PANAMETRICS

Model XGS868

Startup Guide
(One- and Two-Channel)

Process Control Instrument Division

Model XGS868 Steam Ultrasonic Mass Flow Transmitter (1- & 2-Channel)

Startup Guide *910-196UA*

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Chapter 1

Installation

Introduction

To ensure safe and reliable operation of the Model XGS868 Steam Ultrasonic Mass Flow Transmitter, the system must be installed in accordance with the guidelines established by Panametrics' engineers. Those guidelines, which are explained in detail in this chapter, include the following specific topics:

- Unpacking the Model XGS868 system
- Selecting suitable sites for the electronics enclosure and the flowcell/transducers
- Installing the flowcell/transducers

Note: *See the enclosed* Gas Transducer Installation Guide (916-049) *for detailed instructions on transducer installation.*

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

!WARNING!
The Model XGS868 flow transmitter can measure the flow rate of many gases, some of which are potentially hazardous. In such cases, 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 gases or flow conditions. Consult company safety personnel or local safety authorities to verify the safety of any procedure or practice.

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

Warranty

Each Panametrics instrument is warranted to be free from defects in materials and workmanship. Liability under this warranty is limited to servicing an instrument returned to the factory for that purpose and/or replacing any defective parts. Fuses, batteries, and cables are specifically excluded from any liability. This warranty is effective for one year from the date of delivery to the original purchaser, provided the instrument has been installed and operated in the manner described in this User's Manual. Panametrics must determine that the instrument was defective for this warranty to be valid. If damage is determined to have been caused by misuse or abnormal conditions of operation, the owner will be notified and approved repairs will be billed at standard rates.

Return Policy

If any problem develops, the following steps should be taken:

1. Notify Panametrics, giving full details of the difficulty, and provide the model and serial numbers of the instrument. Upon notification, Panametrics will then supply a RETURN AUTHORIZATION NUMBER and/or shipping instructions, depending on the problem.

2. If Panametrics provides instructions for returning the instrument to the factory, it must be sent prepaid to the authorized repair station specified in the shipping instructions.

3. If the warranty has expired or the damage has been caused by misuse or abnormal operating conditions, an estimate will be provided before any repairs are begun.

A *Service Form* is included in back of this manual along with a list of Panametrics offices. Send the completed Service Form to the closest office for the fastest service. If you need additional forms, write to:

Panametrics Inc.
221 Crescent Street, Suite 1
Waltham, Massachusetts 02453-3497
Attn.: Technical Publications Department

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.

Site Considerations

Because the relative location of the flowcell and the electronics enclosure is important, use the guidelines in this section to plan the XGS868 installation. Figure 1-1 below shows a typical XGS868 enclosure and spoolpiece ready for insertion into a process line.

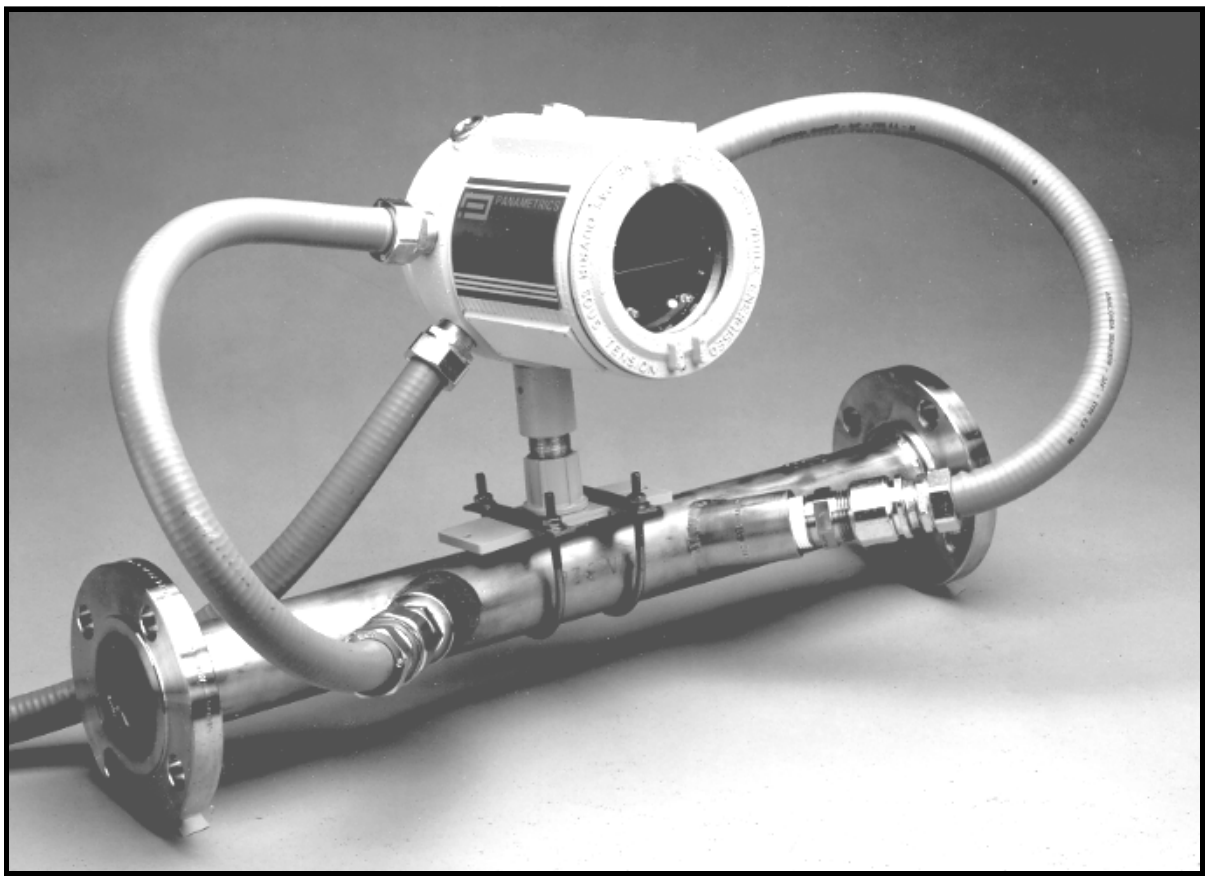


Figure 1-1: A Typical Model XGS868 System

Electronics Enclosure Location

The standard Model XGS868 electronics enclosure is a powder-coated, cast-aluminum, NEMA-7/4X explosion-proof enclosure; 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. If an RCCU will be used to communicate with the unit, the electronics enclosure window must have a clear line-of-sight from a distance of ≤ 8 ft (2.5 m) with an angle of incidence ≤ 15°.

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 XGS868.*

Flowcell Location

The pipeline flowcell consists of the flow rate transducers and any pressure and/or temperature transducers employed as part of the flow measurement system. Ideally, choose a section of pipe with unlimited access to the flowcell; 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.

Transducer Location

For a given fluid and pipe, the Model XGS868'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:

1. Locate the transducers so that there are at least 20 pipe diameters of straight, undisturbed flow upstream and 10 pipe diameters of straight, undisturbed flow downstream from the measurement point. To ensure undisturbed flow, avoid sources of turbulence in the fluid such as valves, flanges, expansions and elbows; swirl; and dips or low spots in which condensed liquid may collect.
2. Because condensate or sediment at the bottom of the pipe may cause attenuation of the ultrasonic signal, locate the transducers on the side of a horizontal pipe, when possible. If limited pipe access necessitates top-mounted transducers and the sound beam path includes a reflection, shift the transducers to at least 10° off top dead center. This will minimize the influence of any sediment on the reflected ultrasonic signals.

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.

Temperature and Pressure Transmitters

When installing temperature and/or pressure transmitters in the flowcell, locate them downstream of the transducers. These transmitters should be positioned no closer to the Model XGS868 transducers than 2 pipe diameters and no further away from the transducers than 20 pipe diameters.

Transducer Cables

When installing the transducer cables, always observe established standard practices for the installation of electrical cables. Specifically, 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.

Transducer Cables (cont.)

Note: *When using non-Panametrics cables to connect the flow rate transducers to the Model XGS868 electronics enclosure, the cables must have electrical characteristics identical to the Panametrics cables. Type RG62 a/U coaxial cable should be used, and each cable must be the same length (within ±4 in.).*

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 1-1 on page 1-3 shows a typical Model XGS868 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 *Gas Transducer Installation Guide (916-049)*.

Installing Temperature and Pressure Transmitters

Optional temperature and pressure transmitters may be installed near the ultrasonic transducer ports as part of the flowcell. 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 XGS868. In turn, the Model XGS868 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.

IMPORTANT: *Under changing temperature and pressure conditions, the Model XGS868 can calculate accurate steam density and mass flow only if live temperature and pressure transmitters have been installed in the system.*

Figure 1-2 on page 1-6 shows a typical mounting arrangement for the pressure and temperature transmitters. The temperature sensor should protrude 1/4 to 1/2 way into the pipe.

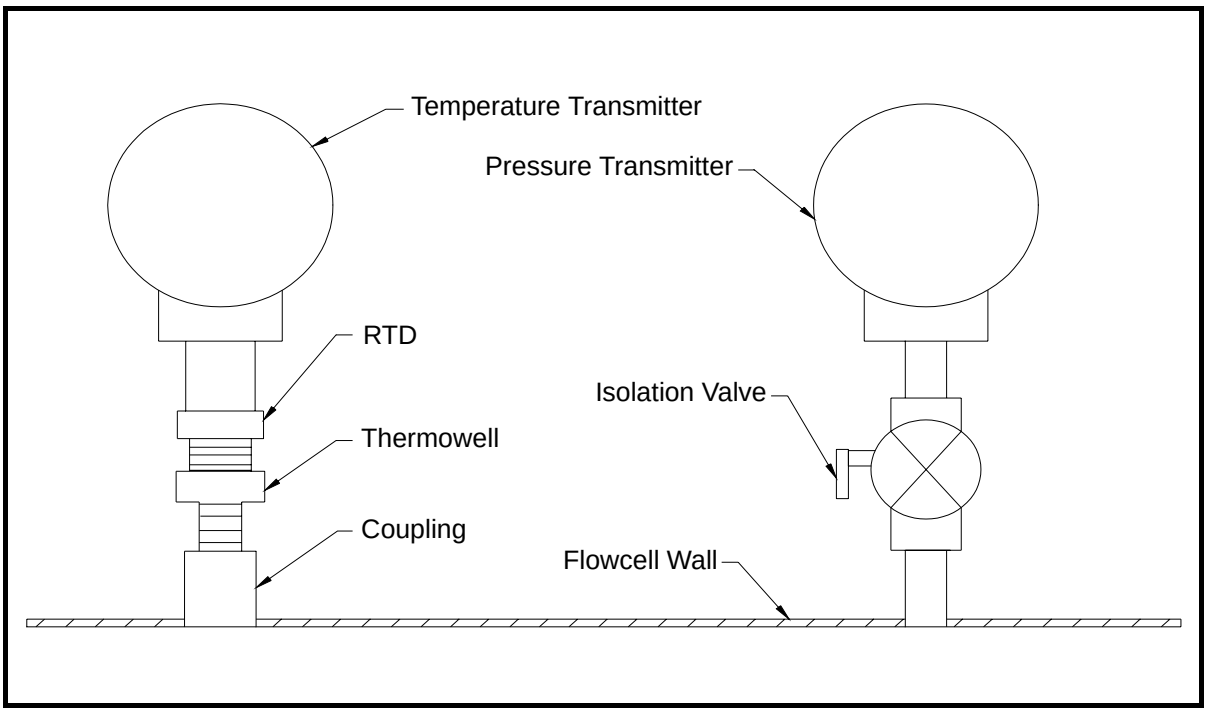


Figure 1-2: Typical Temperature/Pressure Transmitter Mounting

Mounting the XGS868 Electronics Enclosure

The standard Model XGS868 electronics package is housed in a NEMA-4X weather-resistant enclosure suitable for indoor or outdoor use. Refer to Figure 1-8 on page 1-21 for the mounting dimensions and the weight of this enclosure.

!WARNING!
If a unit equipped with an optional LCD display board is being installed in a hazardous area, be sure to adjust the backlight brightness and display contrast before mounting the electronics enclosure. See Chapter 2, *Displaying Data*, in the *Programming Manual* for details.

The Model XGS868 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 1-9 on page 1-22.

Making the Electrical Connections

This section contains instructions for making all the necessary electrical connections to the Model XGS868 flow transmitter. Refer to Figure 1-10 on page 1-23 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 onto their terminal blocks.

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

Refer to Figure 1-3 on page 1-8 and prepare the Model XGS868 for wiring by completing the following steps:

!WARNING!
Always disconnect the line power from the Model XGS868 before removing either the front cover or the rear cover. This is especially important in a hazardous environment.

1. Disconnect any existing power line from its source.
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 clamps in the appropriate conduit holes around the side of the enclosure.
5. Note the labels inside the rear cover to assist in wiring the power and option card connections. Also, Figure 1-11 on page 1-24 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.

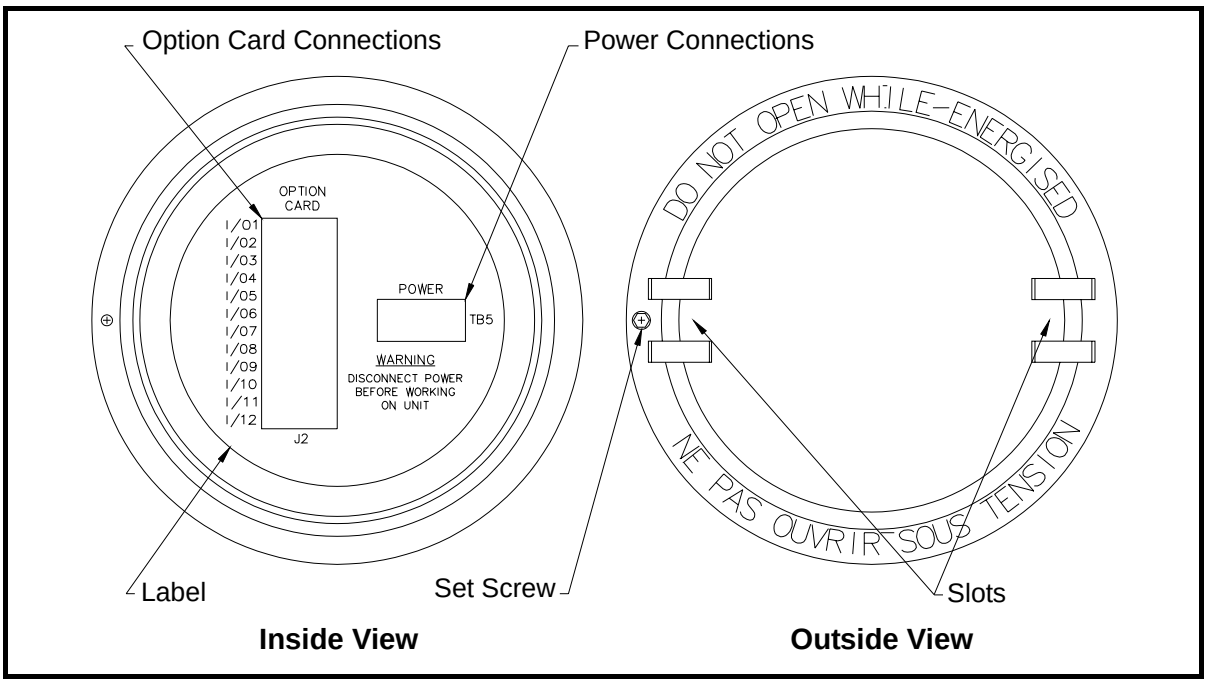


Figure 1-3: Rear Cover with Connection Labels

Wiring the Line Power

The Model XGS868 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 (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 XGS868.*

Refer to Figure 1-10 on page 1-23 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.

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 1-10 on page 1-23. If possible, avoid using the other conduit holes for this purpose, to minimize any interference in the circuitry from the AC power line.

!ATTENTION EUROPEAN CUSTOMERS!
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 power line 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 1-10 on page 1-23.
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.

Note: *If a unit with an optional LCD display board is being installed in a hazardoua area, be sure to adjust the backlight brightness and display contrast before mounting the electronics enclosure. See Chapter 2,* Displaying Data*, in the* Programming Manual *for details.*

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 XGS868 flow transmitter.

Wiring the Transducers

Before wiring the XGS868 transducers, complete the following steps:

- disconnect the main power from the electronics enclosure
- remove the rear cover and install all required cable clamps

Based on the location of the electronics enclosure, proceed to the appropriate sub-section for detailed instructions.

Flowcell-Mounted Enclosure

For an electronics enclosure mounted directly on the flowcell, wire the transducers as follows:

!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. Refer to the wiring diagram in Figure 1-10 on page 1-23 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.*

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

3. For a 2-Channel XGS868, repeat steps 1-2 to connect the CH2 transducers to terminal block J4. It is <u>not</u> required that both channels of a 2-Channel unit be connected.
4. 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.*

Remote-Mounted Enclosure

For a remote mounted enclosure, refer to the wiring diagram in Figure 1-10 on page 1-23 and the remote transducer wiring in Figure 1-12 on page 1-25, and complete the following steps:

!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.

1. Using the pair of coaxial cables with BNC to BNC connectors supplied by Panametrics (or equivalent cables), connect both CH1 transducers to the preamplifier.

Caution!
As part of maintaining the FM/CSA environmental rating (NEMA/TYPE 4) on the remote preamplifier, thread sealant is required on all conduit entries.

2. If an optional lightning protector is being installed, connect it to the preamplifier as shown.

3. Using the supplied coaxial cables with BNC to flying lead connectors (or equivalent cables), route the cables through one of the conduit holes in the electronics enclosure and connect the preamplifier to terminal block J3. Secure the cable clamp.

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

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

4. For a 2-Channel XGS868, repeat steps 3-5 to connect the CH2 transducers to terminal block J4 in the electronics enclosure. 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.*

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

Wiring the Standard 0/4-20 mA Analog Outputs

The standard configuration of the Model XGS868 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 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 1-10 on page 1-23 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 XGS868 software.*

!ATTENTION EUROPEAN CUSTOMERS!
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.

Wiring the Serial Port

The Model XGS868 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. For more information on serial communications refer to your *EIA-RS Serial Communications* manual (916-054). Proceed to the appropriate sub-section for wiring instructions.

Wiring the RS232 Interface

Use the serial port to connect the Model XGS868 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 1-1 below. Refer to Figure 1-10 on page 1-23 to complete the following steps:

1. Disconnect the main power 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 1-1 below to construct a suitable cable for connecting the Model XGS868 to the external device. If desired, an appropriate cable may be purchased from Panametrics.

Table 1-1: 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

4. Feed the cable's flying leads through the conduit hole and wire it to terminal block J1. Connect the other end of the cable to the external serial device, and secure the cable clamp.

