

TOTALFLOW[®]

XFC6200/6201EX

**Flow Computer
User's Manual**

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Inquiries regarding this manual should be addressed to ABB, Inc., Totalflow Products, Technical Communications, 7051 Industrial Blvd., Bartlesville, Oklahoma 74006, U.S.A.

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Introduction

About the Manual

This manual is written to provide an experienced flow meter technician with the requirements necessary to install, setup and operate the XFC6200EX Totalflow Flow Computer System.

Organization & Style Each of the chapters in this manual presents information in an organized and concise manner. Readers are able to look at the headings and get a broad picture of the content without reading every word. Also, there are overviews at the beginning of each chapter that provides you with an idea of what is in the chapter, and how it fits into the overall manual.

Highlights This manual provides the following information:

Chapter	Description
1) System Description	Provides a description of the Totalflow XFC-EX system components, specifications, and description of flow computer computation methods.
2) Installation	Includes unpacking and detailed procedures for setup and installation.
3) XFC6200EX Operation	Provides you with a tutorial on how to get a newly installed XFC6200EX system up and running.
4) Maintenance	Provides instructions on how to remove and replace major modules and general maintenance techniques.
5) Troubleshooting	Provides instructions on front panel error messages and provides a troubleshooting chart on how to correct common problems.
6) Definitions & Acronyms	Provides quick access to the majority of terms and acronyms, as well as their definitions.
7) Data Sheet & Drawings	Provides a place to put product data sheets and drawings that accompany a unit.

Getting Help

At Totalflow, we take pride in the on going support we provide our customers. When you purchase a product, you receive documentation which should answer your questions; however, your Totalflow technical support provides you an 800 number as an added source of information.

If you require assistance, call:






USA: (800) 442-3097 or International: 001-918-338-4880

Before You Call

- Know your Totalflow's serial number. Serial numbers can be found on the escutcheon plate located on the top of each unit.
- Be prepared to give the customer service representative a detailed description of the problem.
- Note any alarms or messages as they appear on the PCCU or front panel LCD.
- Prepare a written description of problem.
- Know your software version, board and TRANSDUCER part numbers.

Key Symbols

The following symbols are used frequently in the manual. These are intended to catch your eye and draw your attention to important information.

- FYI**  Intended to draw your attention to useful information or to clarify a statement made earlier.
- TIP**  Intended to draw your attention to a fact that may be useful or helpful in understanding a concept.
- ACCESS**  Intended to draw your attention to information regarding security access to equipment and Software Security features.
- WARNING**  Intended to draw your attention to a statement regarding the likelihood of personal injury or fatality that could result from improper access or techniques used while working in hazardous locations. Please refer to the "Safety Practices and Precaution" section for additional information.
- CAUTION**  Intended to draw your attention to a statement that might keep you from making a mistake, keep you from destroying equipment or parts, or keep you from creating a situation that could cause personal injury if caution is not used. Please refer to the "Safety Practices and Precaution" section for additional information.

Safety Practices and Precautions

This manual contains information and warnings which have to be followed by the user to ensure safe operation and to retain the product in a safe condition. Installation, maintenance and repairs should only be performed by a trained and qualified technician. Please refer to Certification Drawings shipped with this unit for specific guidelines.


Safety Guidelines DO NOT open the equipment to perform any adjustments, measurements, maintenance, parts replacement or repairs until all external power supplies have been disconnected.

Only a properly trained technician should work on any equipment with power still applied.


When opening covers or removing parts, exercise extreme care "live parts or connections can be exposed".

Capacitors in the equipment can still be charged even after the unit has been disconnected from all power supplies.

Safety First Various statements in this manual identified as conditions or practices that could result in equipment damage, personal injury or loss of life will be highlighted using the following Icons.

CAUTION  Exercise caution while performing this task. Carelessness could result in damage to the equipment, other property and personal injury.


Stop. Do not proceed without first verifying that a hazardous condition does not exist. This task may not be undertaken until proper protection has been accomplished, or the hazardous condition has been removed. Personal injury or fatality could result. Examples of these warnings include:

- WARNING** 
- Removal of enclosure cover(s) in a hazardous location must follow guidelines stipulated in the Certification Drawings shipped with this unit.
 - If unit is to be installed in a hazardous location, technician must follow the guidelines stipulated in the Certification Drawings shipped with this unit and adhere to local codes.
 - Access to unit via PCCU cable in a hazardous location must follow guidelines stipulated in the Certification Drawings shipped with this unit.

Connecting or disconnecting equipment in a hazardous location for installation or maintenance of electric components must follow guidelines stipulated in the Certification Drawings shipped with this unit.

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Safety Practices and Precautions, Cont.

Safety First, Cont.	<p>DANGER indicates a personal injury hazard immediately accessible as one reads the markings.</p> <p>CAUTION indicates a personal injury hazard not immediately accessible as one reads the markings, or a hazard to property, including the equipment itself.</p>
Equipment Markings	 Protective ground (earth) terminal
Grounding the Product	<p>If a grounding conductor is required, it should be connected to the grounding terminal before any other connections are made.</p>
Danger From Loss of Ground	<p>A grounding conductor may or may not be required depending on the hazardous classification. If required, any interruption of the grounding conductor inside or outside the equipment or loose connection of the grounding conductor can result in a dangerous unit. Intentional interruption of the grounding conductor is not permitted.</p> <p>If it is determined that the equipment cannot be operated safely, it should be taken out of operation and secured against unintentional use.</p>
Operating Voltage	<p>Before switching on the power, check that the operating voltage listed on the equipment agrees with the power being connected to the equipment.</p>
Safe Equipment	<p>Fuses used on the XFC6200EX termination board is surface mount and field repair should not be attempted. Most fuses automatically reset themselves, but if a known problem exists, the termination board should be sent in for repair or replacement.</p>

Chapter 1

System Description

Overview

This Chapter introduces you to the Totalflow® XSeries 6200EX (XFC6200EX) and 6201EX (XFC6201EX) Flow Computers. These computers are low power, microprocessor based units designed to meet a wide range of measurement, control, monitor and alarming applications for remote gas systems located in Div 1 hazardous areas.

This “little” explosion proof flow computer, designated by the EX following the model number, is based on the XSeries technology. It includes many of the cutting edge features of the XSeries family, but with an emphasis on being a cost effective solution for Div 1 classification areas.

See Table 1–1 for the XFC Family Genealogy which highlights the main differences between the members.

Highlights

In this chapter you will learn about:

Topic	See Page
Functions of the XFC6200EX	1-3
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Overview, Cont.

Table 1–1 XFC Family Genealogy

XFC Model	Div Class	Multi Tube	Orifice Meter	Pulse Meter	Battery Charger	Max. Battery Capacity	Communication Equipment	Max. TFIO Modules
6200EX	1		•		External	External	External	External
6201EX	1			•	External	External	External	External
6410	2	•	•		On Board	26AH	External	N/A
6411	2	•		•	On Board	26AH	External	N/A
6413	2	•	•		On Board	26AH	Internal	3
6414	2	•		•	On Board	26AH	Internal	3
6713	2	•	•		On Board	42AH	Internal	6
6714	2	•		•	On Board	42AH	Internal	6

Capabilities

Models XFC6200EX and XFC6201EX are packaged in a small explosion proof cast aluminum enclosure which accommodates the EX Processor Board, Termination Board and Display. The power supply, charging source, and radio communication applications must be housed in separate accommodations. See Totalflow's 6270 OEU (Figure 1–1).

In the XFC6200EX model, the Integral Multivariable Transducer (EXIMV) is a separate unit with no internal electronics and is attached to the bottom of the enclosure via a threaded neck which contains the wiring for connection to the electronics located in the enclosure. The transducer is factory sealed and is not field repairable. Because the characterization files are stored on the main electronics board, when returning the transducer, the main electronics board must also be returned.

The XFC6200EX defaults to retention of daily and log period records for 40 days and retention of 200 events. These defaults can be extended, limited only by the file storage space on the device.

This model may be used in conjunction with the handheld FS/2 and/or a laptop computer running PCCU32 software. The FS/2 can do basic procedures, but PCCU32 is required for the initial setup and setup of the advanced features.

The XFC6200EX maintains a history of alarms as well as average differential pressure (DP), average static pressure (SP), average flowing temperature (Tf), accumulated volume, energy and an average extension.

The XFC6200EX can be programmed to calculate flow rates and volumes in accordance with either AGA 3, AGA-7 or ISO-5167.

Supercompressibility calculations can be performed in accordance with either NX-19 or AGA 8.

Continued on Next Page

Overview, Cont.

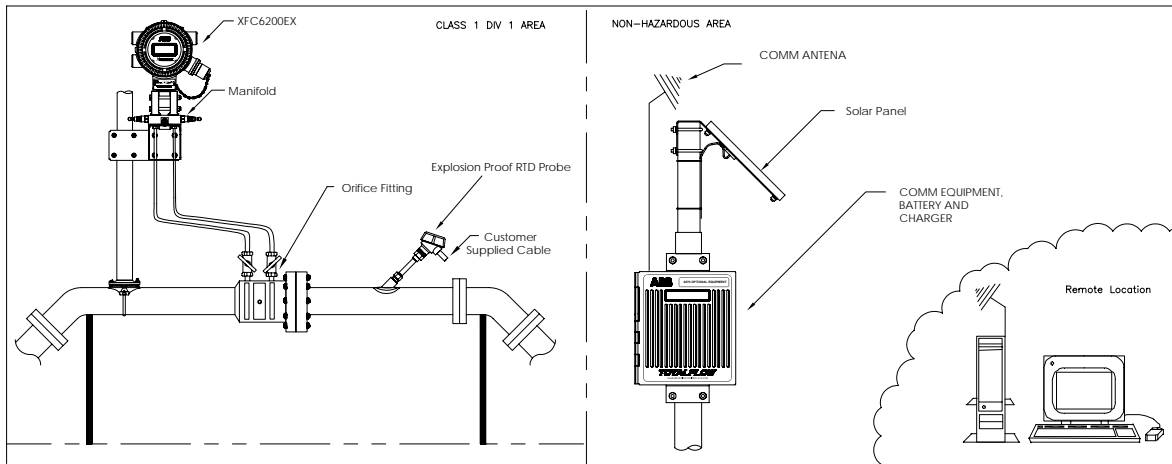


Figure 1-1 Typical XFC6200EX Installation

Functions of the XFC6200EX

Functions of the XFC6200EX reflect a design that is practical, straight-forward and efficient. The XFC6200EX is simple to use and easy to learn - and it saves time usually spent on calculations and report preparation. The XFC6200EX allows you to perform the following with minimum effort, maximum speed and greater accuracy.

Complete log period flow and operational records reported hourly (default) including:

- Average static pressure
- Average differential pressure
- Average flowing temperature
- Corrected volume total
- Corrected energy total
- Operating status and alarms

Continued on Next Page

Functions of the XFC6200EX, Cont.

Complete daily flow records including:

- Average static pressure
- Average differential pressure
- Average flowing temperature
- Average Extension
- Corrected volume total
- Corrected energy total
- Operating status and alarms

Complete daily operation statistics including:

- Percent flowing time
- Percent back flow time
- Percent out of limits (programmable) on SP, DP, Tf and Flow Rate
- Minimum and maximum values for SP, DP, Tf and Flow Rate

XFC6200EX Capabilities

The records and statistics generated are based on the following calculation methods of the XFC6200EX:

- Calculation of flow rates and volumes in accordance with AGA 3–85, AGA 3–92, AGA-7 or ISO-5167.
- Calculation of flow rates and volumes in accordance with AGA-8 92 Gross or Detail, or NX-19 Supercompressibility Standards.
- Calculation of flow extension $\sqrt{\frac{Dp^* Sp}{Tf}}$ once per second
- Extrapolation of flow accumulation during transducer calibration or calibration checks
- Selection of all coefficients for calculation; calculation of dynamic factors (dependent upon DP, SP and Tf) using averages based on one second samples.
- Sample set of most recent calculations allowing subsequent verification.
- Monitoring of the operational limits, minimums and maximums to insure detection and reporting of malfunctions or abnormal site conditions.
- Acceptance and storage of system constants from the PCCU or remote communications protocols.
- Storage of data records and operational events determined by user (based on available memory).

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Functions of the XFC6200EX, Cont.

Additional Features

Additional features of the Totalflow System's flexibility include the following:

- Programmable differential pressure zero cutoff.
- Programmable bi-level security codes to prevent unauthorized access to and configuration of the XFC6200EX.
- Automatic temperature compensation of measurement element.
- Automatic internal calibration of the RTD, with programmable bias adjustment.
- Quick, simple calibration procedures for TRANSDUCER with steps outlined.
- Real time clock providing a highly stable time base for the system
- Proper Battery and Solar sizing is determined by geographic location of unit and total power consumption of system. Totalflow Project Engineers can select the appropriate battery and solar requirements for your specific application. Larger capacity batteries are available to increase autonomy if needed (required).
- Three available power sources:
 - External solar panel (standard)
 - External AC or AC to DC power
 - External 24/12 VDC power
- LCD (liquid crystal display) programmable to allow monitoring of the XFC6200EX operations and can display any variable that has a Register (for example, displays current Static Pressure).
- Optional ability to allow rapid data collection over communication link.
- 3 Communication ports are available on the XFC6200EX: 1 dedicated Local and 2 Remote Communication ports.

Log Period Records

Each record has entries that contain the following information (and more):

- Average Static Pressure
- Average Differential pressure
- Average Flow Temperature
- Calculated Volume

Log Period Data Entries

Log period data entries are made every 60 minutes by default. You may change this period to any one of 7 choices (1,2,5,10,20,30, 60). Choosing a log period of less than 60 minutes will result in additional records being logged, thus requiring more storage space to hold a full day's data. The log period must never be less than the volume calculation period.

Continued on Next Page

Log Period Records, Cont.

Volume Calculation Period Entries Volume Calculation period entries are made every 60 minutes by default. You may change this period to any one of 7 choices (1,2,5,10,20,30,60). The volume calculation period should never be greater than the log period and should be evenly divisible into the log period.

Volume calculations are completed, following the top of the current period. (i.e. Top of the hour, top of the minute)

Display Function

During operation, the front panel LCD continuously scrolls through the operating parameters. Table 1–2 shows typical displayed parameters, however any parameter with a Register Address can be displayed. The duration that the parameter is displayed can vary from 1 to 255 seconds (default is 5 seconds); a setting of 0 seconds will set any display item to off. See "Program Display" in Chapter 3 (and PCCU32 help files) for more details.

Table 1–2 Typical XFC6200EX Display Options

Display	Description
DATE/TIME MM/DD/YY HH:MM:SS	Current Date and Time, 24 hour clock
YEST DP LO NN PERCENT	Yesterday's % time below DP Low Set Point
YEST DP HI NN PERCENT	Yesterday's % time below DP High Set Point
FLOWRATE NNNNNN.N SCF/HR	Current Flow Rate, Programmable SCF, MCF or MMCF
ACCUM VOL NNNNNN.NN MCF	Total Accumulated Vol., Programmable SCF, MCF or MMCF
DIFF PRESS NNN.N IN. H2O	Differential Pressure, Inches H2O
PRESSURE NNN.N PSIA	Static Pressure Absolute, PSIA
FLOW TEMP NN.N DEG. F	Flowing Temperature, °F
YEST VOL NNNN.N MCF	Yesterday's Volume, Programmable SCF, MCF or MMCF
PERIOD VOL NNNN.N SCF	Last volume calculation period volume
BATTERY VOLTAGE NN.N VOLTS	Battery Voltage as supplied by external unit
M_FLOWRATE NNNNNN.N SCF/HR	Minute Average Flow Rate
STATION ID	ID of unit
ORIFICE DIAMETER N.NNNN INCHES	Size of Orifice Plate

Display Annunciators

Since a primary function of the XFC6200EX is to provide complete volume and operational records; it is important to indicate unusual or “alarm” conditions as they occur. This is supported on the LCD in the Annunciator display area as shown in Figure 1–2.

In the XFC6200EX computer, the status and alarm indicators are user programmable. Table 1–3 identifies the default annunciator locations. Please consult the PCCU32 help files for more instruction on programming the annunciators.

Whenever an alarm is indicated the XFC6200EX records it in the appropriate log period flow record. These are automatically retrieved when data is collected. Visual alarms and status codes are described in Table 1–4.

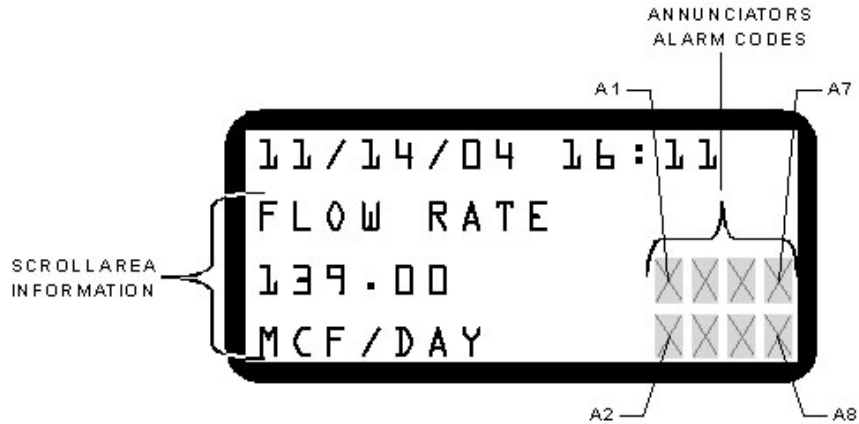


Figure 1–2 Liquid Crystal Display (LCD) and Indicators

Table 1–3 Default Annunciator Locations

Annunciator	Application
A1	Measurement Tube 1
A2	Unassigned
A3	Unassigned
A4	COM2
A5	Unassigned
A6	Local-COM0
A7	I/O Subsystem
A8	Remote WinCCU-COM1

Continued on Next Page

Display Annunciators, Cont.

Table 1–4 XFC6200EX Status and Alarm Description

Indicator	Description
I/O Sub-System	
L_L	Low Lithium Battery Alarm: When L_L (low lithium) is displayed, lithium battery voltage is not sufficient to maintain SRAM data. A new lithium battery measures approximately 3.6 VDC.
Display Application	
1	A number represents the Display Group number currently being displayed.
↑	The displayed item's value is above the Data High Limit value specified on the display Item Setup screen.
↓	The displayed item's value is below the Data Low Limit value specified on the display Item Setup screen.
Communication Protocols	
→	Transmitting Data: Sending a response
←	Receiving Data: Processing request.
!	Negative Acknowledgement (Nak) w/packet list.
+	Positive Acknowledge (Ack) of receipt of request.
†	Waiting for Positive Acknowledgement. Waiting for response after transmission.
?	Exception Alarm Processing.
¥	ID Recognized. Recognized and receiving request.
‡	Listen Cycle. Flashes if this remote port is active and running Totalflow Remote Protocol. Flashes in sync with listening cycle that occurs at 1, 2 or 4 second intervals. May not be visible if baud rate is faster than 2400. Annunciator will remain on if listen cycle is set to zero.
M	MODBUS ASCII: MODBUS ASCII protocol selected for the port assigned to this annunciator.
m	MODBUS RTU: MODBUS RTU protocol is selected for the port assigned to this annunciator.
L	Local Protocol. Displayed when PCCU port is active and running Totalflow Local Protocol.
¥	ID Recognized. The ID has been recognized but is waiting for "Sync".
Measurement Application	
B_F	Back Flow Condition. Visible only when DP variable displayed.
Z	Zero Flow Condition: Visible only when Flow Rate displayed.
H	Hold. Displayed when PCCU has entered Calibration Mode on a Measurement Application.
A	Alarm Condition. Need to view alarm. You may need to compare application limits to current values to determine where the alarm condition is present.
A_D	A to D Failure. Displayed if A to D Converter's Differential Pressure, Absolute Static Pressure or temperature readings exceed maximum counts or are less than minimum counts.

XFC6200EX Computer Hardware

Overview

The Totalflow® XFC6200EX computers are housed in an explosion proof enclosure. It's components are:

- XFC6200EX Enclosure
- XFC6200EX Main Processor Board (Part No. 2101471-xxx)
- XFC6200EX Termination Board (Part No. 2101873-xxx)
- XFC6200EX Liquid Crystal Display (LCD) Assembly (Part No. 2101688-xxx)
- PCCU Connector
 - Internal Connector (Part No. 2101667-xxx) or
 - Explosion Proof External Connector (Part No. 2101739-xxx)
- Explosion Proof Integral Multivariable Transducer (Part No. 2101465-xxx)
- Resistive Temperature Detector
 - Standard RTD (DIV 2) (Part No. 2011905-xxx)
 - Explosion Proof RTD (DIV 1) (Part No. 2101691-xxx)

XFC6200EX Enclosure

The custom designed explosion proof enclosure consists of a cylindrical shaped cast aluminum housing, powder coated, with front and rear end caps for access to internal components (see Figures 1–3 through 1–5). This enclosure may be Direct Mounted, Pipe Mounted on meter run using a Pipe Saddle or mounted on a stand alone pipe.

The unit enclosure features 4 exterior hubs for wiring:

- Communication and Power
- External or internal PCCU Connection
- Resistive Temperature Detector (RTD)
- Input/Output Wires

The end caps have precision engineered threading and are susceptible to damage if treated roughly. End caps are water tight, corrosion resistant and NEMA 4X rated. Unauthorized removal of the end caps are protected with a 1/16" countersunk Hex Head set screw on each end cap.



Do not attempt to loosen end cap before loosening set screw. Doing so may damage threads on unit.



Removal of enclosure end caps should follow guidelines stipulated in the Certification Drawings shipped with this unit and adhere to local codes.

Continued on Next Page

XFC6200EX Enclosure, Cont.

6200 Dimensions

Unit	Width		Height	Depth
	w/o External PCCU	w/ External PCCU		
US	7.87"	9.50"	11.25"	8.34"
Metric	199.90 mm	241.30 mm	285.75 mm	211.84 mm

6200 Installation & Weight

Unit	Weight	W/ EX PCCU Connector	Pipe Mounted Depth	Direct Mounted Depth
US	15.65 lbs.	16.35 lbs.	9.69"	8.34"
Metric	5.84 kg	6.10 kg	246.13 mm	211.84 mm

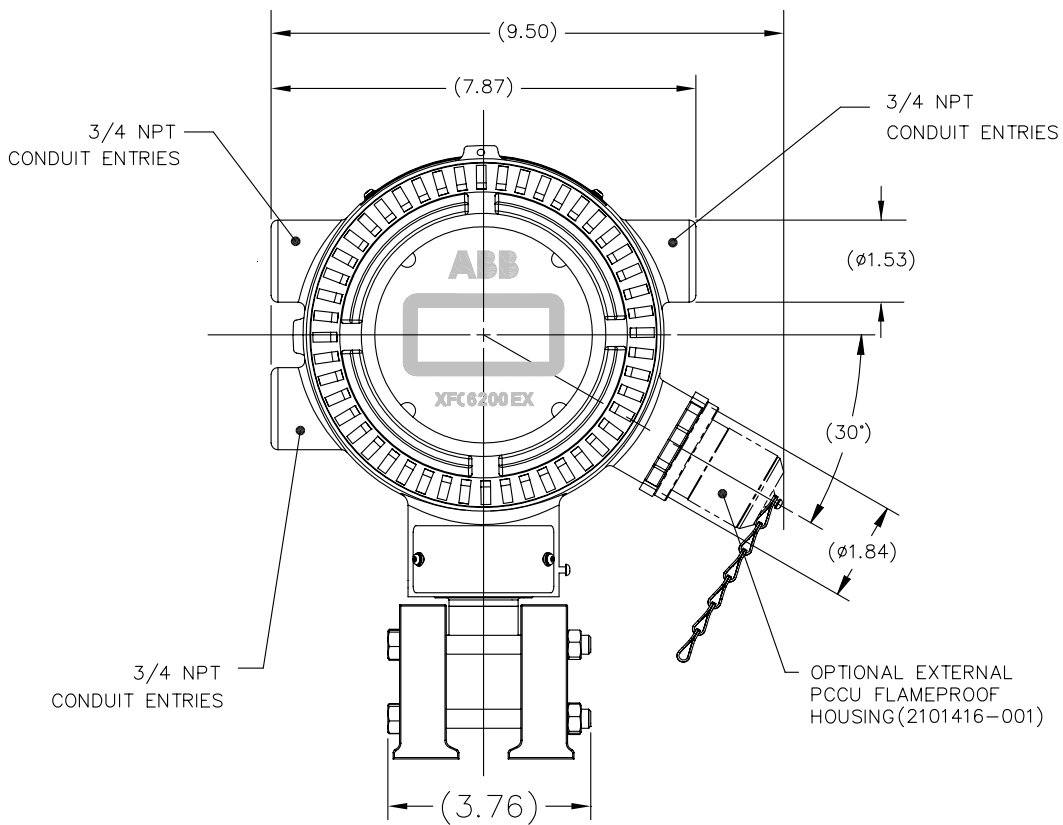


Figure 1-3 XFC6200EX Enclosure

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XFC6200EX Enclosure, Cont.

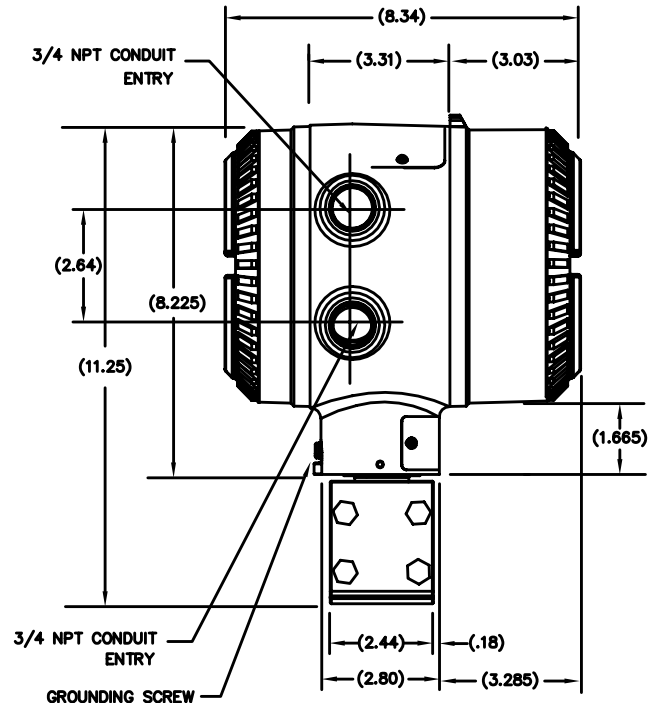


Figure 1-4 XFC6200EX Enclosure Left Side

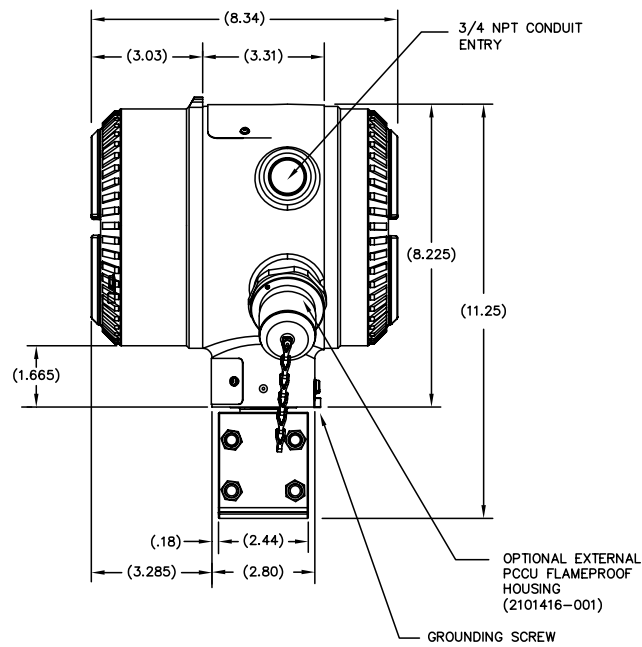


Figure 1-5 XFC6200EX Enclosure Right Side


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XFC6200EX Main Processor Board (2101471-xxx)

The XFC6200EX Main Processor Board is mounted inside the front end cap directly behind the Display Assembly (see Figure 1–6).

User applicable connections on this board consist of the four connectors, which allow attachment of the EXIMV, Display Board, Lithium Battery and the Termination Board.

This board uses a low power processor running at 11.0592 MHz with data stored in 512K SRAM that has a lithium backup battery. The application programs are stored in 512K Flash, the flash loader is stored in 512K PROM, and Registry and Configuration files are stored in 32K E²PROM. Other circuitry processes the inputs from the TRANSDUCER and Termination Board and provides interfaces to the LCD Assembly and the PCCU Connection (see Table 1–5).

FYI  The 2101471-xxx Main Processor Board contains the characterization files for the EXIMV Transducer. Therefore, when either the Board or the Transducer need replaced, the new replacement contains both parts.

CAUTION  Installation and/or Maintenance of electric components should follow guidelines stipulated in the Certification Drawings shipped with this unit and adhere to local codes.

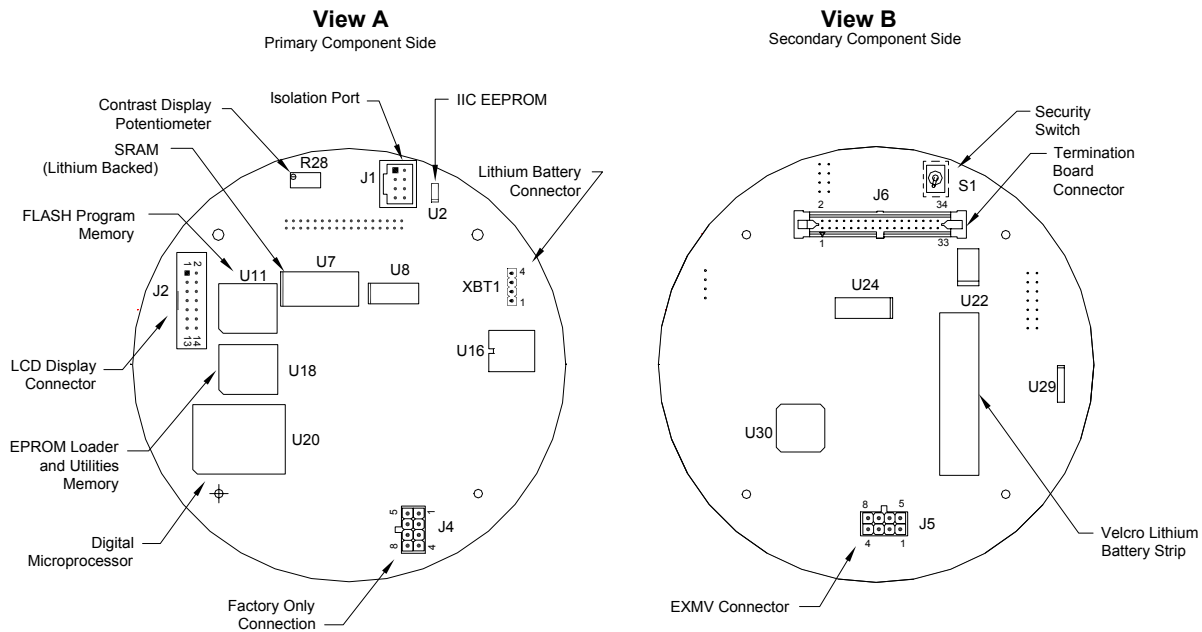


Figure 1–6 XFC6200EX Main Processor Board (2101471-xxx)

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XFC6200EX Main Processor Board (2101471-xxx), Cont.

Table 1–5 XFC6200EX Main Processor Board (2101471-xxx) Specifications

Power	External DC Voltage 9 to 30 VDC
Memory	<ul style="list-style-type: none">• 512K SRAM (Data Storage). RAM memory has lithium backup battery.• 512K Flash (Program Application Storage).• 512K PROM (FLASH Loader)• 32K E²PROM (Registry Configuration files)• Transducer factory calibration data stored in separate E²PROM
Security Switch	On/Off Bi-level on-board Security (See Chapter 3 for details)
Scan Rate	1 time per second
Time Base Stability	± 7.5 ppm (parts per million)
LCD Interface	Dedicated interface for Liquid Crystal Display (LCD)

XFC6200EX Termination Board (2101873-xxx)

XFC6200EX Termination Board may be accessed by removing the rear end cap (see Figure 1–7). All user connections should be routed through the cable entry hubs and should adhere to local codes.

Located on the termination board, you will find field connectors for 2 communication ports—RS232, RS422 or RS485 (software selectable). Also you will note that there is a dedicated port for local communications. This is a plug type port and will connect to an internal PCCU connector or an Explosion Proof External PCCU connector.

For more information on the Explosion Proof PCCU connector, see the section later in this chapter, or for the Internal PCCU connector see the section under Optional Equipment in this chapter.

Comm 1 Port Remote communication wiring for Port 1 is handled using the J19 Connector and the SW1 Communication Switch.

Comm 2 Port Remote communication wiring for Port 2 is handled using the J20 Connector and the SW2 Communication Switch.



Access to field wiring on the Termination board is achieved by removing rear end cap and should only be done by technician after area has been cleared for access based on local codes for Div. 1 areas.

Wiring entering and exiting through the external hubs on enclosure should be in conduit and sealed based on local codes for Div. 1 areas.

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XFC6200EX Termination Board (2101873-xxx), Cont.

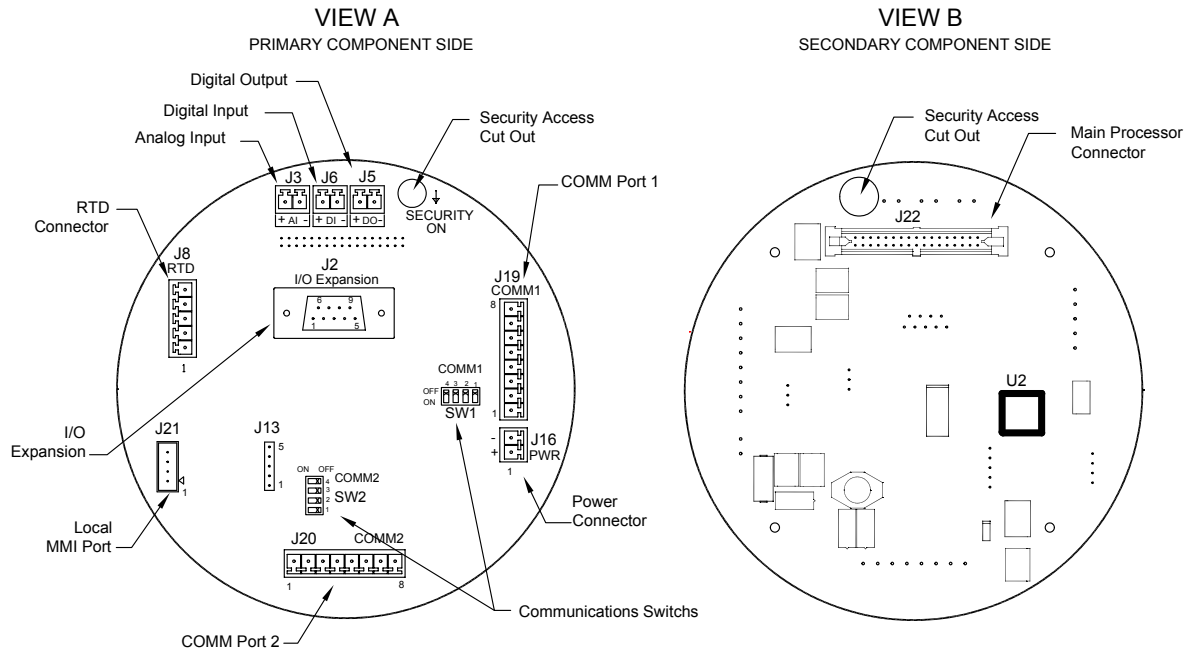


Figure 1-7 XFC6200EX Termination Board (2101873-xxx)

On-board I/O The XFC6200EX Termination Board provides similar base I/O as earlier XSeries models, only a reduced number due to enclosure restrictions, including:

- 1 User A/I
- 1 User D/O
- 1 User D/I
- Interface for external TFIO Modules

In the next few pages, you will see the specifications for Digital Input, Digital Output and Analog Input and supported TFIO Modules.

Digital Input The Totalflow XFC6200EX provides one digital input as a means to monitor external equipment. This is primarily used as a status input to read external equipment. Selectable de-bounce may be enabled or disabled within PCCU32 when using the input to measure pulses. See the Help Files for additional information.

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XFC6200EX Termination Board (2101873-xxx), Cont.

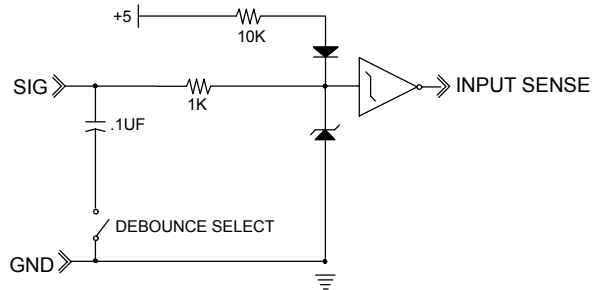
DI Electrical Specifications

Open Circuit Voltage:	5VDC (Internally pulled up to 5VDC Nom.)
Short Circuit Leakage Current:	395uA typical
Input Capacitance:	0.1 ufd typical
Max. Voltage Range:	-0.5VDC to 15VDC
Max. Frequency Input:	100Hz @ 50% duty cycle with de-bounce enabled 10KHz @ 50% duty cycle with de-bounce disabled.

