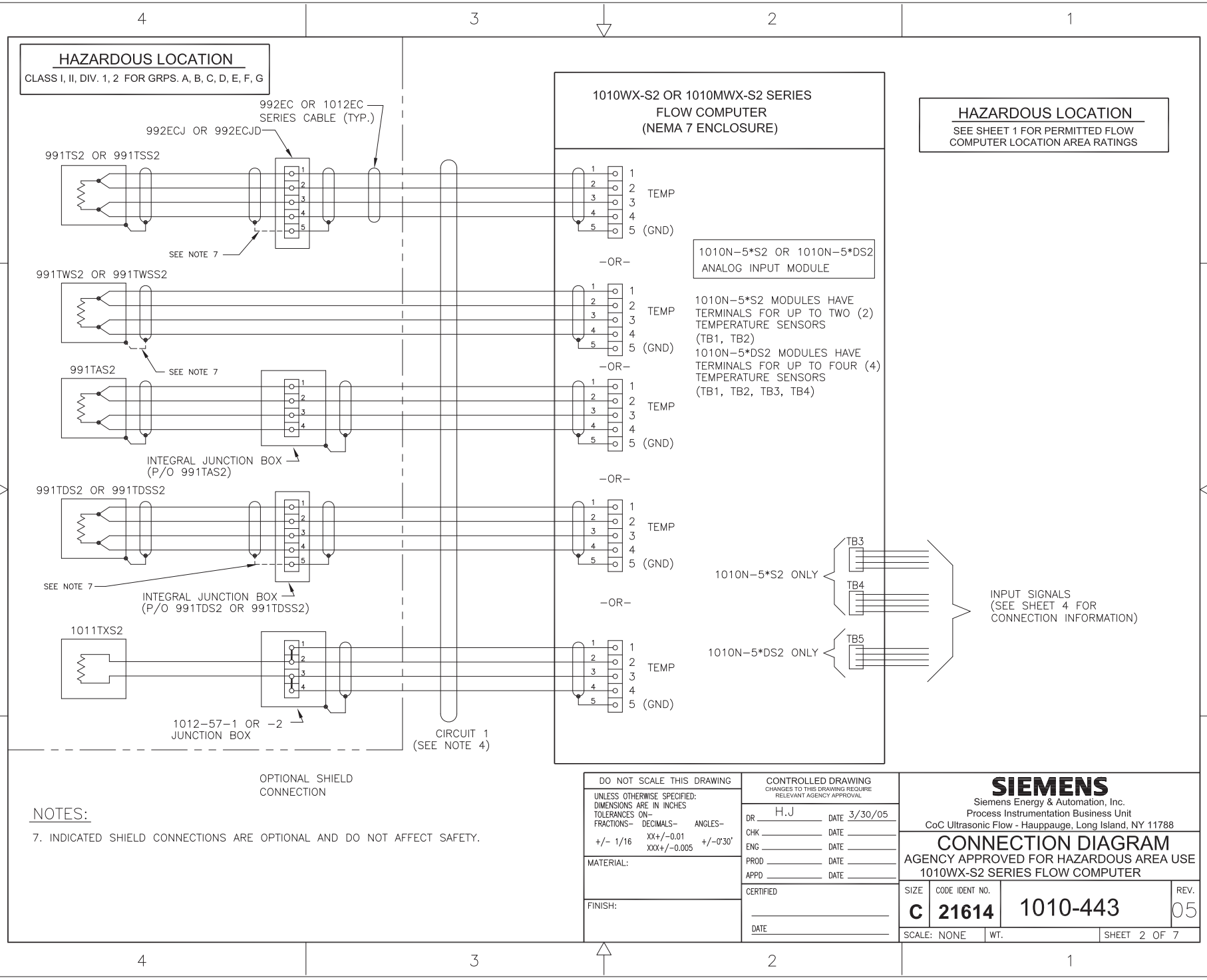


NOTES:

1. WARNING: SUBSTITUTION WITH UNSPECIFIED COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
   - 1.1. MODEL –S2 TRANSDUCERS ARE RATED:
     INTRINSICALLY SAFE FOR CL I, II, DIV 1, GROUPS A, B, C, D, E, F, G
     NON–INCENDIVE FOR CL I, DIV 2, GROUPS A, B, C, D
     SUITABLE FOR CL II, DIV 2, GROUPS E, F, G
   - 1.2. STANDARD MODEL 1010WX–S2 FLOW COMPUTERS ARE RATED:
     CLASS1, ZONE 1, AEx d [ia] IIB T5
     EXPLOSION PROOF WITH I. S. OUTPUTS FOR CL I, II, GROUPS C, D, E, F, G
     NON–INCENDIVE WITH N. I. OUTPUTS FOR CL I, DIV 2, GROUPS A, B, C, D
     SUITABLE FOR CL II, DIV 2, GROUPS E, F, G
   - 1.3. MODEL 1010WX–S2 FLOW COMPUTERS WITH "C5" ENCLOSURE CODE ARE RATED:
     CLASS1, ZONE 1, AEx d [ia] IIB+H2 T5
     EXPLOSION PROOF WITH I. S. OUTPUTS FOR CL I, II, GROUPS B, C, D, E, F, G
     NON–INCENDIVE WITH N. I. OUTPUTS FOR CL I, DIV 2, GROUPS A, B, C, D
     SUITABLE FOR CL II, DIV 2, GROUPS E, F, G
2. USE 1010WX MANUALS FOR OPERATION AND MAINTENANCE INSTRUCTIONS.
3. ANY COMBINATION OF OUTPUTS MAY BE USED.
4. CIRCUITS 1, 2, AND 3 MUST BE IN SEPARATE CONDUIT.
5. DATA/CONTROL SIGNAL CONNECTIONS ARE MADE ON 1010N–2* , 1010N–5*, 1010N–7*, 1010M–8M AND 1015N–5M MODULES. INCLUDED MODULES VARY WITH FLOW COMPUTER MODEL, 1015N–5M IS ORDERED SEPARATELY.
6. MODULE PART NUMBER SUFFIX (*) MAY VARY DEPENDING ON FLOW COMPUTER MODEL.

DO NOT SCALE THIS DRAWING	CONTROLLED DRAWING	SIEMENS
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON– FRACTIONS– +/– 1/16 DECIMALS– XX+/–0.01 XXX+/–0.005 ANGLES– +/–0°30'	CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL	Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788
MATERIAL:	DR H.J DATE 9/17/04	CONNECTION DIAGRAM
FINISH:	CHK DATE	AGENCY APPROVED FOR HAZARDOUS AREA USE
	ENG DATE	1010WX-S2 SERIES FLOW COMPUTER
	PROD DATE	
	APPD DATE	
	CERTIFIED DATE	SIZE C · CODE IDENT NO. 21614 · 1010-443 · REV. 05
		SCALE: · WT. · SHEET 1 OF 7

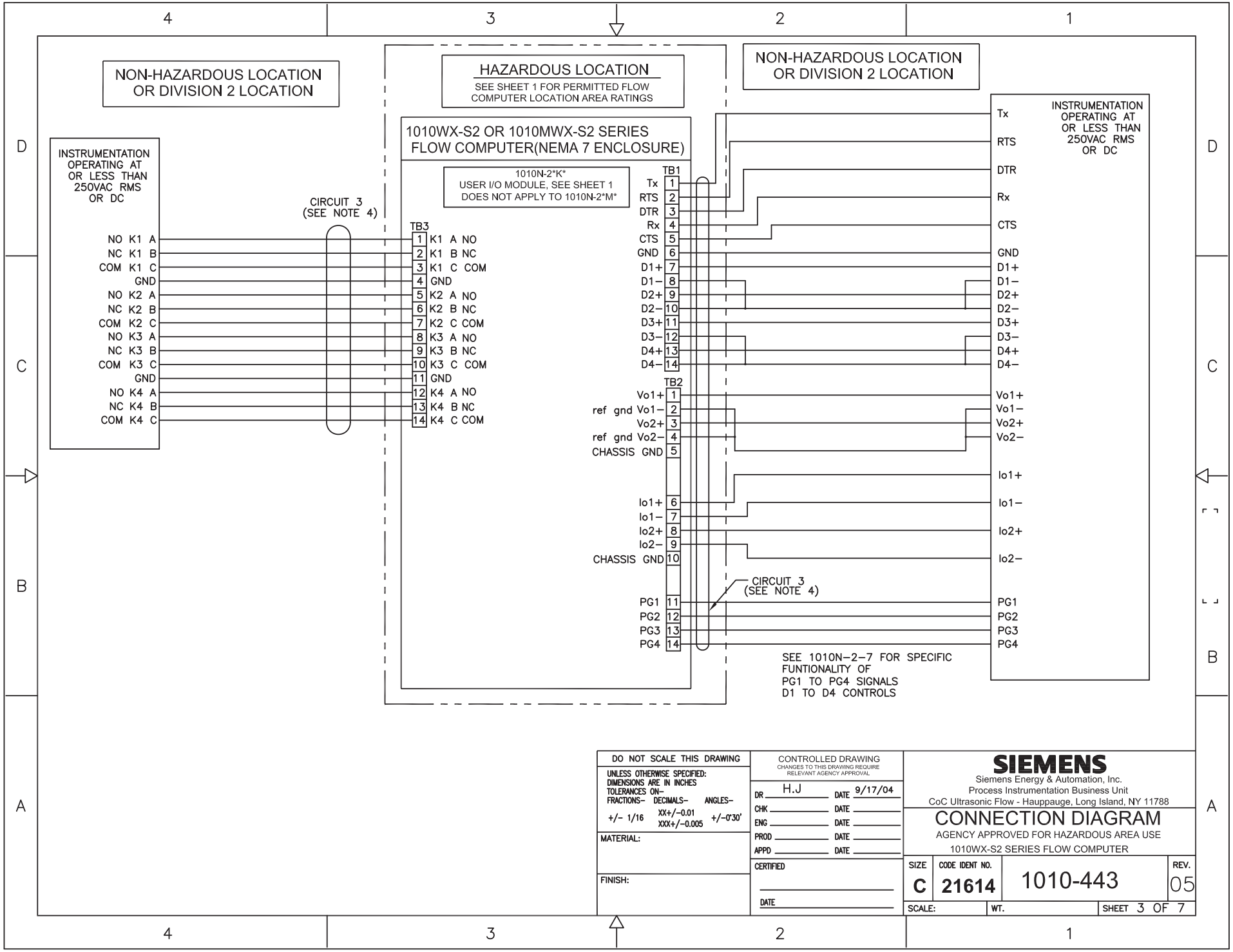
EC#79C13894



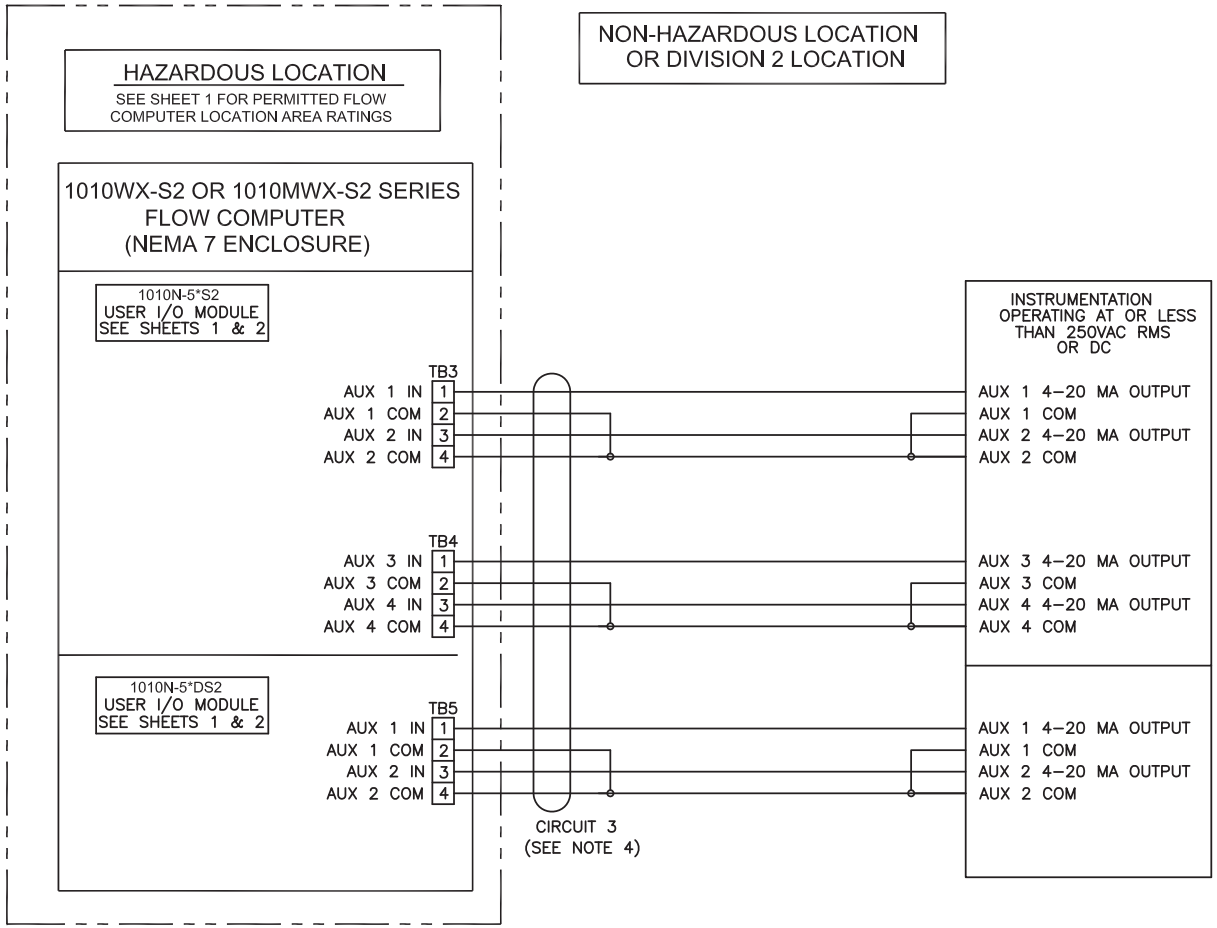
NOTES:

7. INDICATED SHIELD CONNECTIONS ARE OPTIONAL AND DO NOT AFFECT SAFETY.

DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON– FRACTIONS– DECIMALS– ANGLES– +/- 1/16 XX+/-0.01 +/-0°30' XXX+/-0.005 MATERIAL: FINISH:	CONTROLLED DRAWING CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL DR H.J DATE 3/30/05 CHK ____ DATE ____ ENG ____ DATE ____ PROD ____ DATE ____ APPD ____ DATE ____ CERTIFIED DATE	SIEMENS Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788 CONNECTION DIAGRAM AGENCY APPROVED FOR HAZARDOUS AREA USE 1010WX-S2 SERIES FLOW COMPUTER SIZE C · CODE IDENT NO. 21614 · 1010-443 · REV. 05 SCALE: NONE · WT. · SHEET 2 OF 7



DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON– FRACTIONS– DECIMALS– ANGLES– +/– 1/16 XX+/–0.01 +/–0°30' XXX+/–0.005 MATERIAL: FINISH:	CONTROLLED DRAWING CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL DR H.J DATE 9/17/04 CHK DATE ENG DATE PROD DATE APPD DATE CERTIFIED DATE	**SIEMENS** Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788 CONNECTION DIAGRAM AGENCY APPROVED FOR HAZARDOUS AREA USE 1010WX-S2 SERIES FLOW COMPUTER SIZE C · CODE IDENT NO. 21614 · 1010-443 · REV. 05 SCALE: · WT. · SHEET 3 OF 7



DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON–
FRACTIONS– +/– 1/16
DECIMALS– XX+/–0.01 XXX+/–0.005
ANGLES– +/–0°30'

MATERIAL:

FINISH:

CONTROLLED DRAWING
CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL

DR	H.J	DATE 9/17/04
CHK		DATE
ENG		DATE
PROD		DATE
APPD		DATE

CERTIFIED

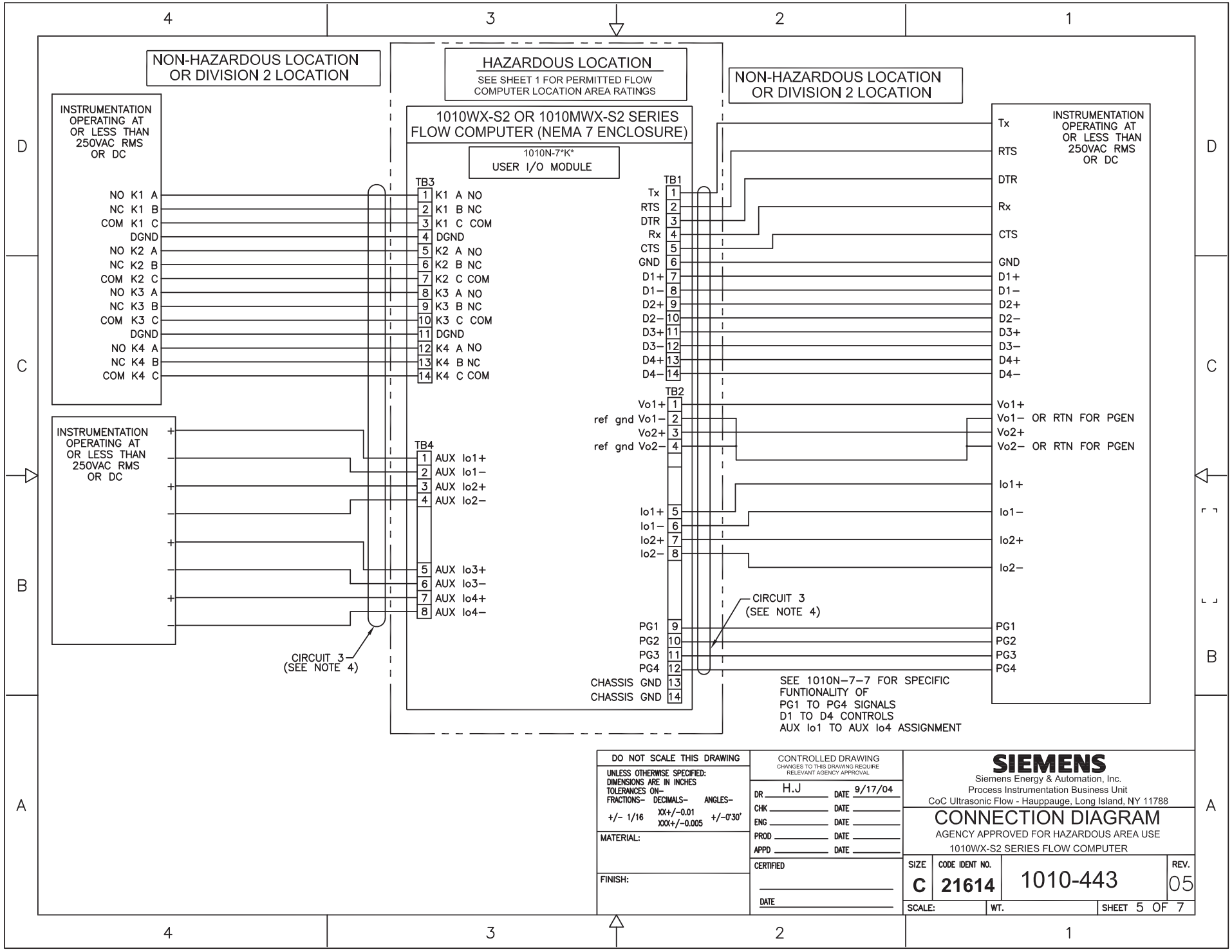
DATE

SIEMENS
Siemens Energy & Automation, Inc.
Process Instrumentation Business Unit
CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788

CONNECTION DIAGRAM
AGENCY APPROVED FOR HAZARDOUS AREA USE
1010WX-S2 SERIES FLOW COMPUTER

SIZE	CODE IDENT NO.		REV.
C	21614	1010-443	05

SCALE: | WT. | SHEET 4 OF 7



DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON–
FRACTIONS– +/– 1/16
DECIMALS– XX+/–0.01 XXX+/–0.005
ANGLES– +/–0°30'

MATERIAL:

FINISH:

CONTROLLED DRAWING
CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL

DR	H.J	DATE 9/17/04
CHK		DATE
ENG		DATE
PROD		DATE
APPD		DATE

CERTIFIED

DATE

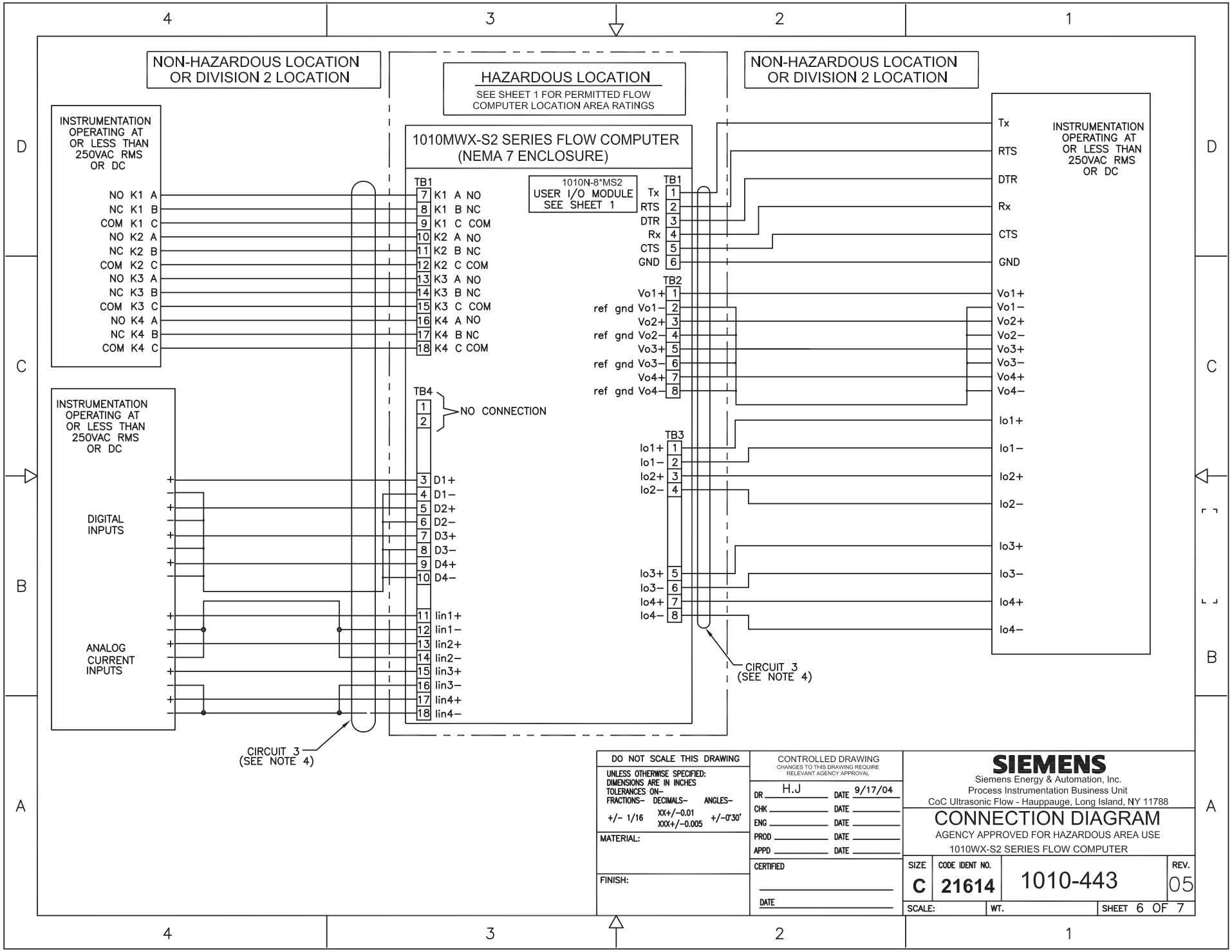
SIEMENS
Siemens Energy & Automation, Inc.
Process Instrumentation Business Unit
CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788

CONNECTION DIAGRAM

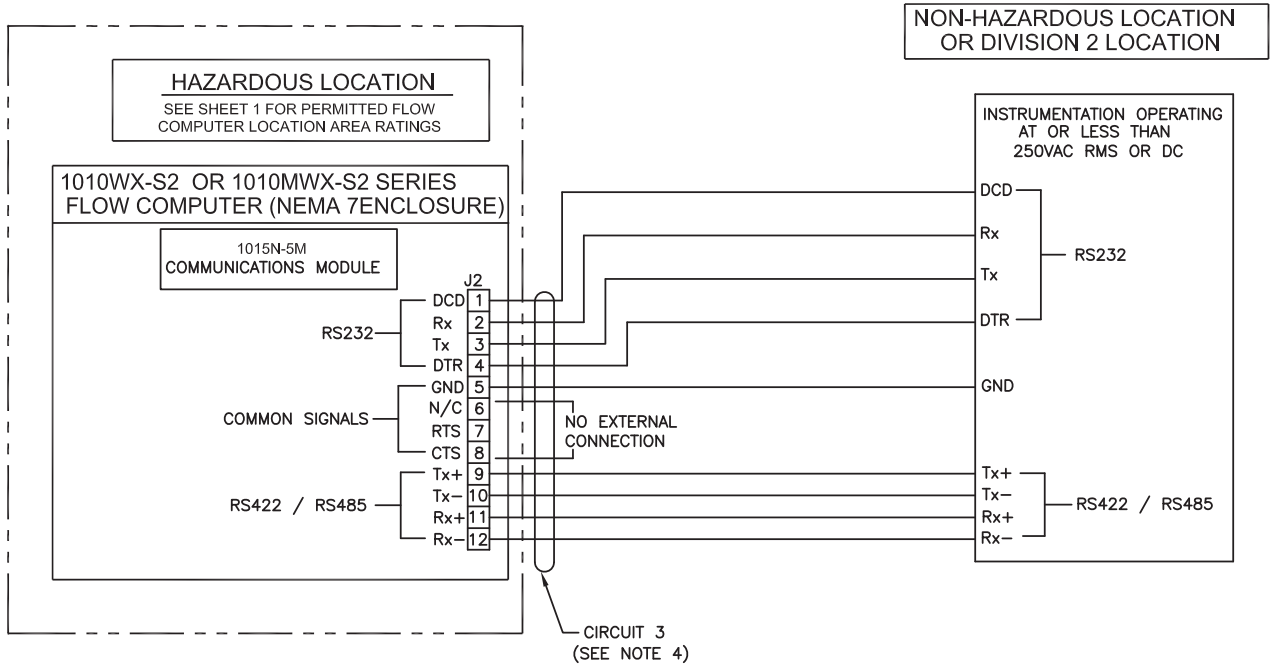
AGENCY APPROVED FOR HAZARDOUS AREA USE
1010WX-S2 SERIES FLOW COMPUTER

SIZE	CODE IDENT NO.		REV.
C	21614	1010-443	05

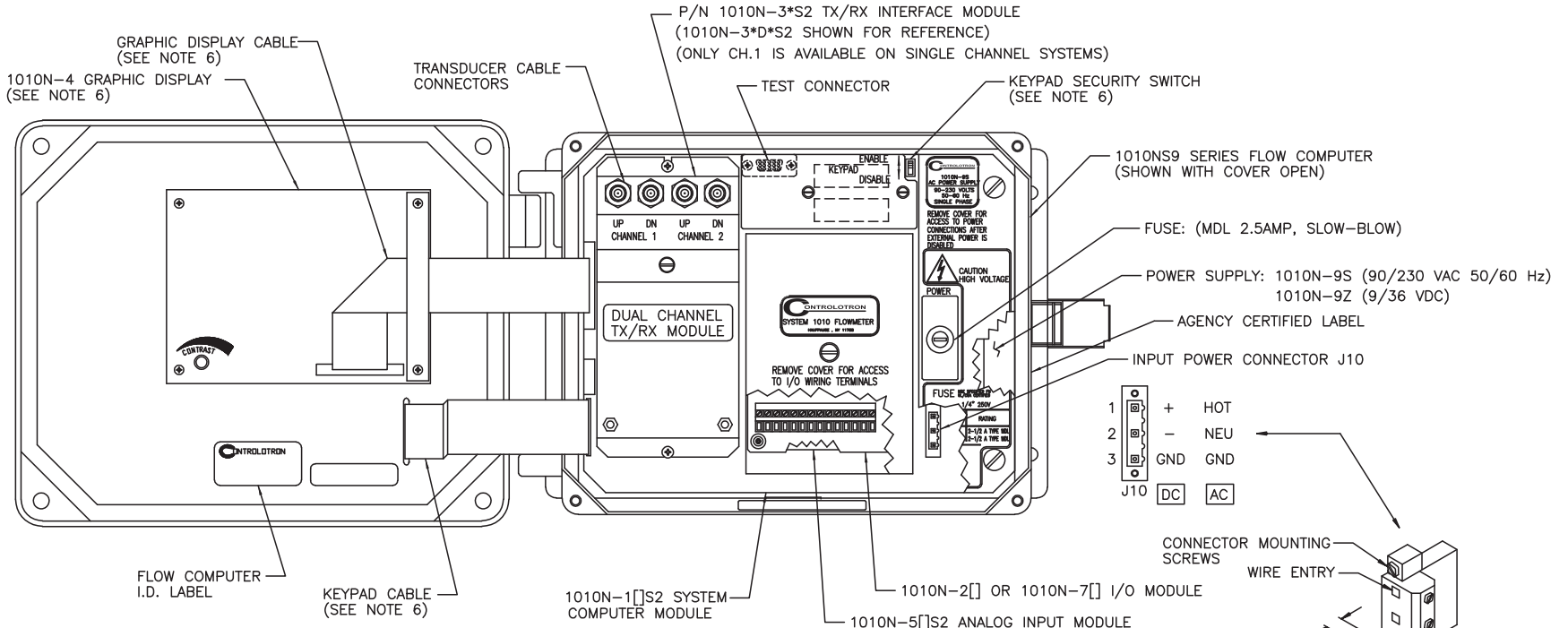
SCALE: WT. SHEET 5 OF 7

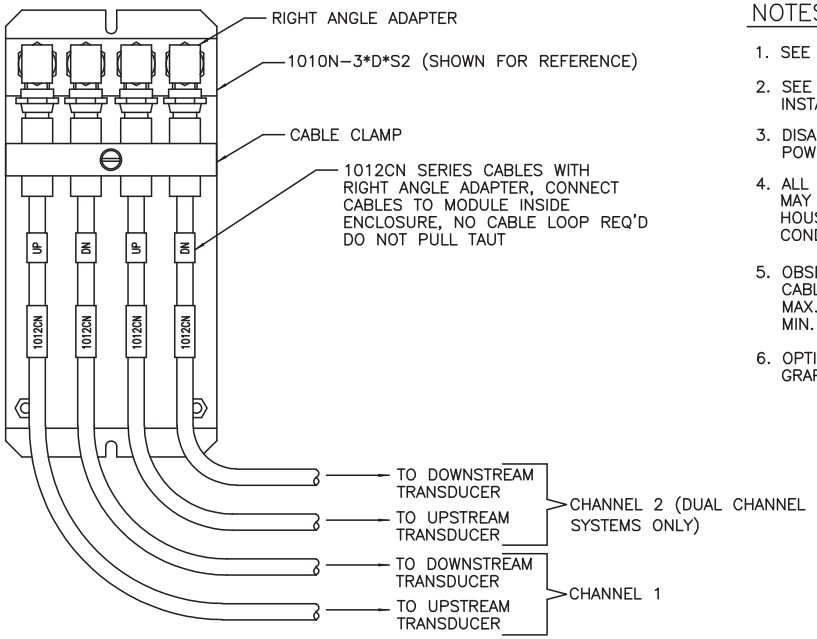


DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON— FRACTIONS— DECIMALS— ANGLES— +/− 1/16 XX+/−0.01 +/−0°30' XXX+/−0.005 MATERIAL: FINISH:	CONTROLLED DRAWING CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL DR H.J DATE 9/17/04 CHK DATE ENG DATE PROD DATE APPD DATE CERTIFIED DATE	**SIEMENS** Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788 CONNECTION DIAGRAM AGENCY APPROVED FOR HAZARDOUS AREA USE 1010WX-S2 SERIES FLOW COMPUTER SIZE C · CODE IDENT NO. 21614 · 1010-443 · REV. 05 SCALE: · WT. · SHEET 6 OF 7



DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON– FRACTIONS– DECIMALS– ANGLES– +/– 1/16 XX+/–0.01 +/–0°30' XXX+/–0.005 MATERIAL: FINISH:	CONTROLLED DRAWING CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL DR H.J DATE 9/17/04 CHK DATE ENG DATE PROD DATE APPD DATE CERTIFIED DATE	SIEMENS Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788 CONNECTION DIAGRAM AGENCY APPROVED FOR HAZARDOUS AREA USE 1010WX-S2 SERIES FLOW COMPUTER SIZE C · CODE IDENT NO. 21614 · 1010-443 · REV. 05 SCALE: · WT. · SHEET 7 OF 7





NOTES:

1. SEE DRAWING 1010NS9–8 FOR OUTLINE DIMENSIONS.
2. SEE 1010 FIELD MANUAL AND APPROPRIATE TRANSDUCER INSTALLATION DRAWINGS FOR MOUNTING PROCEDURE.
3. DISABLE INSTRUMENT POWER BEFORE SERVICING POWER SUPPLY, POWER SWITCH / CIRCUIT BREAKER OR INPUT POWER CONNECTOR.
4. ALL TRANSDUCER CABLES ORIGINATING AT THE SAME FLOW COMPUTER MAY SHARE THE SAME CONDUIT. NO OTHER CABLES SHOULD BE HOUSED IN THE TRANSDUCER CABLE CONDUITS. CONNECT METALLIC CONDUITS TO EARTH GROUND.
5. OBSERVE FOLLOWING LIMITS WHEN INSTALLING TRANSDUCER CABLES IN CONDUIT:
   MAX. PULL TENSION: 80 lbs.
   MIN. BEND RADIUS: 2–1/2 INCHES
6. OPTIONAL DISPLAY AND KEYPAD APPEAR ON MODELS WITH GRAPHIC DISPLAY ONLY.

THE INPUT POWER CONNECTOR IS A PLUGGABLE, LUG–LESS WIRE CLAMP TYPE, PROVIDING RELIABLE TERMINATION OF STRIPPED STRANDED OR SOLID CONDUCTORS AWG.12–18 SECURE WITH SCREWS AFTER MATING CONNECTOR.