!ATTENTION EUROPEAN CUSTOMERS!
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 XGS868.

Wiring the RS485 Interface

Use the optional RS485 serial port to network multiple XGS868 flow transmitters to a single control system. Upon request, the standard RS232 port on the XGS868 may be configured as a two-wire, half-duplex RS485 interface, through a device such as the INMAC Model 800052 RS232-RS422/RS485 converter.

IMPORTANT: *The Model XGS868 must be configured at the factory for RS485 operation.*

To wire the RS485 serial port, refer to Figure 1-10 on page 1-23 and complete the following steps:

1. Disconnect the main power 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. Connect the other end of the cable to the converter, as shown in Figure 1-4 below.

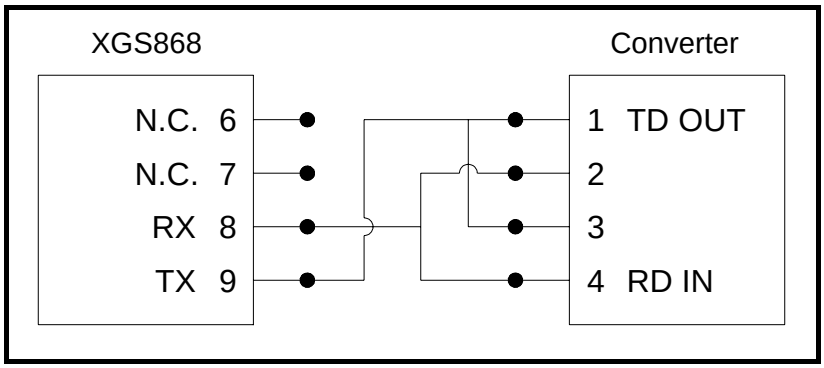


Figure 1-4: Typical RS485 Connections

!ATTENTION EUROPEAN CUSTOMERS!
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.

Wiring the Option Cards

The Model XGS868 can accommodate one option card in Slot 1 and one option card in Slot 2. The following option card functions are available only in the combinations listed in Table B-1 on page B-1:

- Alarm Relays (Slot 1)
- Analog Inputs (Slot 1)
- Totalizer/Frequency Outputs (Slot 1)
- RTD Inputs (Slot 1)
- Analog Outputs (Slot 1)
- Datalogging (Slot 2) - *no wiring required*
- Modbus Communications (Slot 2) - *no wiring required*

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

1. Disconnect the main power 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 1-10 on page 1-23 and wire the option card as indicated on the label inside the rear cover (see Figure 1-3 on page 1-8 and Figure 1-11 on page 1-24). Secure the cable clamp.

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

!ATTENTION EUROPEAN CUSTOMERS!
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 section(s) that follow.

Wiring an Alarms Option Card

Each alarms option card includes two or four *Form C relays* (designated as A, B, C and D), which are available in two types:

- general purpose
- hermetically sealed for Class I, Division 2 hazardous areas

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 1-5 below for the operation of a NO 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 1-3 on page 1-8 and Figure 1-11 on page 1-24).

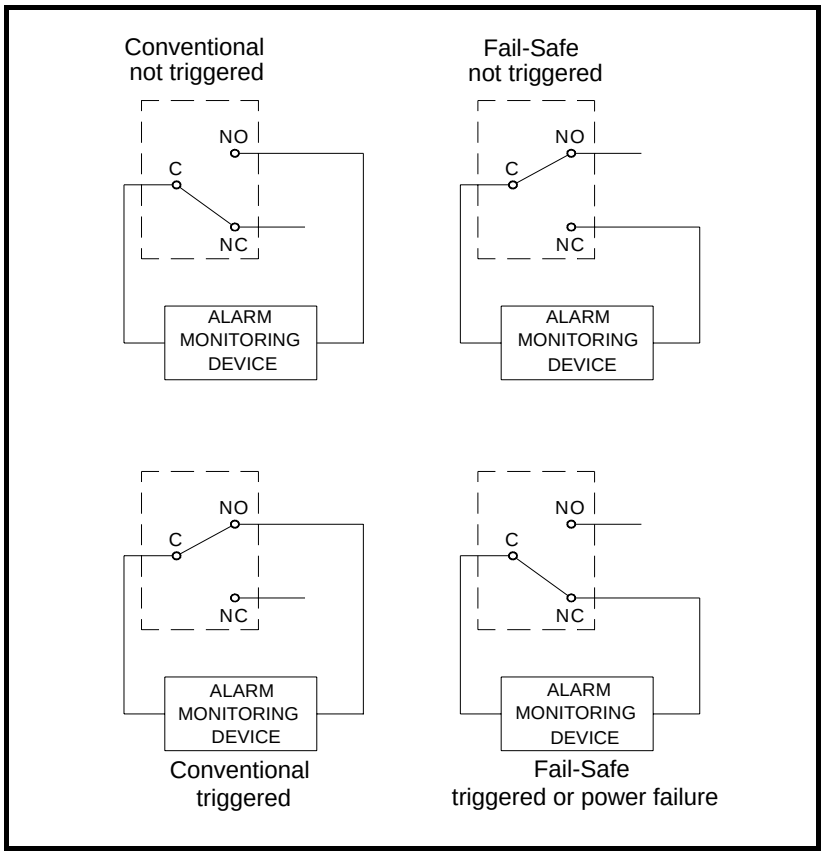


Figure 1-5: Conventional and Fail-Safe Operation

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

To calculate the standard mass flow rates of the steam, the Model XGS868 requires accurate *temperature* and *pressure data* from the measurement site. Transmitters installed in the flowcell can provide this information via an optional 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 properly enter programming data into the meter, it is 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 1-6 below shows typical wiring diagrams, with and without an external power supply, for one of the analog inputs.

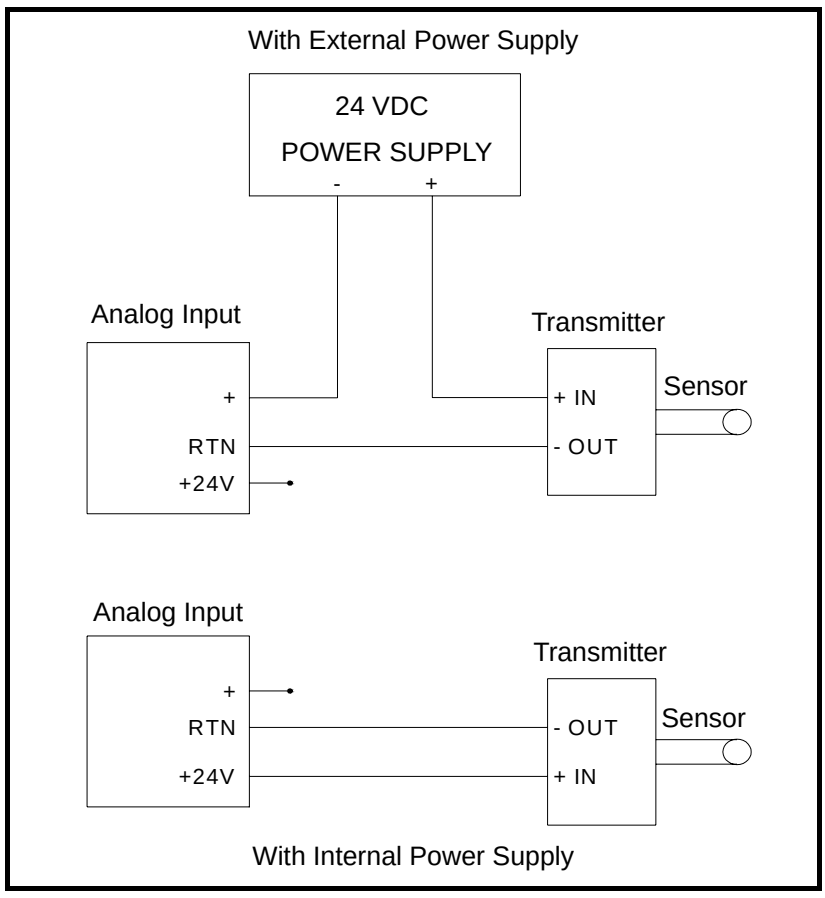


Figure 1-6: Analog Input Wiring Diagram

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 1-3 on page 1-8 and Figure 1-11 on page 1-24). The Model XGS868 is often equipped with an analog inputs option card, which is used to process the live pressure reading required for accurate mass flow calculations.

Note: *The analog inputs option card can be calibrated with the Model XGS868'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.*

Wiring a Totalizer/ Frequency Outputs Option Card

Each totalizer/frequency outputs option card provides two or four outputs (designated as A, B, C, and D) that can be used as either totalizer or frequency outputs.

Wire this option card in accordance with the connections shown on the label in the rear cover (see Figure 1-3 on page 1-8 and Figure 1-11 on page 1-24). Figure 1-7 below shows sample wiring diagrams of a totalizer output circuit and a frequency output circuit.

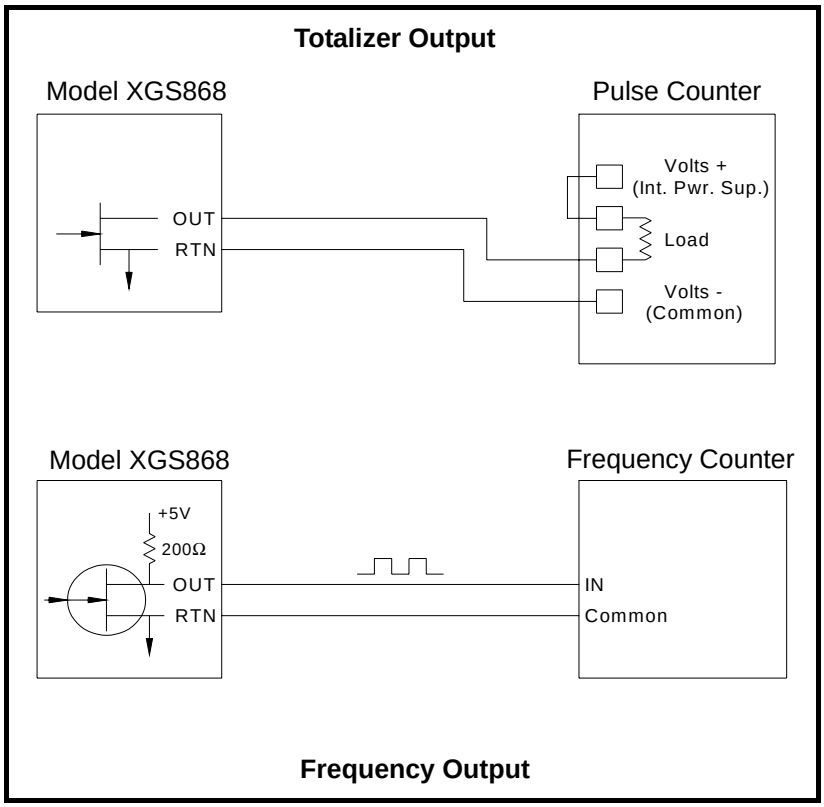


Figure 1-7: Totalizer/Frequency Outputs Wiring

Wiring an RTD Inputs Option Card

The Model XGS868 RTD (Resistance Temperature Device) inputs option card provides two or four direct RTD inputs (designated as A, B, C and D). Each RTD input requires three wires, and should be connected as shown on the label in the rear cover (see Figure 1-3 on page 1-8 and Figure 1-11 on page 1-24).

Note: *The Model XGS868 is often equipped with an RTD inputs option card, which is used to process the live temperature reading required for accurate mass flow calculations.*

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 1-3 on page 1-8 and Figure 1-11 on page 1-24).

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 Model XGS868 is equipped with and option card numbered *703-1223-08*. Table B-1 on page B-1 in Appendix B, *Data Records*, indicates that this option card includes two analog current inputs and two standard alarm relays.

By referring to Figure 1-11 on page 1-24, it is determined 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 Model XGS868. Based on this information, wiring of the Input/Output connections to terminal block J2 should be completed as shown in Table 1-2 below.

Table 1-2: 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 (-)

Data Logging and Modbus Option Cards

The Model XGS868 can be fitted with either a data logging option card or a Modbus option card, which must be installed in Slot 2. The data logging option card increases the XGS868's memory by up to 2 MB, to enhance its logging capability, and includes an industry-standard PCMCIA card connector for additional expansion. The Modbus option card adds the Modbus communications protocols to meters equipped with the optional RS485 serial interface.

Note: *The Modbus option card provides its own RS485 connections. Thus, the meter can have its serial port configured for RS232 operation 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 1-11 on page 1-24 are compatible with the Modbus option card.*

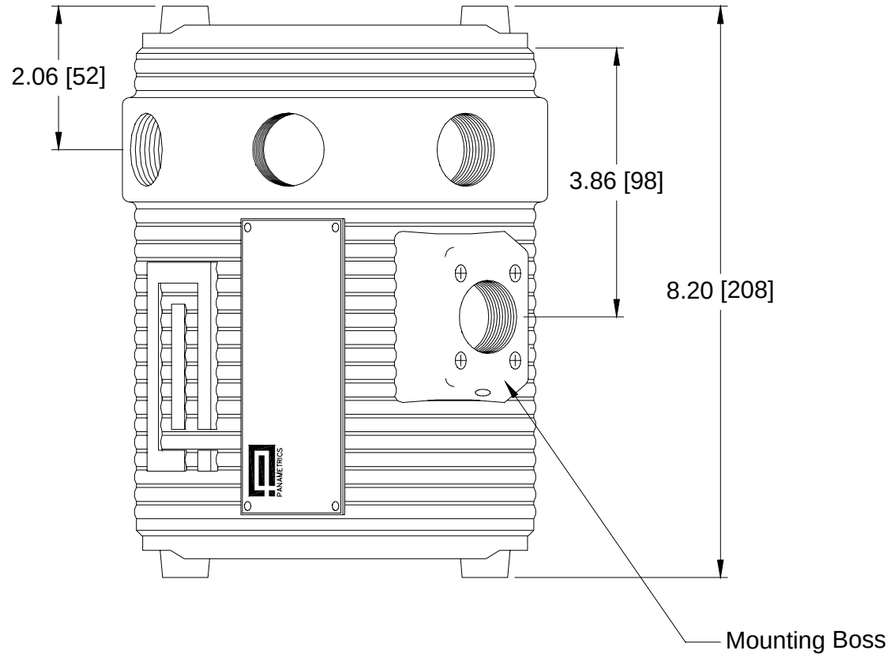
What Next?

After the Model XGS868 has been completely installed and wired, proceed to Chapter 2, *Initial Setup*, to program the meter for taking flow rate measurements.

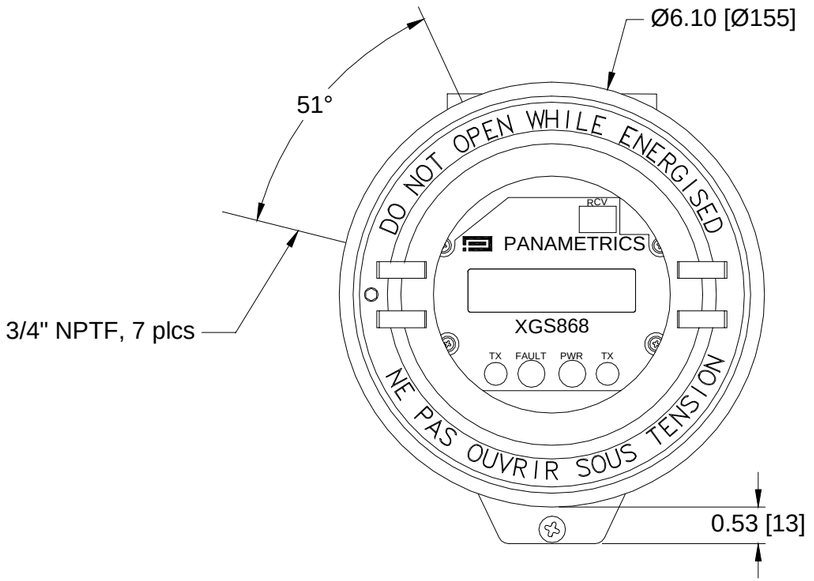
!WARNING!
Make sure both covers, with their o-ring seals, are installed and the set screws tightened before applying power in a hazardous environment.