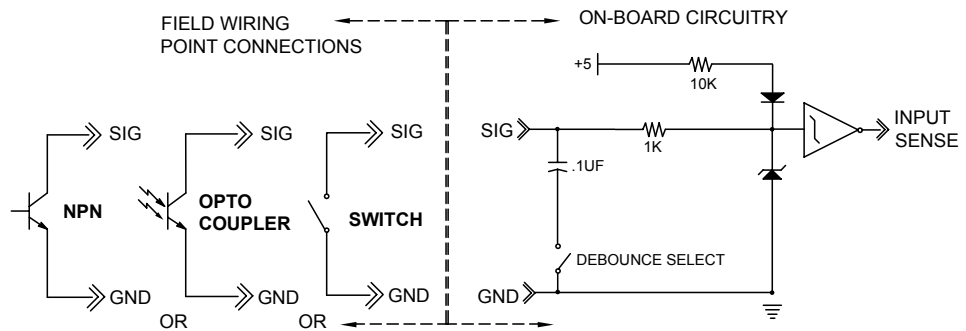
Digital Input Specifications

- Dry Contact, Open Collector or Active Voltage.
- Minimum contact resistance to activate input 1000Ω.
- Maximum voltage to deactivate the input: 3.1V (referenced to GND terminal.)
- Minimum voltage to activate the input: 0.5V (referenced to GND terminal.)
- Conductor pairs must be shielded to prevent spurious signals.

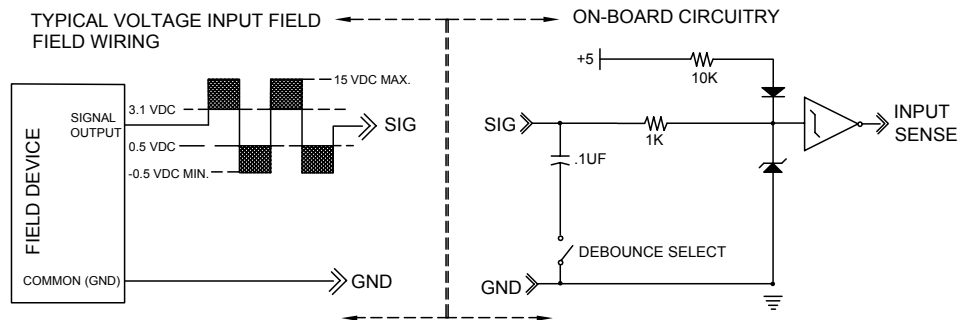
Typical DI Point Schematic



DI Connection Example



DI Connection Example



Continued on Next Page

XFC6200EX Termination Board (2101873-xxx), Cont.

Digital Output The Totalflow XFC6200EX provides one digital output (12 or 24VDC Max) as a means to control external equipment.

The digital output can be used in conjunction with a measurement tube (AGA3 or AGA7) and triggered on the following measurement parameters or conditions:

- Differential pressure over high limit
- Differential Pressure under low limit
- Static Pressure over high limit
- Static Pressure under low limit
- Remote Sense is On
- Volume Set point
- Flow Temperature Low
- Flow Temperature High
- Flow Rate Low
- Flow Rate High
- Trip on Digital Input

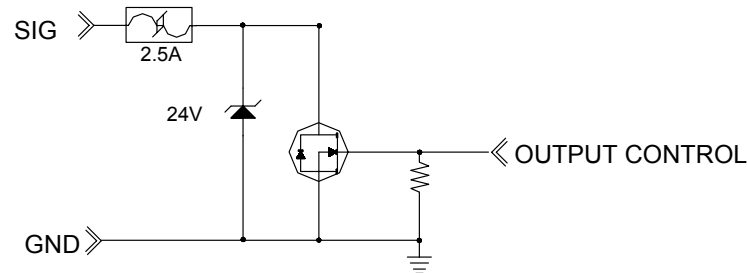
DO Electrical Specifications

Open Circuit Voltage:	0 VDC
Short Circuit Leakage Current:	0uA typical.
Output Capacitance:	1000pF typical
Max. Voltage Range:	0.5VDC to 26.5VDC

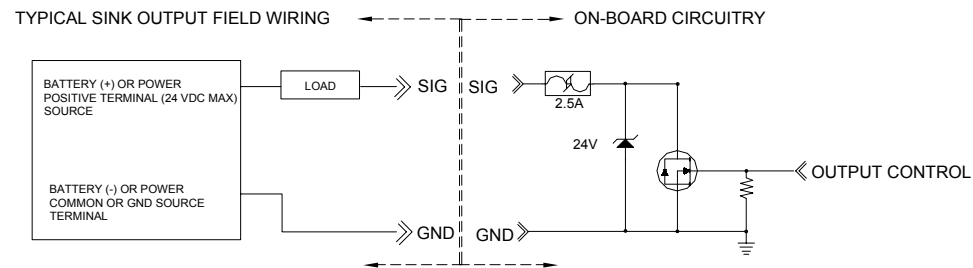
DO Input Specifications

- Open Drain FET type
- "ON" Resistance: 0.1Ω Typical (Including PTC fuse protection)
- Maximum pulse current: 3A for 5 seconds.
- Maximum continuous sink current: 2A.

Typical DO Point Schematic



DO Connection Example



Continued on Next Page

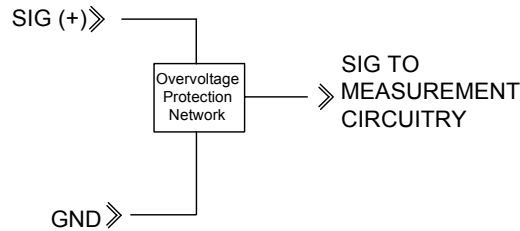
XFC6200EX Termination Board (2101873-xxx), Cont.

Analog Input The Totalflow XFC6200EX provides one analog input as a means of receiving data represented by continuously varying voltage/current.

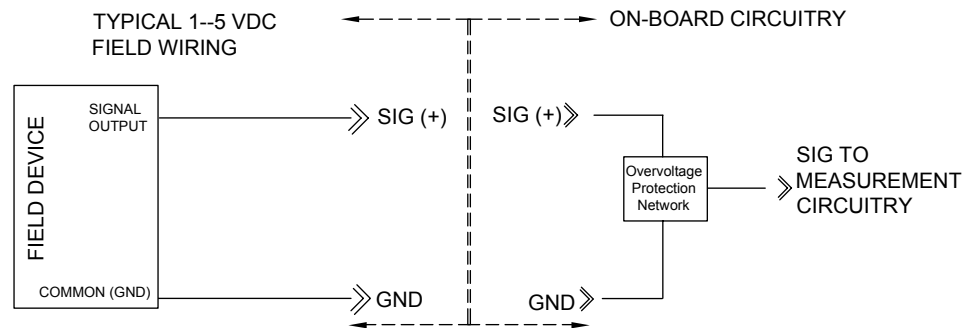
AI Electrical Specifications

Open Circuit Voltage:	1.3 VDC
Short Circuit Leakage Current:	0uA typical.
Input Impedance	82KΩ typical (-5 TO +5Vdc)
Measurable Input Voltage Range	-5 to +7 VDC
Max. Voltage on Input	10 VDC

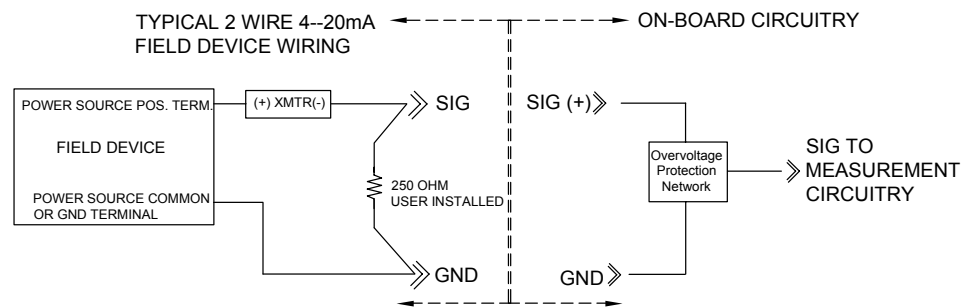
Typical AI Point Schematic



AI Example Connection



AI Example Connection



Continued on Next Page

XFC6200EX Termination Board (2101873-xxx), Cont.

TFIO Module Expansion

Totalflow's modular I/O system may be mounted in a DIV 2 or safe area and interface to the XFC6200EX unit via J2, I/O Expansion connector. Supported modules include:

- Valve Control Interface (2100412-xxx)
- Analog Output (2100415-xxx)
- Analog Input (2100418-xxx)
- Communication Interface (2100421-xxx)
- Combo Digital (2100543-xxx)
- Thermocouple (2100869-xxx)
- Platinum 100 Ohm RTD (2101018-xxx)

Explosion Proof Multivariable Transducer (EXIMV)

The EXIMV is an explosion proof version of the factory calibrated "Smart" Integral Multivariable Transducer. The EXIMV is characterized over temperature so that any changes occurring in the EXIMV or in the electronics can be compensated, thus the EXIMV is not field repairable. All repairs should be done at an authorized Totalflow service center or returned to the factory.

Providing the primary measurement capability for the XFC6200EX (see Figure 1–8), the circuitry and characterization information are stored on the main processor board. EXIMV specifications are discussed in Table 1–6.

The unit is designed to provide EMI/RFI protection of the low level signals, and to protect the circuitry from other environmental effects.

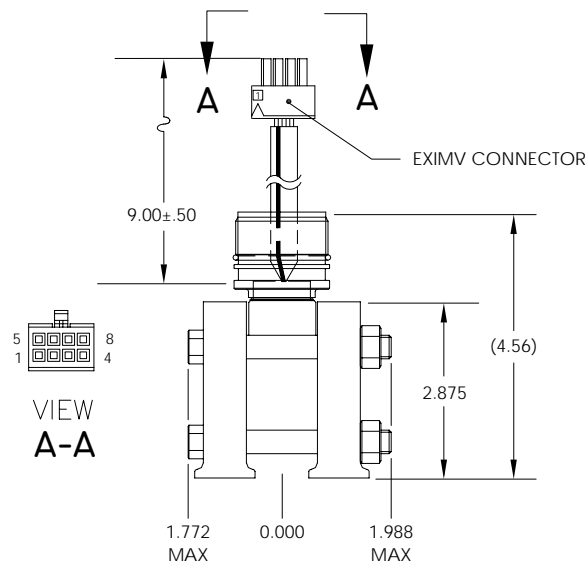


Figure 1–8 Explosion Proof Multivariable Transducer (EXIMV)

Continued on Next Page

Explosion Proof Multivariable Transducer (EXIMV), Cont.

Table 1–6 Explosion Proof EXIMV Specifications

Temperature Limits	Compensated: -20°F to 140°F (-29°C to 60°C) Operational: -40°F to 185°F (-40°C to 85°C) Storage: -40°F to 185°F (-40°C to 85°C)
Resolution	16 Bit A/D conversion (0.003% FS) (0.004% FS effective signal resolution)
Vibration Perf.	1.5 INW per G (2G maximum) at 1 Hz, decreasing to zero at 1 KHz in straight line mode
Mounting Spec.	Change from perpendicular along y-axis will be <1.5 INW
Static Pressure	
Accuracy	Linearity, Hysteresis and repeatability combined: ± 0.075% of Calibrated Span
Ambient Temp.	± 0.15% of URL +0.125% of Reading (Effect per 160°F)
Stability	± .1% of URL (for 12 months)
Differential Pressure	
Accuracy	Linearity, Hysteresis and repeatability combined: ± 0.075% of Calibrated Span
Ambient Temp.	± 0.15% of URL + 0.125% of Reading (Effect per 160°F)
Stability	± .1% of URL (for 12 months)
SP Effect	DP Zero per 1500 psi: ± 0.03% of Calibrated Span DP Span per 1500 psi: ± 0.05% of URL
Temperature	
Operating Range	-80°F to 230°F (-62°C to 110°C)
Accuracy	± 0.35°F (± 0.2°C) over Operating Range (as shipped from factory) ± 0.2°F (± 0.12°C) repeatability over Operating Range (after single point field calibration)

Display Assembly

The XFC6200EX display assembly (see Figure 1–9), has a dedicated interface to the Main Processor board from the 4X16 Liquid Crystal Display (LCD) via a 14 pin ribbon cable connector.

The display utilizes four lines by 16 characters per line. Line 1 has been programmed to display the date and time continuously. Line 2, characters 1 through 16 is a scroll area containing a customer programmable description for each item in the display scroll list. Lines 3 and 4, characters 1 through 12 may also be programmed to display information. Characters 13 through 16 of lines 3 and 4 contain alarm codes and annunciators that communicate a basic message(s) to the technician, indicating a need for further attention. These codes are location dependent and may mean different things based upon which character space A1 through A8 the code appears in. These are also customer programmable to a certain extent.

Display Assembly, Cont.

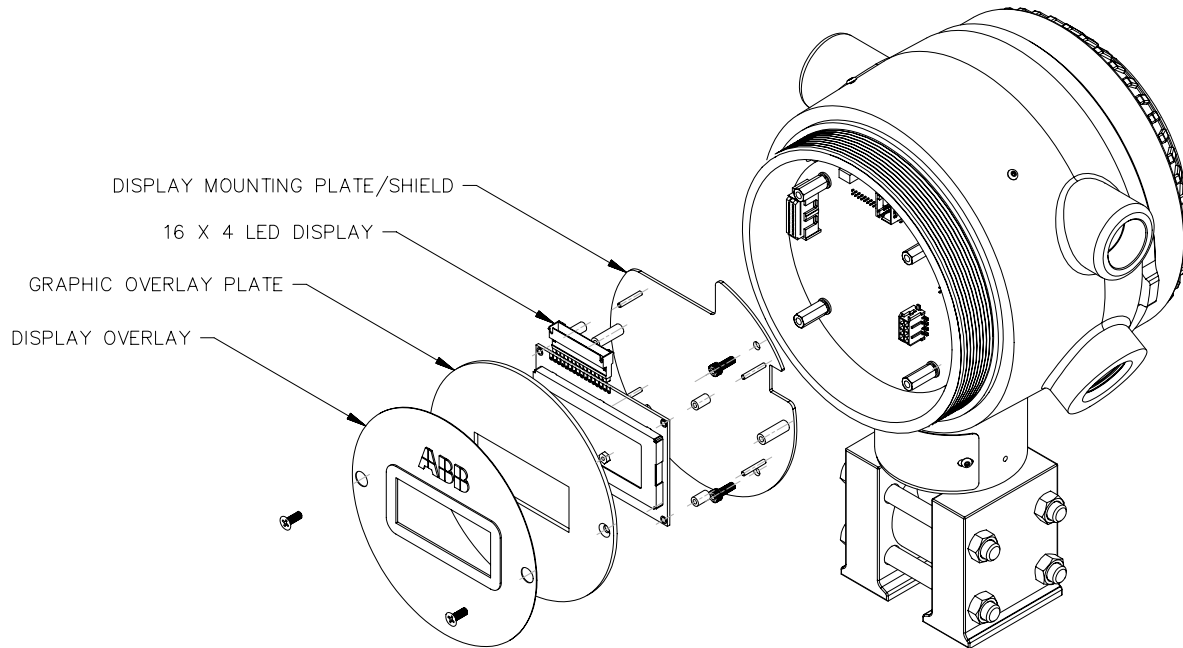


Figure 1-9 Liquid Crystal Display (LCD) Assembly

Resistive Temperature Detector (RTD)

Totalflow offers a choice of two RTD options. The 100 ohm Platinum RTD measures real-time flowing temperature of the gas.

Standard RTD The standard RTD is not DIV 1 approved, therefore may only be installed and used in DIV 2 and general purpose areas.

Explosion Proof RTD The Explosion Proof RTD (Part No. 2101690-xxx) is available for use in DIV 1 areas (see Figure 1-10). Two probe lengths are available; 10" and 16". See Table 1-7 for standard probes based on Thermowell "U" lengths and Table 1-8 for standard thermowells based on thread diameter.

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Resistive Temperature Detector (RTD), Cont.

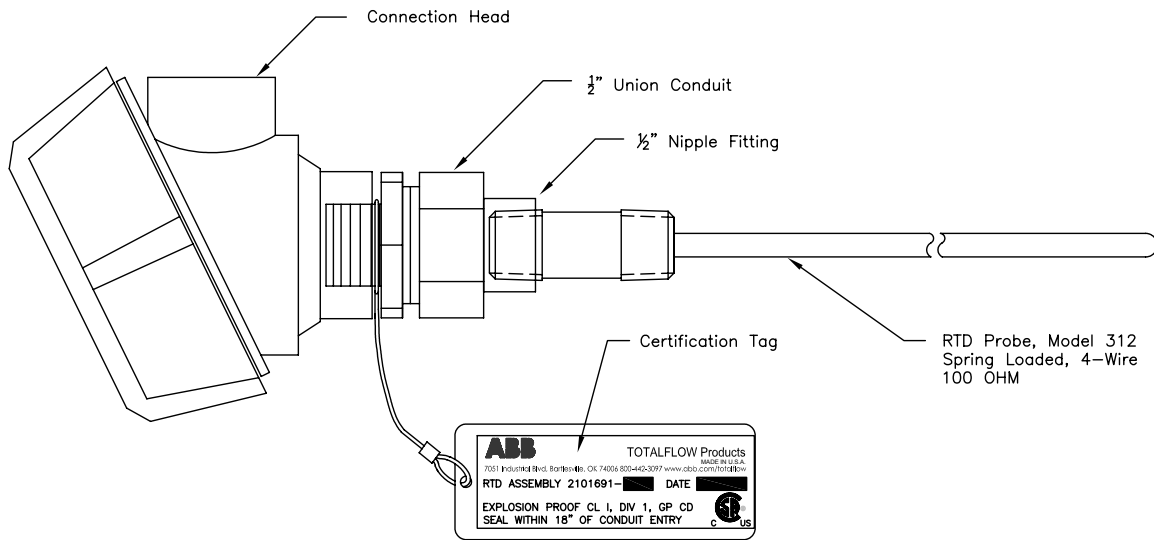


Figure 1–10 Explosion Proof Resistive Temperature Detector

Table 1–7 Standard RTD Probes

“U” Length	Part Number	“U” Length	Part Number
2.00”	2101691–020	6.00”	2101691–060
2.50”	2101691–025	7.00”	2101691–070
3.00”	2101691–030	8.00”	2101691–080
4.00”	2101691–040	9.00”	2101691–090
5.00”	2101691–050	10.00”	2101691–095

Table 1–8 Standard Thermowells


Thread Diameter	“U” Length	Base Part Number
1/2”	2” through 10”	1622305
1”	2” through 10”	1622302
3/4”	2” through 10”	1622300

6270 Optional Equipment Unit (OEU)

The XFC6200EX unit is designed to be located in DIV 1 Hazardous Areas, therefore many features and requirements of the unit are housed in a separate enclosure located in DIV 2 or General Purpose areas.

Space is provided inside the enclosure to house a variety of remote communication devices; transmitter, cellular phone, etc, Battery, charging source and additional I/O (see Figure 1–11).

The battery compartment shelf will house various optional battery packs that are available for the OEU; from 8 ampere hours up to 26 ampere hours. Installation of the battery is discussed in detail in Chapter 4, “Maintenance”.

CAUTION  This device is NOT intended to be used in a Class I, Division I environment. The XFC6200EX is designed for Class I, Division I with explosive gas in the area. The Battery Box and Solar Panel are not intended for that application.

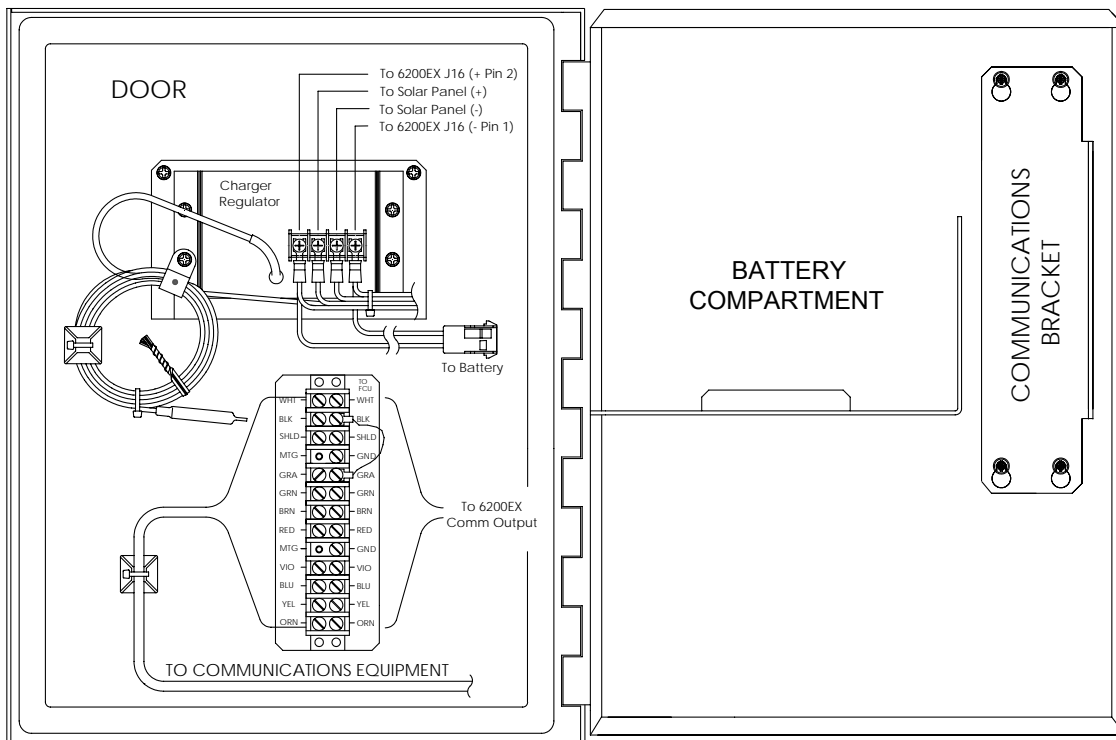


Figure 1–11 Optional Communication Enclosure

Solar Panel

A solar panel may be configured in the system to provide a charging source for the battery. Division 1 installations would require that the Solar Panel and Battery Pack be installed in a General Purpose or Division 2 area. Typically, the Solar Panel would be connected through a Charger Regulator located in the 6270 OEU.

Depending upon power/charging requirements, your unit may be configured for a 5-Watt, 10-Watt, 20-Watt or 30-Watt solar panel. The panel is designed to be mounted on 2-inch extension pipe.



The Solar Panel is NOT intended to be used in a Class I, Division I environment. The XFC6200EX is designed for Class I, Division I with explosive gas in the area. The Battery Pack and Solar Panel are not intended for that application and should be located in DIV 2 or General Purpose areas.

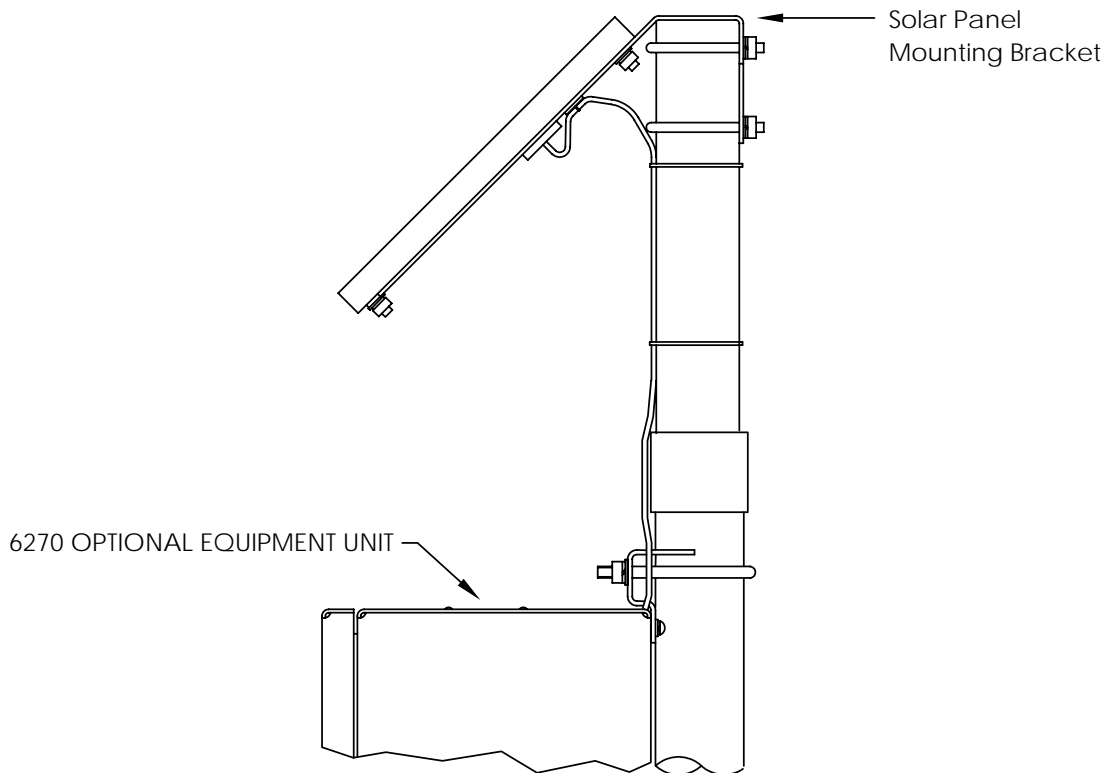


Figure 1-12 Solar Panel Typical Configuration

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Chapter 2 Installation

Overview

This Chapter provides you with the information for installation and setup. By the time you finish this Chapter you will have the XFC6200EX unpacked, installed, field wired and ready for operation. For safe and trouble free installation follow all instructions and advisories.

FYI



Read through this Chapter before you begin the installation, to plan your installation. Also before you begin, refer to the wiring diagrams delivered with the new XFC. You may store these under the tab “Drawings” in the back of this manual.

Highlights

In this chapter you will learn about:

Topic	See Page
Unpacking & Inspection	2-2
Meter Run Installation Overview	2-2
Direct Mount Installation	2-3
Pipe Saddle Mount Installation	2-4
Stand Alone Pipe Mount Installation	2-8
Manifold Input Lines	2-9
Standard RTD Probe Installation	2-10
Explosion Proof RTD Probe Assembly and Installation	2-11
6270 Optional Equipment Unit Installation	2-14
Battery Pack Installation	2-17
Solar Panel Installation	2-18
AC Charging Unit Installation	2-20

Continued on Next Page

Unpacking & Inspection


Unpacking	<p>The XFC6200EX and RTD are shipped in a specially designed shipping carton which contains the unit, mounting brackets, parts list and wiring and interconnect diagrams. Optional Solar Panel, Battery Pack and 6270 OEU enclosure, with applicable hardware, may be shipped in a separate carton.</p> <p>Carefully remove the items from each carton.</p>
Inspection	<ul style="list-style-type: none">• Inspect the shipping carton for damage. If the shipping carton is damaged, keep it until the contents have been inspected for damage.• Inspect the unit's exterior for dents, chipped paint, etc.• Inspect the LCD window for breakage.• Visually inspect the Electronic Boards, cables, and Integral Multivariable Transducer (EXIMV) for damage.
Damaged Components	<p>If any components have been damaged or if there are noticeable defects, notify your Totalflow representative. Keep all shipping materials for the carrier's inspection. Totalflow will arrange for immediate repair or replacement; see 'Getting Help', in this manual's Introduction.</p>

Meter Run Installation Overview

The following procedures, unless otherwise stated, are applicable to all XFC6200EX Computers. The XFC6200EX can either be direct mounted, pipe saddle or stand alone mounted. Care must be given to ensure that the transducer is mounted above the meter run, to allow adequate slope between manifold and orifice fittings. Location and installation of the optional 6270 OEU is covered later in this chapter.

When direct mounting to an instrument manifold, all hardware for mounting is supplied by the customer. Basic instructions are included in this chapter, however we encourage you to also refer to the manifold manufacturer's instructions.

Both the pipe saddle and stand alone pipe mountings require the use of a mounting bracket (P/N 2101913) attached to the transducer. In addition, when pipe saddle mounting, the use of the Saddle Mounting Kit, is required.

FYI  When pipe mounting the XFC6200EX it should be located as close as possible to the orifice fittings. This keeps the stainless steel gauge lines as short as applicable.

Direct Mount Installation

If you are installing the XFC6200EX directly to an instrument manifold use this procedure. Before you begin, review the procedure and the Direct Mount Drawing (see Figure 2–1).

FYI



All required hardware for mounting to the XFC6200EX to the manifold is to be supplied by the customer.

Instructions

Step	Procedure
1.	Attach the Explosion Proof Multivariable Transducer (EXIMV) to the manifold. Before aligning with the manifold ensure that Teflon seal rings are in place around the two process ports.
2.	Using the four 7/16-inch bolts supplied with the manifold secure the transducer to the manifold.
3.	Refer to figure 2–1 and complete installation.

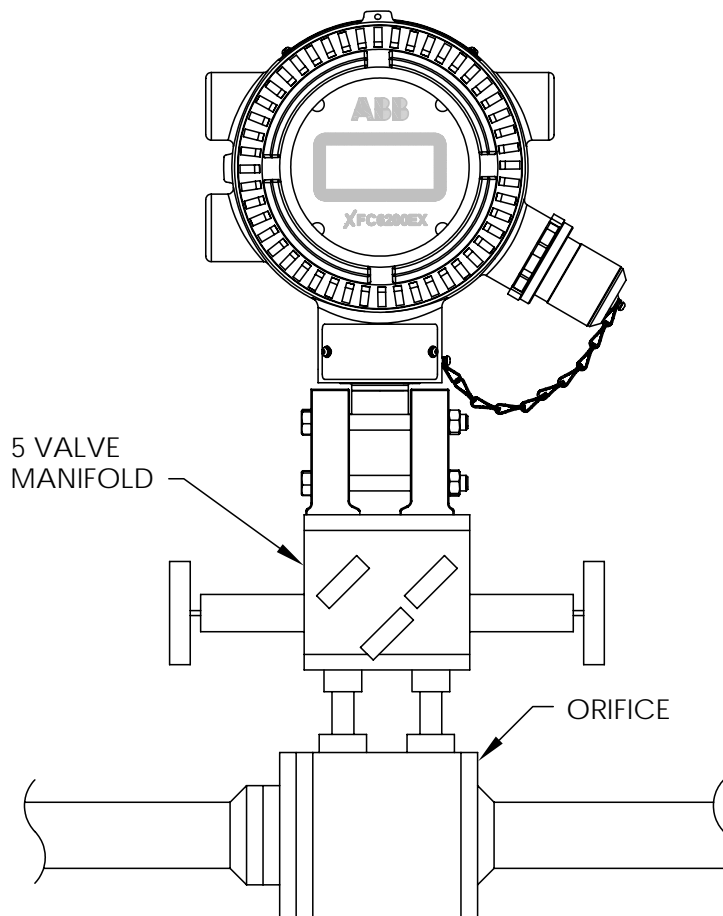


Figure 2–1 Direct Mount to Instrument Manifold

Pipe Saddle Mount Installation

If you are installing the unit directly to the meter run use this procedure (see Figure 2–2). Before you begin, review the procedure and the materials required for installation.

- Materials Supplied**
- XFC6200EX mounting bracket and hardware
- Material Not Supplied**
- One pipe Saddle
 - One 2" pipe of suitable length
 - Standard 3 or 5 valve manifold
 - Stainless steel tubing

FYI



Optional equipment may be ordered from Totalflow.

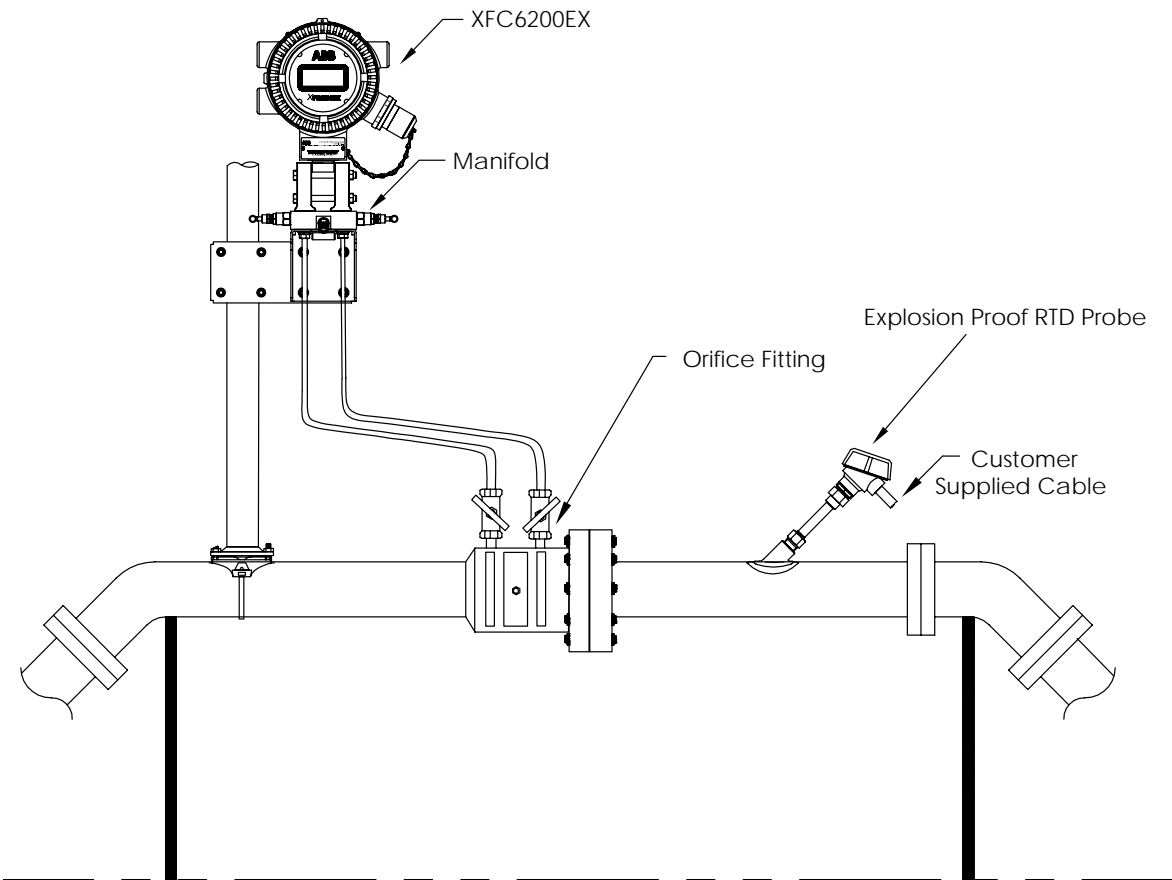


Figure 2–2 Typical Installation

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Pipe Saddle Mount Installation, Cont.

Instructions

Step	Procedure
1.	Position pipe saddle on meter run. Select a location that allows easy user access and is close to the orifice fittings. Lines should be as short as possible.
2.	Attach Saddle on meter run pipe using U-bolt and associated hardware, but do not tighten (see Figure 2–3).
3.	Screw 2" mounting pipe into Saddle. Place level against pipe and vertically align. Adjust pipe, mounted in saddle, until vertical alignment is achieved.
4.	After vertical alignment, securely tighten 2" pipe in Saddle then securely tighten Saddle mounting bolts. Be certain pipe is securely installed in Saddle.
5.	Attach mounting plate to top of 2" pipe with U-Bolts, using silicone spray to prevent galling (see Figure 2–4). Plate may be mounted to the left or right of pipe as required by installation.

FYI



Position mounting bracket high enough on pipe to allow slope from externally mounted manifold to tap valves (see Figure 2–2).

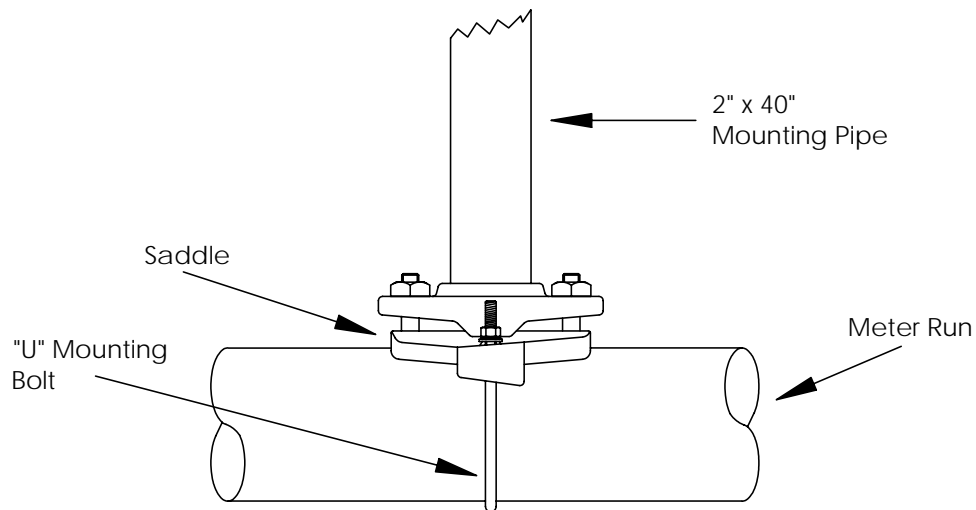


Figure 2–3 Typical Pipe Saddle Installation

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Pipe Saddle Mount Installation, Cont.

Step	Procedure, Cont.
------	------------------



Mounting of the XFC6200EX depends on whether a discrete or block manifold is used. Proceed to step 6 for discrete manifold mounting instructions or step 7 for block manifold mounting instructions.

To verify direction of flow, look at the (+) and (-) signs on the transducer tag. Plus (+) indicates the high side (Upstream) and Minus (-) indicates the low side (Downstream).