CHANGES TO THIS DOCUMENT REQUIRE SAFETY AGENCY APPROVAL

DO NOT SCALE THIS DRAWING
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON–
INCHES (MM)
± .1 ± 2

CONTRACT NO.

DR H.J DATE 8/12/05
CHK DATE
ENG DATE
PROD DATE
APPD DATE

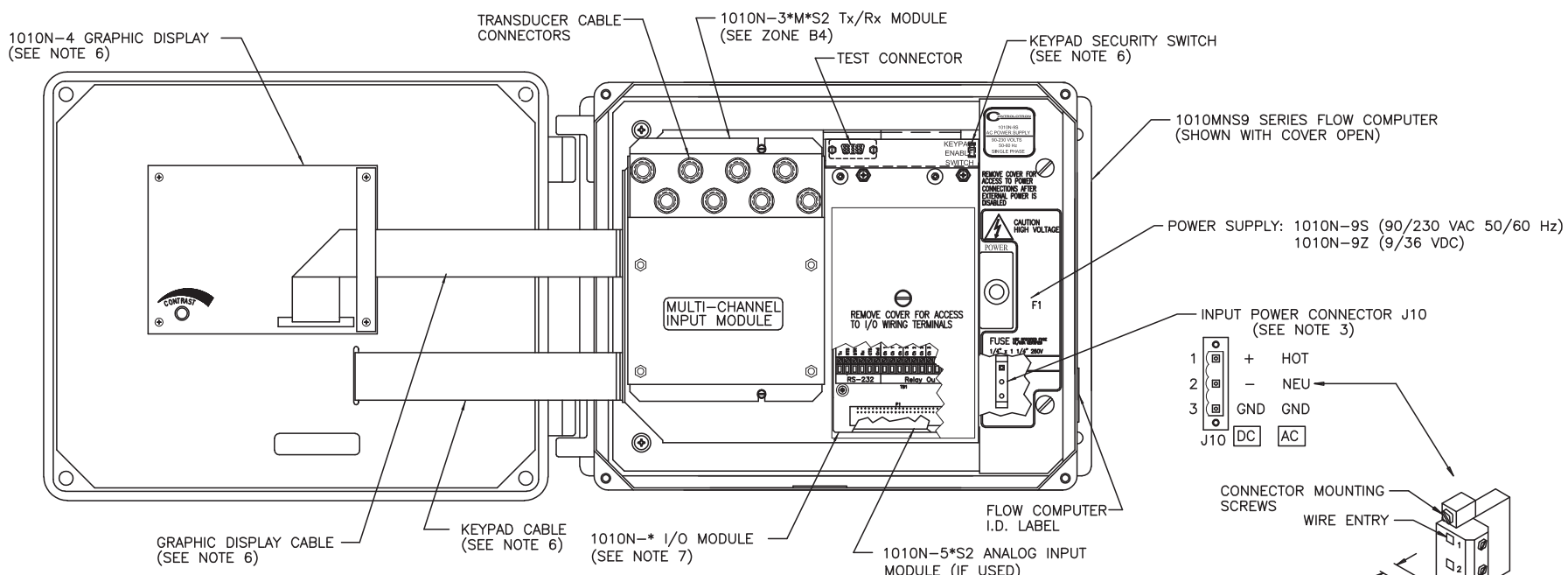
CERTIFIED
DATE

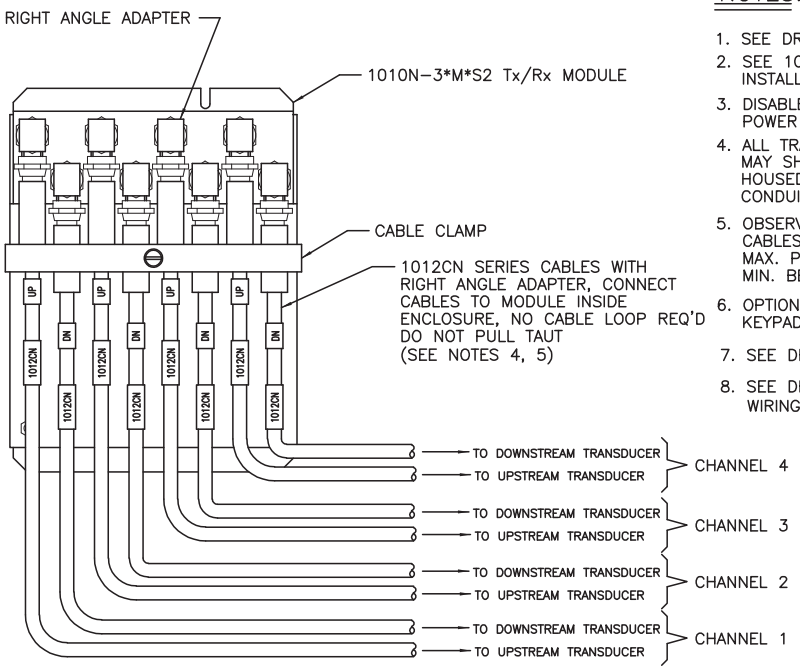
CONTROLOTRON
HAUPPAUGE , NY 11788

INSTALLATION DRAWING
1010 SERIES FLOW COMPUTER
AGENCY APPROVED

SIZE	CODE IDENT NO.		REV.
C	21614	1010NS9-7	A
SCALE: NONE	WT.	SHEET 1 OF 1	

FILE No: 1010NS9–7 rev.A
ER#1865





NOTES:

1. SEE DRAWING 1010MNS9–8 FOR OUTLINE DIMENSIONS.
2. SEE 1010 FIELD MANUAL AND APPROPRIATE TRANSDUCER INSTALLATION DRAWINGS FOR MOUNTING PROCEDURE.
3. DISABLE INSTRUMENT POWER BEFORE SERVICING POWER SUPPLY, POWER SWITCH / CIRCUIT BREAKER OR INPUT POWER CONNECTOR.
4. ALL TRANSDUCER CABLES ORIGINATING AT THE SAME FLOW COMPUTER MAY SHARE THE SAME CONDUIT. NO OTHER CABLES SHOULD BE HOUSED IN THE TRANSDUCER CABLE CONDUITS. CONNECT METALLIC CONDUITS TO EARTH GROUND.
5. OBSERVE FOLLOWING LIMITS WHEN INSTALLING TRANSDUCER CABLES IN CONDUIT:
   MAX. PULL TENSION: 80 lbs.
   MIN. BEND RADIUS: 2–1/2 INCHES
6. OPTIONAL DISPLAY AND KEYPAD APPEAR ON MODELS WITH GRAPHIC DISPLAY ONLY. KEYPAD SECURITY SWITCH CONTROLS ACCESS TO USER SELECTABLE PARAMETERS.
7. SEE DRAWING 1010N–2–7, 1010N–7–7 OR 1010N–8MS2–7 FOR USER I/O WIRING CONNECTIONS.
8. SEE DRAWING 1010N–5S2–7 OR 1010N–5DS2–7 FOR USER ANALOG INPUT WIRING CONNECTIONS.

THE INPUT POWER CONNECTOR IS A PLUGGABLE, LUG–LESS WIRE CLAMP TYPE, PROVIDING RELIABLE TERMINATION OF STRIPPED STRANDED OR SOLID CONDUCTORS AWG.12–18 SECURE WITH SCREWS AFTER MATING CONNECTOR.

CHANGES TO THIS DOCUMENT REQUIRE SAFETY AGENCY APPROVAL

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON–
INCHES ± .1
(MM) ± 2

CONTRACT NO.

DR H.J DATE 8/12/05
CHK DATE
ENG DATE
PROD DATE
APPD DATE

CERTIFIED
DATE

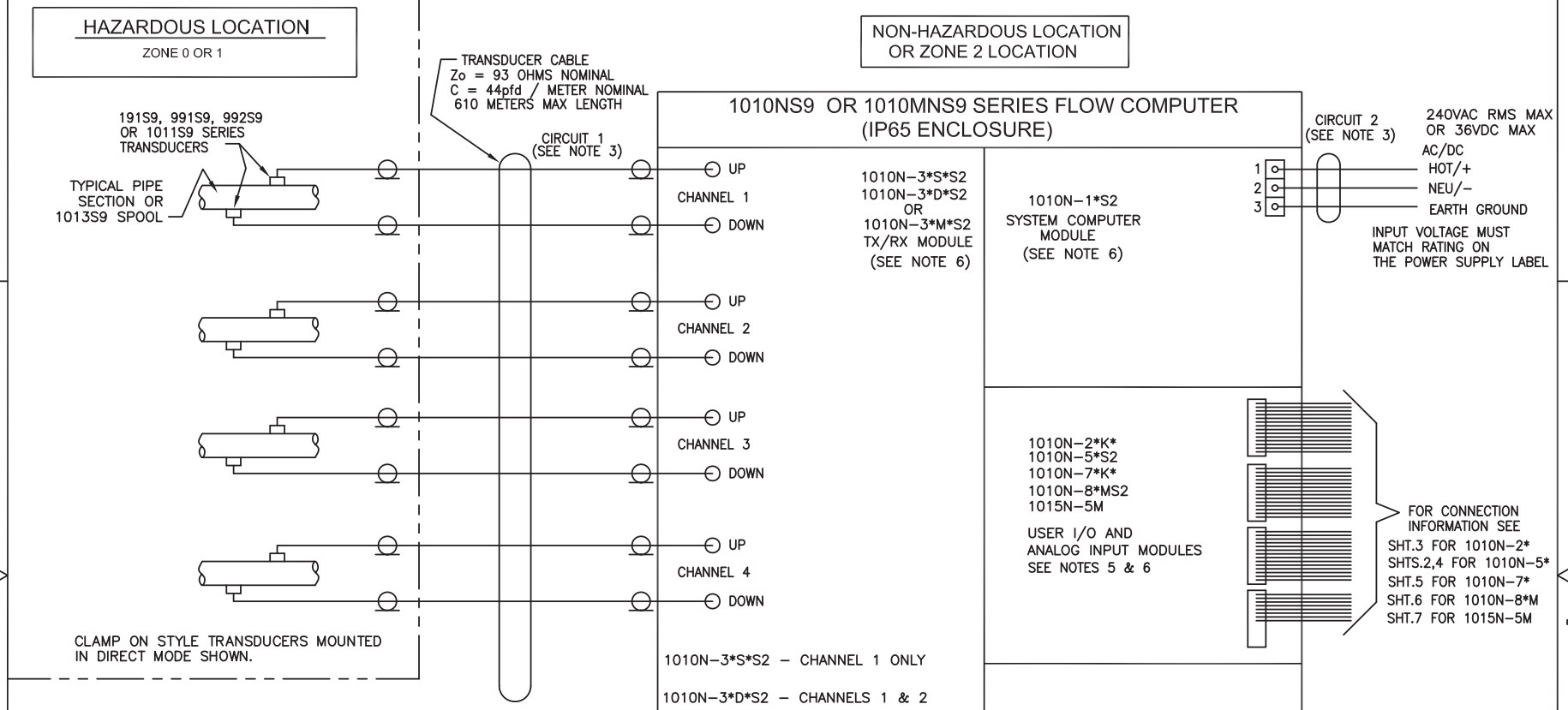
CONTROLOTRON
HAUPPAUGE , NY 11788

INSTALLATION DRAWING
1010 SERIES MULTI- CHANNEL FLOW COMPUTER, AGENCY APPROVED

SIZE	CODE IDENT NO.		REV.
C	21614	1010MNS9 - 7	A

SCALE: NONE | WT. | SHEET 1 OF 1

FILE No: 1010MNS9–7 rev.A
ER#1865



NOTES:

1. WARNING: SUBSTITUTION WITH UNSPECIFIED COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
1.1. MODEL –S9 TRANSDUCERS ARE RATED:
   II 1 G EEx ia IIC T5
1.2. MODEL 1010NS9 AND 1010MNS9 FLOW COMPUTERS ARE RATED:
   II (1) G [EEx ia] IIC or
   II 3 (1) G EEx nC [ia] IIC T5
2. USE 1010N MANUALS FOR OPERATION AND MAINTENANCE INSTRUCTIONS.
3. CIRCUITS 1, 2, AND 3 MUST BE IN SEPARATE CONDUIT.
4. ALL CASE CONDULET OPENINGS ARE TO USE WEATHER PROOF SEALS.
5. DATA/CONTROL SIGNAL CONNECTIONS ARE MADE ON 1015N–5M, 1010N–2*K*, 1010N–7*K* OR 1010N–8*MS2 MODULES. 1015N–5M IS ORDERED SEPARATELY, OTHER INCLUDED MODULES VARY WITH FLOW COMPUTER MODEL.
6. MODULE PART NUMBER SUFFIX (*) MAY VARY DEPENDING ON FLOW COMPUTER MODEL.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON–
FRACTIONS– +/– 1/16
DECIMALS– XX+/–0.01 XXX+/–0.005
ANGLES– +/–0°30'

MATERIAL:

FINISH:

CONTROLLED DRAWING
CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL

DR	H.J	DATE 3/30/05
CHK		DATE
ENG		DATE
PROD		DATE
APPD		DATE

CERTIFIED

DATE

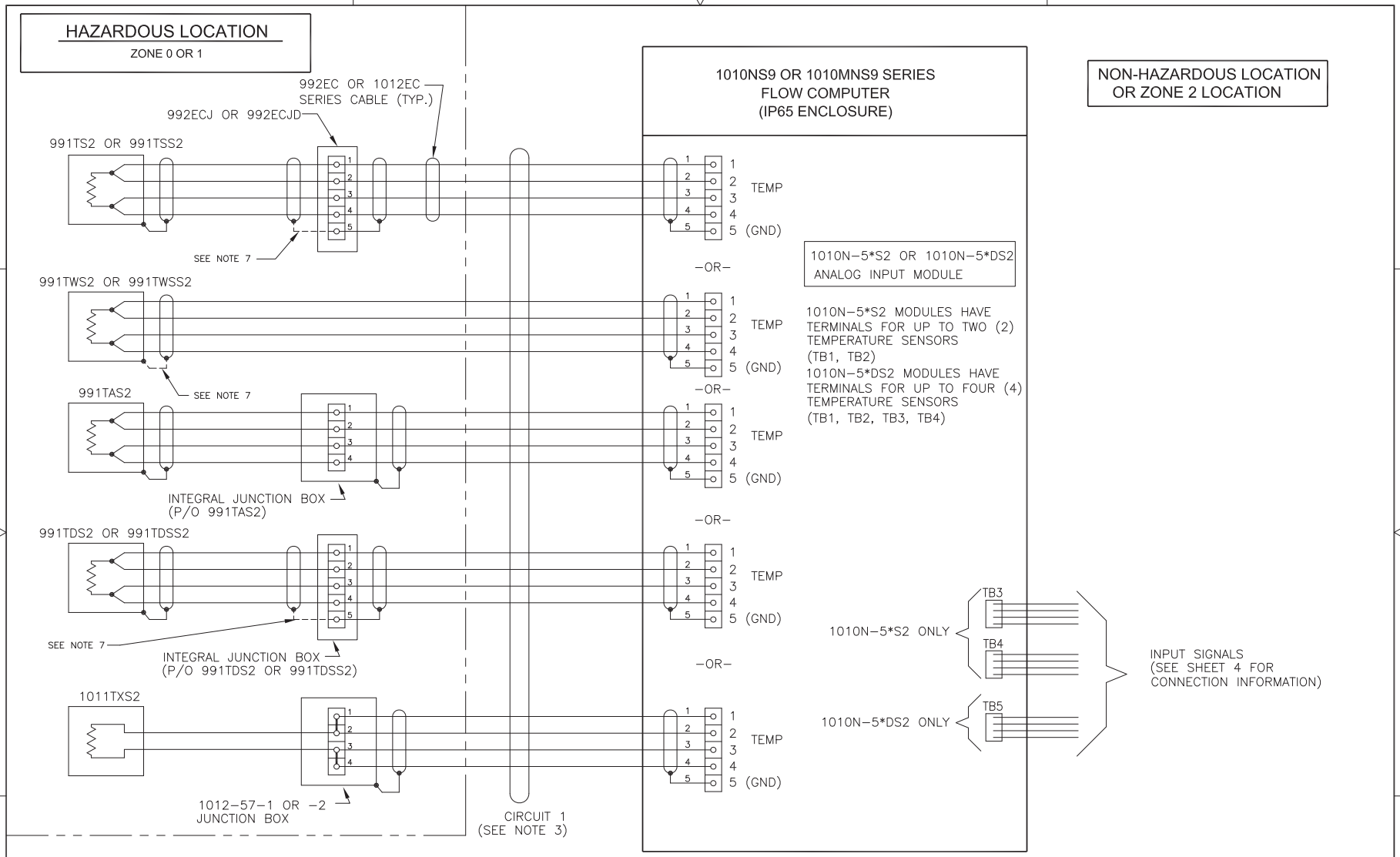
SIEMENS
Siemens Energy & Automation, Inc.
Process Instrumentation Business Unit
CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788

CONNECTION DIAGRAM
AGENCY APPROVED FOR HAZARDOUS AREA USE
1010NS9/1010MNS9 SERIES FLOW COMPUTER

SIZE	CODE IDENT NO.		REV.
C	21614	1010-389	05

SCALE: NONE | WT. | SHEET 1 OF 7

EC#79C13894



NOTES:

7. INDICATED SHIELD CONNECTIONS ARE OPTIONAL AND DO NOT AFFECT SAFETY.

DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON- FRACTIONS- DECIMALS- ANGLES- +/- 1/16 XX+/-0.01 +/-0°30' XXX+/-0.005 MATERIAL: FINISH:	CONTROLLED DRAWING CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL DR H.J DATE 3/30/05 CHK DATE ENG DATE PROD DATE APPD DATE CERTIFIED DATE	SIEMENS Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788 CONNECTION DIAGRAM AGENCY APPROVED FOR HAZARDOUS AREA USE 1010NS9/1010MNS9 SERIES FLOW COMPUTER SIZE C · CODE IDENT NO. 21614 · 1010-389 · REV. 05 SCALE: NONE · WT. · SHEET 2 OF 7

NON-HAZARDOUS LOCATION
OR ZONE 2 LOCATION

INSTRUMENTATION OPERATING AT OR LESS THAN 250VAC RMS OR DC

NO K1 A
NC K1 B
COM K1 C
GND
NO K2 A
NC K2 B
COM K2 C
NO K3 A
NC K3 B
COM K3 C
GND
NO K4 A
NC K4 B
COM K4 C

CIRCUIT 3
(SEE NOTE 3)

1010NS9 OR 1010MNS9 SERIES
FLOW COMPUTER
(IP65 ENCLOSURE)

1010N-2*K*
USER I/O MODULE, SEE SHEET 1
DOES NOT APPLY TO 1010N-2*M*

TB3
1 K1 A NO
2 K1 B NC
3 K1 C COM
4 GND
5 K2 A NO
6 K2 B NC
7 K2 C COM
8 K3 A NO
9 K3 B NC
10 K3 C COM
11 GND
12 K4 A NO
13 K4 B NC
14 K4 C COM

TB1
Tx 1
RTS 2
DTR 3
Rx 4
CTS 5
GND 6
D1+ 7
D1− 8
D2+ 9
D2− 10
D3+ 11
D3− 12
D4+ 13
D4− 14

TB2
Vo1+ 1
ref gnd Vo1− 2
Vo2+ 3
ref gnd Vo2− 4
CHASSIS GND 5
Io1+ 6
Io1− 7
Io2+ 8
Io2− 9
CHASSIS GND 10
PG 1 11
PG 2 12
PG 3 13
PG 4 14

CIRCUIT 3
(SEE NOTE 3)

SEE 1010N−2−7 FOR SPECIFIC
FUNTIONALITY OF
PG1 TO PG4 SIGNALS
D1 TO D4 CONTROLS

INSTRUMENTATION OPERATING AT OR LESS THAN 250VAC RMS OR DC

Tx
RTS
DTR
Rx
CTS
GND
D1+
D1−
D2+
D2−
D3+
D3−
D4+
D4−
Vo1+
Vo1−
Vo2+
Vo2−
Io1+
Io1−
Io2+
Io2−
PG 1
PG 2
PG 3
PG 4

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON−
FRACTIONS− DECIMALS− ANGLES−
+/− 1/16 XX+/−0.01 +/−0°30'
XXX+/−0.005

MATERIAL:

FINISH:

CONTROLLED DRAWING
CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL

DR H.J DATE 3/30/05
CHK DATE
ENG DATE
PROD DATE
APPD DATE

CERTIFIED

DATE

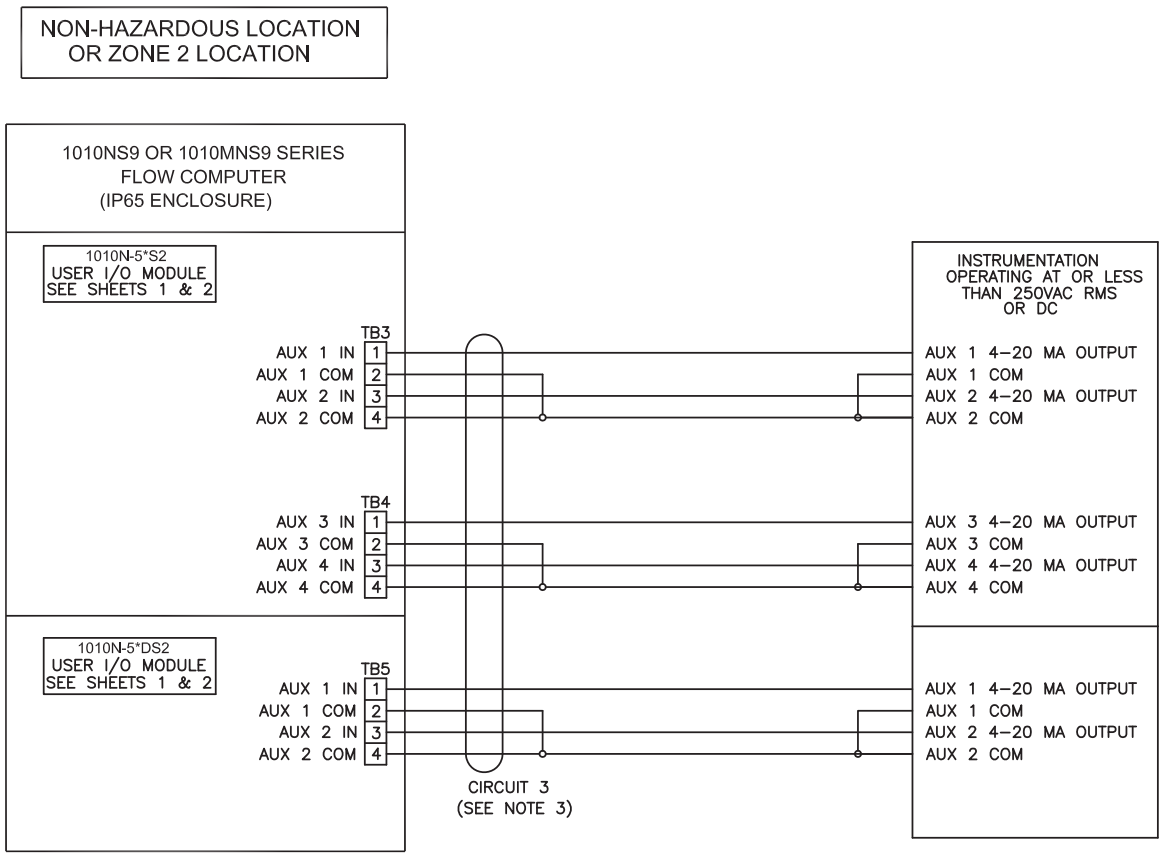
SIEMENS
Siemens Energy & Automation, Inc.
Process Instrumentation Business Unit
CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788

CONNECTION DIAGRAM

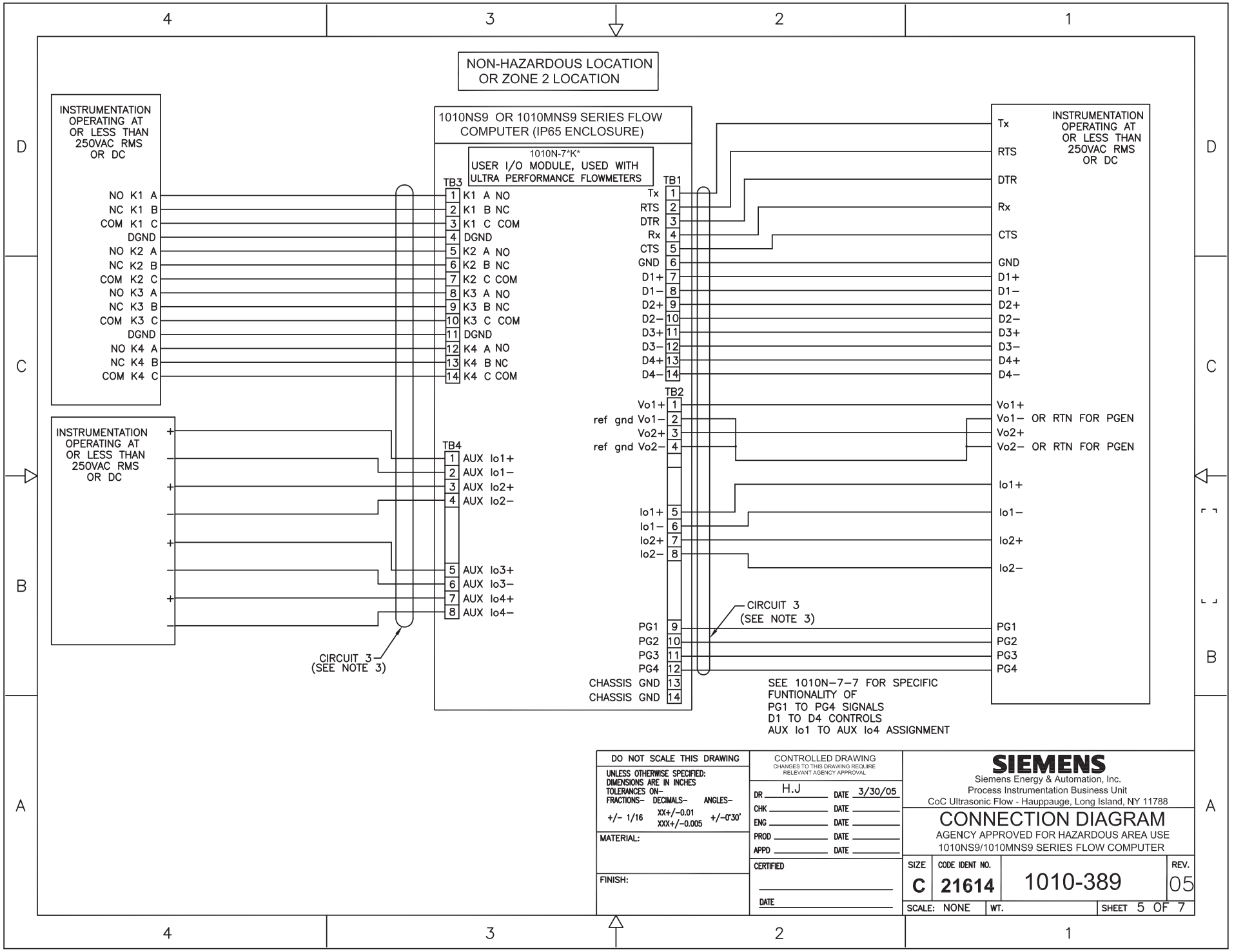
AGENCY APPROVED FOR HAZARDOUS AREA USE
1010NS9/1010MNS9 SERIES FLOW COMPUTER

SIZE	CODE IDENT NO.		REV.
C	21614	1010-389	05

SCALE: NONE WT. SHEET 3 OF 7



DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON– FRACTIONS– DECIMALS– ANGLES– +/– 1/16 XX+/–0.01 +/–0°30' XXX+/–0.005 MATERIAL: FINISH:	CONTROLLED DRAWING CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL DR H.J DATE 3/30/05 CHK DATE ENG DATE PROD DATE APPD DATE CERTIFIED DATE	**SIEMENS** Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788 CONNECTION DIAGRAM AGENCY APPROVED FOR HAZARDOUS AREA USE 1010NS9/1010MNS9 SERIES FLOW COMPUTER SIZE C · CODE IDENT NO. 21614 · 1010-389 · REV. 05 SCALE: NONE · WT. · SHEET 4 OF 7



DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON—
FRACTIONS— +/− 1/16
DECIMALS— XX+/−0.01 XXX+/−0.005
ANGLES— +/−0°30'

MATERIAL:

FINISH:

CONTROLLED DRAWING
CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL

DR	H.J	DATE 3/30/05
CHK		DATE
ENG		DATE
PROD		DATE
APPD		DATE

CERTIFIED

DATE

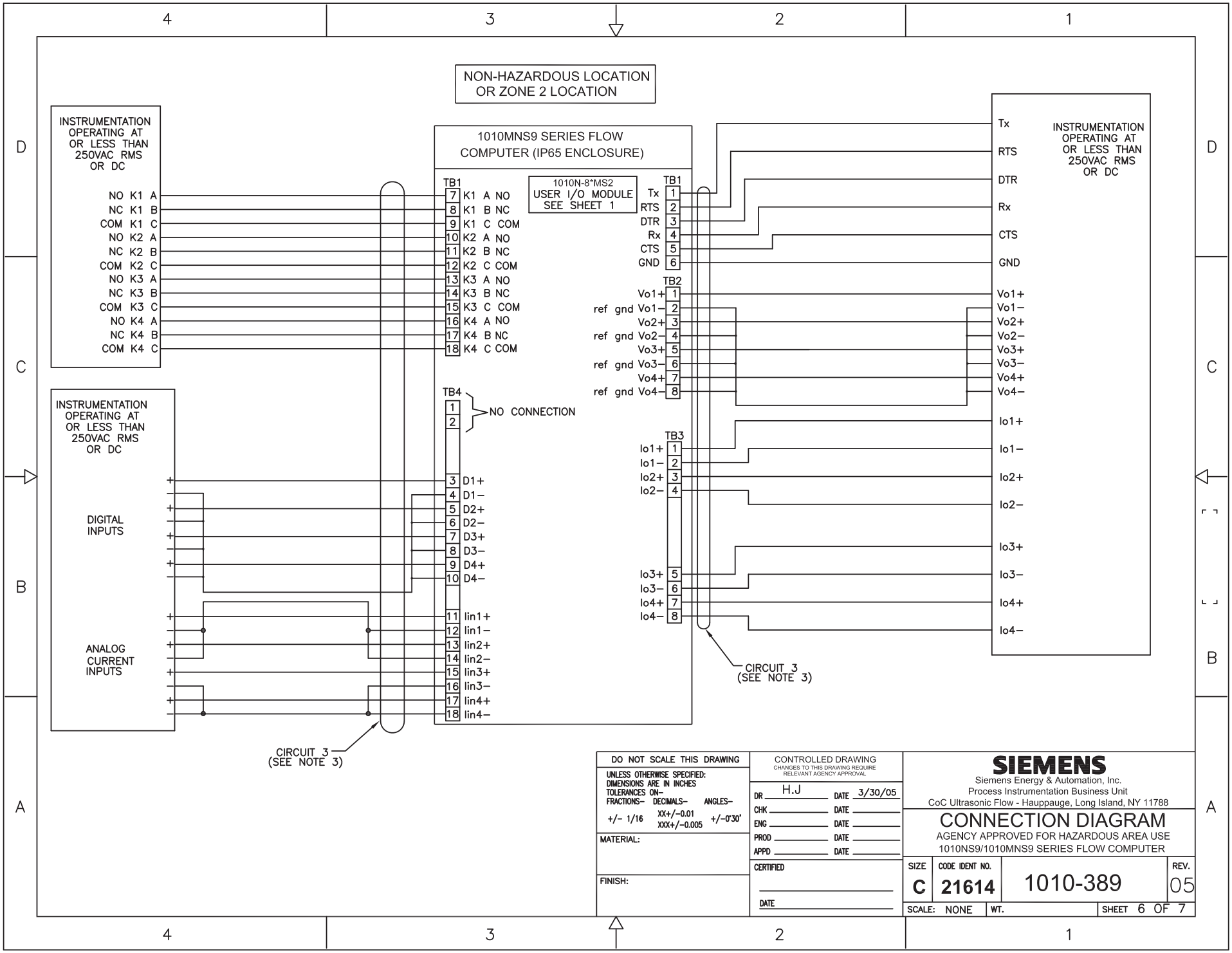
SIEMENS
Siemens Energy & Automation, Inc.
Process Instrumentation Business Unit
CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788