IMPORTANT: *If a unit equipped with an optional LCD display board is to be installed in a hazardoua area, be sure to adjust the backlight brightness and display contrast before mounting the electronics enclosure. See Chapter 2,* Displaying Data*, in the* Programming Manual *for details.*

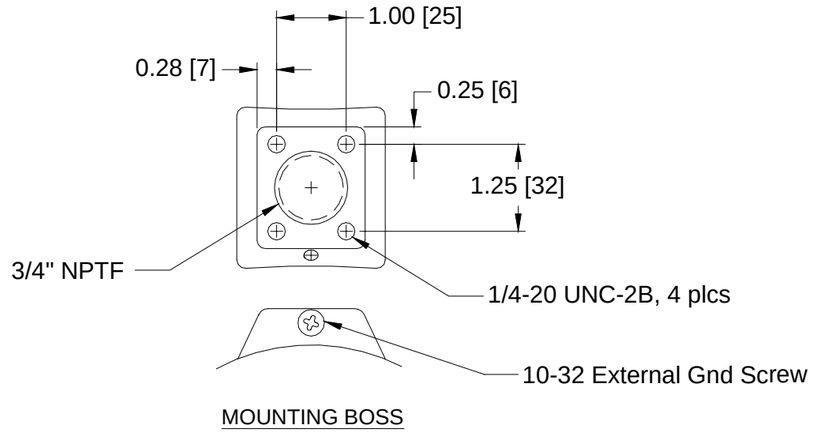
SIDE VIEW



TOP VIEW



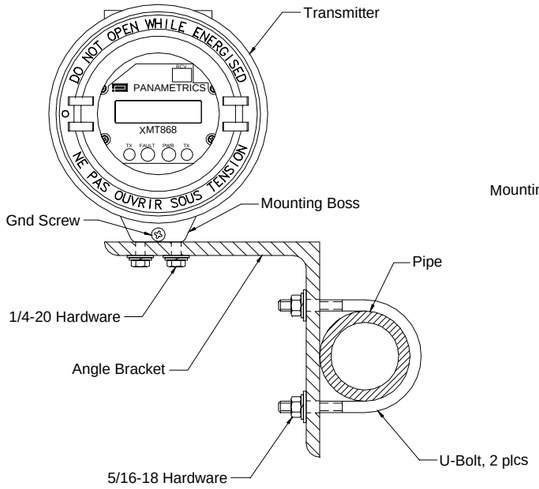
(shown with optional display board)



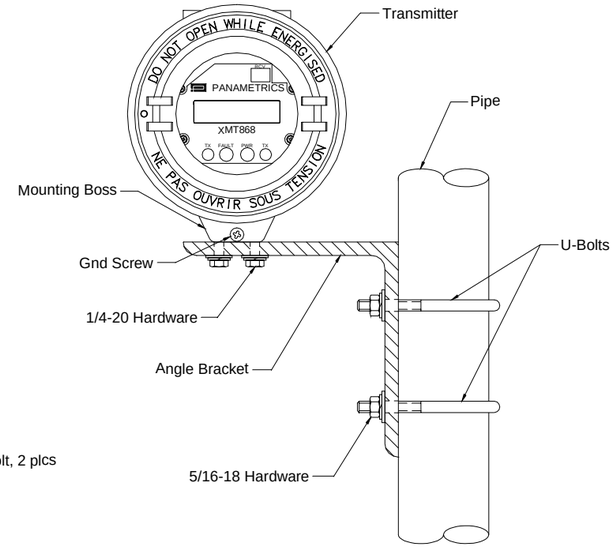
MOUNTING BOSS

NOTE: AL Weight = 10 lb [4.5 kg]
SS Weight = 25 lb [11.5 kg]

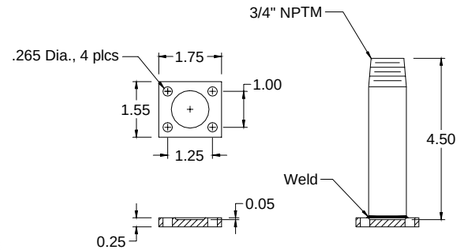
Figure 1-8: Model XGS868 Outline Drawing #712-1002



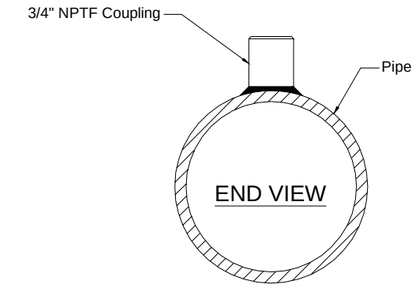
TYPICAL BRACKET MOUNTING
(Horizontal Pipe)

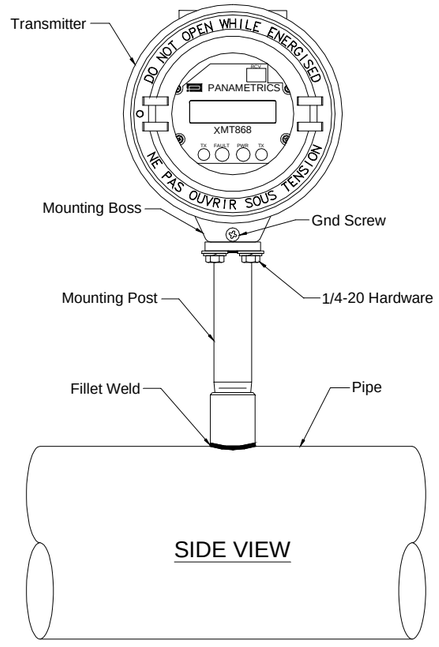


TYPICAL BRACKET MOUNTING
(Vertical Pipe)

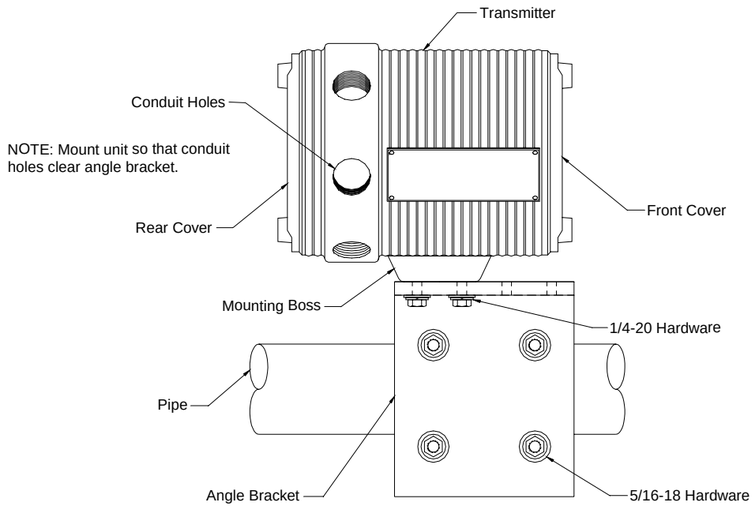


TYPICAL MOUNTING POST

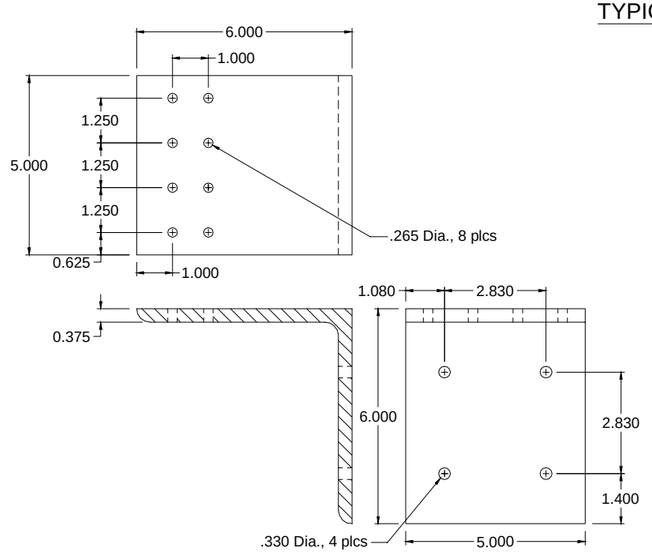




TYPICAL PIPE MOUNTING
(Horizontal Pipe)



BRACKET MOUNTING - SIDE VIEW

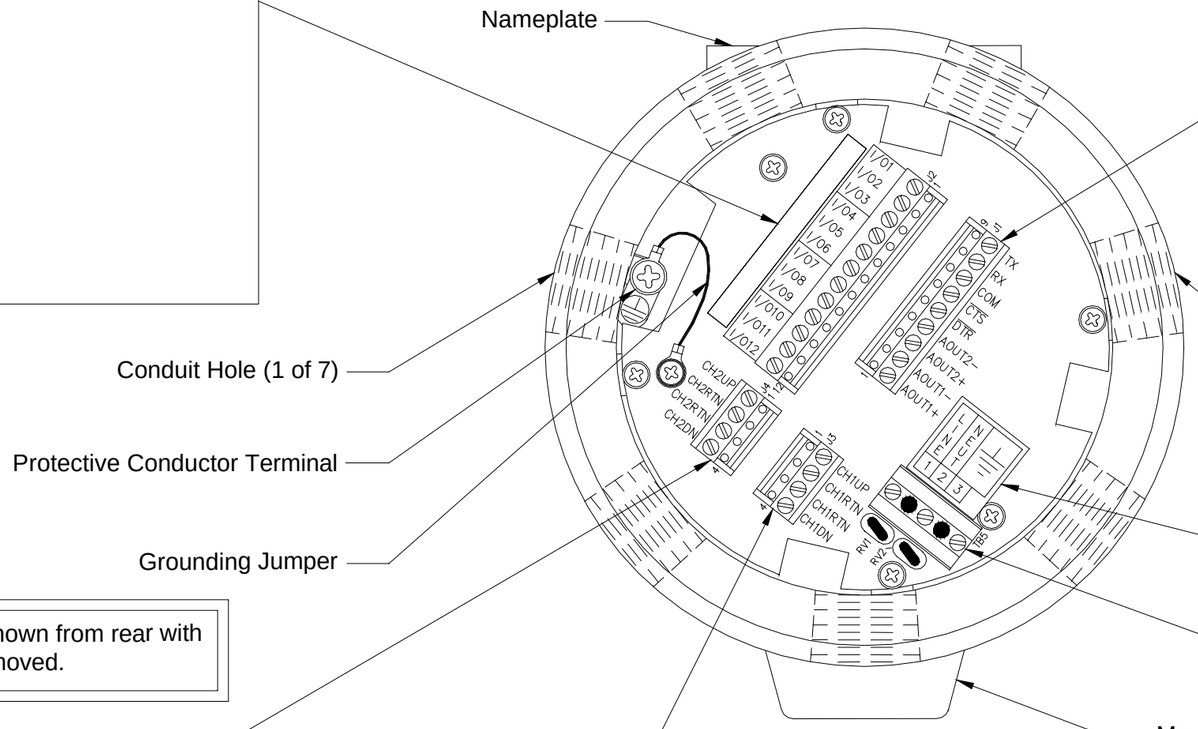


ANGLE MOUNTING BRACKET

Figure 1-9: Model XGS868 Mounting Techniques

INPUT/OUTPUT CONNECTIONS	
Pin No.	Description
1 I/O1	See wiring label in rear cover and in Figure 1-11 on page 1-24.
2 I/O2	
3 I/O3	
4 I/O4	
5 I/O5	
6 I/O6	
7 I/O7	
8 I/O8	
9 I/O9	
10 I/O10	
11 I/O11	
12 I/O12	

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 XGS868.*



NOTE: Unit shown from rear with rear cover removed.

RS232/RS485 SERIAL PORT	
Pin No.	Description
5 DTR	Data Terminal Ready
6 CTS	Clear To Send
7 COM	Ground
8 RX	Receive
9 TX	Transmit

0/4-20 mA ANALOG OUTPUTS	
Pin No.	Description
1 AOUT1+	Output 1 - SIG(+)
2 AOUT1-	Output 1 - RTN(-)
3 AOUT2+	Output 2 - SIG(+)
4 AOUT2-	Output 2 - RTN(-)

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

CH2 TRANSDUCER	
Pin No.	Description
1 CH2UP	Upstream SIG(+)
2 CH2RTN	Upstream RTN(-)
3 CH2RTN	Downstream RTN(-)
4 CH2DN	Downstream SIG(+)

CH1 TRANSDUCER	
Pin No.	Description
1 CH1UP	Upstream SIG(+)
2 CH1RTN	Upstream RTN(-)
3 CH1RTN	Downstream RTN(-)
4 CH1DN	Downstream SIG(+)

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

Figure 1-10: Model XGS868 Wiring Diagram

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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 1-11: Option Card Connection Labels

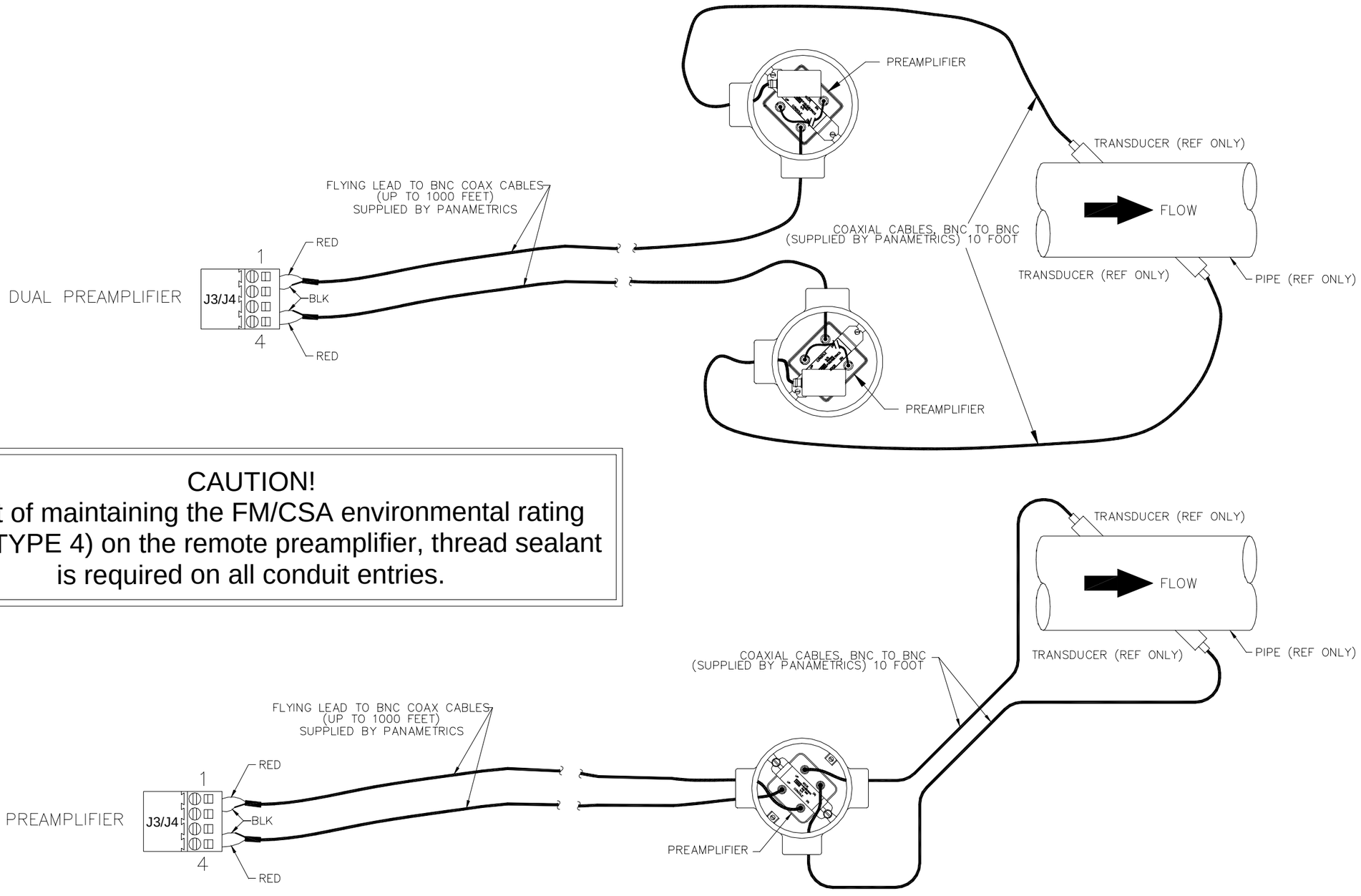


Figure 1-12: Transducer Wiring for Remote Mounted XGS868

Chapter 2

Initial Setup

Introduction

This chapter provides instructions for programming the minimum amount of data required to place the Model XGS868 flowmeter into operation. Before the Model XGS868 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 XGS868, 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.*

Site Parameters

In order to begin using the Model XGS868, the following submenus within the *User Program* will be accessed:

- CHx-ACTIV - activate one or both channels and select the desired measurement method
- CHx-SYSTM - enter the individual channel parameters
- GLOBL-SYSTM - enter the global system parameters
- CHx-PIPE - enter the pipe parameters

As a guide in following the programming instructions in this chapter, the relevant portions of the Model XGS868 menu map have been reproduced in Figure 2-3 on page 2-25.

Programming Methods

There are two methods for programming the Model XGS868:

- **Remote Control Communications Unit (RCCU)** - a hand-held device that communicates with the Model XGS868 via wireless, infrared transmissions.
- **Instrument Data Manager (IDM)** - a PC-based, non-resident software program that communicates with the Model XGS868 via its RS232 serial port.

Note: *The Model XGS868 cannot be programmed at the electronics enclosure. One of the above methods must be used.*

Although the screen displays and the methods of navigating through the menu system differ, the programming sequences and all of the available menu options are identical for the RCCU and IDM methods. This chapter provides specific instructions for the RCCU method, and your *IDM User's Manual* (910-185) provides similar instructions for IDM. Regardless of the programming method chosen, refer to the menu prompts and menu options presented in this chapter.

Using the RCCU

To energize the RCCU, press the [ON] key on its keypad. The LCD display, which consists of 4 lines x 20 characters, is activated. See Figure 2-1 below for the layout of the RCCU keypad and display.

Note: *For detailed instructions on using and maintaining the RCCU, refer to the* Service Manual *and/or the* Programming Manual.

For reliable RCCU operation, the XGS868's infrared receiver should:

- have a clear line of sight to the RCCU
- be located within 8 ft (2.5 m) of the RCCU
- have an angle of incidence of no more than 15°

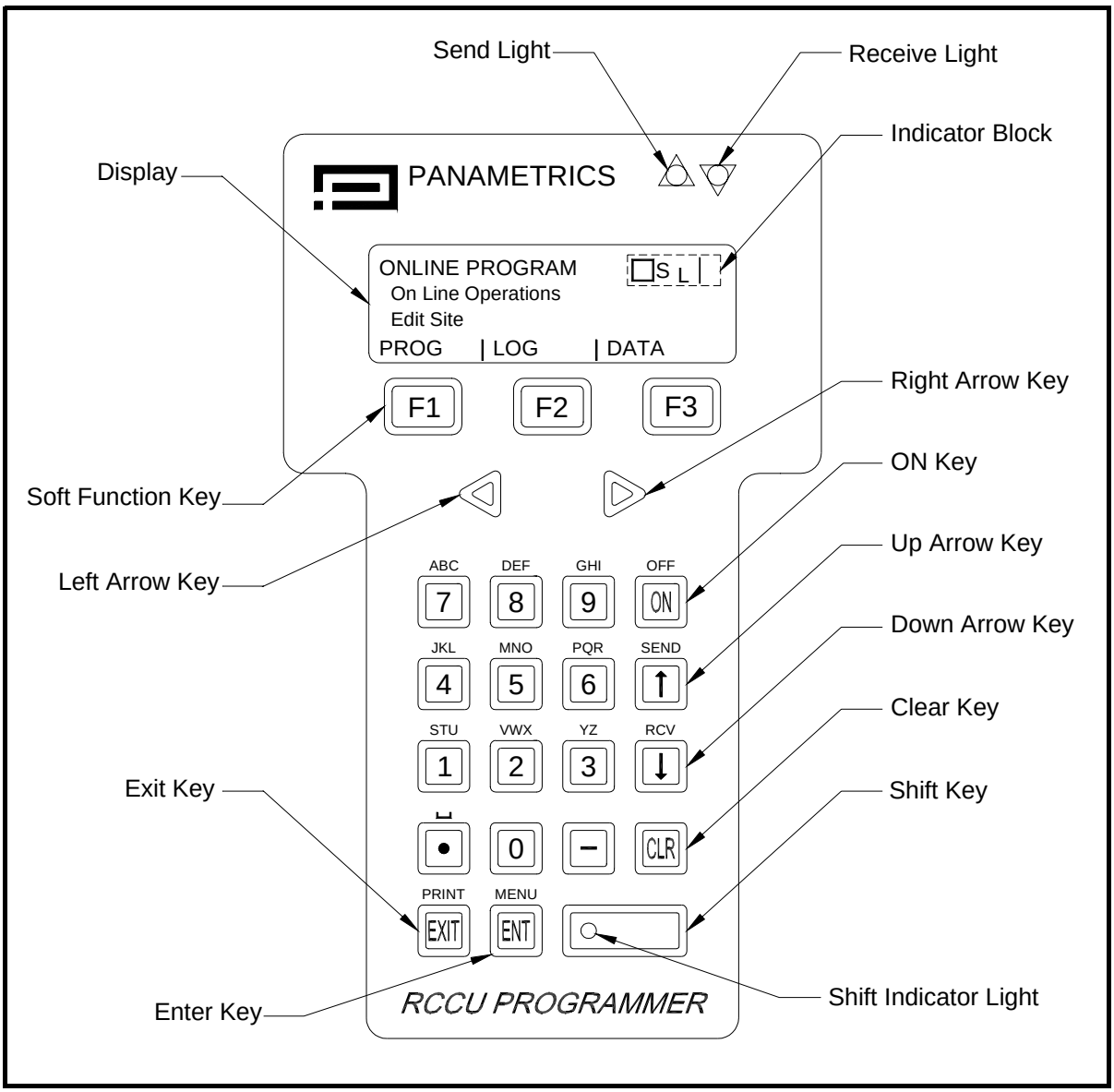
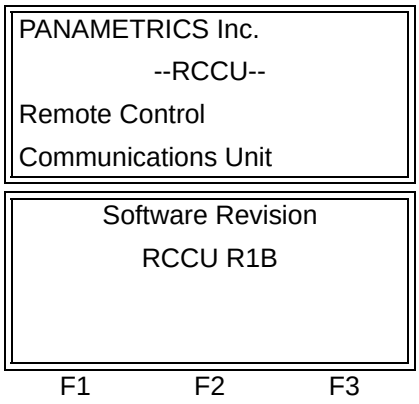
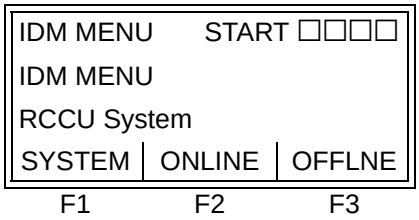


Figure 2-1: The RCCU Keypad and Display

Using the RCCU (cont.)