6.	If using a discrete manifold, mount the XFC6200EX directly to the bracket and then screw the tubing from the discrete manifold into the bottom of the XFC6200EX's transducer.
7.	If using a block manifold, sandwich the manifold between the XFC6200EX's transducer and the top of the mounting bracket. Thin block manifolds as shown in Figure 2-5 can be mounted with four bolts inserted up through the bottom of the bracket, through the manifold and into the threaded holes of the XFC6200EX transducer. Larger block manifolds with flanges on top and bottom will require separate hardware to mount the manifold to the XFC6200EX's transducer and then mount the manifold to the mounting bracket.

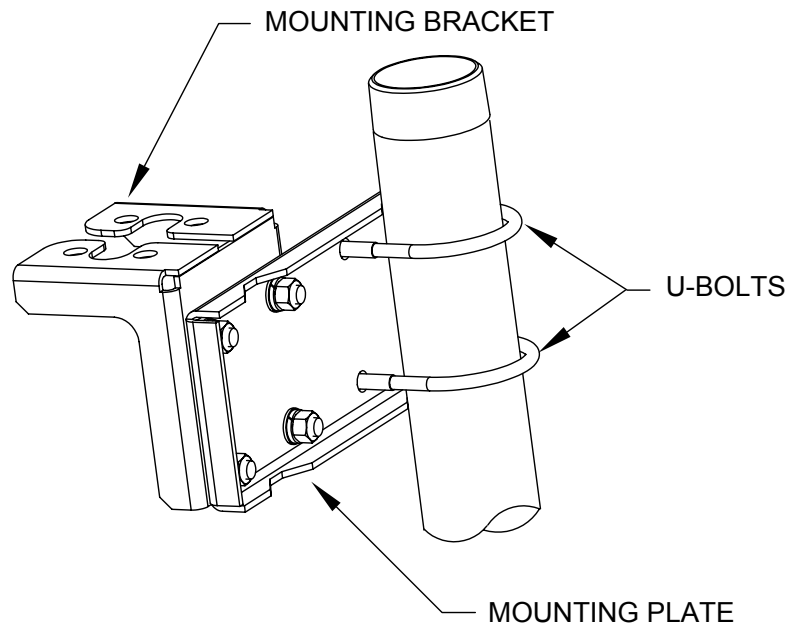


Figure 2-4 XFC6200EX Mounting Bracket

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Pipe Saddle Mount Installation, Cont.

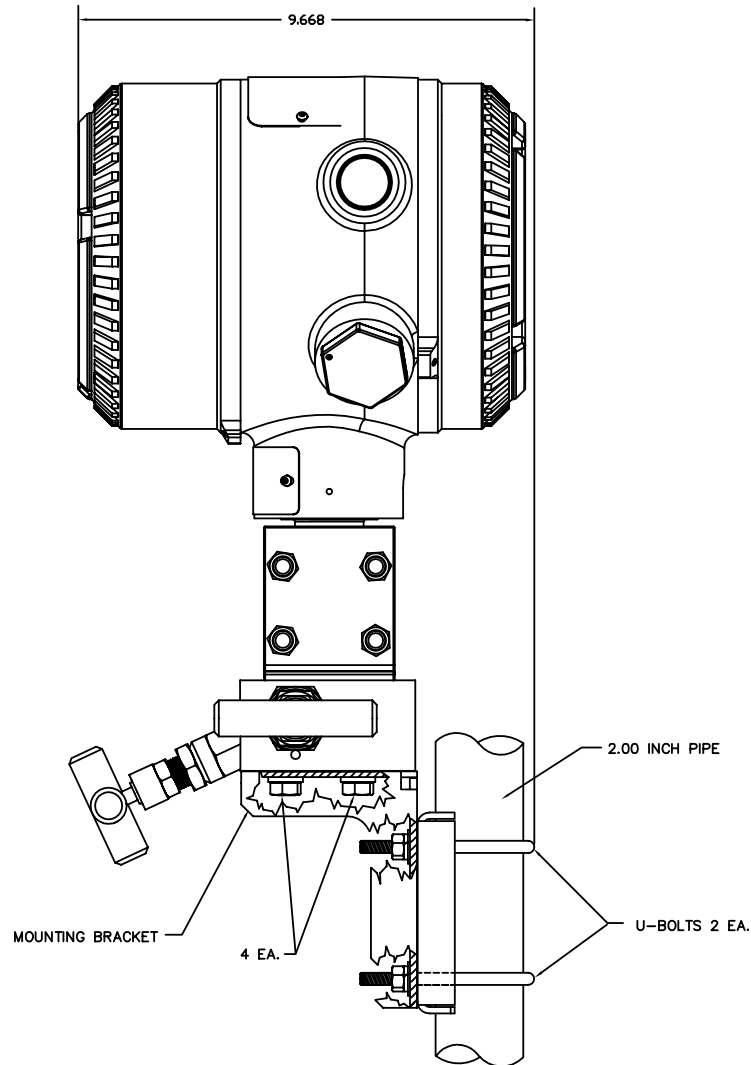


Figure 2-5 XFC6200EX Manifold Mounted

Step	Procedure, Cont.
8.	If position of unit is not facing the correct direction when manifold is attached, you may loosen the Countersunk Hex Socket Locking Set Screw located in the neck of the unit. Using a 3/32" Hex wrench, loosen set screw on the neck of the device and gently turn the unit clockwise until facing the correct direction. Retighten set screw.



Never rotate the unit more than 360° in either direction. If unit head gets tight before reaching desired position, rotate counter clockwise.

Stand Alone Pipe Mount Installation

If you are installing the unit to a pipe located by the meter run use this procedure. Before you begin, review the procedure and the materials required for installation.

Materials Supplied


- XFC6200EX mounting bracket plus fastening hardware

Material Not Supplied

- Installed 2" pipe of suitable length
- Standard 3 or 5 valve manifold
- Stainless steel tubing


Instructions

Step	Procedure
------	-----------


FYI  The following procedures are to be followed when installing XFC6200EX on 2" mounting pipe.

Method of installation must be consistent with customers company policy.

1.	Attach mounting plate to top of 2" pipe with U-Bolts, using silicone spray to prevent galling (see Figure 2-4). Plate may be mounted to the left or right of pipe as required by installation.
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FYI  Position mounting bracket high enough on pipe to allow slope from externally mounted manifold to tap valves (see Figure 2-2).

2.	Install manifold to bottom of XFC6200EX (see Figure 2-6). To verify direction of flow, look at the (+) and (-) signs on the transducer tag. Plus (+) indicates the high side (Upstream) and Minus (-) indicates the low side (Downstream).
3.	Mount XFC6200EX with attached manifold to the bracket with the four bolts and washers provided with the bracket kit.
4.	Attach mounting bracket to mounting plate using supplied nuts and bolts.
5.	If position of unit is not facing the correct direction when manifold is attached, you may loosen the Countersunk Hex Socket Locking Set Screw located in the neck of the unit. Using a 3/32" Hex wrench, loosen set screw on the neck of the device and gently turn the unit clockwise until facing the correct direction. Retighten set screw.

CAUTION  Never rotate the unit more that 360° in either direction. If unit head gets tight before reaching desired position, rotate counter clockwise.

Manifold Input Lines

The following instructions will provide procedural steps to install the manifold. The meter run manifold high (+) and low (-) pressures terminate in transducer (EXIMV) + and - Differential Port cells. Differential Port holes are located on bottom of EXIMV (see Figure 2-6).

Material Not Supplied

- Stainless steel tubing
- Tubing fittings



A backup wrench should always be used when working with stainless steel tubing and valves. This prevents fitting from turning and/or putting tension on stainless steel tubing.

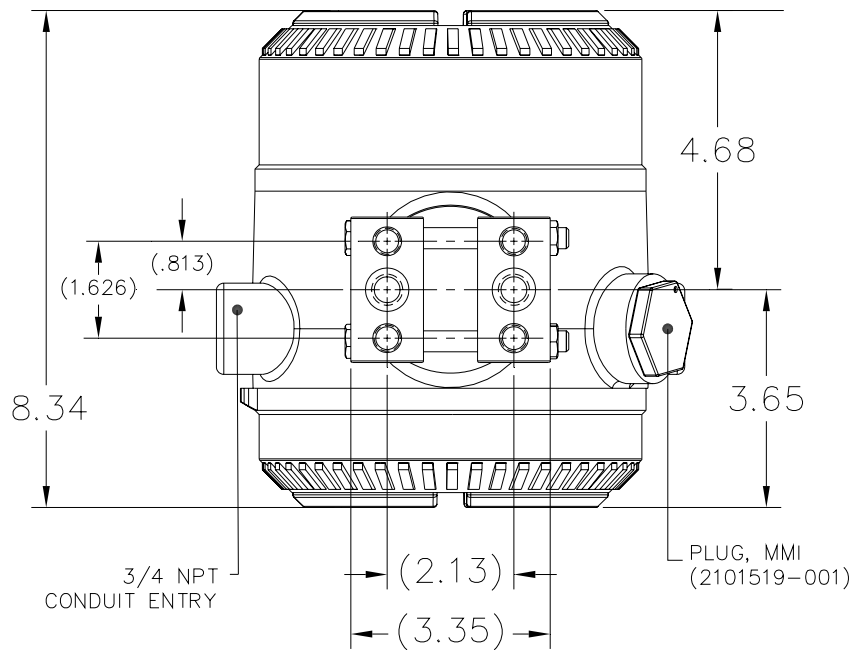


Figure 2-6 XFC6200EX Computer EXIMV Ports

Instructions

Step	Procedure
1.	Install isolation valves on meter run.
2.	Install tubing between meter run and XFC. (Note: fittings not supplied with unit).
3.	Leak check all connections.



Leaks in the tubing or manifold will introduce errors when calibrating the transducer (EXIMV).

Standard RTD Probe Installation

The standard RTD (Part No. 2011905-xxx) measures flowing gas temperature and should only be located in DIV 2 or General Purpose areas, following local codes. Procedures, presented in this section, enable the user to install the RTD into the meter run.

Optionally Supplied Materials

- RTD probe with 10' of cable. Optional lengths are 15', 25', 30', 40', and 50'.
- One (1) Thermowell with 3/4" npt threads. Optional threads are 1/2" and 1".
- 3/4" to 1/2" Adapter Bushing
- Nylon tie wraps.

Materials not Supplied

- Customer must specify Thermowell "U" length
- Teflon tape

Instructions

Step	Procedure
1.	Unpack parts, verifying all supplied materials are present. Contact Totalflow Customer Service if parts are missing: 800-442-3097 or 1-918-338-4880.
2.	Install Thermowell into meter run.

FYI



To prevent moisture from entering XFC after installing RTD cord connector, be certain associated connector at XFC has a metal backed sealing "O" ring and metal locking nut attached.

Power should be removed from XFC before performing any field wiring.

3.	Using snap ring pliers, adjust probe length so that it is spring loaded against bottom of Thermowell.
4.	Screw Probe Connector into Thermowell.
5.	At the XFC6200EX remove plug from Explosion Proof RTD hub and screw adapter bushing into hub.
6.	Remove nut from water tight cord connector leaving nylon sealing ring in place. Insert wires through the cord connector and continue through the Adapter Bushing into enclosure (see Figure 2-7).
7.	Screw Cord Connector into Adapter Bushing and tighten.
8.	Inside of XFC6200EX enclosure, begin by disconnecting connector plug from RTD connection, J8 to begin field wiring.

Continued on Next Page

Standard RTD Probe Installation, Cont.

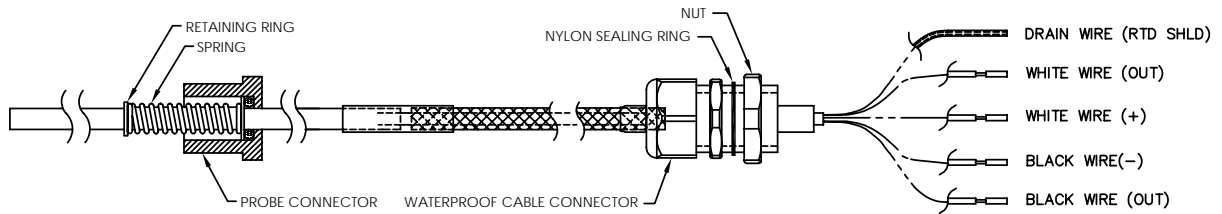


Figure 2-7 RTD Probe Wiring

Step	Procedure
9.	Using supplied wiring instructions, make field connections to connector plug and re-insert into J8 board connector.
10.	Following connection of RTD Thermowell, secure cable to meter run pipe with plastic tie wraps. Do Not wrap cable around meter run pipe.

Explosion Proof RTD Probe Assembly and Installation

If the XFC6200EX is installed in a Div 1 area, the Explosion Proof RTD must be used (see Figure 2-8). Procedures, presented in this section assume that the Explosion Proof RTD kit was provided. For additional information, refer to the Wiring Interconnect and Application Instructions supplied with the kit.

Supplied Materials

- RTD Probe (see Table 1-7 in Chapter 1 for available parts)
- Optional Thermowell (see Table 1-8 in Chapter 1 for available parts)
- Explosion Proof Connection Head
- Conduit Union
- Nipple Fitting
- Certification Tag
- Wiring Instructions

Continued on Next Page

Explosion Proof RTD Assembly and Installation, Cont.

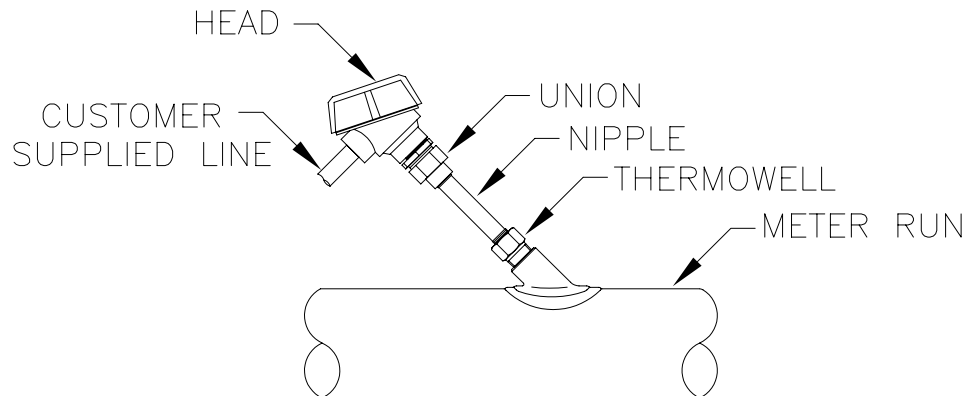


Figure 2-8 Explosion Proof RTD Overview

Supplied Materials

- RTD Probe (see Table 1-7 in Chapter 1 for available parts)
- Optional Thermowell (see Table 1-8 in Chapter 1 for available parts)
- Explosion Proof Connection Head
- Conduit Union
- Nipple Fitting
- Certification Tag
- Wiring Instructions

Materials not Supplied

- Teflon tape
- Wiring Cable/conduit from Explosion Proof RTD to Flow Computer (see local codes for material specifications).



The following instructions assume that the Thermowell has previously been installed. The end of the Thermowell should penetrate the center 1/3 of the meter run.

Instructions

Step	Procedure
1.	Unpack parts, verifying all supplied materials are present. Contact Totalflow Customer Service if parts are missing: 800-442-3097 or +1918-338-4880.
2.	Screw nipple fitting into Thermowell and tighten (see Figure 2-9).
3.	Separate top and bottom of union. Screw union bottom onto nipple fitting, being remindful that union nut is on union bottom, and tighten.

Continued on Next Page

RTD Probe Kit Assembly and Installation, Cont.

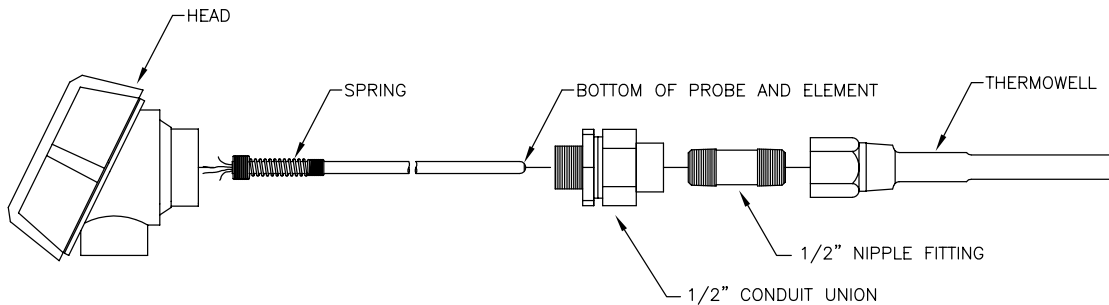


Figure 2–9 Explosion Proof RTD Probe Disassembled

Step	Procedure, Cont.
4.	Screw union top into bottom of connection head and tighten.
5.	Unscrew and remove cap from Explosion Proof Connection Head.
6.	Insert RTD Probe through the opening in the head. Holding the probe from underneath, screw spring clockwise down into center of wiring block. Stop when the top edge of the spring is flush with the top of the wiring block.
7.	Insert probe and head assembly through bottom half of union previously installed into Thermowell. As union halves meet, you should encounter some resistance. As the probe contacts the bottom of the Thermowell, you should see the top of the probe rise (3/4" max.)



If the probe assembly is too long or too short, you may need to change nipple lengths.

8.	Lift union nut up to union top, screwing together.
9.	Align RTD head to correct position for conduit and wiring, then tighten union nut.
10.	Using supplied Wiring Interconnect drawings, wire RTD Probe at wiring block (see Figure 2–10).
11.	Following local code, run RTD wiring to XFC6200EX unit.

Continued on Next Page

RTD Probe Kit Assembly and Installation, Cont.

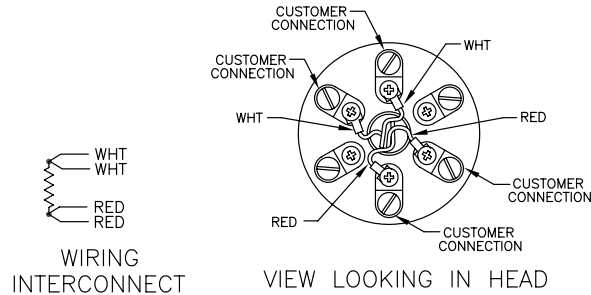


Figure 2–10 RTD Probe Wiring

12.	Inside of XFC6200EX enclosure, begin by disconnecting power from Termination Board. Remove connection from J16.
13.	Remove Connector plug from RTD connection, J8 to begin field wiring.
14.	Using supplied wiring instructions, make field connections to connector plug and re-insert into J8 board connector.
15.	Restore power to unit.

6270 Optional Equipment Unit Installation

If optional 6270 OEU Enclosure is used, it may be configured to include other options, including, but not limited to a battery pack to provide power to the XFC6200EX, communication equipment, solar power charger and additional I/O.

Following local codes for installation, this unit would normally be located in a Division 2 or General Purpose area. The unit may be mounted on a 2" pipe, or mounted on a flat surface, such as a wall.

The battery and solar panel are packed and shipped separately from the 6270 OEU. Before installation, inspect all power cables, where they terminate, and connector for breakage.

Before you begin, review the procedure and the materials required for installation.



This device is NOT intended to be used in a Class I, Division I environment. The XFC6200EX is designed for Class I, Division I with explosive gas in the area. The Battery Box and Solar Panel are not intended for that application.

Pipe Mount

Enclosure mounting brackets and fastening hardware are supplied with unit. Customer must provide 2" pipe of suitable length (see Figure 2–11).

If a charging source, such as a solar panel is desired, this procedure may be configured to mount the solar panel on the upper portion of the pipe.

Continued on Next Page

6270 Optional Equipment Unit Installation, Cont.

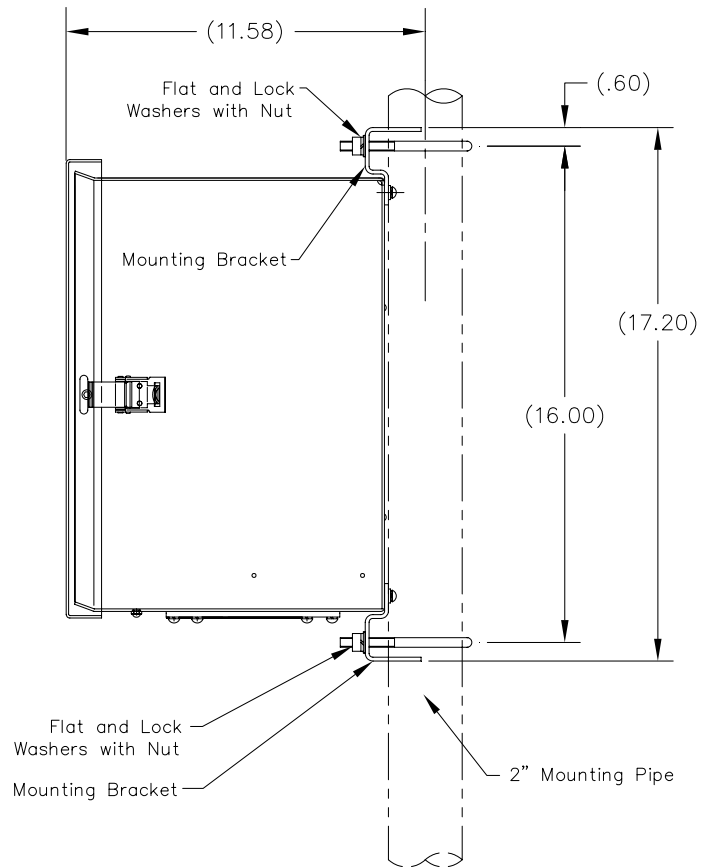


Figure 2–11 6270 OEU Pipe Mounting Installation

Instructions



Instructions assume that customer has completed installation of the 2" pipe.

Step	Procedure
1.	Using instructions supplied with mounting kit, attach bracket to back of enclosure unit.
2.	Position unit on 2" mounting pipe (Part No. 2000089) and secure in place with two U-bolts, flat washers, lock washers and two bolts (see Figure 2–11).

Continued on Next Page

6270 Optional Equipment Unit Installation, Cont.

Wall Mount

Before you begin, review the procedure and the materials required for installation. Typical installation should be similar to figure 2–12.

Enclosure mounting brackets and fastening hardware are supplied with unit.

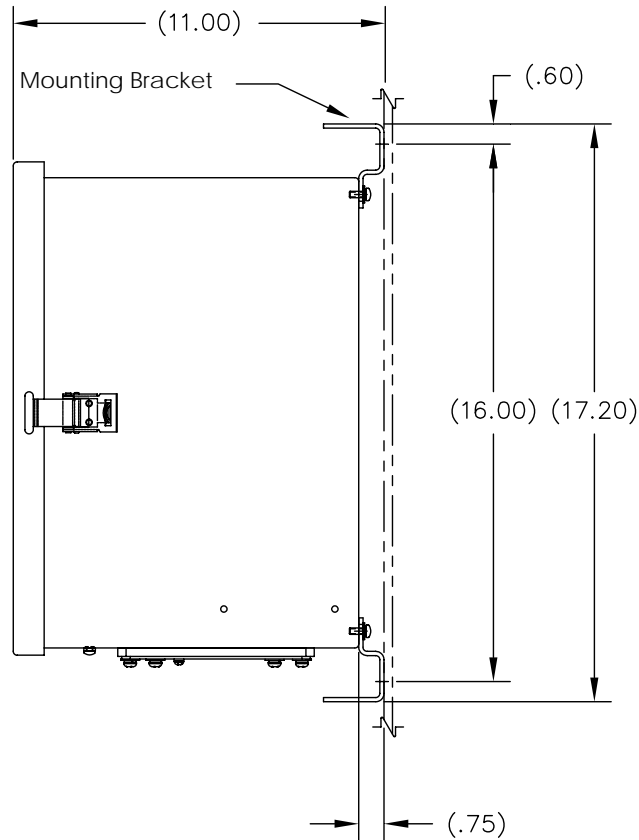


Figure 2–12 6270 OEU Wall Mounted Installation

Instructions

Step	Procedure
1.	Using instructions supplied with mounting kit, attach bracket to back of enclosure unit.
2.	Prepare wall surface for mounting, and mount the enclosure to wall.

Battery Pack Installation

If optional 6270 OEU Enclosure is used (see Figure 2–13), and its configured to include a battery pack use the following instructions.

The battery is packed and shipped separately from the 6270 OEU. Before installation, inspect power cables located inside the 6270 OEU where they terminate on battery pack, and connector for breakage.

Before you begin, review the procedure and the materials required for installation.

FYI



To extend the life of the Battery pack, fully charge the battery prior to installation. Systems using solar panels, may not fully charge the battery. Charging the battery fast will remove the oxide buildup and will improve the life of the battery.

CAUTION



DO NOT over charge the Battery Pack.

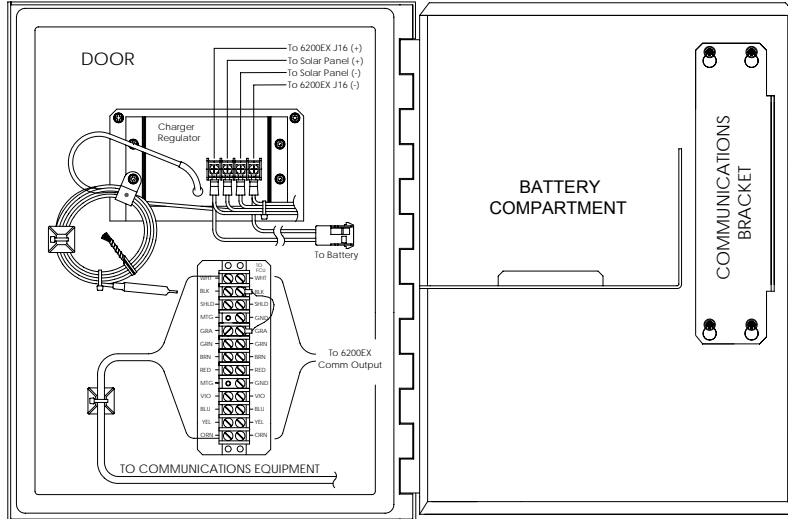


Figure 2–13 Optional 6270 OEU Enclosure

Instructions

Step	Procedure
1.	Insert battery pack into the battery compartment (see Figure 2–13) with the long dimension of battery facing outward.
2.	Connect Battery Pack connector to the battery connector mate wired to the Charger Regulator.
3.	If XFC6200EX unit is already wired to 6270 enclosure, LCD screen should display a warm start.

Solar Panel Installation

The Solar Panel is designed for outdoor mounting on a 2" extension pipe installed on upper end of 6270 OEU 40" mounting pipe (see Figure 2–14). The Solar panel must be mounted within 12 feet of 6270 enclosure (other lengths available). For wall mounted enclosures it can be mounted on top or side of meter house.



Do not connect the solar panel power cable to the Charger Regulator located in the 6270 enclosure unless main Battery Pack has been connected. Refer to previous section on Battery Pack Installation.

Exercise caution when installing the Solar Panel, so as not to damage it.

FYI



For Solar Panel installations where panel is mounted on top of or side of a meter house, please insure that panel receives full sun all day. When mounted, Solar Panel will face up from horizon at 50° angle and southerly in direction.



This device is NOT intended to be used in a Class I, Division I environment. The XFC6200EX is designed for Class I, Division I with explosive gas in the area. The Battery Box and Solar Panel are not intended for that application.

Material not Supplied

- Cable ties

Materials Supplied

- One Solar Panel
- Two U-Bolts and fastening hardware
- Solar panel cable (if not already attached)
- Solar Panel Mounting Bracket (if not already attached to Solar Panel)
- Pipe Mounting Kit (Part No. 2000089)

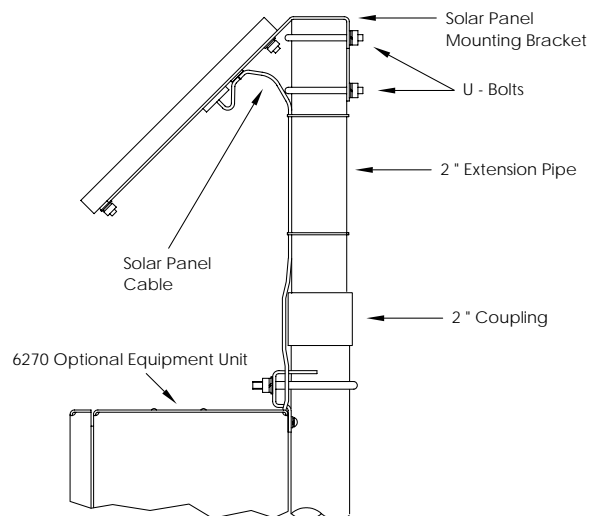


Figure 2–14 Solar Panel Installation

Continued on Next Page

Solar Panel Installation, Cont.

Instructions

Step	Procedure
1.	Attach 2" pipe Coupling to top end of 6270 OEU mounting pipe. Securely tighten.
2.	Install 2" pipe extension into Coupling and securely tighten.
3.	Check solar panel using Digital MultiMeter to verify polarity and output voltage. Voltage will vary depending on amount of sun, angle to sun, etc.
4.	Install Solar Panel on mounting bracket, if required, with provided hardware. Install Solar Panel Cable if required.
5.	Attach Solar Panel mounting plate to top end of 2" extension pipe with U-bolts and associated mounting hardware. Do not tighten U-bolts until Solar Panel has been correctly orientated.
6.	For northern hemispheres, position Solar Panel facing South, for southern hemispheres, position Solar Panel facing North. For optimum charging, solar panel should not be in shadows for any portion of the day. Panel should be kept clean for maximum charging.

FYI



The sun's orientation in the sky varies from summer to winter. Keep this in mind when installing the solar panel to make sure there are no obstructions during the entire year.

7.	DO NOT connect other end of cable to 6270 OEU until instructed to do so AND main Battery Pack has been connected.
8.	Remove hole plug from OEU and install cord connector.
9.	Remove nut, sealing ring and grommet from cord connector. Slide nut, sealing ring and grommet over end of cable and insert cable through body of cord connector. Leave enough cable on the outside of the unit to allow cable to dip below the level of the access hole. This provides a path for moisture to run away from the unit to the lowest point of cable.
10.	On the inside of the enclosure, allow enough cable to comfortably extend to input terminals on Charger Regulator (see Figure 2-14).
11.	Slide nut, sealing ring and grommet to cord connector on side of unit and tighten.
12.	Before making connections to Charger Regulator, trim wire ends back 1/4".

Continued on Next Page

Solar Panel Installation, Cont.

Step	Procedure, Cont.
13.	Verify main Battery Pack is connected.
14.	Loosen securing screws on Charger Regulator, insert wire then retighten. Connect Solar Panel (+) lead to + terminal and (-) wire to - terminal.
15.	Following connection of Solar Panel power cable, secure cable to 2" extension and mounting pipe cable with plastic tie-wraps provided.

AC Charging Unit Installation

The AC Power Charging Unit maintains a constant voltage charge on installed Battery Pack. See Figure 2–15

Installation The following hardware is required to mount the AC power charging unit to 6270 OEU enclosure.

Materials Supplied

- AC Charging Unit
- Pipe nipple

Materials Not Supplied

- Plastic cable ties
- AC wiring, conduit (rigid or flexible)

FYI



To maintain system certification, all wiring must comply with NEC 501 code and applicable ABB certification drawings.

CAUTION



To prevent injury only a licensed electrician should install AC power wiring to customer supplied primary AC power source.

Instructions

Step	Procedure
1.	The AC Charging Unit is shipped separately. When unit is received, unpack and inspect all components for evidence of damage. Report damage to shipping carrier and to Totalflow's Service Department.
2.	Remove one of the plugs from the side of 6270 OEU so that AC charging unit can be mounted without obstruction; see Figure 2–15.
3.	Remove outside Lock Nut from nipple, leaving sealing ring and inside locknut..

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AC Charging Unit Installation, Cont.

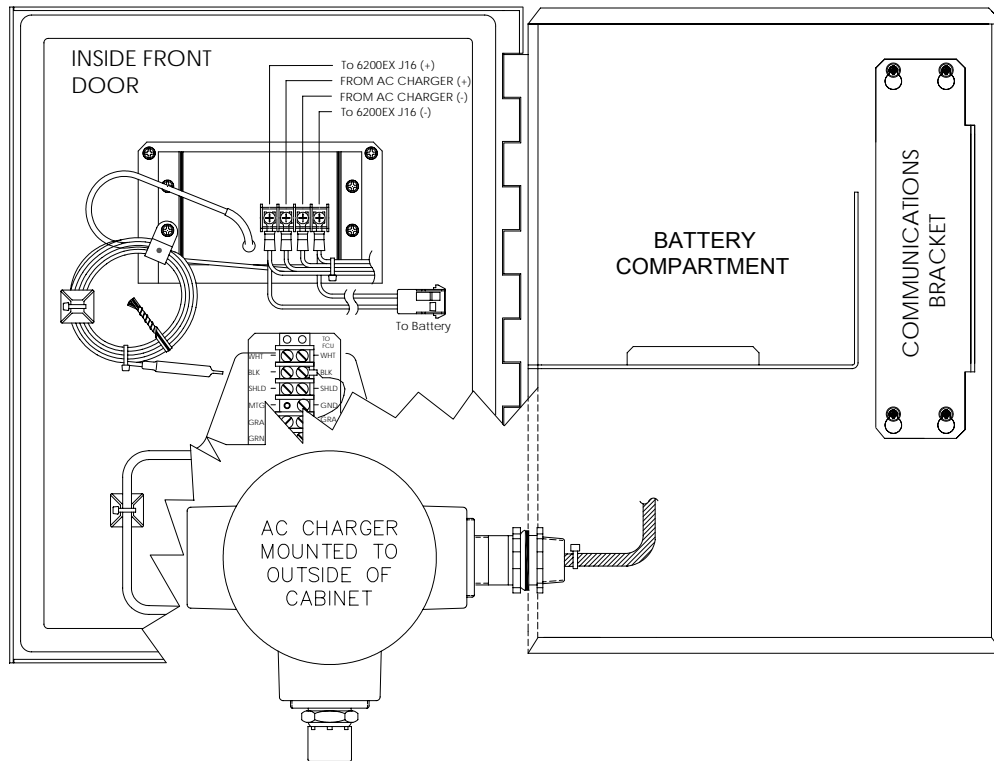


Figure 2-15 AC Charger Installed

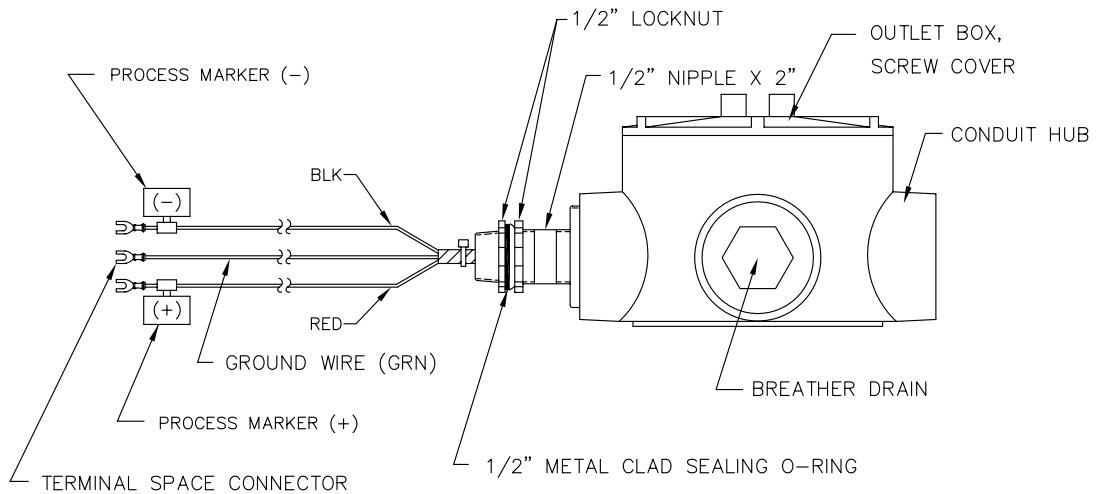


Figure 2-16 AC Charger Outlet Box Installation

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AC Charging Unit Installation, Cont.

Step	Procedure, Cont.
4.	Feed AC Charger's DC power lines into enclosure (see Figure 2-16).
5.	Insert nipple through side of enclosure and install removed lock nut.
6.	To prevent moisture from entering enclosure after installing AC Battery Pack Charger unit, be certain "O" ring side of metal backed sealing "O" ring is against enclosure.
7.	Loosen terminal screws, insert red wire into plus (+) array terminal and black wire in negative (-) array terminal (see Figure 2-17). Retighten screws.
8.	Connect green wire to one of the grounding screws located on bottom of enclosure.
9.	Pipe the conduit and associated AC wiring into the AC Charger conduit box. The AC Charger is rated at either 120 VAC 60 Hz or 240 VAC 50 Hz. Connect the 120 V hot and neutral or the two hot wires for 240 V to Terminals of the AC Charger. Connect the ground wire to the green screw.
10.	Verify that the DC power wires are terminated properly inside the 6270 OEU cabinet and that the main Battery Pack plug is already connected. Apply AC power to the AC Charger.

