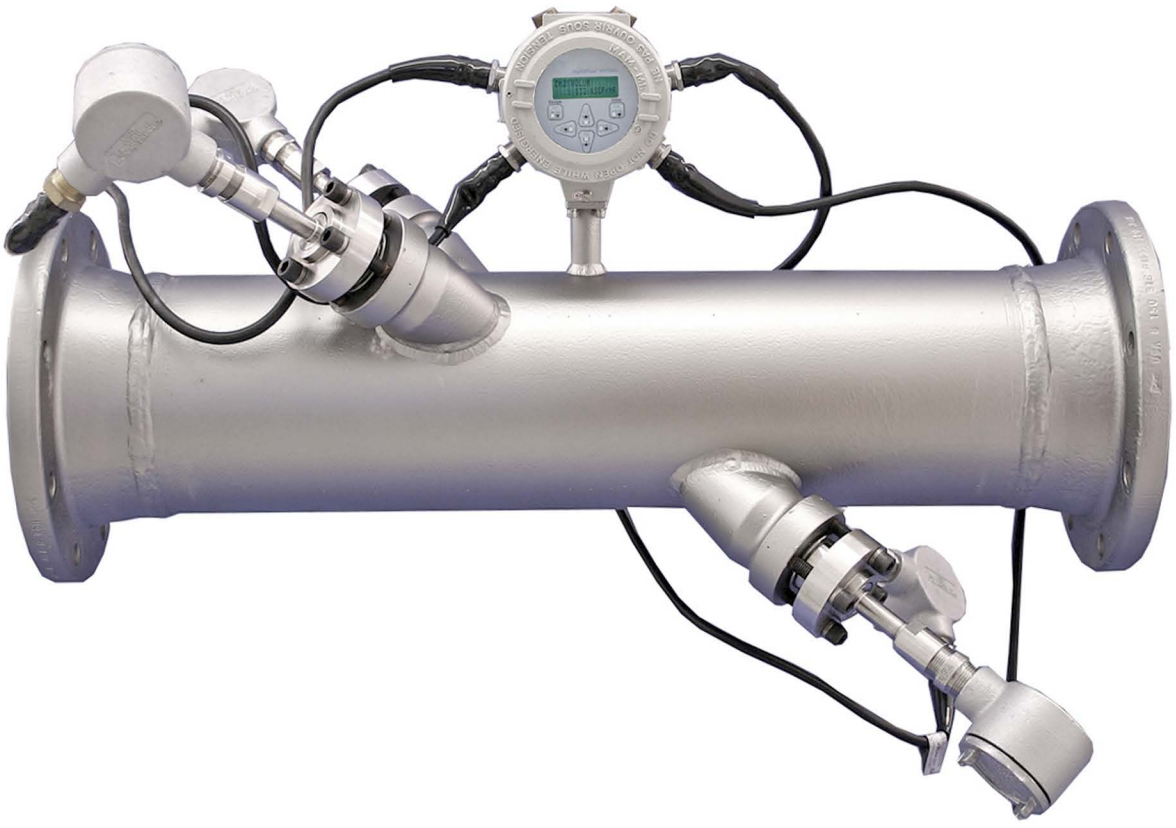
Panametrics

Startup Guide

DigitalFlow™ XMT868i

Ultrasonic Flow Transmitter for Liquids (1 & 2-Channel)



Panametrics

DigitalFlow™ XMT868i

Ultrasonic Flow Transmitter for Liquids (1 & 2-Channel)

Startup Guide

PANA058C41 Rev. H

Aug 2026

panametrics.com

Copyright 2026 by Panametrics LLC. ALL RIGHTS RESERVED. This material contains one or more registered trademarks of Panametrics LLC and/or its subsidiaries. All third-party products and company names are trademarks of their respective holders.

[no content intended for this page]

Services

Panametrics provides customers with an experienced staff of customer support personnel ready to respond to technical inquiries, as well as other remote and on-site support needs. To complement our broad portfolio of industry-leading solutions, we offer several types of flexible and scalable support services including: Training, Product Repairs, Service Agreements and more.

Please visit https://panametrics.com/services for more details.

Typographical Conventions

Note: *These paragraphs provide information that provides a deeper understanding of the situation, but is not essential to the proper completion of the instructions.*

IMPORTANT: These paragraphs provide information that emphasizes instructions that are essential to proper setup of the equipment. Failure to follow these instructions carefully may cause unreliable performance.

CAUTION! This symbol indicates a risk of minor personal injury and/or damage to the equipment unless these instructions are followed carefully.

WARNING! This symbol indicates a risk of serious personal injury unless these instructions are followed carefully.

Safety Issues

WARNING! It is the responsibility of the user to follow all site rules and applicable regulatory requirements.

IMPORTANT Any instructions on grounding and cable termination in this manual are necessary for compliance with global EMC / RFI standards. Such compliance may be required by National EMC / RFI legislation.

Local Safety Standards

The user shall ensure that he operates the equipment in accordance with the applicable local codes, standards, regulations, or laws.

Qualification of Personnel

Ensure that all personnel have applicable training to use the equipment.

Personal Safety Equipment

Ensure that operators and maintenance personnel have all safety equipment applicable.

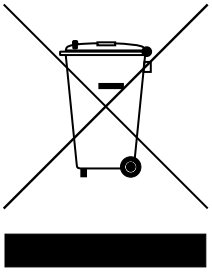
Unauthorized Operation

Ensure that unauthorized personnel cannot gain access to the operation of the equipment.

Environmental Compliance

Waste Electrical and Electronic Equipment

This apparatus required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment. To avoid the dispersal of these substances into our environment and to reduce the pressure on natural resources, we encourage you to use an appropriate “take-back” resource recovery scheme. These schemes will reuse or recycle most of the materials of your end-of-life equipment in an environmentally responsible way. The crossed-out wheeled bin symbol marked on the product invites you to use such a scheme.



If you need more information on the collection, reuse and recycling systems, please contact your local waste management administration.

As part of its commitment to the environment and the EU's WEEE Directive 2012/19/EU, Panametrics participates in a take-back scheme.

Please visit https://panametrics.com/health-safety-and-environment-hse for take-back instructions and more information about this initiative.

Chapter 1. Installation

1.1 Introduction 1
1.2 Unpacking 1
1.3 Site Considerations 2
1.3.1 Electronics Enclosure Location 2
1.3.2 Flowcell Location 2
1.3.3 Transducer Location 3
1.3.4 Cable Lengths 3
1.3.5 Transducer Cables 3
1.4 Installing a Flowcell 3
1.5 Installing Temperature Transmitters 4
1.6 Mounting the XMT868i Electronics Enclosure 5
1.7 Making Electrical Connections 5
1.7.1 Wiring the Line Power 6
1.7.2 Wiring Transducers 8
1.7.3 Wiring Standard 0/4-20 mA Analog Outputs 9
1.7.4 Wiring the Serial Port 9
1.7.4.1 Wiring the RS232 Interface 10
1.7.4.2 Wiring the RS485 Interface 11
1.7.5 Wiring Option Cards 12
1.7.5.1 Preparing for Wiring 12
1.7.5.2 Wiring an Alarms Option Card 13
1.7.5.3 Wiring a 0/4-20 mA Analog Inputs Option Card 14
1.7.5.4 Wiring a Totalizer and Frequency Output Option Card 15
1.7.5.5 Wiring an RTD Inputs Option Card 16
1.7.5.6 Wiring a 0/4-20 mA Analog Outputs Option Card 16
1.7.5.7 A Specific Example 16
1.7.5.8 Wiring the MODBUS Option Card 16
1.7.5.9 Wiring the MODBUS/TCP Interface 17
1.7.5.10 Wiring the Ethernet Interface 17
1.7.5.11 Wiring the Foundation Fieldbus Interface 18
1.7.5.12 Data Logging Option Card 18
1.7.5.13 Procedure Options 18
1.8 Specific Conditions for Safe Use 19

Chapter 2. Initial Setup

2.1 Introduction 27
2.2 XMT868i Enclosure Keypad Program 28
2.3 Entering Data in the Global Menu 29
2.3.1 Entering Global System Data 29
2.3.1.1 Volumetric Units 30
2.3.1.2 Totalizer Units 31
2.3.1.3 Programming Mass Flow Data 32
2.3.1.4 Programming the Energy Option 33
2.4 Entering Data in the Channel Menu 34
2.4.1 Selecting the Channel Measurement Method 34
2.4.2 Entering Data in the Channel System Option 35
2.4.2.1 Programming the Mass Flow Option 37
2.4.2.2 Programming the Energy Option 38
2.4.3 Entering Pipe Parameters 39
2.4.3.1 Special Transducers 39
2.4.3.2 Pipe Material 40
2.4.3.3 Pipe OD 41
2.4.3.4 Path and Axial Lengths 41
2.4.3.5 Pipe Lining 41
2.4.3.6 Tracking Windows 42

2.4.3.7 Fluid Type 42
2.4.3.8 Reynolds Correction 43
2.4.3.9 Procedure Options 43

Chapter 3. Operation

3.1 Introduction 47
3.2 Powering Up 48
3.3 The LCD Display 49
3.4 The Optional PanaView Display 50
3.5 Taking Measurements 51
3.5.1 Programming the LCD 51
3.5.2 Using the LCD Display 53
3.5.3 PanaView Display 54
3.5.3.1 Displaying Multiple Process Parameters 56
3.5.3.2 Displaying Multiple Text Windows 57
3.5.4 Pausing Measurement 57
3.5.4.1 Procedure Options 58

Chapter 4. Specifications

4.1 General 59
4.1.1 Hardware Configuration 59
4.1.2 Environmental 59
4.1.3 Markings 59
4.1.4 Flow Accuracy (Velocity) 60
4.1.5 Range 60
4.1.6 Rangeability (Overall) 60
4.1.7 Repeatability 60
4.1.8 Energy Accuracy (% of Reading): 60
4.1.9 Fluid Types 60
4.2 Electrical 61
4.2.1 Power Supply 61
4.2.2 Operating Modes 61
4.2.3 European Compliance 61
4.2.4 Input/Output 62
4.2.5 Additional Options 62
4.3 Transducer 63
4.3.1 Wetted Transducers 63
4.3.2 Clamp-On Transducers 64
4.3.3 Transducer Cables 64
4.3.4 Temperature Transducers (optional) 64
4.4 Pipe Size and Materials 65
4.4.1 Wetted Transducers 65
4.4.2 Clamp-on Transducers 65
4.5 Flowcell 66
4.5.1 Tilted Diameter 66

Appendix A. CE Mark Compliance

A.1 Introduction 67
A.2 Wiring 67

Appendix B. Data Records

B.1 Available Option Cards 69
B.2 Option Cards Installed 70
B.3 Site Data 71

Appendix C. Measuring P and L Dimensions

C.1 Measuring P and L 75

Chapter 1. Installation

1.1 Introduction

To ensure safe and reliable operation of the Model XMT868i Flowmeter, the system must be installed in accordance with the guidelines established by Panametrics engineers. Those guidelines, explained in detail in this chapter, include the following topics:

- Unpacking the Model XMT868i system
- Selecting suitable sites for the electronics enclosure and the flowcell/transducers
- Installing the flowcell/transducers

Note: *See the enclosed* Transducer Installation Guide *for detailed instructions on transducer installation.*

- Installing optional temperature transmitters
- Installing the electronics enclosure
- Wiring the electronics enclosure



WARNING! The Model XMT868i flow transmitter can measure the flow rate of many fluids, some potentially hazardous. The importance of proper safety practices cannot be overemphasized.
Be sure to follow all applicable local safety codes and regulations for installing electrical equipment and working with hazardous fluids or flow conditions. Consult company safety personnel or local safety authorities to verify the safety of any procedure or practice.



WARNING! To meet CE Mark requirements, all cables must be installed as described in *Appendix A, "CE Mark Compliance"*.

1.2 Unpacking

Carefully remove the electronics enclosure, the transducers, and the cables from the shipping containers. Before discarding any of the packing materials, account for all components and documentation listed on the packing slip. The discarding of an important item along with the packing materials is all too common. If anything is missing or damaged, contact the factory immediately for assistance.

1.3 Site Considerations

Because the relative location of the flowcell and the electronics enclosure is important, use the guidelines in this section to plan the XMT868i installation. *Figure 1* shows a typical installation.

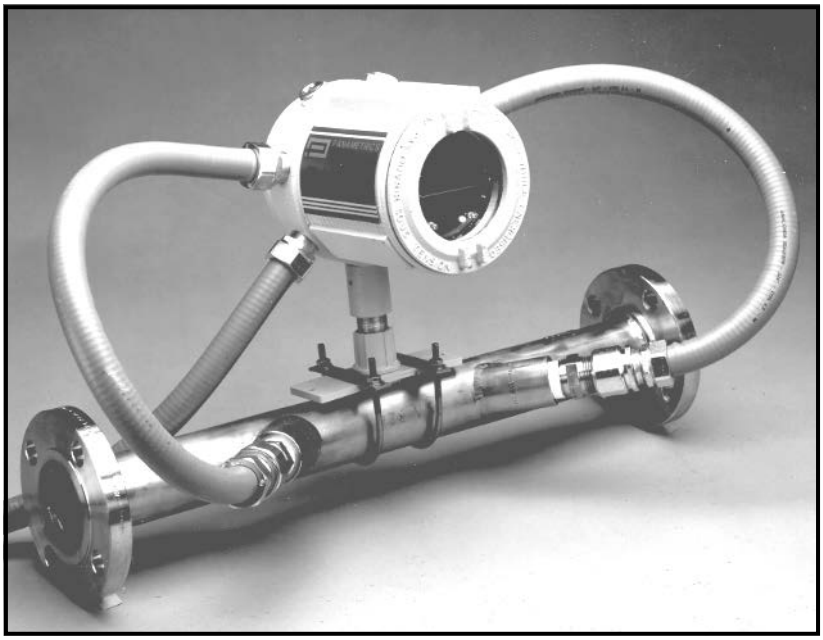


Figure 1: A Typical Model XMT868i System

1.3.1 Electronics Enclosure Location

The standard Model XMT868i electronics enclosure is a powder-coated, cast-aluminum, Type-7/4X explosion-proof enclosure, and an optional stainless-steel enclosure is available. Typically, the enclosure is mounted as close as possible to the transducers. When choosing a site, make sure the location permits easy access to the electronics enclosure for programming, maintenance and service.

Note: *For compliance with the European Union's Low Voltage Directive (2006/95/EC), this unit requires an external power disconnect device such as a switch or circuit breaker. The disconnect device must be marked as such, clearly visible, directly accessible, and located within 1.8 m (6 ft) of the Model XMT868i.*

1.3.2 Flowcell Location

Ideally, choose a section of pipe with unlimited access; for example, a long stretch of pipe that is above ground. However, if the flowcell is to be mounted on an underground pipe, dig a pit around the pipe to facilitate installation of the transducers.

1.3.3 Transducer Location

For a given fluid and pipe, the Model XMT868i's accuracy depends primarily on the location and alignment of the transducers. In addition to accessibility, when planning for transducer location, adhere to the following guidelines:

- Locate the transducers so that there are at least 10 pipe diameters of straight, undisturbed flow upstream and 5 pipe diameters of straight, undisturbed flow downstream from the measurement point. Undisturbed flow means avoiding sources of turbulence in the fluid such as valves, flanges, expansions, and elbows; avoiding swirl; and avoiding cavitation.
- Locate the transducers on a common axial plane along the pipe. Locate the transducers on the side of the pipe, rather than the top or bottom, since the top of the pipe tends to accumulate gas and the bottom tends to accumulate sediment. Either condition will cause increased attenuation of the ultrasonic signal. There is no similar restriction with vertical pipes. However, vertical pipes should be avoided in order to insure a full pipe at the measurement point.

1.3.4 Cable Lengths

Locate the electronics enclosure as close as possible to the flowcell/transducers, preferably directly on the flowcell. However, Panametrics can supply transducer cables up to 1,000 ft (300 m) in length for remote location of the electronics enclosure. If longer cables are required, consult the factory for assistance.

1.3.5 Transducer Cables

When installing the transducer cables, always observe established standard practices for the installation of electrical cables. Do not route transducer cables alongside high amperage AC power lines or any other cables that could cause electrical interference. Also, protect the transducer cables and connections from the weather and corrosive atmospheres.

Note: *If you are using your own cables to connect the transducers to the electronics console, they must have electrical characteristics identical to the cables supplied by Panametrics. For transducer frequencies up to 2 MHz, the cables in each pair must be the same length within ±4 in. (10 cm). For transducer frequencies above 2 MHz, the cables in each pair must be the same length within ±0.5 in. (1.25 cm).*

1.4 Installing a Flowcell

A flowcell is the section of pipe where the transducers are mounted. It can be created either by mounting the transducers on the existing pipeline or by mounting them on a spoolpiece. A spoolpiece is a separately manufactured pipe section, matched to the existing pipe, which contains ports for mounting the transducers. This approach allows the transducers to be aligned and calibrated before inserting the spoolpiece into the pipeline.

Figure 1 on page 2 shows a typical Model XMT868i spoolpiece, with a mounting bracket to hold the electronics enclosure. For detailed instructions on installing the transducers and/or spoolpiece, refer to the supplied drawings and the enclosed Panametrics *Liquid Transducer Installation Guide* (916-055).

1.5 Installing Temperature Transmitters

Optional temperature transmitters may be installed as part of the flowcell, near the ultrasonic transducer ports. Be sure to observe the siting requirements given earlier in this chapter. These transmitters should send a 0/4-20 mA signal to the Model XMT868i. In turn, the XMT868i must be fitted with a suitable option card to process the signals and to provide the required 24 VDC power to the transmitters. Any desired transmitters or sensors may be used, but they must have an accuracy equal to 0.5% of the reading or better.

Note: *Resistive Thermal Devices (RTDs) are a good choice for measuring the temperature.*

Typically, a 1/2" NPT female threaded port is used to mount the transmitters on the flowcell. If the pipeline is insulated, the coupling may need to be extended to provide convenient access. Of course, other types of mounting ports, including flanged ports, may be used for the transmitters.

Figure 2 shows a typical mounting arrangement for a temperature transmitter. The temperature transmitter should protrude 1/4 to 1/2 way into the pipe.

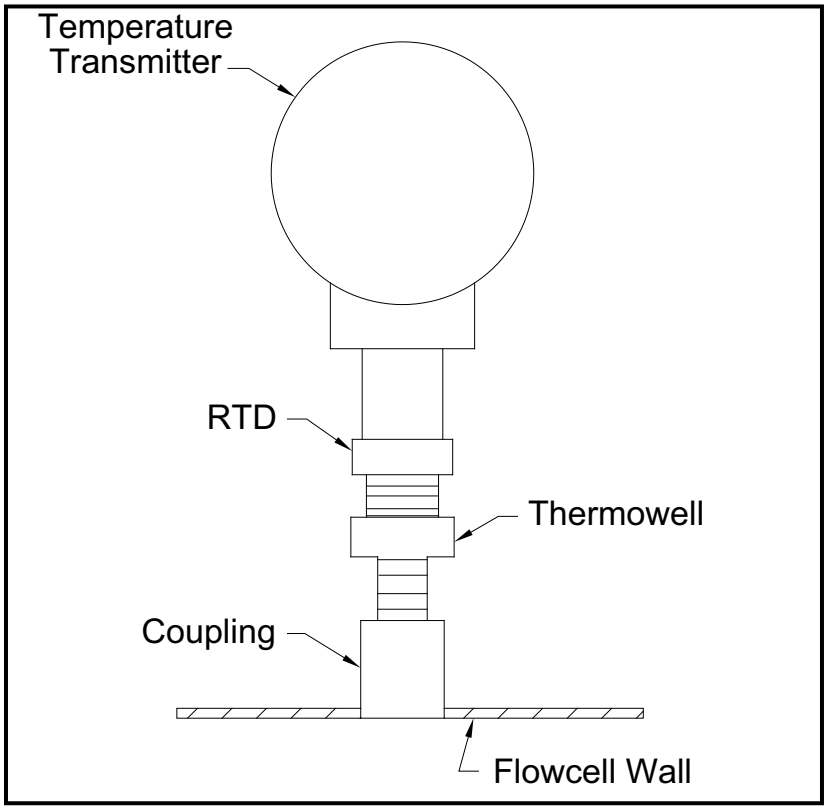


Figure 2: Typical Temperature Transmitter Mounting

1.6 Mounting the XMT868i Electronics Enclosure

The standard model XMT868i electronics package is housed in a Type-4X weather-resistant enclosure suitable for indoor or outdoor use. Refer to *Figure 8 on page 21* for the mounting dimensions and the weight of this enclosure.

The Model XMT868i electronics enclosure is fitted with a mounting boss that has a single 3/4" NPTF threaded hole at its center and four 1/4-20 tapped holes at its corners. By using this mounting boss, the electronics enclosure may be mounted by any of the typical techniques shown in *Figure 9 on page 22*.