Immediately upon power up, the RCCU performs its normal startup routine. This results in a display of the Panametrics logo, followed by these informational displays:



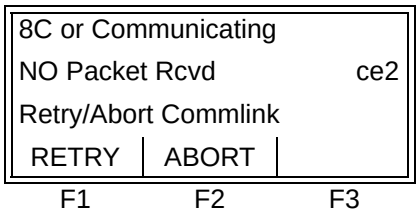


When the startup routine has been completed, this IDM Menu Start display appears.

Note: *See page 2-1 for a description of the IDM software.*

Communications Failure

If a working communications link with the Model XGS868 cannot be established, an error message such as the following appears:



At this display, press [F1] to try again or press [F2] to quit.

In the event of such an error message, try the following remedies:

- make sure that the RCCU battery is not weak
- clean the windows on both the RCCU and the XGS868
- make sure the transmission distance does not exceed 8 ft (2.5 m)
- make sure the angle of incidence does not exceed 15°
- make sure there is an unobstructed line of sight

Then, carefully aim the RCCU and try again. If this fails to resolve the problem, contact Panametrics for assistance.

Accessing the User Program

To access the XGS868's *User Program*, the RCCU must be pointed directly at the receiver in the window on the electronics enclosure whenever data is being sent or received (see Figure 2-2 below).

Note: *For the corresponding* IDM *procedures, see your* IDM User's Manual *(910-185).*

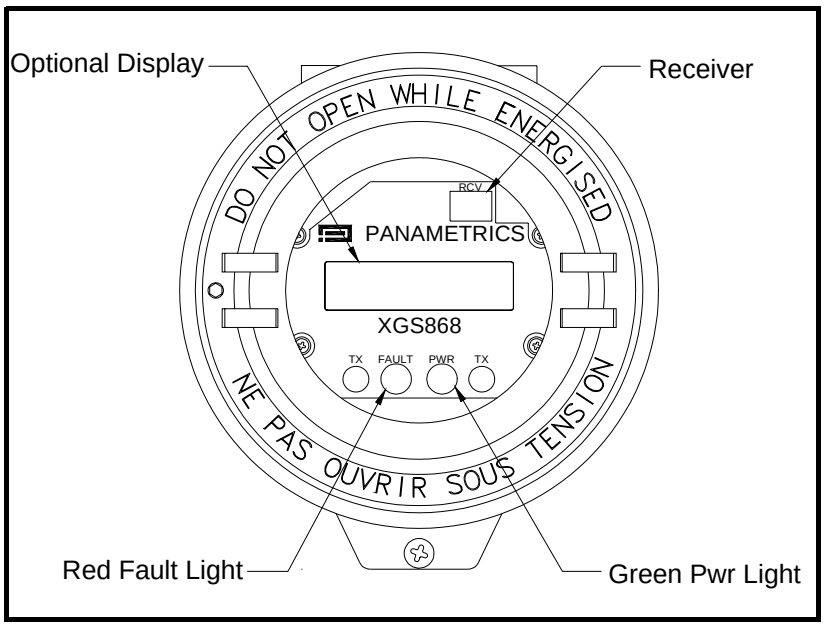


Figure 2-2: Model XGS868 Front Window

The green light in the window glows continuously to indicate that the XGS868 is receiving power, while the red light should glow for more than two seconds whenever a signal is sent from the RCCU. If the red light blinks repeatedly, the XGS868 is <u>not</u> receiving the RCCU signal correctly. The Send/Receive lights on the RCCU blink once to indicate the sending/receiving of a signal.

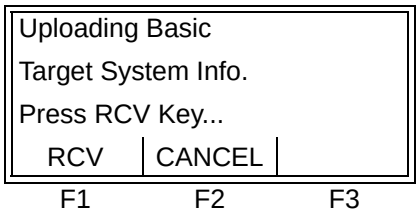
Note: *If the red (Fault) light blinks once or flickers briefly, a flow fault is indicated. This is unrelated to the RCCU, and the problem must be resolved by referring to Chapters 2 and 3,* Error Codes *and* Diagnostics*, in the* Service Manual.

IDM MENU START □□□□		
IDM MENU		
previous selection appears here		
SYSTEM	ONLINE	OFFLNE
F1	F2	F3

At this display, press [F2] to select ONLINE

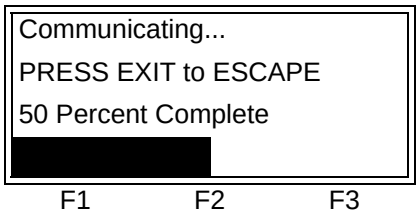
IMPORTANT: *Always keep the RCCU pointed directly at the XGS868 while communicating with the meter.*

Accessing the User Program (cont.)

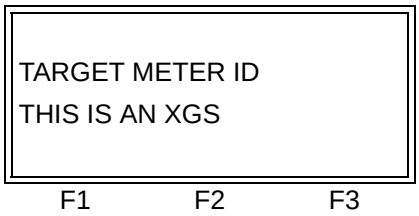


Press the [F1] key to select RCV and begin communications, or press [F2] to select CANCEL and abort the operation.

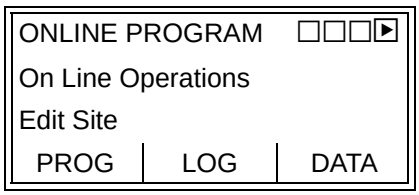
If the operation was aborted, the RCCU resets to the main menu. Otherwise, proceed to the next display.



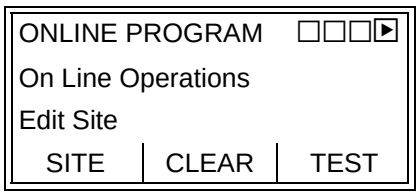
This display shows the status of the communication attempt.



When the connection is established, this message appears briefly and is then replaced by the following display.



The XGS868 is now ready to be programmed. To begin programming, press [F1] to select PROG.



(These additional options are accessed by pressing the [◁] and/or [▷] keys.)

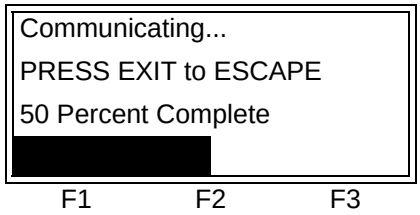
Note: *The right arrow in the upper right corner of the display indicates that additional options are available. These are accessed by pressing the* [◁] *or* [▷] *key.*

Refer to the *Menu Map* in Figure 2-3 on page 2-25, and proceed to the next section to begin setting up your meter.

The PROG Menu

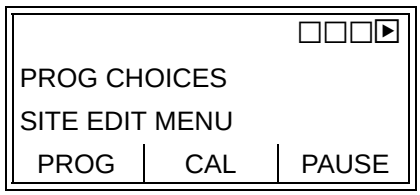
This *Startup Guide* provides instructions only for entering the setup data required for basic operation. Refer to the *Programming Manual* for information on programming all other features. Be sure to record all programming data in Appendix B, *Data Records*.

After pressing [ENT] or one of the [Fx] keys on the RCCU, the following screen appears:

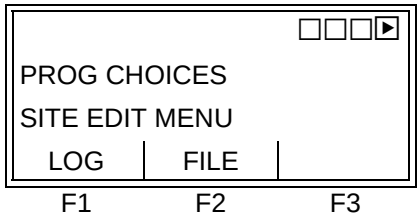


This display shows the status of the communication attempt.

IMPORTANT: *Wait for the RCCU and the XGS868 to communicate and for the next prompt to appear before pressing any other keys. Although the above display always appears, it will not be specifically shown in this manual after every selection entry.*



Press [F1] to enter the PROG menu, and proceed to the next section.



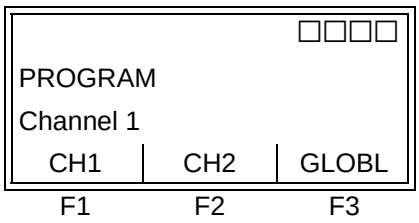
(These additional options, which only appear if a data logging option card is installed in Slot 2, are accessed by pressing the [◁] or [▷] key.)

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 procedures used for Channel 1.*

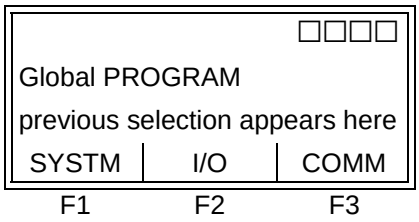
For either the RCCU or the IDM programming method, after reaching the *Main Menu*, follow the programming steps shown in the remainder of this chapter and in Figure 2-3 on page 2-25.

The GLOBL Menu

The first step in programming the XGS868 is to select the desired system units in the GLOBL menu. To do this, proceed as follows:



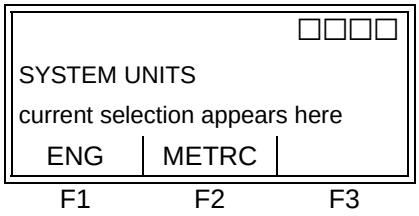
Press the [Fx] key under GLOBL to select it. (For a 1-Channel meter, the CH2 option does not appear.)



Press [F1] to select SYSTM.

The GLOBL-SYSTM Submenu

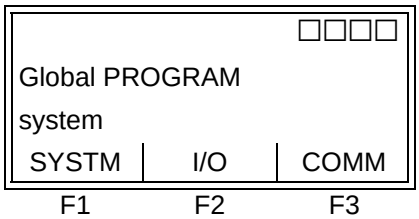
This submenu is used to specify the desired system units. In addition, for a 2-Channel meter, the choices made in this submenu are used to calculate the SUM, DIF, and AVE values. Any conflicting data entered in the CHx-SYSTM submenu is ignored.



Press [F1] to select English units, or press [F2] to select metric units. Then, proceed to either the 1-Channel meter or 2-Channel meter section.

A: 1-Channel Meter

For a 1-Channel XGS868, the meter exits the GLOBL-SYSTM submenu upon responding to the previous prompt. (For a 2-Channel meter, skip this section and proceed directly to the next page.)



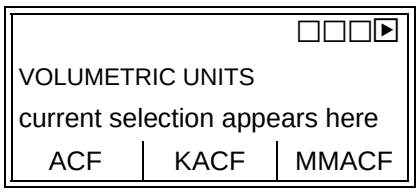
Press [EXIT] to leave the Global PROGRAM submenu.

Skip the 2-Channel meter instructions that follow and proceed directly to the CHx menu on page 2-12.

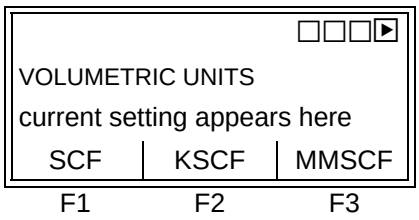
The GLOBL-SYSTM Submenu (cont.)

B: 2-Channel Meter

For a 2-Channel meter, continue the programming as follows:



Press [F1]-[F3] to select the desired volumetric units for the flow rate display.



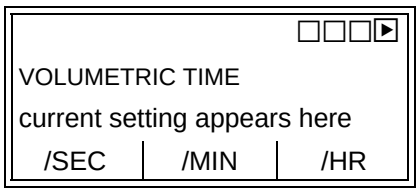
Use the [◃] and [▹] keys to access the additional choices shown.

Note: *The above prompt shows English units, as an example. If metric units were selected as the* SYSTEM UNITS*, the appropriate choices would appear instead.*

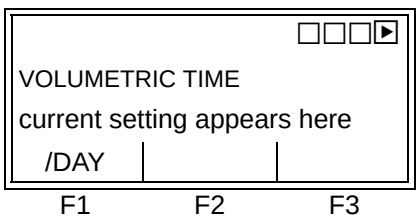
All the available volumetric and totalizer units are listed in Table 2-1 below. The choices shown at the above prompt are determined by the selection made at the SYSTEM UNITS prompt.

Table 2-1: Available Volumetric/Totalizer Units

English	Metric
Actual Units	
ACF = Actual Cubic Feet	ACM = Actual Cubic Meters
KACF = Thousands of ACF	KACM = Thousands of ACM
MMACF = Millions of ACF	MMACM = Millions of ACM
Standard Units	
SCF = Standard Cubic Feet	SCM = Standard Cubic Meters
KSCF = Thousands of SCF	KSCM = Thousands of SCM
MMSCF = Millions of SCF	MMSCM = Millions of SCM

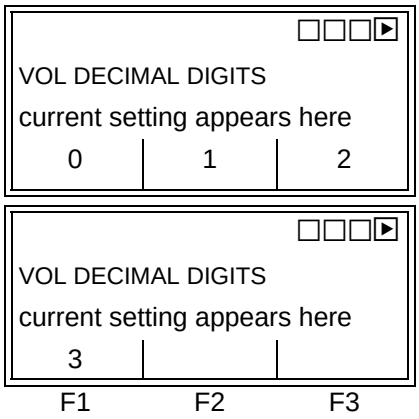


Press [F1]-[F3] to select the desired time units for the volumetric flow rate display.



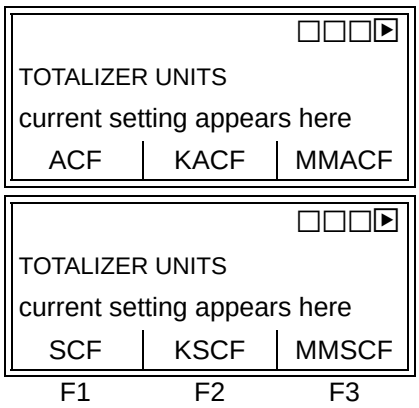
Use the [◃] and [▹] keys to access the additional choice shown.

The GLOBL-SYSTM Submenu (cont.)



Press [F1]-[F3] to select the desired number of digits to the right of the decimal point in the volumetric flow rate display.

Use the [◃] and [▹] keys to access the additional choice shown.

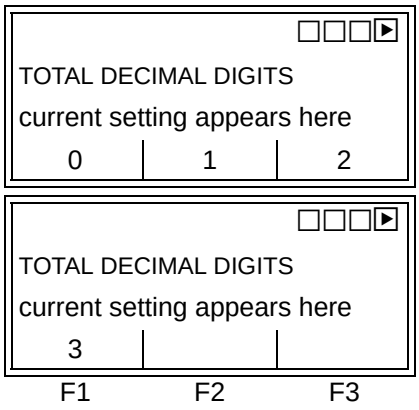


Press [F1]-[F3] to select the desired units for the totalized flow rate display.

Use the [◃] and [▹] keys to access the additional choices shown.

Note: *The above prompt shows English units, as an example. If metric units were selected as the* SYSTEM UNITS*, the appropriate choices would appear instead.*

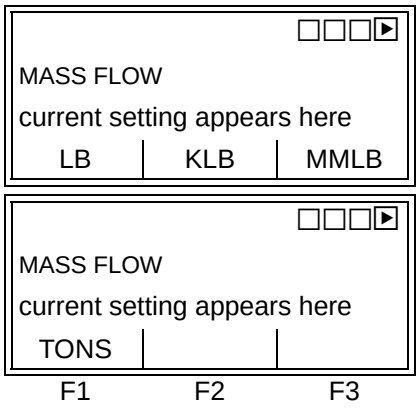
All the available volumetric and totalizer units are shown in Table 2-1 on page 2-8. The choices shown at the above prompt are determined by the selection made at the SYSTEM UNITS prompt.



Press [F1]-[F3] to select the desired number of digits to the right of the decimal point in the totalized flow rate display.

Use the [◃] and [▹] keys to access the additional choice shown.

The GLOBL-SYSTM Submenu (cont.)



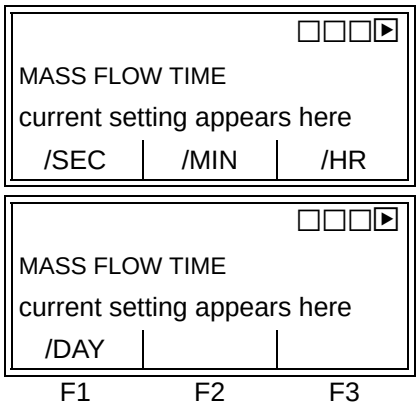
Press [F1]-[F3] to select the desired mass flow units for the flow rate display.

Use the [◃] and [▹] keys to access the additional choice shown.

The available mass flow units are shown in Table 2-2 below.

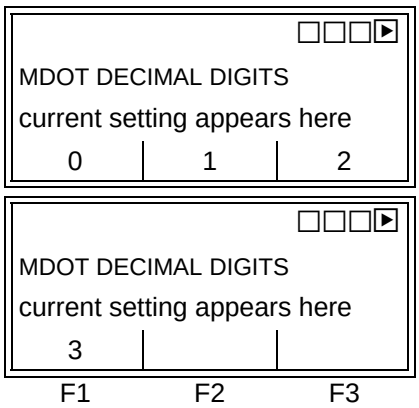
Table 2-2: Available Mass Flow Units

English	Metric
LB = Pounds	KG = Kilograms
KLB = Thousands of LB	TONNE = Metric Tons (1000 KG)
MMLB = Millions of LB	
TONS = Tons (2000 LB)	



Press [F1]-[F3] to select the desired time units for the mass flow rate display.