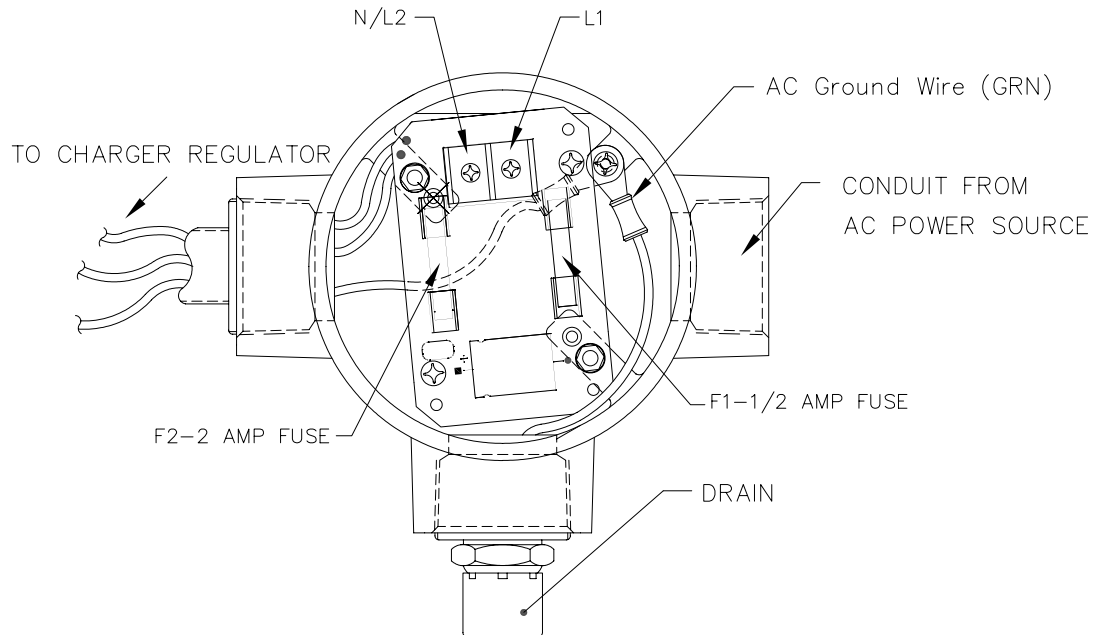


Figure 2-17 AC Charger, Inside Conduit Enclosure

Chapter 3

XFC6200EX Startup

Overview

This Chapter generally describes the steps required to get a newly installed XFC6200EX system up and running. Specific information required to complete each step (depending on your equipment choice) is discussed in the PCCU32 help files, or the Operations manual for the FS/2 Portable Calibration and Collection Unit.

Highlights In this chapter you will learn about:

Topics	See Page
Laptop Computer running PCCU32	3-2
FS/2 Handheld PCCU	3-2
Start Up and Configuration	3-3
Local Communication	3-3
Date/Time	3-3
Station ID	3-3
Location	3-3
Security System	3-4
Contract Hour	3-4
Volume Calculation Period	3-5
Log Period	3-5
Calculation Type	3-5
Super Compressibility Calculation (Fpv)	3-6
Constants	3-8
Alarm Limits	3-9
Put XFC6200EX On Line	3-9
Reset Volume	3-9
Program Display	3-10

Continued on Next Page

Overview, Cont.

FYI



Before you begin the tasks outlined in this Chapter, Chapter 2, “Installation” should be completed.

Once the unit is installed, the next step is to connect directly to the unit with a laptop or handheld FS/2 and begin the setup process. The PCCU software will actually read the device default values programmed at the factory. These preset values are based on the type of product ordered and programmed for the most widely used configuration.

Specific information required to complete each step (depending on your equipment choice) is discussed in the PCCU32 help files, or the Operations manual for the FS/2 Portable Calibration and Collection Unit.

The two equipment options for programming the XFC6200EX are the Windows based PCCU32 Software and the DOS based FS/2 device, these are discussed in more detail below.

Laptop Computer running PCCU32

PCCU32 Software running in a laptop Windows environment offers you the most options for programming the XFC. Many of the features designed into the XFC6200EX cannot be accessed by the FS/2 due to the FS/2's limited capabilities. The Windows environment features user friendly help files and easy to follow menus.

The laptop computer connects via a cable directly to the PCCU Connector on the side of the XFC6200EX or to optional Internal PCCU Connector.

FS/2 Handheld PCCU

The FS/2 Portable Calibration & Collection Unit (PCCU) is a hand held device running the DOS version of PCCU. This equipment allows the user to perform only the most basic of operations and program the minimal features of the XFC. Because the device functions in the DOS environment, help files, icons and drop down menus are not available.

The FS/2 PCCU connects via a cable directly to the PCCU Connector on the side of the XFC6200EX or to optional Internal PCCU Connector.

Start Up and Configuration

Local Communication

Using the PCCU cable supplied with your unit, attach one end to your programming device and the other end to the local communication port, then instruct the PCCU32 Software to connect to the unit.

Depending on the programming device used, the following are the minimum required entries. Specific information required to complete each step (depending on your equipment choice) is discussed in the PCCU32 help files, or the Operations manual for the FS/2 Portable Calibration and Collection Unit.

Date/Time

The XFC6200EX date and time should be set before other tube parameters are entered to ensure that events are properly dated and time tagged. Attention should be given that the date and time are set correctly and should agree with the Collection Equipment. PCCU or WinCCU can be used to update the date and time of the device.

Description	Format	Note
Date	MM/DD/YY	Must enter 2 digits each
Time	HH:MM:SS	24 hour clock

Station ID

The station identifier code should uniquely identify one XFC6200EX from that of any others.

Description	Format	Note
Station ID	XXXXXXXXXX	10 digit alphanumeric

Location

The location field can hold up to 24 alphanumeric characters to describe its location. An example would be the lease name, county name or road number.

Description	Format	Note
Location	xxxxxxxxxxxxxxxxxxxxxxxx	24 digit alphanumeric

FYI




There are additional fields stored in WinCCU for uniquely identifying the meter including fields for entering the lease holder, producer, operator and buyer. These fields reside on the host computer in the ID Manager, not in the XFC.


Security System

The XFC6200EX has a bi-level security system built in. For the purpose of this manual, we will refer to this as the Hardware Security. When the XFC6200EX is accessed through PCCU32 or WinCCU Host software packages, there is a third level of security included. We will refer to this as the Software Security.

Hardware Security The Hardware Security System is designed to have two levels of user access; 1) downloading data files, read only access, and 2) uploading application and configurations, read/write access. By default, user access is restricted from modifying the Application Table or from downloading files to the device's R: and S: Drives, but has all other user type privileges. These default privileges can be edited by the Administrator.

CAUTION  If the Security Switch S1, located on the XFC6200EX 2101471 Board, is in the OFF position, no security code has to be entered to access the operating parameters even if there is one programmed into the device.


Software Security The Software Security System is designed for the Password Administrator to set up the accounts and privileges for himself as well as all other PCCU users. These privileges include being able to instantiate applications and making changes to the configuration files, thus altering the functionality of the XFC6200EX. These are separate privileges, and may be given individually or totally. See the help files in the host software package for more information.

TIP  The XFC6200EX does not send an error message when you have breached the security level access, it simply does not accept value changes.

Description	Format	Note
Security Code	XXXX	4 digit numeric

Contract Hour

You can program the XFC6200EX to begin the contract day based on your contract or company standards. When a XFC6200EX first powers up, the contract defaults to midnight.

FYI  Midnight is 00 o'clock. If any value entered is greater than 23, will force the value to 00 (midnight).

Volume Calculation Period

Volume Calculation Period is the specified length of time between volume calculations. The Volume Calculation Period must be equally divisible into the Log Period. The default is 1 minute. This ensures that changes made to the calculations are included at the top of the next minute.

Description	Options
Volume Calculation Period	1,2,5,10,20,30,60


Log Period

Log period is the specified length of time between writing the calculated accumulated volume to record. You may record volumes from every minute up to once an hour. The default is 60 minutes. The XFC6200EX defaults to 960 log periods (40 days x 24 logs). A 5 minute log period will consume available memory in 8 days.

Description	Options
Log Period	1,2,5,10,20,30,60

Calculation Type

When the XFC6200EX is powered up initially, the default is AGA-3-1985. You have the option of setting the calculation method to AGA-3 1985, AGA-3 1992, ISO-5167 or AGA-7. Once you have determined the calculation type, you may toggle specific factors on or off depending upon their availability. Once you have selected the Calculation type, only those applicable parameters shown in Table 3–1 will be visible.

TIP  Calculation type, and many of the factors involved with setting up the calculations, are usually dictated by your sales contract or by company policy.

Continued on Next Page

Calculation Type, Cont.

Table 3–1 Configurable Calculation Factors

Calculation Parameter	AGA-3 1985	AGA-3 1992	AGA-7	ISO-5167
Fpb (Pressure Base Factor)	Yes	N/A	N/A	N/A
Ftb (Temperature Base Factor)	Yes	N/A	N/A	N/A
Fg (Specific Gravity Factor)	Yes	N/A	N/A	N/A
Fb (Orifice Factor)	Yes	N/A	N/A	N/A
Ftf (Flowing Temperature Factor)	Yes	N/A	N/A	N/A
Y (Expansion Factor)	Yes	Yes	N/A	Yes
Fr (Reynolds Number)	Yes	N/A	N/A	N/A
Fa (Orifice Thermal Expansion Factor)	Yes	N/A	N/A	N/A
Fpv (Supercompressibility Factor) ¹	Yes	Yes	Yes ²	Yes ³
Fw (Water Vapor Factor) ⁴	Yes	Yes	Yes	Yes
Faux (Full Well Stream Factor) ⁵	Yes	Yes	Yes	Yes
Cd (Coefficient of Discharge)	N/A	Yes	N/A	Yes
Fp (Fpv method = NX19 Fixed)	Yes	Yes	Yes	N/A
Ft (for Fpv method=NX19 Fixed)	Yes	Yes	Yes	N/A
Coefficient of Discharge Calc. Type	N/A	N/A	N/A	Yes ⁶
Fpc (Pressure Correction Factor)	N/A	N/A	Yes	N/A
Ftc (Temperature Correction Factor)	N/A	N/A	Yes	N/A
Fs (Fpv ² Compressibility Factor)	N/A	N/A	Yes	N/A

Super Compressibility Calculation (Fpv)

When the XFC6200EX is powered up, the calculation defaults to NX-19 Fixed FtFp. You have the option of changing the formula method to any of several other choices: NX19 Auto, NX 19 GCN or GCNM, AGA8 Gross 92 or AGA8 Detail 92. Depending upon the method you have selected, only the applicable constants shown in Table 3–2 will be visible. You may enter specific values for each item depending upon whether you would like to use fixed or live analysis data.

Continued on Next Page

¹ NX19 GCN, NX19 GCNM, AGA-8 1992 Gross and AGA-8 1992 Detail

² See Fs for AGA-7 Fpv²

³ Only AGA-3 1992 Gross and Detail.

⁴ Not an AGA factor. Fw is a factor which compensates for water vapor in the gas stream and its affect on volume measurements.

⁵ Not an AGA factor. Faux is a user set multiplier to compensate for liquids in the gas stream, defaults to 1.

⁶ Discharge Coefficient Type-only AGA-3 1992 and ISO-5167-1

Super Compressibility Calculation (Fpv), Cont.



Many decisions involved with setting up the Fpv are dictated by your sales contract or based on company policy.

Table 3–2 Fpv Analysis Data

Analysis Data	Default Value	Units	NX19 Fixed FtFp	AGA-8 1992 Detail	All Others ⁷
Fp (for Fpv method NX19 Fixed)	1.000		Yes	No	No
Ft (for Fpv method NX19 Fixed)	1.000		Yes	No	No
Heating value ⁸	1000.0000	BTU/SCF	Yes	Yes	Yes
Argon	0.0000	mol %	No	Yes	No
Carbon dioxide CO2	0.0000	mol %	Yes	Yes	Yes
Carbon Monoxide	0.0000	mol %	No	Yes	No
Ethane	0.0000	mol %	No	Yes	No
H2S	0.0000	mol %	No	Yes	No
Helium	0.0000	mol %	No	Yes	No
Hydrogen	0.0000	mol %	No	Yes	No
iButane	0.0000	mol %	No	Yes	No
iPentane	0.0000	mol %	No	Yes	No
Methane	100.000	mol %	No	Yes	Yes
nButane	0.0000	mol %	No	Yes	No
nDecane	0.0000	mol %	No	Yes	No
nHeptane	0.0000	mol %	No	Yes	No
nHexane	0.0000	mol %	No	Yes	No
nitrogen N2	0.0000	mol %	Yes	Yes	Yes
nNonane	0.0000	mol %	No	Yes	No
nOctane	0.0000	mol %	No	Yes	No
nPentane	0.0000	mol %	No	Yes	No
Oxygen	0.0000	mol %	No	Yes	No
Propane	0.0000	mol %	No	Yes	No
Water H2O	0.0000	mol %	No	Yes	No
Specific Gravity	0.6000	N/A	Yes	Yes	Yes

⁷ NX19 GCN, NX19 GCNM, AGA-8 1992 Gross

⁸ Enter the Heating Value in Btu per SCF. Not used in volume calculations. Only used for calculating MMBTU for reports.

Constants

On a single tube meter, there are certain constants or parameters that you may need to enter or change from the default values. Depending upon the calculation type you have selected, only the applicable constants shown in Table 3–3 will be visible.

Table 3–3 Meter Constants

Parameter	Default Value	Units	Configurable			
			AGA-3 1985	AGA-3 1992	AGA-7	ISO-5167
Auxiliary Factor (Faux)	1.0		Yes	Yes	Yes	No
Barometric Pressure		PSIA	Yes	Yes	Yes	No
DP zero cutoff	0.0000	In. H2O	Yes	Yes	No	No
Meter Factor (Fb Basic Orifice Factor)	210.2300		Yes	No	No	No
Orifice Coefficient of Expansion	9.2500	In. per Deg. F	No	Yes	No	Yes
Orifice diameter	1.0000		Yes	Yes	No	No
Orifice Material	Stainless		Yes	No	No	No
Pipe Coefficient of Expansion	6.2000	In. per Deg. F	No	Yes	No	Yes
Pipe diameter	2.0670		Yes	Yes	No	No
Pressure Base (Contract)	14.7300	PSIA	Yes	Yes	Yes	No
Specific Heat Ratio	1.3000		Yes	Yes	No	No
Tap Location	Upstream		No	No	No	No
Tap Type	Flange Taps		Yes	No	No	No
Temperature Base (Tb)	60.0000	Degrees F	Yes	Yes	Yes	No
Viscosity	0.0103	Centipoises	Yes	Yes	No	No
Z of air at base condition	0.9996		No	Yes	No	No
Fixed Cd	.6		No	Yes	No	Yes
Barometric Pressure (Contract)	14.73	PSIA	No	No	Yes	No
K Factor (Vol. of Gas per Pulse)	1.0		No	No	Yes	No

Alarm Limits

You have the ability to set XFC6200EX Alarm Limits for the parameters listed in Table 3–4. There are many purposes for setting these limits. i.e. Controlling well output, or sending digital signals.

Table 3–4 Alarm Limits

Parameter	Default Value	Units	Configurable			
			AGA-3 1985	AGA-3 1992	ISO-5167	AGA-7
DP High Limit	2047.9688	In H2O	Yes	Yes	Yes	N/A
DP Low Limit	0	In H2O	Yes	Yes	Yes	N/A
Flow Rate High Limit	1,000,000	SCF/Hr	Yes	Yes	Yes	Yes
Flow Rate Low Limit	0	SCF/Hr	Yes	Yes	Yes	Yes
RTD High Limit	420	Degrees F	Yes	Yes	Yes	Yes
RTD Low Limit	0	Degrees F	Yes	Yes	Yes	Yes
SP High Limit	2047.9688	PSIA	Yes	Yes	Yes	Yes
SP Low Limit	0	PSIA	Yes	Yes	Yes	Yes
Uncorrected Vol. High Limit		ACF	N/A	Yes	Yes	Yes
Uncorrected Vol. Low Limit		ACF	N/A	Yes	Yes	Yes

Put XFC6200EX On Line



To avoid a calibration shift, carefully follow these instructions.

Instructions

Close the vent to atmosphere valve and open both bypass valves. This stabilizes the pressure on both sides of the cell. Your XFC6200EX should read zero. If not, refer to the calibration section in Chapter 4. Begin to SLOWLY open the high side orifice tap valve from the meter run. Then SLOWLY open the low side valve. Once both the high and low sides are completely open, you may close both bypass valves and open vent valves.

Reset Volume

Since the XFC6200EX volume calculations are made each vol calc period, any changes you make during the period would affect the volume calculations and be introduced into the calculations. To avoid introduced errors, it is recommended that Reset Volume command be used. This command forces the XFC6200EX to perform volume calculations for the elapsed time since a previous volume calculation was made. A new partial period volume is added to the volume accumulator, which is logged as an event before it is reset to zero (0).

Continued on Next Page

Reset Volume, Cont.

- Description** When you reset the volume accumulator the XFC6200EX will:
- Store time, date and previous accumulated partial calc period volume into the historical record file.
 - Zero the remaining partial calc period accumulation.
 - Complete all computations for the present flow file daily record.
 - Begin a new flow file daily record.
 - Zero total volume accumulator and log the event with an accumulator value before zeroing out accumulator.

Program Display

The single tube XFC6200EX comes from the factory with a set default displays (see Table 3–5). By default, each display item remains on the display for 5 seconds. You have the ability to change this default to zero (item not displayed) or any value from 1 to 255 seconds. You are also able to change the engineering units, and data format for display purposes. Further instructions on programming the display system can be found in the PCCU32 Help Files. All display items and item groups are user programmable and may be displayed by user defined parameters.

Table 3–5 XFC6200EX Displayed Items

Description	Format	Note
DATE/TIME	MM/DD/YY HH:MM:SS	24 hour clock
YEST DP LO	NN PERCENT	Yesterday's Percent DP Low Limit Percent time below DP Low Set Point
YEST DP HI	NN PERCENT	Yesterday's Percent DP High Limit Percent time below DP High Set Point
FLOWRATE	NNNNNN.N SCF/HR	Current Flow Rate Programmable SCF or MCF or MMCF
ACCUM VOL	NNNNNN.NN MCF	Total Accumulated Volume Programmable SCF or MCF or MMCF
BATTERY	NN.N VOLTS	Battery Voltage Volts
DIFF PRESS	NNN.N IN. H2O	Differential Pressure Inches H2O
STATIC PRESSURE	NNN.N PSIA	Static Pressure Static PSIA
FLOW TEMP	NN.N DEG. F	Flowing Temperature °F
YEST VOL	NNNN.N MCF	Yesterday's Volume Programmable SCF, MCF or MMCF
PERIOD VOL	NNNN.N SCF	Previous Period Volume Last volume calculation period volume
Orifice Diameter	N.NNNN INCHES	Diameter of installed orifice
STATION ID	XXXXXXXXXX	10 Character alphanumeric identifier
DEVICE ID	XXXXXXXXXX	10 Character alphanumeric application or tube identifier

Chapter 4

XFC6200EX Maintenance

Overview

This Chapter provides you with standard Maintenance instructions for removal and installation of XFC6200EX components.

How to Use This Chapter We recommend that you develop a regularly scheduled maintenance program. By establishing a maintenance program, XFC6200EX downtime can be minimized.

Record all items within this Chapter, in the maintenance practice procedures. Practical experience permits updating this schedule over a period of time. This results in many maintenance items being handled on a routine basis before potential problem(s) arise.

Highlights In this chapter you will learn about:

Topic	See Page
Backing up Configuration Files	4-2
Restoring Configuration Files	4-3
Changing XFC6200EX Clock	4-3
Replacing Battery Pack	4-4
Replacing Liquid Crystal Display (LCD) Board	4-6
Internal PCCU Connector Disassembly	4-9
Replacing Lithium Battery	4-10
Replacing Transducer (EXIMV) and Main Processor Board	4-12
Calibration Overview	4-15
Static Pressure (SP) Calibration Checks	4-16
Differential Pressure (DP) Calibration Checks	4-18
Calibrating Static Pressure (SP)	4-19
Calibrating Differential Pressure (DP)	4-22
Zero Transducer	4-23
RTD Bias	4-24
How to Change Orifice Plate	4-24

Continued on Next Page

Overview, Cont.

Maintenance Support

If installation, calibration and maintenance assistance is required, user can contact the Totalflow Service Department.

USA: (800) 442-3097 or International: 001-918-338-4880

Returning Part(s) for Repair

Before returning a component, call for a Return Authorization Number (RA). If a Totalflow® electronic component is to be returned for repair, securely wrap it in protective anti-static packaging. Affix the RA number to the outside of return package. Parts shipments must be prepaid by customer. Any part, not covered by original System Warranty, will be shipped to customer, F.O.B.

Backing up Configuration Files

Before you begin any maintenance on your XFC, you should collect the data and back up all configuration files to your laptop's hard drive or a floppy disk. This safeguards your data and allows you to re-start the unit without the hassle of re-configuring the XFC6200EX should any problem arise.

Although there are "Save" buttons in the Entry Mode screens which allows the user to backup "Entry" mode data items, a complete system backup is only accomplished by using the "Save and Restore Utility". When using this utility to backup files, the user should also download the files to the S: Drive in case of a "Cold" start.

Instructions

Step	Procedure
1.	Collect data from unit.
2.	While in PCCU, use the "Save and Restore Utility" found under "File Utilities" in the "Operate" drop down menu or by clicking the "Save and Restore Utility" button on the toolbar.
3.	In the "Save and Restore" window, click the "Save Station Files" button.
4.	When the "Save Station Files" window appears, verify the default name and path for the files. Click OK, this will save the R: drive files.
5.	When finished saving the Station Files, a new window will offer the option to Restore the Station Files to the S: Drive. If you select Yes, the Station Files will be downloaded to the S: Drive.

Restoring Configuration Files

Following some maintenance procedures or when configuration files need to be downloaded to the Flow Computer, the Restore function will accomplish this.

If prior to performing maintenance, the Save Configuration Files was used, these files were downloaded to your laptop's hard drive or on a floppy disk. The Restore function downloads these files into the Flow Computer's S: Drive. This safeguards your data and allows you to re-start the unit without the hassle of re-configuring the XFC6200EX should any problem arise.

Instructions

Step	Procedure
1.	While in PCCU, use the "Save and Restore Utility" found under "File Utilities" in the "Operate" drop down menu or by clicking the "Save and Restore Utility" button on the toolbar.
2.	In the "Save and Restore" window, click the "Restore Station Files" button.
3.	When the "Restore Station Files" window appears, verify the default name and path for the files. Click OK, this will restore the files to the S: Drive.
4.	Verify unit is functioning properly.

Changing XFC6200EX Clock

When any measurement applications are instantiated on the XFC, changing the clock could affect the time when log period entries are made. To protect integrity of accounting audit trails, the XFC6200EX handles these types of clock changes as follows:

FYI



Examples are based on a 60 minute Log Period

**Clock Change
Not Crossing a
Log Period
Boundary:**

When next log period entry is made, clock is not altered.

Example: If present time is 4:15 p.m. and clock is changed to 4:05 p.m. of the same day, the daily flow record is the same. Entry reflects accumulation over a 70 minute time period (15 minutes plus 55 minutes).

Continued on Next Page

Changing XFC6200EX Clock, Cont.

Forward Clock Change Crossing a Log Period Boundary: Forces a log period entry for part of the log period that has accumulated since last log period entry. XFC6200EX then advances to a new data flow record and begins maintaining the balance of day's data in newly defined boundary.

Example: If present time is 4:55 p.m. and clock is changed to 5:05 p.m. of the same day, the entry reflects only a 55 minute average accumulation. Then a new flow record is written and this period is also based on a 55 minute accumulation.

Backward Clock Change Crossing a Log Period Boundary: Forces a log period entry for part of the log period that has accumulated since last log period entry. This is same as for a Forward Clock Change Crossing an Hourly Boundary. XFC6200EX advances to a new day's data flow record and maintains balance of day's data in new record.

Example: If present time is 5:05 p.m. and clock is changed to 4:55 p.m. of the same day, the log period record entry reflects only a 5 minute average accumulation (5:00 to 5:05). Then a new flow record is written and this log period is based on a 5 minute accumulation (4:55 to 5:00).

FYI



A backward clock change uses two (2) daily records to maintain data integrity. This assures that previously recorded data is not overwritten.

If it is necessary to make small backward time changes, less than one (1) hour, user should wait until current hour has progressed far enough to make change that does not cross an hour boundary.

Replacing Battery Pack

This section presents the procedures for removal and installation of the Battery Pack located inside the 6270 OEU. To access the Battery Pack, open door (see Figure 4-1). Battery Pack is located in the upper portion of the chamber, on top of the battery shelf.

Instructions

Step	Procedure
1.	Collect data from unit.
2.	Back up configuration files following the instructions listed previously in this chapter titled: Backing Up Configuration Files.
3.	Verify "LL" battery alarm is not being displayed on XFC6200EX's display. This prevents any data stored in RAM from being lost when power is removed.

Continued on Next Page

Replacing Battery Pack, Cont.

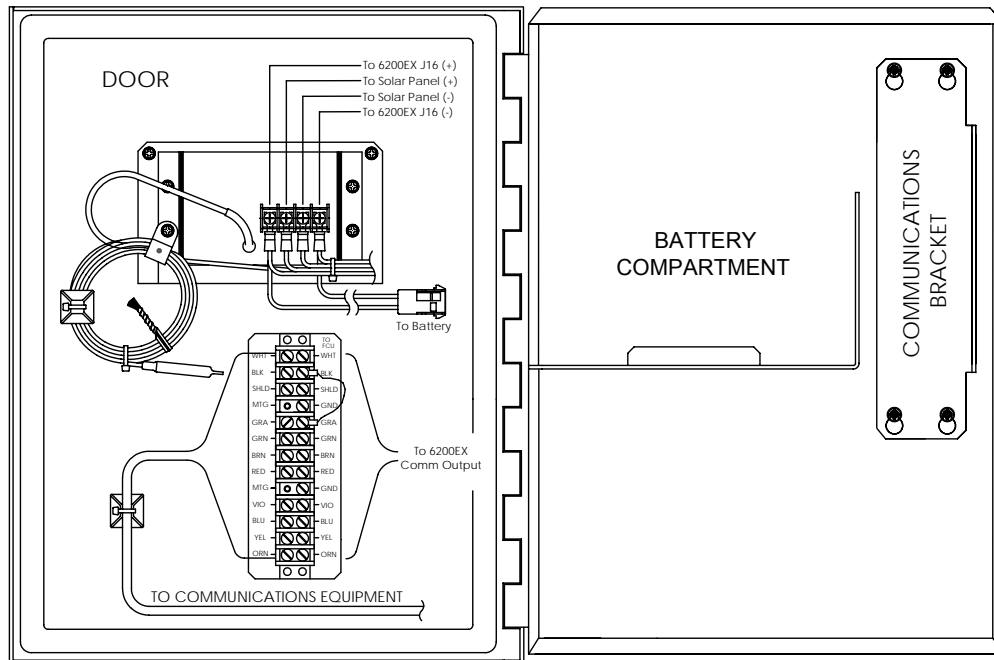


Figure 4-1 6270 OEU Configuration

Step	Procedure, Cont.
4.	Disconnect Charging Source from Charger Regulator.
5.	Disconnect the Battery Pack Cable connector going to the Charger Regulator.
6.	Remove Battery Pack from battery compartment.
7.	Remove terminal lugs from battery and place on new battery being sure to connect the red wire to the positive (+) side and black wire to the negative (-) side.
8.	Insert Battery Pack into compartment. Insert Battery Pack so that it's terminals are not touching any metal surface inside of the unit.
9.	Reconnect Battery Pack Cable connector to Charger Regulator.
10.	Reconnect Charging Source to Charger Regulator.
11.	Monitor LCD for normal operational readings and Battery Voltage.

Replacing Liquid Crystal Display (LCD) Board

The LCD Board is mounted inside of XFC6200EX front end cap. To access and remove Display Board, perform the following procedures.



DO NOT remove the Lithium battery since it provides power to RAM. It is recommended that historical flow data be downloaded before accessing and removing LCD Board to prevent potential loss of stored data.

Instructions

Step	Procedure
1.	Collect data from unit.
2.	Back up configuration files following the instructions listed previously in this chapter titled: Backing Up Configuration Files.
3.	Verify "LL" battery alarm is not being displayed on XFC6200EX LCD.
4.	Gain access to rear Termination Board by loosening the Countersunk Hex Socket Locking Set Screw in the rear end cap using a 1/16" Hex wrench, then unscrewing the end cap.
5.	Disconnect the Power connector J16 from the board mounted connector (see Figure 4-2).

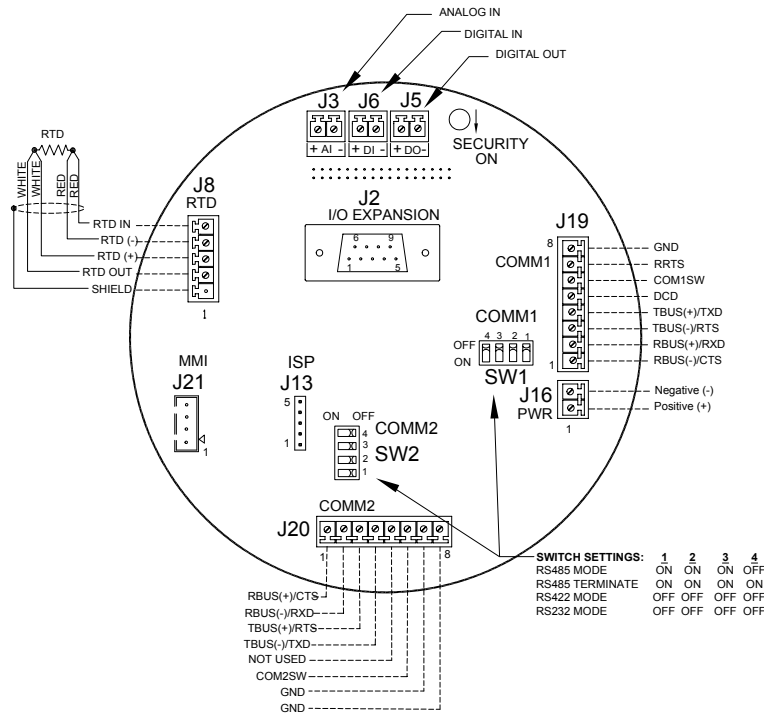


Figure 4-2 Termination Board (2101873-xxx)

Continued on Next Page

Replacing Liquid Crystal Display (LCD) Board, Cont.

Step	Procedure, Cont.
6.	Gain access to LCD Assembly by loosening the Countersunk Hex Socket Locking Set Screw in the front end cap using a 1/16" Hex wrench, then unscrewing the end cap.
7.	Using a #2 Phillips Head screwdriver, remove two Flat Head Screws. This releases the Display Overlay and Graphic Overlay Plate (see Figure 4-3).
8.	Using a 7/64" Hex Head wrench, remove three Hex Socket Screws. This removes the Display Mounting Plate/Shield.
9.	Disconnect LCD Board cable J2 connector on Main Processor Board (see Figure 4-4).
10.	Using a 3/16" Hex nut driver, remove 4 nylon Hex Nuts that hold the LCD screen and board in place on Display Mounting Plate/Shield.

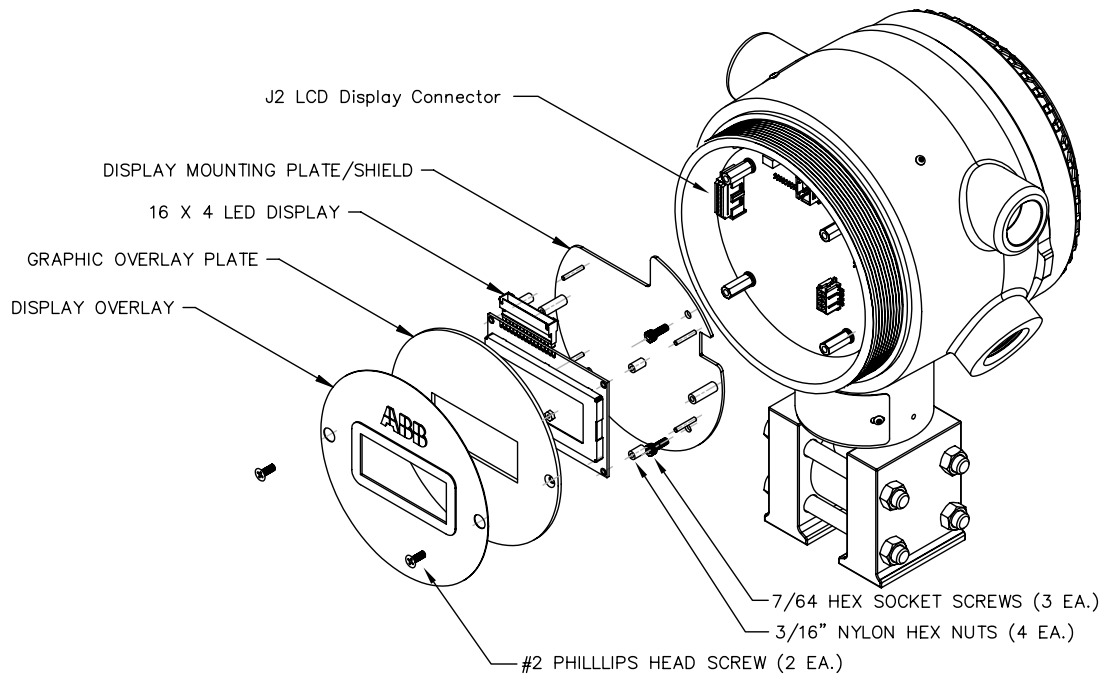


Figure 4-3 Liquid Crystal Display (LCD) Assembly

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Replacing Liquid Crystal Display (LCD) Board, Cont.

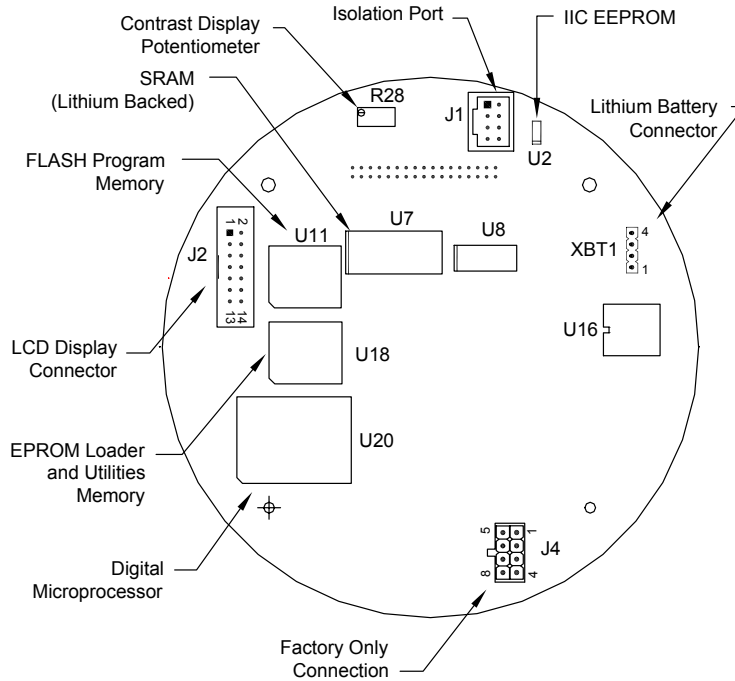


Figure 4–4 Main Processor Board Primary Component Side (2101471-xxx)

Step	Procedure, Cont.
11.	Lift Board from Plate. If Board is being returned to Totalflow for service, it is recommended that attached ribbon cable be left connected and returned with Display Board.
12.	To reinstall Display Board, perform procedures 6 to 10 in reverse order. DO NOT over tighten screws.



Please note that display ribbon cable pin 1 wire is red. On LCD Display Board, the red edge (pin 1) of cable should plug onto the outer most edge of connector, closest to edge of board. On Main Processor Board, red edge of cable should be to the top of on board connector.

13.	Once Display Board is reinstalled, apply power to XFC6200EX (Step 5) and verify information displayed on LCD is correct.
14.	Adjust contrast potentiometer R28 for optimum display.
15.	Replace Graphic Overlay Plate, removed in step 7.



If LCD is being re-assembled following replacement of the main processor board, you may need to adjust the display's contrast. To adjust display contrast, use an extra small screw driver to turn potentiometer R28 (see Figure 4–3) completely clockwise, then move screw back counter clockwise until screen is readable.

Internal PCCU Connector Disassembly

Depending upon the configuration of your system, you may need to uninstall and reinstall an internal PCCU mounting plate (see Figure 4–5) to have access to internal components . If an external PCCU connection exists, you will not need to use these instructions. You may be directed to these instructions from another procedure; if so, return to the next step in your original instructions.

Instructions

Step	Procedure
1.	Gain access to rear Termination Board by loosening the Countersunk Hex Socket Locking Set Screw in the rear end cap using a 1/16" Hex wrench, then unscrewing the end cap.
2.	Remove the 4 Phillips Screws located at the four corners of the mounting plate as shown in Figure 4–2.
3.	Lift mounting plate away from unit, being careful to not disconnect PCCU cable from Termination Board.
4.	Disconnect the Power connector J16 from the board mounted connector. DO Not disconnect if you are replacing the Lithium Battery in unit.
5.	Disconnect cable from Termination Board at J21.