WARNING! **Proper grounding of the XMT868i chassis is required to prevent the possibility of electric shock. See *Figure 9 on page 22* to locate the chassis grounding screw.**

IMPORTANT: Since the keys do not work properly in direct sunlight, be sure to position the XMT868i with an optional sunshield or out of direct sunlight.

1.7 Making Electrical Connections

This section contains instructions for making all the necessary electrical connections to the Model XMT868i flow transmitter. Refer to *Figure 10 on page 23* for a complete wiring diagram.

Except for the power connector, all electrical connectors are stored on their terminal blocks during shipment and may be removed from the enclosure for more convenient wiring. Simply, feed the cables through the conduit holes on the side of the enclosure, attach the wires to the appropriate connectors and plug the connectors back into their terminal blocks.

WARNING! **To meet CE Mark requirements, all cables must be installed as described in *Appendix A, "CE Mark Compliance"*.**

Refer to *Figure 3 on page 6* and prepare the Model XMT868i for wiring by completing the following steps:

WARNING! **Always disconnect the line power from the Model XMT868i before removing either the front cover or the rear cover. This is especially important in a hazardous environment.**

1. Disconnect any previously wired power line from the unit.
2. Loosen the set screw on the rear cover.
3. Place a rod or long screwdriver across the cover in the slots provided, and rotate the cover counterclockwise until it comes free from the enclosure.
4. Install any required cable glands in the appropriate conduit holes around the side of the enclosure.

CAUTION! **To ensure safe and reliable operation of the flowmeter, be sure to install and tighten all cable glands in accordance with the gland manufacturer's instructions.**

5. Note the labels inside the rear cover to assist in wiring the power and option card connections. Also, *Figure 11 on page 24* shows the rear cover option card labels for every available option card configuration.

Proceed to the appropriate section of this chapter to make the desired wiring connections.

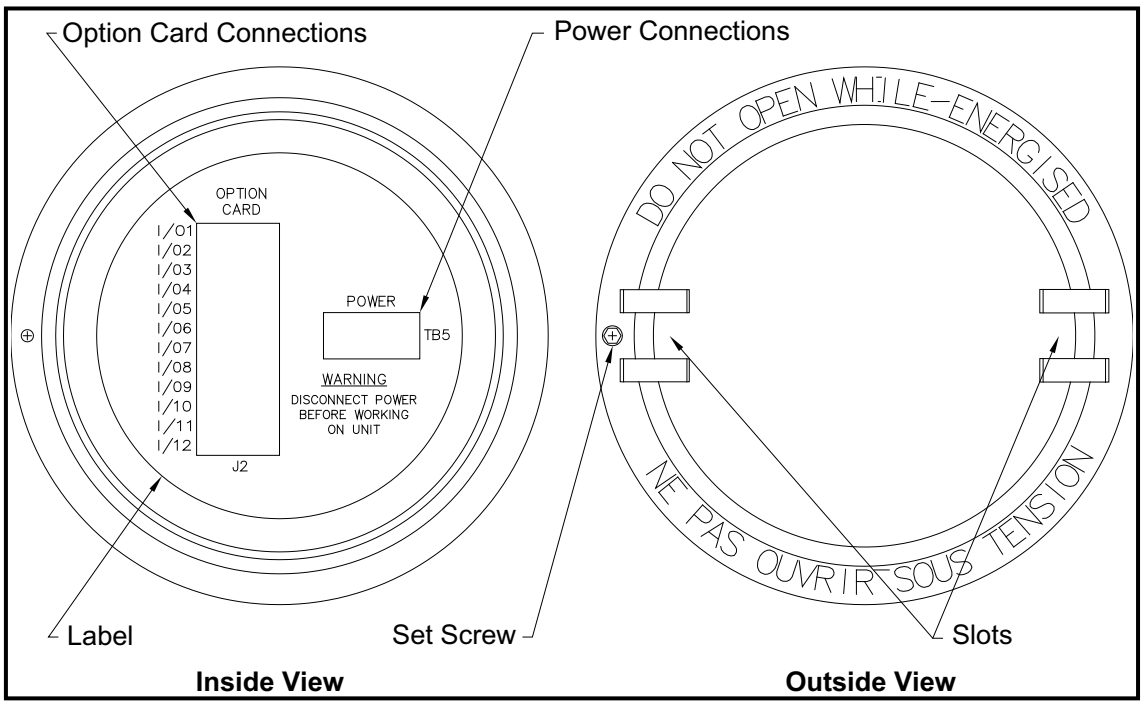


Figure 3: Rear Cover with Connection Labels

1.7.1 Wiring the Line Power

The Model XMT868i may be ordered for operation with power inputs of 100-120 VAC, 220-240 VAC, or 12-28 VDC. The label on the side of the electronics enclosure lists the meter's required line voltage and power rating. The fuse size is listed in *Chapter 4, "Specifications"*. Be sure to connect the meter only to the specified line voltage.

Note: *For compliance with the European Union's Low Voltage Directive (2006/95/EC), this unit requires an external power disconnect device such as a switch or circuit breaker. The disconnect device must be marked as such, clearly visible, directly accessible, and located within 1.8 m (6 ft) of the Model XMT868i.*

Note: *Only use Class 2 Rated Power supply for line power connection to DC instrument.*

Refer to *Figure 10 on page 23* to locate terminal block **TB5** and connect the line power as follows:

WARNING! **Improper connection of the line power leads or connecting the meter to the incorrect line voltage may damage the unit. It may also result in hazardous voltages at the flowcell and associated piping as well as within the electronics enclosure.**

1.7.1 Wiring the Line Power (cont.)

1. Prepare the line power leads by trimming the line and neutral AC power leads (or the positive and negative DC power leads) to a length 0.5 in. (1 cm) shorter than the ground lead. This ensures that the ground lead is the last to detach if the power cable is forcibly disconnected from the meter.
2. Install a suitable cable clamp in the conduit hole indicated in *Figure 10 on page 23*. If possible, avoid using the other conduit holes for this purpose, to minimize any interference in the circuitry from the AC power line.



WARNING! To meet CE Mark requirements, all cables must be installed as described in *Appendix A, "CE Mark Compliance"*.

3. Strip 1/4-in. of insulation from the end of each of the three line power leads.
4. Route the cable through the conduit hole and connect the line power leads to terminal block **TB5**, using the pin number assignments shown in *Figure 10 on page 23*.
5. Leaving a bit of slack, secure the power line with the cable clamp.



WARNING! Make sure both covers, with their O-ring seals, are installed and the set screws tightened before applying power in a hazardous environment.



CAUTION! The transducers must be properly wired before applying power to the meter.

Proceed to the next section to continue the initial wiring of the Model XMT868i flow transmitter.

1.7.2 Wiring Transducers

Before wiring the XMT868i transducers, complete the following steps:

- Disconnect the main power from the electronics enclosure.
- Remove the rear cover and install all required cable clamps.



WARNING! **Before connecting the transducers, take them to a safe area and discharge any static buildup by shorting the center conductor of the transducer cables to the metal shield on the cable connector.**

Note: *For transducer frequencies below 2 MHz, the cable lengths must be within 4 in. (10 cm) of each other. If the transducer frequency exceeds 2 MHz, the cable lengths must be within 0.5 in. (1.25 cm) of each other.*

1. Locate the **CH1** transducer cables and connect them to the two **CH1** transducers in the flowcell. Feed the free ends of the cables through the selected conduit hole in the electronics enclosure.
2. If an optional lightning protector is being installed, connect it between the meter and the transducers.
3. Refer to the wiring diagram in *Figure 10 on page 23* and connect the transducer cables to terminal block **J3**. Then, secure the cable clamp.

Note: *The* RED *cable leads are the SIG(+) leads and the* BLACK *cable leads are the RTN(-) leads.*



WARNING! **To meet CE Mark requirements, all cables must be installed as described in *Appendix A, "CE Mark Compliance"*.**

4. For a 2-Channel XMT868i, repeat steps 1-2 to connect the **CH2** transducers to terminal block **J4**. It is not required that both channels of a 2-Channel unit be connected.
5. If wiring of the unit has been completed, reinstall the rear cover on the enclosure and tighten the set screw.

Note: *A channel must be activated before it can begin taking measurements. See Chapter 2, "Initial Setup", for instructions.*

1.7.3 Wiring Standard 0/4-20 mA Analog Outputs

The standard configuration of the Model XMT868i flow transmitter includes two isolated 0/4-20 mA analog outputs (designated as outputs 1 and 2). Connections to these outputs may be made with standard twisted-pair wiring, but the current loop impedance for these circuits must not exceed 600 ohms.

To wire the analog outputs, complete the following steps:

1. Disconnect the main power to the unit and remove the rear cover.
2. Install the required cable clamp in the chosen conduit hole on the side of the electronics enclosure.
3. Refer to *Figure 10 on page 23* for the location of terminal block **J1** and wire the analog outputs as shown. Secure the cable clamp.

Note: *Analog outputs 1 and 2 in the wiring diagram correspond to analog outputs A and B in Slot 0 in the XMT868i software.*



WARNING! **To meet CE Mark requirements, all cables must be installed as described in *Appendix A, "CE Mark Compliance"*.**

4. If wiring of the unit has been completed, reinstall the rear cover on the enclosure and tighten the set screw.



WARNING! **Make sure both covers, with their o-ring seals, are installed and the set screws tightened before applying power in a hazardous environment.**

Note: *Prior to use, the analog outputs must be set up and calibrated. See Chapter 1,* Calibration*, of the* Service Manual *for detailed instructions.*

Proceed to the next section to continue the initial wiring of the unit.

1.7.4 Wiring the Serial Port

The Model XMT868i flow transmitter is equipped with a built-in serial communications port. The standard port is an RS232 interface, but an optional RS485 interface is available upon request. Proceed to the appropriate sub-section for wiring instructions. For more information on serial communications refer to the *EIA-RS Serial Communications* manual (916-054).

1.7.4.1 Wiring the RS232 Interface

Use the serial port to connect the Model XMT868i flow transmitter to a printer, an ANSI terminal or a personal computer. The RS232 interface is wired as Data Terminal Equipment (DTE), and the signals available at terminal block **J1** are shown in *Table 1*. Refer to *Figure 10 on page 23* and complete the following steps:

1. Disconnect the main power to the unit and remove the rear cover.
2. Install the required cable clamp in the chosen conduit hole on the side of the electronics enclosure.
3. Use the information in *Table 1* to construct a suitable cable for connecting the Model XMT868i to the external device. If desired, an appropriate cable may be purchased from Panametrics.

Table 1: RS232 Connection to DCE or DTE Device

J1 Pin #	Signal Description	DCE DB25 Pin #	DCE DB9 Pin #	DTE DB25 Pin #	DTE DB9 Pin #
5	DTR (Data Terminal Ready)	20	4	20	4
6	CTS (Clear to Send)	4	7	5	8
7	COM (Ground)	7	5	7	5
8	RX (Receive)	2	3	3	2
9	TX (Transmit)	3	2	2	3

Note: *Signal names that imply direction (e.g., transmit and receive) are named from the point of view of the DTE device (the Panametrics meter is usually considered the DTE device). When the RS232 standard is strictly followed, these signals are labeled with the same name and pin # on the DCE device side as well. Unfortunately, the convention is not followed because the DTE and DCE side get confused. Therefore, connections that imply direction are changed to reflect their direction on the DCE side.*

4. Feed the flying leads end of the cable through the conduit hole and wire it to terminal block **J1**. Connect the other end of the cable to the printer, ANSI terminal or personal computer, and secure the cable clamp.



WARNING! To meet CE Mark requirements, all cables must be installed as described in *Appendix A, "CE Mark Compliance"*.

After the wiring has been completed, consult the *User's Manual* for the external device to configure it for use with the XMT868i.

1.7.4.2 Wiring the RS485 Interface

Use the optional RS485 serial port to network multiple XMT868i flow transmitters to a single computer terminal. As an option, the standard RS232 port on the XMT868i may be configured as a two-wire, half-duplex RS485 interface.

IMPORTANT: The XMT868i must be configured at the factory for RS485 operation. The maximum cable length for RS485 is 4000 ft (1200 m).

To wire the RS485 serial port, refer to *Figure 10 on page 23* and complete the following steps:

1. Disconnect the main power to the unit and remove the rear cover.
2. Install the required cable clamp in the chosen conduit hole on the side of the electronics enclosure.
3. Feed one end of the cable through the conduit hole, wire it to terminal block **J1** and secure the cable clamp. Use the information in *Table 2* to wire a suitable cable for connecting the XMT868i to the external device.

Table 2: RS485 Connections

J1 Pin #	Signal Description
9	Data +
8	Data -
7	Shield
6	Not Used
5	Not Used
4	Not Used



WARNING! To meet CE Mark requirements, all cables must be installed as described in *Appendix A, "CE Mark Compliance"*.

4. If wiring of the unit has been completed, reinstall the rear cover on the enclosure and tighten the set screw.

Proceed to the next section to continue the initial wiring of the unit.

1.7.5 Wiring Option Cards

The XMT868i can accommodate one option card in **Slot 1** and one option card in **Slot 2**. The following types of option cards are available only in the combinations listed in *Table 22*:

- Alarm Relays (Slot 1)
- Analog Inputs (Slot 1)
- Totalizer/Frequency Outputs (Slot 1)
- RTD Inputs (Slot 1)
- Analog Outputs (Slot 1)
- MODBUS Communications (Slot 2)
- MODBUS/TCP Communications (Slot 2)
- Ethernet (Slot 2)
- Foundation Fieldbus (Slot 2)
- Data logging (Slot 2) - *no wiring required*

1.7.5.1 Preparing for Wiring

Wiring any option card installed in Slot 1 requires completion of the following general steps:

1. Disconnect the main power to the unit and remove the rear cover.
2. Install a cable clamp in the chosen conduit hole on the side of the electronics enclosure and feed a standard twisted-pair cable through this conduit hole.
3. Locate the 12-pin terminal block (**J2**) in *Figure 10 on page 23* and wire the option card as indicated on the label inside the rear cover (see *Figure 3 on page 6* and *Figure 11 on page 24*). Secure the cable clamp.

IMPORTANT: Because of the attached wiring label, all rear covers must remain with their original meters.



WARNING! **To meet CE Mark requirements, all cables must be installed as described in *Appendix A, "CE Mark Compliance"*.**

4. If wiring of the unit has been completed, reinstall the rear cover on the enclosure and tighten the set screw.

Note: *Prior to use, the option card must be set up and calibrated. See Chapter 1,* Programming Site Data*, in the* Programming Manual *and Chapter 1,* Calibration*, in the* Service Manual *for detailed instructions.*

For more specific instructions on particular option cards, proceed to the appropriate sub-section(s) that follow.

1.7.5.2 Wiring an Alarms Option Card

Each alarms option card includes two or four general-purpose *Form C relays* (designated as A, B, C and D).

The maximum electrical ratings for the relays are listed in *Chapter 4, "Specifications"*. Each of the alarm relays can be wired as either *Normally Open* (NO) or *Normally Closed* (NC).

In setting up an alarm relay, it may be wired for either *conventional* or *fail-safe* operation. In fail-safe mode, the alarm relay is constantly energized, except when it is triggered or a power failure or other interruption occurs. See *Figure 4* for the operation of a normally open alarm relay in both conventional and fail-safe mode.

Connect each alarm relay in accordance with the wiring instructions shown on the label inside the rear cover (see *Figure 3 on page 6* and *Figure 11 on page 24*).

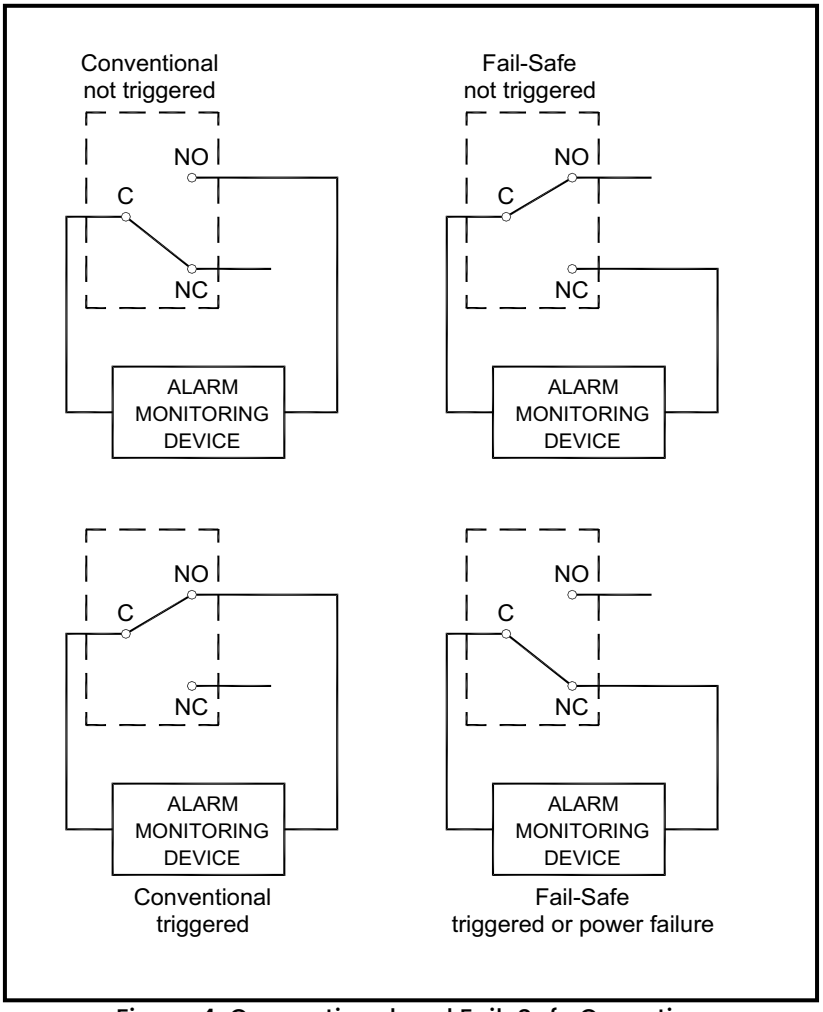


Figure 4: Conventional and Fail-Safe Operation

1.7.5.3 Wiring a 0/4-20 mA Analog Inputs Option Card

This option card includes two or four isolated 0/4-20 mA analog inputs (designated as A, B, C and D), each of which includes a 24 VDC power supply for loop-powered transmitters. Either input may be used to process the temperature signal, while the other input is used to process the pressure signal.

Note: *To enter programming data during operation of the meter, it will be necessary to know which input is assigned to which process parameter. This information should be entered in Appendix B, "Data Records".*

The analog inputs, which have an impedance of 118 ohms, should be connected with standard twisted-pair wiring. Power to the transmitters may be supplied either by the integral 24 VDC power supply on the analog input option card or by an external power supply. *Figure 5* shows typical wiring diagrams, with and without an external power supply, for one of the analog inputs.

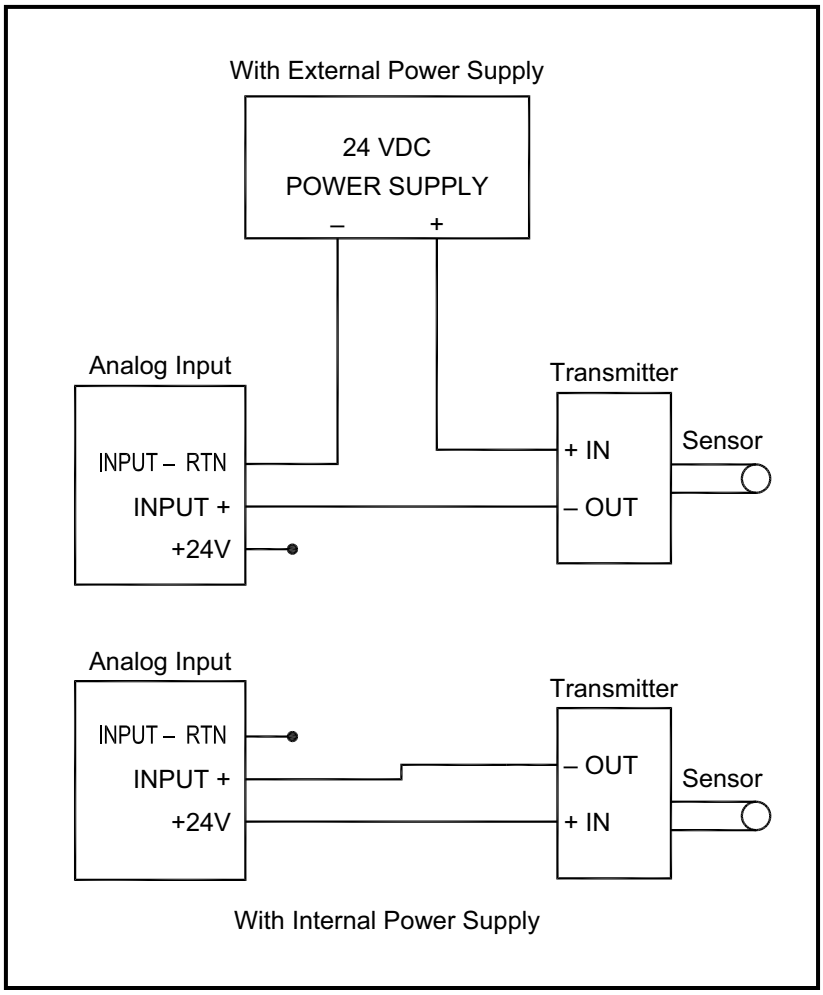


Figure 5: Analog Input Wiring Diagram

1.7.5.3 Wiring a 0/4-20 mA Analog Inputs Option Card (cont.)

Wire the analog inputs as shown on the label in the rear cover (see *Figure 3 on page 6* and *Figure 11 on page 24*).