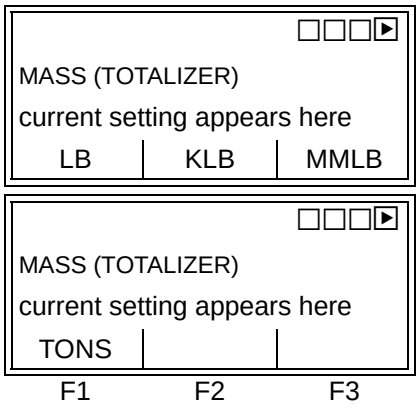
Use the [◃] and [▹] keys to access the additional choice shown.



Press [F1]-[F3] to select the desired number of digits to the right of the decimal point in the mass flow rate display.

Use the [◃] and [▹] keys to access the additional choice shown.

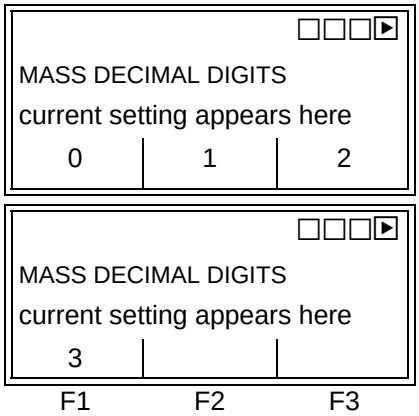
The GLOBL-SYSTM Submenu (cont.)



Press [F1]-[F3] to select the desired units for the totalized mass flow rate display.

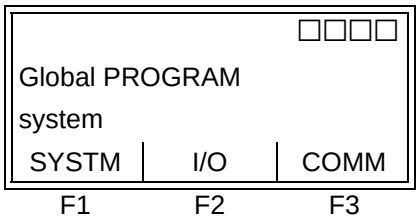
Use the [◁] and [▷] keys to access the additional choice shown.

The available mass flow units are shown in Table 2-2 on page 2-10.



Press [F1]-[F3] to select the desired number of digits to the right of the decimal point in the totalized mass flow display.

(Use the [◁] and [▷] keys to access the additional choice shown.)

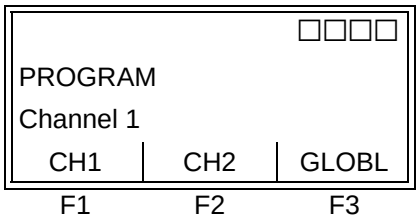


Press [EXIT] to leave the Global PROGRAM submenu.

Proceed to the next section to continue programming your meter.

The CHx Menu

This menu is used to enter data that is specific to each channel. Refer to the *Menu Map* in Figure 2-3 on page 2-25 and remember to record all programming data in Appendix B, *Data Records*.

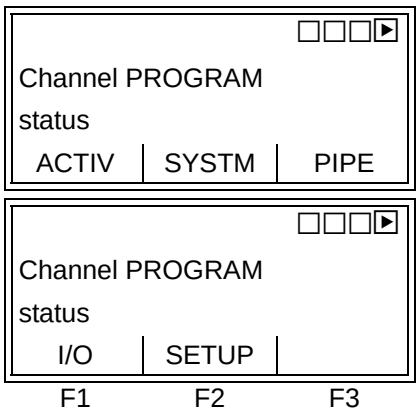


Press the [F1] key under CH1 to select it. (For a 1-Channel meter, the CH2 option does not appear.)

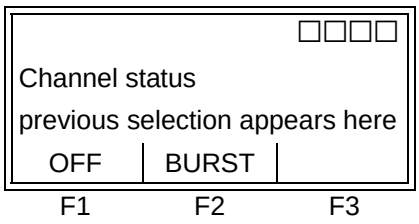
Note: *In this manual, only the programming of Channel 1 is described. To program Channel 2 of a 2-Channel meter, select* CH2 *above and follow the same general procedures.*

The ACTIV Submenu

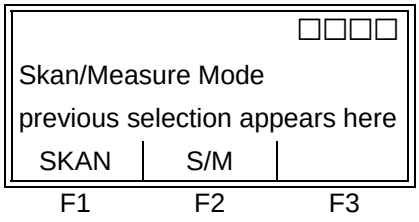
The ACTIV submenu permits selection of the desired measurement method. In addition, it is used to activate/deactivate one or both of the channels in a 2-Channel Model XGS868.



Press [F1] to enter the ACTIV submenu.



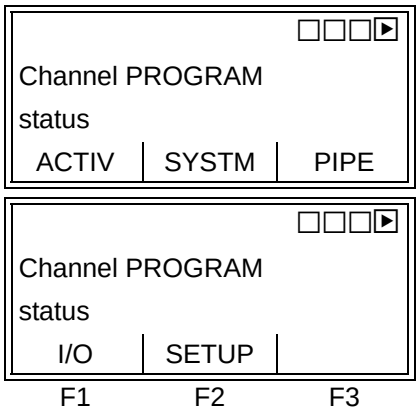
Press the [Fx] key under BURST to activate Channel 1. (For a 1-Channel meter, this prompt is called Site status and the OFF option does not appear.)



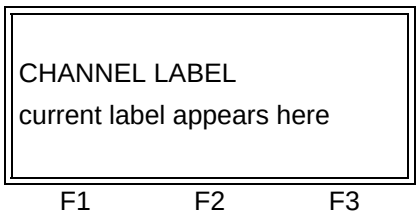
Press [F1] to select Skan mode or [F2] to select Skan/Measure mode. The meter returns to the Channel PROGRAM prompt.

The CHx-SYSTM Submenu

After completing the final entry in the ACTIV submenu, the meter returns to the Channel PROGRAM prompt:

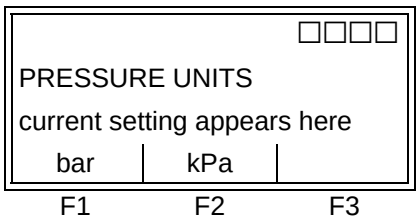


Press the [F2] key to enter the SYSTM submenu.

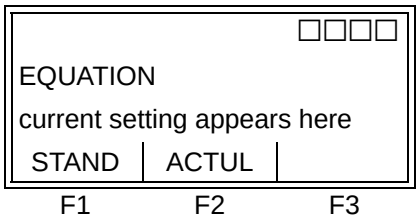


Key in the desired CHANNEL LABEL (up to 9 characters) and press [ENT].

Key in the desired CHANNEL MESSAGE (up to 21 characters) and press [ENT]. (For a 1-Channel meter, this prompt is called SITE MESSAGE.)



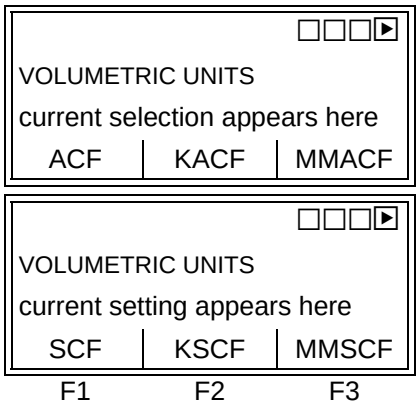
Press [F1] or [F2] to select the desired PRESSURE UNITS. (This prompt only appears if METRC was selected for the SYSTEM UNITS.)



Press [F1] to display data in *standard* volumetric units or press [F2] to display data in *actual* volumetric units.

The XGS868 uses the gas equation specified above to calculate the flow rate corresponding to the measured signal transit times.

The CHx-SYSTM Submenu (cont.)



Press [F1]-[F3] to select the desired volumetric units for the flow rate display.

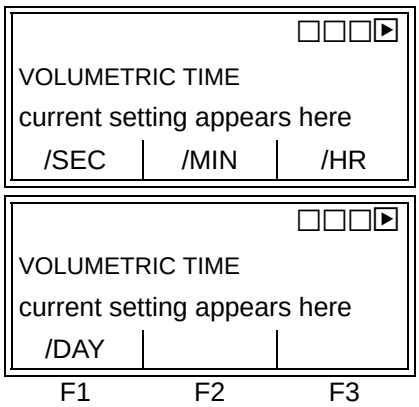
Use the [◃] and [▹] keys to access these additional choices, which are only available if STAND was selected at the EQUATION prompt.

Note: *The above prompt shows English units, as an example. If metric units were selected as the* SYSTEM UNITS*, the appropriate choices would appear instead.*

The abbreviations and definitions of all the available volumetric and totalizer units are shown in Table 2-3 below. The choices shown at the above prompt are determined by the selections made at the EQUATION and SYSTEM UNITS prompts.

Table 2-3: Available Volumetric/Totalizer Units

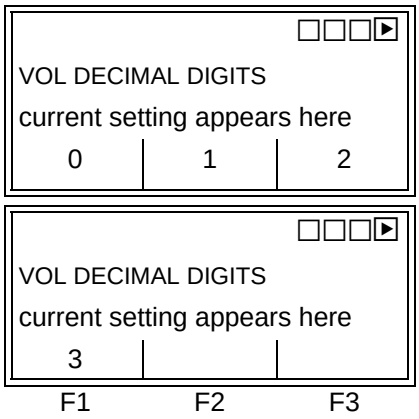
English	Metric
Actual Units	
ACF = Actual Cubic Feet	ACM = Actual Cubic Meters
KACF = Thousands of ACF	KACM = Thousands of ACM
MMACF = Millions of ACF	MMACM = Millions of ACM
Standard Units	
SCF = Standard Cubic Feet	SCM = Standard Cubic Meters
KSCF = Thousands of SCF	KSCM = Thousands of SCM
MMSCF = Millions of SCF	MMSCM = Millions of SCM



Press [F1]-[F3] to select the desired time units for the volumetric flow rate display.

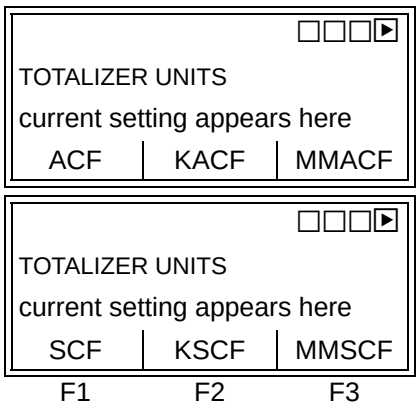
Use the [◃] and [▹] keys to access the additional choice shown.

The CHx-SYSTM Submenu (cont.)



Press [F1]-[F3] to select the desired number of digits to the right of the decimal point in the volumetric flow rate display.

Use the [◃] and [▹] keys to access the additional choice shown.

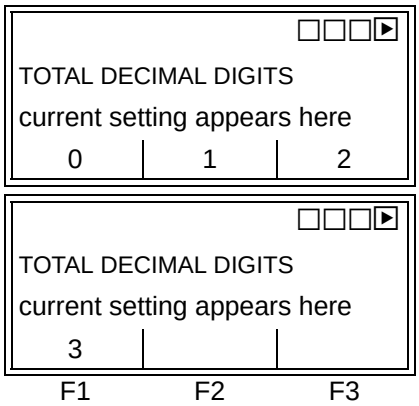


Press [F1]-[F3] to select the desired units for the totalized flow rate display.

Use the [◃] and [▹] keys to access the additional choices, which are only available if STAND was selected at the EQUATION prompt.

Note: *The above prompt shows English units, as an example. If metric units were selected as the* SYSTEM UNITS*, the appropriate choices would appear instead.*

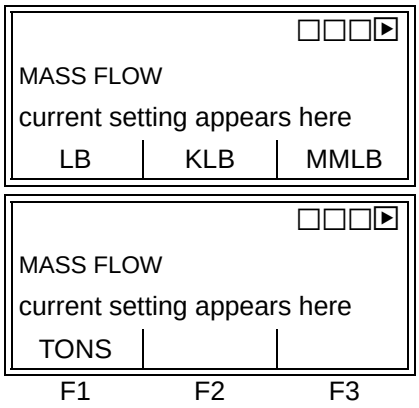
The abbreviations and definitions of all the available volumetric and totalizer units are shown in Table 2-3 on page 2-14. The choices shown at the above prompt are determined by the selections made at the EQUATION and SYSTEM UNITS prompts.



Press [F1]-[F3] to select the desired number of digits to the right of the decimal point in the totalized flow rate display.

Use the [◃] and [▹] keys to access the additional choice shown.

The CHx-SYSTM Submenu (cont.)



Press [F1]-[F3] to select the desired mass flow units for the flow rate display.

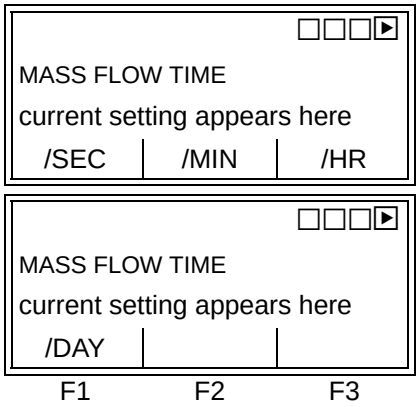
Use the [◃] and [▹] keys to access the additional choice shown.

Note: *The prompt above shows English units, as an example. If metric units were specified, these appear instead.*

The abbreviations and definitions of the available mass flow units are shown in Table 2-4 below. The choices shown at the above prompt are determined by the selection made at the SYSTEM UNITS prompt.

Table 2-4: Available Mass Flow Units

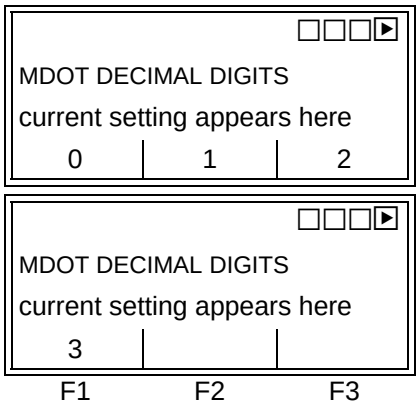
English	Metric
LB = Pounds	KG = Kilograms
KLB = Thousands of LB	TONNE = Metric Tons (1000 KG)
MMLB = Millions of LB	
TONS = Tons (2000 LB)	



Press [F1]-[F3] to select the desired time units for the mass flow rate display.

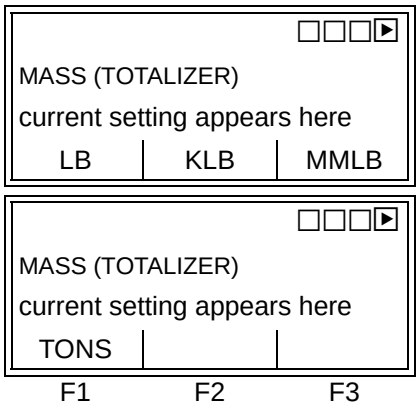
Use the [◃] and [▹] keys to access the additional choice shown.

The CHx-SYSTM Submenu (cont.)



Press [F1]-[F3] to select the desired number of digits to the right of the decimal point in the mass flow rate display.

Use the [◁] and [▷] keys to access the additional choice shown.

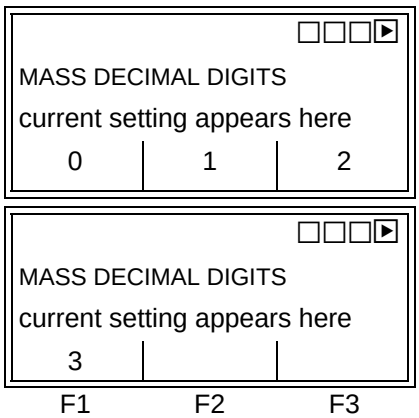


Press [F1]-[F3] to select the desired units for the totalized mass flow rate display.

Use the [◁] and [▷] keys to access the additional choice shown.

Note: *The prompt above shows English units, as an example. If metric units were specified, these appear instead.*

The available mass flow units are shown in Table 2-4 on page 2-16. The choices shown at the above prompt are determined by the selection made at the SYSTEM UNITS prompt.



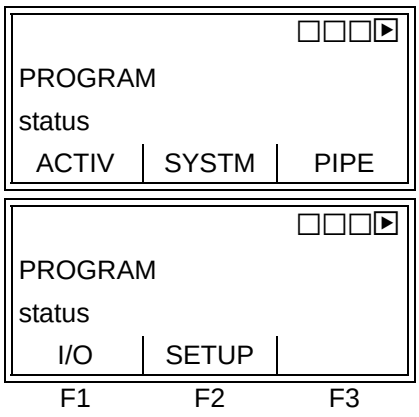
Press [F1]-[F3] to select the desired number of digits to the right of the decimal point in the totalized mass flow display.

(Use the [◁] and [▷] keys to access the additional choice shown.)

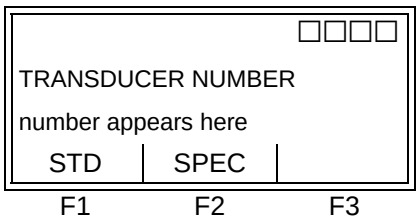
Proceed directly to the next section to program the PIPE submenu.

The PIPE Submenu

After completing the final entry in the CHx-SYSTM submenu, continue programming the meter as follows:



Press the [F3] key to enter the PIPE sub-menu.



For a standard transducer, press [F1], enter the number engraved on the transducer head, and press [ENT]. If there is no number engraved on the transducer head, press [F2] and then press [ENT].

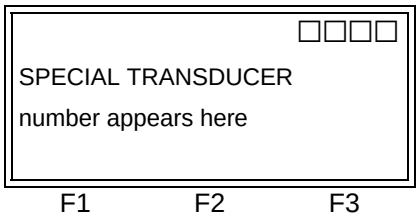
IMPORTANT: *Special transducers, which have no engraved number on the head, are rarely used. Examine the transducer head carefully for a number.*

Based on your response to the above prompt, proceed as follows:

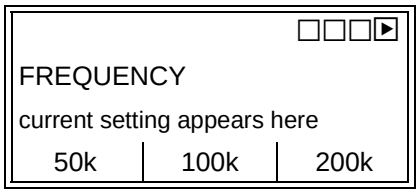
- To program the Model XGS868 for use with a special transducer, proceed to the instructions on page 2-19.
- To program the Model XGS868 for use with a standard transducer, proceed to the instructions on page 2-20.

Special Transducers

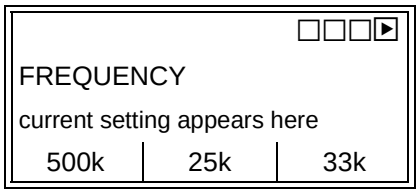
The next three prompts apply only to special transducers. If a standard transducer is being used, skip ahead to the PIPE OD prompt on page 2-20.