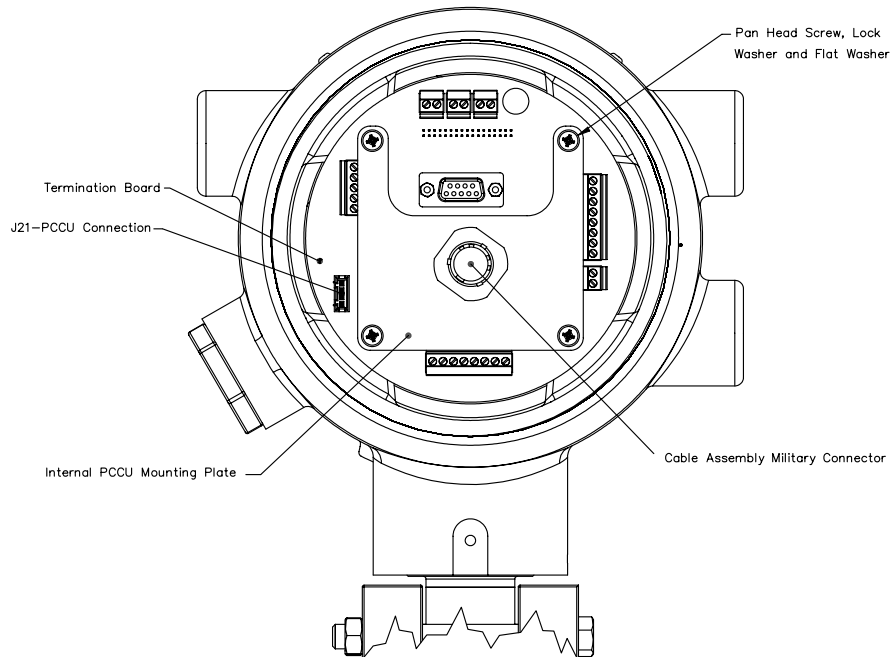


Figure 4–5 Internal PCCU Assembly

Internal PCCU Connector Disassembly, Cont.

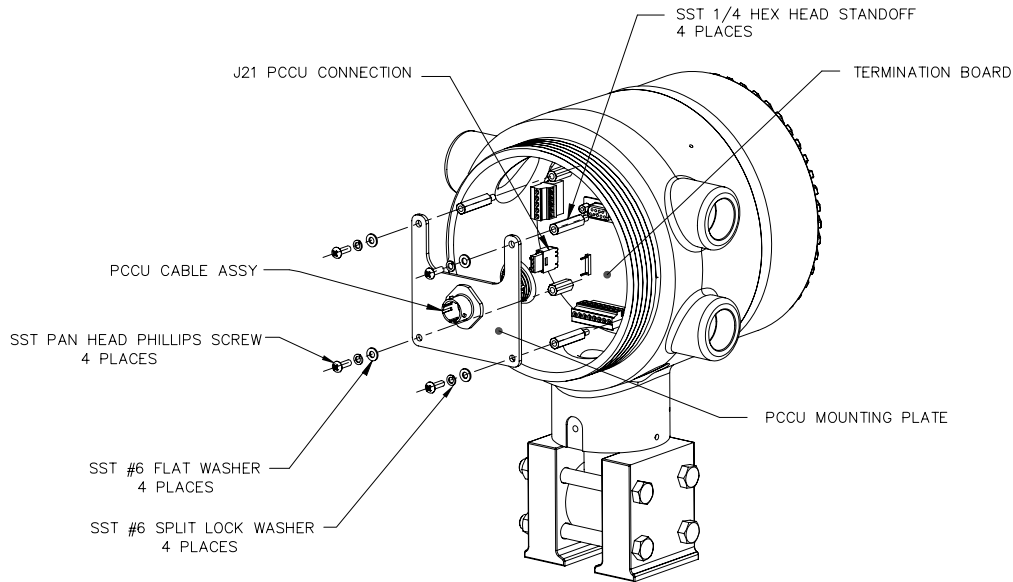


Figure 4–6 Internal PCCU Connector Disassembly

Replacing Lithium Battery

Instructions



Step	Procedure
	DO NOT REMOVE POWER TO UNIT! Loss of power to unit will perform a Cold Start. All data and configuration files will be destroyed.
1.	Collect Data from unit.
2.	Back up configuration files following the instructions listed previously in this chapter titled: Backing Up Configuration Files.
3.	Gain access to Main Processor Board by loosening the Countersunk Hex Socket Locking Set Screw in the front end cap using a 1/16" Hex wrench, then unscrewing the end cap.
4.	Using a #2 Phillips Head screwdriver, remove two Flat Head Screws. This releases the Display Overlay and Graphic Overlay Plate (see Figure 4–3).

Continued on Next Page

Replacing Lithium Battery, Cont.

Step	Procedure, Cont.
5.	Using a 7/64" Hex Head wrench, remove three Hex Socket Screws. This removes the Display Mounting Plate/Shield.
6.	Disconnect LCD Board cable J2 connector on Main Processor Board (see Figure 4-4).
7.	Unplug Lithium Battery connector XBT1 from the front of Main Processor Board (see Figure 4-4).
8.	Using a 1/4" Nut Driver, remove the 4-Hex Head Standoffs.
9.	Gently lift Main Processor Board out of enclosure, being careful to NOT pull on Termination Board Connector Cable and EXIMV Cable located on the backside of board.
10.	Gently remove Lithium Battery from Velcro tape attached to back side of Main Processor Board (see Figure 4-7).
11.	Attach Velcro edge of new Lithium Battery to Velcro strip on back side of Main Processor Board.
12.	Reinstall Main Processor Board.
13.	Reinstall LCD cable connector to J2 connector on Main Processor Board.
14.	Reinstall Display Mounting Plate/LCD Board (see Figure 4-3).
15.	Reinstall Graphic Overlay Plate.

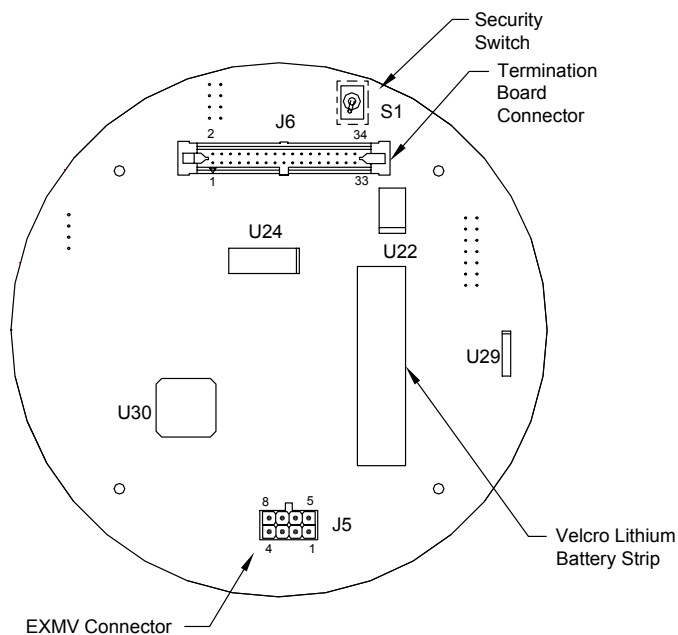


Figure 4-7 Secondary Component Side of Main Processor Board (2101471-xxx)

Replacing Transducer (EXIMV) and Main Processor Board

Part Number 2101465-xxx is the EXIMV (transducer) designed for XFC6200EX. The transducer characterization files are stored in the Main Processor Board (2101471-xxx), therefore, replacement/repair involves removing both the transducer and the Main Processor Board from the actual Flow Computer. Contact Totalflow to return BOTH pieces for replacement under warranty or for repair.

Please take care to follow the precise instructions.

Figure 4–8 shows a front and side view of the EXIMV as installed in the XFC6200EX unit.



Entry into interior of transducer, voids transducer warranty. If the transducer requires servicing, the entire assembly must be removed from the unit, securely packaged for shipping and returned to Totalflow. Please contact Totalflow Customer Service for instructions.

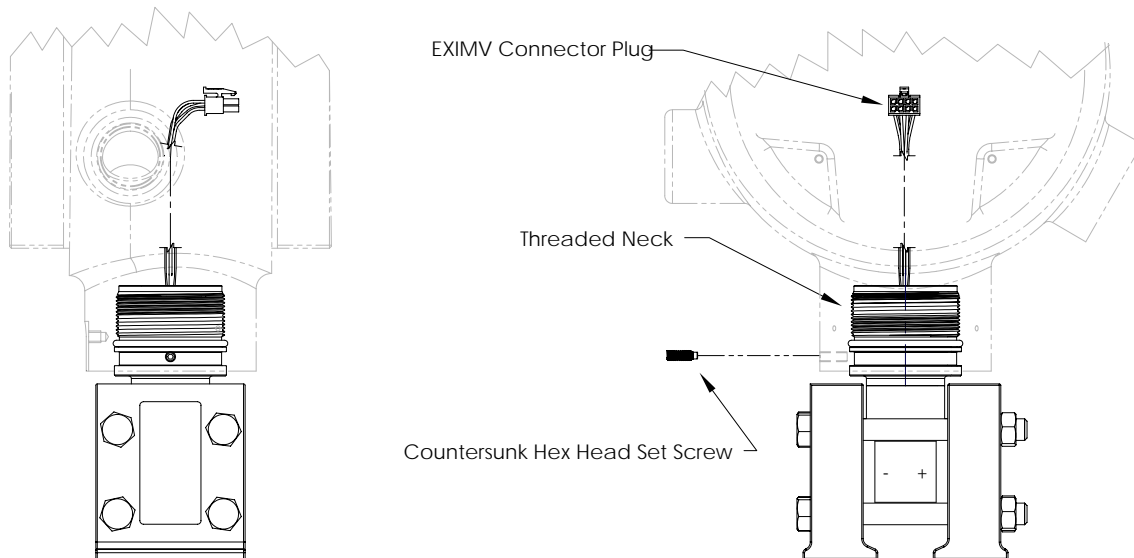


Figure 4–8 EXIMV Installation Overview

Instructions

Step	Procedure
1.	Collect Data from unit.
2.	Back up all configuration and data files. While in PCCU, use the “Save and Restore Utility” found under “File Utilities” in the “Operate” drop down menu or by clicking the “Save and Restore Utility” button on the toolbar.
3.	In the “Save and Restore” window, click the “Save Station Files” button.

Continued on Next Page

Replacing Transducer (EXIMV) and Main Processor Board, Cont.

Step	Procedure, Cont.
4.	When the “Save Station Files” window appears, verify the default name and path for the files. Click OK, this will save the R: drive files.
5.	When finished saving the Station Files, a new window will offer the option to Restore the Station Files to the S: Drive, select No.

FYI



Although there are “Save” buttons in the Entry Mode screens which allows the user to backup “Entry” mode data items, a complete system backup is only accomplished by using the “Save and Restore Utility”.

6.	Open manifold high/low equalizer valves (see Figure 4–9).
7.	Using orifice tap valves, close off both upstream and downstream. These two valves connect Meter Run high/low output lines to transducer.
8.	Open vent valve to atmosphere.
9.	Completely disconnect high/low manifold lines from transducer.
10.	If able to do so at this time, remove external power feeding the unit, skip to step 14. Otherwise continue to the next step.

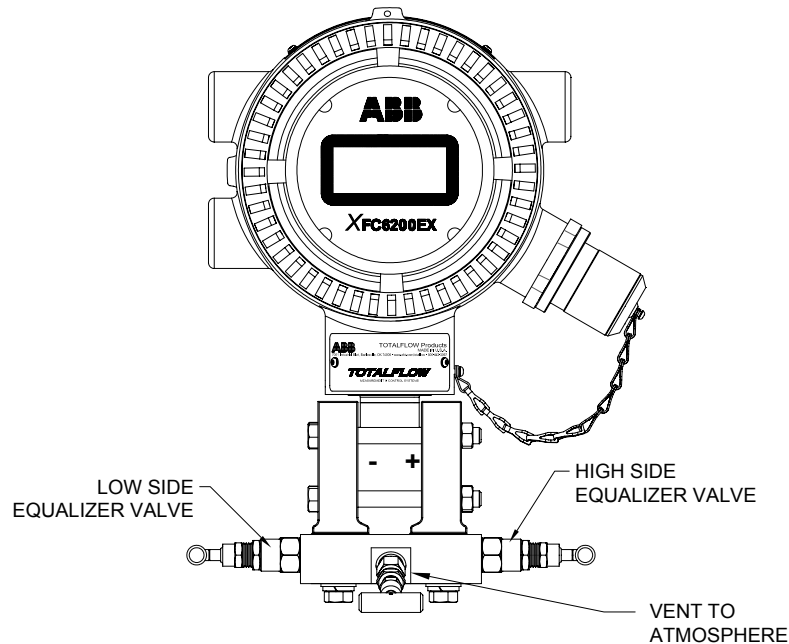


Figure 4–9 Flow Computer with Block Manifold

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Replacing Transducer (EXIMV) and Main Processor Board, Cont.

Step	Procedure, Cont.
11.	Gain access to rear Termination Board by loosening the Countersunk Hex Socket Locking Set Screw in the rear end cap using a 1/16" Hex wrench, then unscrewing the end cap.
12.	Remove Internal PCCU Assembly, if required, following instructions previous to this section "Internal PCCU Connector Disassembly". Return here when completed.
13.	Disconnect the Power connector J16 from the board mounted connector.
14.	Gain access to rear Front Display Assembly and Main Processor Board by loosening the Countersunk Hex Socket Locking Set Screw in the rear end cap using a 1/16" Hex wrench, then unscrewing the end cap.
15.	Using a #2 Phillips Head screwdriver, remove two Flat Head Screws. This releases the Display Overlay and Graphic Overlay Plate (see Figure 4-2).
16.	Using a 7/64" Hex Head wrench, remove three Hex Socket Screws. This removes the Display Mounting Plate/Shield.
17.	Disconnect LCD Board cable J2 connector on Main Processor Board.
18.	Using a 1/4" Hex Head wrench, remove 4 Hex Head Standoffs holding Main Processor Board in place.
19.	Gently lift Main Processor Board out of enclosure, being careful to NOT pull on Termination Board Connector Cable and EXIMV Cable located on the backside of board.
20.	Disconnect Main Processor Connector Cable from back side of Main Processor Board by moving connector brackets toward the outside and gently pull cable off connector.



WARNING

DO NOT disconnect transducer cable with power connected.

21.	Disconnect transducer port J5 from Main Processor board connector.
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Continued on Next Page

Replacing Transducer (EXIMV) and Main Processor Board, Cont.

Step	Procedure, Cont.
22.	Loosen 2" mounting pole U-Bolts enough to rotate/lower unit a sufficient distance to allow removal of transducer.
23.	Loosen the Hex Socket Head Set Screws on the neck of the unit using a 3/32" Hex wrench until transducer turns freely and gently turn counter-clockwise until transducer is free from enclosure.
24.	Replace transducer with new/repared/spare unit of same type and pressure rating.
25.	Reconnect High/Low Manifold lines and restore pressure.
26.	Replace Main Processor Board with new/repared/spare unit.
27.	Reassemble unit by performing steps in reverse order.
28.	Follow instructions in this Chapter to Restore the Station Files.
29.	Perform unit calibration using directions in this section.

Calibration Overview

The calibration mode allows you to calibrate, check and zero the static and differential pressure as well as the RTD. In addition, this mode allows you to set the installation parameter if an RTD is installed, set the (bias) for the Resistance Temperature Detector (RTD) if needed, or set a default flow temperature. During the initial setup and calibration, the parameters shown in Table 4–1 will need to be configured.

Table 4–1 Calibration Configurable Parameters

Parameter	Default Value	Units
RTD installed	No	
RTD Bias	0.00	Degrees F
Use Fixed Temperature (TF)	No	
Fixed Temperature (TF)	60.0000	Degrees F

Required Test Equipment

The following test equipment is required to calibrate the XFC6200EX Integral Multivariable Transducer (EXIMV):

- PCCU (either laptop with PCCU32 software or FS/2)
- Deadweight tester or equivalent calibration standard OR
- Test Gauge capable of dual range measurement (PSIG and Inches)
- Barometer or another means which can determine barometric pressure
- Nitrogen or compressed air source

Continued on Next Page

Calibration Overview, Cont.

FYI



If a method other than the “the compressed nitrogen / deadweight tester” method is used to calibrate Static Pressure cell, you must ensure that the prescribed Flange Tap valves are blocked to prevent false differential pressure from being applied to the DP cell. Also ensure that both high and low sides are placed under pressure during SP calibration.

Hold Mode

When calibrating the transducer or setting up a fixed temperature, PCCU will instruct the XFC6200EX to ignore live values for the flow calculations for the period of time the XFC6200EX is being calibrated. During this time the XFC6200EX uses SP, DP and temperature captured at the time calibration mode was entered. (This is called the “HOLD” mode.)

To exit the Hold mode:

1. Exit Calibration mode
2. Unplug DATA cable at XFC6200EX PCCU connector

TIP



During normal operation, either measurement cell may have deviated from the calibration standard. WinCCU, the host software, is capable of recalculating the volume based on the differences between the previous check and the current check.

After a secure audit trail is archived, WinCCU recalculates the flow volumes based on the previous and current markers, this allows more accurate results of the flow volume.

Static Pressure (SP) Calibration Checks

The XFC6200EX allows you to check the Static Pressure Calibration and log the pressure marker check points. It is recommended that checks of the Static Pressure (SP) be done prior to and directly following the calibration.

A minimum of three Static Pressure markers should be set, however you may enter as many SP pressure markers as you desire. Recording too many markers could cause the XFC6200EX to overwrite existing older events. Suggested pressure points are low, mid-low, mid, mid-high and high value. Only the last five checks are used by the WinCCU editor for calibration adjustment.

During normal operation of the XFC, the display provides continuous SP readouts. However during this procedure the XFC6200EX is placed in a temporary hold mode.

CAUTION




The resulting comparison pressure must not be greater than the static pressure cell's maximum pressure.

Continued on Next Page

Static Pressure (SP) Calibration Checks, Cont.

Instructions

Step	Procedure
1.	Enter Calibration menu, "Checks" screen, this places the Flow Computer on HOLD. Select the desired measurement tube from the tree view in the left pane.
2.	Select SP from the calibration drop down box to the left of the pressure marker table.
3.	Select the SP type: Absolute or Gauge.
<p>TIP  Absolute will display values with Barometric Pressure added in plus entered values will need the Barometric Pressure added. Gauge will display values in Gauge Pressure plus entered values will need to be in Gauge Pressure.</p>	
4.	Click on the Enter Pressure Check Value and select Continuous to update the Current Reading.
5.	Verify that the vent valve is closed (see Figure 4–10).
6.	Open both high and low equalizer valves.
7.	Close both the downstream and upstream tap valves.
8.	Open the atmospheric vent valve.
9.	Enter a pressure marker for atmospheric pressure (psia). Enter zero if in Gauge Mode, or the Barometric Pressure (or contract value) if in the Absolute mode. Click OK.
10.	Close the atmospheric vent valve.
11.	Click on the Enter Pressure Check Value.
12.	Connect Calibration Standard to calibration test port.
13.	Pressure to the next desired verification pressure.
14.	When current reading stabilizes, enter the pressure value from the calibration source. Remember to add the Barometric pressure if the pressure type is Absolute. Click OK.
15.	Repeat steps 11 through 14 for each pressure check value.
16.	When all Static Pressure markers have been set, determine if Calibration is required. If no Calibration is required, return manifold to service before exiting Calibration mode.

FYI



For additional information regarding Static Pressure Calibration Checks, see PCCU Help Files.

Continued on Next Page

Static Pressure (SP) Calibration Checks, Cont.

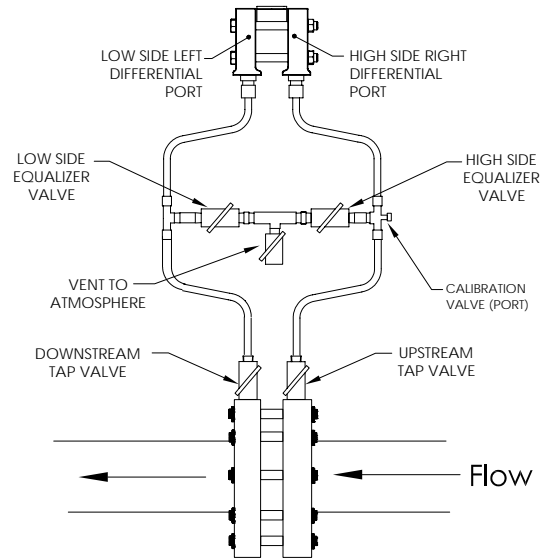


Figure 4-10 Calibration Diagram

Differential Pressure (DP) Calibration Checks

As discussed above under “Checking Static Pressure (SP) Calibration”, it is recommended that checks of the Differential Pressure (DP) be done prior to and directly following calibration.

A minimum of three Differential Pressure markers should be set, however you may enter as many DP pressure markers as you desire. Recording too many markers could cause the XFC6200EX to overwrite existing older events. Suggested pressure points are low, mid-low, mid, mid-high and high value. Only the last five checks are used by the WinCCU editor for calibration adjustment.

During normal operation of the XFC, the display provides continuous DP readouts. However during this procedure the XFC6200EX is placed in a temporary hold mode.

Instructions

Step	Procedure
1.	Enter Calibration menu, “Checks” screen, this places the Flow Computer on HOLD. Select the desired measurement tube from the tree view in the left pane.
2.	Select DP from the calibration drop down box to the left of the pressure marker table.

Continued on Next Page

Differential Pressure (DP) Calibration Checks, Cont.

Step	Procedure, Cont.
3.	Click on the Enter Pressure Check Value and select Continuous to update the Current Reading.
4.	Verify that the vent valve is closed (see Figure 4–10).
5.	Open both high and low equalizer valves.
6.	Close both the downstream and upstream tap valves.
7.	Open the atmospheric vent valve.
8.	Enter a pressure marker for differential pressure “0.0” and click OK.
9.	Close the high side equalizer valve
10.	Connect Calibration Standard to calibration test port.
11.	Pressure to the next desired verification pressure.
12.	When current reading stabilizes, enter the pressure value from the calibration source. Click OK.
13.	Repeat steps 12 through 13 for each pressure check value.
14.	When all Differential Pressure markers have been set, determine if calibration is required. If no calibration is required, return manifold to service before exiting calibration mode.

FYI



For additional information regarding Differential Pressure Calibration Checks, see PCCU Help Files.

Calibrating Static Pressure (SP)

A three or five point pressure method is used to calibrate the XFC6200EX Static Pressure cell. When these different pressures are applied to the cell they are measured using a known traceable source. The resultant pressure values are entered into the XFC6200EX using PCCU software.

When calibrating, wait for the readings to stabilize before entering new values.

TIP



The XFC6200EX uses an absolute Static Pressure (SP) Cell. Absolute pressure measures the pressure referenced to a vacuum or sealed chamber. Thus when vented, it measures true barometric pressure. This is different than a gauge cell which measures the pressure referenced to atmosphere.

Calibrating Static Pressure (SP), Cont.

FYI



For additional information regarding Static Pressure Calibration Mode, see PCCU Help Files.

Absolute vs. Gauge

It is recommended that the initial calibration point be at vented conditions and when doing so that the barometric pressure reading (in psi) be used as the initial point.

When operating in PCCU's Absolute Mode, other points of calibration are arrived at by adding the PSI reading and barometric pressure to arrive at psia, then enter this reading.

When operating in PCCU's Gauge Mode, readings may be entered as read, then a barometric pressure reading is entered.

Calculating PSI

To convert barometric pressure measured from inches of mercury to Barometric Pressure (psi), perform the following calculation:

Barometric pressure, in inches of mercury x .4912 or (÷ 2.036) equals Barometric Pressure in psi.

Instructions

Step	Procedure
1.	Enter Calibration menu, "Calibration" screen, this places the Flow Computer on HOLD. Select the desired measurement tube from the tree view in the left pane.
2.	Select SP from the calibration drop down box to the left of the pressure marker table and select 3 or 5 Point Calibration.
3.	Set Transducer SP Pressure Range in calibration window. This should match the range reading from the tag or label attached to the transducer.
4.	Select the SP type: Absolute or Gauge.

TIP



Absolute will display values with Barometric Pressure added in plus entered values will need the Barometric Pressure added. Gauge will display values in Gauge Pressure plus entered values will need to be in Gauge Pressure.

5.	Enter the barometric in the bottom window before proceeding.
6.	Verify that the vent valve is closed (see Figure 4-10).
7.	Open both high and low equalizer valves.
8.	Close both the downstream and upstream tap valves.

Continued on Next Page

Calibrating Static Pressure (SP), Cont.

Step	Procedure, Cont.
9.	Open atmosphere vent valve.
10.	Click on the Low Cal Point button. Verify the Current Reading is Continuously updated. This should represent the lowest calibration point.
11.	When current reading stabilizes, click OK or enter a different value, then click OK.
12.	When the previous reading was accepted, notice that the 100% Cal Point button becomes highlighted. To select, press Enter.
13.	Connect Calibration Standard to calibration test port.
14.	Close atmosphere vent valve.
15.	Pressure to 100% of the transducer range (100% of target value).
16.	When current reading stabilizes, accept the target value already showing in the window, or enter the pressure value from the calibration source. Click OK.
17.	Again, notice that the next Cal Point is highlighted. To select, press Enter.
18.	Pressure transducer to the next target value as shown in the calibration window.
19.	When current reading stabilizes, accept the target value already showing in the window, or enter the pressure value from the calibration source. Click OK.
20.	Repeat steps 17 through 19 until all calibration points have been entered.
21.	Upon completion of the SP Calibration, new calibration markers should be set.
22.	Return manifold to service before exiting calibration mode.

Calibrating Differential Pressure (DP)

A three or five point pressure method is used to calibrate the XFC6200EX Differential Pressure cell. When these different pressures are applied to the cell they are measured using a known traceable source. The resultant pressure values are entered into the XFC6200EX using PCCU software.

When calibrating, wait for the readings to stabilize before entering new values.

Instructions

FYI



The following instructions are based on the assumption that Differential Pressure Calibration Markers have previously been entered.

Step	Procedure
1.	Enter Calibration menu, "Calibration" screen, this places the Flow Computer on HOLD.
2.	Select DP to begin Differential Pressure calibration and select 3 or 5 Point Calibration.
3.	Set Transducer DP Pressure Range in calibration window before proceeding. This should match the range reading from the tag or label attached to the transducer.
4.	Target values based on the selected range will appear in the calibration table.
5.	Verify that the vent valve is closed (see Figure 4–10).
6.	Open both high and low equalizer valves.
7.	Close both the downstream and upstream tap valves.
8.	Open the atmospheric vent valve.
9.	Click on the Low Cal Point button. Verify the Current Reading is Continuously updated.
10.	When current reading stabilizes, click OK or enter a different value and click OK.
11.	When the previous reading was accepted, notice that the 100% Cal Point button becomes highlighted. To select, press Enter.
12.	Connect Calibration Standard to calibration test port.
13.	Close the high side equalizer valve.
14.	Pressure to 100% of the transducer range (100% of target value).
15.	When current reading stabilizes, accept the target value already showing in the window, or enter the pressure value from the calibration source. Click OK.

Continued on Next Page

Calibrating Differential Pressure (DP), Cont.

Step	Procedure, Cont.
16.	Again, notice that the next Cal Point is highlighted To select, press Enter.
17.	Pressure transducer to the next target value as shown in the calibration window.
18.	When current reading stabilizes, accept the target value already showing in the window, or enter the pressure value from the calibration source. Click OK.
19.	Repeat steps 16 through 18 until all calibration points have been entered.
20.	Upon completion of the DP Calibration, new calibration markers should be set.
21.	Return manifold to service before exiting calibration mode.

FYI



For additional information regarding Differential Pressure Calibration Mode, see PCCU Help Files.

Zero Transducer

During the process of setting pressure markers to determine the need for a calibration of either the Static Pressure (SP) or the Differential Pressure (DP), you may observe that the SP or the DP pressures are out of alignment exactly the same amount at each pressure marker (zero shift). When this occurs, you may either re-calibrate the XFC6200EX or you may reset the Transducer to zero. The preferred method is to re-calibrate the XFC. This maintains the XFC6200EX records in a manner that assures accountability and continuity when other measurement issues arise.

CAUTION



Using the Zero Transducer capability assumes that the shift is Linear, meaning that at different levels of pressure that the transducer is off by exactly the same amount. If this is not the case, you need to re-calibrate the transducer instead.

Static Pressure

The SP can be zeroed without re-calibrating. If the SP shifts, user can enter a new barometric pressure value. This shifts the SP transducer curve. After the HOLD state begins, select Zero Transducer.

Following reset, new pressure markers should be entered.

FYI



WinCCU, the host software, treats the Zero Transducer command as a calibration, therefore when using the Calibration Adjustment feature, the last five pressure markers are used.

For more information on the effects of the Zero Transducer command in WinCCU, see the WinCCU Help files.

RTD Bias

The RTD (Resistive Temperature Detector) does not require calibration. However, it can be made to match another reference source. Adjustments are accomplished by entering temperature bias, which shifts the RTD probe curve either positive or negative.

Setting XFC6200EX Temperature Calculation

The XFC6200EX temperature calculations can be set to the following conditions:

- Selection of "Fixed Tf" Used in Calculations—causes fixed temperature to be used in flow calculations.
- Selection of "Fixed Tf" and "Tf Device Connected"—will record RTD temperature while using fixed temperature in calculations.
- Selection of "Tf Device Connected" and not use "Fixed Tf"—measures and uses RTD temperature in calculations. However, if the RTD fails, the "Fixed Temperature" will be used for calculations.



Selecting "Tf Device Connected" only, does not force the unit to use the flowing temperature in its calculations. You must turn off the "Use Fixed Tf" selection.

How to Change Orifice Plate

Use one of the following procedures when changing an orifice plate.

Instructions

Taking Run Out-of-Service Procedure (Simplex Fitting)

Step	Procedure
1.	Take meter run out of service.
2.	Replace the orifice plate.
3.	If you would like to record a Volume Calculation, go to the Entry screen, select the measurement tube, and move to the Commands tab. Set the Reset Log Period command to Yes. This forces a new record to be written based on the old orifice plate size. If you would also like to simultaneously zero the accumulated volume, you may use the Reset Volume command instead.

FYI



Totalflow recommends performing either the Reset Log Period or the Reset Volume command to close out the current period using the old plate and begin a new period using the new plate, thus making the audit trail accurate.

4.	In PCCU, enter the new orifice plate diameter.
5.	Return meter to service.

How to Change Orifice Plate, Cont.

Instructions

Leaving Run In-Service Procedure (Senior Fitting)

Step	Procedure
1.	Place XFC6200EX in HOLD, by entering the calibration mode, so constant SP, DP and Temperature values are used, while the orifice plate is being changed.
2.	Replace the orifice plate.
3.	Exit the Calibration mode, releasing the Hold of the SP, DP and Temperature.
4.	If you would like to record a Volume Calculation, go to the Entry screen, select the measurement tube, and move to the Commands tab. Change the value for the Reset Log Period to Yes. This forces a new record to be written based on the old orifice plate size. If you would also like to simultaneously zero the accumulated volume, you may use the Reset Volume command instead.
5.	In PCCU, enter the new orifice plate diameter.

FYI



At top of next Volume Calculation Period, the XFC6200EX will do calculations based on new orifice plate diameter for the part of the period after the log was reset.

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Chapter 5

Troubleshooting

Overview

As an aid to troubleshooting the XFC6200EX, this chapter will provide troubleshooting guidelines for the various subsystems of the XFC6200EX. Some of these procedures will differ slightly from other XSeries units because the communications, power charger/source and other I/O are contained in the 6270 OEU Enclosure rather than within the XSeries enclosure. Some of the procedures are based on tests performed on the XFC6200EX Termination Board and others are based on tests performed on the 6270 OEU components. You will determine which of these procedures correspond to your particular unit. If using equipment other than the Totalflow 6270 OEU, you will need to refer to the manufacturer's procedures for troubleshooting their equipment.

Highlights

In this chapter you will learn about:

Topic	See Page
Visual Alarm Codes	5-4
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Transducer Communications Test	5-6
Resistive Temperature Detector (RTD) Continuity Test	5-8
RTD Current Source (Resistive) Test	5-10
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Termination Board Supply Voltage Test	5-20
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RS232 Termination Board (2101873-xxx) Test	5-20
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Overview, Cont.

Focus	This section primarily focuses on the electronic/electrical connections, and issues related to equipment malfunction. The flowchart in figure 5–1 may help to determine which tests to begin with. It should be noted, that it is not intended to cover every issue, but provide general guidance.
Troubleshooting Support	If troubleshooting instructions do not lead to a resolution and assistance is required, user can contact the Totalflow Service Department. USA: (800) 442–3097 or International: 001–918-338-4880
Visual Alarm Codes	As noted in Chapter 1, the units LCD Annunciator area shows many different status indicators related to device operations. This section contains info on those codes that reflect errors or provide information useful in troubleshooting. Alarm codes indicate that an operational problem exists. The user is informed of operational problems and operational limit violations by observing the alarm codes on the right side of the LCD display.
SLEEP Mode	Totalflow units are designed to go into a low power mode, SLEEP, when an insufficient amount of voltage is present for a period of time. At issue here, is locating the reason for the SLEEP alarm, simply “waking up” the unit will not suffice, therefore issues relating to the systems power supply should be investigated.
Solar Panel	When a Solar Panel is attached to the optional 6270 OEU Enclosure to provide a charging source for the battery, cleanliness and positioning play an important roll, as do proper electrical and cabling techniques. More detailed information on power consumption may be found at www.abb.com/totalflow .
RTD Testing	The RTD Probe is an integral part of the measurement system of the XFC unit, therefore it requires special attention. You will find procedures for performing a Continuity Test, Current Source (Resistive) Test and Impedance Test. Each procedure is a stand alone test and may refer you to one of the other tests as required.
Communication	Troubleshooting the communications for this unit requires that equipment in two areas be tested; 1) the XFC6200EX Comm Ports and 2) the external Communication device. This is discussed in more detail in the Communications Overview section. Other communication troubleshooting information is shared in the following categories: <ul style="list-style-type: none">• RS-232 Communications• RS485 Communications• RS422 Communications

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Overview, Cont.

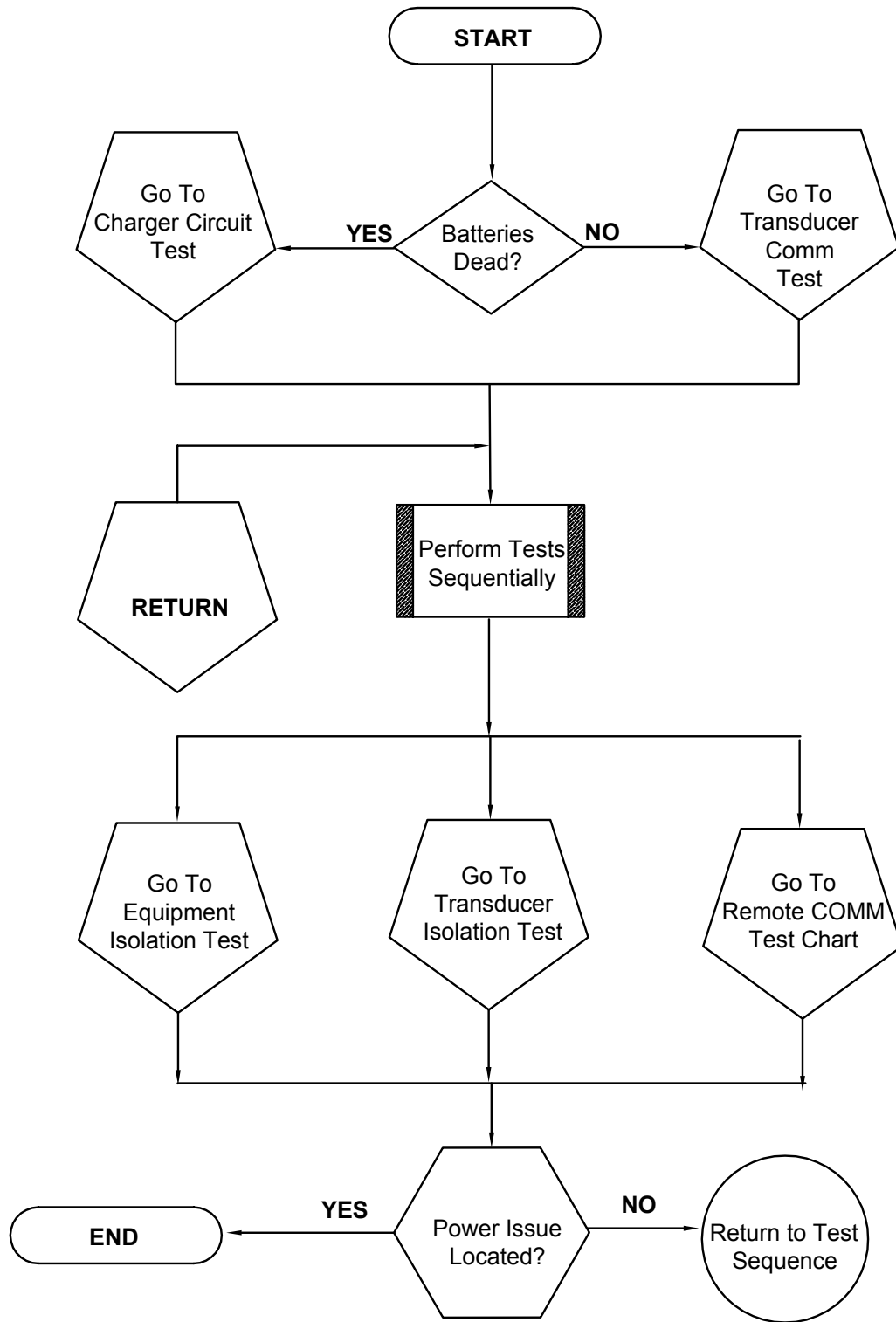


Figure 5-1 Power Troubleshooting Flowchart

Visual Alarm Codes

After the XFC6200EX completes recording log period flow and operational records the LCD will show any alarm conditions that have occurred (see Figure 5–2). Also, the date, hour and type of alarm conditions are stored in the XFC6200EX memory. An alarm can be a word, character, letter or symbol. The entire list of Status and Alarm codes may be found in Chapter 1. For the purpose of troubleshooting, only those codes considered to be helpful for the purpose of troubleshooting communications are discussed here. A description of each XFC6200EX alarm code, is described in Table 5–1.