Note: *The analog inputs option card can be calibrated with the Model XMT868i's built-in analog outputs. However, be certain that the analog outputs have been calibrated first. See Chapter 1,* Calibration*, in the* Service Manual *for the appropriate procedures.*

1.7.5.4 Wiring a Totalizer and Frequency Output Option Card

Each totalizer and frequency output option card provides two or four outputs (designated as **A, B, C**, and **D**).

Wire this option card in accordance with the connections shown on the label in the rear cover (see *Figure 3 on page 6* and *Figure 11 on page 24*). *Figure 6* shows sample wiring diagrams of a totalizer output circuit and a frequency output circuit. Refer to *Electrical Specifications* on *Section 4.2* for the load and voltage requirements.

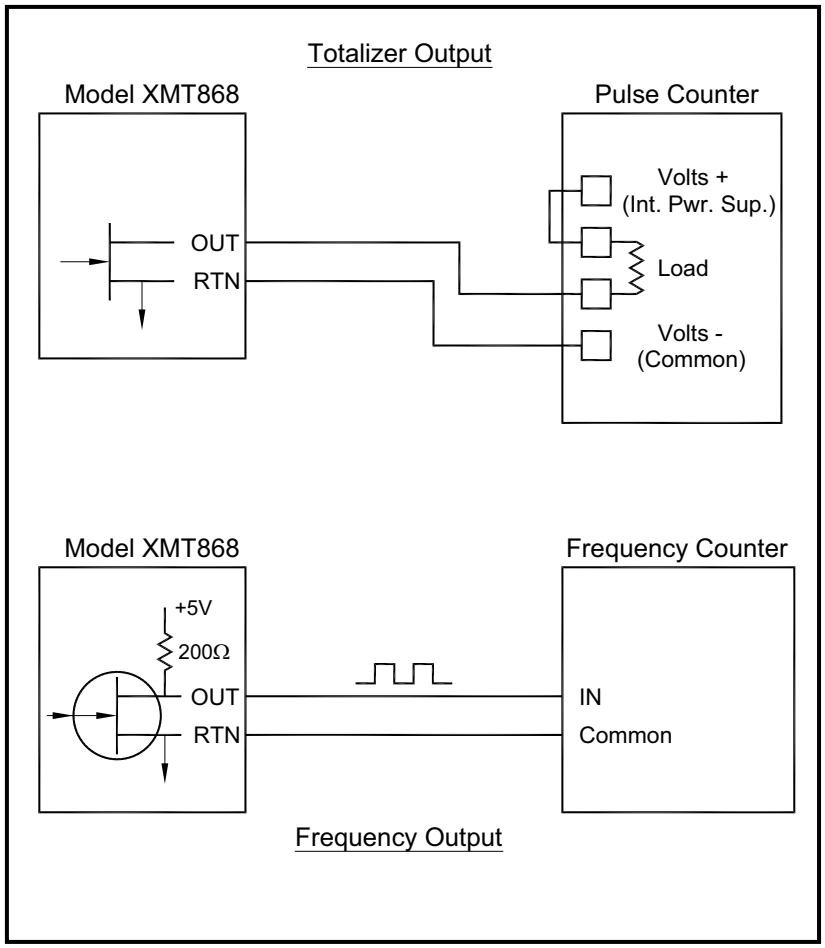


Figure 6: Totalizer and Frequency Output Wiring

1.7.5.5 Wiring an RTD Inputs Option Card

The Model XMT868i RTD (Resistance Temperature Device) inputs option card provides two direct RTD inputs (designated as A and B). Each RTD input requires three wires, and should be connected as shown on the label in the rear cover (see *Figure 3 on page 6* and *Figure 11 on page 24*).

1.7.5.6 Wiring a 0/4-20 mA Analog Outputs Option Card

The analog outputs option card includes two isolated 0/4-20 mA outputs (designated as A and B). Connections to these outputs may be made with standard twisted-pair wiring, but the total current loop impedance for these circuits must not exceed 1,000 ohms. Wire this option card with the connections shown on the label in the rear cover (see *Figure 3 on page 6* and *Figure 11 on page 24*).

1.7.5.7 A Specific Example

To illustrate the procedures described in the previous sections for wiring the option cards, a specific example may prove helpful. Assume that an XMT868i is equipped with an option card numbered *703-1223-08*. *Table 22* in *Appendix B, "Data Records"*, indicates that this option card includes two analog current inputs and two standard alarm relays.

By referring to *Figure 11 on page 24*, you can see that the appropriate connection diagram for this option card is the first one from the left in the middle row. This label should also be found inside the rear cover of the XMT868i. Based on this information, wiring of the Input/Output connections to terminal block **J2** should be completed as shown in *Table 3*.

Table 3: Wiring a 703-1223-08 Option Card

J2 Pin #	Description	Connection
1	Alarm A	Normally Open
2	Alarm A	Common
3	Alarm A	Normally Closed
4	Alarm B	Normally Open
5	Alarm B	Common
6	Alarm B	Normally Closed
7	Out C	+24 V to Input C
8	Input C	Signal (+)
9	Input C	Return (-)
10	Out D	+24 V to Input D
11	Input D	Signal (+)
12	Input D	Return (-)

1.7.5.8 Wiring the MODBUS Option Card

The MODBUS option card uses the RS485 standard for MODBUS communication. The MODBUS card must be installed in Slot 2. The RS485 standard allows up to 32 nodes (drivers and receivers) on one multidrop network, at distances up to 4,000 ft (1,200 m). Panametrics recommends using 24-gauge (24 AWG) twisted-pair wire with a characteristic impedance of 120 ohms and 120-ohm termination at each end of the communications line.

Note: *The MODBUS option card provides its own RS485 connections. Thus, the meter can have its serial port configured as RS232 and still provide RS485 MODBUS signals.*

IMPORTANT: Because the MODBUS option card uses pins 1 and 2 on terminal block **J2**, only those option cards that do not use these pins may be installed in **Slot 1**, while a MODBUS card is installed in **Slot 2**. Specifically, only the option cards designated as "OI" and "OR" in *Figure 11 on page 24* are compatible with the MODBUS option card.

To link the XMT868i to the control system (refer to *Figure 7*):

1. Connect the MODBUS – wire to pin **#2**, the inverting or negative connection.
2. Connect the MODBUS + wire to pin **#1**, the non-inverting or positive connection.

3. Pin #3 has no connection.

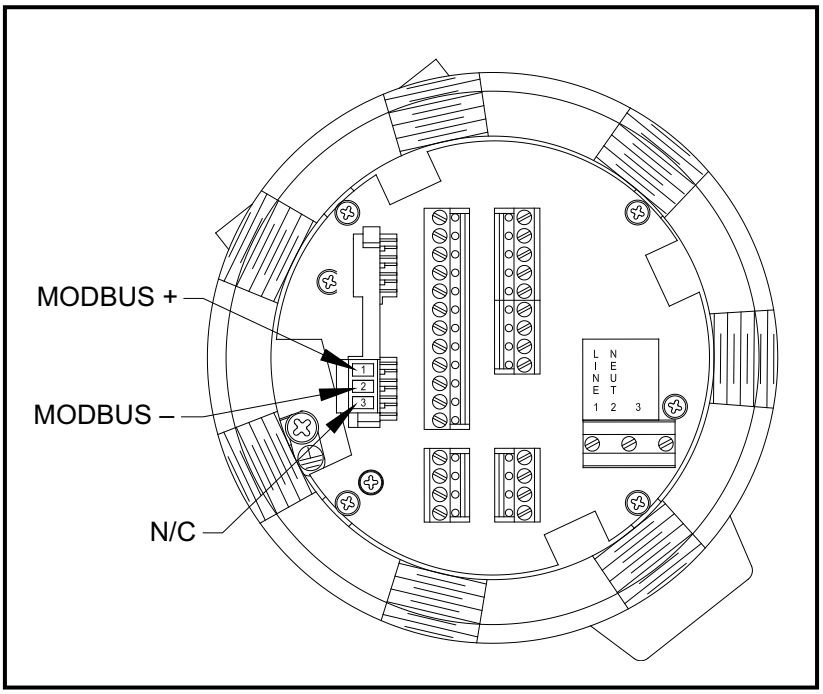


Figure 7: The RS485 MODBUS Terminal Block Connector

1.7.5.9 Wiring the MODBUS/TCP Interface

Customers can also use a modified XMT868i that provides a MODBUS/TCP interface to communicate to an internal network. An optional MODBUS/TCP card with a unique MAC (IP) address (installed only in slot 2) includes an RJ45 connector. To connect the MODBUS/TCP-enabled XMT868i to the network, insert the jack of an RJ45 cable into the RJ45 connector, route the cable through one of the conduit holes using an appropriate cable clamp, and wire the other end of the cable to the Ethernet network according to the manufacturer's instructions. See *Figure 12 on page 25*.

Note: *The MAC address for a specific XMT868i is included with customer documentation. For more information on setting up the MAC address, refer to Chapter 6 of the Programming Manual.*

1.7.5.10 Wiring the Ethernet Interface

A modified XMT868i can use the Ethernet interface to communicate to a local area network. An optional Ethernet card with a unique MAC (IP) address (installed only in slot 2) includes an RJ45 connector. To connect the Ethernet-enabled XMT868i to the network, insert the jack of an RJ45 cable into the RJ45 connector, route the cable through one of the conduit holes using an appropriate cable clamp, and wire the other end of the cable to the Ethernet network according to the manufacturer's instructions. An external connection is required between the Ethernet option card and the XMT868i's RS232 connector, as shown in Table 4 and *Figure 12 on page 25*.

Note: *The MAC address for a specific XMT868i is included with customer documentation. For more information on setting up the MAC address, refer to Appendix C of the* Programming Manual.

Table 4: RS232 to Ethernet Interconnections

XMT868i Type	Terminal Block	Terminal Block
Terminal	RS232 on Rear Board	TB1 on Ethernet Card
	TX	Pin 1
	RX	Pin 2
	COM	Pin 3

1.7.5.11 Wiring the Foundation Fieldbus Interface

To connect the Foundation Fieldbus interface to the XMT868i, make the network connections at J8, pins 1 and 2, as shown in drawing Y of *Figure 12 on page 25*. As an option, you can connect a shield to J8 pin 3, depending on the network wiring.

No connections are made to J9 under normal operation. If you need to reset the network board to factory defaults:

1. Connect a jumper between J9 pin 2 and J9 pin 3.
2. Power cycle (i.e., turn off and on) the XMT868i.
3. Ten seconds after the power has been restored to the XMT868i, remove the jumper to return the network board to normal operation.

1.7.5.12 Data Logging Option Card

The XMT868i can be fitted with a data logging option card, which must be installed in **Slot 2**. The data logging option card increases the XMT868i's memory by up to 2 MB.



WARNING! To meet CE Mark requirements, all cables must be installed as described in *Appendix A, "CE Mark Compliance".*

1.7.5.13 Procedure Options

After the XMT868i has been completely installed and wired, proceed to *Chapter 2, "Initial Setup"*, to program the meter for taking flow rate measurements.



WARNING! Make sure both covers, with their o-ring seals, are installed and the set screws tightened before applying power in a hazardous environment.

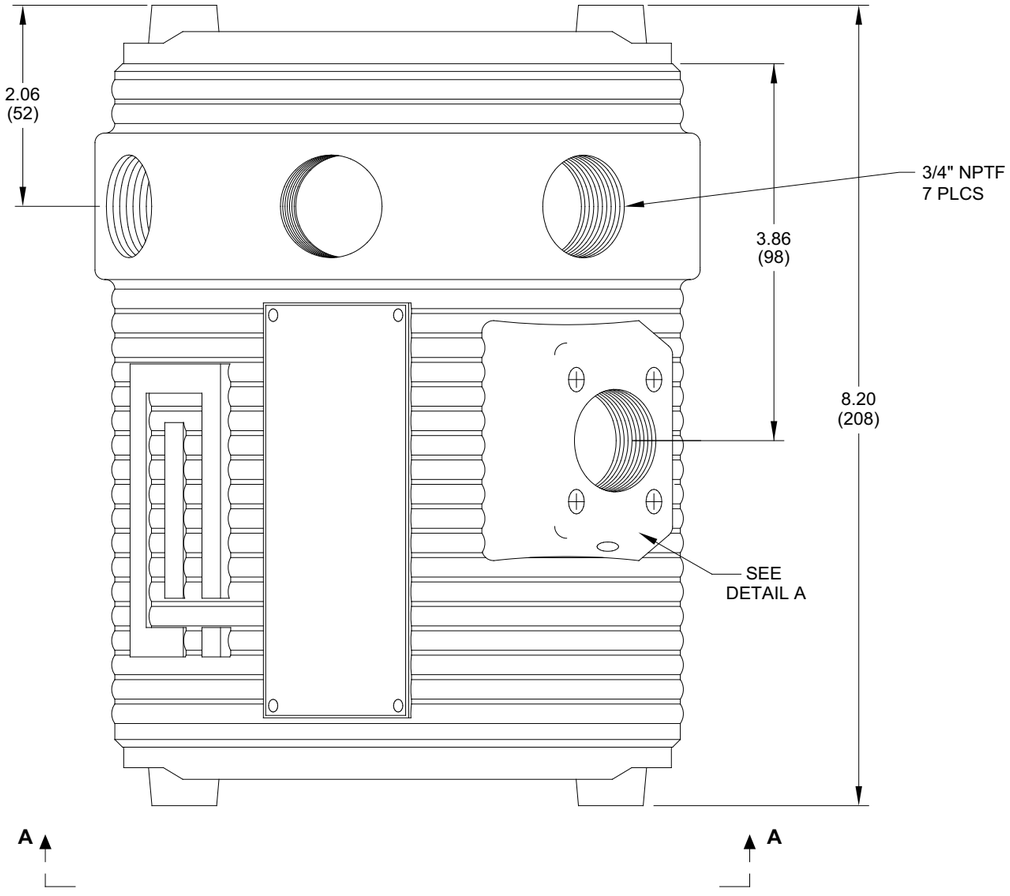
1.8 Specific Conditions for Safe Use

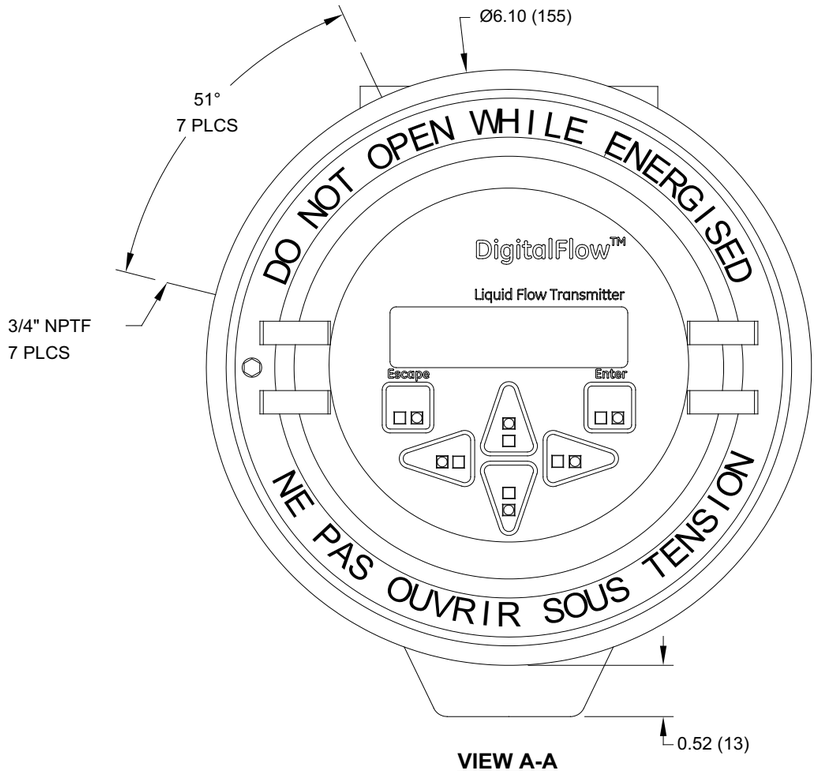
When installing this apparatus, the following requirements must be met:

- Field wiring shall be rated at least 10°C above 70°C.
- Connecting cables shall be mounted securely and protected from mechanical damage, pulling and twisting.
- Cable entries are ¾" NPT.
- Cable glands of an approved flameproof design are required. These must be installed according to the manufacturer's instructions. Where the cable glands are provided by Panametrics, the manufacturer's instructions, as supplied, to Panametrics, will be included in the documentation.
- Unused cable entries must be sealed using a certified threaded plug.
- Modifications to the flameproof enclosure are not permitted.
- The apparatus should be de-energized before opening.
- Installation should comply with IEC/EN 60079-14.
- Equipment is of type flameproof "d" design and complies with: EN 60079-0:2009, EN 60079-1:2007, EN 60529:1991 +A1:2000, IEC 60079-0:2011, IEC 60079-1:2007, IEC 60529:2001.
- The product contains no exposed parts which produce surface temperature infrared, electromagnetic ionizing, or non-electrical dangers.
- The product must not be subjected to mechanical or thermal stresses in excess of those permitted in the certification documentation and the instruction manual.
- The product cannot be repaired by the user; it must be replaced by an equivalent certified product. Repairs should only be carried out by the manufacturer or by an approved repairer.
- Only trained, competent personnel may install, operate and maintain the equipment
- The product is an electrical apparatus and must be installed in the hazardous area in accordance with the requirements of the EC Type Examination Certificate. The installation must be carried out in accordance with all the appropriate international, national and local standard codes and practices and site regulations for flameproof apparatus and in accordance with the instructions contained in the manual. Access to the circuitry must not be made during operation.

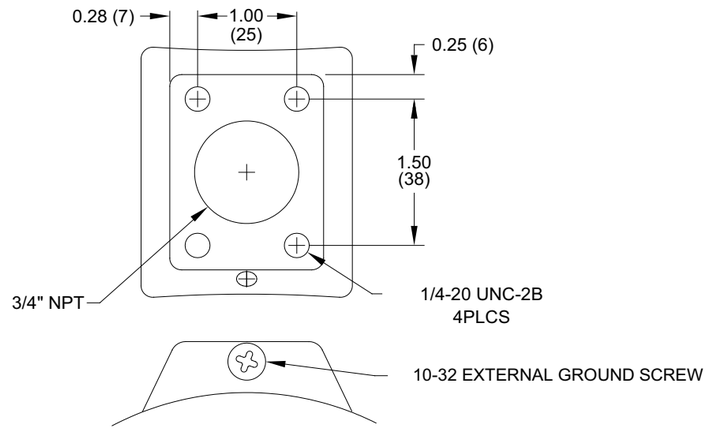
IMPORTANT: Consult the manufacturer if dimensional information on the flameproof joints is necessary.