Assign a number between 91 and 99 to the special transducer and press [ENT].

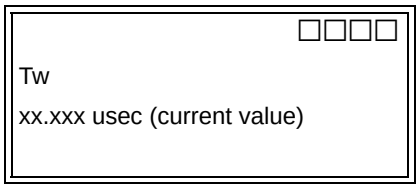


Press [F1]-[F3] to select the frequency of the special transducer.



Use the [◁] and [▷] keys to access the additional choices shown.

IMPORTANT: *The frequency is required to transmit an excitation voltage at the transducer's natural frequency.*

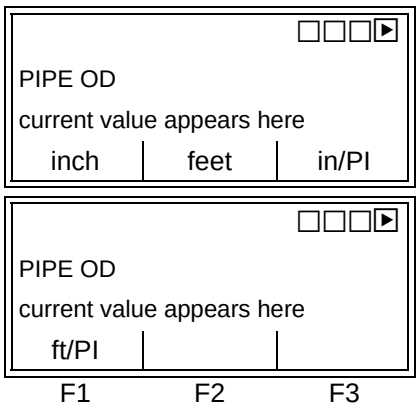


Enter the special transducer time delay value (in µsec) supplied by Panametrics and press [ENT].

Note: *Tw is the time required for the transducer signal to travel through the transducer and its cable. This time delay must be subtracted from the transit times of the upstream and downstream transducers to ensure an accurate flow rate calculation.*

The PIPE Submenu (cont.)

After the standard or special transducer data has been entered, the programming sequence should be rejoined at this point.



Press [F1]-[F3] to select the appropriate units and enter the known PIPE OD or circumference. Press [ENT] when done.

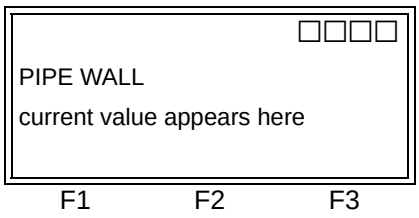
Use the [◁] and [▷] keys to access the additional choice shown.

Note: *The prompt above shows English units, as an example. If metric units were specified, these appear instead.*

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 the *Sound Speeds and Pipe Size Data* manual (914-004). The available English and metric units and their definitions are listed in Table 2-5 below.

Table 2-5: Available Pipe OD Units

English	Metric
inch = pipe OD in inches	mm = pipe OD in millimeters
feet = pipe OD in feet	m = pipe OD in 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

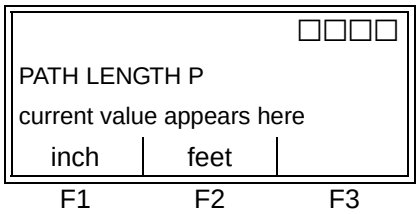


Enter the known thickness of the PIPE WALL, in the same units used for the PIPE OD, and press [ENT].

IMPORTANT: *The* PIPE WALL *thickness must be entered in the same units used for the* PIPE OD.

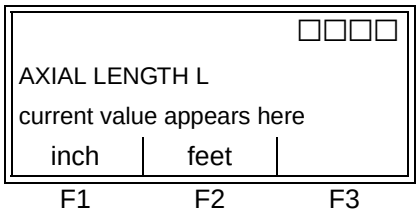
If the pipe wall thickness cannot be measured, look it up in the *Sound Speeds and Pipe Size Data* manual (914-004).

The PIPE Submenu (cont.)

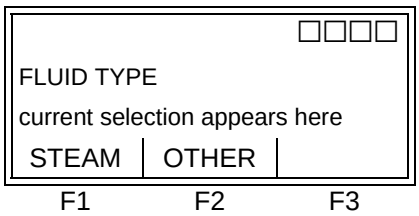


Press [F1] or [F2] to select the desired units. Then, enter the PATH LENGTH of the ultrasonic signal and press [ENT].

Note: *If a spoolpiece was ordered with the meter, both 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.*

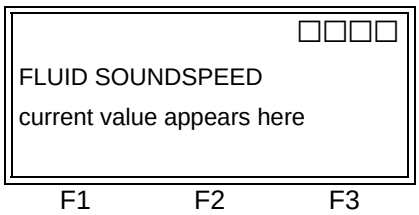


Press [F1] or [F2] to select the desired units. Then, enter the AXIAL LENGTH of the ultrasonic signal and press [ENT].



Press [F1] to select STEAM as the gas type or press [F2] to configure the meter for a different gas.

If [F2] = OTHER was selected as the FLUID TYPE, the following prompt appears. If [F1] = STEAM was chosen, skip the following prompt and proceed directly to the Mass Flow (static)? prompt on page 2-22.

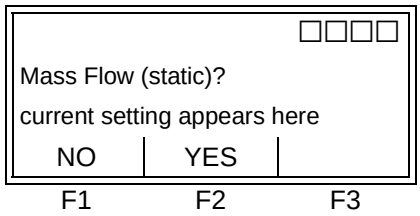


Enter the speed of sound (in feet per second) in the gas to be measured, and press [ENT].

Note: *If the speed of sound in your fluid is not known, look it up in the* Sound Speeds and Pipe Size Data *manual (914-004).*

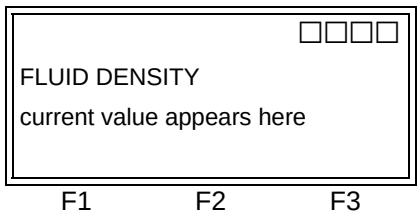
The PIPE Submenu (cont.)

The Model XGS868 calculates the actual steam density from the live or fixed temperature and pressure inputs, as programmed in the I/O menu. However, setting the Mass Flow (static)? prompt to YES overrides this value and uses the density entered at the FLUID DENSITY prompt below to calculate mass flow.

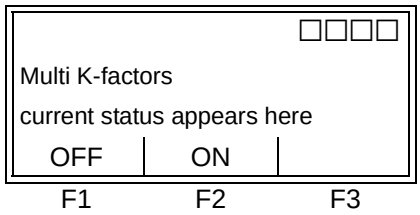


Press [F1] to select NO or press [F2] to select YES.

If [F2] = YES was selected above, the following prompt appears. If [F1] = NO was chosen, skip the following prompt.



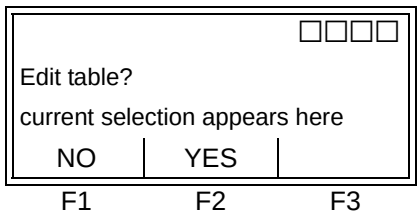
Enter the density of the gas to be measured and press the [ENT] key. (This prompt appears only if Mass Flow (static) ? is set to YES.)



Press [F1] to disable this function, or press [F2] to enable multiple K-factors.

Based on your response to the above prompt, proceed as follows:

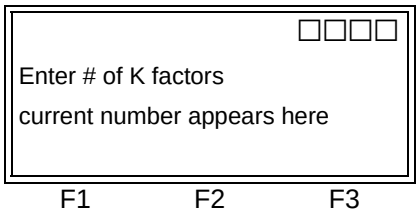
- If Multi K-factors are turned OFF, proceed to the CALIBRATION FACTOR prompt on page 2-23.
- If Multi K-factors are turned ON, continue with the next prompt.



Press [F1] to retain the current K-factor table and proceed directly to the CALIBRATION FACTOR prompt, or press [F2] to edit the K-factor table.

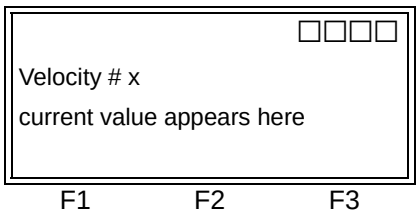
Note: *If velocity vs. K-factor data was not provided with the Model XGS868's documentation, the K-factor table cannot be edited.*

The PIPE Submenu (cont.)

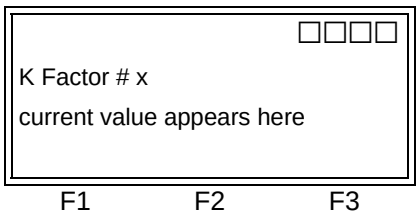


Enter the number of K-factors to be entered into the table and press [ENT]. This number must be between 2 and 20.

IMPORTANT: *When editing the K-factor table, the velocities must be entered in increasing order.*

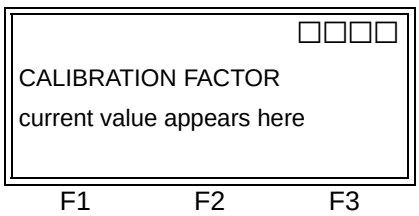


Enter the velocity value for K-factor number "x" and press [ENT].



Enter the K-factor corresponding to velocity number "x" and press [ENT]. (The Velocity # x and K Factor # x prompts repeat until all of the data points have been entered.)

Regardless of the choices made at the various Multi K-factors prompts, the programming sequences converge here.

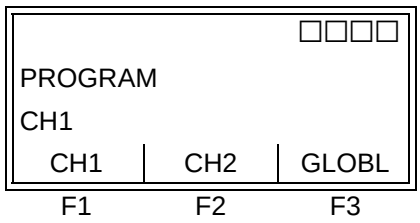


Enter a value for the flow calibration factor and press [ENT]. The default value is 1.00, but values between 0.90 and 1.10 may be entered.

After the CALIBRATION FACTOR entry, the meter leaves the PIPE submenu. At that point, press the [EXIT] key on the RCCU keypad to leave the Channel PROGRAM submenu, and proceed to the next section.

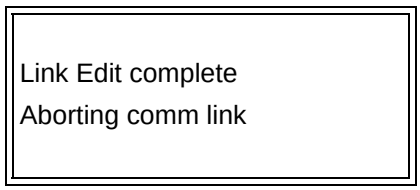
Exiting the User Program

After leaving the Channel PROGRAM submenu, the meter returns to the following prompt:

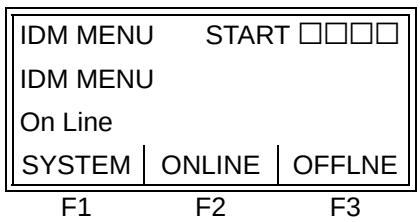


Press the [EXIT] key to leave the *User Program*. (For a 1-Channel meter, the CH2 option does not appear.)

Note: *See your* IDM User's Manual *(910-185) for instructions on terminating IDM communications.*



This display appears briefly.



The initial RCCU startup display then reappears.

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 reapplied when the unit is next powered on.*

Proceed to Chapter 3, *Operation*, for instructions on taking measurements or refer to the *Programming Manual* for instructions on programming the Model XGS868's advanced features.

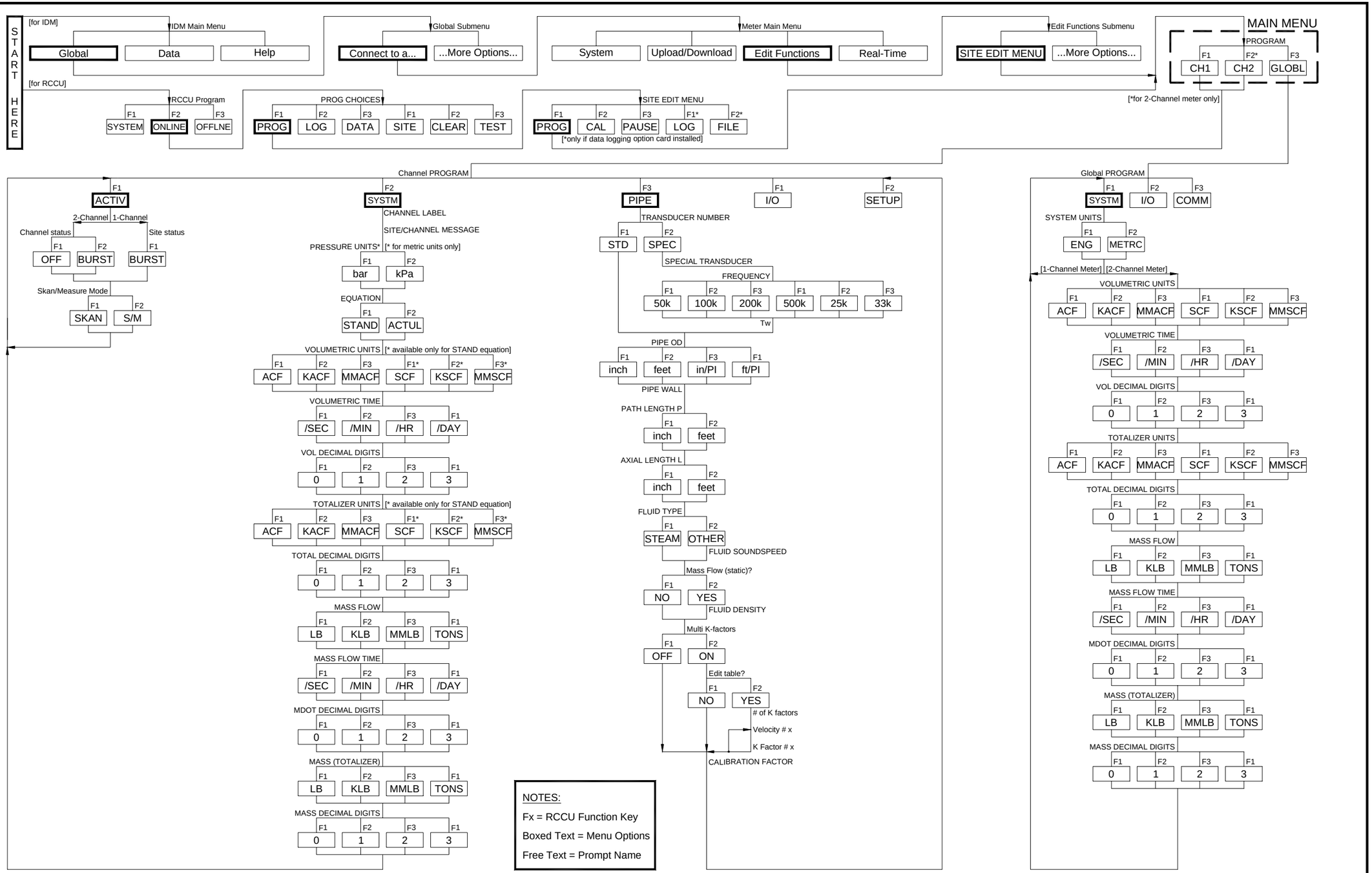


Figure 2-3: Model XGS868 Initial Setup Menu Map

Chapter 3

Operation

Introduction

See Chapter 1, *Installation*, and Chapter 2, *Initial Setup*, to prepare the Model XGS868 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 Displays
- Taking Measurements

Note: *All inputs and outputs of the Model XGS868 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 XGS868, 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.

Powering Up

Because the Model XGS868 does not have an ON/OFF switch, it powers 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 XGS868.*

There are four methods for obtaining readings from the XGS868:

- Built-In LCD Display - see page 3-3
- Remote Control Communications Unit (RCCU) - see page 3-4
- Instrument Data Manager (IDM) - see *Programming Manual*
- The Model XGS868's analog output - see *Programming Manual*

At least one of the above options must be installed and configured in order to obtain flow rate readings from the meter. For instructions on using the IDM or analog output options, refer to the *Programming Manual* and/or the *IDM User's Manual* (914-185).

Immediately upon power up the green PWR light begins to glow, and about 15 seconds later the software version display appears. Then, the meter performs a series of internal checks, which takes about 45 seconds, prior to outputting the flow rate data.

Note: *If the Model XGS868 fails any of the internal checks (see Chapter 2,* Error Codes*, in the* Service Manual*), try disconnecting the power and then re-powering 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 XGS868 begins taking measurements and the software version display is replaced by a measurement mode display (assuming that a display has been enabled). Proceed to the appropriate section for instructions on using the LCD display and the RCCU display options.

Note: *As a minimum, the system and pipe parameters (for each installed channel of a 2-channel meter) must be entered before the Model XGS868 can display valid data. Refer to Chapter 2,* Initial Setup*, for specific instructions.*

The Optional LCD Display

The components of the optional LCD display are shown in Figure 3-1 below, along with a typical mass flow rate readout.

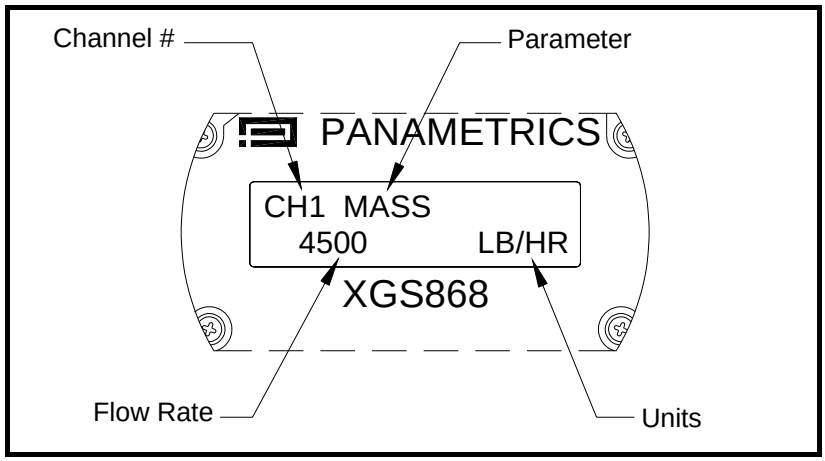


Figure 3-1: A Typical LCD Flow Rate Display

As shown in Figure 3-1 above, the display screen includes the following information:

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

!WARNING!
If a unit equipped with an optional LCD display board is being installed in a hazardous area, be sure to adjust the backlight brightness and display contrast before mounting the electronics enclosure. See Chapter 2, *Displaying Data*, in the *Programming Manual* for details.

The example in Figure 3-1 above uses the default display settings. However, the first three items in the list above may be reprogrammed to display those parameters that are most frequently used. See the *Programming Manual* for instructions on changing these parameters.

Note: *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 XGS868.

The Optional RCCU Display

The components of the optional RCCU display are shown in Figure 3-2 below, along with a typical mass flow rate readout.