CONNECTION DIAGRAM

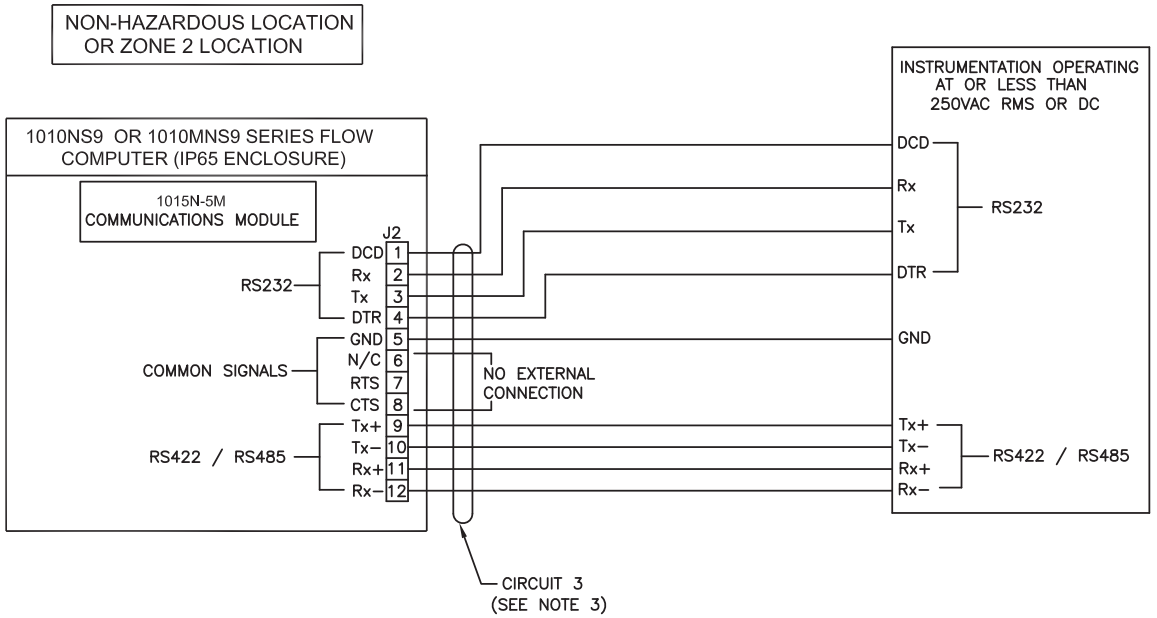
AGENCY APPROVED FOR HAZARDOUS AREA USE
1010NS9/1010MNS9 SERIES FLOW COMPUTER

SIZE	CODE IDENT NO.		REV.
C	21614	1010-389	05

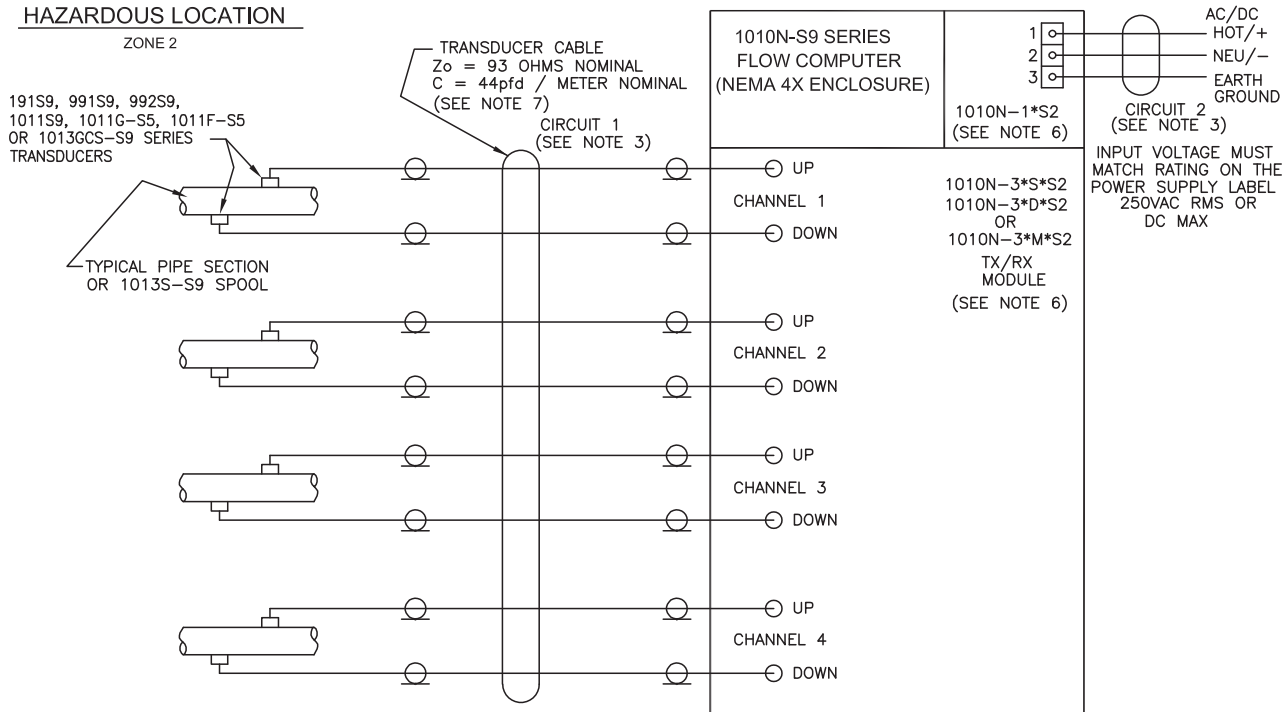
SCALE: NONE | WT. | SHEET 5 OF 7



DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON– FRACTIONS– DECIMALS– ANGLES– +/– 1/16 XX+/–0.01 +/–0°30' XXX+/–0.005 MATERIAL: FINISH:	CONTROLLED DRAWING CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL DR H.J DATE 3/30/05 CHK DATE ENG DATE PROD DATE APPD DATE CERTIFIED DATE	**SIEMENS** Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788 CONNECTION DIAGRAM AGENCY APPROVED FOR HAZARDOUS AREA USE 1010NS9/1010MNS9 SERIES FLOW COMPUTER	SIZE C CODE IDENT NO. 21614 1010-389 REV. 05 SCALE: NONE WT. SHEET 6 OF 7



DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON– FRACTIONS– DECIMALS– ANGLES– +/– 1/16 XX+/–0.01 +/–0°30' XXX+/–0.005 MATERIAL: FINISH:	CONTROLLED DRAWING CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL DR H.J DATE 3/30/05 CHK DATE ENG DATE PROD DATE APPD DATE CERTIFIED DATE	**SIEMENS** Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788 CONNECTION DIAGRAM AGENCY APPROVED FOR HAZARDOUS AREA USE 1010NS9/1010MNS9 SERIES FLOW COMPUTER SIZE C · CODE IDENT NO. 21614 · 1010-389 · REV. 05 SCALE: NONE · WT. · SHEET 7 OF 7



CHANGES TO THIS DOCUMENT REQUIRE SAFETY AGENCY APPROVAL

NOTES:

1. WARNING: SUBSTITUTION WITH UNSPECIFIED COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
2. USE 1010N MANUALS FOR OPERATION AND MAINTENANCE INSTRUCTIONS.
3. CIRCUITS 1, 2, AND 3 MUST BE IN SEPARATE CONDUIT.
4. ALL CASE CONDULET OPENINGS ARE TO USE DUST TIGHT OR EXPLOSION PROOF SEALS.
5. DATA/CONTROL SIGNAL CONNECTIONS ARE MADE ON 1015N-5M, 1010N-2*, 1010N-7* OR 1010N-8* MODULES. 1015N-5M IS ORDERED SEPARATELY, OTHER INCLUDED MODULES VARY WITH FLOW COMPUTER MODEL.
6. MODULE PART NUMBER SUFFIX (*) MAY VARY DEPENDING ON FLOW COMPUTER MODEL.
7. CABLE LENGTHS GREATER THAN 300 FEET REQUIRE CONTROLOTRON APPROVAL.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-
FRACTIONS- DECIMALS- ANGLES-
+/- 1/16 XX+/-0.01 +/-0°30'
XXX+/-0.005

MATERIAL:

FINISH:

CONTRACT NO.

DR	H.J	DATE 3/29/04
CHK		DATE
ENG		DATE
PROD		DATE
APPD		DATE

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

CONNECTION DIAGRAM

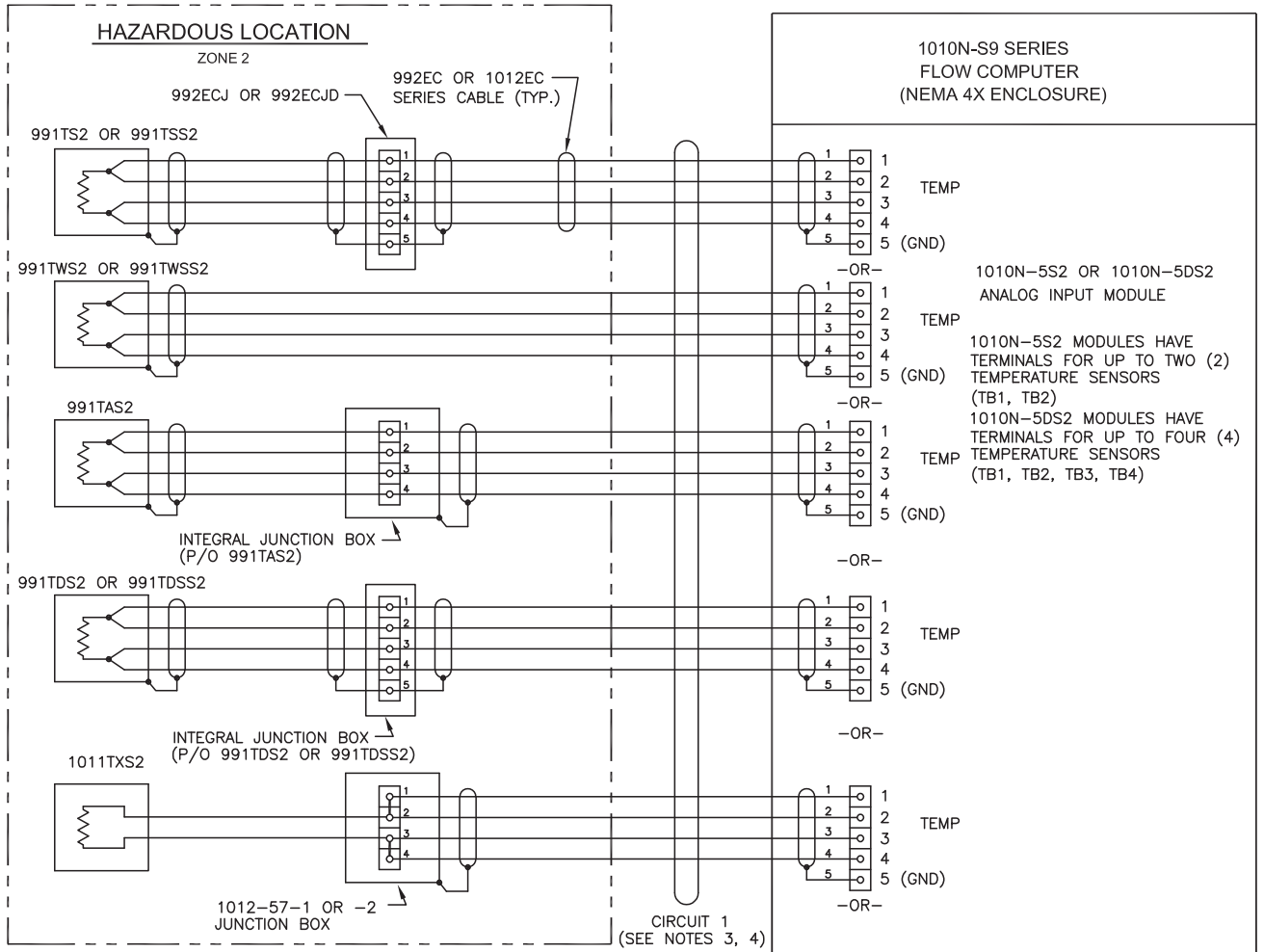
AGENCY APPROVED FOR ZONE 2 CONNECTIONS

1010NS9 FLOW COMPUTER SYSTEM

SIZE	CODE IDENT NO.		REV.
C	21614	1010-391	C

SCALE: NONE | WT. | SHEET 1 OF 4

CN#4824



CHANGES TO THIS DOCUMENT REQUIRE SAFETY AGENCY APPROVAL

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-
FRACTIONS- +/- 0.015
DECIMALS- XX+/-0.01 XXX+/-0.005
ANGLES- +/-0°30'

CONTRACT NO.

DR	H.J	DATE 3/29/04
CHK		DATE
ENG		DATE
PROD		DATE
APPD		DATE

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

CONNECTION DIAGRAM

AGENCY APPROVED FOR ZONE 2 CONNECTIONS

1010NS9 FLOW COMPUTER SYSTEM

SIZE	CODE IDENT NO.		REV.
C	21614	1010-391	C

SCALE: NONE | WT. | SHEET 2 OF 4

CN#4824

NORMAL SIGNAL CHARACTERISTICS (SEE NOTES 5 & 6)				
MODULE	LOCATION	FUNCTION	NORMAL VOLTAGE	CURRENT
1010N-2, 1010N-2K2 OR 1010N-2K3	TB1–1	Tx	to ±12 Vdc	4 mA
	TB1–2	RTS	to ±12 Vdc	4 mA
	TB1–3	DTR	to ±12 Vdc	4 mA
	TB1–4	Rx	to ±12 Vdc	4 mA
	TB1–5	CTS	to ±12 Vdc	4 mA
	TB1–6	GND	0 Vdc	20 mA
	TB1–7	D1+	0 to 5 Vdc	5 mA
	TB1–8	D1–	0 Vdc	5 mA
	TB1–9	D2+	0 to 5 Vdc	5 mA
	TB1–10	D2–	0 Vdc	5 mA
	TB1–11	D3+	0 to 5 Vdc	5 mA
	TB1–12	D3–	0 Vdc	5 mA
	TB1–13	D4+	0 to 5 Vdc	5 mA
	TB1–14	D4–	0 Vdc	5 mA
	TB2–1	Vo1+	0 – 10 Vdc	1 mA
	TB2–2	Vo1–	0 Vdc	1 mA
	TB2–3	Vo2+	0 – 10 Vdc	1 mA
	TB2–4	Vo2–	0 Vdc	1 mA
	TB2–5	NO CONNECTION	——	——
	TB2–6	Io1+	0 – 33 Vdc	4 – 20 mA
	TB2–7	Io1–	0 Vdc	4 – 20 mA
	TB2–8	Io2+	0 – 33 Vdc	4 – 20 mA
	TB2–9	Io2–	0 Vdc	4 – 20 mA
	TB2–10	NO CONNECTION	——	——
	TB2–11	PGEN 1+	0 to 5 Vdc	4 mA
	TB2–12	PGEN 1–	0 Vdc	4 mA
	TB2–13	PGEN 2+	0 to 5 Vdc	4 mA
	TB2–14	PGEN 2–	0 Vdc	4 mA
	TB3–1	K1 NO	0 – 50 Vdc	250 mA
	TB3–2	K1 NC	0 – 50 Vdc	250 mA
	TB3–3	K1 COM	0 – 50 Vdc	250 mA
	TB3–4	NO CONNECTION	——	——
	TB3–5	K2 NO	0 – 50 Vdc	250 mA
	TB3–6	K2 NC	0 – 50 Vdc	250 mA
	TB3–7	K2 COM	0 – 50 Vdc	250 mA
	TB3–8	K3 NO	0 – 50 Vdc	250 mA
	TB3–9	K3 NC	0 – 50 Vdc	250 mA
	TB3–10	K3 COM	0 – 50 Vdc	250 mA
	TB3–11	NO CONNECTION	——	——
	TB3–12	K4 NO	0 – 50 Vdc	250 mA
	TB3–13	K4 NC	0 – 50 Vdc	250 mA
	TB3–14	K4 COM	0 – 50 Vdc	250 mA

NORMAL SIGNAL CHARACTERISTICS (SEE NOTE 6)				
MODULE	LOCATION	FUNCTION	NORMAL VOLTAGE	CURRENT
1010N-5S2	TB3–1	I in 1	15 Vdc Max	4 – 20 mA
	TB3–2	I in 1 COMMON	——	4 – 20 mA
	TB3–3	I in 2	15 Vdc Max	4 – 20 mA
	TB3–4	I iN 2 COMMON	——	4 – 20 mA
	TB4–1	I in 3	15 Vdc Max	4 – 20 mA
	TB4–2	I in 3 COMMON	——	4 – 20 mA
	TB4–3	I in 4	15 Vdc Max	4 – 20 mA
	TB4–4	I iN 4 COMMON	——	4 – 20 mA
1010N-5DS2	TB5–1	I in 1	15 Vdc Max	4 – 20 mA
	TB5–2	I in 1 COMMON	——	4 – 20 mA
	TB5–3	I in 2	15 Vdc Max	4 – 20 mA
	TB5–4	I iN 2 COMMON	——	4 – 20 mA

NORMAL SIGNAL CHARACTERISTICS (SEE NOTES 5 & 6)				
MODULE	LOCATION	FUNCTION	NORMAL VOLTAGE	CURRENT
1010N-8MS2	TB1–1	Tx	to ±12 Vdc	4 mA
	TB1–2	RTS	to ±12 Vdc	4 mA
	TB1–3	DTR	to ±12 Vdc	4 mA
	TB1–4	Rx	to ±12 Vdc	4 mA
	TB1–5	CTS	to ±12 Vdc	4 mA
	TB1–6	GND	0 Vdc	20 mA
	TB1–7	K1 NO	0 – 50 Vdc	250 mA
	TB1–8	K1 NC	0 – 50 Vdc	250 mA
	TB1–9	K1 COM	0 – 50 Vdc	250 mA
	TB1–10	K2 NO	0 – 50 Vdc	250 mA
	TB1–11	K2 NC	0 – 50 Vdc	250 mA
	TB1–12	K2 COM	0 – 50 Vdc	250 mA
	TB1–13	K3 NO	0 – 50 Vdc	250 mA
	TB1–14	K3 NC	0 – 50 Vdc	250 mA
	TB1–15	K3 COM	0 – 50 Vdc	250 mA
	TB1–16	K4 NO	0 – 50 Vdc	250 mA
	TB1–17	K4 NC	0 – 50 Vdc	250 mA
	TB1–18	K4 COM	0 – 50 Vdc	250 mA
	TB2–1	Vo1+	0 – 10 Vdc	1 mA
	TB2–2	Vo1–	0 Vdc	1 mA
	TB2–3	Vo2+	0 – 10 Vdc	1 mA
	TB2–4	Vo2–	0 Vdc	1 mA
	TB2–5	Vo3+	0 – 10 Vdc	1 mA
	TB2–6	Vo3–	0 Vdc	1 mA
	TB2–7	Vo4+	0 – 10 Vdc	1 mA
	TB2–8	Vo4–	0 Vdc	1 mA
	TB3–1	Io1+	33 Vdc	4 – 20 mA
	TB3–2	Io1–	0 – 33 Vdc	4 – 20 mA
	TB3–3	Io2+	33 Vdc	4 – 20 mA
	TB3–4	Io2–	0 – 33 Vdc	4 – 20 mA
	TB3–5	Io3+	33 Vdc	4 – 20 mA
	TB3–6	Io3–	0 – 33 Vdc	4 – 20 mA
	TB3–7	Io4+	33 Vdc	4 – 20 mA
	TB3–8	Io4–	0 – 33 Vdc	4 – 20 mA
	TB4–1	NO CONNECTION	——	——
	TB4–2	NO CONNECTION	——	——
	TB4–3	D1+	0 to 5 Vdc	5 mA
	TB4–4	D1–	0 Vdc	5 mA
	TB4–5	D2+	0 to 5 Vdc	5 mA
	TB4–6	D2–	0 Vdc	5 mA
	TB4–7	D3+	0 to 5 Vdc	5 mA
	TB4–8	D3–	0 Vdc	5 mA
	TB4–9	D4+	0 to 5 Vdc	5 mA
	TB4–10	D4–	0 Vdc	5 mA
	TB4–11	Iin1+	0 – 15 Vdc	4 – 20 mA
	TB4–12	Iin1–	0 Vdc	4 – 20 mA
	TB4–13	Iin2+	0 – 15 Vdc	4 – 20 mA
	TB4–14	Iin2–	0 Vdc	4 – 20 mA
	TB4–15	Iin3+	0 – 15 Vdc	4 – 20 mA
	TB4–16	Iin3–	0 Vdc	4 – 20 mA
	TB4–17	Iin4+	0 – 15 Vdc	4 – 20 mA
	TB4–18	Iin4–	0 Vdc	4 – 20 mA

CHANGES TO THIS DOCUMENT REQUIRE SAFETY AGENCY APPROVAL

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON–
FRACTIONS– +/– 1/16
DECIMALS– XX+/–0.01 XXX+/–0.005
ANGLES– +/–0°30'

MATERIAL:

FINISH:

CONTRACT NO.

DR H.J DATE 3/29/04
CHK DATE
ENG DATE
PROD DATE
APPD DATE

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

CONNECTION DIAGRAM

AGENCY APPROVED FOR ZONE 2 CONNECTIONS

1010NS9 FLOW COMPUTER SYSTEM

SIZE	CODE IDENT NO.		REV.
C	21614	1010-391	C

SCALE: NONE | WT. | SHEET 3 OF 4

CN#4824

NORMAL SIGNAL CHARACTERISTICS (SEE NOTES 5 & 6)				
MODULE	LOCATION	FUNCTION	NORMAL VOLTAGE	CURRENT
1010N-7, 1010N-7K2 OR 1010N-7K3 USED IN STANDARD, HIGH-PERFORMANCE, OR ENHANCED-PERFORMANCE FLOWMETERS	TB1–1	Tx	to ±12 Vdc	4 mA
	TB1–2	RTS	to ±12 Vdc	4 mA
	TB1–3	DTR	to ±12 Vdc	4 mA
	TB1–4	Rx	to ±12 Vdc	4 mA
	TB1–5	CTS	to ±12 Vdc	4 mA
	TB1–6	GND	0 Vdc	20 mA
	TB1–7	D1+	0 to 5 Vdc	5 mA
	TB1–8	D1–	0 Vdc	5 mA
	TB1–9	D2+	0 to 5 Vdc	5 mA
	TB1–10	D2–	0 Vdc	5 mA
	TB1–11	D3+	0 to 5 Vdc	5 mA
	TB1–12	D3–	0 Vdc	5 mA
	TB1–13	D4+	0 to 5 Vdc	5 mA
	TB1–14	D4–	0 Vdc	5 mA
	TB2–1	Vo1+	0 – 10 Vdc	1 mA
	TB2–2	Vo1–	0 Vdc	1 mA
	TB2–3	Vo2+	0 – 10 Vdc	1 mA
	TB2–4	Vo2–	0 Vdc	1 mA
	TB2–5	Io1+	0 – 33 Vdc	4 – 20 mA
	TB2–6	Io1–	0 Vdc	4 – 20 mA
	TB2–7	Io2+	0 – 33 Vdc	4 – 20 mA
	TB2–8	Io2–	0 Vdc	4 – 20 mA
	TB2–9	PG1	0 to 5 Vdc	4 mA
	TB2–10	PG2	0 Vdc	4 mA
	TB2–11	PG3	0 to 5 Vdc	4 mA
	TB2–12	PG4	0 Vdc	4 mA
	TB3–1	K1 NO	0 – 50 Vdc	250 mA
	TB3–2	K1 NC	0 – 50 Vdc	250 mA
	TB3–3	K1 COM	0 – 50 Vdc	250 mA
	TB3–4	NO CONNECTION	——	——
	TB3–5	K2 NO	0 – 50 Vdc	250 mA
	TB3–6	K2 NC	0 – 50 Vdc	250 mA
	TB3–7	K2 COM	0 – 50 Vdc	250 mA
	TB3–8	K3 NO	0 – 50 Vdc	250 mA
	TB3–9	K3 NC	0 – 50 Vdc	250 mA
	TB3–10	K3 COM	0 – 50 Vdc	250 mA
	TB3–11	NO CONNECTION	——	——
	TB3–12	K4 NO	0 – 50 Vdc	250 mA
	TB3–13	K4 NC	0 – 50 Vdc	250 mA
	TB3–14	K4 COM	0 – 50 Vdc	250 mA
	TB4–1	AUX IO1+	30 Vdc Max.	4 – 20 mA
	TB4–2	AUX IO1–	30 Vdc Max.	4 – 20 mA
	TB4–3	AUX IO2+	30 Vdc Max.	4 – 20 mA
	TB4–4	AUX IO2–	30 Vdc Max.	4 – 20 mA
	TB4–5	AUX IO3+	30 Vdc Max.	4 – 20 mA
	TB4–6	AUX IO3–	30 Vdc Max.	4 – 20 mA
	TB4–7	AUX IO4+	30 Vdc Max.	4 – 20 mA
	TB4–8	AUX IO4–	30 Vdc Max.	4 – 20 mA

NORMAL SIGNAL CHARACTERISTICS (SEE NOTES 5 & 6)				
MODULE	LOCATION	FUNCTION	NORMAL VOLTAGE	CURRENT
1010N-7, 1010N-7K2 OR 1010N-7K3 USED IN ULTRA PERFORMANCE FLOWMETERS	TB1–1	Tx	to ±12 Vdc	4 mA
	TB1–2	RTS	to ±12 Vdc	4 mA
	TB1–3	DTR	to ±12 Vdc	4 mA
	TB1–4	Rx	to ±12 Vdc	4 mA
	TB1–5	CTS	to ±12 Vdc	4 mA
	TB1–6	GND	0 Vdc	20 mA
	TB1–7	D1+	0 to 5 Vdc	5 mA
	TB1–8	D1–	0 Vdc	5 mA
	TB1–9	NO CONNECTION		
	TB1–10	NO CONNECTION		
	TB1–11	NO CONNECTION		
	TB1–12	NO CONNECTION		
	TB1–13	NO CONNECTION		
	TB1–14	NO CONNECTION		
	TB2–1	Vo1+	0 – 10 Vdc	1 mA
	TB2–2	Vo1–	0 Vdc	1 mA
	TB2–3	Vo2+	0 – 10 Vdc	1 mA
	TB2–4	Vo2–	0 Vdc	1 mA
	TB2–5	Io1+	0 – 33 Vdc	4 – 20 mA
	TB2–6	Io1–	0 Vdc	4 – 20 mA
	TB2–7	Io2+	0 – 33 Vdc	4 – 20 mA
	TB2–8	Io2–	0 Vdc	4 – 20 mA
	TB2–9	PG1	0 to 28 Vdc	5 mA
	TB2–10	PG2	0 to 5 Vdc	4 mA
	TB2–11	PG3	0 to 28 Vdc	5 mA
	TB2–12	PG4	0 to 5 Vdc	4 mA
	TB2–13	NO CONNECTION	——	——
	TB2–14	NO CONNECTION	——	——
	TB3–1	K1 NO	0 – 50 Vdc	250 mA
	TB3–2	K1 NC	0 – 50 Vdc	250 mA
	TB3–3	K1 COM	0 – 50 Vdc	250 mA
	TB3–4	NO CONNECTION	——	——
	TB3–5	K2 NO	0 – 50 Vdc	250 mA
	TB3–6	K2 NC	0 – 50 Vdc	250 mA
	TB3–7	K2 COM	0 – 50 Vdc	250 mA
	TB3–8	K3 NO	0 – 50 Vdc	250 mA
	TB3–9	K3 NC	0 – 50 Vdc	250 mA
	TB3–10	K3 COM	0 – 50 Vdc	250 mA
	TB3–11	NO CONNECTION	——	——
	TB3–12	K4 NO	0 – 50 Vdc	250 mA
	TB3–13	K4 NC	0 – 50 Vdc	250 mA
	TB3–14	K4 COM	0 – 50 Vdc	250 mA
	TB4–1	NO CONNECTION		
	TB4–2	NO CONNECTION		
	TB4–3	NO CONNECTION		
	TB4–4	NO CONNECTION		
	TB4–5	AUX IO3+	30 Vdc Max.	4 – 20 mA
	TB4–6	AUX IO3–	30 Vdc Max.	4 – 20 mA
	TB4–7	AUX IO4+	30 Vdc Max.	4 – 20 mA
	TB4–8	AUX IO4–	30 Vdc Max.	4 – 20 mA

NORMAL SIGNAL CHARACTERISTICS (SEE NOTE 5)				
MODULE	LOCATION	FUNCTION	NORMAL VOLTAGE	CURRENT
1015N-5M	J2–1	DCD	to ±12 Vdc	22 mA
	J2–2	RX	to ±12 Vdc	22 mA
	J2–3	TX	to ±12 Vdc	22 mA
	J2–4	DTR	to ±12 Vdc	22 mA
	J2–5	GND	0 Vdc	75 mA
	J2–6	N/C		
	J2–7	RTS	to ±12 Vdc	22 mA
	J2–8	CTS	to ±12 Vdc	22 mA
	J2–9	TX+	0 to 5 Vdc	25 mA
	J2–10	TX–	0 to 5 Vdc	25 mA
	J2–11	RX+	0 to 5 Vdc	25 mA
	J2–12	RX–	0 to 5 Vdc	25 mA

CHANGES TO THIS DOCUMENT REQUIRE SAFETY AGENCY APPROVAL

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON–
FRACTIONS– +/– 1/16
DECIMALS– XX+/–0.01 XXX+/–0.005
ANGLES– +/–0°30'

MATERIAL:

FINISH:

CONTRACT NO.

DR H.J DATE 3/29/04
CHK DATE
ENG DATE
PROD DATE
APPD DATE

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

CONNECTION DIAGRAM

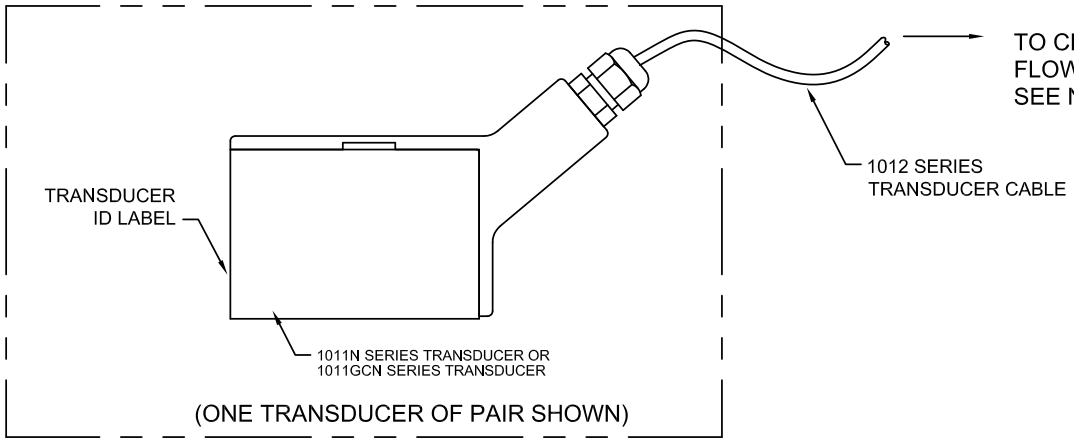
AGENCY APPROVED FOR ZONE 2 CONNECTIONS

1010NS9 FLOW COMPUTER SYSTEM

SIZE	CODE IDENT NO.		REV.
C	21614	1010-391	C

SCALE: NONE | WT. | SHEET 4 OF 4

CN#4824

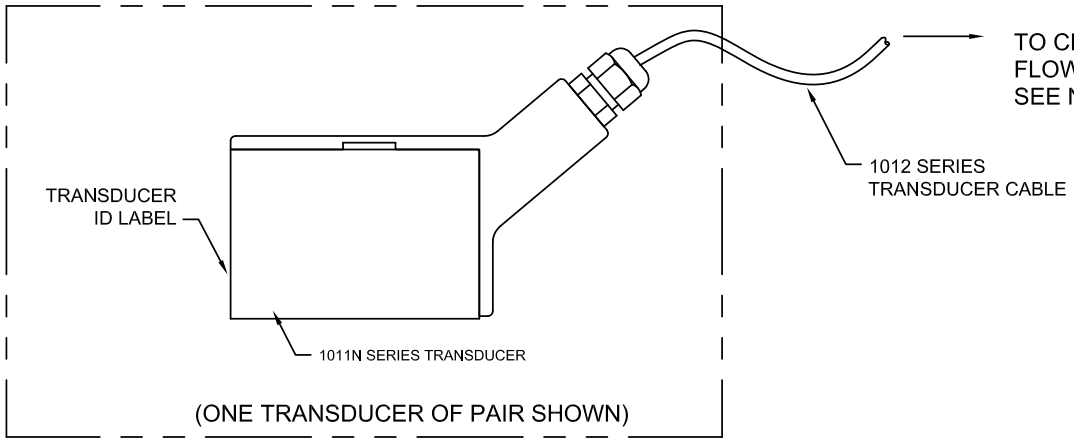


1. INSTALL ONE OF THNE FOLLOWING TRANSDUCER
   P/N 1011N(MODEL CODES)-(SIZE)-S2
   P/N 1011GCN(MODEL CODES)-(SIZE)-S2
   IN ACCORDANCE WITH THE FOLLOWING DRAWINGS:
   a. FOR USE WITH 994 SERIES AGENCY APPROVED FLOW COMPUTERS-
      INTRINSICALLY SAFE FOR CLASS I, II, DIVISION 1, GROUPS A - G, PER DRAWING 990-104 OR 990-105
      NON-INCENDIVE FOR CLASS I, DIVISION 2, GROUPS A - D, SUITABLE FOR CLASS II, DIVISION 2, GPS F, G
      PER DRAWING 990-110 OR 990-111.
   b. FOR USE WITH 1010 SERIES AGENCY APPROVED FLOW COMPUTERS-
      INTRINSICALLY SAFE FOR CLASS I, II, DIVISION 1, GROUPS A - G, PER DRAWING 1010-304, 1010-341 OR 1010-443
      NON-INCENDIVE FOR CLASS I, DIVISION 2, GROUPS A - D, SUITABLE FOR CLASS II, DIVISION 2, GPS E, F, G
      PER DRAWING 1010-304, 1010-339, 1010-342 OR 1010-443.
2. SEE DRAWING 1011NPS-7 AND APPROPRIATE FLOW COMPUTER FIELD MANUAL
   FOR ADDITIONAL INSTALLATION INSTRUCTIONS.
3. SEE DRAWING 1011NPS-8 FOR OUTLINE INSTALLATION DIMENSIONS
4. WARNING: SUBSTITUTION WITH UNSPECIFIED COMPONENTS MAY
   IMPAIR INTRINSIC SAFETY.

CHANGES TO THIS DOCUMENT
REQUIRE SAFETY AGENCY APPROVAL

DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON– INCHES +/–.01 (MM) +/– 2	CONTRACT NO. DR H.J DATE 11/04/04 CHK DATE ENG DATE PROD DATE APPD DATE CERTIFIED DATE	SIEMENS Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788 INSTALLATION GUIDE, CONNECTION DIAGRAM SELECTION AGENCY APPROVED 1011N SERIES TRANSDUCERS SIZE A · CODE IDENT NO. 21614 · 1011NS2-7 · REV. D SCALE: · WT. · SHEET 1 of 1

CN#5160



1. INSTALL TRANSDUCER P/N 1011NFPS-(SIZE)-S9 (OR P/N 1011NPS-(SIZE)-S9) IN ACCORDANCE WITH THE FOLLOWING DRAWINGS:
   a. FOR USE WITH 1010 SERIES AGENCY APPROVED FLOW COMPUTERS- INTRINSICALLY SAFE EEx ia IIC T5 PER DRAWING 1010-389, 1010-422 OR 1010-464.
   b. NON-INCENDIVE FOR ZONE 2 PER DRAWING 1010-389, 1010-391, 1010-423 OR 1010-464.
2. SEE DRAWING 1011NPS-7 OR 1011NFPS-7 AND APPROPRIATE FLOW COMPUTER FIELD MANUAL FOR ADDITIONAL INSTALLATION INSTRUCTIONS.
3. SEE DRAWING 1011NPS-8 OR 1011NFPS-8 FOR OUTLINE INSTALLATION DIMENSIONS.
4. WARNING: SUBSTITUTION WITH UNSPECIFIED COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

CHANGES TO THIS DOCUMENT
REQUIRE SAFETY AGENCY APPROVAL

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON–
INCHES +/–.01
(MM) +/– 2

CONTRACT NO.