[no content intended for this page]





VIEW A-A



DETAIL A

NOTES:

1. ALL DIMENSIONS ARE REFERENCE.

2. WEIGHT: 10 LB (4.5 KG) AL
   25 LB (11.5 KG) SS

3. DIMENSIONS ARE IN INCHES (MILLIMETERS).

Figure 8: Model XMT868i Outline and Installation (ref. dwg #712-1318)

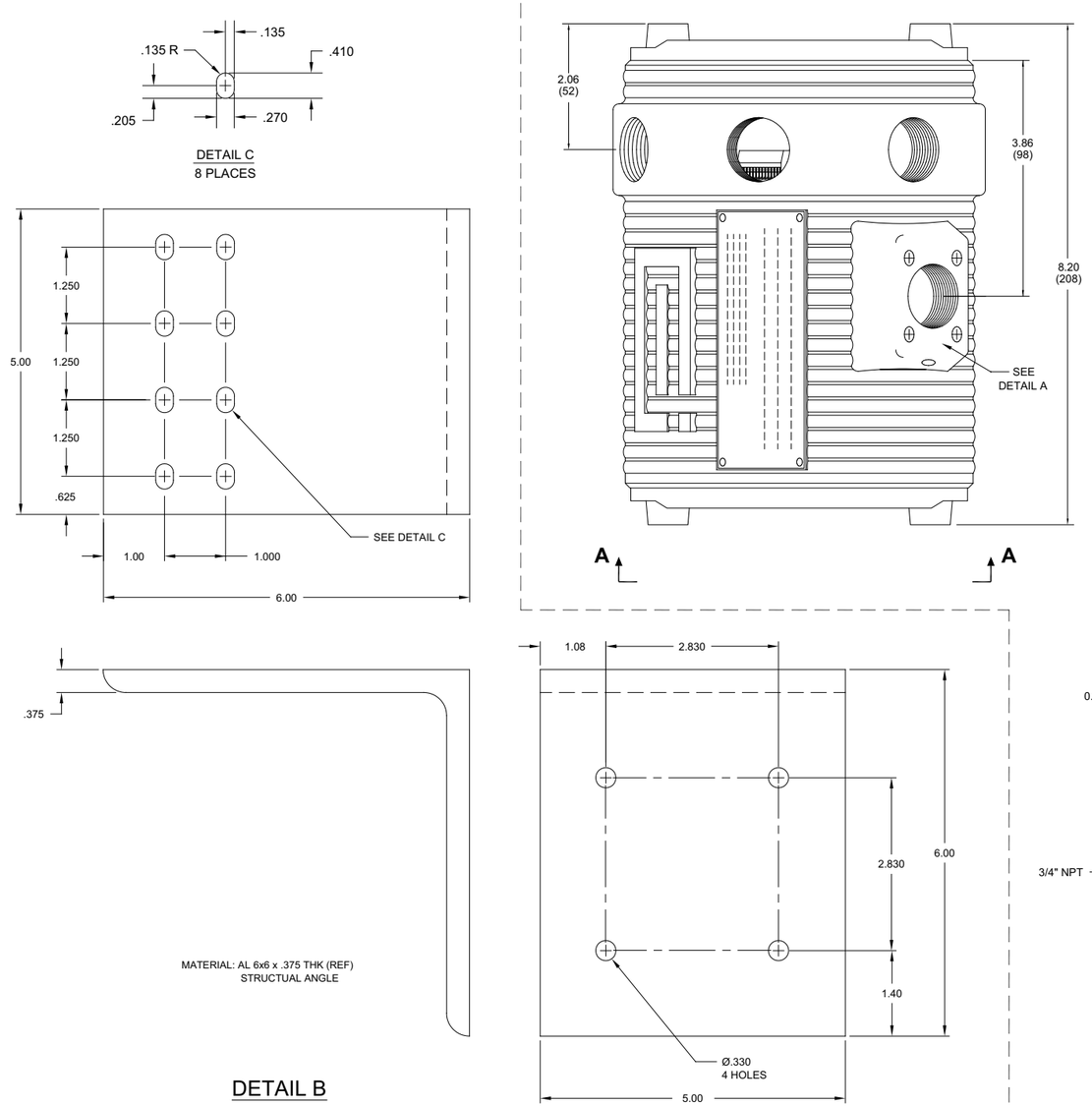


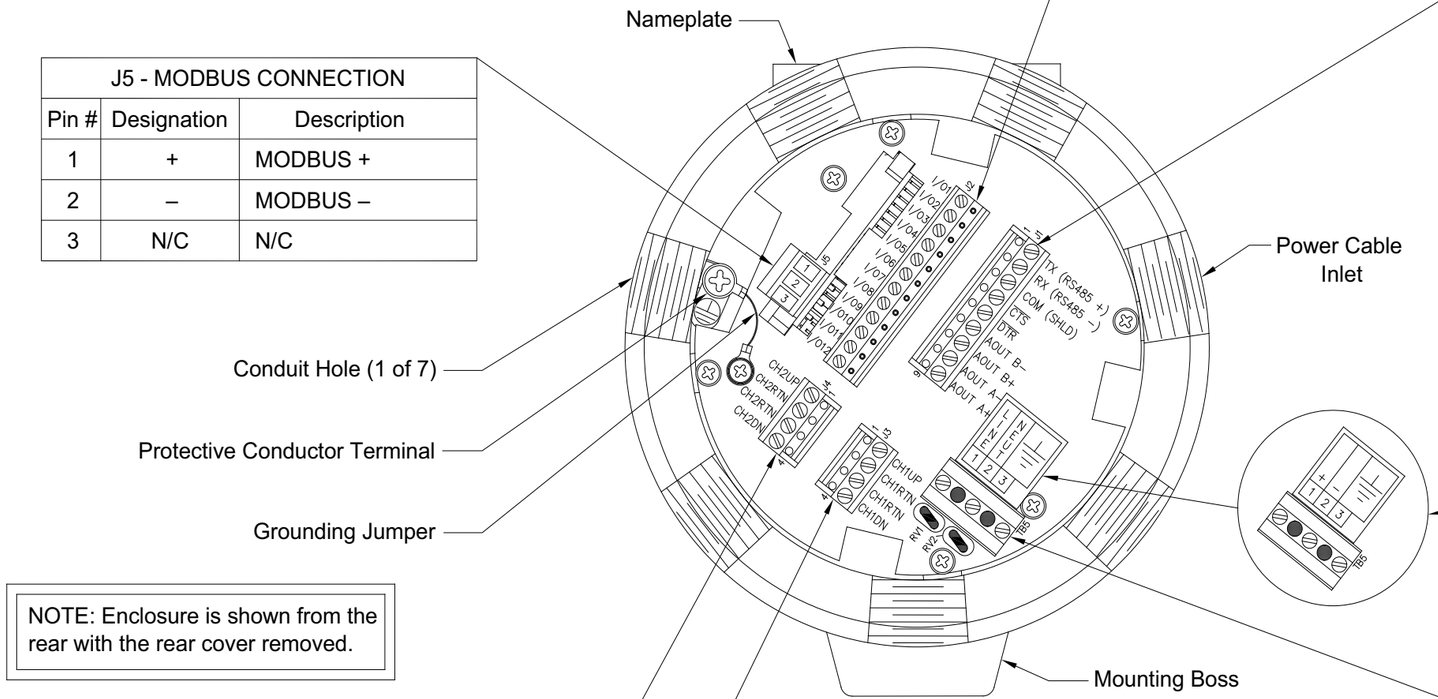
Figure 9: Model XMT868i Outline and Installation – Right Angle Mounting Bracket (ref. dwg #712-1317)

NOTE: *For compliance with the European Union's Low Voltage Directive (2006/95/EC), this unit requires an external power disconnect device such as a switch or circuit breaker. The disconnect device must be marked as such, clearly visible, directly accessible and located within 1.8 m (6 ft) of the Model XMT868i.*

J2 - INPUT/OUTPUT CONNECTIONS*												
Pin #	1	2	3	4	5	6	7	8	9	10	11	12
Designation	I/O1	I/O2	I/O3	I/O4	I/O5	I/O6	I/O7	I/O8	I/O9	I/O10	I/O11	I/O12
Description	*See the wiring label inside the rear cover and Figure 1-11.											

J5 - MODBUS CONNECTION		
Pin #	Designation	Description
1	+	MODBUS +
2	–	MODBUS –
3	N/C	N/C

J1 - RS232/RS485 / 4-20 OUTPUT		
Pin #	Designation	Description
1	TX(RS485+)	Transmit / +
2	RX(RS485–)	Receive / –
3	COM (SHLD)	Ground
4	$\overline{\text{CTS}}$	Clear To Send
5	$\overline{\text{DTR}}$	Data Terminal Ready
6	AOUT B–	4-20 Output 2 RTN
7	AOUT B+	4-20 Output 2 SIG
8	AOUT A–	4-20 Output 1 RTN
9	AOUT A+	4-20 Output 1 SIG



NOTE: Enclosure is shown from the rear with the rear cover removed.

DC POWER INPUT	
Pin #	Description
1	Line Positive
2	Line Negative
3	No Connection

AC POWER INPUT	
Pin #	Description
1	Line Power
2	Line Neutral
3	Earth Ground

J4 - CH2 TRANSDUCER CONNECTION (optional)		
Pin #	Designation	Description
1	CH2UP	Upstream Transducer SIG(+)
2	CH2RTN	Upstream Transducer Analog RTN(-)
3	CH2RTN	Downstream Transducer Analog RTN(-)
4	CH2DN	Downstream Transducer SIG(+)

J3 - CH1 TRANSDUCER CONNECTION		
Pin #	Designation	Description
1	CH1UP	Upstream Transducer SIG(+)
2	CH1RTN	Upstream Transducer Analog RTN(–)
3	CH1RTN	Downstream Transducer Analog RTN(-)
4	CH1DN	Downstream Transducer SIG(+)

Figure 10: Model XMT868i Wiring Diagram (ref. dwg 702-646)

-01 (AA,HH)

Pin	
1	ALARM A - NO
2	ALARM A - COM
3	ALARM A - NC
4	ALARM B - NO
5	ALARM B - COM
6	ALARM B - NC
7	ALARM C - NO
8	ALARM C - COM
9	ALARM C - NC
10	ALARM D - NO
11	ALARM D - COM
12	ALARM D - NC

-02 (FF,TT,FT,CT,CF)

Pin	
1	OUT - A
2	RTN - A
3	NC
4	OUT - B
5	RTN - B
6	NC
7	OUT - C
8	RTN - C
9	NC
10	OUT - D
11	RTN - D
12	NC

-03 (FO,TO,CO)

Pin	
1	OUT - A
2	RTN - A
3	NC
4	OUT - B
5	RTN - B
6	NC
7	NC
8	NC
9	NC
10	NC
11	NC
12	NC

-04 (FA,FH,TA,TH,CA,CH)

Pin	
1	OUT - A
2	RTN - A
3	NC
4	OUT - B
5	RTN - B
6	NC
7	ALARM C - NO
8	ALARM C - COM
9	ALARM C - NC
10	ALARM D - NO
11	ALARM D - COM
12	ALARM D - NC

-05 (CI,TI,FI)

Pin	
1	OUT - A
2	RTN - A
3	NC
4	OUT - B
5	RTN - B
6	NC
7	OUT C - +24V
8	INPUT C - +
9	INPUT C - RTN
10	OUT D - +24V
11	INPUT D - +
12	INPUT D - RTN

-06 (CR,FR,TR)

Pin	
1	OUT - A
2	RTN - A
3	NC
4	OUT - B
5	RTN - B
6	NC
7	RTD - C
8	COMM - C
9	COM - C
10	RTD - D
11	COMM - D
12	COM - D

-07 (CIR)

Pin	
1	OUT - A
2	RTN - A
3	NC
4	OUT - B
5	RTN - B
6	NC
7	OUT C - +24V
8	INPUT C - +
9	INPUT C - RTN
10	RTD - D
11	COMM - D
12	COM - D

-08 (AI,HI)

Pin	
1	ALARM A - NO
2	ALARM A - COM
3	ALARM A - NC
4	ALARM B - NO
5	ALARM B - COM
6	ALARM B - NC
7	OUT C - +24V
8	INPUT C - +
9	INPUT C - RTN
10	OUT D - +24V
11	INPUT D - +
12	INPUT D - RTN

-09 (OI)

Pin	
1	NC
2	NC
3	NC
4	NC
5	NC
6	NC
7	OUT C - +24V
8	INPUT C - +
9	INPUT C - RTN
10	OUT D - +24V
11	INPUT D - +
12	INPUT D - RTN

-10 (OR)

Pin	
1	NC
2	NC
3	NC
4	NC
5	NC
6	NC
7	RTD - C
8	COMM - C
9	COM - C
10	RTD - D
11	COMM - D
12	COM - D

-11 (AR,HR)

Pin	
1	ALARM A - NO
2	ALARM A - COM
3	ALARM A - NC
4	ALARM B - NO
5	ALARM B - COM
6	ALARM B - NC
7	RTD - C
8	COMM - C
9	COM - C
10	RTD - D
11	COMM - D
12	COM - D

-12 (II)

Pin	
1	OUT A - +24V
2	INPUT A - +
3	INPUT A - RTN
4	OUT B - +24V
5	INPUT B - +
6	INPUT B - RTN
7	OUT C - +24V
8	INPUT C - +
9	INPUT C - RTN
10	OUT D - +24V
11	INPUT D - +
12	INPUT D - RTN

-13 (RR)

Pin	
1	RTD - A
2	COMM - A
3	COM - A
4	RTD - B
5	COMM - B
6	COM - B
7	RTD - C
8	COMM - C
9	COM - C
10	RTD - D
11	COMM - D
12	COM - D

-14 (IR)

Pin	
1	OUT A - +24V
2	INPUT A - +
3	INPUT A - RTN
4	OUT B - +24V
5	INPUT B - +
6	INPUT B - RTN
7	RTD - C
8	COMM - C
9	COM - C
10	RTD - D
11	COMM - D
12	COM - D

-15 (FHII)

Pin	
1	A-FREQ OUT
2	A-FREQ RTN
3	A-NC
4	B-ALARM NO
5	B-ALARM COM
6	B-ALARM NC
7	C- +24 OUT
8	C-ANALOG IN+
9	C-ANALOG IN RTN
10	D- +24v OUT
11	D-ANALOG IN+
12	D-ANALOG IN RTN

-16 (HART)

Pin	
1	+HART/OUT-A
2	–HART/OUT-A
3	NC
4	NC
5	NC
6	NC
7	NC
8	NC
9	NC
10	NC
11	NC
12	NC

-17 (HART/OI)

Pin	
1	+HART/OUT-A
2	–HART/OUT-A
3	NC
4	NC
5	NC
6	NC
7	OUT C- +24V
8	INPUT C- +
9	INPUT D-RTN
10	OUT D- +24V
11	INPUT D- +
12	INPUT C-RTN

-18 (F(F)HH)

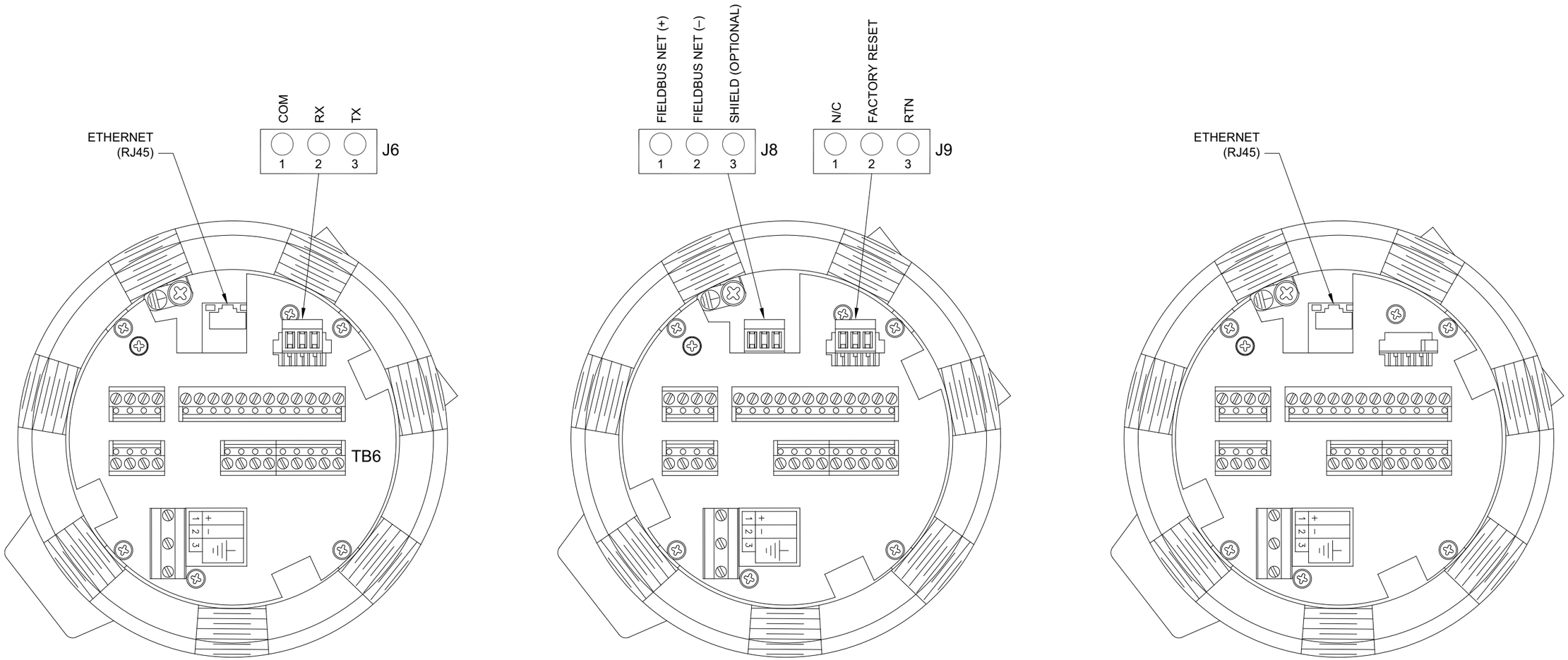
Pin	
1	A-FREQ OUT
2	A-FREQ RTN
3	A-NC
4	B-FREQ OUT
5	B-FREQ RTN
6	B-NC
7	C-ALARM NO
8	C-ALARM COM
9	C-ALARM NC
10	D-ALARM NO
11	D-ALARM COM
12	D-ALARM NC

-19 (HART/RI)

Pin	
1	+HART/OUT-A
2	–HART/OUT-A
3	NC
4	NC
5	NC
6	NC
7	RTD-A
8	COMM-A
9	COM-A
10	OUT D- +24V
11	INPUT D- +
12	INPUT D-RTN

NOTE:
R = RTD Input
A = Standard Alarm
H = Hermetic Alarm
F = Frequency Output
T = Totalizer Output
I = Current Input
C = Current Output
O = Blank/No Connection

Figure 11: Option Card Connection Labels (ref. dwg #442-615)



(a)
ETHERNET
Terminal Block Connector

(b)
FOUNDATION FIELDBUS
Terminal Block Connector

(c)
MODBUS/TCP
Terminal Block Connector

Figure 12: Ethernet, Foundation Fieldbus and MODBUS/TCP Terminal Block Connections

[no content intended for this page]

Chapter 2. Initial Setup

2.1 Introduction

This chapter provides instructions for programming the minimum amount of data required to place the Model XMT868i flowmeter into operation. Before the Model XMT868i can begin taking measurements and displaying valid data, the current system and pipe parameters must be entered. In addition, a 2-Channel meter requires that each channel be activated prior to use. Additional programming options provide access to the more advanced features of the Model XMT868i, but this information is not required to begin taking measurements.

Note: *See the* Programming Manual *for information on those* User Program *features not covered in this chapter.*

You can program the XMT868i using either the keypad on the lower part of the glass enclosure, or **PanaView™,** a PC-based, non-resident software program that communicates with the XMT868i using its RS232 serial port. PanaView supplements basic XMT868i functions with several additional capabilities. With PanaView, you can:

- load and save site file data
- create and save graph and log files
- display text output and graphs of live measurement data
- create custom templates for displaying text, graph and log data
- interface with multiple Panametrics instruments.

This chapter focuses on programming using the infrared keypad. For information on programming the XMT868i using PanaView, refer to the *Programming Manual*.

2.2 XMT868i Enclosure Keypad Program

Along with the 2-line, 16-character LCD, the XMT868i includes a 6-key magnetic keypad. The decal cutout for each key contains a hall effect sensor, pushbutton switch and visible red LED. The magnetic wand used to activate a magnetic key is found attached to the meter chassis below the front panel. An operator activates the key by pressing the magnetic wand up to the glass lid over the desired key. The LED will light indicating a successful key press.

Note: *The pushbutton switch will also act as a key press but is done with the glass lid open. Do not use the pushbutton switch in a hazardous area where the lid needs to be installed.*

Use the magnetic keypad to navigate through the user program. The menu map may be followed in sequence, or the four arrow keys may be used to scroll through the prompt screens. *Figure 13* shows the front of the XMT868i, with magnetic keypad and magnetic wand.