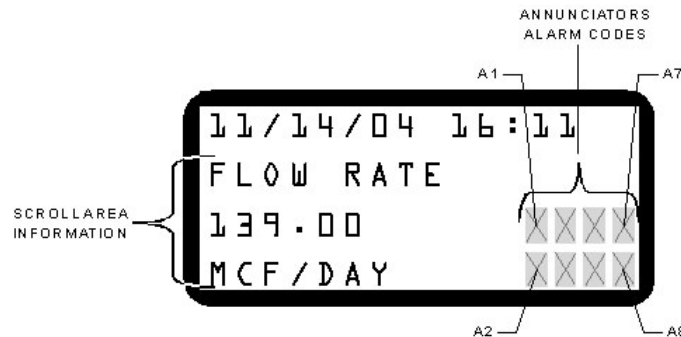


Figure 5–2 Liquid Crystal Display and Indicators

Table 5–1 Visual Status and Alarm Codes

Indicator	Description
I/O Sub-System	
\llcorner	Low Lithium Battery Alarm: When \llcorner (low lithium) is displayed, lithium battery voltage is not sufficient to maintain SRAM data. A new lithium battery measures approximately 3.6 VDC.
Communication Protocols	
→	Transmitting Data: Sending a response
←	Receiving Data: Processing request.
!	Nak. Negative Acknowledgement w/packet list.
+	Ack. Positive Acknowledge of receipt of request.
⋈	Waiting for Ack. Waiting for response after transmission.
?	Exception Alarm Processing.
Ǝ	ID Recognized. Recognized and receiving request.
⋈	Listen Cycle. Flashes if this remote port is active and running Totalflow Remote Protocol. Flashes in sync with listening cycle that occurs at 1, 2 or 4 second intervals.
M	MODBUS ASCII: MODBUS ASCII protocol selected for the port assigned to this annunciator.
m	MODBUS RTU: MODBUS RTU protocol is selected for the port assigned to this annunciator.
L	Local Protocol. Displayed when PCCU port is active and running Totalflow Local Protocol.
¥	ID Recognized. The ID has been recognized but is waiting for “Sync”.
Measurement Application	
AD	A to D Failure. Displayed if A to D Converter Absolute Differential Pressure, Absolute Static Pressure or temperature readings exceed maximum counts or are less than minimum counts. Investigate transducer communications issues.

SLEEP Mode Wakeup

The SLEEP mode is a low power feature which maintains the flow records but discontinues flow measurement calculations. When the XFC6200EX is in the SLEEP mode the word SLEEP is displayed on the LCD along with the date and time the unit went to SLEEP. The XFC6200EX enters SLEEP mode if the XFC6200EX device power supply voltage stays below user entered parameter 10.9 VDC (default), for 2 minutes. Connecting PCCU cable wakes unit up.

If supply voltage is still below parameter 10.9 VDC (default), when you disconnect locally, the XFC6200EX returns to SLEEP mode after 2 minutes. If supply voltage is above parameter 10.9 VDC (default), XFC6200EX remains awake.

The XFC6200EX has a "real time clock" which maintains time and date during the SLEEP mode and writes an event record when entering and leaving the SLEEP mode. Upon wake-up, the XFC6200EX performs the following functions:

- Stores present calculation periods accumulations in historical record,
- Zeros present calculation periods accumulations,
- Ends current daily record and starts new daily record.

Instructions

Step	Procedure
1.	Connect locally to the XFC6200EX. This should WAKE-UP the unit for you to determine the cause.
2.	Check power wiring leading to Termination Board J16 inside the XFC6200EX. It must make a good secure electrical connection.
3.	Check power connections inside the 6270 OEU enclosure.
4.	Check external charging source to Charger Regulator and Battery Pack wiring inside 6270 OEU enclosure, to ensure it is making a good secure electrical connection. If the external charging source is a solar panel, you may need to clean the solar cell surface. Also take into consideration recent weather patterns, specifically cloudy days with little sun light.
5.	If battery cable is securely connected, check Battery Pack voltage. If voltage is low, replace with another Battery Pack.
6.	Check current consumption of the system to ensure system current requirements are not too high (see Figure 5-3). The XFC and EXIMV should consume a maximum of 50.0 ma at 12 VDC. You may need to disconnect external equipment connections, including I/O and remote communications equipment, to isolate problem.
7.	If steps 1 through 5 do not locate and repair the issue, investigate other power supply issues as discussed in Figure 5-1, in this chapter.

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SLEEP Mode Wakeup, Cont.

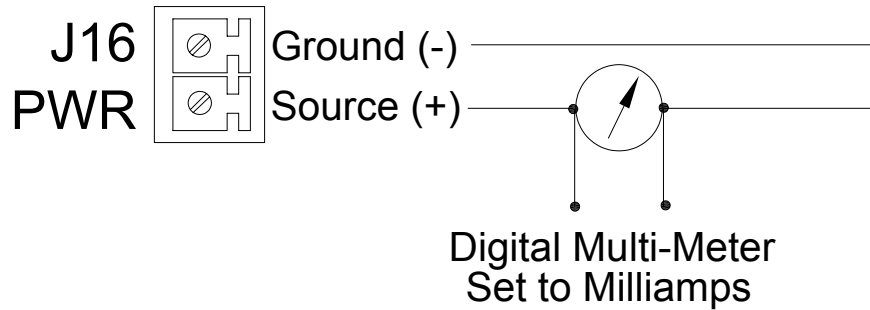


Figure 5-3 Current Consumption Test

Transducer Communications Test

If the A to D Failure alarm code is present, or if the device is in the SLEEP mode, but is still receiving minimum voltage, it may be necessary to test the data link between the Main Processor Board and the transducer. Follow the instructions below to check transducer.

Probable causes of receiving the A to D failure include:

- A/D Converter is Over or Under Range (DP, SP or Tf)
- Loose wiring Connections
- Faulty RTD Probe

If the Transducer Communications test fails, both the EXIMV (2101465-xxx) and the Main Processor Board (2101471-xxx) will need replaced as the characterization files for the EXIMV are stored on the Main Processor Board.

Instructions

Step	Procedure
1.	Begin by collecting data from unit.
2.	View event log in PCCU for codes (see PCCU Help Files for more information): -99 A/D converter could not be read -100 A/D converter could be read again.
3.	If event code is found, follow guidelines for returning EXIMV (2101465-xxx) and Main Processor Board (2101471-xxx) to Totalflow for repair or replacement. If event code is not found, continue to next step.

Continued on Next Page

Transducer Communications Test, Cont.

Step	Procedure, Cont.
4.	<p>In the PCCU Entry screen, monitor the readings by clicking on the I/O subsystem, On Board and Analog Inputs. Check SP, DP and temperature to determine which measurement channel is causing the alarm.</p> <p>A) If alarm is caused by the SP or DP channel, equalize and vent manifold.</p> <ul style="list-style-type: none"> ▪ If alarm disappears, 1) SP or DP cell is not ranged properly or 2) Manifold may have blockage. ▪ If alarm is still present, replace EXIMV (2101465-xxx) and Main Processor Board (2101471-xxx). <p>B) If alarm is caused by the temperature channel, Skip to Step 9, otherwise go to next step.</p>
5.	<p>Set EXIMV back to “Factory” calibration. If this corrects the alarm, recalibrate EXIMV to correct field calibration. If alarm is not corrected, continue to next step.</p>
6.	<p>Perform “Warm” start on unit. Verify that unit is not displaying a LL (Low Lithium) alarm, then remove power from unit. Restore power to unit. If A/D Failure alarm is not corrected, continue to next step.</p>
7.	<p>Perform Save and Restore function. Follow procedure in “Chapter 4 Maintenance” for Backing up Configuration Files. Be sure to Restore these files to the S: Drive.</p>
8.	<p>Perform a Cold Start on unit following Reset Procedures covered in this chapter. If problem is not corrected, continue to next step.</p>
9.	<p>Check RTD wiring on Termination Board J8 (see figure 5–4).</p>
10.	<p>Perform the following three procedures found next in this Chapter:</p> <p>A) RTD Continuity Test</p> <p>B) RTD Resistive Test</p> <p>C) RTD Impedance Test</p>
11.	<p>Contact Totalflow to repair or replace EXIMV (2101465-xxx) and Main Processor Board (2101471-xxx).</p>

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Transducer Communications Test, Cont.

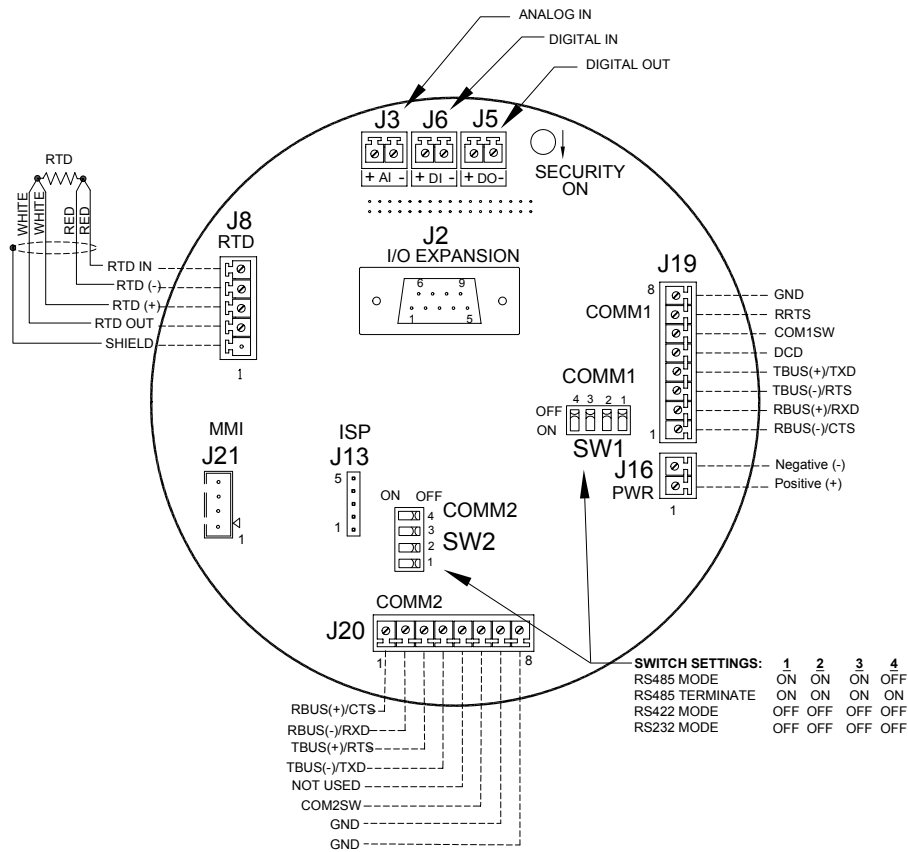


Figure 5-4 Termination Board (2101873-xxx)

Resistive Temperature Detector (RTD) Continuity Test

Should the readings from the RTD be suspect, follow the Instructions below to test the RTD Probe.

Required Equipment

- Digital MultiMeter w/ alligator clip leads

Instructions

Step	Procedure
1.	Begin by disconnecting power from Termination Board. Remove connection from J16 (see Figure 5-4).
2.	Remove connectors for any external connections: J3-Analog In, J6-Digital In, J5-Digital Output, J19-Communication Port 1, J20-Communication Port 2.

Continued on Next Page

Resistive Temperature Detector (RTD) Continuity Test, Cont.

Step	Procedure, Cont.
3.	Disconnect RTD connection, J8-RTD.
4.	Perform continuity test on wires leading to probe. Set DMM to 200 OHM or Continuity Audio.
5.	Check continuity of red wire pair by connecting one lead to each wire. Meter should read zero or close to zero.
6.	If there is continuity, skip to step no. 8. If there is NO continuity, verify wiring at RTD head is correct.
7.	If wiring at connection head is correct, the RTD is defective. Replace probe.
8.	Check continuity of each red wire to probe or shield. If there IS continuity, the RTD is defective, Replace probe. If there is NO continuity, continue to next step
9.	Check continuity of white wire pair by connecting one lead to each wire. Meter should read zero or close to zero.
10.	If there is continuity, skip to step no. 12. If there is NO continuity, RTD is defective. Replace Probe.
11.	Check continuity of each white wire to probe or shield. If there IS continuity, the RTD is defective, Replace probe. If there is NO continuity, continue to next step
12.	Check continuity of each red wire to each white wire. Meter should read approximately 100 to 140 Ohms, continue to Step 13. If NOT, RTD is defective and should be replaced.
13.	If Probe is still not functioning correctly, re-check wiring using supplied diagram. If no wiring error was found, perform RTD Current Source Troubleshooting.

RTD Current Source (Resistive) Test

If readings from the RTD are still suspect following the RTD Probe Continuity test, follow the Instructions below to test the current source on the Termination Board to verify it is receiving power.

- Required Equipment**
- Totalflow Diagnostics Kit 2017373
 - Digital MultiMeter w/ alligator clip leads

Instructions

Step	Procedure
1.	Begin by disconnecting power from Termination Board. Remove connection from J16 (see Figure 5-4).
2.	Remove connectors for any external connections: J3–Analog In, J6–Digital In, J5–Digital Output, J19–Communication Port 1, J20–Communication Port 2.
3.	Disconnect RTD connection, J8–RTD.
4.	Set DMM to 200 mVDC.
5.	Select RTD Test Resistance value by selecting resistor test connector from FCU Diagnostic Kit, or make one using a resistor appropriate for your unit: <ul style="list-style-type: none"> • Substitute RTD Probe wiring by connecting either a 100 OHM or 123 OHM Resistor across J8 connector terminals 3 and 4. • Connect a jumper wire between terminals 2 and 3. • Connect a jumper wire between terminals 4 and 5.
6.	Clip the positive lead of the DMM to the upper side of the RTD TEST RESISTOR.
7.	Clip the negative lead of the DMM to the lower side of the RTD TEST RESISTOR.
8.	Supply power to the unit.
9.	Once running, the measured value across the RTD TEST RESISTOR should be either: <i>100 OHM Resistor – Min. of 100mv to a maximum of 125mv.</i> <i>123 OHM Resistor – Min. of 123mv to a maximum of 155mv</i>
10.	The RTD measurement temperature on the FCU display should read either: <i>100 OHM Resistor – 31.0°F to 33.0°F</i> <i>123 OHM Resistor – 140.8°F to 142.8°F</i>

RTD Current Source (Resistive) Test, Cont.

Step	Procedure, Cont.
11.	If either of the measured values are outside of range, remove power and replace Termination Board Connector Cable (1801415-xxx).
12.	Return power and perform steps 9 and 10. If either of the measured values are outside of range, remove power and replace Termination Board (2101873-xxx).
13.	Return power and perform steps 9 and 10. If either of the measured values are outside of the range, remove power and replace Main Processor Board (2101471-xxx) and EXIMV (2101465-xxx).

RTD Impedance Test

If readings from the RTD are still suspect following the RTD Probe test, follow the Instructions below to test the current source on the Termination Board to verify it is receiving power.

- Required Equipment**
- Ice Bath
 - Digital MultiMeter

Instructions

Step	Procedure
1.	Immerse RTD Probe in ice bath.
2.	Perform a Continuity check between any two similar color wires. Measured resistance should be 1 OHM or less.
3.	Perform a Continuity check between any two dissimilar color wires. Measured resistance should be approximately 100 Ohms.
4.	Perform a Continuity check between shield wire and any other wires. Measured resistance should be in the Megohm range.
5.	If any values are returned out of range, RTD Probe is defective. Replace RTD.

Charger Circuit Test

If your system setup includes a Battery Pack, Solar Panel or AC Charging source connected to the 6270 Optional Equipment Unit (OEU), and the units battery is not staying charged, you will need to test the Battery Pack, AC Charger and or Solar Panel.

The following instructions contain the steps required to perform the Circuit testing.

Things to Consider

The following list shows other troubleshooting procedures that you may want to consider as well:

- Solar Panel Troubleshooting Test
- AC Charging Source Troubleshooting Test

Instructions

Step	Procedure
1.	Begin by disconnecting power from Charger Regulator, located in Optional 6270 enclosure.
2.	Replace Battery with a known good battery, using Battery Pack Replacement Procedure located in "Chapter 4, Maintenance".
3.	Reconnect Power to Charger Regulator. If battery pack is charged through an AC Charger, skip to Step 5, otherwise continue to Step 4.
4.	Measure charging voltage from Solar Panel Voltage at Charger Regulator using a DMM connecting the (+) and (-) leads to the (+) and (-) Solar Panel Wires. Loaded Voltage should be greater than or equal to specification listed in Table 5–2. If voltage is within range, battery was bad. If loaded voltage is not above minimum, perform the Solar Panel Troubleshooting Test found next in this Chapter.
5.	If unit receives charging voltage from AC Charger, perform the AC Charger Troubleshooting Test found later in this chapter.
6.	If all other testing to this point has not located the error, return to Figure 5–1 Power Troubleshooting Flowchart and continue.

Table 5–2 Specifications for Solar panels

Panel	Max	Volts @P _{Max}	Open Circuit	Load Resistance	Loaded Voltage
5	4.5W	16.5V	20.5V	50 Ω 25W	13.5V
10	10W	16.8V	21V	30 Ω 25W	17.5V
20	20W	16.8V	21V	15 Ω 25W	17.8V
30	30W	16.8V	21V	10 Ω 40W	17.8V

Solar Panel Troubleshooting Test

If your system setup includes a Solar Panel connected to the 6270 Optional Equipment Unit (OEU), and it is not supplying the required voltage and current to the XFC6200EX unit, you may need to test the Solar Panel.

The following instructions contain the steps required to do so.

Things to Consider

The following list shows other troubleshooting procedures that you may want to consider as well:

- Power Consumption Test (Remote Equipment)
- Transducer Isolation Test

Required Equipment

- Digital MultiMeter with 0-20 VDC range.
- Required resistors for testing specific panels listed in Table 5–2

FYI



In continuous low sun light conditions, the unit may not supply the required voltage. Solar panel should be positioned so it receives the most sunlight. Do not place it in a shaded area.

Instructions

Step	Procedure
1.	Measure Solar Panel Voltage at Charger Regulator using a DMM connecting the (+) and (-) leads to the (+) and (-) Solar Panel Wires. Loaded Voltage should be greater than or equal to specification listed in Table 5–2. If Solar Panel is not above minimum, replace Solar Panel continue to Step 2.
2.	Check solar panel angle and direction. In the northern hemisphere, panel should face due south and in southern hemisphere, due north.
3.	Check solar panel for any physical damage or obstructions to sunlight. Sunlight obstruction prevents solar panel from receiving enough sunlight to charge installed Battery Pack. Clear any debris from the cell face of the panel.
4.	Check solar panel wiring to be certain it is correctly connected to associated termination pins located in the 6270 OEU enclosure (see Figure 5–5).

Continued on Next Page

Solar Panel Troubleshooting Test, Cont.

Step	Procedure, Cont.
5.	Disconnect Solar Panel from Field Device.
6.	Set DMM to 20+ VDC.
7.	Determine if Open Circuit voltage is greater than or equal to specification listed in Table 5–2, by clipping positive lead of the DMM to 1 st wire and clipping negative lead of the DMM to 2 nd wire. If Solar Panel is not above minimum, continue to next step.
8.	Using selected Resistor from Table 5–2 for your Solar Panel Wattage, attach selected Resistor between the two Solar Panel wires.
9.	Clip the positive lead of the DMM to the upper side of the Test Resistor.
10.	Clip the negative lead of the DMM to the lower side of the Test Resistor.
11.	Determine if Loaded Voltage is greater than or equal to specification listed in Table 5–2. If Solar Panel is not above minimum, replace Solar Panel and return to step 3.

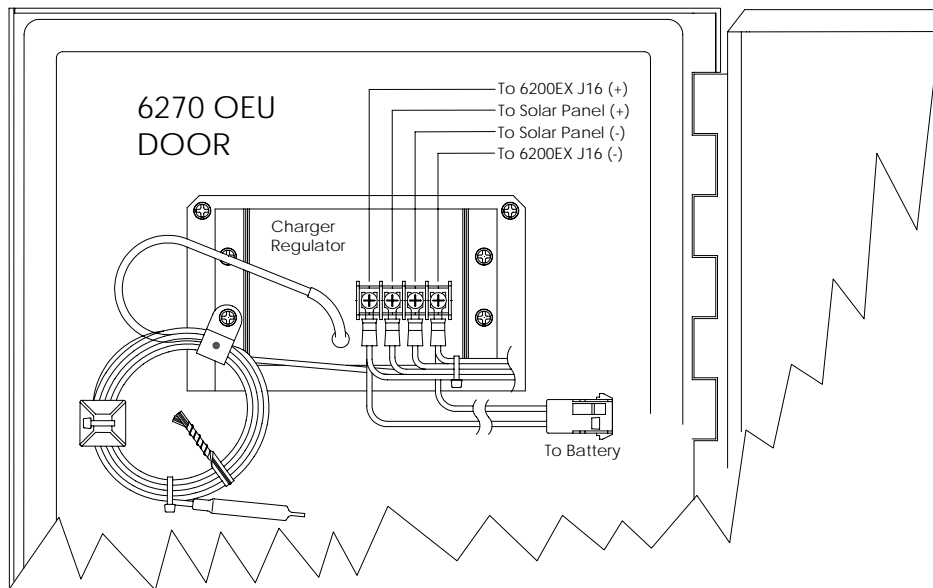


Figure 5–5 6270 OEU Charger Regulator

AC Charger Troubleshooting Test

If your system setup includes an AC Charging unit connected to the 6270 Optional Equipment Unit (OEU), and not supplying the required voltage to the XFC6200EX unit, you may need to test the AC Charger. The following instructions contain the steps required to do so.

Instructions

Step	Procedure
1.	Check AC charger wiring to 6270 OEU Enclosure Termination Board connector. Be certain wiring is correct.
2.	Check input AC voltage to external AC charging unit. Be certain primary AC voltage is correct.
3.	If input primary AC voltage level is correct, wiring to 6270 OEU enclosure Termination Board is correct and there is no DC output from the charger, replace charger fuse.
4.	If fuse is not faulty or there is no charger DC output voltage after replacing fuse, replace AC charging unit.

Equipment Isolation Test

This test will need to be performed if your Battery Pack output voltage is not remaining consistent and no errors were found during the previous Charging Circuit Troubleshooting Tests.

Instructions

Step	Procedure
1.	Disconnect Solar Panel Charger or AC Charger located in Optional 6270 enclosure.
2.	Disconnect Battery Pack Cable from Charger Regulator, located in Optional 6270 enclosure and substitute known "Good Battery".
3.	Connect Current Measurement Troubleshooting Cable (Part No. 2017350-xxx), to known "Good Battery" and re-connect to Charger Regulator.
4.	Using DMM, connect to Troubleshooting Cable and measure Average Current. If less than or equal to 80 ma at 12 VDC, disconnect Battery Pack, then Remote Equipment, continue to next step. If Average Current is equal to or greater than specification, no problem is found with remote equipment. Return to test sequence on Troubleshooting Flowchart (see Figure 5–1).

Continued on Next Page

Equipment Isolation Test, Cont.

Step	Procedure, Cont.
5.	Re-connect known "Good" Battery Pack using Troubleshooting Cable.
6.	Using DMM, connect to Troubleshooting Cable and measure Average Current during "Start Up". If current is higher than 33–40 ma, return to test sequence on Troubleshooting Flowchart (see Figure 5–1) and continue. If current is within acceptable limits, continue to next step.
7.	When unit reaches normal operating status, measure Average Current. If current is higher than 26–30 ma, return to test sequence on Troubleshooting Flowchart (see Figure 5–1) and continue. If current is within acceptable limits, return to test sequence on Troubleshooting Flowchart (see Figure 5–1) and skip sequential testing going directly to Remote Communications Troubleshooting.

Transducer Isolation Test

This test will only need to be performed if your unit does not have external remote equipment attached or remote equipment has been detached for troubleshooting purposes.

Instructions

Step	Procedure
1.	Disconnect Power Connect at XFC6200EX Termination Board, Connector J16.
2.	Using instructions found in Chapter 4, Replacing Transducer, disconnect EXIMV from rear of Main Processor Board Connector J7 and J5. Perform only steps required to disconnect wiring (see Figure 4–6).
3.	Reconnect Power Connector J16.
4.	Using DMM, measure amps at J16 during "Start Up". If average current is higher than 34–60 ma, replace Main Processor Board and EXIMV. If "Start Up" current is within acceptable limits, continue to next step.
5.	When unit reaches normal operating status, measure current at J16. If average current is higher than 30 ma, replace Transducer and Main Processor Board. If Operational current is within acceptable limits, return to test sequence on Troubleshooting Flowchart (see Figure 5–1) and continue.

Communications Overview

These troubleshooting procedures are applicable to an XFC6200EX with an installed radio in the optional 6270 OEU Enclosure Unit. Use Figure 5–6 as an aid for troubleshooting communication problems. The three basic types of radio communications that can be used between the XFC6200EX and a radio receiver, are:

- RS-232 Communications (see Table 5–3 for Pin Configurations)
- RS-485 Communications (see Table 5–4 for Pin Configurations)
- RS-422 Communications (available, but not detailed)

The radio/modem may be powered one of two ways. Always on, or Switched. Your specific system set up will determine what steps you need to power the Radio/Modem.

When switching power to a radio without Inhibit (SLEEP) mode using the scheduling software on-board the unit, utilization of an interposing relay will be required. This should mount in the 6270 OEU Enclosure.

When switching power to a radio with Inhibit (SLEEP) mode, the COM1SW line for COMM Port 1 or COM2SW for COMM Port 2, will go to the radios inhibit (SLEEP) Mode input. When COM1SW or COM2SW is “On”, the switch is open. When “Off”, the switch is closed (path to ground).

Setting Up Communication

After installation of communication equipment and before placing the communication system into operation, the user should note the following:

- Verify field wiring terminations on the XFC6200EX Termination Board.
- Verify field wiring on from XFC6200EX unit to termination board inside the 6270 OEU enclosure.
- Verify Field wiring from termination board to radio.
- Check XFC6200EX identifier (ID). Log the ID for future reference.
- Log XFC6200EX access security code, baud rate, listen cycle, protocol and interface for future reference.

FYI



The following helpful hints aid the user after communication equipment has been installed and setup:

- When communication equipment is powered/switched on, XFC6200EX displays the “→” after it recognizes the XFC6200EX ID and is responding.
- Check baud rate of XFC6200EX transmission and LISTEN time settings. The baud rate and time settings can be changed in Entry Mode of PCCU. Default settings are 1200 baud and the listening time is 4 seconds and communications interface is turned off.
- Minimum power required for operating remote communications is 11.9 VDC (default), or as set by user. Should the power fall below this level, remote communications will be terminated.
- Test remote communications using RS-232 CCU to FCU Troubleshooting Cable (2011781-xxx). Use RS-232 to RS485 communication Converter (1800255-xxx) in conjunction with RS-232 Troubleshooting cable to test RS-485 remote communications.

Continued on Next Page

Communications Overview, Cont.

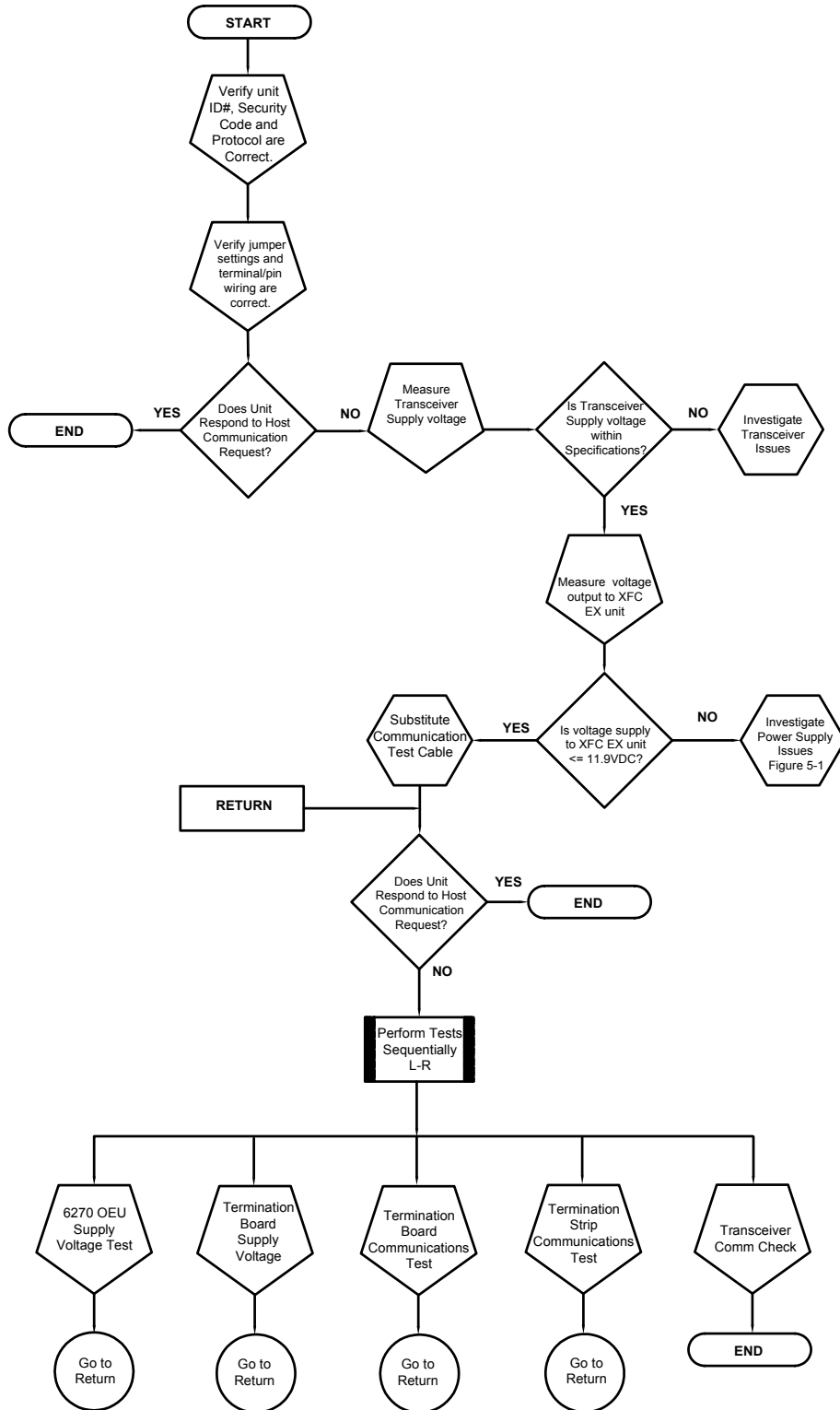


Figure 5-6 Communication Troubleshooting Flowchart

Transceiver Supply Voltage Test

Using wiring information and guidelines supplied by transceiver manufacturer, verify that transceiver is receiving manufacturer's suggested voltage. If unit is receiving sufficient voltage, continue to the 6270 OEU Wiring Voltage Test.

FYI



If transceiver is not receiving sufficient voltage, investigate power supply issues. These may involve wiring irregularities at either the Charger Regulator, Termination Board, Terminal Strip or at the Power Relay if using Relay for switching power to Radio.

6270 OEU Supply Voltage Test

Instructions

If Transceiver does not feature a SLEEP Mode and power is supplied through an optional Relay, begin with Step 1, Relay Supply Voltage Test.

If Transceiver features a SLEEP Mode, or is continuously powered, begin with Step 2, Charger Regulator Supply Voltage Test.

Step	Procedure
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FYI



Wire color/origination inside the 6270 enclosure should comply with WI drawings. For the purposes of these instructions, wire color name and designation will coincide with Totalflow drawings. You may need to adapt for your individual installation.

1.	<p>If Transceiver does not feature a SLEEP Mode and receives power through an optional Relay, activate COM1SW or COM2SW and, using a Digital MultiMeter (DMM) set to Volts DC, measure voltage at Relay between Relay coil terminals.</p> <p>If Voltage reads the same as supplied voltage (12 VDC), and Transceiver is still not receiving power, Relay may be incorrectly wired (use normally open contacts) or Relay may be bad.</p> <p>If Relay is not receiving power, continue to Step 2.</p>
2.	<p>If Transceiver features a SLEEP Mode or is continuously powered, activate COM1SW or COM2SW, and using a Digital MultiMeter (DMM) set to Volts DC, measure voltage at next supply junction. If next junction is located on the Termination Strip, verify wiring is firmly connected, other wise continue to the Charger Relay and measure voltage between:</p> <p style="text-align: center;"><i>Terminal 1 (Batt +) and Terminal 4 (Batt -).</i></p> <p>Voltage should be greater than or equal to 11.9 VDC for this unit. If voltage is less than 11.9, return to test sequence outlined in the Power Troubleshooting Flowchart (see Figure 5–1).</p>

Termination Board Supply Voltage Test

Instructions

Step	Procedure
1.	Using a Digital MultiMeter (DMM) set to Volts DC, measure power supply voltage from the OEU Enclosure to J16 on the Termination Board (see Figure 5–4) between: <i>Pin 1 (+) and Pin 2 (-).</i> Voltage should be equal to or greater than amount specified as Low Voltage Input in PCCU for this unit (9 volt minimum, default is 11.9 VDC).
2.	If supplied voltage falls in the correct range, return to test sequence outlined in the Power Troubleshooting Flowchart (see Figure 5–1).

RS-232 Communications

The following RS-232 Serial Communication troubleshooting procedures directed from Figure 5–6 will assist the user in what may be the possible cause for indicated error message. With the exception of the field wiring directly on the XFC6200EX Termination board (2101873-xxx), all other wiring is located inside the 6270 OEU Enclosure. Therefore, two separate procedures are required for testing.

RS232 Termination Board (2101873-xxx) Test

Before performing the Voltage Test on the Termination board located inside the Rear End Cap, please verify that the wiring is correct (see Table 5–3).

Table 5–3 RS-232 Field Wiring on XFC6200EX Termination Board (2101873-xxx)

	Description	ABRV	Description	ABRV
	Jumper 19–COMM 1		Jumper 20–COMM 2	
Pin 1	Clear to Send	CTS	Clear to Send	CTS
Pin 2	Receive Data	RXD	Receive Data	RXD
Pin 3	Request to Send	RTS	Request to Send	RTS
Pin 4	Transmit Data	TXD	Transmit Data	TXD
Pin 5	Data Carrier Detect	DCD	Not Used	N/A
Pin 6	Switched Output	COM1SW	Switched Output	COM2SW
Pin 7	Mirror Request to Send	RRTS	Ground	GND
Pin 8	Ground	GND	Ground	GND

Continued on Next Page

RS232 Termination Board (2101873-xxx) Test, Cont.



When troubleshooting RS-232 mode, verify settings of COMM 1 SW1 and COMM 2 SW2 on Termination Board are configured properly (see Figure 5-4).

Instructions

Step	Procedure
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Voltage on the following steps may be hard to see using a Digital MultiMeter. If available, an oscilloscope will provide a more accurate reading. To verify, the CCU software must be continuously polling the meter

Generally speaking, these tests performed on the Terminal Board will only verify incorrect or damaged wiring. If all previous testing passed, and all wiring, jumper and terminations have been verified correct, the board will need replaced. Contact Totalflow Customer Service. See “Getting Help” in the introduction of this manual for instructions.

1.	<p>Using an oscilloscope, measure Receiving Data voltage on Termination Board J19 or J20 between:</p> <p style="text-align: center;"><i>COMM 1, J19–Pin 8(GND) and Pin 2(RXD) or COMM 2, J20–Pin 8(GND) and Pin 2(RXD).</i></p> <p>When the unit is receiving data from WinCCU, voltage should vary between -5 VDC and +5VDC. This would indicate that the unit is receiving data, continue to Step 2. If unit is not receiving data, investigate wiring issues (see Table 5-3).</p>
2.	<p>Using an oscilloscope, measure Request to Send voltage on Termination Board J19 or J20 between:</p> <p style="text-align: center;"><i>COMM 1, J19–Pin 8(GND) and Pin 3(RTS) or COMM 2, J20–Pin 8(GND) and Pin 3(RTS).</i></p> <p>When unit is communicating to WinCCU, voltage should be +5VDC and remain +5VDC until XFC transmit stops. This would indicate that the unit is transmitting data, continue to Step 3. If unit is not receiving data, investigate wiring issues (see Table 5-3).</p>
3.	<p>Using an oscilloscope, measure Transmit Data voltage on Termination Board J19 or J20 between:</p> <p style="text-align: center;"><i>COMM 1, J19–Pin 8(GND) and Pin 4(TXD) or COMM 2, J20–Pin 8(GND) and Pin 4(TXD).</i></p> <p>When the unit is transmitting to WinCCU, voltage should vary between -5 VDC and +5VDC. This would indicate that the unit is transmitting data. If unit is still not responding, continue to next test as directed in Figure 5-6.</p>

RS232 OEU Termination Strip (2018339) Test

Instructions



Generally speaking, these tests performed on the Terminal Strip will only verify incorrect or damaged wiring. If all previous testing passed, and all wiring, jumper and terminations have been verified correct, the Termination Strip may need replaced, but does not typically fail. Contact Totalflow Customer Service. See “Getting Help” in the introduction of this manual for instructions.



Please note that NO wire colors are referenced. Individual units may vary.

Voltage on the following steps may be hard to see using a Digital MultiMeter. If available, an oscilloscope will provide a more accurate reading. To verify, the CCU software must be continuously polling the meter.