DR H.J DATE 11/04/04
CHK DATE
ENG DATE
PROD DATE
APPD DATE

CERTIFIED
DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

INSTALLATION GUIDE, CONNECTION DIAGRAM SELECTION

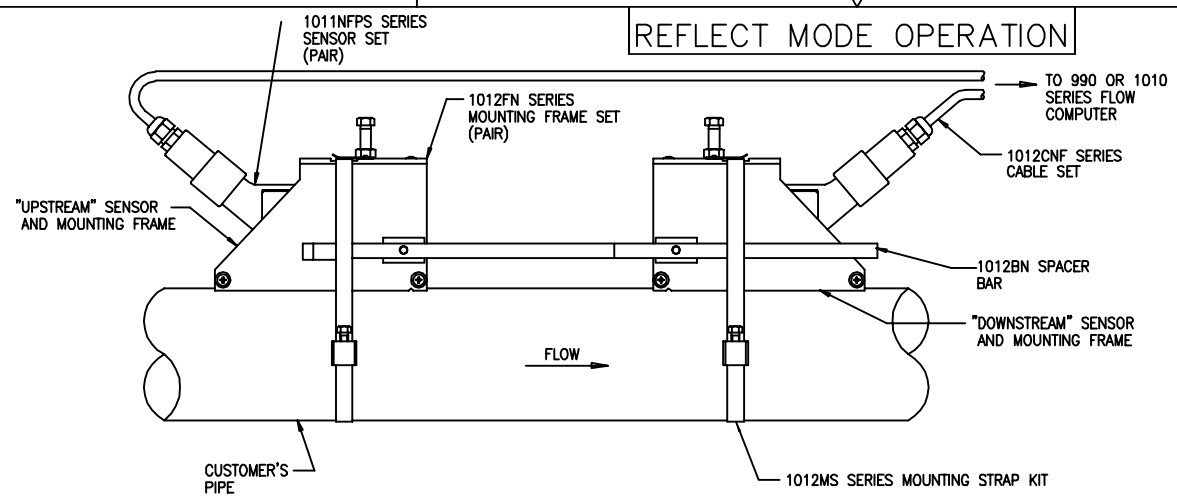
AGENCY APPROVED 1011N SERIES TRANSDUCERS

SIZE	CODE IDENT NO.		REV.
A	21614	1011NS9-7	C1

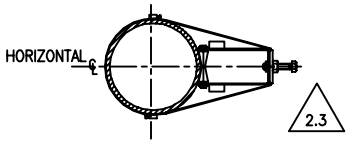
SCALE: | WT. | SHEET 1 of 1

CN#4931

REFLECT MODE OPERATION



PREFERRED MOUNTING PLANE

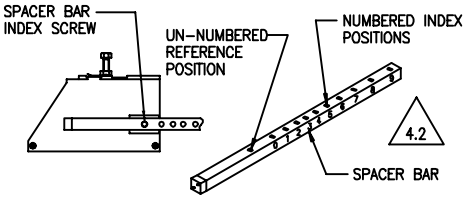


MOUNT SENSORS/MOUNTING FRAMES IN HORIZONTAL PLANE TO PREVENT BLOCKING OF ULTRASONIC BEAM BY AIR OR SEDIMENT.

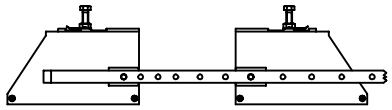
USING THE SPACER BAR TO SET SENSOR MOUNTING FRAME SPACING

USING THE INSTALLATION MENU, AS OUTLINED IN THE FLOW COMPUTER FIELD MANUAL, DETERMINE THE SPACING INDEX NUMBER FOR THE SELECTED APPLICATION.

USE THE SPACER BAR INDEX SCREW TO SECURE THE SPACER BAR TO ONE OF THE MOUNTING FRAMES AT THE UN-NUMBERED REFERENCE POSITION.

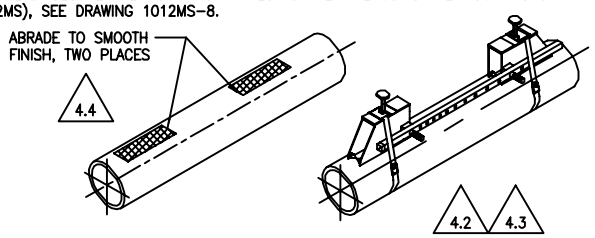


SECURE THE SECOND MOUNTING FRAME TO THE SPACER BAR AT THE NUMBERED INDEX POSITION DETERMINED FROM THE INSTALLATION MENU.



SECURING MOUNTING FRAMES TO THE PIPE SURFACE

HOLD THE MOUNTING FRAME/SPACER BAR ASSEMBLY AGAINST THE PIPE AT THE SELECTED MOUNTING LOCATION. MARK THE APPROXIMATE OUTLINE OF THE MOUNTING FRAMES ON THE PIPE SURFACE. USING THE ABRASIVE PAD SUPPLIED, SMOOTH THE PIPE SURFACE IN THE MARKED AREAS. SECURE THE MOUNTING FRAMES TO THE PIPE USING THE MOUNTING STRAP KIT (1012MS), SEE DRAWING 1012MS-8.



INSTALLATION NOTES – SEE DRAWING REFERENCE

1. USING THE INSTALLATION MENU AND THE PROCEDURE OUTLINED IN THE FLOW COMPUTER FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE SENSORS AND SPACER BAR (IF USED) FOR REFLECT MODE OPERATION ON THE CHOSEN PIPE.

2. SELECT MOUNTING LOCATION;
2.1 CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
2.2 WHERE POSSIBLE LOCATE SENSORS 10 PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
2.3 ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE TO AVOID SEDIMENT BLOCKAGE OF ULTRASONIC BEAM.

3. PREPARE PIPE FOR TRACK MOUNTING:
3.1 REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
3.2 CLEAN AND DEGREASE SURFACE
3.3 DO NOT MOUNT OVER FROST.
3.4 CONDITION PIPE SURFACE;
LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE SENSORS. USE THE ABRASIVE PAD PROVIDED.

4. INSTALLATION WITH MOUNTING FRAMES
4.1 CONSULT THE 1010 FIELD MANUAL AND USE THE INSTALLATION MENU TO SELECT THE APPROPRIATE INDEX HOLE OR SPACING (LTN) FOR YOUR APPLICATION.

4.2 IF SPACER BAR IS USED:
4.2.1 CLAMP ONE MOUNTING FRAME AT THE UN-NUMBERED REFERENCE POSITION OF THE SPACER BAR. BE SURE THE INDEX PIN AND SPACER BAR INDEX SCREW ENGAGE THE HOLE IN THE SPACER BAR.
4.2.2 CLAMP THE SECOND MOUNTING FRAME TO THE SPACER BAR IN THE SAME MANNER AT THE INDEX HOLE INDICATED DURING STEP 4.1.
4.2.3 HOLD THE MOUNTING FRAME/SPACER BAR ASSEMBLY ON THE PIPE AT THE SELECTED LOCATION AND TEMPORARILY SECURE IT TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT. GO TO 4.4.

4.3 IF MOUNTING FRAMES ARE SPACED BY MEASURING "LTN":
4.3.1 TEMPORARILY SECURE ONE OF THE MOUNTING FRAMES TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT.
4.3.2 MEASURE ALONG THE PIPE AND TEMPORARILY SECURE THE SECOND MOUNTING FRAME TO THE PIPE SO THAT SPACING "LTN" DETERMINED IN STEP 4.1 IS MEASURED BETWEEN THE SPACING MARKS ON THE MOUNTING FRAMES.

4.4 IF THE PIPE SURFACE IS CLEAN AND SMOOTH, PROCEED TO SENSOR INSTALLATION ON SHT.3. IF PIPE SURFACE NEEDS CONDITIONING; MARK THE MOUNTING FRAME POSITION CAREFULLY, LOOSEN STRAPS AND MOVE THE MOUNTING FRAMES ASIDE. LOCALLY SMOOTH THE PIPE SURFACE IN THE MARKED AREAS USING THE ABRASIVE PAD SUPPLIED. SHIFT THE MOUNTING FRAMES BACK INTO THEIR APPROPRIATE LOCATIONS AND TIGHTEN THE THE MOUNTING STRAPS SECURELY.

** SEE SHEET 3 FOR INSTRUCTIONS TO COMPLETE SENSOR INSTALLATION.

SEE SHEET 4 FOR SENSOR INSTALLATION WITHOUT MOUNTING FRAMES

SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-

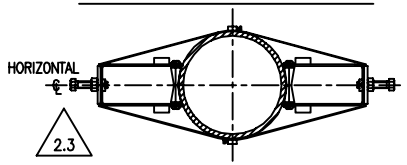
FRACTIONS	DECIMAL	ANGLES	HOLES
± 1/64"	XX±0.01 XXX±0.005	±0°30'	±.003

DRAWN BY: H.Jenkins

INSTALLATION, 1011NPFS SERIES DEDICATED PLASTIC BODY SENSOR

SAP MATERIAL NO.	A5E32959662	REV AA
ITEM NO.	A5E32959662	RS AA
DOCUMENT NO.	1011NFPS - 7	REV 003
DATE: 9/30/2013	SCALE: NONE	SHEET 1 OF 4

PREFERRED MOUNTING PLANE

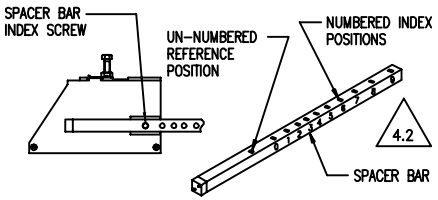


MOUNT SENSORS/MOUNTING FRAMES IN HORIZONTAL PLANE TO PREVENT BLOCKING OF ULTRASONIC BEAM BY AIR OR SEDIMENT.

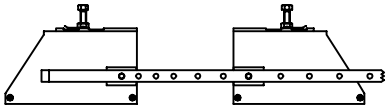
USING THE SPACER BAR TO SET SENSOR MOUNTING FRAME SPACING

USING THE INSTALLATION MENU, AS OUTLINED IN THE FLOW COMPUTER FIELD MANUAL, DETERMINE THE SPACING INDEX NUMBER FOR THE SELECTED APPLICATION.

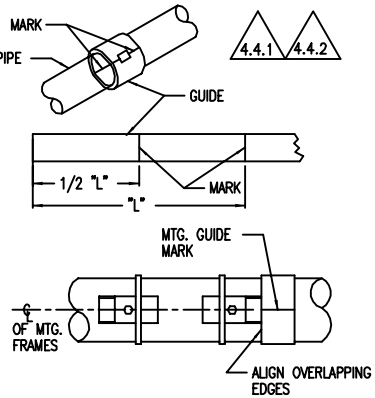
USE THE SPACER BAR INDEX SCREW TO SECURE THE SPACER BAR TO ONE OF THE MOUNTING FRAMES AT THE UN-NUMBERED REFERENCE POSITION.



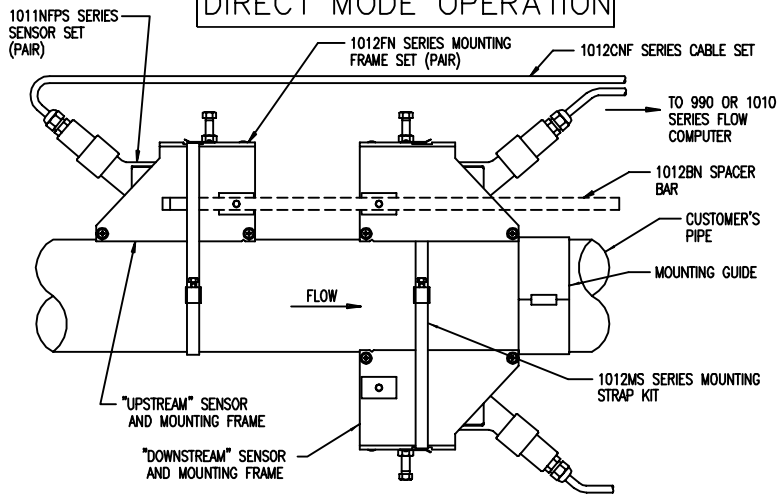
SECURE THE SECOND MOUNTING FRAME TO THE SPACER BAR AT THE NUMBERED INDEX POSITION DETERMINED FROM THE INSTALLATION MENU.



WRAP MOUNTING GUIDE AROUND PIPE AND MARK AT OVERLAPPING EDGE, UNWRAP GUIDE, MEASURE DISTANCE "L" FROM EDGE TO MARK, MARK AGAIN AT 1/2 "L". RE-INSTALL THE MOUNTING GUIDE, TAPE IN PLACE WITH BOTH MARKS VISIBLE, ALIGN ONE MARK WITH THE CENTER LINE OF THE MOUNTING FRAMES.

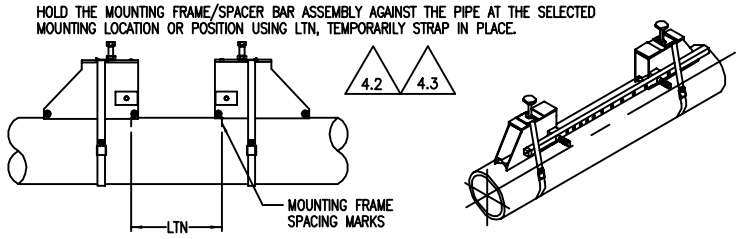


DIRECT MODE OPERATION

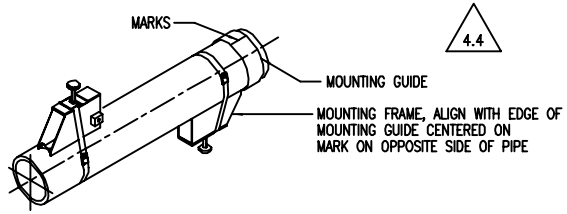


SECURING MOUNTING FRAMES TO THE PIPE SURFACE

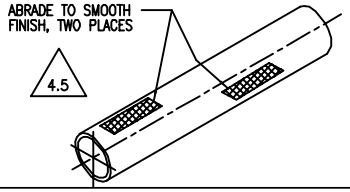
HOLD THE MOUNTING FRAME/SPACER BAR ASSEMBLY AGAINST THE PIPE AT THE SELECTED MOUNTING LOCATION OR POSITION USING LTN, TEMPORARILY STRAP IN PLACE.



USE THE MOUNTING GUIDE TO TRANSFER ONE OF THE MOUNTING FRAMES TO THE OPPOSITE SIDE OF THE PIPE.



IF NECESSARY, USE THE ABRASIVE PAD SUPPLIED TO PRODUCE A SMOOTH FINISH ON THE PIPE AT THE SENSOR MOUNTING POSITIONS.



INSTALLATION NOTES – SEE DRAWING REFERENCE ⚠

1. USING THE INSTALLATION MENU AND THE PROCEDURE OUTLINED IN THE FLOW COMPUTER FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE SENSORS AND SPACER BAR (IF USED) FOR DIRECT MODE OPERATION ON THE CHOSEN PIPE.
2. SELECT MOUNTING LOCATION;
2.1 CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
2.2 WHERE POSSIBLE LOCATE SENSORS 10 PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
2.3 ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE TO AVOID SEDIMENT BLOCKAGE OF ULTRASONIC BEAM.
3. PREPARE PIPE FOR TRACK MOUNTING
3.1 REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
3.2 CLEAN AND DEGREASE SURFACE
3.3 DO NOT MOUNT OVER FROST.
3.4 CONDITION PIPE SURFACE; LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE SENSORS. USE THE ABRASIVE PAD PROVIDED.
4. INSTALLATION WITH MOUNTING FRAMES
4.1 CONSULT THE 1010 FIELD MANUAL AND USE THE INSTALLATION MENU TO SELECT THE APPROPRIATE INDEX HOLE OR SPACING (LTN) FOR YOUR APPLICATION.
4.2 IF SPACER BAR IS USED:
4.2.1 CLAMP ONE MOUNTING FRAME AT THE UN-NUMBERED REFERENCE POSITION OF THE SPACER BAR. BE SURE THE INDEX PIN AND SPACER BAR INDEX SCREW ENGAGE THE HOLE IN THE SPACER BAR.
4.2.2 CLAMP THE SECOND MOUNTING FRAME TO THE SPACER BAR IN THE SAME MANNER AT THE INDEX HOLE INDICATED DURING STEP 4.1.
4.2.3 HOLD THE MOUNTING FRAME/SPACER BAR ASSEMBLY ON THE PIPE AT THE SELECTED LOCATION AND TEMPORARILY SECURE IT TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT. GO TO 4.4.
4.3 IF MOUNTING FRAMES ARE SPACED BY MEASURING "LTN":
4.3.1 TEMPORARILY SECURE ONE OF THE MOUNTING FRAMES TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT.
4.3.2 MEASURE ALONG THE PIPE AND TEMPORARILY SECURE THE SECOND MOUNTING FRAME TO THE PIPE SO THAT SPACING "LTN" DETERMINED IN STEP 4.1 IS MEASURED BETWEEN THE SPACING MARKS ON THE MOUNTING FRAMES. USE STRAIGHT EDGE OR OTHER MEANS TO ALIGN BOTH MOUNTING FRAMES WITH PIPE AXIS:
4.4 USE THE MOUNTING GUIDE INCLUDED WITH THE 1012MS STRAP MOUNTING KIT TO TRANSFER ONE OF THE MOUNTING FRAMES TO THE OPPOSITE SIDE OF THE PIPE.
4.4.1 WRAP THE MOUNTING GUIDE AROUND THE PIPE. POSITION IT SO THAT THE OVERLAPPING LENGTHS ARE EDGE-ALIGNED. MARK THE OVERLAPPED PORTION OF THE GUIDE AT THE EDGE OF THE OVERLAPPING PORTION. REMOVE THE GUIDE, MEASURE THE DISTANCE FROM THE END TO THE MARK AND MARK AGAIN HALFWAY BETWEEN.
4.4.2 RE-POSITION THE GUIDE ON THE PIPE AND TAPE IN PLACE SO THAT ONE OF THE MARKS INDICATES THE CENTERLINE OF THE INSTALLED MOUNTING FRAMES AND THE MOUNTING GUIDE EDGE IS AGAINST THE END OF ONE OF THE MOUNTING FRAMES. MAKE SURE THE OVERLAPPING LENGTHS OF THE MOUNTING GUIDE ARE EDGE-ALIGNED. THIS ASSURES A DIAMETRICAL TRANSFER OF THE MOUNTING FRAME POSITION.
4.4.3 LOOSEN THE MOUNTING STRAP ON THE MOUNTING FRAME WITH WHICH THE MOUNTING GUIDE HAS BEEN ALIGNED. ROTATE IT AROUND THE PIPE SURFACE UNTIL IT IS CENTERED ON THE OPPOSITE SIDE MOUNTING GUIDE MARK MADE IN STEP 4.4.1. TIGHTEN THE STRAP, REMOVE THE MOUNTING GUIDE.
4.5 IF THE PIPE SURFACE IS CLEAN AND SMOOTH, PROCEED TO SENSOR INSTALLATION ON SHT.3, IF PIPE SURFACE NEEDS CONDITIONING; MARK THE MOUNTING FRAME POSITION CAREFULLY, LOOSEN STRAPS AND MOVE THE MOUNTING FRAMES ASIDE. LOCALLY SMOOTH THE PIPE SURFACE IN THE MARKED AREAS USING THE ABRASIVE PAD SUPPLIED. SHIFT THE MOUNTING FRAMES BACK INTO THEIR APPROPRIATE LOCATIONS AND TIGHTEN THE MOUNTING STRAPS SECURELY.

** SEE SHEET 3 FOR INSTRUCTIONS TO COMPLETE SENSOR INSTALLATION.

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-

FRACTIONS	DECIMAL	ANGLES	HOLES
± 1/64"	XX±0.01 XXX±0.005	±0°30'	±.003

DRAWN BY: H.Jenkins

SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

INSTALLATION, 1011NPFS SERIES DEDICATED PLASTIC BODY SENSOR

SAP MATERIAL NO.	A5E32959662	REV AA
ITEM NO.	A5E32959662	RS AA
DOCUMENT NO.	1011NFPS - 7	REV 003
DATE: 9/30/2013	SCALE: NONE	SHEET 2 OF 4

MATING 1012CNF SERIES SENSOR CABLES WITH 1011NFPS SERIES TRANSDUCERS

a) REMOVE PROTECTIVE CAPS.

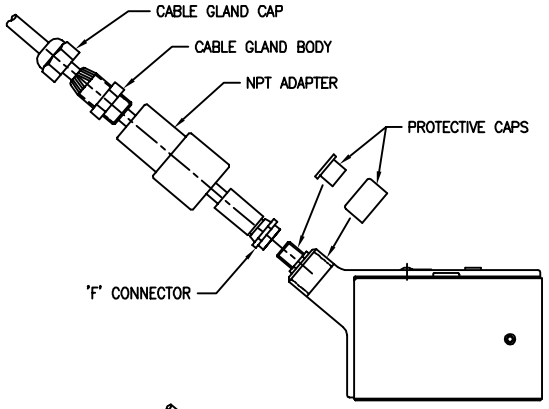
b) SEE APPROPRIATE CABLE ASSEBMLY DRAWING FOR 'F' CONNECTOR, NPT ADAPTER AND GLAND ASSEMBLY DETAIL.

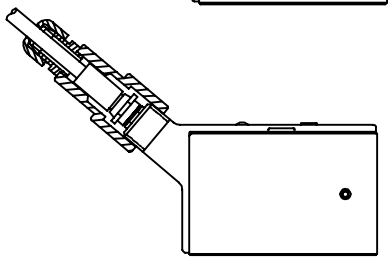
c) MATE 'F' CONNECTORS, CABLES TO TRANSDUCER.

d) FOR BEST WEATHER SEAL, WRAP TEFLON PIPE TAPE (NOT SUPPLIED) AROUND MALE NPT THREADS ON SENSOR HOUSING.

e) SCREW NPT ADAPTER TO SENSOR HOUSING (HAND TIGHT IS SUFFICIENT).

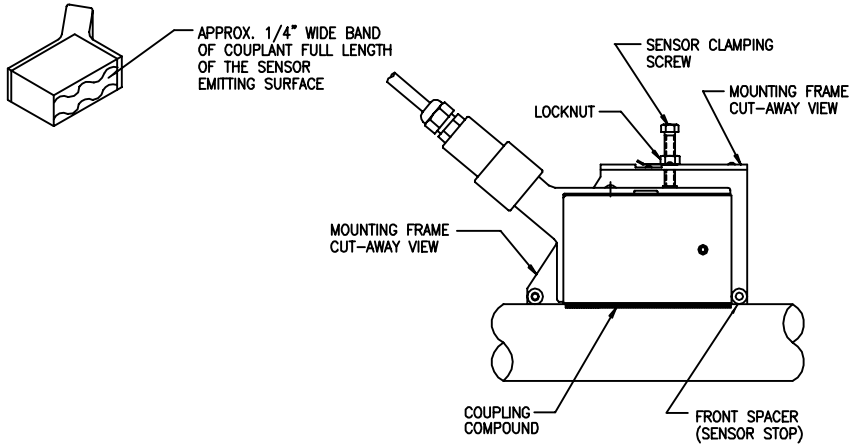
f) TIGHTEN GLAND BODY WITH NPT ADAPTER AND SECURE CABLE BY TIGHTENING GLAND TOP NUT. (HAND TIGHT IS SUFFICIENT).





INSTALLING SENSORS IN MOUNTING FRAMES

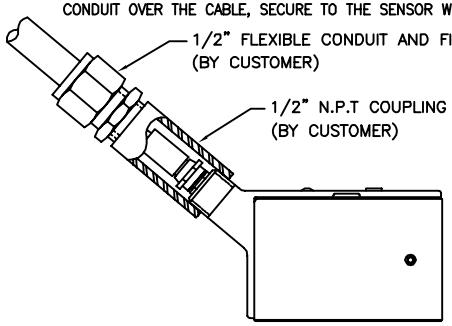
APPLY A THIN BAND OF COUPLANT TO THE EMITTING SURFACE OF THE SENSORS. SLIP THE SENSORS INTO THE MOUNTING FRAMES, SEATING THEM SQUARELY ON THE PIPE SURFACE, PUSH FORWARD INTO THE FRAMES AGAINST THE FRONT SPACER. TIGHTEN THE SENSOR CLAMPING SCREW, FIRMLY SEATING THE SENSORS ON THE PIPE SURFACE. SECURE THE CLAMPING SCREW WITH THE LOCKNUT.



**SEE DRAWING 1012TP-7 FOR INSTALLATION USING 1012TP SERIES MOUNTING TRACKS.

USE OF FLEXIBLE CONDUIT WITH SENSORS

THE SENSOR WIRING HOUSING HAS INTEGRAL 1/2" N.P.T THREADS TO ACCEPT A CONDUIT COUPLING IF FLEXIBLE CONDUIT IS USED. MAKE CONNECTION AS SHOWN, THEN PASS COUPLING AND CONDUIT OVER THE CABLE, SECURE TO THE SENSOR WIRING HOUSING.



INSTALLATION NOTES – CONT'D FROM SHT. 1 OR SHT. 2

5. MAKE CABLE CONNECTIONS AT FLOW COMPUTER IN ACCORDANCE WITH APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 1010 FIELD MANUAL.
6. SEE DRAWINGS 1012FN-8 AND 1011NFPS-8 FOR MOUNTING FRAME AND SENSOR OUTLINE DIMENSIONS.

SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-

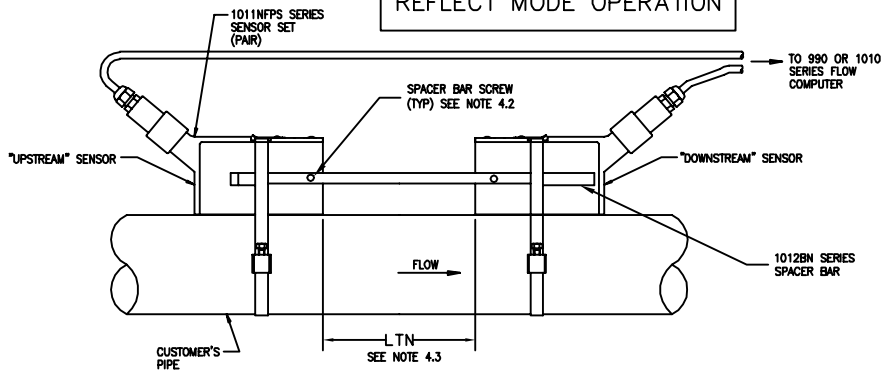
FRACTIONS	DECIMAL	ANGLES	HOLES
± 1/64"	XX±0.01 XXX±0.005	±0°30'	±.003

DRAWN BY: H.Jenkins

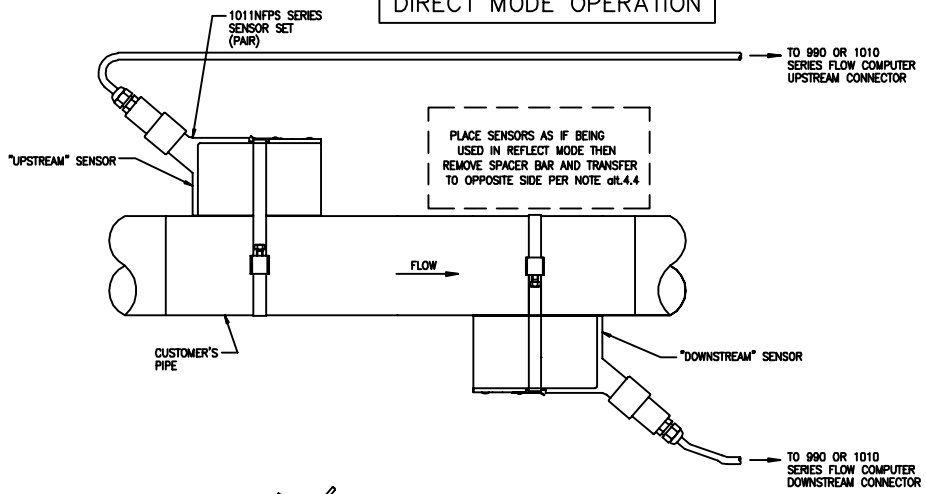
INSTALLATION, 1011NPFS SERIES DEDICATED PLASTIC BODY SENSOR

SAP MATERIAL NO.	A5E32959662	REV AA
ITEM NO.	A5E32959662	RS AA
DOCUMENT NO.	1011NFPS - 7	REV 003
DATE: 9/30/2013	SCALE: NONE	SHEET 3 OF 4

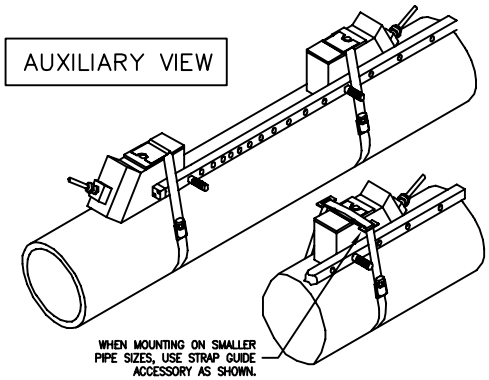
REFLECT MODE OPERATION



DIRECT MODE OPERATION



AUXILIARY VIEW



INSTALLATION OF SENSORS WITHOUT MOUNTING FRAMES

THE SAME GENERAL NOTES AND PROCEDURES APPLY WHEN INSTALLING SENSORS WITHOUT THE BENEFIT OF MOUNTING FRAMES. APPLY THE FOLLOWING ALTERNATES TO THE INSTALLATION NOTES ON SHEETS 1 & 2.

4.2 IF SPACER BAR IS USED:

alt.4.2.1 SECURE ONE SENSOR AT THE UN-NUMBERED REFERENCE POSITION OF THE SPACER BAR BY ENGAGING ONE OF THE SCREWS STOWED IN THE SPACER BAR CAP WITH THE THREADED INSERT IN THE SIDE OF THE SENSOR BLOCK.

alt4.2.2 SECURE THE SECOND SENSOR TO THE SPACER BAR IN THE SAME MANNER AT THE INDEX HOLE INDICATED DURING STEP 4.1.

alt.4.2.3 HOLD SENSOR/SPACER BAR ASSEMBLY ON THE PIPE AT THE SELECTED LOCATION AND TEMPORARILY SECURE IT TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT.

4.3 IF SENSORS ARE SPACED BY MEASURING "LTN":

alt.4.3.1 TEMPORARILY SECURE ONE OF THE SENSORS TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT.

alt.4.3.2 MEASURE ALONG THE PIPE AND TEMPORARILY SECURE THE SECOND SENSOR TO THE PIPE SO THAT SPACING "LTN" DETERMINED IN STEP 4.1 IS MEASURED BETWEEN THE SPACING MARKS ON THE FRONT FACES OF THE SENSORS. USE A STRAIGHT EDGE OR OTHER MEANS TO ALIGN BOTH SENSORS WITH THE PIPE AXIS.

FOR REFLECT MODE INSTALLATION GO TO STEP alt.4.5
FOR DIRECT MODE INSTALLATION CONTINUE WITH alt.4.4

alt.4.4 USE THE MOUNTING GUIDE INCLUDED WITH THE 1012MS STRAP MOUNTING KIT TO TRANSFER ONE OF THE SENSORS TO THE OPPOSITE SIDE OF THE PIPE. (SEE SHEET 2, ZONE A4)

alt.4.4.1 WRAP THE MOUNTING GUIDE AROUND THE PIPE. POSITION IT SO THAT THE OVERLAPPING LENGTHS ARE EDGE-ALIGNED, MARK THE OVERLAPPED PORTION OF THE GUIDE AT THE EDGE OF THE OVERLAPPING PORTION. REMOVE THE GUIDE, MEASURE THE DISTANCE FROM THE END TO THE MARK AND MARK AGAIN HALFWAY BETWEEN.

alt.4.4.2 RE-POSITION THE GUIDE ON THE PIPE AND TAPE IN PLACE SO THAT ONE OF THE MARKS INDICATES THE CENTERLINE OF THE INSTALLED SENSOR AND THE MOUNTING GUIDE EDGE IS AGAINST THE END OF ONE OF THE SENSORS. MAKE SURE THE OVERLAPPING LENGTHS OF THE MOUNTING GUIDE ARE EDGE-ALIGNED. THIS ASSURES A DIAMETRICAL TRANSFER OF THE SENSOR POSITION.

alt.4.4.3 LOOSEN THE MOUNTING STRAP ON THE SENSOR WITH WHICH THE MOUNTING GUIDE HAS BEEN ALIGNED. ROTATE IT AROUND THE PIPE SURFACE UNTIL IT IS CENTERED ON THE OPPOSITE SIDE MOUNTING GUIDE MARK MADE IN STEP alt.4.4.1. TIGHTEN THE STRAP, REMOVE THE MOUNTING GUIDE.

alt.4.5 WITH THE SENSORS TEMPORARILY STRAPPED IN PLACE, MARK THE PIPE SURFACE AT THE SENSOR PERIMETER. REMOVE THE SENSORS FROM THE PIPE. IF THE PIPE SURFACE IS CLEAN AND SMOOTH, PROCEED TO STEP alt.4.6. IF THE PIPE SURFACE NEEDS CONDITIONING, LOCALLY SMOOTH THE SURFACE IN THE MARKED AREAS USING THE ABRASIVE PAD SUPPLIED. DO NOT OBSCURE THE MARKED SENSOR LOCATIONS.

alt.4.6 APPLY A THIN BAND OF COUPLANT TO THE EMITTING SURFACE OF BOTH SENSORS. CAREFULLY REPLACE THE SENSORS ON THE PIPE, REPEATING THE PROCEDURE ABOVE, IF REQUIRED, TO ASSURE ACCURATE POSITIONING.

CONTINUE WITH INSTALLATION NOTE 5 AND CABLE CONNECTING INSTRUCTIONS ON SHEET 3.

SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

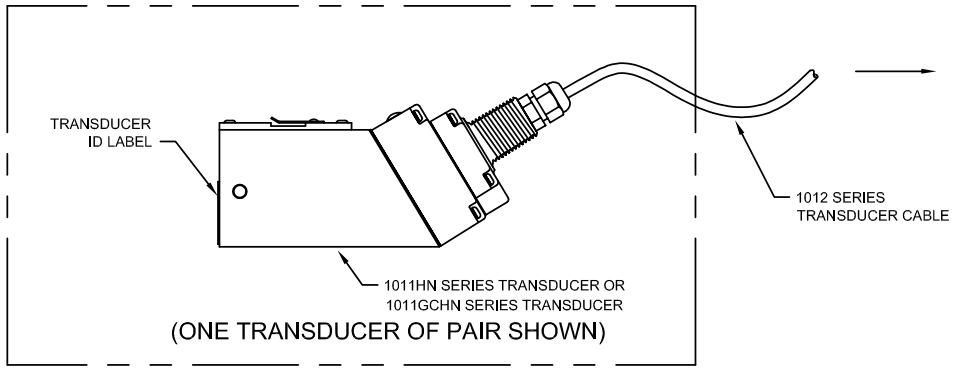
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-

FRACTIONS	DECIMAL	ANGLES	HOLES
± 1/64"	XX±0.01 XXX±0.005	±0°30'	±.003

DRAWN BY: H.Jenkins

INSTALLATION, 1011NPFS SERIES DEDICATED PLASTIC BODY SENSOR

SAP MATERIAL NO.	A5E32959662	REV AA
ITEM NO.	A5E32959662	RS AA
DOCUMENT NO.	1011NFPS - 7	REV 003
DATE: 9/30/2013	SCALE: NONE	SHEET 4 OF 4



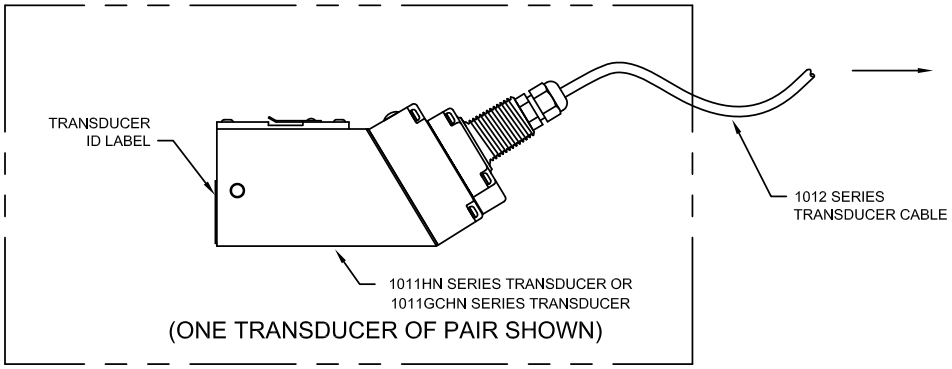
1. INSTALL ONE OF THE FOLLOWING TRANSDUCERS
   P/N 1011HN(MODEL CODES)-(SIZE)-S2
   P/N 1011GCHN(MODEL CODES)-(SIZE)-S2
   IN ACCORDANCE WITH THE FOLLOWING DRAWINGS:
   a. FOR USE WITH 994 SERIES AGENCY APPROVED FLOW COMPUTERS-
      INTRINSICALLY SAFE FOR CLASS I, II, DIVISION 1, GROUPS A - G, PER DRAWING 990-104 OR 990-105
      NON-INCENDIVE FOR CLASS I, DIVISION 2, GROUPS A - D, SUITABLE FOR CLASS II, DIVISION 2, GPS F, G
      PER DRAWING 990-110 OR 990-111.
   b. FOR USE WITH 1010 SERIES AGENCY APPROVED FLOW COMPUTERS-
      INTRINSICALLY SAFE FOR CLASS I, II, DIVISION 1, GROUPS A - G, PER DRAWING 1010-304, 1010-341 OR 1010-443
      NON-INCENDIVE FOR CLASS I, DIVISION 2, GROUPS A - D, SUITABLE FOR CLASS II, DIVISION 2, GPS E, F, G
      PER DRAWING 1010-304, 1010-339, 1010-342 OR 1010-443.
2. SEE DRAWING 1011HNS-7 OR 1011HNFS-7 AND APPROPRIATE FLOW COMPUTER FIELD MANUAL FOR ADDITIONAL INSTALLATION INSTRUCTIONS.
3. SEE DRAWING 1011HNS-8 OR 1011HNFS-8 FOR OUTLINE INSTALLATION DIMENSIONS.
4. WARNING: SUBSTITUTION WITH UNSPECIFIED COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

CHANGES TO THIS DOCUMENT
REQUIRE SAFETY AGENCY APPROVAL

DO NOT SCALE THIS DRAWING	CONTRACT NO.	SIEMENS
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON– INCHES +/-.01 (MM) +/- 2	DR H.J DATE 11/04/04 CHK DATE ENG DATE PROD DATE APPD DATE CERTIFIED DATE	Siemens Energy & Automation, Inc. Process Instrumentation Business Unit CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788 INSTALLATION GUIDE, CONNECTION DIAGRAM SELECTION AGENCY APPROVED 1011HN SERIES TRANSDUCERS

SIZE	CODE IDENT NO.		REV.
A	21614	1011HNS2-7	D
SCALE:	WT.	SHEET 1 of 1	

CN#5160



1. INSTALL ONE OF THE FOLLOWING TRANSDUCERS
   P/N 1011HN(MODEL CODES)-(SIZE)-S9
   P/N 1011GCHN(MODEL CODES)-(SIZE)-S9
   IN ACCORDANCE WITH THE FOLLOWING DRAWINGS:

   a. FOR USE WITH 1010 SERIES AGENCY APPROVED FLOW COMPUTERS-
      INTRINSICALLY SAFE EEx ia IIC T5 PER DRAWING 1010-389, 1010-422. OR 1010-464.

   b. NON-INCENDIVE FOR ZONE 2 PER DRAWING 1010-389, 1010-391, 1010-423 OR 1010-464.

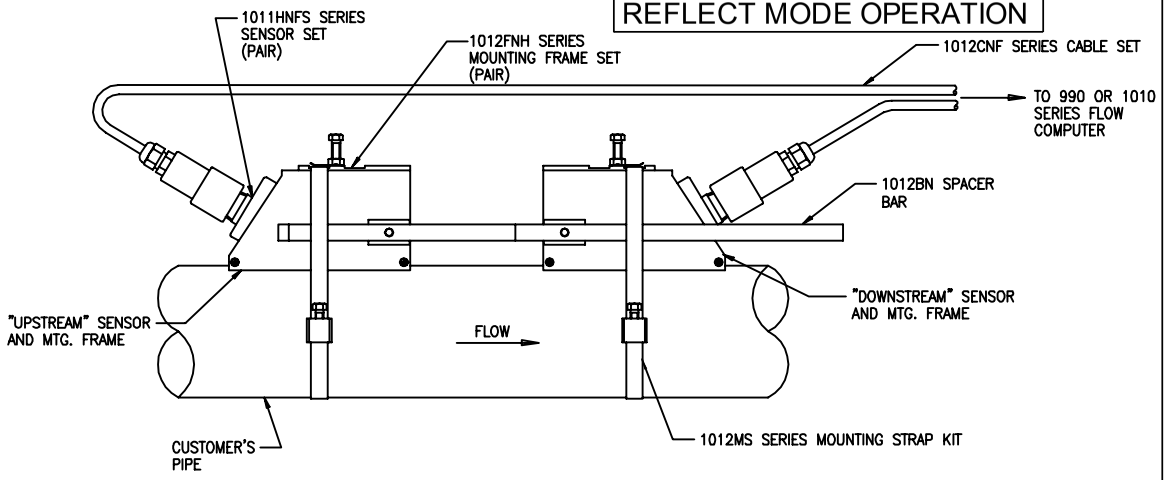
2. SEE DRAWING 1011HNS-7 OR 1011HNFS-7 AND APPROPRIATE FLOW COMPUTER FIELD MANUAL FOR ADDITIONAL INSTALLATION INSTRUCTIONS.
3. SEE DRAWING 1011HNS-8 OR 1011HNFS-8 FOR OUTLINE INSTALLATION DIMENSIONS.
4. WARNING: SUBSTITUTION WITH UNSPECIFIED COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

CHANGES TO THIS DOCUMENT
REQUIRE SAFETY AGENCY APPROVAL

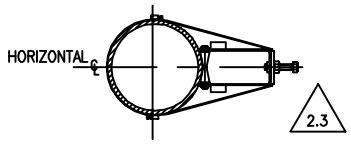
DO NOT SCALE THIS DRAWING UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON– INCHES +/–.01 (MM) +/– 2	CONTRACT NO. DR CHEV. DATE 5/16/01 CHK DATE ENG DATE PROD DATE APPD DATE CERTIFIED DATE	CONTROLOTRON HAUPPAUGE , NY 11788 INSTALLATION GUIDE, CONNECTION DIAGRAM SELECTION AGENCY APPROVED 1011HN SERIES TRANSDUCERS SIZE A · CODE IDENT NO. 21614 · 1011HNS9-7 · REV. C1 SCALE: · WT. · SHEET 1 of 1

CN#4931

REFLECT MODE OPERATION



PREFERRED MOUNTING PLANE

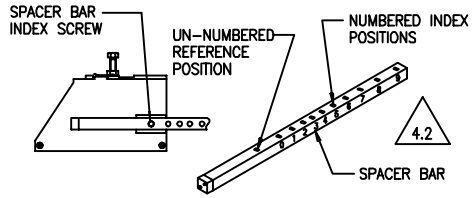


MOUNT SENSORS/MOUNTING FRAMES IN HORIZONTAL PLANE TO PREVENT BLOCKING OF ULTRASONIC BEAM BY AIR OR SEDIMENT.

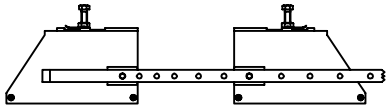
USING THE SPACER BAR TO SET SENSOR MOUNTING FRAME SPACING

USING THE INSTALLATION MENU, AS OUTLINED IN THE FLOW COMPUTER FIELD MANUAL, DETERMINE THE SPACING INDEX NUMBER FOR THE SELECTED APPLICATION.

USE THE SPACER BAR INDEX SCREW TO SECURE THE SPACER BAR TO ONE OF THE MOUNTING FRAMES AT THE UN-NUMBERED REFERENCE POSITION.

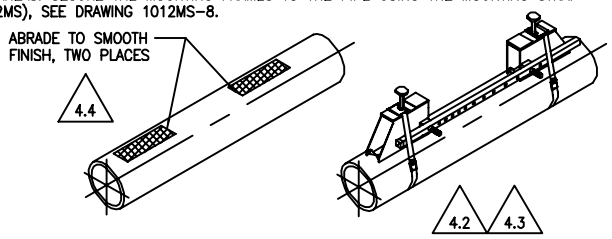


SECURE THE SECOND MOUNTING FRAME TO THE SPACER BAR AT THE NUMBERED INDEX POSITION DETERMINED FROM THE INSTALLATION MENU.



SECURING MOUNTING FRAMES TO THE PIPE SURFACE

HOLD THE MOUNTING FRAME/SPACER BAR ASSEMBLY AGAINST THE PIPE AT THE SELECTED MOUNTING LOCATION. MARK THE APPROXIMATE OUTLINE OF THE MOUNTING FRAMES ON THE PIPE SURFACE. USING THE ABRASIVE PAD SUPPLIED, SMOOTH THE PIPE SURFACE IN THE MARKED AREAS. SECURE THE MOUNTING FRAMES TO THE PIPE USING THE MOUNTING STRAP KIT (1012MS), SEE DRAWING 1012MS-8.



INSTALLATION NOTES – SEE DRAWING REFERENCE

1. USING THE INSTALLATION MENU AND THE PROCEDURE OUTLINED IN THE FLOW COMPUTER FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE SENSORS AND SPACER BAR (IF USED) FOR REFLECT MODE OPERATION ON THE CHOSEN PIPE.

2. SELECT MOUNTING LOCATION;
2.1 CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
2.2 WHERE POSSIBLE LOCATE TRACK ASS'Y 10 PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
2.3 ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE TO AVOID SEDIMENT BLOCKAGE OF ULTRASONIC BEAM.

3. PREPARE PIPE FOR TRACK MOUNT;
3.1 REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
3.2 CLEAN AND DEGREASE SURFACE
3.3 DO NOT MOUNT OVER FROST.
3.4 CONDITION PIPE SURFACE;
LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE SENSORS. USE THE ABRASIVE PAD PROVIDED.

4. LOCATE MOUNTING FRAMES;
4.1 CONSULT THE 1010 FIELD MANUAL AND USE THE INSTALLATION MENU TO SELECT THE APPROPRIATE INDEX HOLE OR SPACING (LTN) FOR YOUR APPLICATION.

4.2 IF SPACER BAR IS USED:
4.2.1 CLAMP ONE MOUNTING FRAME AT THE UN-NUMBERED REFERENCE POSITION OF THE SPACER BAR. BE SURE THE SPACER BAR INDEX SCREW FITS THROUGH THE HOLE IN THE SPACER BAR AND ENGAGES THE HOLE IN THE MOUNTING FRAME BLOCK.

4.2.2 CLAMP THE SECOND MOUNTING FRAME TO THE SPACER BAR IN THE SAME MANNER AT THE INDEX HOLE INDICATED DURING STEP 4.1.

4.2.3 HOLD THE MOUNTING FRAME/SPACER BAR ASSEMBLY ON THE PIPE AT THE SELECTED LOCATION AND TEMPORARILY SECURE IT TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT. GO TO 4.4.

4.3 IF MOUNTING FRAMES ARE SPACED BY MEASURING "LTN":

4.3.1 TEMPORARILY SECURE ONE OF THE MOUNTING FRAMES TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT.

4.3.2 MEASURE ALONG THE PIPE AND TEMPORARILY SECURE THE SECOND MOUNTING FRAME TO THE PIPE SO THAT SPACING "LTN" DETERMINED IN STEP 4.1 IS MEASURED BETWEEN THE SPACING MARKS ON THE MOUNTING FRAMES.

4.4 IF THE PIPE SURFACE IS CLEAN AND SMOOTH, PROCEED TO SENSOR INSTALLATION ON SHT.3. IF PIPE SURFACE NEEDS CONDITIONING; MARK THE MOUNTING FRAME POSITION CAREFULLY, LOOSEN STRAPS AND MOVE THE MOUNTING FRAMES ASIDE. LOCALLY SMOOTH THE PIPE SURFACE IN THE MARKED AREAS USING THE ABRASIVE PAD SUPPLIED. SHIFT THE MOUNTING FRAMES BACK INTO THEIR APPROPRIATE LOCATIONS AND TIGHTEN THE THE MOUNTING STRAPS SECURELY.

** SEE SHEET 3 FOR INSTRUCTIONS TO COMPLETE SENSOR INSTALLATION.

CONTROLLED DRAWING
CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL

SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

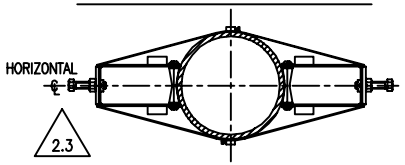
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-

FRACTIONS	DECIMAL	ANGLES	HOLES
± 1/64"	XX±0.01 XXX±0.005	±0°30'	±.003

INSTALLATION, 1011HNFS SERIES DEDICATED PLASTIC BODY SENSOR

SAP MATERIAL NO.	A5E32947129	REV AA
ITEM NO.	A5E32947129	RS AA
DOCUMENT NO.	1011HNFS-7	REV 004
DRAWN BY H.Jenkins:	DATE: 9/30/2013	SCALE NONE: SHEET 1 OF 3

PREFERRED MOUNTING PLANE

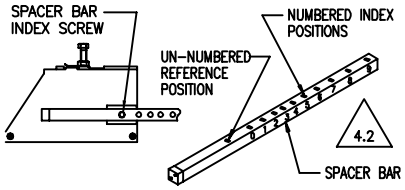


MOUNT SENSORS/MOUNTING FRAMES IN HORIZONTAL PLANE TO PREVENT BLOCKING OF ULTRASONIC BEAM BY AIR OR SEDIMENT.

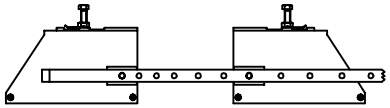
USING THE SPACER BAR TO SET SENSOR MOUNTING FRAME SPACING

USING THE INSTALLATION MENU, AS OUTLINED IN THE FLOW COMPUTER FIELD MANUAL, DETERMINE THE SPACING INDEX NUMBER FOR THE SELECTED APPLICATION.

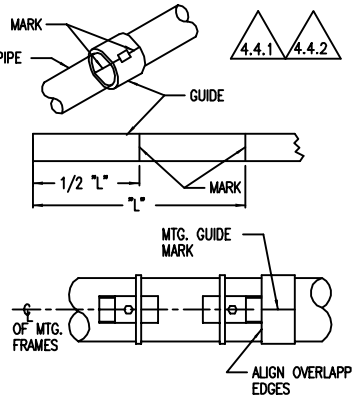
USE THE SPACER BAR INDEX SCREW TO SECURE THE SPACER BAR TO ONE OF THE MOUNTING FRAMES AT THE UN-NUMBERED REFERENCE POSITION.



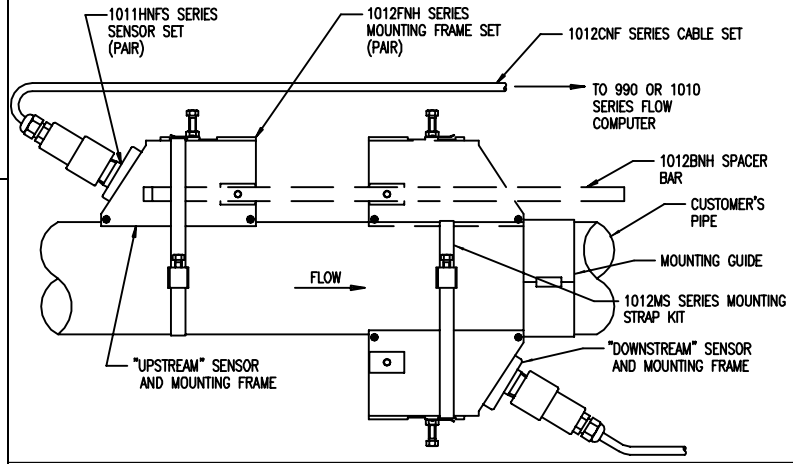
SECURE THE SECOND MOUNTING FRAME TO THE SPACER BAR AT THE NUMBERED INDEX POSITION DETERMINED FROM THE INSTALLATION MENU.



WRAP MOUNTING GUIDE AROUND PIPE AND MARK AT OVERLAPPING EDGE, UNWRAP GUIDE, MEASURE DISTANCE "L" FROM EDGE TO MARK, MARK AGAIN AT 1/2 "L". RE-INSTALL THE MOUNTING GUIDE, TAPE IN PLACE WITH BOTH MARKS VISIBLE, ALIGN ONE MARK WITH THE CENTER LINE OF THE MOUNTING FRAMES.

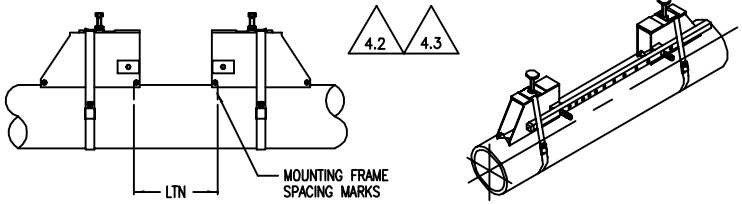


DIRECT MODE OPERATION

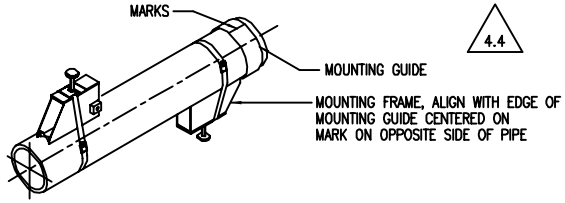


SECURING MOUNTING FRAMES TO THE PIPE SURFACE

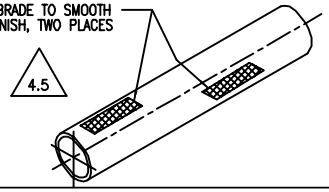
HOLD THE MOUNTING FRAME/SPACER BAR ASSEMBLY AGAINST THE PIPE AT THE SELECTED MOUNTING LOCATION OR POSITION USING LTN, TEMPORARILY STRAP IN PLACE.



USE THE MOUNTING GUIDE TO TRANSFER ONE OF THE MOUNTING FRAMES TO THE OPPOSITE SIDE OF THE PIPE.



IF NECESSARY, USE THE ABRASIVE PAD SUPPLIED TO PRODUCE A SMOOTH FINISH ON THE PIPE AT THE SENSOR MOUNTING POSITIONS.



INSTALLATION NOTES – SEE DRAWING REFERENCE ⚠

1. USING THE INSTALLATION MENU AND THE PROCEDURE OUTLINED IN THE FLOW COMPUTER FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE SENSORS AND SPACER BAR (IF USED) FOR DIRECT MODE OPERATION ON THE CHOSEN PIPE.
2. SELECT MOUNTING LOCATION;
2.1 CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
2.2 WHERE POSSIBLE LOCATE TRACK ASS'Y 10 PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
2.3 ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE TO AVOID SEDIMENT BLOCKAGE OF ULTRASONIC BEAM.
3. PREPARE PIPE FOR TRACK MOUNT;
3.1 REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
3.2 CLEAN AND DEGREASE SURFACE
3.3 DO NOT MOUNT OVER FROST.
3.4 CONDITION PIPE SURFACE;
LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE SENSORS. USE THE ABRASIVE PAD PROVIDED.
4. LOCATE MOUNTING FRAMES;
4.1 CONSULT THE 1010 FIELD MANUAL AND USE THE INSTALLATION MENU TO SELECT THE APPROPRIATE INDEX HOLE OR SPACING (LTN) FOR YOUR APPLICATION.
4.2 IF SPACER BAR IS USED:
4.2.1 CLAMP ONE MOUNTING FRAME AT THE UN-NUMBERED REFERENCE POSITION OF THE SPACER BAR. BE SURE THE SPACER BAR INDEX SCREW FITS THOUGH THE HOLE IN THE SPACER BAR AND ENGAGES THE HOLE IN THE MOUNTING FRAME BLOCK.
4.2.2 CLAMP THE SECOND MOUNTING FRAME TO THE SPACER BAR IN THE SAME MANNER AT THE INDEX HOLE INDICATED DURING STEP 4.1.
4.2.3 HOLD THE MOUNTING FRAME/SPACER BAR ASSEMBLY ON THE PIPE AT THE SELECTED LOCATION AND TEMPORARILY SECURE IT TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT. GO TO 4.4.
4.3 IF MOUNTING FRAMES ARE SPACED BY MEASURING "LTN":
4.3.1 TEMPORARILY SECURE ONE OF THE MOUNTING FRAMES TO THE PIPE USING STRAPS FROM THE 1012MS STRAP MOUNTING KIT.
4.3.2 MEASURE ALONG THE PIPE AND TEMPORARILY SECURE THE SECOND MOUNTING FRAME TO THE PIPE SO THAT SPACING "LTN" DETERMINED IN STEP 4.1 IS MEASURED BETWEEN THE SPACING MARKS ON THE MOUNTING FRAMES. USE STRAIGHT EDGE OR OTHER MEANS TO ALIGN BOTH MOUNTING FRAMES WITH PIPE AXIS:
4.4 USE THE MOUNTING GUIDE INCLUDED WITH THE 1012MS STRAP MOUNTING KIT TO TRANSFER ONE OF THE MOUNTING FRAMES TO THE OPPOSITE SIDE OF THE PIPE.
4.4.1 WRAP THE MOUNTING GUIDE AROUND THE PIPE. POSITION IT SO THAT THE OVERLAPPING LENGTHS ARE EDGE-ALIGNED, MARK THE OVERLAPPED PORTION OF THE GUIDE AT THE EDGE OF THE OVERLAPPING PORTION. REMOVE THE GUIDE, MEASURE THE DISTANCE FROM THE END TO THE MARK AND MARK AGAIN HALFWAY BETWEEN.
4.4.2 RE-POSITION THE GUIDE ON THE PIPE AND TAPE IN PLACE SO THAT ONE OF THE MARKS INDICATES THE CENTERLINE OF THE INSTALLED MOUNTING FRAMES AND THE MOUNTING GUIDE EDGE IS AGAINST THE END OF ONE OF THE MOUNTING FRAMES. MAKE SURE THE OVERLAPPING LENGTHS OF THE MOUNTING GUIDE ARE EDGE-ALIGNED. THIS ASSURES A DIAMETRICAL TRANSFER OF THE MOUNTING FRAME POSITION.
4.4.3 LOOSEN THE MOUNTING STRAP ON THE MOUNTING FRAME WITH WHICH THE MOUNTING GUIDE HAS BEEN ALIGNED. ROTATE IT AROUND THE PIPE SURFACE UNTIL IT IS CENTERED ON THE OPPOSITE SIDE MOUNTING GUIDE MARK MADE IN STEP 4.4.1. TIGHTEN THE STRAP, REMOVE THE MOUNTING GUIDE.
4.5 IF THE PIPE SURFACE IS CLEAN AND SMOOTH, PROCEED TO TRANSDUCER INSTALLATION ON SHT.3, IF PIPE SURFACE NEEDS CONDITIONING; MARK THE MOUNTING FRAME POSITION CAREFULLY, LOOSEN STRAPS AND MOVE THE MOUNTING FRAMES ASIDE. LOCALLY SMOOTH THE PIPE SURFACE IN THE MARKED AREAS USING THE ABRASIVE PAD SUPPLIED. SHIFT THE MOUNTING FRAMES BACK INTO THEIR APPROPRIATE LOCATIONS AND TIGHTEN THE MOUNTING STRAPS SECURELY.

** SEE SHEET 3 FOR INSTRUCTIONS TO COMPLETE SENSOR INSTALLATION.

CONTROLLED DRAWING
CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL

SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-

FRACTIONS	DECIMAL	ANGLES	HOLES
± 1/64"	XX±0.01 XXX±0.005	±0°30'	±.003

DRAWN BY H.Jenkins:

INSTALLATION, 1011HNFS SERIES DEDICATED PLASTIC BODY SENSOR

SAP MATERIAL NO.	A5E32947129	REV AA
ITEM NO.	A5E32947129	RS AA
DOCUMENT NO.	1011HNFS-7	REV 004
DATE: 9/30/2013	SCALE NONE:	SHEET 2 OF 3

MATING 1012CNF SERIES SENSOR CABLES WITH 1011HNF SERIES SENSORS

a) REMOVE PROTECTIVE CAPS.

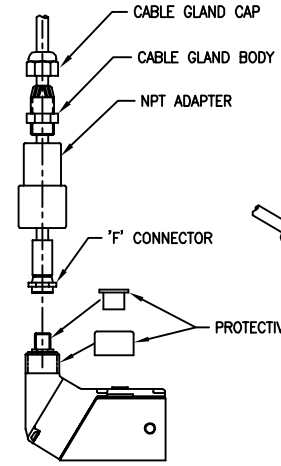
b) SEE APPROPRIATE CABLE ASSEBMLY DRAWING FOR 'F' CONNECTOR, NPT ADAPTER AND GLAND ASSEMBLY DETAIL.

c) MATE 'F' CONNECTORS, CABLES TO SENSOR.

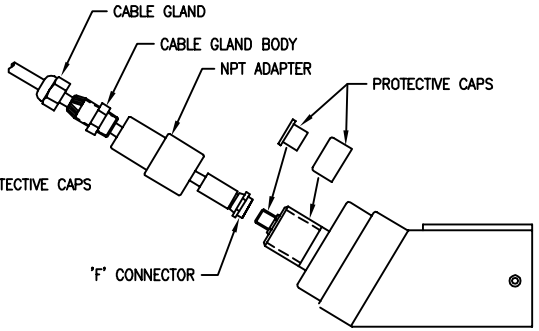
d) FOR BEST WEATHER SEAL, WRAP TEFLON PIPE TAPE (NOT SUPPLIED) AROUND MALE NPT THREADS ON SENSOR HOUSING.

e) SCREW NPT ADAPTER TO SENSOR HOUSING (HAND TIGHT IS SUFFICIENT).

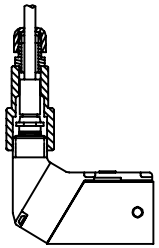
f) TIGHTEN GLAND BODY WITH NPT ADAPTER AND SECURE CABLE BY TIGHTENING GLAND TOP NUT. (HAND TIGHT IS SUFFICIENT).



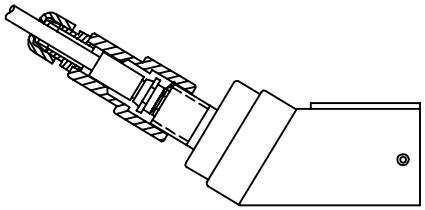
SENSOR SIZE A & B



SENSOR SIZE C & D



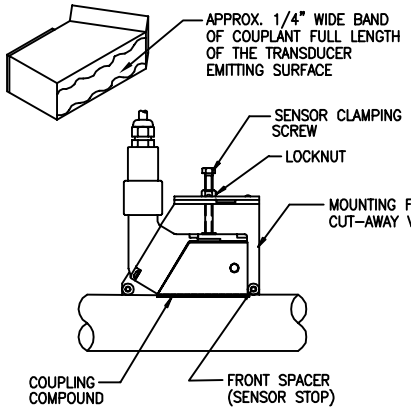
SENSOR SIZE A & B



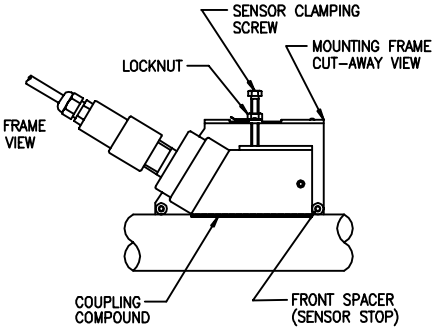
SENSOR SIZE C & D

INSTALLING SENSORS IN MOUNTING FRAMES

APPLY A THIN BAND OF COUPLANT TO THE EMITTING SURFACE OF THE SENSORS. SLIP THE SENSORS INTO THE MOUNTING FRAMES, SEATING THEM SQUARELY ON THE PIPE SURFACE, PUSH FORWARD INTO THE FRAMES AGAINST THE FRONT SPACER. LOCATE CLAMPING SCREW IN PROPER POSITION TIGHTEN THE SENSOR CLAMPING SCREW, FIRMLY SEATING THE SENSORS ON THE PIPE SURFACE. SECURE THE CLAMPING SCREW WITH LOCK NUT.



SENSOR SIZE A & B

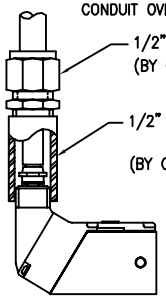


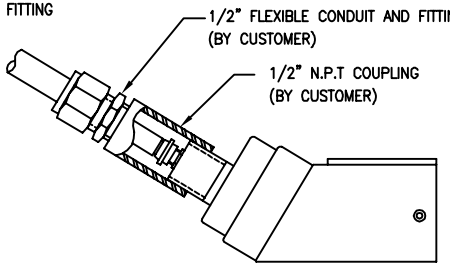
SENSOR SIZE C & D

**SEE DRAWING 1012THP-7 FOR INSTALLATION USING 1012THP SERIES MOUNTING TRACKS.

USE OF FLEXIBLE CONDUIT WITH SENSORS

THE SENSOR WIRING HOUSING HAS INTEGRAL 1/2" N.P.T THREADS TO ACCEPT A CONDUIT COUPLING IF FLEXIBLE CONDUIT IS USED. MAKE CONNECTION AS SHOWN, THEN PASS COUPLING AND CONDUIT OVER THE CABLE, SECURE TO THE SENSOR WIRING HOUSING.





INSTALLATION NOTES – CONT'D FROM SHT. 1 OR SHT. 2

5. MAKE CABLE CONNECTIONS AT FLOW COMPUTER IN ACCORDANCE WITH APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 1010 FIELD MANUAL.
6. SEE DRAWINGS 1012FNH-8 AND 1011HNFS-8 FOR MOUNTING FRAME AND SENSOR OUTLINE DIMENSIONS.