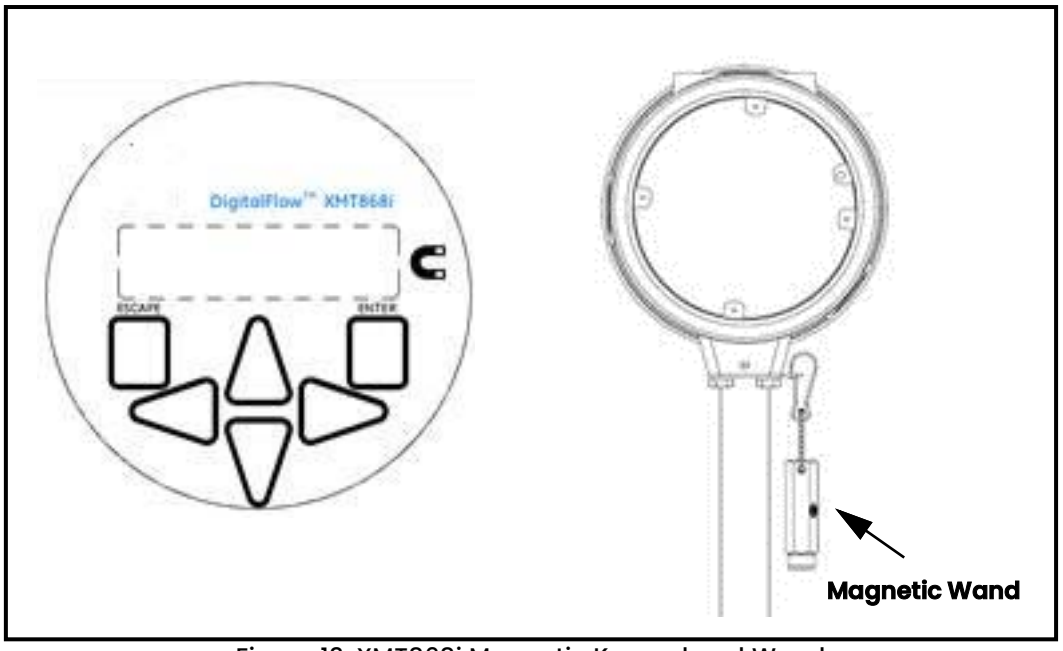


Figure 13: XMT868i Magnetic Keypad and Wand

Six keys on the keypad enable users to program the XMT868i:

- **[Enter]** - confirms choice of a specific option and data entry within the option
- **[Escape]** - allows users to exit from a specific option without entering unconfirmed data
- [△] and [▽] - enable users to highlight a specific window in the display option or to scroll through a list of options (parameters, letters, and numbers 0-9 as well as the negative sign and decimal point) in a menu
- [◁] and [▷] - enable users to scroll to a specific option, among choices in an option, or to a character in a text entry.

When you power up the XMT868i, the display first shows the model and software version:

Panametrics
XMT868i X3A.STD

2.2 XMT868i Enclosure Keypad Program (cont.)

The meter then starts to display measured parameters.

CH1 VEL	E1
10.00	Ft/s

To enter the *Keypad Program*, press the **[Escape]** key, followed by the **[Enter]** key, and the **[Escape]** key again. Each successive key must be entered within 10 seconds of the prior key.

As a guide in following the programming instructions in this chapter, the relevant portions of the Model XMT868i menu map have been reproduced in *Figure 14 on page 45* and *Figure 15 on page 46.* Proceed to the following sections to enter data in the **Channel** or **GLOBL** menus.

IMPORTANT: If the keypad has not been pressed for 10 minutes, the XMT868i exits the Keypad Program and returns to displaying measurements. The meter retains any configuration changes that were confirmed with the **[Enter]** key, and restarts as if the operator had completed the programming cycle.

2.3 Entering Data in the Global Menu

To begin programming your meter, you must select the system units from the **GLOBL** menu as discussed below. Refer to *Figure 14 on page 45* and remember to record all programming data in *Appendix B, "Data Records"*.

Note: *Refer to the* Programming Manual *for information on the other submenus in the* **GLOBL** *menu.*

2.3.1 Entering Global System Data

The **GLOBL-SYSTM** submenu is used to enter several general system parameters (e.g., English or metric units). For units with 2 channels, this menu is also used to compute parameters such as the sum, difference or average of the channel 1 and channel 2 signals. When calculating the **SUM**, **DIF** or **AVE** readouts, data from the **GLOBL-SYSTM** submenu is used. Any conflicting data entered in the **Channel Systm** submenu is overridden.

1. In the *Keypad Program*, scroll to **PROG** and press **[Enter].**
2. In the **PROG** menu, scroll to **GLOBL** and press **[Enter]**.
3. In the **Global PROGRAM** menu, scroll to **SYSTM** and press **[Enter]**.
4. The first prompt asks for a *Meter Message*. Enter a numeric or text message (up to 16 characters) and press **[Enter].**
5. Scroll to the desired *System Units* selection (either metric or English) and press **[Enter].** The XMT868i will display all parameters and measurements in the designated units.

- For a single-channel XMT868i, the program returns to the **Global PROGRAM** menu. Scroll to CH1 or CH2 to enter the **Channel** menu discussed on *Section 2.4*.
- For a 2-channel meter, proceed to step 6.

2.3.1.1 Volumetric Units

6. Scroll to the desired *Volumetric Units* for the flow rate display and press **[Enter].** *Table 5* lists the available volumetric units.

Table 5: Available Volumetric Units

English	Metric
GAL/S = gallons/second	L/S = Liter/sec
GAL/M = gallons/minute	L/M = Liter/min
GAL/H = gallons/hour	L/H = Liter/hr
MGD = mega gallons/day	ML/D = mega liters/day
ft3/s = Cubic ft/sec	m^3/s = Cubic m/sec
ft3/m = Cubic ft/min	m^3/m = Cubic m/min
ft3/h = Cubic ft/hr	m^3/h = Cubic m/hr
ft3/d = Cubic ft/day	m^3/d = Cubic m/day
Mft3/d = mega cubic feet/day	Mm^3/d = mega cubic meters/day
BBL/S = Barrel/sec	BBL/S = Barrel/sec
BBL/M = Barrel/min	BBL/M = Barrel/min
BBL/H = Barrel/hr	BBL/H = Barrel/hr
BBL/D = Barrel/day	BBL/D = Barrel/day
MBL/D = mega barrels/day	MBL/D = mega barrels/day
A-I/S = Acre-inch/sec	
A-I/M = Acre-inch/min	
A-I/H = Acre-inch/hr	
A-I/D = Acre-inch/day	
A-F/S = Acre-feet/sec	
A-F/M = Acre-feet/min	
A-F/H = Acre-feet/hr	
A-F/D = Acre-feet/day	

7. Scroll to the desired number of *Vol Decimal Digits* (digits to the right of the decimal point) in the volumetric flow display, and press **[Enter]**.

2.3.1.2 Totalizer Units

8. Scroll to the desired *Totalizer Units* for the totalized flow rate display (listed in *Table 6*), and press **[Enter]**.

Table 6: Totalizer Units

English	Metric
GAL = Gallons	L = Liters
MGAL = mega gallons	ML = Megaliters
ft^3 = Cubic feet	m^3 = Cubic meters
Mft^3 = mega cubic feet	Mm^3= mega cubic meters
BBL = Barrels	BBL = Barrels
MBBL = mega barrels	MBBL = mega barrels
AC-IN = Acre-inches	
AC-FT = Acre-feet	

9. Scroll to the desired number of *Decimal Digits* (digits to the right of the decimal point) in the totalized flow display, and press **[Enter]**.

The program now varies, depending on whether you have activated *Mass Flow* (see the *Programming Manual* for details) or the *Energy Option* in one of the **Channel PROGRAM** options.

- If you have activated *Mass Flow*, continue to step 1 on page 32.
- If you have activated the *Energy Option* (but not *Mass Flow*), skip to step 1 on page 33.
- If you have activated neither option, the XMT868i returns to the **Global PROGRAM** window. Press **[Escape]** to return to the **PROG** menu. Then scroll to **CH1** or **CH2** and press **[Enter]** to program the **Channel** menu.

2.3.1.3 Programming Mass Flow Data

1. Scroll to the desired *Mass Flow Units* for flow rate display (listed in *Table 7*), and press **[Enter]**.

Table 7: Available Mass Flow Units

English	Metric
LB = Pounds	KG = Kilograms
KLB = KiloPounds (Thousands of Pounds)	Tonne = Metric Tons (1000 KG)
MMLB = MegaPounds	
TONS (2000 LB)	

2. Scroll to the desired *Mass Flow Time Units* (from seconds to days), and press **[Enter]**.
3. Scroll to the desired number of *Decimal Digits* (digits to the right of the decimal point) in the mass flow rate display, and press **[Enter]**.
4. Scroll to the desired *Mass Totals* (units for the totalized mass flow rate display, listed in *Table 7 on page 32*), and press **[Enter]**.
5. Scroll to the desired number of *Mass Decimal Digits* (digits to the right of the decimal point) in the totalized mass flow rate display, and press **[Enter]**.

The program varies, depending on whether or not you have enabled the *Energy Option*.

- If you have not enabled the option, the XMT868i returns to the **Global PROGRAM** window. Press **[Escape]** to return to the **PROG** menu and scroll to the **Channel PROGRAM**.
- If you have enabled the option, continue to the next page.

2.3.1.4 Programming the Energy Option

1. Scroll to the desired *Power Units* (listed in *Table 8*) and press **[Enter]**.

Table 8: Available Power Units

English	Metric
kBTUh = Thousands of BTUs/hour	kCALs = Kilocalories/second
MMBTU = Millions of BTUs/hour	kCALm = Kilocalories/minute
kW = Kilowatt	kCALh = Kilocalories/hour
TONS = Tons of refrigerant	kCALd = Kilocalories/day
	MCals = Megacalories/second
	MCALm = Megacalories/minute
	MCALh = Megacalories/hour
	MCALd = Megacalories/day
	kW = Kilowatt
	MW = Megawatt

2. Scroll to the desired number of *Power Decimal Digits,* and press **[Enter]**.
3. Scroll to the desired *Total Energy Units* (shown in *Table 9*), and press **[Enter]**.

Table 9: Available Total Energy Units

English	Metric
kBTU = Thousands of BTUs	kCAL = Kilocalories
MMBTU = Millions of BTUs	MCAL = Megacalories
kWHr = Kilowatt-hour	kWHr = Kilowatt-hour
TONS = Tons (of refrigerant)	MWHr = Megawatt-hour

4. Scroll to the desired number of *Energy Decimal Digits,* and press **[Enter]**.

You have completed entering selections in this option.The program returns to the **Global PROGRAM** menu. Scroll to **CH1** or **CH2** and press **[Enter]** to program the **Channel** menu on the next page.

2.4 Entering Data in the Channel Menu

The **Channel** menu is used to enter data specific to each channel. Refer to *Figure 14 on page 45* and remember to record all programming data in *Appendix B, "Data Records"*.

Note: *In this manual, only the programming of Channel 1 will be described. To program Channel 2 of a 2-Channel meter, simply repeat the same procedures presented for Channel 1.*

2.4.1 Selecting the Channel Measurement Method

The **ACTIV** submenu permits selection of the desired measurement method.

1. In the *Keypad Program*, scroll to **PROG** and press **[Enter]**.
2. In the **PROG** menu, scroll to the desired channel (**CH1** or **CH2**) and press **[Enter].**

Note: *In the 1-Channel XMT868i,* **CH2** *does not appear.*

3. In the **Channel PROGRAM** menu, scroll to **ACTIV** and press **[Enter]**.
4. The option offers two choices: **OFF** and **TRANS** (Transit-Time). Scroll to the desired option for this channel and press **[Enter]**.

Note: *In the 1-Channel XMT868i,* **OFF** *does not appear.*

The XMT868i returns to the **Channel PROGRAM** menu. Scroll to the **SYSTM** option.

2.4.2 Entering Data in the Channel System Option

1. From the **Channel PROGRAM** menu, scroll to the **SYSTM** option and press **[Enter]**.
2. The first prompt asks for the *Channel Label*.Use the four scrolling keys to enter the desired label (in any numeric or text combination up to three characters) in the right pane, and press **[Enter]**.
3. The next prompt asks for the *Channel Message*. Enter the desired text in the same manner as the channel label, and press **[Enter]**.
4. The program now asks if you want the *Energy Option*, which enables flow measurement in a heating or cooling system. Scroll to *Off* or *On*, and press **[Enter]**.
5. The next prompt asks for the *Volumetric Units.* Scroll through the available units (from the list shown in *Table 10*) and press **[Enter]** when you reach the desired unit.

Note: *Refer to the* **SYSTM** *option of the* **GLOBL** *menu to choose between English and metric measurements.*

Table 10: Available Volumetric Units

English Volumetric Units	Metric Volumetric Units
GAL/S - U.S. Gallons per Second	L/S = Liters per Second
GAL/M - U.S. Gallons per Minute	L/M = Liters per Minute
GAL/H - U.S. Gallons per Hour	L/H = Liters per Hour
MGD - Mega U.S. Gallons per Day	ML/D = MegaLiters per Day
ft3/s - Cubic Feet per Second	m^3/s = Cubic Meters per Second
ft3/m - Cubic Feet per Minute	m^3/m = Cubic Meters per Minute
ft3/h- Cubic Feet per Hour	m^3/h = Cubic Meters per Hour
ft3/d- Cubic Feet per Day	m^3/d = Cubic Meters per Day
Mf3/d- Mega Cubic Feet per Day	Mm3/d = Mega Cubic Meters per Day
BBL/S - Barrels per Second	BBL/S = Barrels per Second
BBL/M - Barrels per Minute	BBL/M = Barrels per Minute
BBL/H - Barrels per Hour	BBL/H = Barrels per Hour
BBL/D - Barrels per Day	BBL/D = Barrels per Day
MBL/D - Mega Barrels per Day	MBL/D = Mega Barrels per Day
A-I/S-Acre-inches per second	N/A
A-I/M -Acre-inches per minute	N/A
A-I/H -Acre-inches per hour	N/A
A-I/D -Acre-inches per day	N/A
A-F/S -Acre-feet per second	N/A
A-F/M-Acre-feet per minute	N/A
A-F/H -Acre-feet per hour	N/A
A-F/D -Acre-feet per day	N/A

2.4.2 Entering Data in the Channel System Option (cont.)

6. Scroll to the desired number of *Vol Decimal Digits* (digits to the right of the decimal point) in the volumetric flow display, and press **[Enter]**.
7. Scroll to the desired *Totalizer Units* for the totalized flow rate display (listed in *Table 11*), and press **[Enter]**.

Table 11: Totalizer Units

English	Metric
GAL - U.S. Gallons	L - Liters
MGAL - Mega U.S. gallons	ML - Megaliters
ft^3 - Cubic Feet	m^3- Cubic Meters
Mft^3 - Mega Cubic Feet	Mm^3- Mega Cubic Meters
BBL - Barrels	BBL - Barrels
MBBL - Megabarrels	MBBL - Megabarrels
AC-IN - Acre-inches	
AC-FT - Acre-feet	

8. Scroll to the desired number of *Decimal Digits* (digits to the right of the decimal point) in the totalized flow rate display, and press **[Enter]**.

The program now varies, depending on whether you have activated *Mass Flow* (see the *Programming Manual* for details) or the *Energy Option*.

- If you have activated *Mass Flow*, continue to step 1 on the next page.
- If you have activated the *Energy Option* (but not *Mass Flow*), skip to step 1 on *Section 2.4.2.2*.
- If you have activated neither option, the XMT868i returns to the **Channel PROGRAM** window. Proceed to the **PIPE** option.

2.4.2.1 Programming the Mass Flow Option

1. Scroll to the desired *Mass Flow Units* for flow rate display (listed in *Table 12*), and press **[Enter]**.

Table 12: Available Mass Flow Units

English	Metric
LB = Pounds	Kilograms
KLB = KiloPounds (Thousands of Pounds)	Tonnes = Metric Tons (1000 KG)
MMLB = MegaPounds	
TONS (2000 LB)	

2. Scroll to the desired *Mass Flow Time Units* (from seconds to days), and press **[Enter]**.
3. Scroll to the desired number of *Decimal Digits* (digits to the right of the decimal point) in the mass flow rate display, and press **[Enter]**.
4. Scroll to the desired *Mass Totals* (units for the totalized mass flow rate display, listed in *Table 12*), and press **[Enter]**.
5. Scroll to the desired number of *Mass Decimal Digits* (digits to the right of the decimal point) in the totalized mass flow rate display, and press **[Enter]**.

The program varies, depending on whether or not you have enabled the *Energy Option*.

- If you have not enabled the option, the XMT868i returns to the **Channel PROGRAM** window. Proceed to the **PIPE** option.
- If you have enabled the option, continue to the next page.

2.4.2.2 Programming the Energy Option

1. Scroll to the desired *Power Units* (listed in *Table 13*) and press **[Enter]**.

Table 13: Available Power Units

English	Metric
kBTUh = Thousands of BTUs/hour	kCALs = Kilocalories/second
MMBTU = Mega BTUs/hour	kCALm = Kilocalories/minute
kW = Kilowatt	kCALh = Kilocalories/hour
TONS = Tons (2000 LB)	kCALd = Kilocalories/day
	MCALs = Megacalories/second
	MCALm = Megacalories/minute
	MCALh = Megacalories/hour
	MCALd = Megacalories/day
	kWATT = Kilowatt
	MWATT - Megawatt

2. Scroll to the desired number of *Power Decimal Digits,* and press **[Enter]**.
3. Scroll to the desired *Total Energy Units* (shown in *Table 14*), and press **[Enter]**.

Table 14: Available Total Energy Units

English	Metric
kBTU = Thousands of BTUs/hr	kCAL = Kilocalories
MMBTU = Mega BTUs/hour	MCAL = Megacalories
kWHr = Kilowatt-hour	kWHr = Kilowatt-hour
TONS = Tons (2000 LB)	MWHr - Megawatt-hour

4. Scroll to the desired number of *Energy Decimal Digits*, and press **[Enter]**.
5. Scroll to highlight if you are using a *Heating* or *Cooling System*, and press **[Enter]**.
6. The final prompt asks whether you want to conduct *Flow Measurement* at the point of **RTN** (Return, where the liquid exits) or of **SPPLY** (Supply, where the liquid enters). Scroll to the appropriate choice, and press **[Enter]**.

You have completed entering data in the **SYSTM** option. The meter returns to the **Channel PROGRAM** menu. Proceed to the next page to enter **PIPE** parameters.

2.4.3 Entering Pipe Parameters

Enter the transducer and pipe parameters using the **PIPE** submenu. While following the programming instructions, refer to *Figure 15 on page 46*.

1. From the **Channel PROGRAM** menu, scroll to the **PIPE** option and press **[Enter]**.
2. The first prompt asks for the *Transducer Number.*
   - For a standard transducer, enter the number engraved on the transducer head in the right pane, and press **[Enter]**.
   - If there is no number engraved on the transducer head, press the right arrow key to scroll to the *Special* option, enter an assigned number (from 91 to 99), and press **[Enter]**.

IMPORTANT: Special transducers, which have no engraved number on the head, are rarely used. Examine the transducer head carefully for a number.

The menu now varies, depending on your selection in step 2.

- If you entered the number for a standard clamp-on transducer, proceed to the *Pipe Material* prompt in step 4.
- If you entered the number for a standard wetted transducer, proceed to the *Pipe OD* prompt in step 5.
- If you entered the number for a special transducer, proceed to step 3 below.

2.4.3.1 Special Transducers

Note: *For special transducers, Panametrics will supply a transducer data sheet with programming information.*

3. For special transducers:
   a. The program first asks for the *Wedge Type*. Press the appropriate transducer type (Rayleigh clamp-on, shear clamp-on, or wetted).

Note: *Panametrics will supply the information required for steps b through f with the transducers.*

   b. Press the appropriate *Frequency* (from 500 kHz to 5 MHz).
   c. Enter the *Time Delay (Tw)* value supplied by Panametrics and press **[Enter]**.

If you have selected a special wetted transducer, the program now goes to step 5. But if you have selected a clamp-on transducer, three more prompts appear.

   d. Enter the *Wedge Angle* of the transducer (the angle of the ultrasonic transmission, in degrees) and press **[Enter]**.
   e. Enter the *Wedge Temperature* and press **[Enter]**.
   f. Enter the *Wedge Soundspeed* and press **[Enter]**.

2.4.3.2 Pipe Material

4. Scroll to the appropriate *Pipe Material* from the supplied list. For some materials (shown in *Table 15*), the program displays additional selections. At the desired choice, press **[Enter]**.

Table 15: Pipe Material Choices

Material	Types
Steel	Carbon Steel Stainless Steel
Iron	Ductile Iron Cast Iron
Copper	no additional selection required
Aluminum	no additional selection required
Brass	no additional selection required
Copper Nickel	70%Cu/30%Ni - 70/30 Copper/Nickel 90%Cu/10%Ni - 90/10 Copper/Nickel
Glass	Pyrex Heavy Silicate Flint Light Borate Crown
Plastic	Nylon Polyethylene Polypropylene PVC (Polyvinyl Chloride), CPVC Acrylic
OTHER	Enter the soundspeed of the pipe material and press **[Enter]**. If the soundspeed is unknown, refer to the *Sound Speeds and Pipe Size Data* manual (BH043C21).

2.4.3.3 Pipe OD

5. To select the appropriate *Pipe OD Unit* type from the list shown in *Table 16*, scroll to the right side of the screen, and use the up and down arrow keys to step through the list. Press **[Enter]**. Then enter the known pipe outside diameter or circumference on the left side and press **[Enter]**.

Obtain the required information by measuring either the pipe outside diameter (OD) or circumference at the transducer installation site. The data may also be obtained from standard pipe size tables found in *Sound Speeds and Pipe Size Data* (914-004).