Step	Procedure
1.	Using a oscilloscope if available, measure Receiving Data voltage on FCU side of OEU Termination Strip (see Figure 5–7) between: <i>GND and RXD.</i> When data is being transmitted to the XFC6200EX unit, voltage should vary between -5 VDC and +5VDC. When the unit is receiving data from WinCCU, voltage should vary between -5 VDC and +5VDC. This would indicate that the unit is receiving data.
2.	On the OEU FCU side of Termination Strip (see Figure 5–7), measure the Request to Send voltage between terminals <i>GND and RTS</i> When the XFC6200EX is sending communication data to WinCCU, voltage should be +5 VDC.
3.	On the OEU Termination Strip, measure the Transmitting Data voltage between terminals <i>GND and TXD</i> When data is being transmitted from the XFC6200EX unit, voltage should vary between –5 VDC and +5 VDC.
4.	Repeat steps 1 through 3 on Transceiver side of Termination Strip.
5.	If any inaccuracy exists, investigate wiring errors.

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RS232 OEU Termination Strip (2018339) Test, Cont.

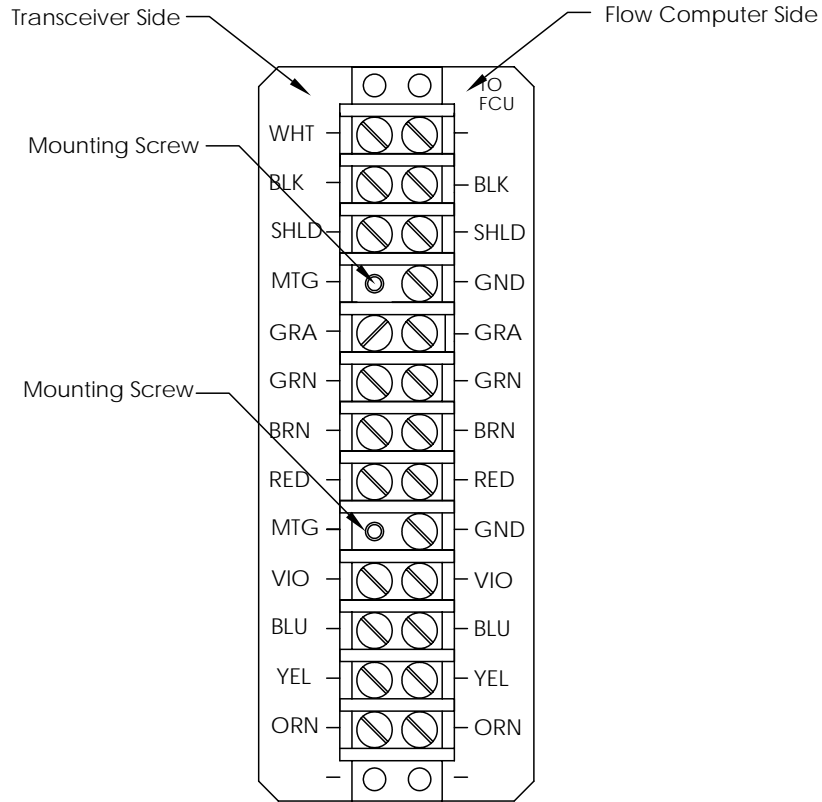


Figure 5-7 OEU Termination Strip (2018339)

RS-485 Communications

The following RS-485 Communications troubleshooting procedures directed from Figure 5-6 will assist the user in what may be the possible cause for indicated error message. With the exception of the field wiring directly on the XFC6200EX Termination board (2101873-xxx), all other wiring is located inside the 6270 OEU Enclosure. Therefore, two separate procedures are required for testing.


RS-485 Termination Board (2101873-xxx) Test


Before performing this test on the Termination Board located inside the Rear End Cap, please verify that the wiring is correct (see Table 5–4).

Table 5–4 RS-485 Field Wiring on XFC6200EX Termination Board (2101873-xxx)

	Description	ABRV	Description	ABRV
	Jumper 19–COMM 1		Jumper 20–COMM 2	
Pin 1	Receive Bus (-)	BUS(-)	Receive Bus (+)	BUS(+)
Pin 2	Receive Bus (+)	BUS(+)	Receive Bus (-)	BUS(-)
Pin 3	Not Used		Not Used	
Pin 4	Not Used		Not Used	
Pin 5	Data Carrier Detect	DCD	Not Used	N/A
Pin 6	Switched Output	COM1SW	Switched Output	COM2SW
Pin 7	Remote Request to Send	RRTS	Ground	GND
Pin 8	Ground	GND	Ground	GND

Instructions

TIP  When troubleshooting RS-485 mode, verify settings of COMM 1 SW1 and COMM 2 SW2 on Termination Board are configured properly (see Figure 5–4).

FYI  Voltage on the following steps may be hard to see using a Digital MultiMeter. If available, an oscilloscope will provide a more accurate reading. To verify, the WinCCU software must be continuously polling the meter

Generally speaking, these tests performed on the Termination Board will only verify incorrect or damaged wiring. If all previous testing passed, and all wiring, jumper and terminations have been verified correct, the Termination Board may need replaced, but does not typically fail. Contact Totalflow Customer Service. See “Getting Help” in the introduction of this manual for instructions.

Step	Procedure
1.	Using an oscilloscope, measure Line Driver voltage on Termination Board J19 or J20 between: <p style="text-align: center;"><i>COMM 1, J19–Pin 1 (BUS-) and Pins 2 (BUS+) or COMM 2, J20–Pin 1 (BUS+) and Pin 2 (BUS-).</i></p> When the unit is receiving data from WinCCU, voltage should vary between +5 VDC and 0 VDC. This would indicate that the unit is receiving data.

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RS-485 Termination Board (2101873-xxx) Test, Cont.

2.	<p>Using an oscilloscope, measure Remote Request to Send voltage on Termination Board J19. On J20, RRTS is not directed:</p> <p style="text-align: center;"><i>COMM 1, J19–Pin 8(GND) and Pin 7(RRTS)</i></p> <p>When the unit is transmitting receiving data, voltage should vary between -5 VDC and +5VDC. This would indicate that the RRTS is working correctly.</p>
3.	<p>If any inaccuracy exists, investigate wiring errors or damaged wires.</p>

FYI



If a communication problems still exists, and the unit has passed the tests in steps 3, 4 and 6, additional testing will be required.

RS-485 OEU Termination Strip (2018339) Test

Instructions

TIP



Voltage on the following steps may be hard to see using a Digital MultiMeter. If available, an oscilloscope will provide a more accurate reading. To verify, the CCU software must be continuously polling the meter.

Generally speaking, these tests performed on the Terminal Strip will only verify incorrect or damaged wiring. If all previous testing passed, and all wiring, jumper and terminations have been verified correct, the Termination Strip may need replaced, but does not typically fail. Contact Totalflow Customer Service. See “Getting Help” in the introduction of this manual for instructions.

Step	Procedure
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FYI



When designating the wire colors in the following procedures, color/origination complies with Totalflow Wiring Instruction drawings. For the purposes of these instructions, you may need to adapt for your individual installation.

1.	<p>Using an oscilloscope if available, measure Line Driver Voltage on the FCU side of the OEU Termination Strip (see Figure 5–7) between:</p> <p style="text-align: center;"><i>BUS+ and BUS-</i></p> <p>When the unit is receiving data from WinCCU, voltage should vary between +5 VDC and 0 VDC. This would indicate that the unit is receiving data.</p>
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RS-485 OEU Termination Strip (2018339) Voltage Test, Cont.

Step	Procedure, Cont.
2.	Using an oscilloscope, measure the Request to Send voltage on the FCU side of OEU Termination Strip between: <i>GND and RRTS</i> When data is XFC6200EX is sending communication data to WinCCU, voltage should be +5 VDC for duration of transmission.
3.	Using an oscilloscope, measure the Transmitting Data voltage on the FCU side of OEU Termination Strip between: <i>GND and BUS-</i> <i>And</i> <i>GND and BUS+</i> When data is being transmitted from the XFC6200EX unit, voltage should vary between +2 VDC and +5 VDC.
4.	Repeat steps 1 through 3 on Transceiver side of Termination Strip.
5.	If any inaccuracy exists, investigate wiring errors.

Transceiver Check

Instructions

Step	Procedure
1.	If available, use a wattmeter to check transceiver output power. Refer to manufacturer's documentation for measuring instructions.
2.	If available, use two (2) hand-held transceivers, and verify communication path between Master and Remote sites. Voice activated interface can be used if available.
3.	Verify that transceiver is set to the correct frequency. Refer to manufacturer's documentation for checking frequency instructions.
4.	If a directional antenna is used, verify the orientation to the antenna to the Master site.

FYI



If a communication problems still exists, and the unit has passed the Transceiver Check test, contact Totalflow Customer Service for additional help.

Reset Procedures

On occasion, it may be necessary to reset the unit. There are two types of reset procedures, Warm or Cold.

Warm Start

A warm start occurs when the main power is removed, then re-applied while memory backup is enabled. This does not clear the data stored in RAM. The warm start will only reset the XFC6200EX microprocessor and not disturb any data that has been stored in RAM. A warm start should be used when taking an XFC6200EX out of service to perform maintenance or troubleshooting. A warm start can be used when a power or communication interruption caused the XFC6200EX microprocessor to lock-up.

Step	Procedure
1.	Collect Data from unit.
2.	Verify "LL" battery alarm is not being displayed on XFC6200EX LCD.
3.	Begin by disconnecting power from Termination Board J16. The XFC6200EX is now out of service.
4.	To place XFC6200EX in service, return power connection J16 to Termination Board.

Cold Start

A cold start clears all the data that is stored in RAM as well as resetting all entered variables to their factory default values. A cold start should be used for new XFC6200EX installations. This will ensure that all memory is clear and the operating program is at its default settings. Discretionary use of this procedure is advised.

Step	Procedure
1.	Using PCCU, in the terminal mode, type this command exactly as shown (use precise capitalization): 0.0.0=COLD

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Chapter 6

Totalflow[®] Definitions and Acronyms

TERM	DEFINITION
μ	Greek letter for “mu”. Often used in math and engineering as the symbol for “micro”. Pronounced as a long u.
μ FLO 6210EX	This Totalflow Flow Computer is housed in an explosion proof housing and has similar operational features as the μFLO, with additional capabilities. Its overall appearance is drastically different as is reflected in it's cast aluminum enclosure.
μ FLO IMV	μFLO's measurement and operational features are housed in this single unit assembly. The main electronic board (μFLO-195 Board), communication connection, power, SP, DP and Temperature readings are all housed in this unit.
μ FLO-2100767 Board	Main Electronic Board used in the μFLO Computers. It is housed on an integrated assembly and includes the IMV. It operates at 195 MHz while drawing minimal power.
μ Sec	Micro Second.
μFLO 6200	This Totalflow Flow Computer is housed in a small lightweight enclosure. It's main feature is it's low power, microprocessor based units designed to meet a wide range of measurement, monitor and alarming applications for remote gas systems, while being a cost effective alternative.
*.CSV file	See Comma Separated Values (I.E. spreadsheet format).
*.INI file	See Initialization File.
A/D	Analog-to-digital.
ABB Inc.	Asea, Brown & Boveri, parent company of Totalflow
Absolute Pressure	Gauge pressure plus barometric pressure. Totalflow devices use Static Pressure (SP) for flow calculations.
Absolute Zero	The zero point on the absolute temperature scale. It is equal to -273.16 degrees C, or 0 degrees K (Kelvin), or -459.69 degrees F, or 0 degrees R (Rankine).
Absorber	A tower or column that provides contact between natural gas being processed and a liquid solvent.
Absorption	The operation in which one or more components in the gas phase are transferred to (absorbed into) a liquid solvent.
Absorption Factor	A factor which is an indication of the tendency for a given gas phase component to be transferred to the liquid solvent. It is generally expressed as $A=L/KV$ where L and V are the moles of liquid and vapor, and K is the average value of the vapor-liquid equilibrium constant for the component of concern.
Absorption Oil	A hydrocarbon liquid used to absorb and recover components from the natural gas being processed.
AC	See Alternating Current.
Accuracy	How closely a measured value agrees with the correct value. Usually expressed as ± percent of full scale output or reading.
Acid Gas	See Gas, Acid.
ACK	See Acknowledgment.
Acknowledgment	This refers to a response over a remote communication device to a request such as a PING. Basically, saying, "I'm here, and I saw your request!"
ACM	See Analyzer Control Module.

Acoustics	The degree of sound. The nature, cause, and phenomena of the vibrations of elastic bodies; which vibrations create compressional waves or wave fronts which are transmitted through various media, such as air, water, wood, steel, etc.
Active Analog Output	Analog Output to a host providing power to the host.
Active Mode	An operational mode used by the LevelMaster for measuring dual float levels by applying a signal to the primary windings, reading the voltage level on the secondary windings and using an algorithm to determine the oil and water levels.
Adapter	A mechanism or device for attaching non-mating parts.
ADC	See Analog-to-Digital Converter.
Address	A unique memory designation for location of data or the identity of a peripheral device; allows each device on a single communications line to respond to its own message.
Adiabatic Expansion	The expansion of a gas, vapor, or liquid stream from a higher pressure to a lower pressure in which there is no heat transfer between the gas, vapor, or liquid and the surroundings.
Adsorption	The process by which gaseous components are adsorbed on solids because of their molecular attraction to the solid surface.
Aerial	A length of wire designed to transmit or receive radio waves. (See also Antenna)
Aerosol Liquids	Minute liquid particles suspended in gas. Aerosols will behave like a fluid and can be transported by pipes and pumping. When aerosols contact each other they coalesce into droplets. Aerosols may be present in gas, or may be generated by glow shearing off the skim inside of a pipeline.
AGA	American Gas Association. Trade group representing natural gas distributors and pipelines.
AGA-10	American Gas Association Report No. 10, Speed of Sound in Natural Gas and Other Related Hydrocarbon Gases. Method for calculation of the speed of sound in gases.
AGA-3	American Gas Association Report No. 3, Orifice Metering of Natural Gas. Method for calculating gas volume across an Orifice Plate. This method requires two pressure readings, Differential Pressure (DP) and Static Pressure (SP).
AGA-5	American Gas Association Report No. 5, Fuel Gas Energy Metering. Methods (Volume, Mass or Energy) for calculating BTUs without knowing the composition of the gas.
AGA-7	American Gas Association Report No. 7, Measurement of Gas by Turbine Meters. Method for calculating gas volume using a Pulse Meter. This method requires one pressure reading, Static Pressure (SP).
AGA-8	American Gas Association Report No. 8, Compressibility Factor of Natural Gas and Related Hydrocarbon Gases. Method for calculating the Super Compressibility Factor, Fpv.
AGA-9	American Gas Association Report No. 9, Measurement of Gas by Multipath Ultrasonic Meters. Method for calculating gas based on transit-times.
AGC	Automatic Gain Control
AH	See Ampere-Hour.
AI	Analog Input
AIU	Analyzer Interface Unit.
Alkane	The simplest homologous series of saturated aliphatic hydrocarbons, consisting of methane, ethane, propane, butane; also know as olefins. Unsaturated hydrocarbons that contain one or more carbon-carbon double bonds.

Alkanolamine	See Amine.
Alkynes	Unsaturated hydrocarbons that contain one or more carbon-carbon triple bonds.
Alphanumeric	A character set that contains both letters and digits.
Alternating Current	An electric current whose direction changes with a frequency independent of circuit components.
Aluminum Powder Coating	Totalflow aluminum enclosures have a baked-on Powder Coating designed to our specifications to ensure paint adhesion, weather resistance and durability.
Ambient Compensation	The design of an instrument such that changes in ambient temperature do not affect the readings of the instrument.
Ambient Conditions	The conditions around the transducer (pressure, temperature, etc.).
Ambient Pressure	Pressure of the air surrounding a transducer.
Ambient Temperature	The average or mean temperature of the surrounding air which comes in contact with the equipment and instruments under test.
Amine (Alkanolamine)	Any of several liquid compounds containing amino nitrogen generally used in water solution to remove, by reversible chemical reaction, hydrogen sulfide and/or carbon dioxide from gas and liquid hydrocarbon streams.
Ammeter	An instrument used to measure current.
Amp	See Ampere.
Ampere	The unit of electrical current. Also milliamp (one thousandth of an amp) and microamp (one millionth of an amp). One amp corresponds to the flow of about 6×10^{18} electrons per second.
Ampere-Hour	The quantity of electricity measured in ampere-hours (Ah) which may be delivered by a cell or battery under specified conditions. A current of one ampere flowing for one hour.
Ampere-Hour Efficiency	The ratio of the output of a secondary cell or battery, measured in ampere-hours, to the input required to restore the initial state of charge, under specified conditions.
Amplifier	A device which draws power from a source other than the input signal and which produces as an output an enlarged reproduction of the essential features of its input.
Amplitude	The highest value reached by voltage, current or power during a complete cycle.
Amplitude Modulation	Where audio signals increase and decrease the amplitude of the "carrier wave".
Amplitude Span	The Y-axis range of a graphic display of data in either the time or frequency domain. Usually a log display (dB) but can also be linear.
AMU	See Analog Measurement Unit.
AMU/IMV	Generic reference to the Measurement unit. See Analog Measurement Unit and Integral Multivariable Transducer for more definition.
Analog	A system in which data is represented as a continuously varying voltage/current.
Analog Input	Data received as varying voltage/current.
Analog Measurement Unit	A transducer for converting energy from one form to another. (e.g. Static and Differential pressure to electrical signals)
Analog Output	A voltage or current signal that is a continuous function of the measured parameter. Data that is transmitted as varying voltage/current.
Analog Trigger	A trigger that occurs at a user-selected point on an incoming analog signal. Triggering can be set to occur at a specific level on either an increasing or a decreasing signal (positive or negative slope).
Analog-to-Digital Converter	An electronic device, often an integrated circuit, that converts an analog voltage to a number.

Analyzer Control Module	Consists of various electronic components used for analysis.
Anemometer	An instrument for measuring and/or indicating the velocity of air flow.
Annealed	Toughen (steel or glass) by a process of gradually heating and cooling,
Annunciator	Display of a status on a screen.
ANSI	American National Standards Institute.
Antenna	A length of wire or similar that radiates (such as a transmitting antenna) or absorbs (such as a radio antenna) radio waves. The two basic types are: Yagi (directional) or Omni (bi-directional).
AO	Analog Output
AP	See Absolute Pressure.
API 14.3	American Petroleum Institute Report No. 14.3 addresses the 1992 equation regarding the AGA-3 method for calculating gas volume across an Orifice Plate.
API 21.1	American Petroleum Institute Report No. 21.1 addresses the equation regarding AGA-8 Fpv or Supercompressibility Factor and the energy content of the gas.
API Gravity	An arbitrary scale expressing the relative density of liquid petroleum products. The scale is calibrated in degrees API. The formula is: $DegAPI = \left[\frac{141.5}{\gamma(60^{\circ}F / 60^{\circ}F)} \right] - 131.5$ <p>where γ =relative density.</p>
Archive	A file containing historical records in a compressed format for more efficient long term storage and transfer. Totalflow archive records are non-editable, meaning that when they are stored they may not be changed. These records are used during an audit of data.
Artificial Drives	Techniques for producing oil after depletion or in lieu of natural drives; includes water flooding, natural gas re-injection, inert gas injection, flue gas injection and in-situ combustion.
Artificial Lift	Any of the techniques, other than natural drives, for bringing oil to the surface.
ASCII	American Standard Code for Information Interchange. A very popular standard method of encoding alphanumeric characters into 7 or 8 binary bits.
ASME	American Society of Mechanical Engineers.
ASTM	American Society for Testing and Materials (ASTM International).
ASTM D 3588	ASTM International Standard Practice for calculating heat value, compressibility factor and relative density of gaseous fuels.
Asynchronous	A communications protocol where information can be transmitted at an arbitrary, unsynchronized point in time, without synchronization to a reference time or "clock".
ATC	Automatic temperature compensation.
ATEX	Certification Directive for Explosive Atmospheres.
Atmosphere	A unit of pressure; the pressure that will support a column of mercury 760 mm high at 0 °C.
Atmospheric Pressure	The pressure due to the weight of the atmosphere (air and water vapor) on the earth's surface. The average atmospheric pressure at sea level (for scientific purposes) has been defined at 14.696 pounds per square inch absolute.
Audio Frequency	Generally in the range 20 Hz to 20 KHz.
Audit	To examine or verify data for accuracy. Totalflow's DB1 and DB2 records may be edited to generate a more accurate representation of data information.

Audit Trail	Using the Long Term Archive files to justify changes made to records that more accurately reflects the correct data. Peripheral information used to edit data is recorded without exception, to justify the accuracy of the edited data records.
Automatic Frequency Control	Similar to Automatic Fine Tune (AFT). A circuit that keeps a receiver in tune with the wanted transmission.
AWG	American Wire Gage.
Back Pressure	Pressure against which a fluid is flowing. May be composed of friction in pipes, restrictions in pipes, valves, pressure in vessels to which fluid is flowing, hydrostatic head, or other resistance to fluid flow.
Backflush	Technique used in chromatography to reverse direction of the flow after the lighter components have been measured, allowing the heavier components to remain in the column until measured, shortening the length of the column.
Background Acquisition	Data is acquired by a DAQ system while another program or processing routine is running without apparent interruption.
Background Noise	The total noise floor from all sources of interference in a measurement system, independent of the presence of a data signal.
Backup	A system, device, file or facility that can be used as an alternative in case of a malfunction or loss of data.
Bandwidth	The range of frequencies available for signaling; the difference between the highest and lowest frequencies of a band expressed in Hertz.
Bar	Bar is equal to 1 atmosphere of pressure. I.e. .987 Standard atmospheric pressure or 14.5 lbs./psia.
Barometer	An instrument which measures atmospheric pressure.
Barrel	The unit of volume measurement used for petroleum and it's products; 1 barrel = 42 US gallons, or .159 cubic meters.
Base Pressure	The pressure used as a standard in determining gas volume. Volumes are measured at operating pressures and then corrected to base pressure volume. Base pressure is normally defined in any gas measurement contract. The standard value for natural gas in the United States is 14.73 psia, established by the American National Standards Institute as standard Z-132.1 in 1969.
Basic Sediment and Water	Waste that collects in the bottom of vessels and tanks containing petroleum or petroleum products.
Battery	Two or more electrochemical cells electrically interconnected in an appropriate series/parallel arrangement to provide the required operating voltage and current levels.
Baud	Unit of signaling speed. The speed in baud is the number of discrete conditions or events per second. If each event represents only one bit condition, baud rate equals bits per second (bps).
Baud Rate	Serial communications data transmission rate expressed in bits per second (b/s).
Bias	Term used when calibrating. Amounts to offset the actual measurement taken. On a LevelMaster, it refers to adjusting the measurement of the float level to agree with a calibrated measurement. On an RTD (Resistant Thermal Detector), it refers to adjusting the measurement of the temperature to agree with a calibrated temperature. This figure maybe either a positive or negative figure.
BIAS Current	A very low-level DC current generated by the panel meter and superimposed on the signal. This current may introduce a measurable offset across a very high source impedance.
Binary Number	System based on the number 2. The binary digits are 0 and 1.
Binary-Coded Decimal	A code for representing decimal digits in a binary format.

BIOS	Basic Input/Output System. A program, usually stored in ROM, which provides the fundamental services required for the operation of the computer. These services range from peripheral control to updating the time of day.
Bipolar	A signal range that includes both positive and negative values.
Bipolar Transistor	The most common form of transistor.
Bit	Binary Digit - the smallest unit of binary data. One binary digit, either 0 or 1. See also byte.
Bits Per Second	Unit of data transmission rate.
Blue Dot Technology	Technological changes to the DC and ACM Modules, decreasing noise by changing ground. Allows amplification of the results, gains resolution.
Board	Common name used to identify the Main Electronic Board. Also called Motherboard, Engine Card and Circuit Board.
Boiling Point	The temperature at which a substance in the liquid phase transforms to the gaseous phase; commonly refers to the boiling point of water which is 100°C (212°F) at sea level.
Bottom Solids and Water	Refers to materials that settle to the bottom of an oil tank, including the heavy water.
Bounce	Bouncing is the tendency of any two metal contacts in an electronic device to generate multiple signals as the contacts close or open. When you press a key on your computer keyboard, you expect a single contact to be recorded by your computer. In fact, however, there is an initial contact, a slight bounce or lightening up of the contact, then another contact as the bounce ends, yet another bounce back, and so forth. A similar effect takes place when a switch made using a metal contact is opened.
BPS	See Bits Per Second.
Bridge	Generally a short-circuit on a PC board caused by solder joining two adjacent tracks.
Bridge Resistance	See Input impedance and Output impedance.
British Thermal Unit	Energy required to raise one pound of water one degree Fahrenheit. One pound of water at 32 F° requires the transfer of 144 BTUs to freeze into solid ice.
Browser	Software which formats Web pages for viewing; the Web client
BS&W	See Bottom Solids (or sediment) and Water.
Btu	See British Thermal Unit.
Btu Method	A method of allocating costs between different operations or between different products based upon the heat content of products produced in the various operations or of the various produced products.
Btu per Cubic Foot	A measure of the heat available or released when one cubic foot of gas is burned.
Btu, Dry	Heating value contained in cubic foot of natural gas measured and calculated free of moisture content. Contractually, dry may be defined as less than or equal to seven pounds of water per Mcf.
Btu, Saturated	The number of Btu's contained in a cubic foot of natural gas fully saturated with water under actual delivery pressure, temperature and gravity conditions. See BTU, DRY.
Btu/CV	Used to express the heating content of gas. See British Thermal Units or Calorific Value.
BtuMMI	Refers to the interface program or software that operates the Btu Analyzer.
Buffer	(1) A temporary storage device used to compensate for a difference in data rate and data flow between two devices (typically a computer and a printer); also called a spooler; (2) An amplifier to increase the drive capability, current or distance, of an analog or digital signal.

Burst Pressure	The maximum pressure applied to a transducer sensing element or case without causing leakage.
BUS	A data path shared by many devices (e.g., multipoint line) with one or more conductors for transmitting signals, data, or power.
Bus Master	A type of controller with the ability to read and write to devices on the computer bus.
Busbar	A heavy, rigid conductor used for high voltage feeders.
Butane (C ₄ H ₁₀)	A saturated hydrocarbon (Alkane) with four carbon atoms in its molecule (C ₄ H ₁₀). A gas at atmospheric pressure and normal temperature, but easily liquefied by pressure. Generally stored and delivered in liquefied form and used as a fuel in gaseous form, obtained by processing natural gas as produced and also from a process in petroleum refining. Contains approximately 3,260 Btu per cubic foot.
Byte	A group of binary digits that combine to make a word. Generally 8 bits. Half byte is called a nibble. Large computers use 16 bits and 32 bits. Also used to denote the amount of memory required to store one byte of data.
Cache Memory	Fast memory used to improve the performance of a CPU. Instructions that will soon be executed are placed in cache memory shortly before they are needed. This process speeds up the operation of the CPU.
Calibrate	To ascertain, usually by comparison with a standard, the locations at which scale or chart graduations should be placed to correspond to a series of values of the quantity which the instrument is to measure, receive or transmit. Also, to adjust the output of a device, to bring it to a desired value, within a specified tolerance for a particular value of the input. Also, to ascertain the error in the output of a device by checking it against a standard.
Calorie	The quantity of thermal energy required to raise one gram of water 1°C at 15°C.
Calorimeter	An apparatus which is used to determine the heating value of a combustible material.
Capacitor	An electronic component that stores electrical charge.
Capacity	The total number of ampere-hours (or watt-hours) that can be withdrawn from a cell/battery under specified conditions of discharge.
Carbon	Base of all hydrocarbons and is capable of combining with hydrogen in many proportions, resulting in numberless hydrocarbon compounds. The carbon content of a hydrocarbon determines, to a degree, the hydrocarbon's burning characteristics and qualities.
Carbon Dioxide	Colorless, odorless and slightly acid-tasting gas, consisting of one atom of carbon joined to two atoms of oxygen. CO ₂ . Produced by combustion or oxidation of materials containing carbon.
Carrier Gas	Totalflow recommends that Helium be used as a carrier gas. Carrier gas is used in the "Mobile Phase" of chromatography, pushing the sample gas through the columns ("Stationary Phase"). Because Helium has no heating value, it does not affect the Btu values.
Catalyst	A substance that speeds up a chemical reaction without being consumed itself in the reaction. A substance that alters (usually increases) the rate at which a reaction occurs.
Catalytic	The process of altering, accelerating or instigating a chemical reaction.
Cathode	An electrode through which current leaves any nonmetallic conductor. An electrolytic cathode is an electrode at which positive ions are discharged, or negative ions are formed, or at which other reducing reactions occur. The negative electrode of a galvanic cell; of an electrolytic capacitor.
Cavitation	The boiling of a liquid caused by a decrease in pressure rather than an increase in temperature.
C-Code	C language (IEC supported programming language)

CCU	See DosCCU, WINCCU, PCCU or WEBCCU.
CCV	See Closed Circuit Voltage.
Cd	Coefficient of Discharge factor.
CE	European Community Certification Bureau.
Cell	The basic electrochemical unit used to generate or store electrical energy.
Celsius (centigrade)	A temperature scale defined by 0°C at the ice point and 100°C at boiling point of water at sea level.
Cenelec	European Committee for Electro-technical Standardization. Also known as the European Standards Organization.
Central Processing Unit	The central part of a computer system that performs operations on data. In a personal computer the CPU is typically a single microprocessor integrated circuit.
Ceramic Insulation	High-temperature compositions of metal oxides used to insulate a pair of thermocouple wires. The most common are Alumina (Al ₂ O ₃), Beryllia (BeO), and Magnesia (MgO). Their application depends upon temperature and type of thermocouple. High-purity alumina is required for platinum alloy thermocouples. Ceramic insulators are available as single and multihole tubes or as beads.
Certification	The process of submitting equipment to specific tests to determine that the equipment meets the specifications or safety standards.
CFG	Configuration File. When saving new configuration files, the file is saved as a *.cfg file.
CFM	The volumetric flow rate of a liquid or gas in cubic feet per minute.
Character	A letter, digit or other symbol that is used as the representation of data. A connected sequence of characters is called a character string.
Characteristics	Detailed information pertaining to it's description. The XFC stores this information in the PROM chip. A feature or quality that makes somebody or something recognizable.
Charge	The conversion of electrical energy, provided in the form of a current from an external source, into chemical energy within a cell or battery.
Chip	Another name for integrated circuit or the piece of silicon on which semiconductors are created.
Chromatograph	An instrument used in chemical analysis, to determine the make-up of various substances, and often used to determine the Btu content of natural gas. Chromatography- A method of separating gas compounds by allowing it to seep through an adsorbent so that each compound is adsorbed in a separate layer.
CIM	Communication Interface Module. Totalflow's version is called TFIO Communication Interface Module.
Circuit	1. The complete path between two terminals over which one-way or two-way communications may be provided. 2. An electronic path between two or more points, capable of providing a number of channels. 3. A number of conductors connected together for the purpose of carrying an electrical current. 4. An electronic closed-loop path among two or more points used for signal transfer. 5. A number of electrical components, such as resistors, inductances, capacitors, transistors, and power sources connected together in one or more closed loops.

Circuit board	<p>Sometimes abbreviated PCB. Printed circuit boards are also called cards. A thin plate on which chips and other electronic components are placed. They fall into the following categories:</p> <p>Motherboard: Typically, the mother board contains the CPU, memory and basic controllers for the system. Sometimes call the system board or main board.</p> <p>Expansion board: Any board that plugs into one of the computer's expansion slots, including controller boards, LAN cards, and video adapters.</p> <p>Daughter Card: Any board that attaches directly to another board.</p> <p>Controller board: A special type of expansion board that contains a controller for a peripheral device.</p> <p>Network Interface Card (NIC): An expansion board that enables a PC to be connected to a local-area network (LAN).</p> <p>Video Adapter: An expansion board that contains a controller for a graphics monitor.</p>
Class 1, Division 1	Class 1 refers to the presence of hazardous gas. Division 1 refers to the conditions at the location: meaning that there is not sufficient airflow around the equipment to dissipate any gases that are accumulating in the vicinity. i.e. An enclosed space.
Class 1, Division 2	Class 1 refers to the presence of hazardous gas. Division 2 refers to the conditions at the location: meaning that there is sufficient airflow around the equipment to dissipate any gases that are accumulating in the vicinity.
Clean Gas	Gas that has no particles larger than one micron and no more than one milligram of solids per cubic meter.
Clear	To restore a device to a prescribed initial state, usually the zero state.
Clock	The source(s) of timing signals for sequencing electronic events (e.g. synchronous data transfer).
Closed Circuit Voltage	The difference in potential between the terminals of a cell/battery when it is discharging (on- load condition).
CMOS	See Complimentary Metal-Oxide-Semiconductor.
CNG	See Compressed Natural Gas
Coalbed Methane	A methane-rich, sulfur-free natural gas contained within underground coal beds.
Coefficient of expansion	The ratio of the change in length or volume of a body to the original length or volume for a unit change in temperature.
Coil	A conductor wound in a series of turns.
Cold Start	A rebooting technique which will clear all operational errors, loose all data files, but will not damage configuration files if stored on the SDRIVE.
Collector	The semiconductor region in a bipolar junction transistor through which a flow of charge carriers leaves the base region.
Column	Hardware component used in gas chromatography to separate components into measurable units.
Combustible	Classification of liquid substances that will burn on the basis of flash points. A combustible liquid means any liquid having a flash point at or above 37.8°C (100°F) but below 93.3°C (200°F), except any mixture having components with flash points of 93.3°C (200°F) or higher, the total of which makes up 99 percent or more of the total volume of the mixture.
Combustible	Classification of liquid substances that will burn on the basis of flash points. A combustible liquid means any liquid having a flash point at or above 37.8°C (100°F) but below 93.3°C (200°F), except any mixture having components with flash points of 93.3°C (200°F) or higher, the total of which makes up 99 percent or more of the total volume of the mixture.
Comma Separated Values	These file types are importable records used by spreadsheet programs to display and manipulate data.

Communication	Transmission and reception of data among data processing equipment and related peripherals.
Communication Port	Comm. Port (abbreviation) refers to the host computer's physical communication's port being used to communicate with the equipment. Used by Totalflow when discussing local or remote communication with various equipment including the XFC, FCU, XRC, RTU and LevelMaster etc.
Compensation	An addition of specific materials or devices to counteract a known error.
Complimentary Metal-Oxide-Semiconductor	Family of logic devices that uses p-type and n-type channel devices on the same integrated circuit. It has the advantage of offering medium speed and very low power requirements.
Component	(1) A small object or program that performs a specific function and is designed in such a way to easily operate with other components and applications. Increasingly, the term is being used interchangeably with applet. (2) A part of a device.
Compressed Gas	A gas or mixture of gases having, in a container an absolute pressure exceeding 40 psi at 21.1°C (70°F). A gas or mixture having in a container, an absolute pressure exceeding 104 psi at 54.4°C (130°F) regardless of the pressure at (21.1°C (70°F)). A liquid having a vapor pressure exceeding 40 psi at 37.8°C (70°F) as determined by ASTM D-323-72.
Compressed Natural Gas	Natural gas in high-pressure surface containers that is highly compressed (though not to the point of liquefaction). CNG is used extensively as a transportation fuel for automobiles, trucks and buses in some parts of the world. Small amounts of natural gas are also transported overland in high-pressure containers.
Compressibility	The property of a material which permits it to decrease in volume when subjected to an increase in pressure. In gas-measurement usage, the compressibility factor "Z" is the deviation from the ideal Boyle and Charles' law behavior. See SUPERCOMPRESSIBILITY FACTOR.
Compressibility Factor	See Supercompressibility Factor.
Concentration	Amount of solute per unit volume or mass of solvent or of solution.
Concurrent	Performing more than one task at a time.
Condensate	1) The liquid formed by the condensation of a vapor or gas; specifically, the hydrocarbon liquid separated from natural gas because of changes in temperature and pressure when the gas from the reservoir was delivered to the surface separators. 2) A term used to describe light liquid hydrocarbons separated from crude oil after production and sold separately.
Condensation	Liquefaction of vapor.
Condensed Phases	The liquid and solid phases; phases in which particles interact strongly.
Condensed States	The solid and liquid states.
Conduction	The conveying of electrical energy or heat through or by means of a conductor.
Configuration No.	The Configuration number is a suffix of the serial number which defines the characteristics of the unit.
Console Mode	A local user interface typically used with custom applications that are not supported through any other mechanism. Also referred to as Printer Console Mode.
Contact	Current carrying part of a switch, relay or connector.
Conversion Time	The time required, in an analog input or output system, from the moment a channel is interrogated (such as with a read instruction) to the moment that accurate data is available. This could include switching time, settling time, acquisition time, A/D conversion time, etc.
Coprocessor	Another computer processor unit that operates in conjunction with the standard CPU. Can be used to enhance execution speed. For example, the 8087 is designed to perform floating point arithmetic.

COR	See Corrected Runtime.
Corrected Runtime	Correction to signal made to decrease/increase "ZERO phase" and eliminate the shift between RT and COR for increased accuracy.
Cos	See Cosine.
Cosine	The sine of the complement of an arc or angle.
Counts	The number of time intervals counted by the dual-slope A/D converter and displayed as the reading of the panel meter, before addition of the decimal point.
CPS	Cycles per second; the rate or number of periodic events in one second, expressed in Hertz (Hz).
CPU	See Central Processing Unit.
CPUC	California Public Utilities Commission
CRC	See Cyclic Redundancy Check.
CSA	Canadian Standards Administration. Canadian certification agency.
CTS	Communication abbreviation for Clear To Send.
Cubic Foot	The most common unit of measurement of gas volume in the US. It is the amount of gas required to fill a volume of one cubic foot under stated conditions of temperature, pressure, and water vapor.
Cubic Foot Metered	The quantity of gas that occupies one cubic foot under pressure and temperature conditions in the meter.
Cubic Foot, Standard	That quantity of gas which under a pressure of 14.73 psia and at a temperature of 60 degrees occupies a volume of one cubic foot without adjustment for water vapor content.
Cumulative Capacity	The total number of ampere-hours (or watt hours) that can be withdrawn from a cell/battery under specified conditions of discharge over a predetermined number of cycles or the cycle life.
Current	Current is measured in amps (milliamps and microamps). It is the passage of electrons. Conventional current flows from positive to negative. Electrons flow from negative to positive - called "electron flow".
Cursor	Dots used to indicate the location of the next character or symbol to be entered.
Custody Transfer	The legal and commercial transfer of a commodity such as natural gas, LNG, etc. from one party to another.
Custody Transfer Transaction	The Custody Transfer Transaction is the hand-off of the physical commodity from one operator to another.
Cut-Off Voltage	The cell/battery voltage at which the discharge is terminated.
CV	Calorific Value. European value of heating content.
Cycle	One complete sequence of events. One complete alteration of an AC current or Volt. The discharge and subsequent charge of a rechargeable cell/battery is called a cycle.
Cycle Life	The number of cycles under specified conditions which were available from a rechargeable cell/battery before it fails to meet specified criteria as to performance.
Cycle Time	The time usually expressed in seconds for a controller to complete one on/off cycle.
Cyclic Redundancy Check	An ongoing verification of the validity of transmitted and received data providing assurance that the message conforms to a pre-agreed upon convention of communications.
D/A	See Digital-to-analog.
D/I	See Digital Input.
D/O	See Digital Output.