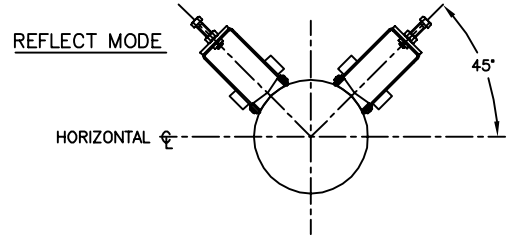
CONTROLLED DRAWING
CHANGES TO THIS DRAWING REQUIRE RELEVANT AGENCY APPROVAL

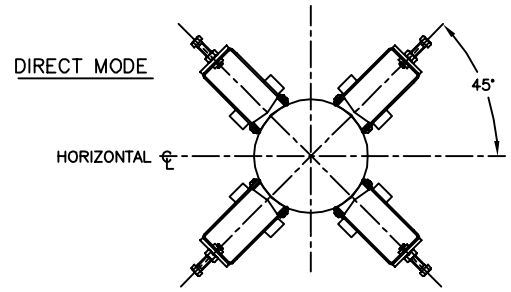
SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-
FRACTIONS ± 1/64" DECIMAL XX±0.01 XXX±0.005 ANGLES ±0°30' HOLES ±.003

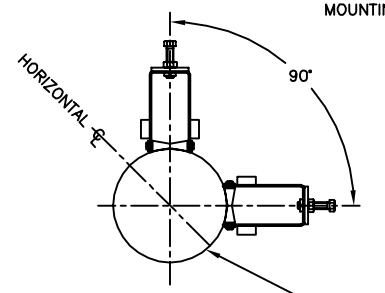
INSTALLATION, 1011HNFS SERIES DEDICATED PLASTIC BODY SENSOR

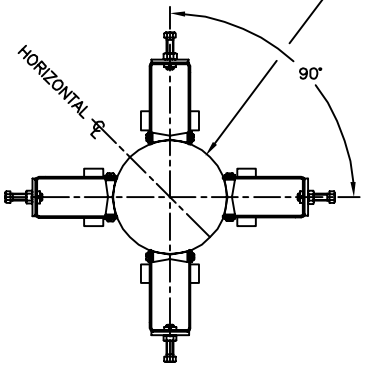
SAP MATERIAL NO.	A5E32947129	REV AA
ITEM NO.	A5E32947129	RS AA
DOCUMENT NO.	1011HNFS-7	REV 004
DRAWN BY H.Jenkins:	DATE: 9/30/2013	SCALE NONE: SHEET 3 OF 3

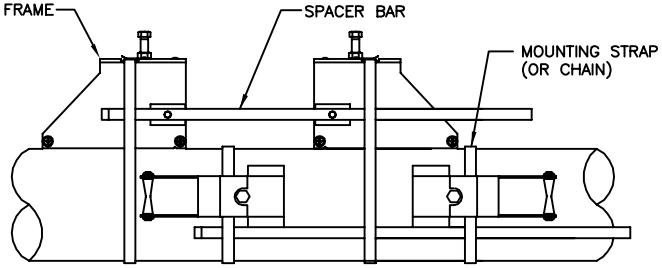




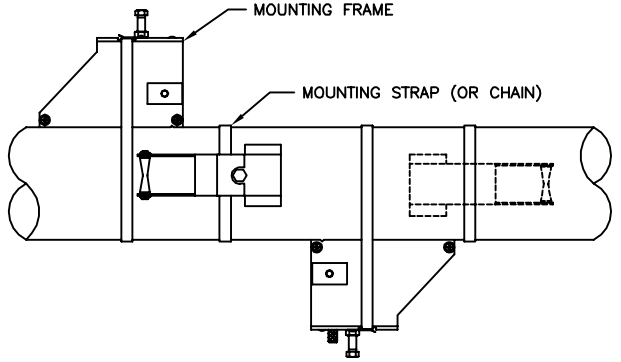
RECOMMENDED INSTALLATION
ON HORIZONTAL PIPES







POSITION FRAME ASSEMBLIES 90° APART (1/4 CIRCUMFERENCE)
BEFORE TIGHTENING ADJUSTING SCREW



NOTES:

1. USING THE INSTALLATION MENU AND THE PROCEDURE OUTLINED IN THE FIELD MANUAL. SELECT THE APPROPRIATE SENSORS AND MOUNTING FRAMES FOR THE MODE OF OPERATION CHOSEN FOR YOUR APPLICATION. REFLECT MODE IS PREFERRED.
2. SELECT MOUNTING LOCATION:
   a) SENSOR SETS SHOULD BE MOUNTED SO THAT THE PLANES OF OPERATION OF THE TWO SETS INTERSECT ORTHOGONALLY; THAT IS, 90° OR 1/4 THE CIRCUMFERENCE OF THE PIPE APART.
   b) CHOOSE A LOCATION WHICH REMAINS FULL AT ZERO FLOW. ON HORIZONTAL PIPES, MOUNT AWAY AWAY FROM THE UNDERSIDE TO AVIOD SEDIMENT BLOCKAGE OF ULTRASONIC BEAM, MOUNT AWAY FROM TOPSIDE TO AVIOD BLOCKAGE DUE TO ENTRAPPED AIR.
   c) WHERE POSSIBLE, LOCATE MOUNTING FRAME ASSEMBLIES AS FAR AS POSSIBLE DOWNSTREAM FROM ANY FLOW DISTURBANCE TO ASSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
3. MOUNT FRAMES ON PIPE:
   a) REFER TO THE APPROPRIATE INSTALLATION DRAWING FOR THE PORTABLE OR DEDICATED SENSORS AND FRAMES SELECTED FOR USE, NOTE THESE DRAWINGS PROVIDE INSTRUCTIONS FOR SINGLE PATH INSTALLATIONS, DUAL PATH SYSTEMS ARE INSTALLED IN THE SAME FASHION BY OFFSETTING A SECOND SET OF MOUNTING FRAMES IN AN ORTHOGONAL PLANE AS SHOWN ABOVE.
4. CONDITION PIPE SURFACE:
   LOCALLY SMOOTH THE PIPE SURFACE AT EACH SENSOR LOCATION AND INSTALL SENSORS IN ACCORDANCE WITH THE PROCEDURE DESCRIBED ON THE APPROPRIATE SENSOR AND FRAME INSTALLATION DRAWING. MAKE SURE THAT SENSOR PAIRS ARE INSTALLED AND CONNECTED TO THE FLOW COMPUTER CORRECTLY.
5. REFER TO THE APPROPRIATE OUTLINE DRAWINGS FOR SENSOR AND MOUNTING FRAME OUTLINE DIMENSIONS.

SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-

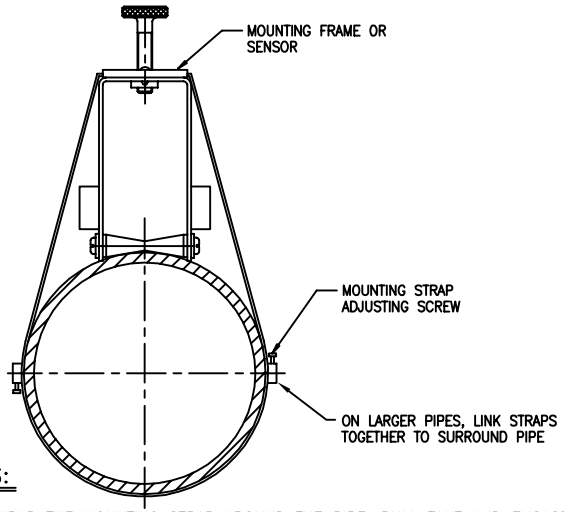
FRACTIONS	DECIMAL	ANGLES	HOLES
± 1/64"	XX±0.01 XXX±0.005	±0°30'	±.003

INSTALLATION DRAWING
DUAL PATH SENSOR SET
WITH MOUNTING FRAMES

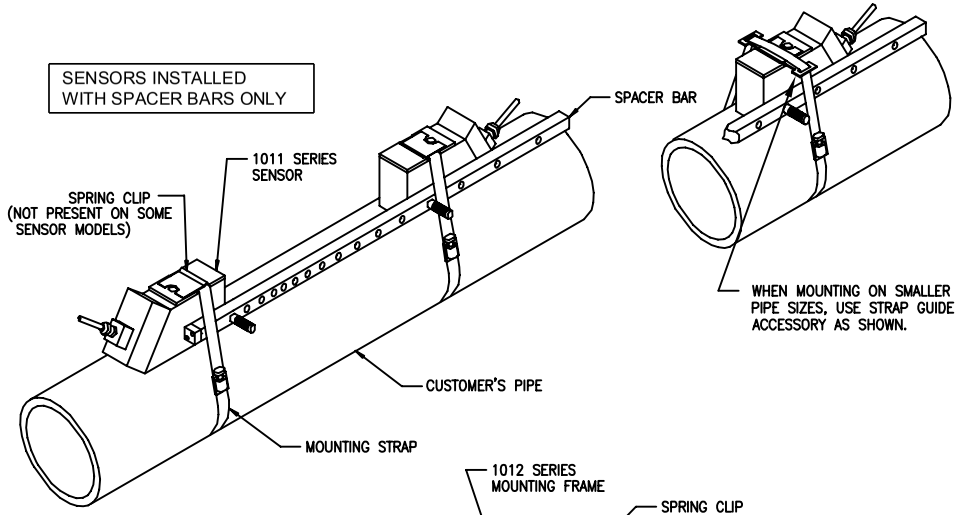
SAP MATERIAL NO.		REV —
ITEM NO.		RS —
DOCUMENT NO.	1012F-DB-7	REV 002
DRAWN BY: H.Jenkins	DATE: 6/10/2013	SCALE: NONE — SHEET 1 OF 1

INSTALLATION PROCEDURE

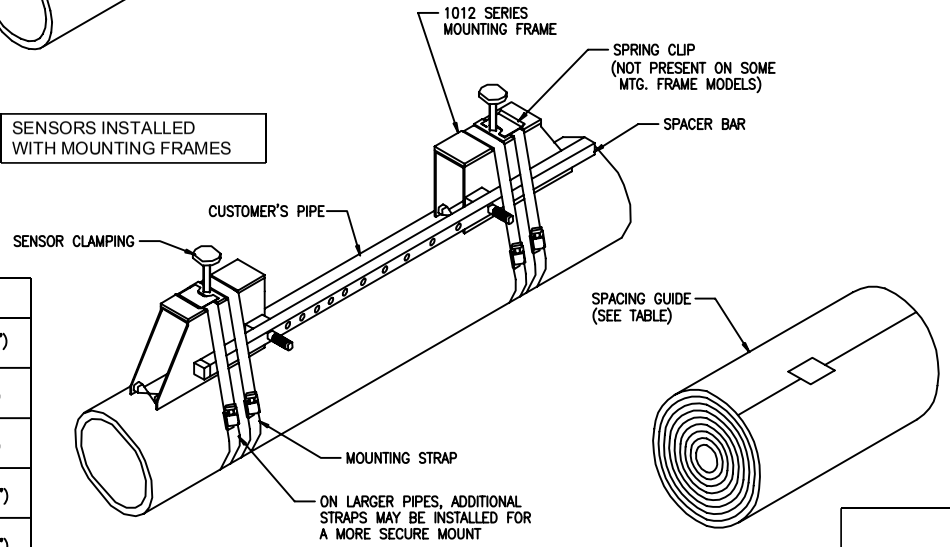
MOUNTING STRAP KITS ARE TO FASTEN SENSORS OR MOUNTING FRAMES TO THE PIPE.



SENSORS INSTALLED WITH SPACER BARS ONLY



SENSORS INSTALLED WITH MOUNTING FRAMES



NOTES:

1. WRAP THE MOUNTING STRAP AROUND THE PIPE, PULL TAUT AND ENGAGE THE END OF MOUNTING STRAP WITH THE MOUNTING STRAP ADJUSTING SCREW.
2. TIGHTEN THE ADJUSTING SCREW TO SECURE THE ASSEMBLY TO THE PIPE.
3. TO SURROUND LARGER PIPES, LINK MOUNTING STRAP SECTIONS WITH SCREW TOGETHER AS SHOWN.

ITEM No.	STRAP MTG. KIT LEGACY PART No.	PIPE DIA.	BAND SIZE (QTY)	SPACING GUIDE P/N (DESCRIPTION)
7ME39600SM00	1012MS-1A	2"-7"	#88 (2) #128 (2)	1012-145-1A (2" x 26")
7ME39600SM10	1012MS-1	2"-13"	#88 (2) #152 (2)	1012-145-1 (2" x 45")
7ME39600SM20	1012MS-2	4"-24"	#224 (2) #280 (2)	1012-145-2 (4" x 81")
7ME39600SM30	1012MS-3	24"-48"	#152 (4) #312 (4)	1012-145-3 (4" x 155")
7ME39600SM40	1012MS-4	48"-60"	36' OF 1/2" BAND AND FASTENER	1012-145-4 (6" x 196")
7ME39600SM50	1012MS-5	60"-84'	46' OF 1/2" BAND AND FASTENER	NOT SUPPLIED
7ME39600SM60	1012MS-6	84"-120"	65' OF 1/2" BAND AND FASTENER	NOT SUPPLIED
1012MS-7	1012MS-7	120"-216"	116' OF 1/2" BAND AND FASTENER	NOT SUPPLIED
1012MS-8	1012MS-8	216"-360"	190' OF 1/2" BAND AND FASTENER	NOT SUPPLIED

SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-

FRACTIONS	DECIMAL	ANGLES	HOLES
± 1/64"	XX±0.01 XXX±0.005	±0°30'	±.003

INSTALLATION / OUTLINE ADJUSTABLE MOUNTING STRAP

SAP MATERIAL NO.		REV —
ITEM NO.	SEE TABLE	RS —
DOCUMENT NO.	1012MS - 8	REV.003
DRAWN BY: H.Jenkins	DATE:	SCALE: NONE — SHEET 1 OF 2

STEP - 1

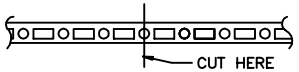
DETERMINE PROPER BAND LENGTH ONE OF TWO WAYS:

A) IF DIAMETER IS KNOWN, REFER TO BAND LENGTH TABLE OR CALCULATE MAXIMUM BAND LENGTH 3.14 x DIA. + 18", TRIM TO FIT WHEN INSTALLING.

B) IF DIAMETER IS NOT KNOWN, MEASURE CIRCUMFERENCE WITH STRING, TWINE, etc., AND ADD 18" (TO ENCIRCLE FRAMES). THIS DIMENSION IS APPROXIMATE, TRIM BAND TO FIT WHEN INSTALLING.

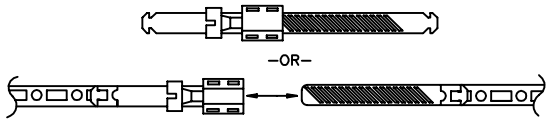
STEP - 2

MEASURE BAND TO PROPER LENGTH AND CUT THROUGH CENTER OF NEAREST ROUND HOLE WITH SHEARS, SNIPS, HACKSAW etc.

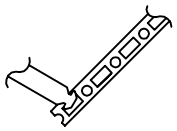


STEP - 3

EITHER MATE FASTENER HALVES AND THEN LINK TO STRAP ALREADY IN PLACE AROUND PIPE, OR LINK FASTENER HALVES INDEPENDENTLY TO STRAP ENDS (HOLD IN PLACE WITH TAPE IF NECESSARY) AND ENGAGE FASTENER AFTER WRAPPING STRAP AROUND PIPE.

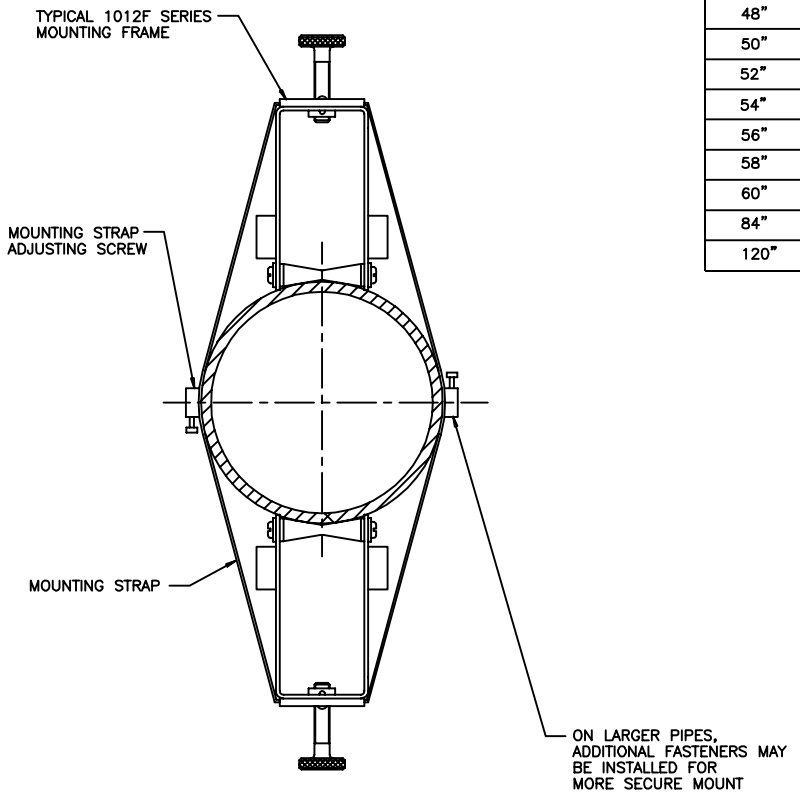


DIAGONALLY INSERT FASTENER END INTO RECTANGULAR SLOTS TO LINK WITH STRAP (INSERT AT LOCATION BEST SUITED FOR TIGHT FIT).



STEP - 4

USING STRAPS MADE TO SIZE REQUIRED, INSTALL MOUNTING TRACKS AND SENSORS IN ACCORDANCE WITH APPROPRIATE INSTALLATION DRAWING FOR SPECIFIC TRACK ASSEMBLIES.



BAND LENGTH TABLE	
PIPE DIA.	LENGTH TO CUT ON MARK
48"	167–5/16"
50"	173–9/16"
52"	177–7/8"
54"	180–3/16"
56"	186–7/16"
58"	188–3/4"
60"	195"
84"	267–3/8"
120"	380–1/2"

NOTES:

1. BAND LENGTHS ARE APPROXIMATE AND CALCULATED FOR USE OF SIZE "D" OR "E" SENSORS.

SIEMENS
Siemens Industry, Inc.
Industry Automation Division
Hauppauge, NY 11788

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ON-
FRACTIONS ± 1/64" DECIMAL XX±0.01 XXX±0.005 ANGLES ±0°30' HOLES ±.003

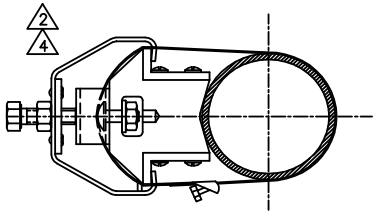
INSTALLATION / OUTLINE ADJUSTABLE MOUNTING STRAP

SAP MATERIAL NO.		REV —
ITEM NO.	SEE TABLE	RS —
DOCUMENT NO.	1012MS - 8	REV.003
DRAWN BY: H.Jenkins	DATE:	SCALE: NONE SHEET 1 OF 2

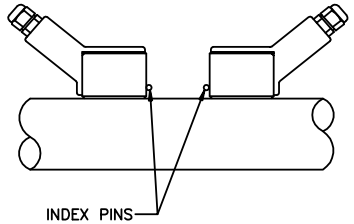
REFLECT MODE INSTALLATION

1011N UNIVERSAL TRANSDUCER AND TRACK

SELECT AND PREPARE THE TRANSDUCER MOUNTING LOCATION, SECURE TRACKS TO PIPE WITH STRAP

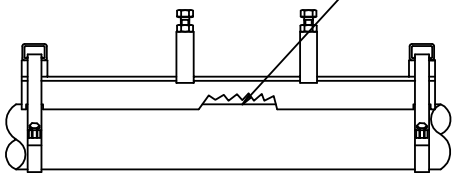


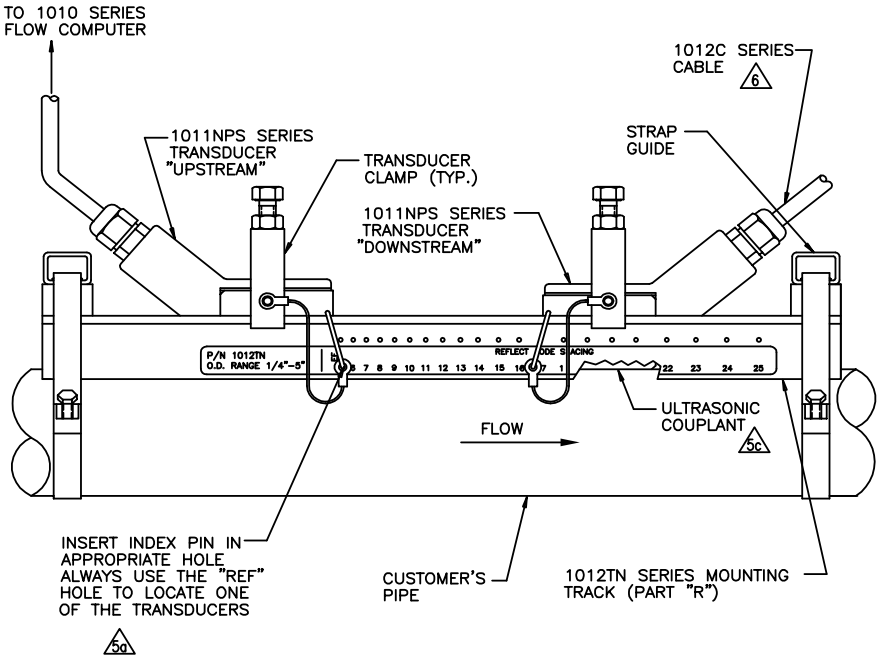
TRANSDUCER INDEX PIN ORIENTATION



ORIENTATION OF PROPERLY INSTALLED TRANSDUCERS IN REFLECT MODE OPERATION

CONDITION PIPE SURFACE AT THE TRANSDUCER MOUNTING LOCATION USING THE ABRASIVE PAD SUPPLIED. 3





INSTALLATION PROCEDURE – SEE DRAWING REFERENCES 4

1. USING THE INSTALLATION MENU PROCEDURES PRESENTED IN THE 1010 FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND TRACK FOR REFLECT MODE OPERATION ON THE CHOSEN PIPE.
2. SELECT MOUNTING LOCATION;
   a) CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
   b) WHERE POSSIBLE LOCATE TRACK ASS'Y TEN (10) PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
   c) ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE, TO AVOID SEDIMENT BLOCKAGE OF TRANSDUCER SIGNAL.
3. PREPARE PIPE FOR TRACK MOUNT;
   a) REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
   b) CLEAN AND DEGREASE SURFACE
   c) DO NOT MOUNT OVER FROST.
   d) CONDITION PIPE SURFACE; LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE ABRASIVE PAD PROVIDED.
4. MOUNT TRACK ON PIPE;
   a) PLACE TRACK RAIL ASS'Y (ASS'Y WITH STRAP) AGAINST PIPE. WHILE HOLDING TRACK, WRAP STRAP AROUND PIPE AND TIGHTEN.
   b) ROTATE ASS'Y AROUND THE PIPE FOR PROPER POSITIONING. ONCE THAT HAS BEEN ACHIEVED, SECURE THE TRACK RAIL ASS'Y TO THE PIPE WITH THE STRAP.
5. LOCATE TRANSDUCERS;
   a) CONSULTING THE 1010 FIELD MANUAL, USE THE INSTALLATION MENU TO DETERMINE THE APPROPRIATE INDEX HOLES FOR YOUR APPLICATION AND INSERT PINS.
   b) APPLY A THIN BAND OF THE ULTRASONIC COUPLANT PROVIDED TO THE BASE OF EACH TRANSDUCER.
   c) INSERT TRANSDUCERS INTO TRACK AS SHOWN, BANKING AGAINST INDEX PINS. SECURE TRANSDUCERS WITH CLAMPS.
6. MAKE TRANSDUCER CABLE CONNECTIONS IN ACCORDANCE WITH THE APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 1010 FIELD MANUAL.
7. SEE DRAWING 1012TN-8 AND 1011NPS-8 FOR TRACK AND TRANSDUCER OUTLINE DIMENSIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-

INCHES	(MM)
+/- .1	+/- 2

CONTRACT NO.

DR	H.J	DATE 6/10/98
CHK		DATE
ENG		DATE
PROD		DATE
APPD		DATE

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

INSTALLATION DRAWING 1010 SERIES TRANSDUCERS AND MOUNTING TRACKS

SIZE	CODE IDENT NO.		REV.
C	21614	1012TN-7	A

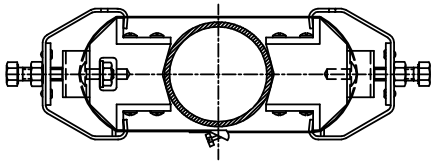
SCALE: NONE | WT. | SHEET 1 OF 2

R14: 1012TN-7A rev.A

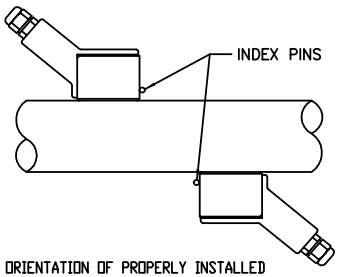
DIRECT MODE INSTALLATION

1011N UNIVERSAL TRANSDUCER AND TRACK

SELECT AND PREPARE THE TRANSDUCER MOUNTING LOCATION, SECURE TRACKS TO PIPE WITH STRAP

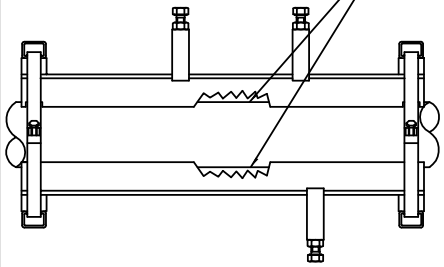


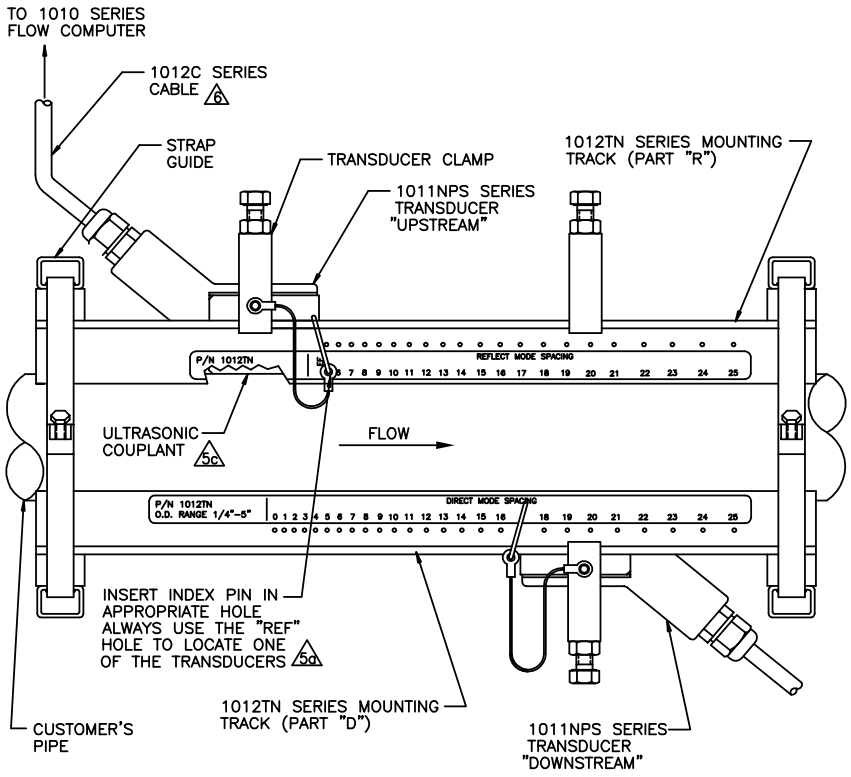
TRANSDUCER INDEX PIN ORIENTATION



ORIENTATION OF PROPERLY INSTALLED TRANSDUCERS IN DIRECT MODE OPERATION

CONDITION PIPE SURFACE AT THE TRANSDUCER MOUNTING LOCATION USING THE ABRASIVE PAD SUPPLIED. (3)





INSTALLATION PROCEDURE – SEE DRAWING REFERENCES (4)

1. USING THE INSTALLATION MENU, PROCEDURES PRESENTED IN THE 1010 FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND TRACK FOR DIRECT MODE OPERATION ON THE CHOSEN PIPE.
2. SELECT MOUNTING LOCATION;
   a) CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
   b) WHERE POSSIBLE LOCATE TRACK ASS'Y TEN(10) PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
   c) ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE, TO AVOID SEDIMENT BLOCKAGE OF TRANSDUCER SIGNAL.
3. PREPARE PIPE FOR TRACK MOUNT;
   a) REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
   b) CLEAN AND DEGREASE SURFACE
   c) DO NOT MOUNT OVER FROST.
   d) CONDITION PIPE SURFACE; LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE ABRASIVE PAD PROVIDED.
4. MOUNT TRACK ON PIPE;
   a) PLACE TRACK RAIL ASS'Y (ASS'Y WITH STRAP) AGAINST PIPE. WHILE HOLDING TRACK, PLACE THE SECOND TRACK ONTO THE PIPE AND HOLD TOGETHER IN PLACE.
   b) ROTATE ASS'Y AROUND THE PIPE FOR PROPER POSITIONING. ONCE THAT HAS BEEN ACHIEVED, SECURE THE TRACK RAIL ASS'Y TO THE PIPE WITH THE STRAP.
5. LOCATE TRANSDUCERS;
   a) CONSULTING THE 1010 FIELD MANUAL, USE THE INSTALLATION MENU TO DETERMINE THE APPROPRIATE INDEX HOLES FOR YOUR APPLICATION AND INSERT PINS.
   b) APPLY A THIN BAND OF THE ULTRASONIC COUPLANT PROVIDED TO THE BASE OF EACH TRANSDUCER.
   c) INSERT TRANSDUCERS INTO TRACK AS SHOWN, BANKING AGAINST INDEX PINS. SECURE TRANSDUCERS WITH CLAMPS.
6. MAKE TRANSDUCER CABLE CONNECTIONS IN ACCORDANCE WITH THE APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 1010 FIELD MANUAL.
7. SEE DRAWING 1012TN-8 AND 1011NPS-8 FOR TRACK AND TRANSDUCER OUTLINE DIMENSIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON-

INCHES	(MM)
+/- .1	+/- 2

CONTRACT NO.

DR	H.J	DATE 6/10/98
CHK		DATE
ENG		DATE
PROD		DATE
APP'D		DATE

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

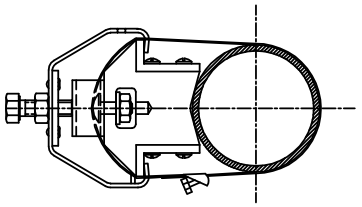
INSTALLATION DRAWING 1010 SERIES TRANSDUCERS AND MOUNTING TRACKS

SIZE	CODE IDENT NO.		REV.
C	21614	1012TN-7	A
SCALE: NONE	WT.		SHEET 2 OF 2

R14: 1012TN-7B rev.A

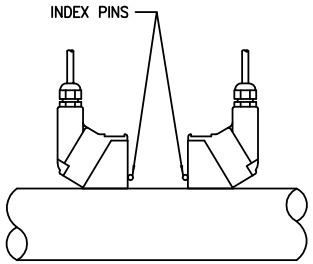
REFLECT MODE INSTALLATION

1011HN HIGH PRECISION TRANSDUCER AND TRACK



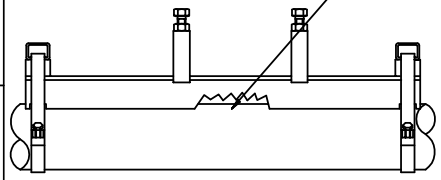
SELECT AND PREPARE THE TRANSDUCER MOUNTING LOCATION, SECURE TRACKS TO PIPE WITH STRAP

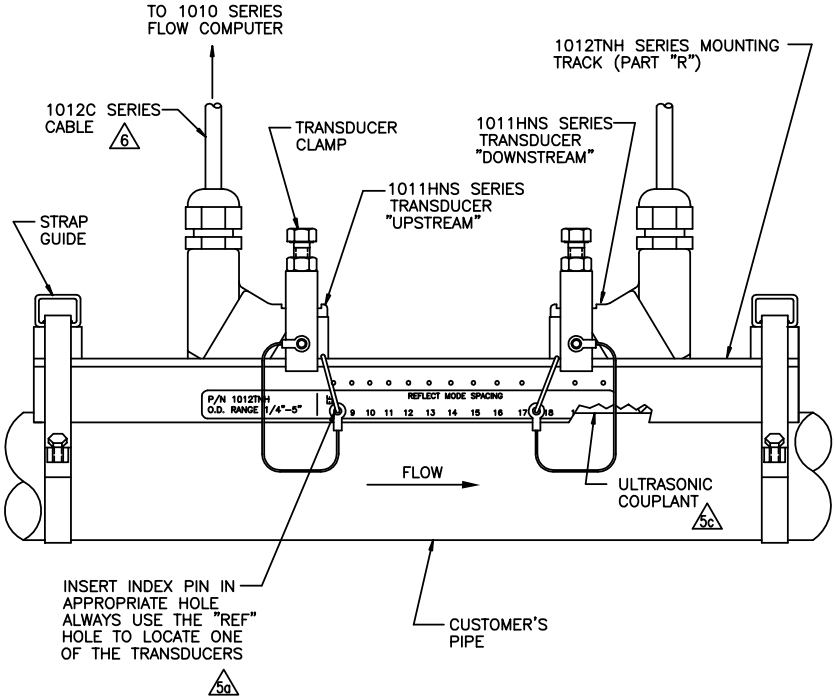
TRANSDUCER INDEX PIN ORIENTATION



ORIENTATION OF PROPERLY INSTALLED TRANSDUCERS IN REFLECT MODE OPERATION

CONDITION PIPE SURFACE AT THE TRANSDUCER MOUNTING LOCATION USING THE ABRASIVE PAD SUPPLIED.





INSTALLATION PROCEDURE – SEE DRAWING REFERENCES

1. USING THE INSTALLATION MENU PROCEDURES PRESENTED IN THE 1010 FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND TRACK FOR REFLECT MODE OPERATION ON THE CHOSEN PIPE.
2. SELECT MOUNTING LOCATION;
   a) CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
   b) WHERE POSSIBLE LOCATE TRACK ASS'Y TEN (10) PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
   c) ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE, TO AVOID SEDIMENT BLOCKAGE OF TRANSDUCER SIGNAL.
3. PREPARE PIPE FOR TRACK MOUNT;
   a) REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
   b) CLEAN AND DEGREASE SURFACE
   c) DO NOT MOUNT OVER FROST.
   d) CONDITION PIPE SURFACE; LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE ABRASIVE PAD PROVIDED.
4. MOUNT TRACK ON PIPE;
   a) PLACE TRACK RAIL ASS'Y (ASS'Y WITH STRAP) AGAINST PIPE. WHILE HOLDING TRACK, WRAP STRAP AROUND PIPE AND TIGHTEN.
   b) ROTATE ASS'Y AROUND THE PIPE FOR PROPER POSITIONING. ONCE THAT HAS BEEN ACHIEVED, SECURE THE TRACK RAIL ASS'Y TO THE PIPE WITH THE STRAP.
5. LOCATE TRANSDUCERS;
   a) CONSULTING THE 1010 FIELD MANUAL, USE THE INSTALLATION MENU TO DETERMINE THE APPROPRIATE INDEX HOLES FOR YOUR APPLICATION AND INSERT PINS.
   b) APPLY A THIN BAND OF THE ULTRASONIC COUPLANT PROVIDED TO THE BASE OF EACH TRANSDUCER.
   c) INSERT TRANSDUCERS INTO TRACK AS SHOWN, BANKING AGAINST INDEX PINS. SECURE TRANSDUCERS WITH CLAMPS.
6. MAKE TRANSDUCER CABLE CONNECTIONS IN ACCORDANCE WITH THE APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 1010 FIELD MANUAL.
7. SEE DRAWING 1012TNH–8 AND 1011HNS–8 FOR TRACK AND TRANSDUCER OUTLINE DIMENSIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON–

INCHES	(MM)
+/– .1	+/– 2

CONTRACT NO.