Table 16: Available Pipe OD Units

English	Metric
inch	mm = millimeters
feet	m = meters
in/PI = pipe circumference in inches	mm/PI = pipe circumference in millimeters
ft/PI = pipe circumference in feet	m/PI = pipe circumference in meters

6. Use the arrow keys to enter the known *Pipe Wall Thickness* (in inches or mm) and press **[Enter]**.

If you are using clamp-on transducers, skip to step 9 below.

2.4.3.4 Path and Axial Lengths

7. To enter the *Path Length*:
   a. Use the [▷] arrow key to highlight the path length unit type at the right of the screen.Then use the [△] and [▽] arrow keys to scroll to the desired unit type.
   b. Use the [◁] arrow key to return to the numeric entry on the left, and enter the path length of the ultrasonic signal. Press **[Enter]**.

Note: *If a spoolpiece was ordered with the meter, the transducer signal path length* **(P)** *and the transducer signal axial length* **(L)** *are engraved on the flowcell and/or are included in the documentation supplied with the meter. For on-site transducer installations, refer to Appendix C,* Measuring P and L Dimensions*, for instructions.*

8. In the same manner, enter the appropriate *Axial Length L* unit type and axial length of the ultrasonic signal, and press **[Enter]**. Skip to step 10 on page 42.

2.4.3.5 Pipe Lining

9. Scroll to the appropriate choice to indicate whether you have a *Pipe Lining.*
   a. If you have selected *Yes*, then select the *Lining Material* from the supplied list.
   - If **OTHER** is selected, enter the lining sound speed, and press **[Enter]**.
   b. Then enter the lining thickness and press **[Enter]**.

2.4.3.6 Tracking Windows

10. Press the appropriate choice to indicate whether you want *Tracking Windows.* These windows are used to detect the receive signal when you are unsure of the fluid sound speed.

2.4.3.7 Fluid Type

11. Press the appropriate *Fluid Type*. The selections for fluid type vary depending on whether:

- the *Energy Option* is **ON** or **OFF**; and
- the *Tracking Window* is enabled or disabled.

Refer to *Table 17* if *Energy Option* is **OFF**, or to *Table 18* if *Energy Option* is **ON**.

Note: *Some of the fluid types may require additional selections, as shown in the following tables.*

Table 17: Fluid Types for ENERGY OFF

Tracking Windows =			
NO	**Additional Selections**	**YES**	**Additional Selections**
Water	Normal Water Sea Water Note: If Normal Water is selected, enter the Water Temperature and press **[Enter]**.	Water, 0-100C	No additional selections required.
Oil	Lube Oil Crude Oil	Water, 0-260C	No additional selections required.
Methanol (25 C)	No additional selections required.	Oil, Tracking	No additional selections required.
Ethanol (25C)	No additional selections required.	OTHER	Enter Minimum Soundspeed and press **[Enter]**. Then enter Maximum Soundspeed and press **[Enter]**.
LN2	No additional selections required.		
Freon	No additional selections required.		
OTHER	Enter the fluid soundspeed and press **[Enter]**.		

Table 18: Fluid Types for ENERGY ON

Tracking Windows =			
NO	**Additional Selections**	**YES**	**Additional Selections**
Water	Enter Water Temperature and press **[Enter]**.	Water, 0-260C	No additional selections required.
Water, Glycol Mixture	Enter Fluid Soundspeed and press **[Enter]**. Then enter Percentage of Water and press **[Enter]**.	Water, Glycol Mixture	Enter Percentage of Water and press **[Enter]**.
OTHER	Enter Fluid Soundspeed and press **[Enter]**.	OTHER	Enter Minimum Soundspeed and press **[Enter]**. Then enter Maximum Soundspeed and press **[Enter]**.

2.4.3.8 Reynolds Correction

12. Scroll to the appropriate choice to indicate whether you want *Reynolds Correction*.
    - If *Off* is selected, enter the *Calibration Factor* and press **[Enter]**.
    - If *Activ* is selected, the program asks for *KV Input Selection*. Scroll to *SIGS (Signals), SOUND (Soundspeed)* or *STATC.*
      - If *SIGS* or *SOUND* is selected, enter the *Calibration Factor* and press **[Enter]**.
      - If *STATC* is selected, enter the *Kinematic Viscosity* and press **[Enter]**. Then enter the *Calibration Factor* and press **[Enter]**.
- For wetted transducers, the program returns to the **Channel PROGRAM** menu. You have completed entering **PIPE** parameters.
- For clamp-on transducers, proceed to step 13 below.

Number of Traverses

13. Scroll to the appropriate *Number of Traverses* (from 1 to 5) and press **[Enter]**.
14. Accept the value for the *Transducer Spacing* by pressing **[Enter]**.

Note: *The XMT868i automatically calculates the transducer spacing. You should not enter a different value unless specifically instructed by the factory.*

PanaView returns to the **Channel PROGRAM** menu. You have completed entering **PIPE** parameters.

Note: *The site data programmed in this chapter is automatically stored in the meter's non-volatile RAM (NVR). If the power to the meter is disconnected, the same site data will be applied when the unit is next powered on.*

2.4.3.9 Procedure Options

Proceed to *Chapter 3, "Operation"*, for instructions on taking measurements. Or refer to the *Programming Manual* for instructions on programming the Model XMT868i's advanced features.

[no content intended for this page]

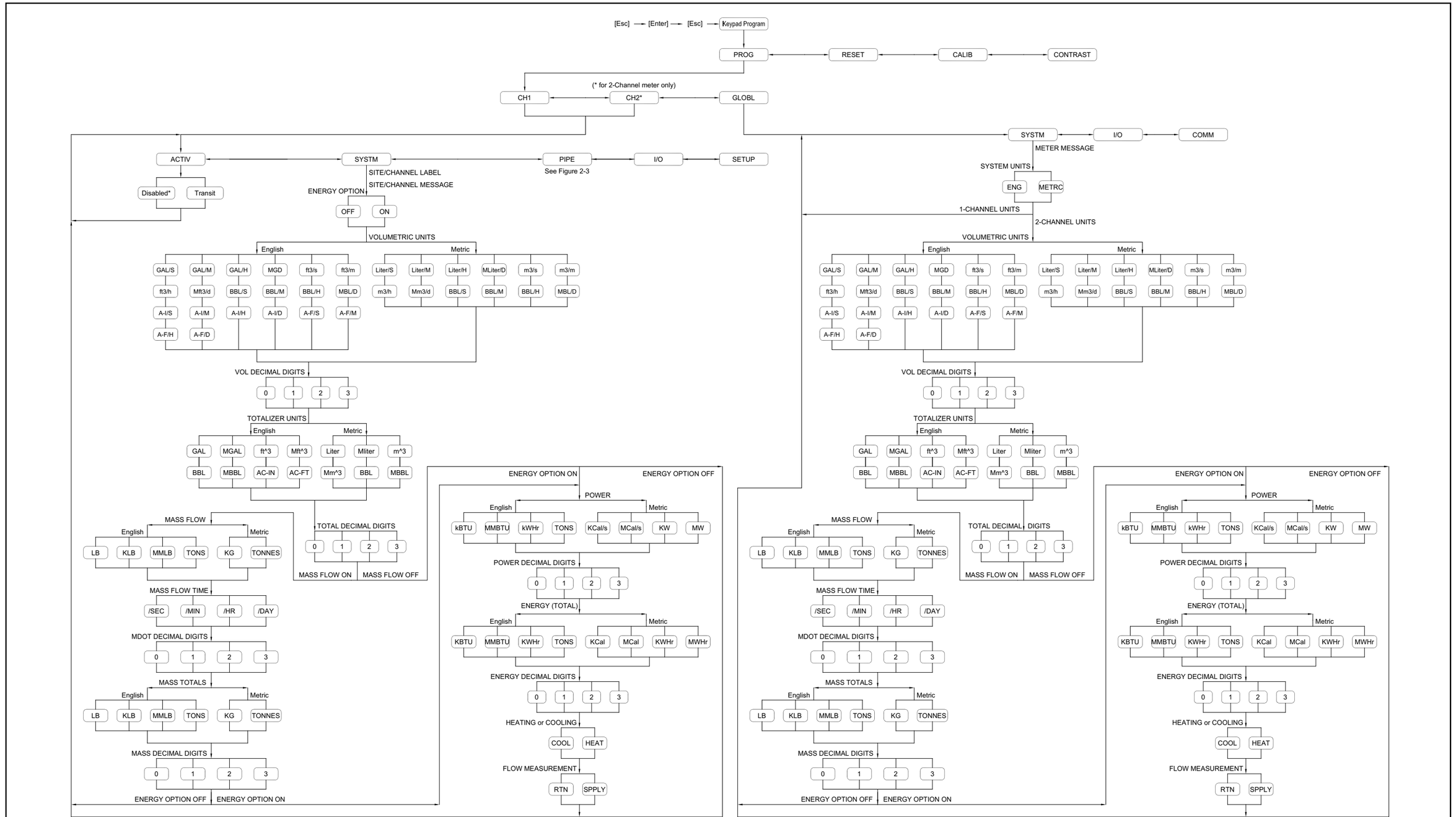


Figure 14: Channel-ACTIV, SYSTM and GLOBL-SYSTM Menu Map

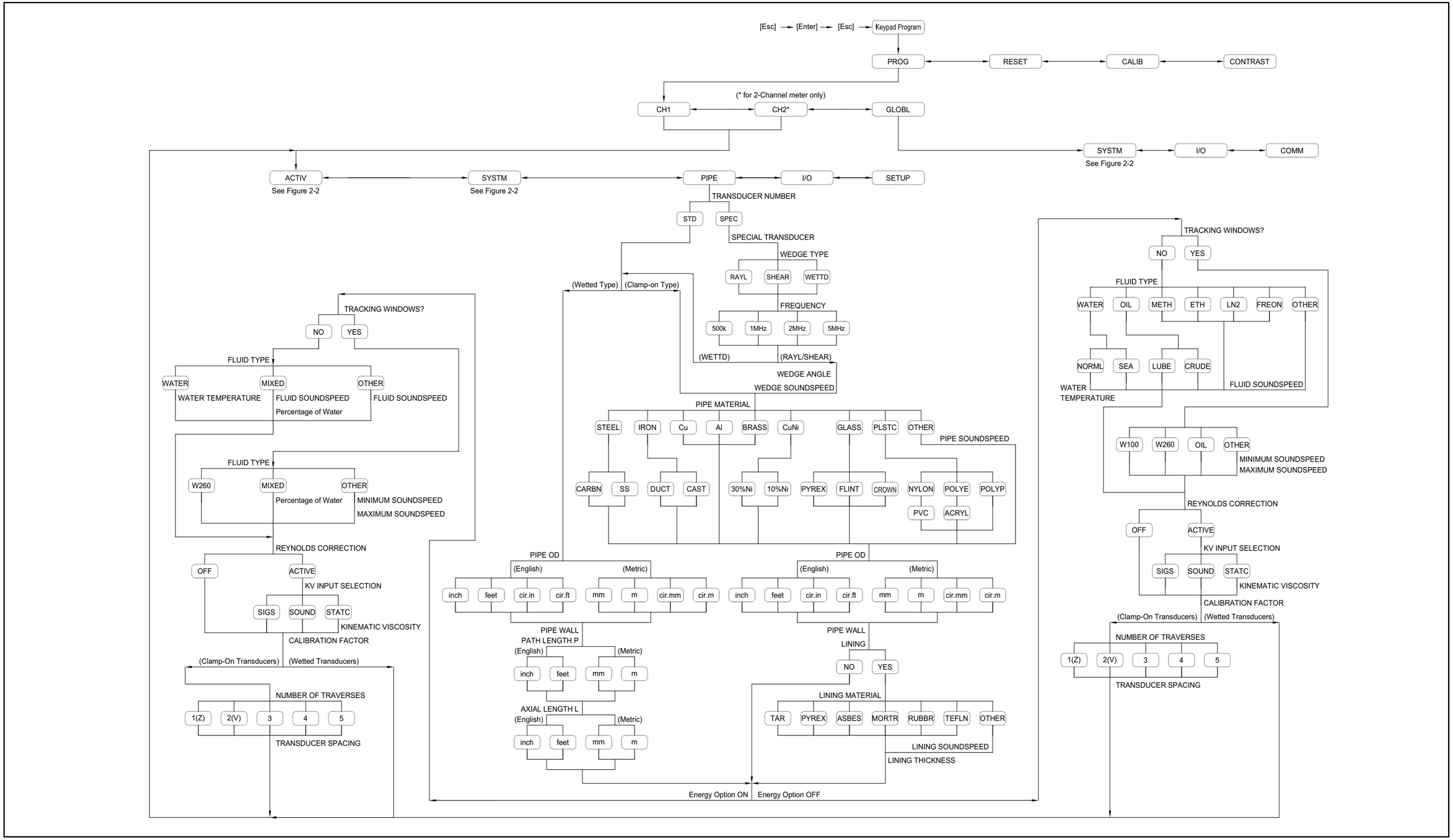


Figure 15: Channel-PIPE Menu Map

Chapter 3. Operation

3.1 Introduction

See *Chapter 1, "Installation"*, and *Chapter 2, "Initial Setup"*, to prepare the Model XMT868i system for operation. When the meter is ready to take measurements, proceed with this chapter. The following specific topics are discussed:

- Powering Up
- Using the Display
- Taking Measurements
- Pausing Measurement

Note: *All inputs and outputs of the Model XMT868i are calibrated at the factory, prior to shipment. If it becomes necessary to recalibrate any of the inputs and/or outputs, see Chapter 1,* Calibration*, of the* Service Manual *for instructions.*



WARNING! **To ensure the safe operation of the Model XMT868i, it must be installed and operated as described in this manual. In addition, be sure to follow all applicable local safety codes and regulations for the installation of electrical equipment.**

3.2 Powering Up

Because the Model XMT868i does **not** have an ON/OFF switch, it will power up as soon as the connected power source is energized.

Note: *For compliance with the European Union's Low Voltage Directive (73/23/EEC), this unit requires an external power disconnect device such as a switch or circuit breaker. The disconnect device must be marked as such, clearly visible, directly accessible, and located within 1.8 m (6 ft) of the Model XMT868i.*

There are three methods for obtaining readings from the XMT868i:

- Built-in LCD display
- PanaView software on a computer
- Device to read the XMT868i's analog output

At least one of the above display options must be installed in order to obtain flow rate readings from the meter.

Immediately upon power up the software version display appears. Then, the meter performs a series of internal checks, which take about 45 seconds, prior to displaying the flow rate data.



CAUTION! **The XMT868i conducts the FRAM (non-volatile RAM) test only on the first powering up. If the screen displays the message, "Program Memory Fault Detected," consult the factory immediately. Otherwise, the XMT868i will not repeat the test and may not properly save programmed values.**

Note: *If the Model XMT868i fails any of the internal checks (see Chapter 2,* Error Codes*, in the* Service Manual*), try disconnecting the power and then repowering the unit. If the meter continues to fail any of the internal checks, contact the factory for assistance.*

After successfully performing the internal checks, the Model XMT868i begins taking measurements and the software version display is replaced by a measurement mode display. Proceed to the appropriate section for instructions on using the LCD display and the PanaView display option.

Note: *As a minimum, the system and pipe parameters (for each installed channel of a 2-channel meter) must be entered before the Model XMT868i can display valid data. Refer to Chapter 2, "Initial Setup", for specific instructions.*

3.3 The LCD Display

The components of the LCD display are shown in *Figure 16*, along with a typical mass flow rate readout.

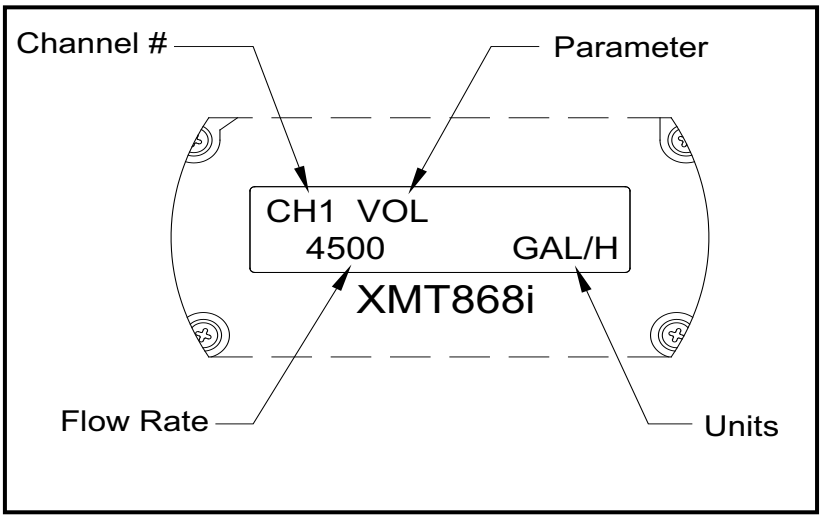


Figure 16: A Typical LCD Flow Rate Display

As shown in *Figure 16*, the display screen includes the following information:

- Channel Number
- Flow Parameter
- Units of Measure
- Flow Rate Value

The example in *Figure 16* uses the default display settings. However, the first three items in the list above may be reprogrammed to display a variety of alternative choices. See the *Programming Manual* for detailed instructions on programming these parameters.

Note: *The LCD backlight flashes to signal errors. If the backlight is off when an error is detected, the display is illuminated briefly; if the backlight is already on, the light is interrupted briefly. Error code messages may appear in the upper right corner of the LCD display. For information about these error codes and how to respond to them, refer to Chapter 2,* Error Codes*, in the* Service Manual.

Proceed to the *Taking Measurements* section to use the XMT868i.

3.4 The Optional PanaView Display

The components of the PanaView text display appear in *Figure 17*, along with a typical flow rate readout.

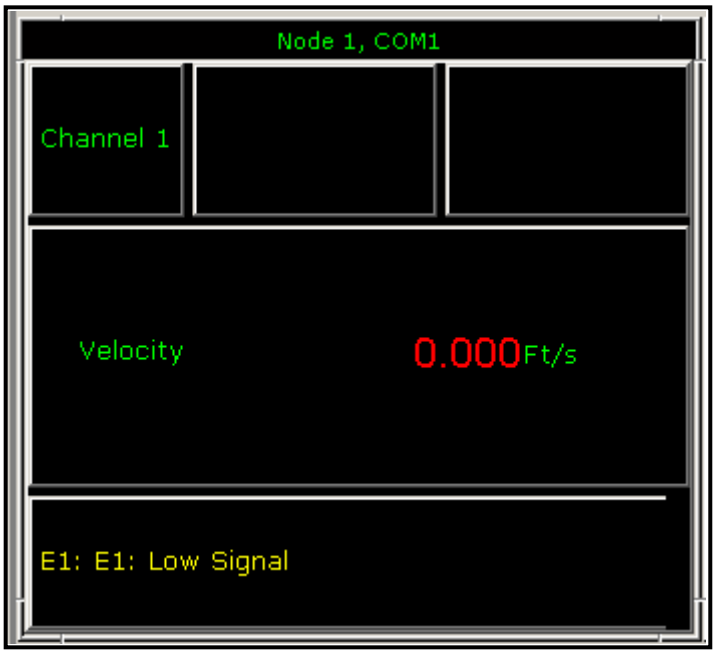


Figure 17: A Typical PanaView Text Display Pane

As shown in *Figure 17*, the text pane includes the following information:

- Channel Number
- Flow Parameter
- Units of Measure
- Flow Rate Value

The example in *Figure 17* is typical, but the first three items in the list above may be reprogrammed to display a variety of alternative choices. See the next section for detailed instructions on programming these parameters.

Note: *Error code messages may appear in the lower left corner of the PanaView text display window. For information about these error codes and how to respond to them, refer to Chapter 2,* Error Codes*, in the* Service Manual.

Proceed to the *Taking Measurements* section to use the XMT868i.

3.5 Taking Measurements

The Model XMT868i is capable of displaying several different variables in a variety of formats. However, this manual will only discuss the basic measurement displays using the LCD display or the PanaView display. Refer to Chapter 2, *Displaying Data*, in the *Programming Manual* for instructions on setting up alternate choices. Also, refer to the *Programming Manual* and/or the *PanaView User's Manual* to use PanaView or the analog outputs to obtain the flow rate data.

3.5.1 Programming the LCD

Note: *When you first initialize the XMT868i, the number of LCD parameters is set to OFF. You must program the LCD to display any measured parameters.*

Through the *Keypad Program*, you can program the LCD display to display up to four variables in sequence. Complete the following steps to program the LCD display:

1. Power up the XMT868i and wait until it has initialized.
2. Press **[Escape]. [Enter], [Escape]**.
3. In the *Keypad Program* window, scroll to **PROG** and press **[Enter]**.
4. In the **PROG** menu, scroll to **GLOBL** and press **[Enter].**
5. Scroll to **I/O** and press **[Enter]**.
6. Scroll to **LCD** and press **[Enter]**.
7. The window now asks for the *# of LCD Parameters*. Scroll to the desired number (from **OFF** through **1-4** and **KEY**) and press **[Enter]**.