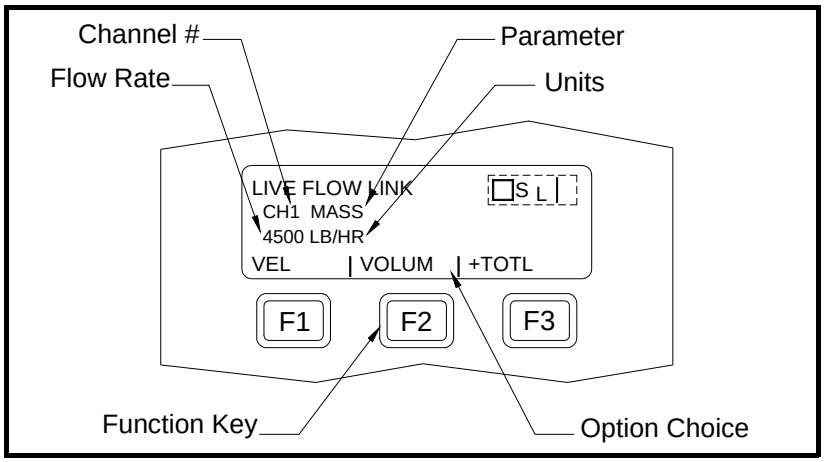


Figure 3-2: A Typical RCCU Flow Rate Display

As shown in Figure 3-2 above, the display screen includes the following information:

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

The example in Figure 3-2 above is typical, but the first three items in the list above may be reprogrammed to display those parameters that are most frequently used. See the *Programming Manual* for detailed instructions on changing these parameters.

Note: *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 on the next page.

Taking Measurements

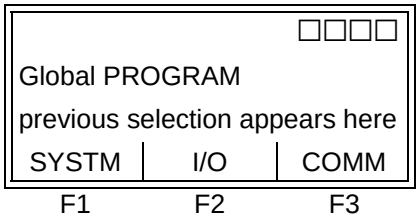
The Model XGS868 is capable of displaying several different variables in a variety of formats. However, this manual only discusses the basic measurement displays using the LCD and the RCCU. Refer to Chapter 2, *Displaying Data*, in the *Programming Manual* for instructions on setting up alternate choices. Also, refer to the *Programming Manual* and/or the *IDM User's Manual* (910-185) to use IDM or the analog outputs to obtain flow rate data.

The LCD Display

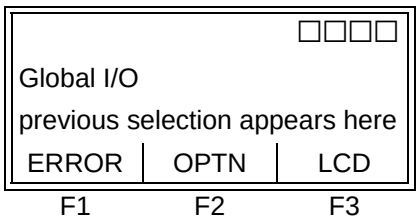
To use the optional LCD display for obtaining live data, simply power on the XGS868 as described earlier in this chapter. Then, read the flow rate directly from the display (see Figure 3-1 on page 3-3).

If the LCD shows only the XGS868 identification screen upon power up, the data display must be initialized. Use the Remote Control Communications Unit (RCCU) to establish communications with the XGS868 and enter the GLOBL menu, as described in Chapter 2. Then, refer to Figure 3-3 on page 3-6 and complete the following steps:

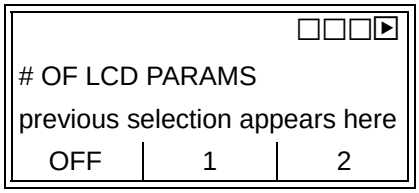
Note: *To perform this task with the optional IDM software, refer to the* Instrument Data Manager User's Manual *(910-185).*



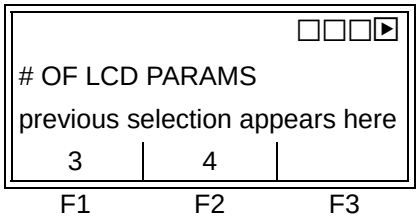
Press [F2] to select I/O.



Press [F3] to select LCD.



Press the [Fx] key under the desired number of parameters to be sequentially displayed.



(These additional options are accessed by pressing the [◃] and/or [▹] keys.)

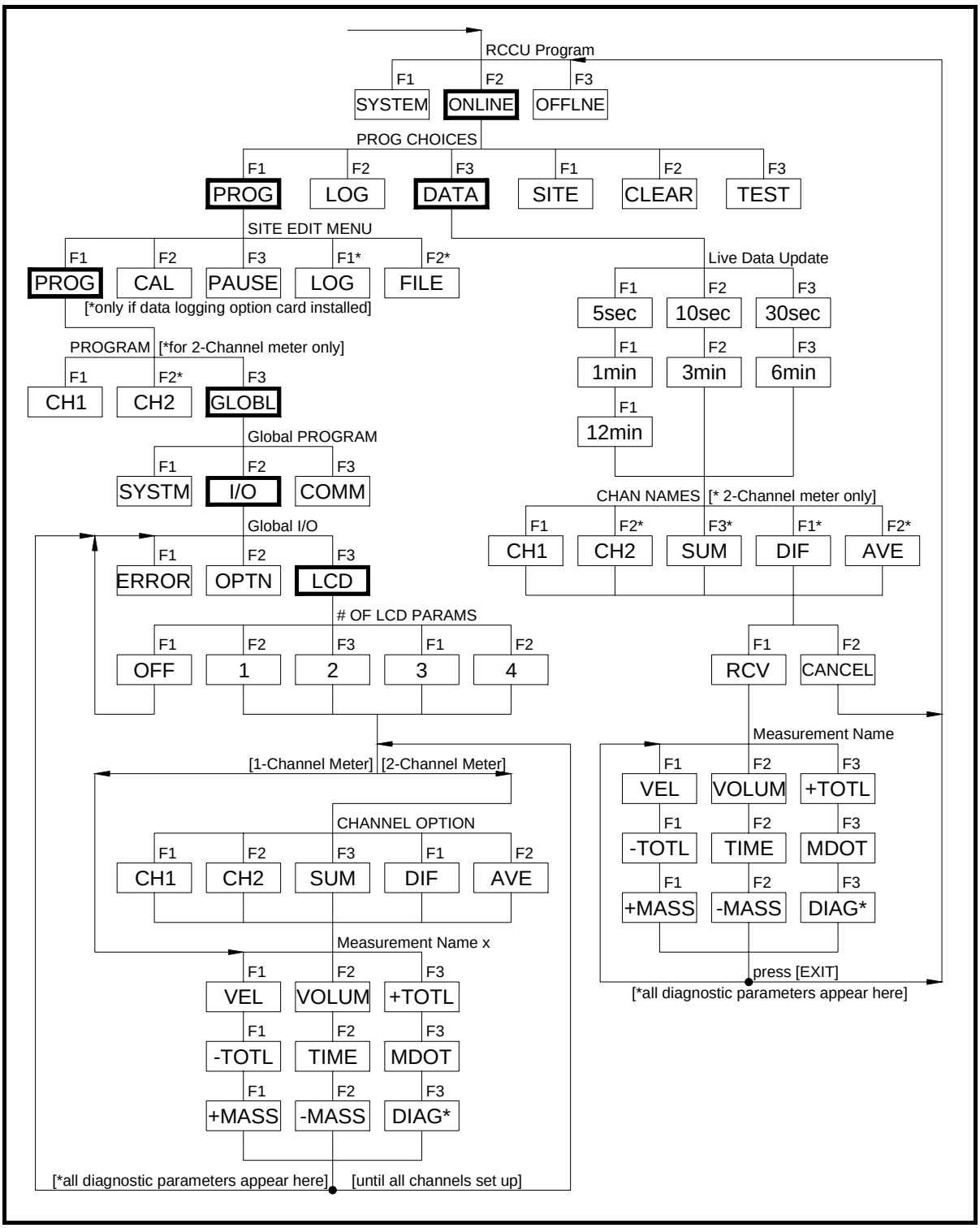
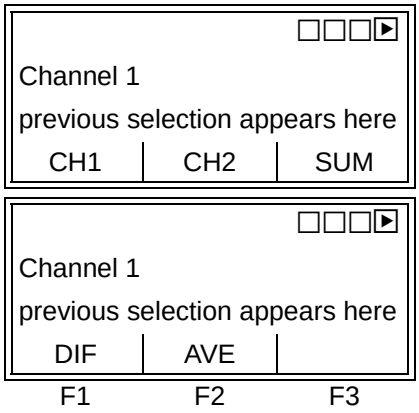


Figure 3-3: Data Display Menu Map

The LCD Display (cont.)

Note: *The XGS868 refers to the parameters specified for display as* 1st channel, 2nd channel, 3rd channel *and* 4th channel. *If* OFF *is selected, the meter returns to the* Global I/O *prompt.*

For a 1-Channel XGS868, the following prompt does not appear; proceed directly to the next page. However, for a 2-Channel meter, the channel option to be used for the display of each parameter must be specified as follows:



Press the [Fx] key under the desired channel option to select it.

(These additional options are accessed by pressing the [◃] and/or [▹] keys.)

IMPORTANT: *Both channels must be activated (see Chapter 2,* Initial Setup*) to make all of the above channel options available. If one of the channels is disabled, only the individual active channel appears.*

See Table 3-1 below for descriptions of the available channel options.

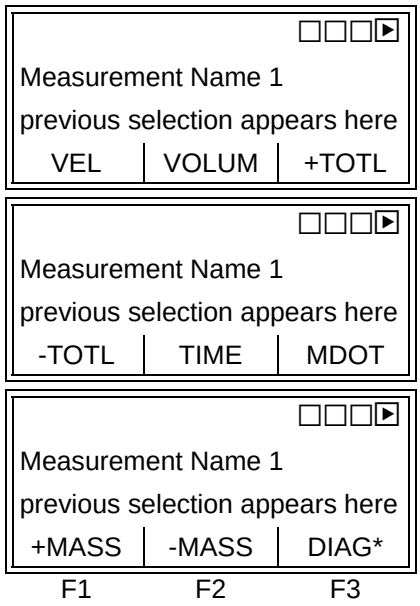
Table 3-1: Channel Options

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

Proceed to the next page to continue setting up the LCD.

The LCD Display (cont.)

The flow parameter to be displayed may now be selected as follows:



Use the [◃] and [▹] keys to find the desired flow parameter, and press the [Fx] key under it to select it.

(These additional options are accessed by pressing the [◃] and/or [▹] keys.)

(These additional options are accessed by pressing the [◃] and/or [▹] keys.)

Table 3-2 below describes the display parameters that are available at the previous prompt

Table 3-2: Display Parameter Options

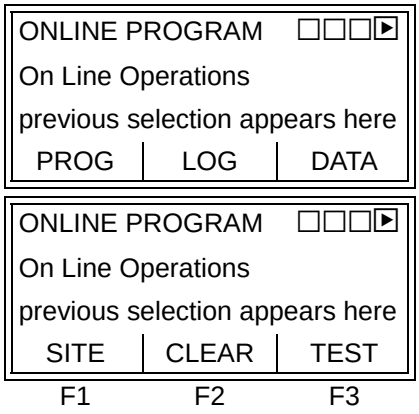
Available Choice	Description
[F1] = VEL	Flow Velocity
[F2] = VOLUM	Volumetric Flow
[F3] = +TOTL	Forward Totalized Volume Flow
[▹] + [F1] = -TOTL	Reverse Totalized Volume Flow
[▹] + [F2] = TIME	Total Flow Measurement Time
[▹][→] + [F3] = MDOT	Mass Flow
[▹] + [▹] + [F1] = +MASS	Forward Totalized Mass Flow
[▹] + [▹] + [F2] = -MASS	Reverse Totalized Mass Flow
[▹] + [▹] + [F3] = DIAG*	Diagnostic Parameters*
The DIAG* option represents all of the individual diagnostic parameters. See Chapter 3, *Diagnostics*, of the *Service Manual* for a complete description of these options.	

The two previous prompts repeat until all of the specified # OF LCD PARAMS are set up. Then, the meter returns to the Global I/O prompt. To leave the *User Program*, press the [EXIT] key three times. After the XGS868 resets, all of the specified parameters are displayed on the LCD in sequence, with a pause of several seconds between the display of each parameter.

The RCCU Display

Flow rate data and diagnostic parameters may be displayed on the optional Remote Control Communications Unit (RCCU) screen. To access and program this display, establish a link between the Remote Control Communications Unit (RCCU) and the XGS868, and enter the ONLINE program (see Chapter 2, *Initial Setup*). Then, refer to Figure 3-3 on page 3-6 and complete the following instructions to display the desired data:

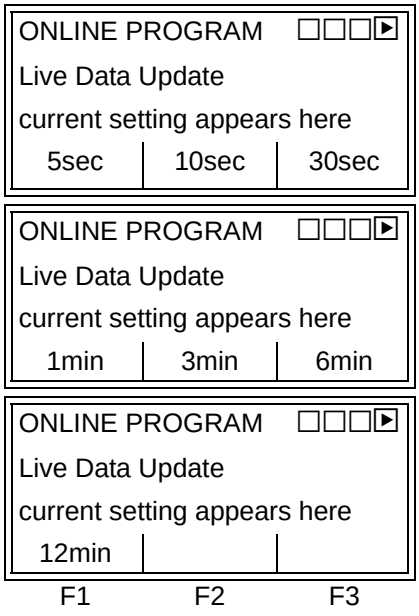
Note: *See Chapter 2,* Initial Setup*, in this manual and/or Chapter 1,* Programming Site Data*, in the* Programming Manual *for complete instructions on using the RCCU.*



Press the [F3] key to select DATA.

(These additional options are accessed by pressing the [◁] and/or [▷] keys.)

Upon entering the ONLINE-DATA submenu, the following display appears:



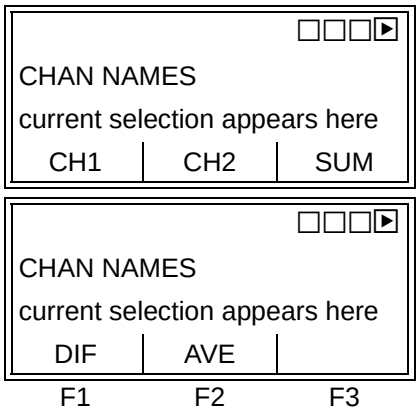
Use the [◁] and [▷] keys to find the desired time between data updates, and press the [Fx] key under it to select that interval.

(These additional options are accessed by pressing the [◁] and/or [▷] keys.)

(These additional options are accessed by pressing the [◁] and/or [▷] keys.)

The RCCU Display (cont.)

Note: *For a 1-Channel XGS868, only the* CH1 *option in the* [F1] *position appears at the next prompt.*



Use the [◁] and [▷] keys to find the desired channel option, and press the [Fx] key under it to select it.

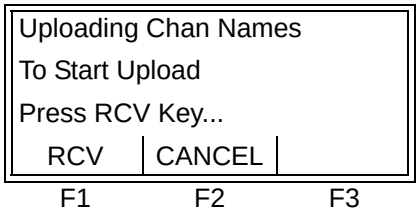
(These additional options are accessed by pressing the [◁] and/or [▷] keys.)

IMPORTANT: *Both channels must be activated (see Chapter 2,* Initial Setup*) to make all of the above channel options available. If one of the channels is disabled, only the individual active channel appears.*

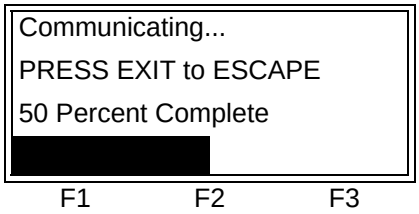
See Table 3-3 below for a complete description of the channel display options available at the above prompt.

Table 3-3: Channel Display Options

Display Type	Description
[F1] = CH1	Channel 1
[F2] = CH2	Channel 2
[F3] = SUM	(Channel 1) + (Channel 2)
[▷] + [F1] = DIF	(Channel 1) - (Channel 2)
[▷] + [F2] = AVE	[(Channel 1) + (Channel 2)]/2



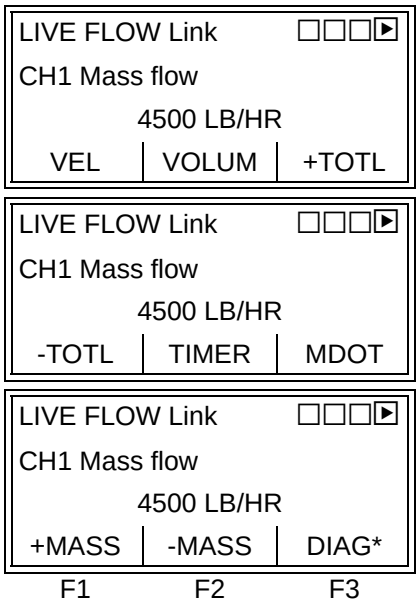
Press the [F1] key to select RCV and begin uploading live data, or press [F2] to select CANCEL and abort the operation.



This display shows the status of the communication attempt.

The RCCU Display (cont.)

After the previous response has been communicated to the XGS868, the RCCU is connected to the meter by a *Live Flow Link* and displays the current flow rate value for the channel option specified. At this time, the flow parameter to be displayed may be changed as follows:



Use the [◃] and [▹] keys to find the desired flow parameter, and press the [Fx] key to select it.

(These additional options are accessed by pressing the [◃] and/or [▹] keys.)

(These additional options are accessed by pressing the [◃] and/or [▹] keys.)

Table 3-4 below describes the measurement parameters that are available at the above prompt.

Table 3-4: Display Parameter Options

Available Choice	Description
[F1] = VEL	Flow Velocity
[F2] = VOLUM	Volumetric Flow
[F3] = +TOTL	Forward Totalized Volume Flow
[▹] + [F1] = -TOTL	Reverse Totalized Volume Flow
[▹] + [F2] = TIME	Total Flow Measurement Time
[▹][→] + [F3] = MDOT	Mass Flow
[▹] + [▹] + [F1] = +MASS	Forward Totalized Mass Flow
[▹] + [▹] + [F2] = -MASS	Reverse Totalized Mass Flow
[▹] + [▹] + [F3] = DIAG*	Diagnostic Parameters*
The DIAG* option represents all of the individual diagnostic parameters. See Chapter 3, *Diagnostics*, of the *Service Manual* for a complete description of these options.	

Note: *To terminate the live data connection between the XGS868 and the RCCU, simple press the* [EXIT] *key on the RCCU keypad, between actual data transmissions.*

What Next?

This *Startup Guide* is intended to provide only those instructions necessary to get the XGS868 installed and operating. By following the instructions in this chapter, the Model XGS868 can be set up to display the desired channel option and the desired measurement parameter, using either the LCD display or the RCCU.

To utilize the more advanced capabilities of the Model XGS868, refer to the *Programming Manual* and/or the *Service Manual* for the instrument. Also, refer to the *IDM User's Manual* (910-185) for instructions on using the IDM software with the XGS868.