DR	H.J	DATE 6/10/98
CHK		DATE
ENG		DATE
PROD		DATE
APPD		DATE

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

INSTALLATION DRAWING 1010 SERIES TRANSDUCERS AND MOUNTING TRACKS

SIZE	CODE IDENT NO.		REV.
C	21614	1012TNH-7	A

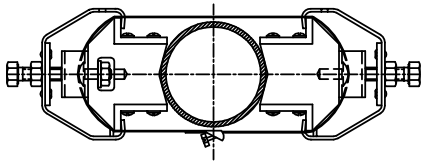
SCALE: NONE | WT. | SHEET 1 OF 2

R14: 1012TNH–7A rev.A

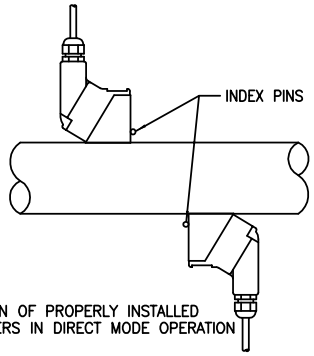
DIRECT MODE INSTALLATION

1011HN HIGH PRECISION TRANSDUCER AND TRACK

SELECT AND PREPARE THE TRANSDUCER MOUNTING LOCATION, SECURE TRACKS TO PIPE WITH STRAP

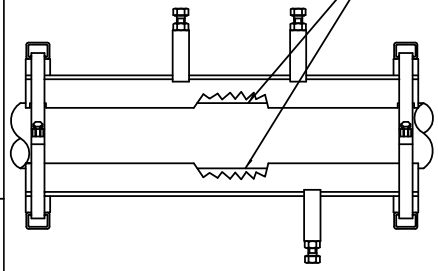


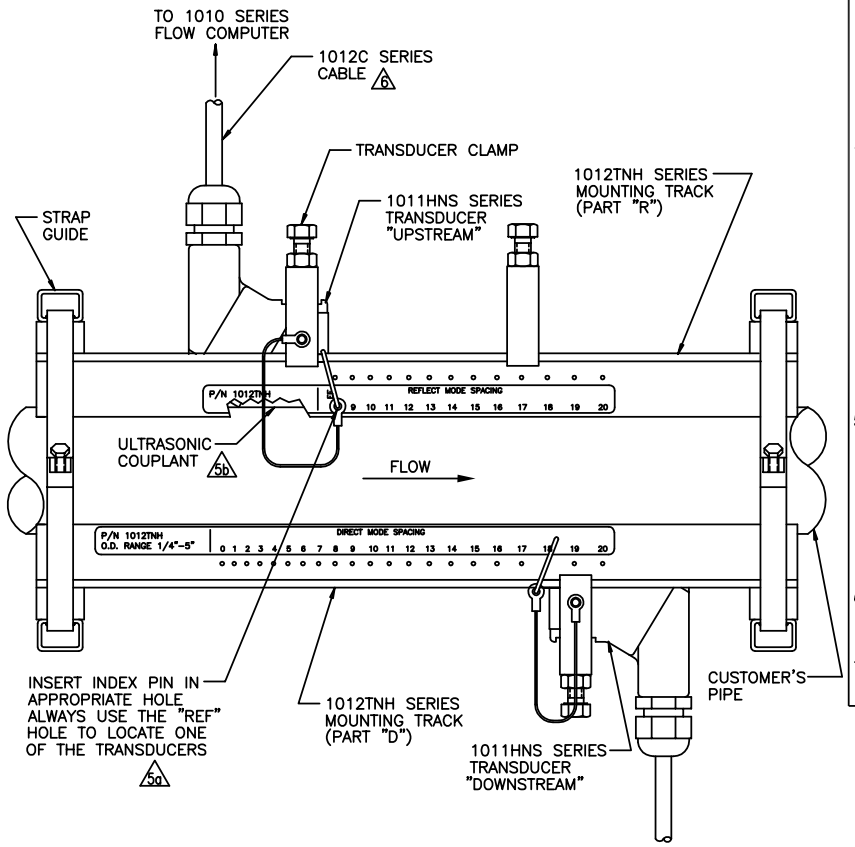
TRANSDUCER INDEX PIN ORIENTATION



ORIENTATION OF PROPERLY INSTALLED TRANSDUCERS IN DIRECT MODE OPERATION

CONDITION PIPE SURFACE AT THE TRANSDUCER MOUNTING LOCATION USING THE ABRASIVE PAD SUPPLIED.





INSTALLATION PROCEDURE – SEE DRAWING REFERENCES

1. USING THE INSTALLATION MENU, PROCEDURES PRESENTED IN THE 1010 FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND TRACK FOR DIRECT MODE OPERATION ON THE CHOSEN PIPE.
2. SELECT MOUNTING LOCATION;
   a) CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
   b) WHERE POSSIBLE LOCATE TRACK ASS'Y TEN(10) PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
   c) ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE, TO AVOID SEDIMENT BLOCKAGE OF TRANSDUCER SIGNAL.
3. PREPARE PIPE FOR TRACK MOUNT;
   a) REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
   b) CLEAN AND DEGREASE SURFACE
   c) DO NOT MOUNT OVER FROST.
   d) CONDITION PIPE SURFACE; LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE ABRASIVE PAD PROVIDED.
4. MOUNT TRACK ON PIPE;
   a) PLACE TRACK RAIL ASS'Y (ASS'Y WITH STRAP) AGAINST PIPE. WHILE HOLDING TRACK, PLACE THE SECOND TRACK ONTO THE PIPE AND HOLD TOGETHER IN PLACE.
   b) ROTATE ASS'Y AROUND THE PIPE FOR PROPER POSITIONING. ONCE THAT HAS BEEN ACHIEVED, SECURE THE TRACK RAIL ASS'Y TO THE PIPE WITH THE STRAP.
5. LOCATE TRANSDUCERS;
   a) CONSULTING THE 1010 FIELD MANUAL, USE THE INSTALLATION MENU TO DETERMINE THE APPROPRIATE INDEX HOLES FOR YOUR APPLICATION AND INSERT PINS.
   b) APPLY A THIN BAND OF THE ULTRASONIC COUPLANT PROVIDED TO THE BASE OF EACH TRANSDUCER.
   c) INSERT TRANSDUCERS INTO TRACK AS SHOWN, BANKING AGAINST INDEX PINS. SECURE TRANSDUCERS WITH CLAMPS.
6. MAKE TRANSDUCER CABLE CONNECTIONS IN ACCORDANCE WITH THE APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 1010 FIELD MANUAL.
7. SEE DRAWING 1012TNH–8 AND 1011HNS–8 FOR TRACK AND TRANSDUCER OUTLINE DIMENSIONS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON–

INCHES	(MM)
+/– .1	+/– 2

CONTRACT NO.

DR	H.J	DATE 6/10/98
CHK		DATE
ENG		DATE
PROD		DATE
APPD		DATE

CERTIFIED

DATE

CONTROLOTRON
HAUPPAUGE , NY 11788

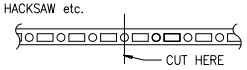
INSTALLATION DRAWING
1010 SERIES TRANSDUCERS
AND MOUNTING TRACKS

SIZE	CODE IDENT NO.		REV.
C	21614	1012TNH-7	A
SCALE: NONE	WT.	SHEET 2 OF 2	

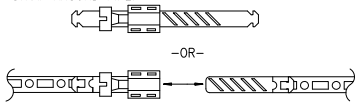
R14: 1012TNH–7B rev.A

STEP - 1 DETERMINE PROPER BAND LENGTH ONE OF TWO WAYS:
A) IF DIAMETER IS KNOWN, REFER TO BAND LENGTH TABLE OR CALCULATE BAND LENGTH = 3.14 x DIA.– 3.5".
B) IF DIAMETER IS NOT KNOWN, MEASURE CIRCUMFERENCE WITH STRING, TWINE, etc., AND SUBTRACT 3.5" (TO ALLOW LENGTH OF FASTENER) TO DETERMINE PROPER BAND LENGTH.

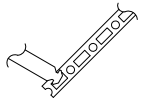
STEP - 2 MEASURE BAND TO PROPER LENGTH AND CUT THROUGH CENTER OF NEAREST ROUND HOLE WITH SHEARS, SNIPS, HACKSAW etc.



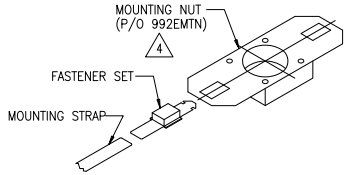
STEP - 3 EITHER MATE FASTENER HALVES AND THEN LINK TO STRAP ALREADY IN PLACE AROUND PIPE, OR LINK FASTENER HALVES INDEPENDENTLY TO STRAP ENDS (HOLD IN PLACE WITH TAPE (IF NECESSARY) AND ENGAGE FASTENER AFTER WRAPPING STRAP AROUND PIPE.

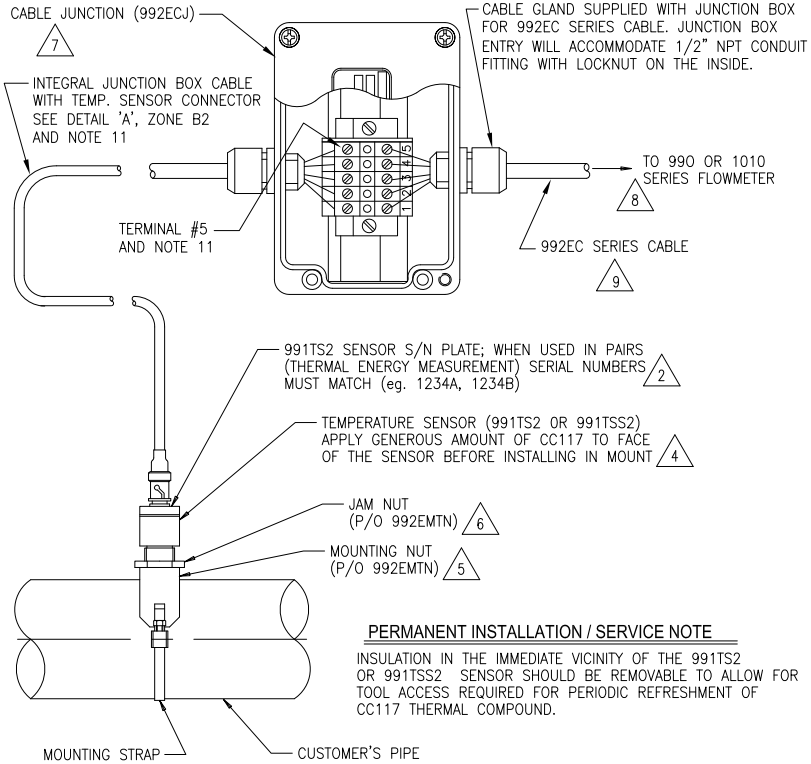


DIAGONALLY INSERT FASTENER END INTO RECTANGULAR SLOTS TO LINK WITH STRAP (INSERT AT LOCATION BEST SUITED FOR TIGHT FIT).



STEP - 4 MATE "T" ON FASTENERS WITH RECTANGULAR CUT–OUT ON MOUNTING NUT ASSEMBLY.
SIZE 2 MOUNTING ASSY'S INCLUDE FIXED LENGTH STRAPS TO MATE WITH FASTENERS ATTACHED TO MOUNTING NUT.
SIZES 3 & 4 MOUNTING ASSY'S INCLUDE A CUT–TO–FIT MOUNTING STRAP. (SEE STEP 3).

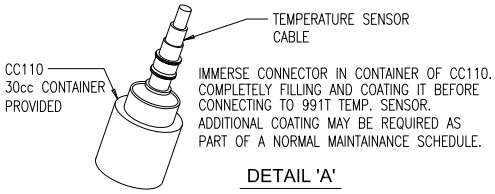




PERMANENT INSTALLATION / SERVICE NOTE

INSULATION IN THE IMMEDIATE VICINITY OF THE 991TS2 OR 991TSS2 SENSOR SHOULD BE REMOVABLE TO ALLOW FOR TOOL ACCESS REQUIRED FOR PERIODIC REFRESHMENT OF CC117 THERMAL COMPOUND.

FOR HARSH OR HEAVY CONDENSATE ENVIRONMENTS:
SERVICE TEMPERATURE RANGE: -40°F TO +150°F



IMMERSE CONNECTOR IN CONTAINER OF CC110. COMPLETELY FILLING AND COATING IT BEFORE CONNECTING TO 991T TEMP. SENSOR. ADDITIONAL COATING MAY BE REQUIRED AS PART OF A NORMAL MAINTAINANCE SCHEDULE.

DETAIL 'A'

INSTALLATION PROCEDURE – SEE DRAWING REFERENCE 4

1. INSTALLATION OF THE DEDICATED NEMA 4 TEMPERATURE SENSOR FOR PIPES 1 1/4" – 48" DIAMETER REQUIRES THE FOLLOWING: THE SENSOR 991TS2(OR 991TSS2), A MOUNTING ASS'Y 992EMTN(–2,–3,–4), AND A CABLE 992ECN–(LENGTH) IN TWO PARTS, JUNCTION 992ECJ AND CABLE 992ECC–(LENGTH).SEE NOTE 10.
2. TEMPERATURE SENSORS ARE SUPPLIED IN PAIRS (P/N 991TS2) FOR THERMAL ENERGY FLOWMETER APPLICATIONS OR SINGLY (P/N 991TSS2) FOR TEMPERATURE COMPENSATED MASS FLOWMETER APPLICATIONS.
3. SELECT THE PIPE LOCATION WHERE TEMPERATURE IS TO BE MONITORED IN ACCORDANCE WITH RECOMMENDATIONS IN THE FIELD MANUAL.
4. CLEAN A SMALL AREA OF PIPE SURFACE (APPROXIMATELY 1" DIAMETER); REMOVE PAINT, SCALE, FOREIGN MATTER THAT CAN AFFECT GOOD THERMAL CONTACT.
5. CENTER THE MOUNTING NUT (PART OF 992EMTN) OVER THE CLEAN SPOT AND STRAP IN PLACE. ALLOW THE STRAP TO REACH APPROXIMATELY THE TEMPERATURE OF THE PIPE AND TIGHTEN SECURELY.
6. SPIN THE JAM NUT (PART OF 992EMTN) ONTO THE SENSOR BODY (991TS2 OR 991TSS2). APPLY A GENEROUS AMOUNT OF THERMAL COUPLANT (SUPPLIED WITH 992EMTN) TO THE FACE OF THE SENSOR AND SCREW IT INTO THE MOUNTING NUT, HAND TIGHT ENGAGEMENT IS SUFFICIENT. SECURE THE SENSOR BY TIGHTENING THE JAM NUT AGAINST THE MOUNTING NUT.
7. SELECT A MOUNTING LOCATION FOR THE 992ECJ JUNCTION BOX. USE INTEGRAL MOUNTING FLANGES OR SECURE AT THE END OF RIGID CONDUIT. IF CONDUIT IS USED, REMOVE THE WATERTIGHT GLAND SUPPLIED WITH THE 992ECC CABLE. INSTALL THE 992ECC CABLE, MAKING WIRING CONNECTIONS 1–5 AS SHOWN.
8. MAKE CABLE CONNECTIONS TO THE 994 OR 1010 SERIES FLOWMETER IN ACCORDANCE WITH THE APPROPRIATE FLOWMETER INSTALLATION DRAWING.
9. STANDARD TEMPERATURE SENSOR CABLE AND JUNCTION BOX ARE PART NUMBERS 992ECC–(LENGTH) AND 992ECJ RESPECTIVELY. FOR PLENUM RATED CABLE ASSEMBLIES, USE CABLE AND JUNCTION BOX PART NUMBERS 992ECCD–(LENGTH) AND 992ECJD.
10. SEE DRAWING 991TS2–8 FOR OUTLINE DIMENSIONS.
11. IF NECESSARY, TO ISOLATE RTD BODY FROM FLOW METER GROUND, DISCONNECT TERMINAL #5 AND TAPE BACK TO PREVENT ELECTRICAL CONTACT, THIS GROUND ISOLATION DOES NOT AFFECT SAFETY.

BAND LENGTH TABLE

PIPE DIA.	LENGTH TO CUT ON MARK	PIPE DIA.	LENGTH TO CUT ON MARK	PIPE DIA.	LENGTH TO CUT ON MARK
6"	14–3/16"	16"	45–7/8"	32"	95–3/8"
7"	16–3/4"	17"	48–7/16"	34"	101–5/8"
8"	20–1/2"	18"	52–1/8"	36"	107–7/8"
9"	23–1/8"	19"	54–3/4"	38"	114–1/4"
10"	26–7/8"	20"	58–1/2"	40"	120–9/16"
11"	29–3/8"	22"	64–7/8"	42"	127"
12"	33–5/16"	24"	71–1/8"	44"	133–5/16"
13"	33–3/4"	26"	76–1/4"	46"	139–5/8"
14"	39–1/2"	28"	85–5/8"	48"	145–15/16"
15"	42–1/16"	30"	88–7/8"		

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON–

INCHES	(MM)
± .1	± 2

MATERIAL:

FINISH:

DR	H.J	DATE 11/14/96
CHK		DATE
ENG		DATE
PROD		DATE
APPD		DATE

CERTIFIED

DATE

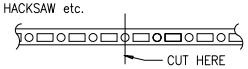
SIEMENS
Siemens Energy & Automation, Inc.
Process Instrumentation Business Unit
CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788

INSTALLATION DRAWING, TEMP.SENOR, DEDICATED, NEMA 4 PIPE O.D. 1 1/4"- 48" (32-1220MM)

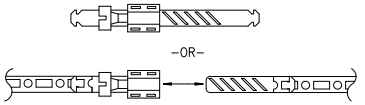
SIZE			
C	SAP MATERIAL NO.		REV
	ITEM NO.		AS
	DOCUMENT NO.	991TS2-7	DS 03
SCALE: NONE	WT.		SHEET 1 OF 1

STEP - 1 DETERMINE PROPER BAND LENGTH ONE OF TWO WAYS:
A) IF DIAMETER IS KNOWN, REFER TO BAND LENGTH TABLE OR CALCULATE BAND LENGTH = 3.14 x DIA.– 3.5".
B) IF DIAMETER IS NOT KNOWN, MEASURE CIRCUMFERENCE WITH STRING, TWINE, etc., AND SUBTRACT 3.5" (TO ALLOW LENGTH OF FASTENER) TO DETERMINE PROPER BAND LENGTH.

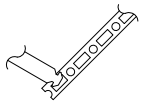
STEP - 2 MEASURE BAND TO PROPER LENGTH AND CUT THROUGH CENTER OF NEAREST ROUND HOLE WITH SHEARS, SNIPS, HACKSAW etc.



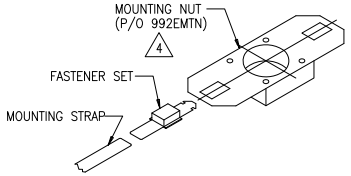
STEP - 3 EITHER MATE FASTENER HALVES AND THEN LINK TO STRAP ALREADY IN PLACE AROUND PIPE, OR LINK FASTENER HALVES INDEPENDENTLY TO STRAP ENDS (HOLD IN PLACE WITH TAPE (IF NECESSARY) AND ENGAGE FASTENER AFTER WRAPPING STRAP AROUND PIPE.

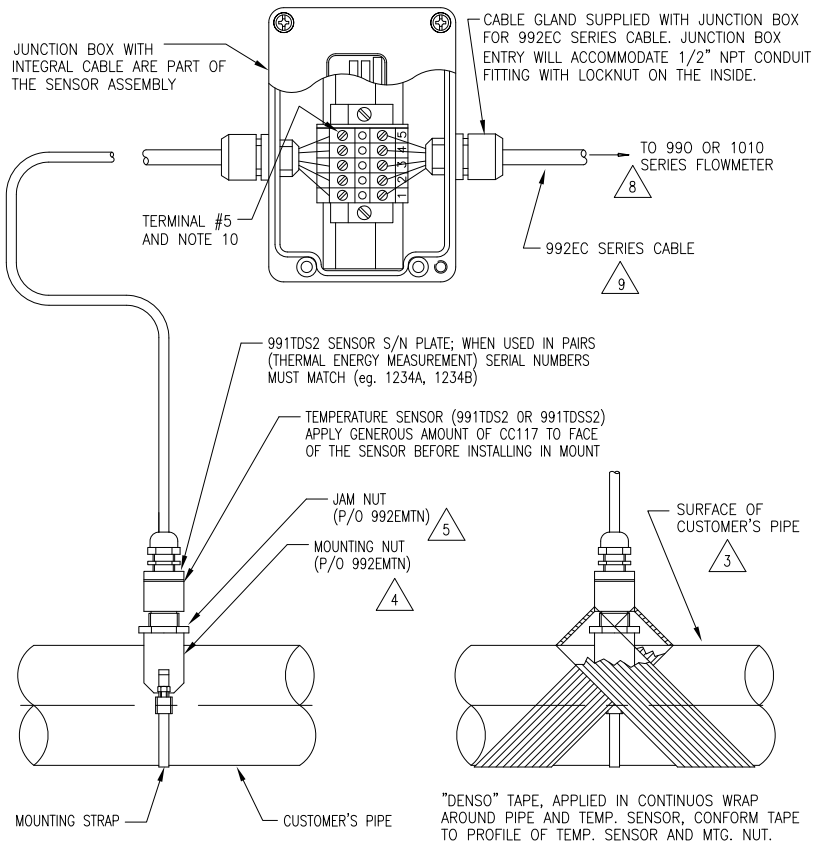


DIAGONALLY INSERT FASTENER END INTO RECTANGULAR SLOTS TO LINK WITH STRAP (INSERT AT LOCATION BEST SUITED FOR TIGHT FIT).



STEP - 4 MATE "T" ON FASTENERS WITH RECTANGULAR CUT–OUT ON MOUNTING NUT ASSEMBLY.
SIZE 2 MOUNTING ASSY'S INCLUDE FIXED LENGTH STRAPS TO MATE WITH FASTENERS ATTACHED TO MOUNTING NUT.
SIZES 3 & 4 MOUNTING ASSY'S INCLUDE A CUT–TO–FIT MOUNTING STRAP. (SEE STEP 3).





INSTALLATION PROCEDURE – SEE DRAWING REFERENCE 4

1. INSTALLATION OF THE DEDICATED NEMA 4 TEMPERATURE SENSOR FOR PIPES 1 1/4" – 48" DIAMETER CONSISTS OF THE FOLLOWING: THE SENSOR P/N 991TDS2/991TDSS2 WITH INTEGRAL CABLE AND JUNCTION BOX, A CABLE 992ECC–(LENGTH), AND MOUNTING ASS'Y 992EMTN(–2,–3 OR –4).
2. SELECT THE PIPE LOCATION WHERE TEMPERATURE IS TO BE MONITORED IN ACCORDANCE WITH RECOMMENDATIONS IN THE FIELD MANUAL.
3. CLEAN A SMALL AREA OF PIPE SURFACE (APPROXIMATELY 1" DIAMETER); REMOVE PAINT, SCALE, FOREIGN MATTER THAT CAN AFFECT GOOD THERMAL CONTACT.
4. CENTER THE MOUNTING NUT (PART OF 992EMTN) OVER THE CLEAN SPOT AND STRAP IN PLACE. ALLOW THE STRAP TO REACH APPROXIMATELY THE TEMPERATURE OF THE PIPE AND TIGHTEN SECURELY.
5. SPIN THE JAM NUT (PART OF 992EMTN) ONTO THE SENSOR BODY (991TDS2 OR 991TDSS2). APPLY A GENEROUS AMOUNT OF THERMAL COUPLANT (SUPPLIED WITH 992EMTN) TO THE FACE OF THE SENSOR AND SCREW IT INTO THE MOUNTING NUT, HAND TIGHT ENGAGEMENT IS SUFFICIENT. SECURE THE SENSOR BY TIGHTENING THE JAM NUT AGAINST THE MOUNTING NUT.
6. SELECT A MOUNTING LOCATION FOR THE JUNCTION BOX USE INTEGRAL MOUNTING HOLES OR SECURE AT END OF RIGID CONDUIT. IF CONDUIT IS USED, REMOVE THE WATERTIGHT GLAND SUPPLIED WITH THE JUCNTION BOX. INSTALL THE 992ECC CABLE, MAKING WIRING CONNECTIONS 1–5 AS SHOWN.
7. AFTER TEMPERATURE SENSOR HAS BEEN POSITIONED PROPERLY, PROTECTIVELY ENCAPSULATE IT AS FOLLOWS: PACK "DENSO" MASTIC AROUND TEMPERATURE SENSOR. SURFACE OF PIPE AND MOUNTING STRAP SHOULD BE CLEAN AND RUBBED WITH "DENSO" PASTE BEFORE WRAPPING. WRAP "DENSO" TAPE AROUND PIPE, STRAP AND TEMPERATURE SENSOR. SMOOTH THE TAPE SURFACE AFTER WRAPPING.
8. MAKE CABLE CONNECTIONS TO THE 994 OR 1010 SERIES FLOWMETER IN ACCORDANCE WITH THE APPROPRIATE FLOWMETER INSTALLATION DRAWING.
9. STANDARD TEMPERATURE SENSOR CABLE IS PART NUMBER 992ECC–(LENGTH) FOR PLENUM RATED CABLE ASSEMBLIES, USE CABLE PART NUMBER 992ECCD–(LENGTH)
10. IF NECESSARY, TO ISOLATE RTD BODY FROM FLOW METER GROUND, DISCONNECT TERMINAL #5 AND TAPE BACK TO PREVENT ELECTRICAL CONTACT, THIS GROUND ISOLATION DOES NOT AFFECT SAFETY.
11. SEE DRAWING 991TDS2–8 FOR OUTLINE DIMENSIONS.

BAND LENGTH TABLE

PIPE DIA.	LENGTH TO CUT ON MARK	PIPE DIA.	LENGTH TO CUT ON MARK	PIPE DIA.	LENGTH TO CUT ON MARK
6"	14–3/16"	16"	45–7/8"	32"	95–3/8"
7"	16–3/4"	17"	48–7/16"	34"	101–5/8"
8"	20–1/2"	18"	52–1/8"	36"	107–7/8"
9"	23–1/8"	19"	54–3/4"	38"	114–1/4"
10"	26–7/8"	20"	58–1/2"	40"	120–9/16"
11"	29–3/8"	22"	64–7/8"	42"	127"
12"	33–5/16"	24"	71–1/8"	44"	133–5/16"
13"	33–3/4"	26"	76–1/4"	46"	139–5/8"
14"	39–1/2"	28"	85–5/8"	48"	145–15/16"
15"	42–1/16"	30"	88–7/8"		

NOTES:

1. TO AID INSTALLATION, THE TEMP. SENSOR CABLE MAY BE DISCONNECTED FROM THE CABLE JUNCTION. THE CAP RING AND SEALING GLAND REMAIN ON CABLE.
2. EACH TEMP.SENSOR WRAP KIT CONSISTS OF:
   1–ROLL OF 2" WIDE "DENSO" TAPE
   1– 1# BLOCK OF "DENSO" MASTIC
   1– 1/2# CONTAINER OF "DENSO" PASTE (P/N 991–82).

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES (MM)
TOLERANCES ON–

INCHES	(MM)
± .1	± 2

MATERIAL:

FINISH:

DR	H.J	DATE	11/14/96
CHK		DATE	
ENG		DATE	
PROD		DATE	
APPD		DATE	

CERTIFIED

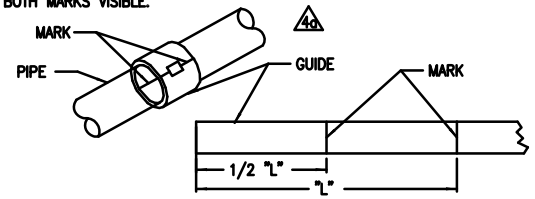
DATE

SIEMENS
Siemens Energy & Automation, Inc.
Process Instrumentation Business Unit
CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788

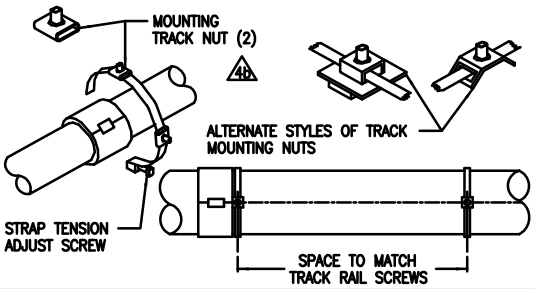
INSTALLATION DRAWING 991TD TEMPERATURE SENSOR SUBMERSIBLE, "FM" APPROVED

SIZE			
C	SAP MATERIAL NO.		REV
	ITEM NO.		AS
	DOCUMENT NO.	991TDS2-7	DS 03
SCALE: NONE	WT.		SHEET 1 OF 1

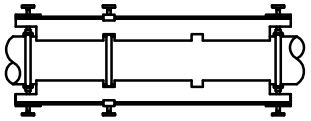
WRAP MOUNTING GUIDE AROUND PIPE AND MARK AT OVERLAPPING EDGE. UNWRAP GUIDE, MEASURE DISTANCE "L" FROM EDGE TO MARK, MARK AGAIN AT 1/2 "L". RE-INSTALL THE MOUNTING GUIDE, TAPE IN PLACE WITH BOTH MARKS VISIBLE.



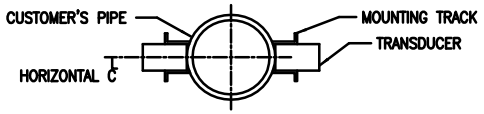
WRAP STRAP WITH MOUNTING NUT AROUND THE PIPE, ALIGN WITH MOUNTING GUIDE, SECURE WITH STRAP TENSION ADJUST SCREWS AFTER POSITIONING MOUNTING NUTS AT MOUNTING GUIDE MARKS. MOUNT SECOND STRAP ON THE PIPE ALIGNING THE MOUNTING NUTS AND SPACED TO MATCH THE TRACK RAIL MOUNTING SCREWS.



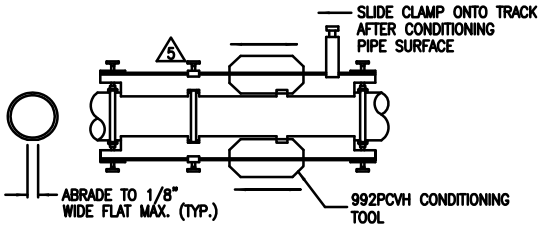
LONGER MOUNTING TRACKS ASSEMBLIES INCLUDE A THIRD STRAP AND MOVEABLE MOUNTING SCREW. POSITION MOVEABLE SCREW FOR BEST ADVANTAGE AFTER TRANSDUCER INDEX HOLES HAVE BEEN SELECTED.

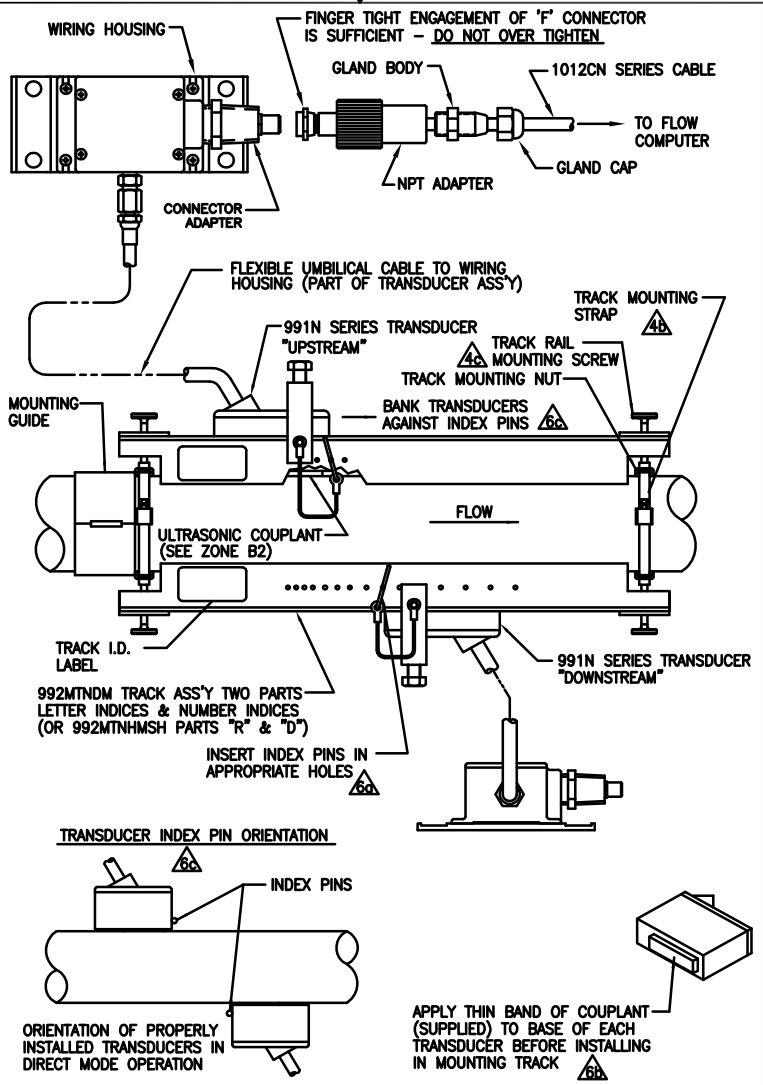


PREFERRED MOUNTING PLANE OF TRANSDUCERS 2c



PIPE CONDITIONING: WITH TRACKS IN PLACE, CONDITION PIPE SURFACE USING 992PCVH PIPE CONDITIONING TOOL AND ABRASIVE PAPER STRIPS SUPPLIED. IN ELEVATED TEMP. ENVIRONMENT, PERIODICALLY DIP THE CONDITIONING TOOL IN WATER BATH TO COOL. THIS WILL ASSURE BEST GRIP OF WATERPROOF ADHESIVE ON THE ABRASIVE STRIPS.