The **OFF** setting switches the measurement display off, while the **KEY** setting enables users to change the measurement display using the arrow keys, without accessing the *Keypad Program.* If you select **KEY**:

- To view a parameter other than the one currently displayed, press the [◁] and [▷] keys to scroll through the various parameters.
- To view the channel measurements on a two-channel XMT868i, press the [△] or [▽] keys until you have reached the desired channel and measurement.

For a 1-Channel XMT868i, the data for Channel 1 is displayed automatically, and you can skip to step 9. However, for a 2-Channel meter, the channel data to be displayed must be specified at the following prompt.

3.5.1 Programming the LCD (cont.)

8. Scroll to the desired *Channel option*, as listed in *Table 19*.

Table 19: Channel Options

Option	Description
CH1	Channel 1
CH2	Channel 2
SUM	CH1+CH2
DIF	CH1-CH2
AVE	(CH1+CH2)/2

9. For each channel, select the desired *Measurement Parameter*, as shown in *Table 20*.

Table 20: Output Measurement Options

Option Bar Choice	Description
VEL	Flow Velocity
VOLUM	Volumetric Flow
+TOTL	Forward Totalized Volume Flow
-TOTL	Reverse Totalized Volume Flow
TIME	Total Flow Measurement Time
MDOT	Mass Flow
+MASS	Forward Totalized Mass Flow
-MASS	Reverse Totalized Mass Flow
POWER	Energy Flow Power
+ENRG	Forward Energy Flow
-ENRG	Reverse Energy Flow
SS up	Signal strength for the upstream transducer.
SS do	Signal strength for the downstream transducer.
Soundspeed	Measured speed of sound in the fluid.
DAC up	AGC DAC count for upstream gain setting.
DAC do	AGC DAC count for downstream gain setting.
T up	Upstream ultrasonic signal transit time.
Tdown	Downstream ultrasonic signal transit time.
DELTA	Transit time difference between upstream and downstream signals.
REYN#	Current velocity/reynolds number.
K (RE)	K factor, based on the Reynolds number.
PEAK%	Percentage of peak (set to +50 by default).
THETA	Theta 3 is the angle between the ultrasonic beam and the normal to the pipe wall. It is calculated from measured transit time and the clamp-on parameters (clamp-ons only).
Qup	Displays the signal quality for the upstream transducer.
Qdown	Displays the signal quality for the downstream transducer.
AMPup	Displays the value for the signal amplitude of the upstream transducer.
AMPdn	Displays the value for the signal amplitude of the downstream transducer.
P#up	Displays signal peaks for the upstream transducer.

Table 20: Output Measurement Options(Continued)

Option Bar Choice	Description
P#dn	Displays signal peaks for the downstream transducer.
NFup	Displays the normalization factor for the upstream transducer.
NFdn	Displays the normalization factor for the downstream transducer.
Cxdcr	Displays the speed of sound in the transducer (clamp-on only).
TEMPs	Displays the temperature for the supply input (energy measurement).
TEMPr	Displays the temperature for the return input (energy measurement).
Ts-Tr	Difference between supply input and return input measurement (energy measurement).
DENSs	Displays the density for the supply input (energy measurement).
DENSr	Displays the density for the return input (energy measurement).
DELTh	Displays the delta enthalpy which is the difference between the supply and return. Enthalpy is a measure of energy contained in the fluid (energy measurement).

Note: *The measurement units that appear in these prompts are those selected in the* **GLOBL-SYSTM** *menu earlier in this section. Also, when differences in one channel's programming invalidate an output previously chosen for the other, the measurement defaults to the nearest selectable item in the parameter list.*

The previous two prompts repeat until all of the specified **# of LCD Parameters** have been set up. When all of the display parameters have been set up, the meter returns to the **Global I/O** window. To leave the *Keypad Program*, press the **[Escape]** key three times.

After leaving the *Keypad Program*, the XMT868i will reset itself and will begin to display the parameters specified in this section. If more than one parameter was set up, each of the parameters will be displayed in sequence, with a pause of several seconds between display changes.

3.5.2 Using the LCD Display

To use the programmed LCD display for obtaining flow rate data, simply power on the XMT868i as described earlier in this chapter. Then, read the flow rate directly from the display, as shown in *Figure 16 on page 49*.

Note: *See Chapter 2,* Displaying Data*, in the* Programming Manual *to customize the contents of the LCD display.*

3.5.3 PanaView Display

Power up PanaView, establish communications with the XMT868i and enter the **required startup parameters**, as described in *Chapter 2, "Initial Setup"*. Then, proceed as follows:

Note: *See Chapter 2, "Initial Setup", in this manual and/or Chapter 1,* Programming Site Data*, in the* Programming Manual *for complete instructions on entering startup data using PanaView.*

1. In PanaView, pull down the *Output* menu, as shown in *Figure 18*, and click on the *Text Display* option.

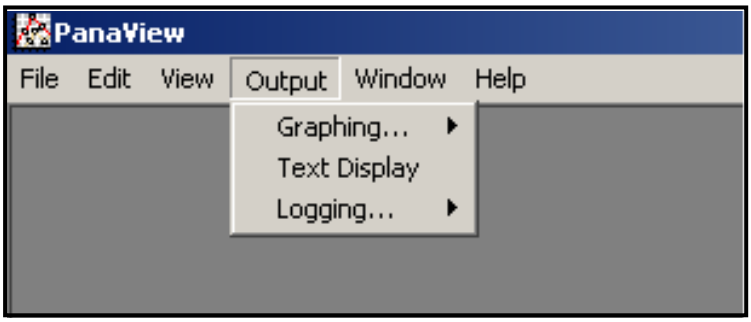


Figure 18: The Output Menu

Note: *The* Text Display *window that appears after Step 1 is actually stacked on top of any previously opened windows (such as the* Meter Browser *window).*

2. Using the *Window* menu, as described in the *PanaView User's Manual,* arrange the open windows in the desired format. For this discussion, *Figure 19* shows the *Text Display* window in its maximized (full-screen) size.

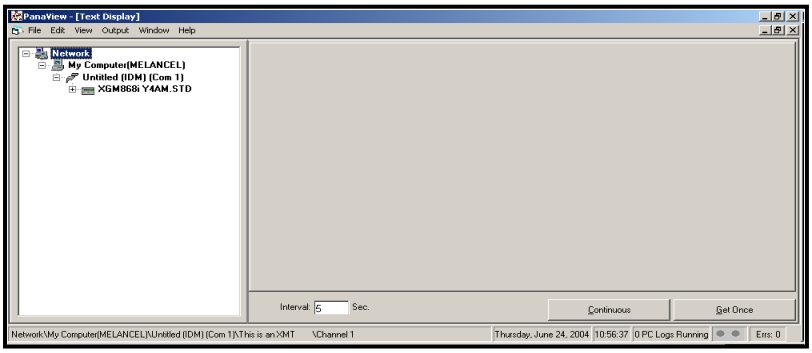


Figure 19: The Text Display Window

3. The left pane of the *Text Display* window contains the standard PanaView network tree. Expand the XMT branch, and double-click on the desired channel. (On 2-channel units, you can also display the **SUM, DIFF** or **AVG** parameters.)

4. From the expanded tree, double-click on the desired flow parameter to display it in the right pane of the window.
5. Before actual data values can be displayed in the text pane, activate one of the following data collection modes (see *Figure 19*):
   - Click on the **[Get Once]** option button at the bottom of the right pane in the *Text Display* window. The current value of the selected process parameter, as specified in the PanaView network tree, is displayed in the right pane of the *Text Display* window.

or

   - Enter an *"interval"* in the text box at the bottom of the right pane in the *Text Display* window, or check the *"Max. Comm Rate"* box to collect readings as fast as the system allows (1 sec). Then, click on the **[Continuous]** option button to begin collecting data for display in the right pane of the *Text Display* window.

Note: *Any value entered in the* "Interval" *text box is overridden if the* "Max. Comm Rate" *box is checked.*

The right pane now appears similar to *Figure 17 on page 50*.

6. If the **[Continuous]** option was selected in Step 5 above, click on the **[Stop]** option button, which has replaced the original **[Continuous]** option button, to terminate data collection.

The *Text Display* window may be left open while other tasks are performed, or it may be closed by clicking on the lower **[X]** control button at the far right of the menu bar.

IMPORTANT: If you click on the upper **[X]** control button at the far right of the PanaView title bar, you will exit PanaView completely.

3.5.3.1 Displaying Multiple Process Parameters

The procedure for displaying a single process parameter in a text screen may be repeated to simultaneously display multiple process parameters. To do so, proceed as follows:

1. Display the first process parameter in a text screen, as described in the previous section.
2. Repeat Step 1 for any desired additional process parameters, by double clicking on them in the PanaView network tree. PanaView automatically tiles the multiple text screens in the right pane of the *Text Display* window, as shown in *Figure 20*.

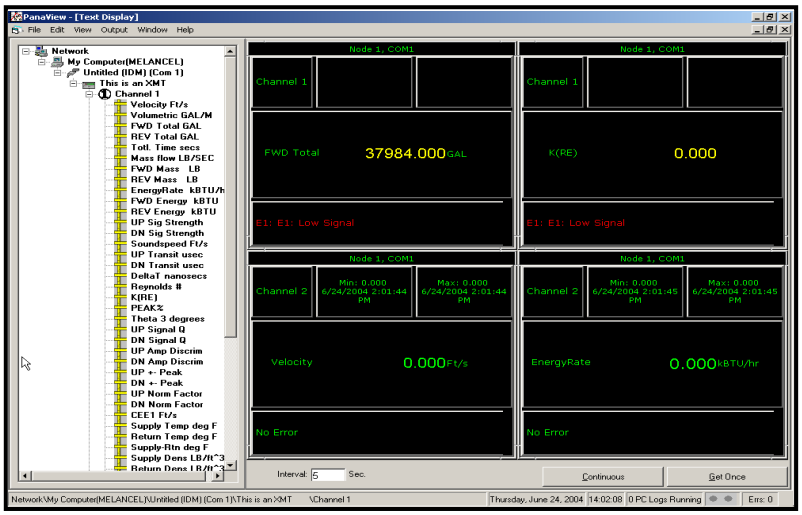


Figure 20: Multiple Text Screens in the *Text Display* Window

3. As in any standard Windows application, the multiple text screens may be resized by dragging their borders. Also, the individual panes within a parameter's text screen may be resized by dragging the borders within that text screen.
4. To close an open text screen, right click anywhere within that screen (except in the title bar or the error section) and click on the **[Remove]** option that pops up in the context menu.

Note: *After resizing or removing any of the multiple text screens, the default tiled layout may be restored by opening the* Window *menu (see the* PanaView User's Manual*) and clicking on the* Tile Output Displays *option.*

3.5.3.2 Displaying Multiple Text Windows

The procedures for displaying one or more process parameters in a single *Text Display* window may be repeated to open multiple *Text Display* windows. To do so, proceed as follows:

1. To open another *Text Display* window and display the desired process parameter(s) in the new window, repeat the steps in *PanaView Display*.
2. Arrange the multiple *Text Display* windows as desired using the *Window* menu (see the *PanaView User's Manual*).

3.5.4 Pausing Measurement

On occasion, it might become necessary for the XMT868i to stop taking measurements. Through PanaView, you can direct the XMT868i to pause measurements without cutting off power from the meter.

1. From the meter tree in the *New Meter Browser*, click on the XMT entry.
2. Expand the *Edit Functions* option, and double-click on the *Pause Measurement* entry. A window opens similar to *Figure 21*.

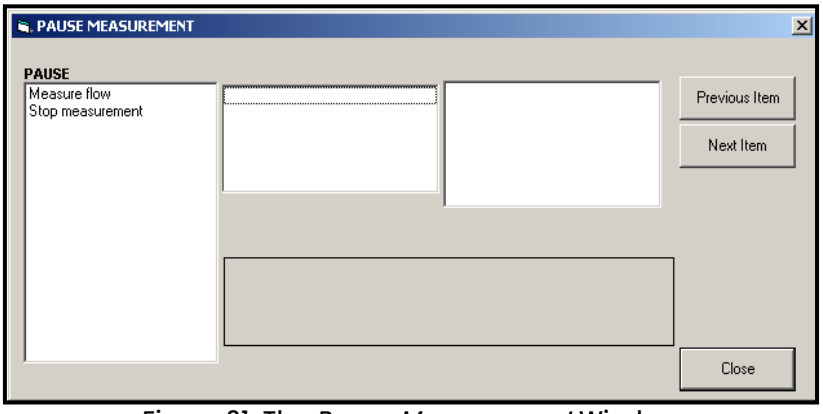


Figure 21: The *Pause Measurement* Window

3. To pause current measurements, double-click on the *Stop measurement* option. The window closes, and the XMT868i stops taking measurements.
4. To restart measurement, double-click on the *Pause Measurement* entry, and then on the *Measure flow* option. The XMT868i resumes flow measurement.

3.5.4.1 Procedure Options

The *Startup Guide* is intended to provide only those instructions necessary to get the XMT868i installed and operating. By following the instructions in this chapter, the Model XMT868i can be set up to display the desired channel option and the desired measurement parameter, using either the LCD display or PanaView.

To utilize the more advanced capabilities of the Model XMT868i, refer to the *Programming Manual* and/or the *Service Manual* for the instrument. Also, refer to the *PanaView User's Manual* for instructions on using the PanaView software with the XMT868i.

Chapter 4. Specifications

4.1 General

The general specifications for the Model XMT868i flow transmitter are divided into the following categories:

4.1.1 Hardware Configuration

Channel Options:

Standard: 1 Channel.
Optional: 2 Channel (2 pipes or 2 paths per pipe).

Mode Options:

Transit-Time.

Package Options:

Standard:
Epoxy-coated aluminum Type 7/4X, IP66
Explosion proof Class I, Div. 1, Groups B, C & D. Class II, Groups E, F & G; Class III
Flameproof Ex II 2 GD EEx d IIC T5/T6
Optional:
Stainless steel Type 7/4X.
Explosion proof Class I, Div. 1, Groups B, C & D. Class II, Groups E, F & G; Class III
Flameproof Ex II 2 GD EEx d IIC T5/T6

Dimensions:

Standard housing: 10 lb (4.5 kg); 8.2 x 6.6 in. (208 x 168 mm).
Optional housing: 30 lb (13.6 kg); 8.2 x 6.6 in. (208 x 168 mm).

4.1.2 Environmental

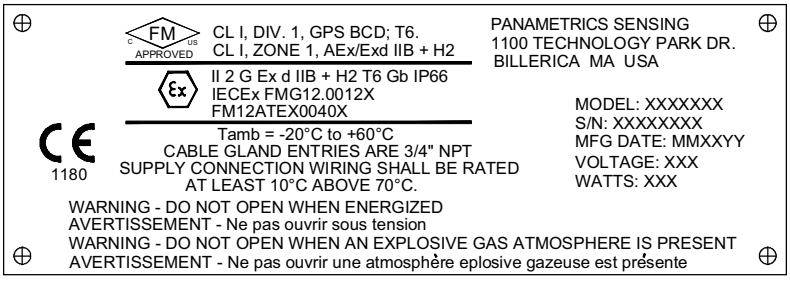
Operating Temperature:

-40° to 140°F (–40° to 60°C).

Storage Temperature:

-67° to 167°F (–55° to 75°C).

4.1.3 Markings



4.1.4 Flow Accuracy (Velocity)

Accuracy specifications assume a fully developed flow profile and a straight run of 10 pipe diameters upstream and 5 pipe diameters downstream.

±0.5% of reading (achievable with process calibration)

Typical Clamp-On Flow Accuracy (Velocity)

Pipe Diameter (ID) > 6 in. (150 mm): ±1% to 2% of reading
Pipe Diameter (ID) ≤ 6 in. (150 mm): ±2 to 5% of reading

Typical Wetted Flow Accuracy (Velocity):

±1% of reading

Note: *Accuracy depends on pipe size, installation and whether measurement is one-path or two-path.*

4.1.5 Range

Transit-Time Mode:

-40 to 40 ft/s (-12.2 to 12.2 m/s).

4.1.6 Rangeability (Overall)

400:1.

4.1.7 Repeatability

±0.1% to 0.3 of reading

4.1.8 Energy Accuracy (% of Reading):

The accuracy of the energy measurement is a combination of the accuracy of the flow and temperature measurements.

Transit-Time Mode:

Accuracy of 1% is typical for calibrated systems.

Note: *Above specifications require a straight run of 10 pipe diameters upstream and 5 pipe diameters downstream.*

4.1.9 Fluid Types

Transit-Time Mode:
Acoustically-conductive fluids. This includes most clean liquids and many with entrained solids or gas bubbles (the maximum void fraction depends on the transducer, interrogation carrier frequency, path length and pipe configuration). Consult the factory for additional information.

4.2 Electrical

The electrical specifications for the Model XMT868i flow transmitter are divided into the following categories:

4.2.1 Power Supply

Options:

Standard: 95 to 240 VAC, 50/60 Hz, ± 10%.
Optional: 12 to 28 VDC, ± 5%.

Power Consumption:

20 W maximum.

4.2.2 Operating Modes

Flow Measurement:

Standard: Correlation Transit-Time™ Mode with clamp-on or wetted transducers.

Energy Measurement (optional):

To calculate energy flow rate, use Analog Input Board for transmitters. Use RTD Input Board for direct RTDs.

4.2.3 European Compliance

See the *Certification & Safety Statements* and the CE *Declaration of Conformity* at the end of this manual.

4.2.4 Input/Output

Digital Display:

2-line x 16-character LCD display, LED backlight, configurable to display up to 4 measurement parameters in sequence, or to scroll through measurement parameters

Digital Communications:

Standard: RS232 serial port for PC, terminal or printer.
Optional: RS485 serial port for multi-user network.
RS485 MODBUS communication
MODBUS/TCP
OPC Server
Ethernet
Foundation Fieldbus

Analog Outputs (built-in):

Standard: Two isolated 0/4–20 mA, 600 Ω max. load.

Option Cards:

Optional Inputs/Outputs of the following types may be added:

1. *Analog Inputs*: two isolated 0/4-20 mA inputs, 24-V loop power.
2. *RTD Inputs*: two isolated 3-wire RTD inputs;
   Span –148° to 662°F (–100° to 350°C), 100 Ω Pt., Alpha 385.
3. *Analog Outputs*: two isolated 0/4–20 mA analog outputs, 1000 Ω maximum load.
4. *Data Logging*: 128 kB or 2 MB memory.
5. *Totalizer or Frequency Outputs*: two or four optically isolated pulse or frequency outputs, 100 VDC/3 A/1 W/10 KHz max.

   Totalizer Mode: one pulse per defined unit of parameter (e.g., 1 pulse/gal).

   Frequency Mode: pulse frequency proportional to magnitude of parameter (e.g., 10 Hz = 1 gal/min).
6. *Alarm Relays*: two or four Form-C relays

   General Purpose: 120 VAC, 28 VDC max., 5 A max.,
   DC: 30 W max., AC: 60 VA max.

Note: *The above optional inputs/outputs are available only in specific combinations. Consult Panametrics or see Table 22 for details.*

4.2.5 Additional Options

PC-Interface Software:

PanaView™ software option links the XMT868i to a PC. Software package includes CD and manual.

4.3 Transducer

4.3.1 Wetted Transducers

Material:

Standard: 316 Stainless Steel.

Optional (for isolating PanAdapta Plugs®): Hastelloy, Monel, Titanium, Duplex, CPVC, PVDF and others.

Process Connection:

Standard: 1-in. NPTM, 3/8-in. NPTM.
Optional: RF flange, socket weld, fuse bond and others.

Maximum Pressure:

Standard: 0 to 3,000 psig (0.1013 to 20 MPa).
Optional: Higher pressures on request.

Temperature Range:

Standard: –40° to 212°F (–40° to 100°C).

Optional (overall range): -310° to 932°F (-190 to 500°C).

Mounting:

Spoolpiece, hot tap, or cold tap.

Area Classifications:

Standard: General-purpose

Optional:

Explosion proof: Class I, Div. 1, Groups B, C & D; Class II, Groups E, F and G; Class III
Flameproof: ⟨Ex⟩ II 2 G EEx d IIC T6
Weatherproof: Type 4/IP65.
Submersible.

Note: *Wetted transducers for special applications and flowcells are also available. Consult the factory for details.*

4.3.2 Clamp-On Transducers

Temperature Range:

Standard: –40° to 300°F (–40° to 150°C).

Optional (overall range): -310° to 572°F (-190° to 300°C).

Mounting:

SS chain or strap, welded or magnetic clamping fixtures.

Area Classifications:

Standard: General-purpose

Optional:

Explosion proof: Class I, Div. 1, Groups B, C & D; Class II, Groups E, F and G; Class III

Flameproof: Ⓔx II 2 G EEx md IIC T6-T3.

Weatherproof: Type 4/IP65.

Submersible.

Note: *Clamp-on transducers for special applications and flowcells are also available. Consult the factory for details.*

4.3.3 Transducer Cables

Length:

Standard: Pair of coaxial cables, type RG62 aU,
length to 3 ft (1 m).