Chapter 4

Specifications

General Specifications

The general specifications for the Model XGS868 flow transmitter are as follows:

Hardware Configuration

Package Options:

Epoxy-coated aluminum (standard): NEMA 7/4X
Explosion-Proof Class 1, Div. 1, Groups C, D
Flameproof EExd IIC T6

Stainless steel (optional): same ratings as above

Physical:

Size: 8.2 in. long x 6.6 in. diameter (208 x 168 mm)

Weight: Al = 10 lb (4.5 kg), SS = 30 lb (13.6 kg)

Environmental

Operating Temperature:

-40° to 140°F (–40° to 60°C)

Storage Temperature:

-67° to 167°F (–55° to 75°C)

Velocity Accuracy

% of Reading:

±1% of reading at ± 3 to ± 150 ft/s (± 0.9 to ± 46 m/s)

Note: *Accuracy depends on pipe size and other factors, such as 1-path or 2-path measurement.*

Velocity Range

Bidirectional:

–150 to –0.1 ft/s (–46 to –0.03 m/s)

0.1 to 150 ft/s (0.03 to 46 m/s)

Rangeability

1500:1

Repeatability

±0.2 to ±0.5% at 1 to 150 ft/s (0.3 to 46 m/s)

Note: *Specifications assume a fully developed flow profile, with a straight run of pipe 20 diameters upstream and 10 diameters downstream.*

Electrical Specifications

The electrical specifications for the Model XGS868 flow transmitter are as follows:

Power Supply

Input Options:

110 to 130 VAC ±10%, 50/60 Hz with 0.25 A Slo-Blo Fuse

200 to 240 VAC ±10%, 50/60 Hz with 0.25 A Slo-Blo Fuse

12 to 28 VDC ±5%, with 2.0 A Slo-Blo Fuse

Power Consumption

20 W maximum

Operating Mode

Correlation Transit-Time™ flow measurement

European Compliance

This unit complies with EMC Directive 89/336/EEC and 73/23/EEC Low Voltage Directive (Installation Category II, Pollution Degree II).

Input/Output Specifications

Digital Display:

Optional 2-line x 16-character, software-configurable, LCD display with LED backlight

Digital Communications:

Standard: RS232 serial port for PC, Terminal or Printer

Optional: RS485 serial port for multi-user network

Analog Outputs (built-in):

Two isolated 0/4–20 mA analog outputs, 600 Ω maximum load

Option Cards:

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

1. *Analog Inputs:* two or four isolated 0/4-20 mA inputs, 24-V loop power.
2. *RTD Inputs:* two or four isolated 3-wire RTD inputs; Span –148° to 662°F (–100° to 350°C)

   Inputs of the following types may be used:

   Input A: Temp from –40° to 500°F (–40° to 260°C)

   Input B: Pressure from 0–3,000 psig

   Input C: Steam quality from 0.0 to 1.0

Input/Output Specifications (cont.)

Option Cards (cont.):

3. *Analog Outputs:* two isolated 0/4–20 mA analog outputs, 1000 Ω maximum load

4. *Data Logging:* 512 kB (expandable to 2 MB) of memory, includes industry-standard PCMCIA card connector

5. *Totalizer/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.

   Hermetically Sealed: 120 VAC, 28 VDC max., 2 A max., DC = 56 W max., AC = 60 VA max.

Note: *The above optional inputs/outputs are available only in specific combinations. Consult Panametrics or see Table B-1 on page B-1 for details.*

Infrared Communications Link:

Hand-held, battery powered (9 V) remote control communications unit (RCCU)

Preamplifier

Inline preamplifier for long cable lengths or attenuating installations, operating temperature –40° to 140°F (–40° to 60°C)

Flow Transducer Specifications

The ultrasonic flow transducer specifications for the Model XGS868 flow transmitter are as follows:

Type

Standard: T9
Optional: BWT™ System

Temperature Range

Standard: –40° to 400°F (–40° to 205°C)
Optional: –310° to 932°F (–190° to 500°C)

Pressure Range

Standard: 0-250 psig (0.1013-1.824 MPa), 750 psig (5.272 MPa) test
Optional: 3,480 psig (240 barg)

Materials

Standard: all metal, titanium
Optional: Monel, Hastalloy, and 316 stainless steel

Physical

Cable Type and Length:

Standard: RG62 a/U coaxial, up to 3 ft (1 m)

Optional: RG62 a/U coaxial, up to 1,000 ft (300 m)

Housing Options:

Explosion-proof (Class 1, Div. 1, Groups C & D)

Flameproof (INIEX/ISSeP certified for EEx d II C T4 & T6)

Weatherproof (NEMA 4X, IP65)

Flowcell Specifications

The flowcell specifications for the Model XGS868 flow transmitter are as follows:

Process Connections

Spoolpiece:

Flanged (typical), threaded (optional)

Transducer Insertion Method:

Cold Tap

Transducer Connection:

1 in. NPTM

Pipe Size & Materials

Outside Diameter (OD):

2 to 48 in. NB ANSI (50 to 1,200 mm NB)

Appendix A

CE Mark Compliance

Introduction

For CE Mark compliance, the Model XGS868 flow transmitter must be wired in accordance with the instructions in this appendix.

IMPORTANT: *CE Mark compliance is required only for units intended for use in EEC countries.*

Wiring

The Model XGS868 must be wired with the recommended cable, and all connections must be properly shielded and grounded. Refer to Table A-1 below for the specific requirements.

Table A-1: Wiring Modifications

Connection	Cable Type	Termination Modification
Transducer	RG62 a/U	Add metallic cable clamp from braid to chassis ground.
	Armored RG62 a/U or conduit	None - grounded via cable gland.
Input/Output	22 AWG shielded (e.g. Baystate #78-1197)	Terminate shield to chassis ground.
	Armored conduit	None - grounded via cable gland.
Power	14 AWG, 3 conductor, shielded (e.g. Belden #19364)	None required
	Armored Conduit	None - grounded via cable gland.

Note: *If the Model XGS868 is wired as described in this appendix, the unit will comply with the EMC Directive 89/336/EEC.*

Appendix B

Data Records

Available Option Cards

The Model XGS868 can hold one option card in Slot 1 and one in Slot 2. The available configurations are listed in Table B-1 below.

Table B-1: Option Card Configurations

Card #	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
1215-08		HH - 4 Hermetic Alarms
1215-09		FA - 2 Frequency Outputs/2 Standard Alarms
1215-10		FH - 2 Frequency Outputs/2 Hermetic Alarms
1215-11		TA - 2 Totalizer Outputs/2 Standard Alarms
1215-12		TH - 2 Totalizer Outputs/2 Hermetic Alarms
1223-02		OI - 2 Current Inputs
1223-03		OR - 2 RTD Inputs
1223-04		TI - 2 Current Inputs/2 Totalizer Outputs
1223-05		TR - 2 RTD Inputs/2 Totalizer Outputs
1223-06		FI - 2 Current Inputs/2 Frequency Outputs
1223-07		FR - 2 RTD Inputs/2 Frequency Outputs
1223-08		AI - 2 Current Inputs/2 Standard Alarms
1223-09		HI - 2 Current Inputs/2 Hermetic Alarms
1223-10		AR - 2 RTD Inputs/2 Standard Alarms
1223-11		HR - 2 RTD Inputs/2 Hermetic 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
1225-17		CH - 2 Current Outputs/2 Hermetic Alarms
1233-02		RR - 4 RTD Inputs
1233-03		IR - 2 RTD Inputs/2 Current Inputs
1233-04		II - 4 Current Inputs
1272-02		CI - 2 Current Outputs/2 Current Inputs
1272-03		CR - 2 Current Outputs/2 RTD Inputs
1272-04		CIR - 2 Current Outputs/1 Current Input/1 RTD Input
1146-02	2	512 KB Memory + PCMCIA Card Connector
1146-03		2 MB Memory + PCMCIA Card Connector
1310		Modbus Communications Protocols

Option Cards Installed

Whenever an option card is installed or changed in the Model XGS868 flow transmitter, record the type of card and any additional setup information in the appropriate row of Table B-2 below.

Table B-2: Option Cards Installed

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

Initial Setup Data

After the Model XGS868 flow transmitter has been installed, some initial setup data must be entered via the *User Program* prior to operation. Record that information in Table B-3 below.

Table B-3: Initial Setup Data

General Information					
Model #			Serial #		
Software Vers.			Setup Date		
Global System Parameters - *GLOBL/SYSTM (1-Channel Meter)*					
System Units	English	Metric			
Global System Parameters - *GLOBL/SYSTM (2-Channel Meter)*					
System Units	English	Metric	Mass Flow		
Vol. Units			Mass Flow Time		
Vol. Time Units			MDOT Dec. Dig.		
Vol. Dec. Digits			Mass Totalizer		
Totalizer Units			Mass Dec. Dig.		
Tot. Dec. Digits					
Measurement Method - *ACTIV (1-Channel meter)*					
Site Status	Burst		Measure Mode	Skan	S/M
Measurement Method - *ACTIV (2-Channel meter)*					
Channel 1			Channel 2		
Channel Status	Off	Burst	Channel Status	Off	Burst
Measure Mode	Skan	S/M	Measure Mode	Skan	S/M
Channel System Parameters - *CHx/SYSTM*					
Channel 1			Channel 2 (if applicable)		
Channel Label			Channel Label		
Site/Channel Msg.			Channel Message		
Metrc Press. Units	bar	kPa	Metrc Press. Units	bar	kPa
Gas Equation	Standard	Actual	Gas Equation	Standard	Actual
Vol. Units			Vol. Units		
Vol. Time Units			Vol. Time Units		
Vol. Dec. Digits			Vol. Dec. Digits		
Totalizer Units			Totalizer Units		
Tot. Dec. Digits			Tot. Dec. Digits		
Mass Flow			Mass Flow		
Mass Flow Time			Mass Flow Time		
MDOT Dec. Dig.			MDOT Dec. Dig.		
Mass Totalizer			Mass Totalizer		
Mass Dec. Dig.			Mass Dec. Dig.		

Table B-3: Initial Setup Data (cont.)

Pipe/Transducer Parameters - *PIPE*					
Channel 1			Channel 2 (if applicable)		
Trans. Type	STD	SPEC	Trans. Type	STD	SPEC
Transducer #			Transducer #		
Spec. Trans. Hz			Spec. Trans. Hz		
Spec. Trans. Tw			Spec. Trans. Tw		
Pipe O.D.			Pipe O.D.		
Pipe Wall			Pipe Wall		
Path Length (P)			Path Length (P)		
Axial Length (L)			Axial Length (L)		
Fluid Type	Steam	Other	Fluid Type	Steam	Other
Other/Sndspd			Other/Sndspd		
Mass Flow	No	Yes	Mass Flow	No	Yes
Fluid Density			Fluid Density		
Multi K-factors	Off	On	Multi K-factors	Off	On
Edit Table	No	Yes	Edit Table	No	Yes
K-factor Table			**K-factor Table**		
K-Factor #	Velocity	K-Factor	K Factor #	Velocity	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		
14			14		
15			15		
16			16		
17			17		
18			18		
19			19		
20			20		
Cal. Factor			Cal. Factor		

Appendix C

Measuring P and L Dimensions

Introduction

When programming the PIPE menu in the Model XGS868's *User Program*, the *path length* (P) and the *axial dimension* (L) must be entered. These parameters are determined by measurements on the actual transducer installation, with P equal to the face-to-face distance between the transducers and L equal to the axial distance between the centers of the transducer faces.

The accuracy of the programmed P and L values is critical to precise flow rate measurements. If Panametrics supplies the flowcell for the system, the correct values will be included in the documentation supplied with the system. For transducers installed on an existing pipe (see Figure C-1 on page C-2), P and L must be measured at the site. This appendix provides instructions for properly determining these dimensions.

Measuring P and L

Whenever possible, physically measure the face-to-face distance (P) and the axial distance (L) between the centers of the flat faces of the transducers. Refer to Figure C-1 on page C-2 for an illustration of the proper distances to measure, in a typical installation.

In some situations only one of the required distances can be directly measured. When this happens, a knowledge of the installation angle (θ) of the transducers, permits the second distance to be calculated from Equation C-1 below:

$$\cos\theta = \frac{L}{P} \qquad \text{(C-1)}$$

As an example, assume that the transducer installation angle is known to be 45° and the L distance is measured to be 10.00 inches. Then, the P distance is calculated to be P = 10.00/0.707 = 14.14 inches.

With a Bias 90° transducer installation, it sometimes happens that the only known parameters are the transducer angle (θ) and the centerline distance between the transducer bodies (CL). In these cases, it is still possible to calculate P and L by combining Equation C-1 above with the additional Equation C-2 below (see Figure C-1 on page C-2):

$$P = CL - 1.2 \qquad \text{(C-2)}$$

Standard Panametrics 90° transducers have the face offset from the centerline of the body by 0.6 inches. Thus, a pair of transducers has a total offset of 1.2 inches, as indicated in Equation C-2 above. For example, suppose that the transducer installation angle is 30° and CL is measured to be 12.00 inches. Then, P = 12.00 – 1.2 = 11.80 inches and L = 11.80 x 0.866 = 10.93 inches.

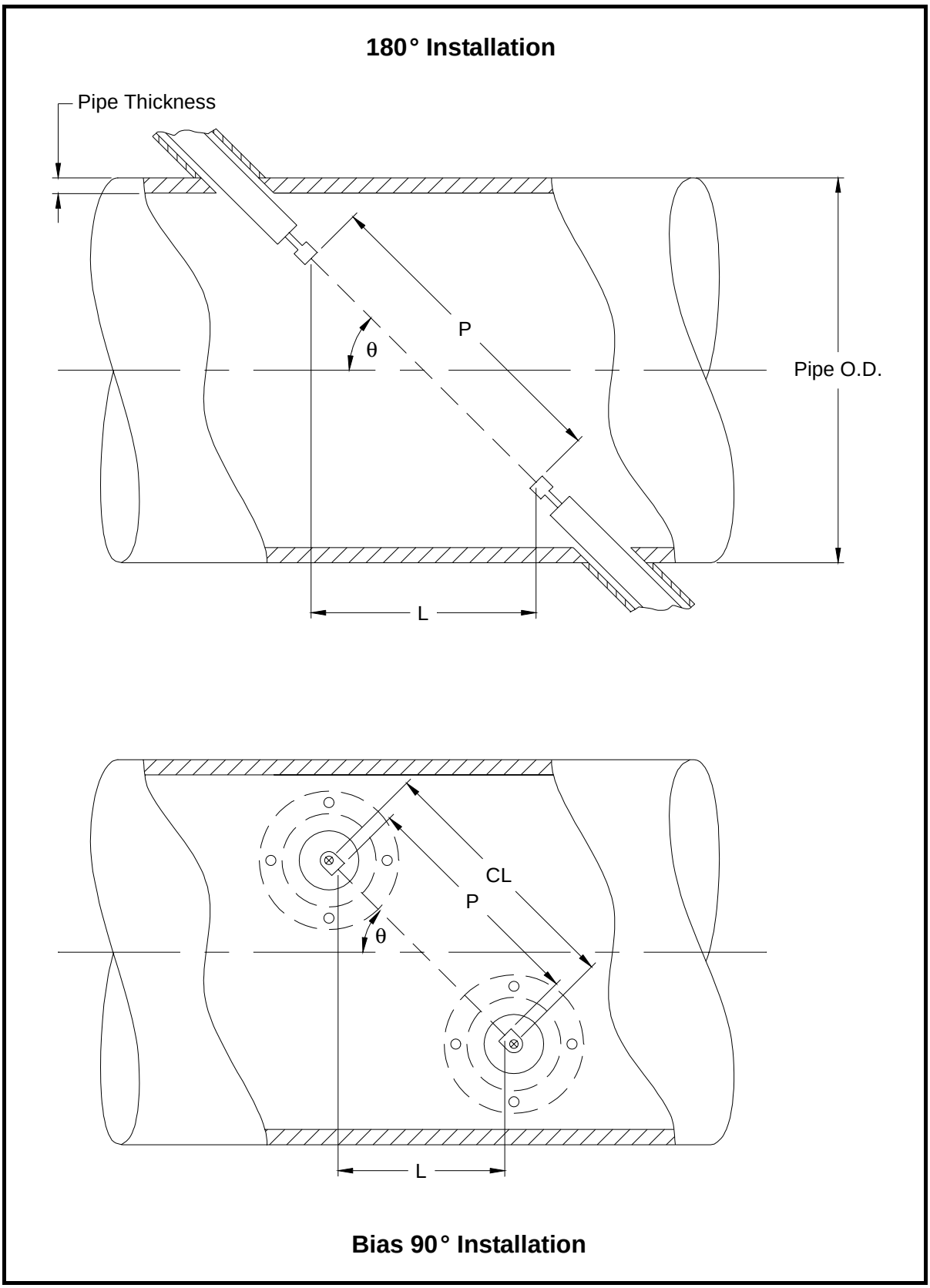


Figure C-1: Top View of Typical Transducer Installations

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P (cont.)

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V

W

DECLARATION OF CONFORMITY

PANAMETRICS

We Panametrics Limited

(supplier's name)

Shannon Industrial Estate, Shannon, Co. Clare, Ireland

(supplier's address)

declare under our sole responsibility that the product

Model XGS868 Steam Ultrasonic Flow Transmitter

(name, type or model)

to which this declaration relates is in conformity with the following standards:

- EN 61326: 1998
- EN 61010-1: 1995

following the provisions of 89/336/EEC EMC Directive and 73/23/EEC Low Voltage Directive

Shannon: November 2, 2000

(place and date of issue)

(name and signature or equivalent marking of authorized person)

Mr. James Gibson
GENERAL MANAGER

CE

I.S. EN ISO 9002
Shannon

ISO 9001
U.S.

DECLARATION DE CONFORMITE

PANAMETRICS

Nous Panametrics Limited

(Nom du Fournisseur)

Shannon Industrial Estate, Shannon, Co. Clare, Ireland

(Adresse)

déclarons, sous notre propre responsabilité, que le produit

Model XGS868 Steam Ultrasonic Flow Transmitter

(Nom, type et modèle)

relatif à cette déclaration est en conformité avec les documents suivants:

- EN 61326: 1998
- EN 61010-1: 1995

suivant, en celà, les règles de la Directive CEM 89/336/EEC et de la Directive Basse Tension DBT 73/23/EEC.

Shannon: November 2, 2000

(lieu et date)

(Nom et signature ou cachet de la personne autorisée)

Mr. James Gibson
GENERAL MANAGER

CE

I.S. EN ISO 9002
Shannon

ISO 9001
U.S.

KONFORMITÄTSERKLÄRUNG

PANAMETRICS

Wir, Panametrics Limited

(Name des Lieferanten)

Shannon Industrial Estate, Shannon, Co. Clare, Ireland

(Anschrift)

erklären in alleiniger Verantwortung, daß das Produkt

Model XGS868 Steam Ultrasonic Flow Transmitter

(Name, Typ oder Modell)

folgende Normen erfüllt:

- EN 61326: 1998
- EN 61010-1: 1995

gemäß den Europäischen Richtlinien, Niederspannungsrichtlinie Nr.: 73/23/EWG und EMV-Richtlinie Nr.: 89/336/EWG.

Shannon: November 2, 2000

(Ort und Datum der Ausstellung)

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