INSTALLATION PROCEDURE – SEE DRAWING REFERENCES 1

1. USING THE INSTALLATION MENU PROCEDURES PRESENTED IN THE FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND TRACK FOR REFLECT MODE OPERATION ON THE CHOSEN PIPE.
2. SELECT MOUNTING LOCATION;
   a) CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
   b) WHERE POSSIBLE LOCATE TRACK ASS'Y TEN (10) PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
   c) ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE, TO AVOID SEDIMENT BLOCKAGE OF TRANSDUCER SIGNAL.
3. PREPARE PIPE FOR TRACK MOUNT;
   a) REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
   b) CLEAN AND DEGREASE SURFACE
   c) DO NOT MOUNT OVER FROST.
4. MOUNT TRACK ON PIPE;
   a) WRAP THE MOUNTING GUIDE AROUND THE PIPE. POSITION SO THAT THE OVERLAPPING LENGTHS ARE EDGE-ALIGNED. MARK THE OVERLAPPING PORTION OF THE GUIDE AT THE END OF THE OVERLAPPING PORTION. REMOVE THE GUIDE. MEASURE THE DISTANCE FROM THE END TO THE MARK AND MARK AGAIN HALFWAY BETWEEN. RE-POSITION THE GUIDE ON THE PIPE AND TAPE IN PLACE SO THAT THE MARKS ON THE MOUNTING GUIDE APPEAR AT THE SELECTED TRACK MOUNTING LOCATIONS.
   b) SLIP TWO OF THE TRACK MOUNTING NUTS PROVIDED ONTO EACH OF THE MOUNTING STRAPS. WRAP ONE OF THE STRAPS AROUND PIPE, USING THE MOUNTING GUIDE TO ALIGN THE STRAP PERPENDICULAR TO THE FLOW AXIS. ENGAGE THE STRAP TENSION ADJUST SCREWS AND TIGHTEN SECURELY AFTER POSITIONING THE MOUNTING NUTS SO THAT THEY ARE CENTERED ON THE MOUNTING GUIDE MARKS MADE EARLIER, 180° OPPOSED. WRAP THE SECOND MOUNTING STRAP AROUND THE PIPE, POSITIONING THE MOUNTING NUTS SO THAT THEY ARE ALIGNED ALONG THE FLOW AXIS WITH THE NUTS ON THE FIRST STRAP AND SPACED TO MATE WITH THE SCREWS AT EITHER END OF THE TRACK RAIL ASSEMBLIES TIGHTEN THE STRAP TENSION ADJUST SCREWS.
   c) SECURE THE TRACK RAIL ASSEMBLIES TO THE PIPE USING THE TRACK RAIL MOUNTING SCREWS.
5. CONDITION PIPE SURFACE;
   LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE 992PCVH CONDITIONING TOOL AND ABRASIVE PAPER (ADHESIVE BACKED) PROVIDED. FINISHED SURFACE SHOULD BE APPROXIMATELY 1/8" WIDE FLAT AT CENTER OF MOUNTING TRACK.
6. LOCATE TRANSDUCERS;
   a) CONSULTING THE FIELD MANUAL, USE THE INSTALLATION MENU TO DETERMINE THE APPROPRIATE INDEX HOLES FOR YOUR APPLICATION AND INSERT PINS.
   b) APPLY A THIN BAND OF THE ULTRASONIC COUPLANT PROVIDED TO THE BASE OF EACH TRANSDUCER.
   c) INSERT TRANSDUCERS INTO TRACK AS SHOWN, BANKING AGAINST INDEX PINS. SECURE TRANSDUCERS WITH CLAMPS.
7. MAKE TRANSDUCER CABLE CONNECTIONS IN ACCORDANCE WITH THE APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 990 FIELD MANUAL.
8. SEE DRAWING 990TDMVH-8 AND 990THMVH-8 FOR TRACK AND TRANSDUCER OUTLINE DIMENSIONS.
9. SEE DRAWING 992-60-7 FOR ASSEMBLY OF CUT-TO-FIT ADJUSTABLE MOUNTING STRAPS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON–

INCHES	(MM)
± .1	± 2

CONTRACT NO.

DR	H.J	DATE 11/03/04
CHK		DATE
ENG		DATE
PROD		DATE
APPD		DATE

CERTIFIED

DATE

SIEMENS
Siemens Energy & Automation, Inc.
Process Instrumentation Business Unit
CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788

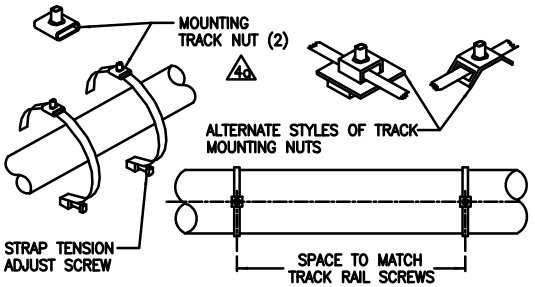
INSTALLATION DRAWING 990 SERIES TRANSDUCER DIRECT MODE, VERY HIGH TEMP.

SIZE	CODE IDENT NO.		REV.
C	21614	990TDMVH-7B	F

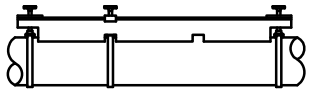
SCALE: NONE | WT. | SHEET 1 OF 1

CN#5216

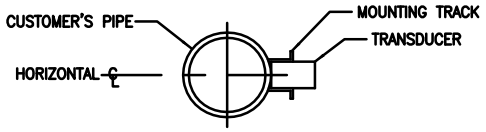
WRAP STRAP WITH MOUNTING NUT AROUND THE PIPE, ALIGN WITH MOUNTING GUIDE, SECURE WITH STRAP TENSION ADJUST SCREWS AFTER POSITIONING MOUNTING NUTS AT MOUNTING GUIDE MARKS. MOUNT SECOND STRAP ON THE PIPE ALIGNING THE MOUNTING NUTS AND SPACED TO MATCH THE TRACK RAIL MOUNTING SCREWS.



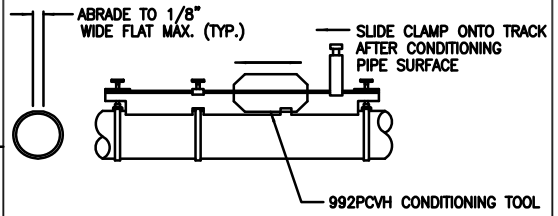
LONGER MOUNTING TRACKS ASSEMBLIES INCLUDE A THIRD STRAP AND MOVEABLE MOUNTING SCREW. POSITION MOVEABLE SCREW FOR BEST ADVANTAGE AFTER TRANSDUCER INDEX HOLES HAVE BEEN SELECTED.



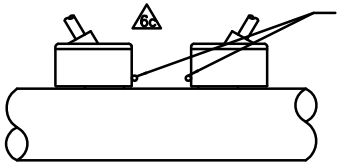
PREFERRED MOUNTING PLANE OF TRANSDUCERS 2c



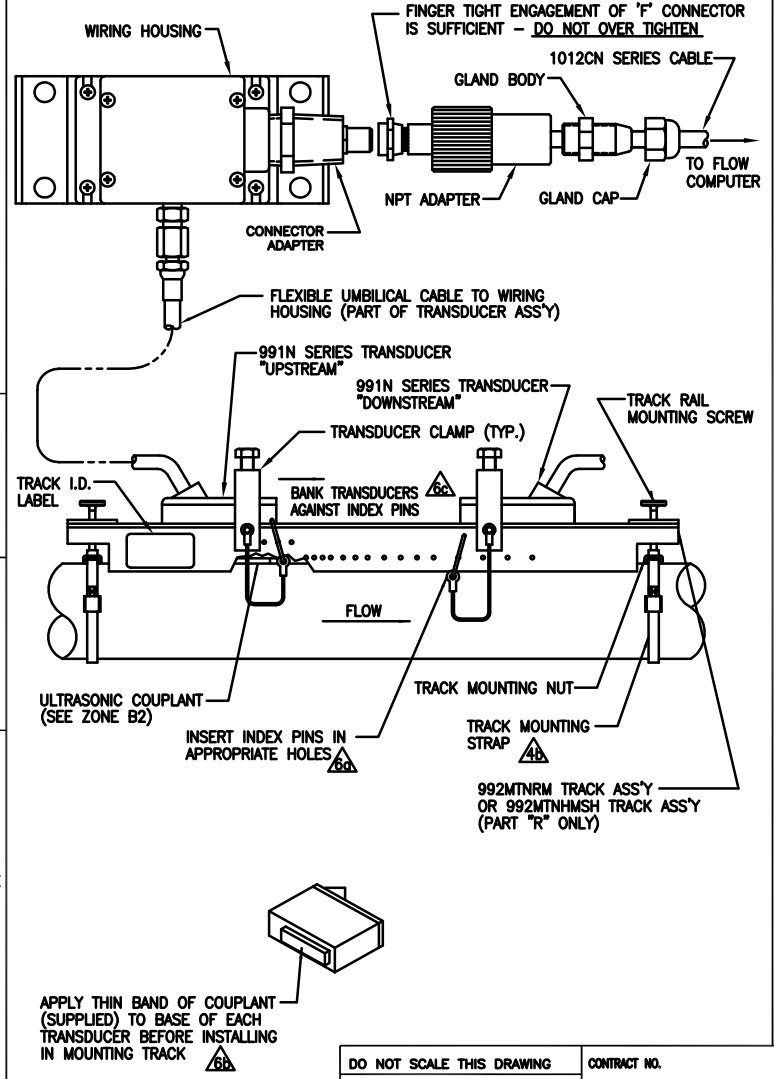
PIPE CONDITIONING: WITH TRACKS IN PLACE, CONDITION PIPE SURFACE USING 992PCVH PIPE CONDITIONING TOOL AND ABRASIVE PAPER STRIPS SUPPLIED. IN ELEVATED TEMP. ENVIRONMENT, PERIODICALLY DIP THE CONDITIONING TOOL IN WATER BATH TO COOL. THIS WILL ASSURE BEST GRIP OF WATERPROOF ADHESIVE ON THE ABRASIVE STRIPS. 5



TRANSDUCER INDEX PIN ORIENTATION



ORIENTATION OF PROPERLY INSTALLED TRANSDUCERS IN REFLECT MODE OPERATION



APPLY THIN BAND OF COUPLANT (SUPPLIED) TO BASE OF EACH TRANSDUCER BEFORE INSTALLING IN MOUNTING TRACK 6b

INSTALLATION PROCEDURE – SEE DRAWING REFERENCES 1

1. USING THE INSTALLATION MENU PROCEDURES PRESENTED IN THE FIELD MANUAL, CONFIRM THAT YOU HAVE THE APPROPRIATE TRANSDUCERS AND TRACK FOR REFLECT MODE OPERATION ON THE CHOSEN PIPE.
2. SELECT MOUNTING LOCATION;
   a) CHOOSE LOCATION WHICH REMAINS FULL AT ZERO FLOW.
   b) WHERE POSSIBLE LOCATE TRACK ASS'Y TEN (10) PIPE DIAMETERS OR MORE FROM BEND TO ENSURE FULLY DEVELOPED AND STABLE FLOW PROFILE.
   c) ON HORIZONTAL PIPE, SELECT HORIZONTAL PLANE, IF POSSIBLE, TO AVOID SEDIMENT BLOCKAGE OF TRANSDUCER SIGNAL.
3. PREPARE PIPE FOR TRACK MOUNT;
   a) REMOVE GRIT, CORROSION, COATING OR HEAVY PAINT
   b) CLEAN AND DEGREASE SURFACE
   c) DO NOT MOUNT OVER FROST.
4. MOUNT TRACK ON PIPE:
   a) SLIP ONE OF THE MOUNTING NUTS PROVIDED ONTO EACH OF THE MOUNTING STRAPS. WRAP THE STRAPS AROUND THE PIPE AT THE SELECTED LOCATION AND ENGAGE THE ADJUSTING SCREWS. POSITION THE MOUNTING NUTS IN LINE WITH THE FLOW AXIS AND SPACED TO MATE WITH THE SCREWS AT EITHER END OF THE TRACK ASSEMBLY. SECURE THE STRAPS (AND NUTS) BY TIGHTENING THE MOUNTING STRAP ADJUSTING SCREWS.
   b) SECURE THE TRACK RAIL ASSEMBLIES TO THE PIPE USING THE TRACK RAIL MOUNTING SCREWS.
5. CONDITION PIPE SURFACE;
   LOCALLY SMOOTH THE PIPE SURFACE TO ACCEPT THE TRANSDUCERS. USE THE 992PCVH CONDITIONING TOOL AND ABRASIVE PAPER (ADHESIVE BACKED) PROVIDED. FINISHED SURFACE SHOULD BE APPROXIMATELY 1/8" WIDE FLAT AT CENTER OF MOUNTING TRACK.
6. LOCATE TRANSDUCERS;
   a) CONSULTING THE FIELD MANUAL, USE THE INSTALLATION MENU TO DETERMINE THE APPROPRIATE INDEX HOLES FOR YOUR APPLICATION AND INSERT PINS.
   b) APPLY A THIN BAND OF THE ULTRASONIC COUPLANT PROVIDED TO THE BASE OF EACH TRANSDUCER.
   c) INSERT TRANSDUCERS INTO TRACK AS SHOWN, BANKING AGAINST INDEX PINS. SECURE TRANSDUCERS WITH CLAMPS.
7. MAKE TRANSDUCER CABLE CONNECTIONS IN ACCORDANCE WITH THE APPROPRIATE FLOW COMPUTER INSTALLATION DRAWING AND 990 FIELD MANUAL.
8. SEE DRAWING 99TRMVH–8 AND 990THMVH–8 FOR TRACK AND TRANSDUCER OUTLINE DIMENSIONS.
9. SEE DRAWING 992–60–7 FOR ASSEMBLY OF CUT–TO–FIT ADJUSTABLE MOUNTING STRAPS.

DO NOT SCALE THIS DRAWING

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES (MM) TOLERANCES ON–

INCHES	(MM)
± .1	± 2

CONTRACT NO.

DR	H.J	DATE 11/03/04
CHK		DATE
ENG		DATE
PROD		DATE
APPD		DATE

CERTIFIED

DATE

SIEMENS
Siemens Energy & Automation, Inc.
Process Instrumentation Business Unit
CoC Ultrasonic Flow - Hauppauge, Long Island, NY 11788

INSTALLATION DRAWING 990 SERIES TRANSDUCER REFLECT MODE, VERY HIGH TEMP.

SIZE	CODE IDENT NO.		REV.
C	21614	990TRMVH-7B	F

SCALE: NONE | WT. | SHEET 1 OF 1

CN#5216

SIEMENS

Siemens Industry, Inc.
Industry Automation Division
CoC Ultrasonic Flow
Hauppauge, New York 11788 USA
Web: www.usa.siemens.com

DUCTILE IRON PIPE

Nominal Diameter	Actual O.D.	CLASS 50		CLASS 51		CLASS 52		CLASS 53		CLASS 54		CLASS 55		CLASS 56		Liner (Cement)	
		Wall	I.D.	Wall	I.D.	Wall	I.D.	Wall	I.D.	Wall	I.D.	Wall	I.D.	Wall	I.D.	Single	Double
3	3.96	N/A	N/A	0.25	3.46	0.28	3.40	0.31	3.34	0.34	3.28	0.37	3.22	0.40	3.16	0.125	0.250
4	4.80	N/A	N/A	0.26	4.28	0.29	4.22	0.32	4.16	0.35	4.10	0.38	4.04	0.41	3.98	0.125	0.250
6	6.90	0.25	6.40	0.28	6.34	0.31	6.28	0.34	6.22	0.37	6.16	0.40	6.10	0.43	6.04	0.125	0.250
8	9.05	0.27	8.51	0.30	8.45	0.33	8.39	0.36	8.33	0.39	8.27	0.42	8.21	0.45	8.15	0.125	0.250
10	11.10	0.29	10.52	0.32	10.46	0.35	10.40	0.38	10.34	0.41	10.28	0.44	10.22	0.47	10.16	0.125	0.250
12	13.20	0.31	12.58	0.34	12.52	0.37	12.46	0.40	12.40	0.43	12.34	0.46	12.28	0.49	12.22	0.125	0.250
14	15.30	0.33	14.64	0.36	14.58	0.39	14.52	0.42	14.46	0.45	14.40	0.48	14.34	0.51	14.28	0.1875	0.375
16	17.40	0.34	16.72	0.37	16.66	0.40	16.60	0.43	16.54	0.46	16.48	0.49	16.42	0.52	16.36	0.1875	0.375
18	19.50	0.35	18.80	0.38	18.74	0.41	18.68	0.44	18.62	0.47	18.56	0.50	18.50	0.53	18.44	0.1875	0.375
20	21.60	0.36	20.88	0.39	20.82	0.42	20.76	0.45	20.70	0.48	20.64	0.51	20.58	0.54	20.52	0.1875	0.375
24	25.80	0.38	25.04	0.41	24.98	0.44	24.92	0.47	24.86	0.50	24.80	0.53	24.74	0.56	24.68	0.1875	0.375
30	32.00	0.39	31.22	0.43	31.14	0.47	31.06	0.51	30.99	0.55	30.90	0.59	30.82	0.63	30.74	0.250	0.500
36	38.30	0.43	37.44	0.48	37.34	0.53	37.24	0.58	37.14	0.63	37.04	0.68	36.94	0.73	36.84	0.250	0.500
42	44.50	0.47	43.56	0.53	43.44	0.59	43.32	0.65	43.20	0.71	43.08	0.77	42.96	0.83	42.84	0.250	0.500
48	50.80	0.51	49.78	0.58	49.64	0.65	49.50	0.72	49.36	0.79	49.22	0.86	49.08	0.93	48.94	0.250	0.500
54	57.56	0.57	56.42	0.65	56.26	0.73	56.10	0.81	55.94	0.89	55.78	0.97	55.62	1.05	55.46	0.250	0.500

CAST IRON PIPE - AWWA STANDARD

Pipe Size	CLASS A			CLASS B			CLASS C			CLASS D			CLASS E			CLASS F			CLASS G			CLASS H		
	O.D	Wall	I.D.	O.D	Wall	I.D.	O.D	Wall	I.D.	O.D	Wall	I.D.	O.D	Wall	I.D.	O.D	Wall	I.D.	O.D	Wall	I.D.	O.D	Wall	I.D.
3	3.80	0.39	3.02	3.96	0.42	3.12	3.96	0.45	3.06	3.96	0.48	3.00												
4	4.80	0.42	3.96	5.00	0.45	4.10	5.00	0.48	4.04	5.00	0.52	3.96												
6	6.90	0.44	6.02	7.10	0.48	6.14	7.10	0.51	6.08	7.10	0.55	6.00	7.22	0.58	6.06	7.22	0.61	6.00	7.38	0.65	6.08	7.38	0.69	6.00
8	9.05	0.46	8.13	9.05	0.51	8.03	9.30	0.56	8.18	9.30	0.60	8.10	9.42	0.66	8.10	9.42	0.71	8.00	9.60	0.75	8.10	9.60	0.80	8.00
10	11.10	0.50	10.10	11.10	0.57	9.96	11.40	0.62	10.16	11.40	0.68	10.04	11.60	0.74	10.12	11.60	0.80	10.00	11.84	0.86	10.12	11.84	0.92	10.00
12	13.20	0.54	12.12	13.20	0.62	11.96	13.50	0.68	12.14	13.50	0.75	12.00	13.78	0.82	12.14	13.78	0.89	12.00	14.08	0.97	12.14	14.08	1.04	12.00
14	15.30	0.57	14.16	15.30	0.66	13.96	15.65	0.74	14.17	15.65	0.82	14.01	15.98	0.90	14.18	15.98	0.99	14.00	16.32	1.07	14.18	16.32	1.16	14.00
16	17.40	0.60	16.20	17.40	0.70	16.00	17.80	0.80	16.20	17.80	0.89	16.02	18.16	0.98	16.20	18.16	1.08	16.00	18.54	1.18	16.18	18.54	1.27	16.00
18	19.50	0.64	18.22	19.50	0.75	18.00	19.92	0.87	18.18	19.92	0.96	18.00	20.34	1.07	18.20	20.34	1.17	18.00	20.78	1.28	18.22	20.78	1.39	18.00
20	21.60	0.67	20.26	21.60	0.80	20.00	22.06	0.92	20.22	22.06	1.03	20.00	22.54	1.15	20.24	22.54	1.27	20.00	23.02	1.39	20.24	23.02	1.51	20.00
24	25.80	0.76	24.28	25.80	0.89	24.02	26.32	1.04	24.22	26.32	1.16	24.00	26.90	1.31	24.28	26.90	1.45	24.00	27.76	1.75	24.26	27.76	1.88	24.00
30	31.74	0.88	29.98	32.00	1.03	29.94	32.40	1.20	30.00	32.74	1.37	30.00	33.10	1.55	30.00	33.46	1.73	30.00						
36	37.96	0.99	35.98	38.30	1.15	36.00	38.70	1.36	39.98	39.16	1.58	36.00	39.60	1.80	36.00	40.04	2.02	36.00						
42	44.20	1.10	42.00	44.50	1.28	41.94	45.10	1.54	42.02	45.58	1.78	42.02												
48	50.50	1.26	47.98	50.80	1.42	47.96	51.40	1.71	47.98	51.98	1.96	48.06												
54	56.66	1.35	53.96	57.10	1.55	54.00	57.80	1.90	54.00	58.40	2.23	53.94												
60	62.80	1.39	60.02	64.40	1.67	60.06	64.20	2.00	60.20	64.82	2.38	60.06												
72	75.34	1.62	72.10	76.00	1.95	72.10	76.88	2.39	72.10															
84	87.54	1.72	84.10	88.54	2.22	84.10																		

STAINLESS STEEL, HASTELLOY “C” & TITANIUM△ PIPE

Sched.	Size	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	14	16	18	20	22	24
5S◇	O.D.	0.840	1.050	1.315	1.660	1.900	2.375	2.875	3.500	4.000	4.500	5.563	6.625	8.625	10.750	12.750	14.000	16.000	18.000	20.000	22.000	24.000
	I.D.	0.710	0.920	1.185	1.530	1.770	2.245	2.709	3.334	3.834	4.334	5.345	6.407	8.407	10.482	12.438	13.688	15.670	17.670	19.634	21.624	23.563
	Wall	0.065	0.065	0.065	0.065	0.065	0.065	0.083	0.083	0.083	0.083	0.109	0.109	0.109	0.134	0.156	0.156	0.165	0.165	0.188	0.188	0.218
10S◇	I.D.	0.674	0.884	1.097	1.442	1.682	2.157	2.635	3.260	3.760	4.260	5.295	6.357	8.329	10.420	12.390	13.624	15.624	17.624	19.564	21.564	23.500
	Wall	0.083	0.083	0.109	0.109	0.109	0.109	0.120	0.120	0.120	0.120	0.134	0.134	0.148	0.165	0.180	0.188	0.188	0.188	0.218	0.218	0.250
40S	I.D.	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	3.548	4.026	5.047	6.065	7.981	10.020	12.000						
	Wall	0.109⊗	0.113⊗	0.133⊗	0.140⊗	0.145⊗	0.154⊗	0.203⊗	0.216⊗	0.226⊗	0.237⊗	0.258⊗	0.280⊗	0.322⊗	0.365⊗	* .375						
80S	I.D.	0.546	0.742	0.957	1.278	1.500	1.939	2.323	2.900	3.364	3.826	4.813	5.761	7.625	9.750	11.750						
	Wall	^.147	^.154	^.179	^.191	^.200	^.218	^.276	^.300	^.318	^.337	^.375	^.432	^.500	^.500	* .500						

CARBON STEEL and PVC△ PIPE

Pipe	Size	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	42
	O.D.	0.840	1.050	1.315	1.660	1.900	2.375	2.875	3.500	4.000	4.500	5.563	6.625	8.625	10.750	12.750	14.000	16.000	18.000	20.000	22.000	24.000	26.000	28.000	30.000	32.000	34.000	36.000	42.000
Stand-ard	I.D.	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	3.548	4.026	5.047	6.065	7.981	10.020	12.000	13.250	15.250	17.250	19.250	21.250	23.250	25.250	27.250	29.250	31.250	33.250	35.250	41.250
	Wall	0.109	0.113	0.133	0.140	0.145	0.154	0.203	0.216	0.226	0.237	0.258	0.280	0.322	0.365	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	0.375	* .375
Extra Strong (XS)	I.D.	0.546	0.742	0.957	1.278	1.500	1.939	2.323	2.900	3.364	3.826	4.813	5.761	7.625	9.750	11.750	13.000	15.000	17.000	19.000	21.000	23.000	25.000	27.000	29.000	31.000	33.000	35.000	41.000
	Wall	0.147	0.154	0.179	0.191	0.200	0.218	0.276	0.300	0.318	0.337	0.375	0.432	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	* .500
Double Extra Strong (XXS)	I.D	0.252	0.434	0.599	0.896	1.100	1.503	1.771	2.300	2.728	3.152	4.063	4.897	6.875	8.750	10.750													
	Wall	0.294	0.308	0.358	0.382	0.400	0.436	0.552	0.600	0.636	0.674	0.750	0.864	0.875	1.000	1.000													
Sched. 10	I.D.																13.500	15.500	17.500	19.500	21.500	23.500	25.376	27.376	29.376	31.376	33.376	35.376	
	Wall																0.250	0.250	0.250	0.250	0.250	0.250	0.312	0.312	0.312	0.312	0.312	0.312	
Sched. 20	I.D.													8.125	10.250	12.250	13.376	15.376	17.376	19.250	21.250	23.250	25.000	27.000	29.000	31.000	33.000	35.000	41.000
	Wall													0.250	0.250	0.250	0.312	0.312	0.312	0.375⊗	0.375⊗	0.375⊗	^.500	^.500	^.500	^.500	^.500	^.500	^.500
Sched. 30	I.D.													8.071	10.136	12.090	13.250	15.250	17.124	19.000	21.000	22.876		26.750	28.750	30.750	32.750	34.750	40.750
	Wall													0.277	0.307	0.330	0.375⊗	0.375⊗	0.438	^.500	^.500	0.562		0.625	0.625	0.625	0.625	0.625	* .625
Sched. 40	I.D.	0.622	0.824	1.049	1.380	1.610	2.067	2.469	3.068	3.548	4.026	5.047	6.065	7.981	10.020	11.938	13.124	15.000	16.876	18.184		22.626							
	Wall	0.109⊗	0.113⊗	0.133⊗	0.140⊗	0.145⊗	0.154⊗	0.203⊗	0.216⊗	0.226⊗	0.237⊗	0.258⊗	0.280⊗	0.322⊗	0.365⊗	0.406	0.438	^.500	0.562	0.593		0.687							
Sched. 60	I.D.													7.813	9.750	11.626	12.814	14.688	16.500	18.376	20.250	22.064							
	Wall													0.406	^.500	0.562	0.593	0.656	0.750	0.812	0.875	0.968							
Sched. 80	I.D.	0.546	0.742	0.957	1.278	1.500	1.939	2.323	2.900	3.364	3.826	4.813	5.761	7.625	9.564	11.376	12.500	14.314	16.126	17.938	19.750	21.564							
	Wall	^.147	^.154	^.179	^.191	^.200	^.218	^.276	^.300	^.318	^.337	^.375	^.432	^.500	0.593	0.687	0.750	0.843	0.937	1.031	1.125	1.218							
Sched. 100	I.D.													7.439	9.314	11.064	12.126	13.938	15.688	17.438	19.250	20.938							
	Wall													0.593	0.718	0.843	0.937	1.031	1.156	1.281	1.375	1.531							
Sched. 120	I.D.										3.624	4.563	5.501	7.189	9.064	10.750	11.814	13.564	15.250	17.000	18.750	20.376							
	Wall										0.438	0.500	0.562	0.718	0.843	1.000	1.093	1.218	1.375	1.500	1.625	1.812							
Sched. 140	I.D.													7.001	8.750	10.500	11.500	13.124	14.876	16.500	18.250	19.876							
	Wall													0.812	1.000	1.125	1.250	1.438	1.562	1.750	1.875	2.062							
Sched. 160	I.D.	0.466	0.614	0.815	1.160	1.338	1.689	2.125	2.624		3.438	4.313	5.189	6.813	8.500	10.126	11.188	12.814	14.438	16.064	17.750	19.314							
	Wall	0.187	0.218	0.250	0.250	0.281	0.343	0.375	0.438		0.531	0.625	0.718	0.906	1.125	1.312	1.406	1.593	1.781	1.968	2.125	2.343							

NON-STANDARD CARBON

Size	10	20	24	24
O.D.	10.750	20.000	24.000	24.000
I.D.	10.192	19.375	23.375	22.126
Wall	0.279	0.312	0.312	0.937

The above sizes are produced by pipe mills but dimensions do not conform to any regular standard or schedule.

△ These materials are generally available in Schedules 40 and 80 only.

◇ Wall Thickness of Schedule 5S & 10S does not permit threading in accordance with the American Standard for Pipe Threads (ASA No. B2.1)

⊗ Wall thickness identical with thickness of “Standard Weight” pipe.

^ Wall Thickness identical with thickness of “Extra-Heavy” pipe.

* These do not conform to American Standard B36. 10.

PIPE WEIGHT FORMULA FOR STEEL PIPE (lbs per foot)
10.68 (D-t) t, where D=Outside Diameter and t=Wall Thickness

SIEMENS

Siemens Industry Inc.
Industry Automation Division
Coc Ultrasonic Flow
Hauppauge, New York 11788 USA
Web: www.usa.siemens.com

Glossary

Active Memory

Section of RAM allocated for active site parameters (all current values). The meter receives site-specific operating instructions from Active Memory.

Alphanumeric Field

An 8-character data entry field that allows you to specify a Site Name or a Security code.

Arrow Keys

Use the <Up, Down, Left and Right> Arrows to navigate through the Installation Menu in their respective directions. The <Up or Down> Arrows allow you also to scroll through option list items.

Asterisk

Refers to the marker used in the Installation Menu to indicate a current option list selection. When you access an option list, you can move the asterisk with the <Up or Down> Arrows to a new selection, then press <ENTER> to select the item.

CLR (Clear) Key

Use the <CLR> key to erase a numeric value or clear a selection from a multiple select option list.

Cursor

This refers to the highlighted text and the arrow cursor that you move via the arrow direction when navigating through menus or menu cells.

Data Entry

Refers to data entered into a menu cell (either numeric or option list selection).

Datalogger Memory

Memory segment that stores data items logged during operation. You can view the Datalogger contents either on-screen or transmit it to an external device via the RS-232 serial port. The amount of Datalogger memory depends on how many sites reside in Site Storage memory.

ENTER (Enter) Key

Use the <ENTER> key to store a current numeric value or option list item.

Flow meter

Refers to the flow meter itself (the transmitter and sensors combined).

Graphic Screen

Refers to the integral display screen.

Initial Makeup

An internal process performed during installation, where the meter acquires its receive signal and enhances other parameters for optimal operation at a site.

In-process Makeup

An internal process where the meter recovers its Initial Makeup parameters after a fault condition interrupts operation.

Interface Detector

Detects various media interfaces on multi-product pipelines.

Interface m/s

Refers to an alarm function that declares the passage of a liquid or gas interface by a comparison of the relative sonic velocities of the two liquids or two gases.

LAPTOT

Refers to a system function that freezes the Totalizer display, while the Totalizer continues to update its registers.

Local Display

Refers to the transmitter integral display screen.

Menu

Sub-sections of the Installation Menu that allow you to define specific operational functions (e.g., RS-232 Setup).

Menu Cell

A location within a menu where you define either a single numeric value or option list selection that supports the Sub-Menu's function. Certain view-only menu cells show reference data appropriate to the current application.

NEGFLOW

Totalizer mode for negative flow total only.

NETFLOW

Totalizer mode that combines positive and negative flow totals.

NOTOT

System function that disables the internal Totalizer.

Number Index

Computed sensor spacing index based on the estimated sonic velocity measurement. This Index can not be overridden by installer.

Numeric Data

Refers to a value entered into a menu cell. An example would be the pipe outer diameter.

Numeric Entry

Refers to a number you type into menu cell that stores numeric data.

Numeric Keys

Use the Numeric keys to type a numeric value where appropriate.

Op Sys ROM

The Read-Only-Memory that stores its basic operating instructions and permanent defaults.

Option List

Lists of options presented at menu cells that allow you to select either a single item or multiple items (depending on the function that the menu cell controls).

Parameters

Refers to value (either numeric or list selection) stored in a menu cell.

POSFLOW

Totalizer mode for positive flow total only.

Register

Refers to a memory location used by the meter to store data such as the flow total, etc.

RTD

Resistive Temperature Device. Temperature sensors used with energy flow of mass flow systems.

Sensor

Refers to entire spool piece in some instances. Flow sensors that the meter uses to measure the flow rate. Also called transducers and abbreviated as Xdcr.

Site Name

A user-entered name that the meter associates with a stored Site Setup. You retrieve a particular Site by selecting its name from a site name list.

Site Setup

A collection of parameters used by the meter to service a specific site (or location). The meter allows you to store several independent Site Setups.

Site Storage Memory

Section of RAM allocated for permanent data storage. This memory segment stores inactive site setups (including a backup of active site). The meter's Site Setup storage capacity depends on the dynamic memory allocation as dictated by each application. In addition, the meter uses Site Storage Memory to store configurable operating parameters such as pipe, liquid or gas tables.

Si-Ware

Siemens software program that interfaces with Siemens flow meters to assess flow meter installation conditions and to collect data for comparison with prior baseline data.

Spacing Index

Refers to the Number Index used by the meter to determine the space between the upstream and downstream sensors on clamp-on systems.

Spacing Offset

Fixed sensor offset assigned by the meter. This can be overridden by the installer.

TOTCNT

A Totalizer pulse count function used for Batching or Sampling.

Transducer

Also known as sensor.

Vaer

The meter’s aeration percent output.

Vps

The sonic propagation velocity of a pipe.

Vs

The sonic velocity of a liquid or gas.

Index

L

M

O

P

R

S

T

W

For more information

www.siemens.com/flow

Siemens Industry, Inc.
Industry Automation Division
Ultrasonic Flow
Hauppauge, NY 11788
USA

Subject to change without prior notice
Order No.: A5E02951504
Lit. No.: A5E02951504-AC

www.siemens.com/processautomation