Optional: Lengths up to 1000 ft (330 m) maximum.

4.3.4 Temperature Transducers (optional)

Type:

Loop-powered 3-wire platinum RTDs; clamp-on and wetted (thermowell) types are available.

Range:

-4° to 500°F (-20° to 260°C), not all extremes of parameters can be achieved simultaneously.

Accuracy:

0.27°F (0.15°C), wetted RTDs, matched pairs.

4.4 Pipe Size and Materials

4.4.1 Wetted Transducers

Materials:

All metals and most plastics. (Consult the factory for concrete, glass and cement.)

Pipe Sizes:

Transit-Time Mode: Inside diameter 1 to 200 in.

4.4.2 Clamp-on Transducers

Materials:

All metals and most plastics. (Consult the factory for concrete, composite materials and highly corroded or lined pipes.)

Pipe Sizes:

Transit-Time Mode:

Outside Diameter: 0.5 to 300 in. (12.7 mm to 7.6 m) and larger.

Pipe Wall Thickness:

Up to 3 in. (76.2 mm).

4.5 Flowcell

4.5.1 Tilted Diameter

Pipe Sizes:

Standard: 2 to 200 in. (50 to 5,000 mm).
Optional: >200 in.

Material:

Standard: Stainless steel; carbon steel; plastics; fiberglass.
Optional: Other metals; plastics; etc.

Process Connection:

Standard: Straight (welding); 150-lb flange; 300-lb flange.
Optional: MJ; Victaulic; RTJ flanged; cold tap.

Wetted Transducer Connection:

1" NPTM for 6 in. or greater pipe sizes; 3/8" NPTM for 2 to 5 in. sizes.

Interrogation:

Standard: Conventional 45^{O} tilted-diameter; one or more traversals.
Optional: Mid-radius chord; multi-chords including multiple paths.

Appendix A. CE Mark Compliance

A.1 Introduction

For CE Mark compliance, the Model XMT868i flow transmitter must be wired in accordance with the instructions in this appendix.

IMPORTANT: CE Mark compliance is required for all units intended for use in EU countries.

A.2 Wiring

The Model XMT868i must be wired with the recommended cable, and all connections must be properly shielded and grounded. Refer to *Table 21* below for the specific requirements.

Table 21: Wiring Requirements

Connection	Cable Type	Ground Termination
Transducer	Armored RG62 a/U	Grounded using a cable gland.
Input/Output	Armored 22 AWG shielded (e.g. Baystate #78-1197) with armored material added to outside of jacket	Grounded using a cable gland.
Power	Armored 14 AWG 3 conductor	Grounded using a cable gland.

Note: *If the Model XMT868i is wired as described in this appendix, the unit will comply with the EMC Directive.*

[no content intended for this page]

Appendix B. Data Records

B.1 Available Option Cards

The XMT868i can accommodate one option card in Slot 1 and one in Slot 2. The available configurations are listed in *Table 22* below.

Table 22: Option Card Configurations

Card #713-	Slot #	Configuration
1215-02	1	FF - 4 Frequency Outputs
1215-03		TT - 4 Totalizer Outputs
1215-04		FT - 2 Frequency Outputs/2 Totalizer Outputs
1215-05		FO - 2 Frequency Outputs
1215-06		TO - 2 Totalizer Outputs
1215-07		AA - 4 Standard Alarms
1215-09		FA - 2 Frequency Outputs/2 Standard Alarms
1215-11		TA - 2 Totalizer Outputs/2 Standard Alarms
1223-02/1473-02		OI - 2 Current Inputs
1223-03/1473-03		OR - 2 RTD Inputs
1223-04/1473-04		TI - 2 Current Inputs/2 Totalizer Inputs
1223-05/1473-05		TR - 2 RTD Inputs/2 Totalizer Inputs
1223-06/1473-06		FI - 2 Current Inputs/2 Frequency Inputs
1223-07/1473-07		FR - 2 RTD Inputs/2 Frequency Inputs
1223-08/1473-08		AI - 2 Current Inputs/2 Standard Alarms
1223-10/1473-10		AR - 2 RTD Inputs/2 Standard Alarms
1225-13		CO - 2 Current Outputs
1225-14		CF - 2 Current Outputs/2 Frequency Outputs
1225-15		CT - 2 Current Outputs/2 Totalizer Outputs
1225-16		CA - 2 Current Outputs/2 Standard Alarms
1430-03		RR - 4 RTD Inputs
1430-04		IR - 2 RTD Inputs/2 Current Inputs
1146-02/1332-02	2	128 KB Memory
1146-03/1332-03		2 MB Memory
1345-04		Modbus Communications Protocol
1477-03	2	MODBUS/TCP/IP
1477-01	2	Ethernet
1475-01	2	Foundation Fieldbus

B.2 Option Cards Installed

Whenever an option card is installed or changed in the XMT868i flow transmitter, record the type of card and any additional setup information in the appropriate row of *Table 23* below.

Table 23: Option Cards Installed

Slot #	Type of Option Card	Additional Setup Information
0	Analog Outputs (A, B)	
1		
2		

B.3 Site Data

After the Model XMT868i flow transmitter has been installed, specific site data must be entered via the *Keypad Program*, prior to operation. Record that information in *Table 24* below.

Table 24: Site Data

General Information					
Model #			Serial #		
Software Vers.			Setup Date		
GLOBL-SYSTEM					
Meter Message			Vol. Dec. Digits		
System Units	English	Metric	Totalizer Units		
Vol. Units			Tot. Dec. Dig.		
GLOBL-I/O-ERROR					
Error Handling			2-Path Error	No	Yes
GLOBL-COMM					
Meter Address			MOD. Parity		
Baud Rate			MOD. Stop Bits		
MOD. Baud Rate			MOD. Address		
CHANNEL X-ACTIV					
Channel 1			Channel 2 (if applicable)		
Channel Status	Off[1]	Trans	Channel Status	Off[1]	Trans
CHANNEL X-SYSTM					
Channel 1			Channel 2 (if applicable)		
Channel Label			Channel Label		
Chan. Message[2]			Chan. Message[2]		
Energy Option	On	Off	Energy Option	On	Off
Vol. Units			Vol. Units		
Vol. Dec. Digits			Vol. Dec. Digits		
Totalizer Units			Totalizer Units		
Tot. Dec. Dig.			Tot. Dec. Dig.		
Mass Flow			Mass Flow		
Mass Flow Time			Mass Flow Time		
MDOT Dec. Dig.			MDOT Dec. Dig.		
Mass Totals			Mass Totals		
Mass Dec. Digits			Mass Dec. Digits		
Power			Power		
Power Dec.Dig.			Power Dec. Dig.		
Energy (Total)			Energy (Total)		
Energy Dec. Dig.			Energy Dec. Dig.		
Heat. or Cool.			Heat. or Cool.		
Flow Meas.			Flow Meas.		

Table 24: Site Data(Continued)

[1]not available for 1-Channel meter, [2]"Site Message" for 1-Channel meter						
CHANNELx-I/O						
Zero Cutoff				Temp. Input	Fixed ( )	Live
Pipe/Transducer Parameters - *PIPE*						
Channel 1				Channel 2 (if applicable)		
Trans. Type	STD	SPEC		Trans. Type	STD	SPEC
Transducer #				Transducer #		
Special Transducers				Special Transducers		
Wedge Type	Rayl Shear Wettd			Wedge Type	Rayl Shear Wettd	
Frequency Hz				Frequency Hz		
Trans. Tw				Trans. Tw		
Wedge Angle				Wedge Angle		
Wedge Sndspd				Wedge Sndspd		
Pipe Material				Pipe Material		
All Clamp-On and Wetted Transducers				All Clamp-On and Wetted Transducers		
Pipe O.D.				Pipe O.D.		
Pipe Wall				Pipe Wall		
Path Length (P)				Path Length (P)		
Axial Length (L)				Axial Length (L)		
Lining	Yes	No		Lining	Yes	No
Lining Material				Lining Material		
Lining Sndspd				Lining Sndspd		
Lining Thickness				Lining Thickness		
Track. Window.	Yes	No		Track. Window.	Yes	No
Fluid Type				Fluid Type		
Other/Sndspd				Other/Sndspd		
% of Water				% of Water		
Reynolds Corr.	Off	Active		Reynolds Corr.	Off	Active
KV Input Sel.	Table	Static		KV Input Sel.	Table	Static
Kin. Visc.				Kin. Visc.		
Cal. Factor				Cal. Factor		
# of Traverses				# of Traverses		
Trans. Spacing				Trans. Spacing		
Response Time				Response Time		
CHANNELx-SETUP-ADVANCED FEATURES -MASS FLOW						
Mass Flow	No	Yes		Mass Flow	No	Yes
Static Density				Static Density		
CHANNELx-SETUP-ADVANCED FEATURES-CODE LENGTH						
Code Length	Auto Short Long			Code Length	Auto Short Long	

Table 24: Site Data(Continued)

CHx-SETUP-ADVANCED FEATURES-KV/SS						
KV/SS (or C3) Pairs				KV/SS (or C3) Pairs		
#	Sig. Strength/ Soundspeed	Kinematic Viscosity		#	Sig. Strength/ Soundspeed	Kinematic Viscosity
1				1		
2				2		
3				3		
4				4		
5				5		
6				6		
7				7		
8				8		
9				9		
10				10		
11				11		
12				12		
13				13		
14				14		
15				15		
16				16		
17				17		
18				18		
19				19		
20				20		
CHx-SETUP-ADVANCED FEATURES-MULTIK						
Custom Type	CstV	CstR		CustomType	CstV	CstR
K-Factor Table				K-Factor Table		
K-Factor #	Vel./Reynolds	K Factor		K-Factor #	Vel./Reynolds	K Factor
1				1		
2				2		
3				3		
4				4		
5				5		
6				6		
7				7		
8				8		
9				9		
10				10		
11				11		
12				12		
13				13		

Table 24: Site Data(Continued)

CHx-SETUP-ADVANCED FEATURES-MULTIK (cont.)						
K-Factor #	Vel./Reynolds	K Factor		K-Factor #	Vel./Reynolds	K Factor
14				14		
15				15		
16				16		
17				17		
18				18		
19				19		
20				20		

Appendix C. Measuring P and L Dimensions

C.1 Measuring P and L

If you are using wetted transducers, the XMT868i requires you to enter the path length (P) and the axial dimension (L). P is the transducer face-to-face distance, and L is the axial projection of P in the flow stream.

To determine L, physically measure the distance between the center of the transducer ports at the inside wall as shown in *Figure 22* below, if possible. If not, consult the factory.

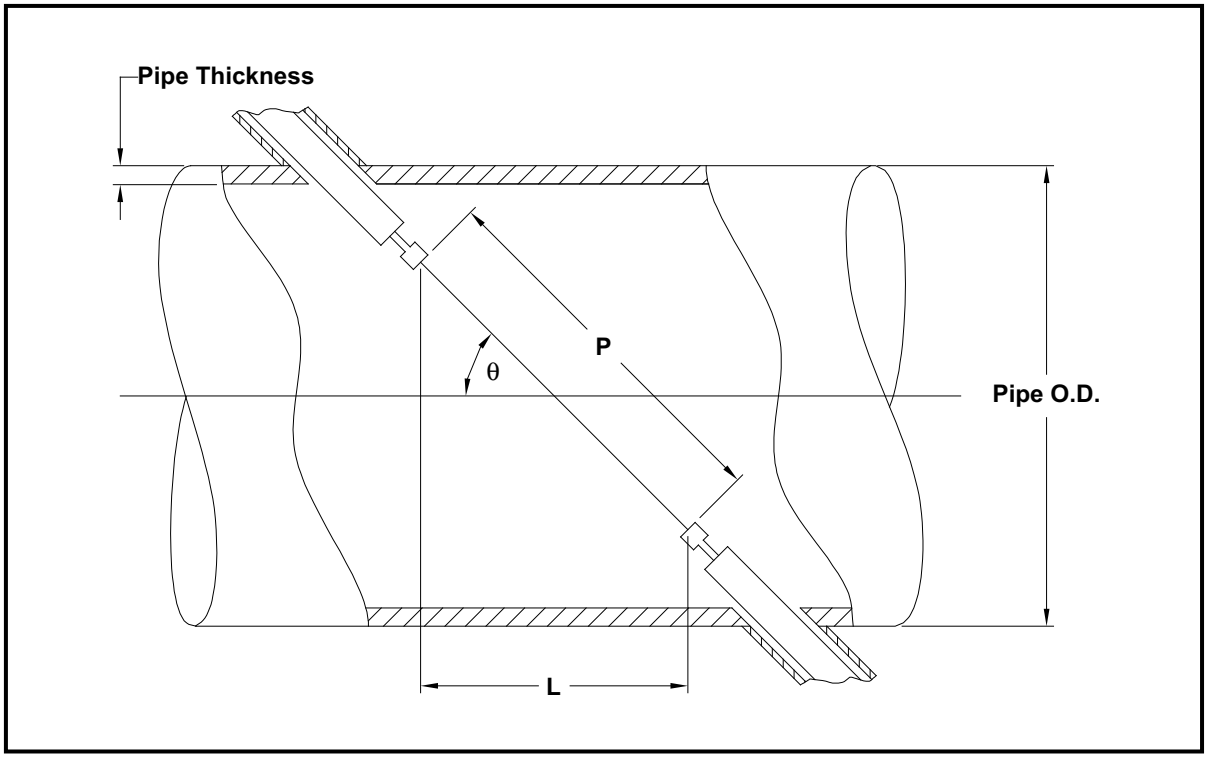


Figure 22: 180° Transducer Installations - Top View

To determine P, you need the following:

- the pipe inside diameter (ID)
- the wall thickness (WT)
- the installed pipe coupling length (CL)
- the transducers face depth (FD)
- the mounting angle (MA)

C.1 Measuring P and L (cont.)

Use *Figure 23* below to properly measure the coupling length. Typically, the transducer face is positioned just outside the inside diameter (ID) of the pipe, or slightly retracted inside the coupling.

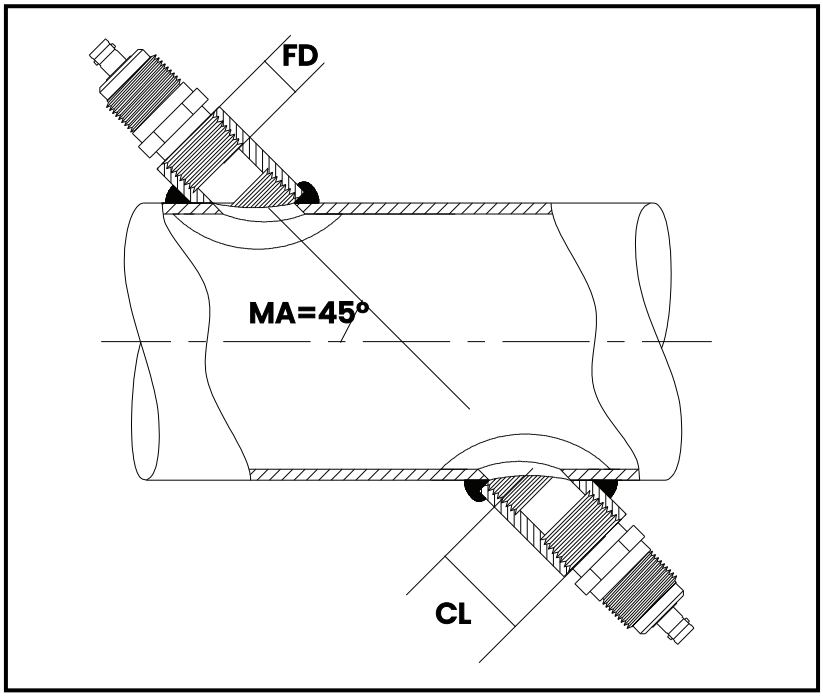


Figure 23: Determining the Pipe Coupling Length

Use the following formula to determine P dimension:

[ID + 2(WT)]/(cos MA) + 2(CL) - FD) = P Dimension.

For example, given the following:

- Inside diameter (ID) = 48”
- Wall thickness (WT) = 3/8”
- Installed coupling length (CL) = 2.0”
- Transducer face depth (FD) = 1.75”
- Mounting Angle (MA) - 45°

The P dimension would be [48 + 2(3/8)]/(0.7071) + 2(2.0 - 1.75) = 69.4”

A

ACTIV Submenu 34
Alarms Option Card
  Connecting 12
  Fail-Safe Operation 13
Analog Inputs Option Card
  Connecting 14
  Pin Assignments 14
  Rating 14
Analog Outputs
  Units Options 52
Analog Outputs (Slot 0)
  Connecting 9
Analog Outputs Option Card
  Connecting 16, 18
Arrow Keys 28
Axial Length 41

C

Cable
  Serial Port 10
  Transducers 3
CE Mark Compliance 67
Channel Label 35
Channel Menu 34
Channel Message 35
Channel-SYSTM Submenu 35
CHx Menu 34
Connecting
  See Part Name
Connectors, Electrical 5

D

Display
  Data 48
  Measurement Mode 48
Down Arrow Key 28

E

Electrical Connectors 5
Electronics Console
  Description 2
  Mounting 5
Energy Option, Enabling 35
Energy Option, Programming 33, 38
Enter Key 28
Escape Key 28
Ethernet, Wiring the 17

F

Flowcell
  Installing 3
Fluid Type 42
Fluid Type, Selecting 41
Frequency
  for Special Transducers 39
Fuse Ratings 61

G

Global
  Menu 29
  Submenus 29
GLOBL Menu 29
GLOBL-SYSTM Submenu 29

I

I/O (Global) Submenu
  LCD Option 51
Initial Setup
  Data Table 71
  Minimum Required 27
Input Voltage 6
Internal Tests 48

K

Keypad Program
  ACTIV Submenu 34
Keypad Program, Entering 29
Keypad Program, Exiting if Unused 29
KV Input Selection 43

L

LCD Option 51
Left Arrow Key 28
Lightning Protector, Connecting 8
Liquid Crystal Display (Transmitter)
  Setting Up 51
LVD Statement 2

M

Magnetic Keypad, Using 28
Mass Flow Data, Programming 32
Mass Flow Option, Programming 37
Measurements
  Displaying 48, 51
  Taking 48, 51
Menus
  Output 54
MODBUS 16
MODBUS/TCP, Wiring the 17
Multiple Parameter Text Displays 56
Multiple Text Windows 57

O

Option Card
  Alarms 12
  Analog Inputs 14
  Analog Outputs 16, 18
  RTD Inputs 16
  Setup Information Table 70
  Totalizer/Frequency Outputs 15
Output Menu 54

P

PanaView, Displaying Data in 50
Path Length 41
Pausing Measurement 57

PIPE
Submenu....39
Pipe Length....41
Pipe Lining....41
Pipe Material....40
Pipe OD Unit....41
Pipe OD, Programming....41
Pipe Wall Thickness....41
Power
Connecting....6
Terminal Block....6
Powering Up
Display....48
Internal Checks....48
Pressure Transmitter
Installing....4

R

Right Arrow Key....28
RS232 Port
See Serial Port
RS485 Port
See Serial Port
RS485 Serial Port
MODBUS....16
RTD Inputs Option Card
Connecting....16

S

Serial Port
Cable....10
Connecting....10, 11
Pin Assignments....10, 11
Slot 0
Output Measurement Options....52
See Analog Outputs (Slot 0)
Special Transducers, Programming....39
Specifications
Electrical....61
General....59
Transducer....63, 64
System (Channel) Submenu....35
System (Global) Submenu....29
System Data
Entering in GLOBL Menu....29
System Units
in GLOBL-SYSTM Submenu....29

T

Temperature Transmitter
Installing....4
Terminal Block
Analog Outputs - I/O....9
Power - TB1....6
Serial Port - RS232....10
Serial Port - RS485....11
Time Delay....39
Totalizer Units
in Channel Menu....36
in GLOBL Menu....31
Totalizer/Frequency Option Card
Connecting....15
Tracking Windows....42
Transducer Number....39
Transducer Parameters, Programming....39
Transducers
Axial Dimension....75
Cables....3
Installation Angle....75
Location....3
Path Length....75
Transmitter
LCD, Setting Up....51

U

Unpacking....1
Up Arrow Key....28

V

Voltage, Input....6
Volumetric Units
in Channel Menu....35
in GLOBL Menu....30

W

Wedge Angle....39
Wedge Soundspeed....39
Wedge Temperature....39
Wedge Type....39
Windows
Resizing....56
Tiling....56
Wiring
CE Mark Compliance....67
Option Card....See Card Name
Terminal Block....See Block Name

Scan here or use the link below for
Customer Service, Technical Support,
or Service Information:
panametrics.com/support

Copyright 2026 by Panametrics LLC. ALL RIGHTS RESERVED. This material contains one or more registered trademarks of Panametrics LLC and/or its subsidiaries. All third-party products and company names are trademarks of their respective holders.

PANA058C41 EN H (08/2026)

Panametrics

panametrics.com