DAC	See Digital to Analog Converter.
DACU	Data Acquisition Control Unit.
Data Acquisition	Gathering information from sources such as sensors and AMUs in an accurate, timely and organized manner. Modern systems convert this information to digital data, which can be stored and processed by a computer.
Data Collect	Physically, locally or remotely, retrieving data stored with a Totalflow unit. This data is typically stored in records located in a data base format.
DB	See Decibel.
DB1	Acronym for Data Base 1. This refers to the previous data base structure used to store data in Totalflow products.
DB2	Acronym for Data Base 2. This refers to the current data base structure used to store data in Totalflow products.
DC	See Direct Current
DCD	Communication abbreviation for Data Carrier Detect
DCS/PLC	Distribution Control System/Programmable Logic Controller
DDE	See Digital Data Exchange. Also called Dynamic Data Exchange. May refer to Totalflow's DDE Server TDS32.
Dead Weight Tester	Portable pressure tester used to check calibration and to calibrate AMU's utilizing a system of calibrated weights.
De-bounce	De-bouncing is any kind of hardware device or software that ensures that only a single signal will be acted upon for a single opening or closing of a contact. When you press a key on your computer keyboard, you expect a single contact to be recorded by your computer. In fact, however, there is an initial contact, a slight bounce or lightening up of the contact, then another contact as the bounce ends, yet another bounce back, and so forth. A similar effect takes place when a switch made using a metal contact is opened. The usual solution is a de-bouncing device or software that ensures that only one digital signal can be registered within the space of a given time (usually milliseconds)
Decibel	A logarithmic measure of the ratio of two signal levels. A practical unit of gain.
Decimal	A numbering system based on 10.
Default	A value assigned or an action taken automatically unless another is specified.
Degree	An incremental value in the temperature scale, i.e., there are 100 degrees between the ice point and the boiling point of water in the Celsius scale and 180°F between the same two points in the Fahrenheit scale.
Delivery Point	Point at which gas leaves a transporter's system completing a sale or transportation service transaction between the pipeline company and a sale or transportation service customer.
Demand Day	That 24-hour period specified by a supplier-user contract for purposes of determining the purchaser's daily quantity of gas used (e.g., 8 AM to 8 AM, etc.). This term is primarily used in pipeline-distribution company agreements. It is similar to, and usually coincides with, the distribution company "Contract Day".
Demand Load	The rate of flow of gas required by a consumer or a group of consumers, often an average over a specified short time interval (cf/hr or Mcf/hr). Demand is the cause; load is the effect.
Demand Meters	A device which indicates or records the instantaneous, maximum or integrated (over a specified period) demand.
Demand, Average	The demand on a system or any of its parts over an interval of time, determined by dividing the total volume in therms by the number of units of time in the interval.
Density	Mass per unit Volume: $D=MV$

Desaturation	Doesn't cause the composition of the gas to change, enabling a more representative sample of gas.
Detector Bead	See Thermal Conductivity Detector.
Deviation	The difference between the value of the controlled variable and the value at which it is being controlled.
Dewar	A glass or metal container made like a vacuum bottle that is used especially for storing liquefied gases. Also called "Dewar flask".
DG	Display Group. When display group files are created
Diaphragm	A bellows inside a displacement type gas meter. Also, a membrane separating two different pressure areas within a control valve or regulator.
Differential	For an on/off controller, it refers to the temperature difference between the temperature at which the controller turns heat off and the temperature at which the heat is turned back on. It is expressed in degrees.
Differential Input	A signal-input circuit where SIG LO and SIG HI are electrically floating with respect to ANALOG GND (METER GND, which is normally tied to DIG GND). This allows the measurement of the voltage difference between two signals tied to the same ground and provides superior common-mode noise rejection.
Differential Pressure	The pressure difference between two points in a system. For example, the difference in pressure between the upstream and downstream taps of an orifice plate, used to measure volume passing through the orifice.
Digit	A measure of the display span of a panel meter. By convention, a full digit can assume any value from 0 through 9, a 1/2-digit will display a 1 and overload at 2, a 3/4-digit will display digits up to 3 and overload at 4, etc. For example, a meter with a display span of ± 3999 counts is said to be a 3-3/4 digit meter.
Digital	A signal which has distinct states, either on or off (0 or 1). Digital computers process data as binary information having either true or false states.
Digital Data	Information transmitted in a coded form (from a computer), represented by discrete signal elements.
Digital Data Exchange or Dynamic Data Exchange	A Microsoft data exchange format generally used to transfer data from one program to another. It is a very simple format to use and Totalflow customers often use TDS to acquire data from Totalflow devices and then transfer the data to an Excel spreadsheet using DDE. The Totalflow Driver, TDS32, supports DDE and its network version, NetDDE.
Digital Electronics	The branch of electronics dealing with information in binary form.
Digital Input	Refers to the signal received in binary format.
Digital Output	Refers to the signal emitted in binary format. An output signal which represents the size of an input in the form of a series of discrete quantities.
Digital to Analog Conversion	The process of translating discrete data into a continuously varying signal. Common uses are to present the output of a digital computer as a graphic display or as a test stimulus.
Digital-to-Analog Converter	An electronic device, often an integrated circuit, that converts a digital number into a corresponding analog voltage or current.
DIN	Deutsches Institut für Normung. German Institute for Standardization set of standards recognized throughout the world.
DIN Rail	Rail on which modules are mounted. Allows modules to snap on and slide right and left.
Diode	A semiconductor that allows current to flow in one direction only.
DIP Switches	A bank of switches typically used in setting the hardware configuration and base address of an option card.
Direct Current	A current that does not change in direction and is substantially constant in value.

Direct Memory Access	A method by which information can be transferred from the computer memory to a device on the bus without using the processor.
Discharge	The conversion of chemical energy of a cell/battery into electrical energy and withdrawal of the electrical energy into a load.
Discharge Rate	The rate, usually expressed in amperes, at which electrical current is taken from the cell/battery.
Discrete Manifold	Also called Tubing Manifold. Used in instances when the XFC is not mounted directly on the Orifice, usually pipe mount or wall mount.
Distillates	The distillate or middle range of petroleum liquids produced during the processing of crude oil. Products include diesel fuel, heating oil, kerosene and turbine fuel for airplanes.
Distillation	The first stage in the refining process in which crude oil is heated and unfinished petroleum products are initially separated.
Distribution	The act or process of distributing gas from the city gas or plant that portion of utility plant used for the purpose of delivering gas from the city gate or plant to the consumers, or to expenses relating to the operating and maintenance of distribution plant.
Distribution Company	Gas Company which obtains the major portion of its gas operating revenues from the operation of a retail gas distribution system, and which operates no transmission system other than incidental connections within its own system or to the system of another company. For purposes of A.G.A. statistics, a distribution company obtains at least 90 percent of its gas operating revenues from sales to ultimate customers, and classifies at least 90 percent of mains (other than service pipe) as distribution. Compare INTEGRATED COMPANY; TRANSMISSION COMPANY, GAS.
DN	Inside diameter standard.
DOS	Disk Operating System.
DOS CCU	Refers to the DOS version of the Calibration and Collection Unit. Also known as FS/2, hand held or Dog Bone.
DOT Matrix	A group of dots/pixels forming a character or symbol, usually five dots across and seven dots down.
DOT/Pixel	An active element that forms a character or symbol when combined in a matrix.
Download	This refers to a Totalflow procedure in which any file(s) located on a laptop PC or storage device, may be copied to the on-board memory of a Totalflow Host device for purposes of restoring, configuration or repair.
Downstream	The oil industry term used to refer to all petroleum activities from the processing of refining crude oil into petroleum products to the distribution, marketing, and shipping of the products. Also see Upstream.
Downstream Pipeline	The pipeline receiving natural gas at a pipeline inter-connect point.
DP	See Differential Pressure.
DRAM	See Dynamic Random Access memory.
Drift	A change of a reading or a set point value over long periods due to several factors including change in ambient temperature, time, and line voltage.
Driver (Hardware)	An electronic circuit that provides input to another electronic circuit.
Driver (Software)	A program that exercises a system or system component by simulating the activity of a higher level component.
Drivers	Software that controls a specific hardware device, such as interface boards, PLCs, RTUs, and other I/O devices.
Droplet Liquids	Large liquid particles
Dry Contact	Contacts which neither break nor make a circuit. 0 Ohms.

Dry Gas	Has no more than seven pounds of water per million cubic feet of gas. Gas has less than 0.1 PPM of liquid at the coldest ambient condition expected at the coldest point in the system. The liquid can be water, oil, synthetic lubrication, glycol, condensed sample or any other non vapor contaminate.
DSP	Digital Signal Processor.
Dual Element Sensor	A sensor assembly with two independent sensing elements.
Dual-Access Memory	Memory that can be sequentially accessed by more than one controller or processor but not simultaneously accessed. Also known as shared memory.
Duplex	The ability to both send and receive data simultaneously over the same communications line.
Duplex Wire	A pair of wires insulated from each other and with an outer jacket of insulation around the inner insulated pair.
Duty Cycle	The total time to one on/off cycle. Usually refers to the on/off cycle time of a temperature controller.
DVI	The Port Manager and communication engine of the iVision SCADA System. This software can multiplex among several communication formats and thus supporting several vendor's equipment over a single radio frequency. It "pushes" new data to the iVision database, saving time and network resources by not transmitting redundant data. The DVI includes the Totalflow WinCPC code and thus supports all Totalflow software and functions – including WinCCU, TDS, PCCU, Report by exception, cryout, etc.
Dynamic Random Access memory	This is the most common form of computer memory It needs to be continually refreshed in order to properly hold data, thus the term "dynamic."
E2Prom	See Electrically Erasable Programmable Read-Only Memory. Also called EEPROM.
Earth	Can mean a connection to the earth itself or the negative lead to the chassis or any point to zero voltage.
EC	European Community.
Echo	To reflect received data to the sender. i.e. depressed on a keyboard are usually echoed as characters displayed on the screen.
Edit	Making changes to information, data or configuration files.
EEPROM	See Electrically Erasable Programmable Read-Only Memory. The PROM can be erased by electricity.
EFI	Electromechanical Frequency Interface.
EFM	See Electronic Flow Measurement.
EFR	Enhance Feature Release.
Electrical Interference	Electrical noise induced upon the signal wires that obscures the wanted information signal.
Electrically Erasable Programmable Read-Only Memory	ROM that can be erased with an electrical signal and reprogrammed. Also referred to as the S Drive. It is a persistent drive that will not loose it's memory unless manually reprogrammed. Also called E2Prom. Totalflow's XFC and XRC have a Serial EEPROM on board, which generally holds registry, application configuration and warranty information (non-volatile).
Electrode	The site, area, or location at which electrochemical processes take place.
Electromagnetic Compatibility	IEEE Standards for Electromagnetic Compatibility.
Electromagnetic Interference	Any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics/electrical equipment. It can be induced intentionally, as in some forms of electronic warfare, or unintentionally, as a result of spurious emissions and responses, intermodulation products, and the like.

Electronic Flow Measurement	Historically, flow measurement was tracked using a chart recording technology. Developments in the field of electronics allowed for electronic measurement devices to overtake the chart recording market. This field continues to develop into peripheral markets, making the "Flow Meter" a valuable asset with multi-tasking "Control" capabilities. Totalflow's answer to this developing market is the XSeries equipment.
EMC	See Electromagnetic Compatibility
EMI	See Electromagnetic Interference.
Emitter	One terminal of a transistor.
EN	Euro Norm (European Standard)
Enagas	Spain's Certification Board
Encoder	A device that converts linear or rotary displacement into digital or pulse signals. The most popular type of encoder is the optical encoder, which uses a rotating disk with alternating opaque areas, a light source, and a photodetector.
Environmental Conditions	All conditions in which a transducer may be exposed during shipping, storage, handling, and operation.
EPROM	See Erasable Programmable Read-Only Memory. The PROM can be erased by ultraviolet light or electricity.
Erasable Programmable Read-Only Memory	ROM that can be erased using Ultraviolet Light. The EPROM maybe re-programmed by removing the EPROM from the circuit and using special equipment to write to it.
Ethane (C ₂ H ₆)	A colorless hydrocarbon gas of slight odor having a gross heating value of 1,773 Btu per cubic foot and a specific gravity of 1.0488. It is a normal constituent of natural gas.
Ethylene (C ₂ H ₄)	A colorless hydrocarbon gas of slight odor having a gross heating value of 1,604 Btu per cubic foot and a specific gravity of 0.9740. It is usually present in manufactured gas, constituting one of its elements.
EU	European Union. Formerly known as the European Community (EC). Members of this union are replacing individual national regulations of member countries with a series of Directives. These Directives are legislative instruments which oblige member states to introduce them into their existing laws. These directives harmonize a variety of existing practices, preserve the different legal traditions and settle constraints for further developments.
Event	Important incident: an occurrence, especially one that is particularly significant.
Event File	Stored records specifying a notable change. The XFC stores up to 200 records, containing: Time, Day, Description, Old Value, New Value.
Events	Signals or interrupts generated by a device to notify another device of an asynchronous event. The contents of events are device-dependent.
Ex	Potential Explosive.
EXIMV	Explosion Proof Integral Multivariable Transducer.
Expansion Board	A plug-in circuit board that adds features or capabilities beyond those basic to a computer, such as a data acquisition system expansion board.
Expansion Factor	Correction factor for the change in density between two pressure measurement areas in a constricted flow.
Expansion Slots	The spaces provided in a computer for expansion boards than enhance the basic operation of the computer.
Explosion-proof Enclosure	Explosion Proof Enclosure for Class 1 Division 1 locations. An enclosure that can withstand an explosion of gases within it and prevent the explosion of gases surrounding it due to sparks, flashes or the explosion of the container itself, and maintain an external temperature which will not ignite the surrounding gases.

Extended Binary Coded Decimal Interchange Code	EBCDIC. An eight-bit character code used primarily in IBM equipment. The code allows for 256 different bit patterns.
External Multivariable Transducer	Multivariable Transducer located outside of the Flow Computer enclosure. Used in multi-tube configurations and on systems where the actual Flow Computer is located at a distance from the flowing tube.
External Transducer	DP/SP Transducer located outside the enclosure. All electronics are located inside the enclosure and communicate via a ribbon cable.
F.O.B.	Abbreviation of free on board with the cost of delivery to a port and loading onto a ship included.
Fa	Orifice Thermal Expansion factor.
Fahrenheit	A temperature scale defined by 32° at the ice point and 212° at the boiling point of water at sea level.
Faux	Full Well Stream Factor.
Fb	Basic Orifice factor.
FBD	Function Block Diagram (IEC supported programming language)
FCC	Federal Communications Commission.
FCU	Flow computer unit
Feed Points	Connections between gas feeder lines and distribution networks.
Feedback	Occurs when some or all of the output of the device (such as an amplifier) is taken back to the input. This may be accidental (such as the acoustic feedback from a speaker to microphone) or intentional , to reduce distortion.
Feeder (Main)	A gas main or supply line that delivers gas from a city gate station or other source of supply to the distribution networks.
FET	Field-effect transistor. Transistor with electric field controlling output: a transistor, with three or more electrodes, in which the output current is controlled by a variable electric field.
Fg	Specific Gravity factor.
Field Pressure	The pressure of natural gas as it is found in the underground formations from which it is produced.
File	A set of related records or data treated as a unit.
Film Liquids	Aerosols liquids who have contacted each other and become adhered to the inside of the pipeline.
Firmware	A computer program or software stored permanently in PROM or ROM or semi-permanently in EPROM.
Firmware Version	This refers to the version of firmware contained in the equipment.
Fixed-Point	A format for processing or storing numbers as digital integers.
Flag	Any of various types of indicators used for identification of a condition or event; for example, a character that signals the termination of a transmission.
Flammable	A liquid as defined by NFPD and DOT as having a flash point below 37.8°C (100°F).
Flange	For pipe, a metal collar drilled with bolt holes and attached to the pipe with its flat surface at right angles to the pipe axis so that it can be securely bolted to a mating flange on a valve, another pipe section, etc.
FLASH	Re-programmable memory onboard an XFC/XRC, similar to an EPROM, except that it can be programmed while in circuit using a Boot Loader Program to write to it. Generally used for the operating system and application code space (non-volatile).
Flash ADC	An Analog to Digital Converter whose output code is determined in a single step by a bank of comparators and encoding logic.

Flash Point	The temperature at which a liquid will yield enough flammable vapor to ignite. There are various recognized industrial testing methods; therefore the method used must be stated.
Flow	Travel of liquids or gases in response to a force (i.e. pressure or gravity).
Flow Computer, XSeries	A device placed on location to measure SP, DP and temperature (to calculate flow) of gases or liquids being transferred, for remote unattended operation.
Flow Formulas	In the gas industry, formulas used to determine gas flow rates or pressure drops in pipelines, regulators, valves, meters, etc.
Flow Rate	Actual speed or velocity of fluid movement .
Flowmeter	A device used for measuring the flow or quantity of a moving fluid.
Fluids	Substances that flow freely; gases and liquids.
FM	Factory Mutual Research Corporation. An organization which sets industrial safety standards.
FM Approved	An instrument that meets a specific set of specifications established by Factory Mutual Research Corporation.
Font	The style of lettering used to display information.
Footprint	The surface space required for an object.
Fpb	Pressure Base factor.
FPM	Flow velocity in feet per minute.
FPS	Flow velocity in feet per second.
Fpv	See Supercompressibility Factor.
Fr	Reynolds Number factor.
Freezing Point	The temperature at which the substance goes from the liquid phase to the solid phase.
Frequency	The number of cycles per second for any periodic waveform - measured in cycles per second - now called Hertz. The number of repeating corresponding points on a wave that pass a given observation point per unit time.
Frequency Modulation	Modulation where the frequency of the sinewave carrier alters with the amplitude of the modulating signal.
Frequency Output	An output in the form of frequency which varies as a function of the applied input.
FRP	Fiberglass Reinforced Polyurethane. A non-flexible material used for LevelMaster sensors.
FS/2	Ruggedized handheld computer device for programming and collecting data from an XFC. Also referred to a Husky or Dog Bone.
Ftb	Temperature Base factor.
Ftf	Flowing Temperature factor.
Fuel Oils	The heavy distillates from the oil refining process that are used primarily for heating, for fueling industrial processes, for fueling locomotives and ships, and for fueling power generation systems.
Full Bridge	Wheatstone bridge configuration utilizing four active elements or strain gages.
Full Duplex	Simultaneous, two-way (transmit and receive), transmission.
Function	A set of software instructions executed by a single line of code that may have input and/or output parameters and returns a value when executed.
Fuse	A short length of wire that will easily burn out when excessive current flows.
Fw	Water Vapor factor.
G	The symbol used for giga or gigabyte.

Gage Factor	A measure of the ratio of the relative change of resistance to the relative change in length of a piezoresistive strain gage.
Gage Pressure	Absolute pressure minus local atmospheric pressure.
Gain	The factor by which a signal is amplified, sometimes expressed in dB.
Gain Accuracy	A measure of deviation of the gain of an amplifier from the ideal gain.
Gas	That state of matter which has neither independent shape nor volume. It expands to fill the entire container in which it is held. It is one of the three forms of matter, the other two being solid and liquid.
Gas Chromatograph	An analytical instrument that separates mixtures of gas into identifiable components by means of chromatography.
Gas Chromatograph Module	Software module used in conjunction with PCCU32 and WINCCU to interact with Btu Chromatograph equipment and software.
Gas Chromatograph Module Coefficient	A co-efficient generated by the factory allowing user to start calibration on location without having a calibration gas available.
Gas Chromatography	Preferred method for determining the Btu value of natural gas.
Gas Field	A district or area from which natural gas is produced.
Gas Injection	An enhanced recovery technique in which natural gas is injected under pressure into a producing reservoir through an injection well to drive oil to the well bore and the surface.
Gas, Acid	The hydrogen sulfide and/or carbon dioxide contained in, or extracted from, gas or other streams.
Gas, Associated	Gas produced in association with oil, or from a gas cap overlying and in contact with the crude oil in the reservoir. In general, most states restrict associated gas production since its indiscriminate production could reduce the ultimate oil recovery. Also, since some wells producing associated gas cannot be shut-in without also shutting-in the oil production, natural gas pipelines are generally required to take associated gas produced from oil wells on a priority basis.
Gas, C1	Methane.
Gas, C2	Ethane.
Gas, C3	Propane.
Gas, C6+	Hexanes Plus (C6, C7, C8, C9, C10, C11, etc.).
Gas, CO2	Carbon Dioxide.
Gas, Dry	Gas whose water content has been reduced by a dehydration process. Gas containing little or no hydrocarbons commercially recoverable as liquid product. Specified small quantities of liquids are permitted by varying statutory definitions in certain states.
Gas, IC4	Iso-Butane.
Gas, IC5	Iso-Pentane.
Gas, Liquefied Petroleum (LPG)	A gas containing certain specific hydrocarbons which are gaseous under normal atmospheric conditions but can be liquefied under moderate pressure at normal temperatures. Propane and butane are the principal examples.
Gas, Low Btu	Gas with a heating value of less than 250 Btu's per cubic foot. Typically heating values fall between 120 and 180 Btu's per cubic foot.
Gas, Manufactured	A gas obtained by destructive distillation of coal, or by the thermal decomposition of oil, or by the reaction of steam passing through a bed of heated coal or coke, or catalyst beds. Examples are coal gases, coke oven gases, producer gas, blast furnace gas, blue (water) gas, and carbureted water gas. Btu content varies widely.
Gas, Natural	A naturally occurring mixture of hydrocarbon and non-hydrocarbon gases found in porous geologic formations beneath the earth's surface, often in association with petroleum. The principal constituent is methane.

Gas, NC4	Normal Butane.
Gas, NC5	Normal Pentane.
Gas, NeoC5	Neo-Pentane.
Gas, Non-associated	Free natural gas not in contact with, nor dissolved in, crude oil in the reservoir.
Gas, Oil	A gas resulting from the thermal decomposition of petroleum oils, composed mainly of volatile hydrocarbons and hydrogen. The true heating value of oil gas may vary between 800 and 1600 Btu per cubic foot depending on operating conditions and feedstock properties.
Gas, Sour	Gas found in its natural state, containing such amounts of compounds of sulfur as to make it impractical to use, without purifying, because of its corrosive effect on piping and equipment.
Gas, Sweet	Gas found in its natural state, containing such small amounts of compounds of sulfur that it can be used without purifying, with no deleterious effect on piping and equipment.
Gas, Unconventional	Gas that can not be economically produced using current technology.
Gas, Wet	Wet natural gas is unprocessed natural gas or partially processed natural gas produced from strata containing condensable hydrocarbons. The term is subject to varying legal definitions as specified by certain state statutes.
Gate Station	Generally a location at which gas changes ownership, from one party to another, neither of which is the ultimate consumer. It should be noted, however, that the gas may change from one system to another at this point without changing ownership. Also referred to as city gate station, town border station, or delivery point.
Gathering	The act of operating extensive low-pressure gas lines which aggregate the production of several separate gas wells into one larger receipt point into an interstate pipeline.
Gathering Agreement	Agreement between a producer and a gathering system operator specifying the terms and conditions for entry of the producer's gas into the gathering system.
Gathering Line	A pipeline, usually of small diameter, used in gathering gas from the field to a central point.
Gathering Station	A compressor station at which gas is gathered from wells by means of suction because pressure is not sufficient to produce the desired rate of flow into a transmission or distribution system.
Gathering System	The gathering pipelines plus any pumps, tanks, or additional equipment used to move oil or gas from the wellhead to the main pipeline for delivery to a processing facility or consumer.
Gauge, Pressure	Instrument for measuring the relative pressure of a fluid. Types include gauge, absolute, and differential.
Gauging Tape Measurements	This refers to a manual method of measuring the level of a liquid in a tank. These measurements may be used to calibrate float levels.
GC	See Gas Chromatograph.
GCM	See Gas Chromatograph Module
GCMC	See Gas Chromatograph Module Coefficient.
GCN	Gravity, Carbon Dioxide and Nitrogen compounds. Used in NX-19 GCN Supercompressibility Factor.
GCNM	Gravity, Carbon Dioxide, Nitrogen and Methane compounds. Used in NX-19 GCNM Supercompressibility Factor.
GDF	Gasde of France
GND	See Ground.
GOST	Russian Government Standards for Importation.

GPA 2145-03	Gas Processors Association Physical Constants for Paraffin Hydrocarbons and other Components of Natural Gas
GPA 2172-96	Gas Processors Association Calculation of Gross Heating Value, Relative Density and Compressibility of Natural Gas Mixtures from Compositional Analysis.
GPM	Gallons of liquid per thousand cubic feet.
GPS 2261	See Gas Processors Standard 2261.
GRD	See Ground.
Ground	1) An electronically neutral circuit having the same potential as the surrounding earth. Normally, a non-current carrying circuit intended for the safety purposes. A reference point for an electrical system. 2) A large conducting body (as the earth) used as a common return for an electric circuit and as an arbitrary zero of potential. 3) Reference point for an electrical system.
Grounding Strap	A grounding strap is a conductive device used to make connection between the person handling the board, and a high quality ground potential.
Half Duplex	Communication transmission in one direction at a time.
Handshake	An interface procedure that is based on status/data signals that assure orderly data transfer as opposed to asynchronous exchange.
Handshaking	Exchange of predetermined signals between two devices establishing a connection. Usually part of a communications protocol.
Hardware	The physical components of a computer system, such as the circuit boards, plug-in boards, chassis, enclosures, peripherals, cables, and so on. It does not include data or computer programs.
Harmonic	A sinusoidal component of a waveform that is a whole multiple of the fundamental frequency. An oscillation that is an integral sub-multiple of the fundamental is called a sub-harmonic.
HART	Communication Interface.
Hazardous Area Classification	Any area likely to have an explosive combination of oxygen and fuel.
Heat	Thermal energy. Heat is expressed in units of calories or Btu's
Heat Capacity	The amount of heat required to raise the temperature of a body (of any mass) one degree Celsius.
Heat of Condensation	The amount of heat that must be removed from one gram of a vapor at it's condensation point to condense the vapor with no change in temperature.
Heat of Vaporization	The amount of heat required to vaporize one gram of a liquid at its boiling point with no change in temperature. Usually expressed in J/g. The molar heat of vaporization is the amount of heat required to vaporize one mole of liquid at its boiling point with no change in temperature and usually expressed ion kJ/mol.
Heat Transfer	A form of energy that flows between two samples of matter because of their differences in temperature.
Heating Value	The amount of heat developed by the complete combustion of a unit quantity of a material.
Heavy Crude	Crude oil of 20-degree API gravity or less; often very thick and viscous.
Heavy Hydrocarbons	More susceptible to increases in temperature and decreases in pressure, thus causing liquids to form.
Hertz	Cycles per second. A measure of frequency or bandwidth.
Hexadecimal	A numbering system to the base 16, 0 through F.
Hexanes	A saturated hydrocarbon (Alkane) with two carbon atoms in it's molecule (C ₂ H ₆). A liquid under normal conditions.
Hierarchical	A method of organizing computer programs with a series of levels, each with further subdivisions, as in a pyramid or tree structure.

High Btu Gas	A term used to designate fuel gases having heating values of pipeline specification, i.e., greater than about 900 Btu's per standard cubic foot.
Hold	Meter HOLD is an external input which is used to stop the A/D process and freeze the display. BCD HOLD is an external input used to freeze the BCD output while allowing the A/D process to continue operation.
Host	The primary or controlling computer in a multiple part system.
Host Console	Host Console via Local Port uses the PCCU cable between the computer and the device's Local PCCU port but running Remote Protocol. Host Console via Remote Port uses the remote protocol
Hub	A market or supply area pooling/delivery where gas supply transaction point occur that serve to facilitate the movement of gas between and among interstate pipelines. Transactions can include a change in title, a change in transporter, or other similar items.
HV	See Heating Value.
Hydrocarbon	A chemical compound composed solely of carbon and hydrogen. The compounds having a small number of carbon and hydrogen atoms in their molecules are usually gaseous; those with a larger number of atoms are liquid, and the compounds with the largest number of atoms are solid.
Hyperterm	Terminal emulation program provided with Windows.
Hysteresis	The maximum difference between output readings for the same measured point, one point obtained while increasing from zero and the other while decreasing from full scale. The points are taken on the same continuous cycle. The deviation is expressed as a percent of full scale.
I/O	See Input/Output.
I/O Address	A method that allows the CPU to distinguish between the different boards in a system. All boards must have different addresses.
I2C	Inter-Integrated Circuit. Serial communications bus to I/O modules (developed by Phillips Semiconductor)
IAR	Maker and distributor of the Embedded Workbench, a compiler, assembler, linker development system for the Z80/64180 microprocessor family.
IC	See Integrated Circuit
Icon	A graphic functional symbol display. A graphic representation of a function or functions to be performed by the computer.
ID	Identification Number. You must assign an ID to the unit. Units are communicated to by this ID number, therefore the ID assigned in the software must agree with the hardware.
IEC	International Electro-technical Commission. Developers of the IEC-61131-3 standard. Programming Language used by Totalflow for user applications in XSeries equipment.
IEEE	Institute of Electrical and Electronics Engineers
IIC	Inter-Integrated Circuit. Also see I2C.
IL	Instruction List (IEC supported programming language)
Impedance	The total opposition to electrical flow (resistive plus reactive).
IMV	See Integral Multivariable Transducer.
Inch of Mercury	A pressure unit representing the pressure required to support a column of mercury one inch high at a specified temperature; 2.036 inches of mercury (at 32 degrees F and standard gravity of 32.174 ft/sec ²) is equal to a gauge pressure of one pound per square inch.
Inch of Water	A pressure unit representing the pressure required to support a column of water one inch high. Usually reported as inches W.C. (water column) at a specified temperature; 27.707 inches of water (at 60o and standard gravity of 32.174 ft/sec ²) is equal to a gauge pressure of one pound per square inch.

Industry Canada	Canadian Certification.
Inert	A material not acted upon chemically by the surrounding environment. Nitrogen and carbon dioxide are examples of inert constituents of natural gases; they dilute the gas and do not burn, and thus add no heating value.
Initialization File	Generic file used to support the display of Totalflow application data in PCCU32.
Input	That part of a circuit that accepts a signal for processing.
Input Impedance	The resistance measured across the excitation terminals of a transducer.
Input Sense	To examine or determine the status of the input.
Input/Output	The transfer of data to/from a computer system involving communications channels, operator interface devices, and/or data acquisition and control interfaces.
Instantiate	Starting an instance of an object.
Instrument Manifold	Manifold type used when XFC is mounted directly on the Orifice.
Insulator	Any material that resists the flow of electrical current.
Integral Multivariable Transducer	A Multivariable Transducer that is an integral part of the flow computer, measuring DP and SP. This refers only to the transducer portion of the device and makes no assumption whether or not the circuitry is located as part of the unit, or if the circuitry is located on the Mother Board and attached via wiring. Also see Multivariable Transducer.
Integrated Circuit	A circuit component consisting of a piece of semiconductor material containing up to thousands of transistor and diodes. A chip.
Integrating ADC	An ADC whose output code represents the average value of the input voltage over a given time interval.
Interface (computer)	Usually refers to the hardware that provides communication between various items of equipment.
Interface (liquid)	The area between two liquids that are not easily mixed, i.e. oil and water.
Interference	A disturbance to the signal in any communications system.
Intrinsically Safe	An instrument which will not produce any spark or thermal effects under normal or abnormal conditions that will ignite a specified gas mixture.
Inverter	A circuit in both analogue and digital systems that provides an output that is inverse to the input.
Inverter, DC to AC	Converts DC to AC at a high frequency.
ioINT	Interrupt signal from the I/O modules.
ioVBB	i/o Battery Voltage- Unregulated 13.8 volts. Host supplies 2.5 amps to the I/O modules.
ioVDD	Unregulated 5.6 volts from the host for I/O modules.
ISA	Instrument Society of America.
ISO	International Standards Organization.
ISO 5167	International Standards Organization Report No. 5167, Measurement of Fluid Flow by Means of Pressure Differential Devices.
ISO 6976-95	International Standards Organization Report No. 6976-95, Calculation of Calorific Values, Density, Relative Density and Wobbe Index from Composition.
Isobutane (C4H10)	A hydrocarbon of the same chemical formula as butane but different molecular structure, resulting in different physical properties, notably lower boiling point. Gross heating value 3261 Btu/cu. ft. gas.
Isokenetic Sampling	Laboratory technique where gas sample is tested after removing liquids, therefore not allowing the atomized liquid to return to the gaseous state, changing the sample accuracy.

Isolation	The reduction of the capacity of a system to respond to an external force by use of resilient isolating materials.
IVision	SCADA system designed for oil and gas applications
Joule	The basic unit of thermal energy.
Joule-Thompson Effect	The change in gas temperature which occurs when the gas is expanded at constant enthalpy from a higher pressure to a lower pressure. The effect for most gases at normal pressure, except hydrogen and helium, is a cooling of the gas creating condensation.
K	Kilo. 1) In referring to computers, a "kilo" is 1024 or 2 to the 10th power (Note that it is actually slightly more than an even 1000.). 2) the standard metric prefix for 1,000, or 10 ³ , used with units of measure such as volts, hertz, and meters.
Kbytes/s	A unit for data transfer that means 1,000 or 10 ³ bytes/s.
Kerosene	An oily liquid obtained in the distilling of gasoline in a temperature range from 174-288 degree C. A hydrocarbon of specific gravity of 0.747 to 0.775. Used as fuel for some internal combustion engines, heating equipment, and illuminating purposes. A heavy grade known as range oil is used for cooking and heating.
KHz	Electronic abbreviation for Kilohertz.
kilobyte	1024 bytes.
Kilowatt	Equivalent to 1000 watts.
kilowatt-hour	A unit of energy when one kilowatt of power is expended for one hour. Example A radiator bar is usually rated at 1,000 watts and this switched on for one hour consumes one kilowatt-hour of electricity.
KPa	Kilopascal-Measure of Pressure
kw	See Kilowatt.
kwh	See Kilowatt-hour.
LACT	Lease Automatic Custody Transfer.
Lag	1) A time delay between the output of a signal and the response of the instrument to which the signal is sent. 2) A time relationship between two waveforms where a fixed reference point on one wave occurs after the same point of the reference wave.
Latent Heat of Vaporization	Represents the amount of heat required to vaporize a liquid. In the instance of natural gas, the equation appears: 1 Btu = heat to change. This is the most likely scenario for causing gas to liquefy.
LCD	Liquid Crystal Display.
LD	Ladder Diagram (IEC supported programming language)
LED	Light Emitting Diodes.
LevelMaster	Intelligent Digital Level Sensor and is designed for custody transfer accuracy in demanding level measurement applications in tanks. LevelMaster is the name of the Totalflow's Tank Gauging System.
Life	For rechargeable batteries, the duration of satisfactory performance, measured in years (float life) or in the number of charge/discharge cycles (cycle life).
Life Cycle	The minimum number of pressure cycles the transducer can endure and still remain within a specified tolerance.
Light Crude	Crude oil with a high API gravity due to the presence of a high proportion of light hydrocarbon fractions.
Light Hydrocarbons	More volatile.
Linearity	The maximum deviation of the calibration curve from a straight line between zero and full scale, expressed as a percent of full scale output and measured on increasing measurement only.

Liquefied Natural Gas	Natural gas which has been liquefied by reducing its temperature to minus 260 degrees Fahrenheit at atmospheric pressure. It remains a liquid at -116 degrees Fahrenheit and 673 psig. In volume, it occupies 1/600 of that of the vapor at standard conditions.
Liquefied Petroleum Gas	A gas containing certain specific hydrocarbons which are gaseous under normal atmospheric conditions, but can be liquefied under moderate pressure at normal temperatures. Propane and butane are the principal examples.
Liquid Crystal Display	A reflective display that requires very low power for operation.
Liquids, Natural Gas	Those liquid hydrocarbon mixtures which are gaseous at reservoir temperatures and pressures but are recoverable by condensation or absorption. Natural gasoline and liquefied petroleum gases fall in this category.
LNG	See Liquefied Natural Gas.
Load (electrical)	A load is an energy consuming device. The device can be an actual device such as a bulb of a flash light, radio, cassette player, motor, etc., a resistor or a constant current load.
Load (units)	The amount of gas delivered or required at any specified point or points on a system; load originates primarily at the gas consuming equipment of the customers. Also, to load a pressure regulator is to set the regulator to maintain a given pressure as the rate of gas flow through the regulator varies. Compare DEMAND.
Location File	This is a file containing the configuration of the Location or site and the LevelMasters assigned to the Location. You may have a file that contains everything or a file for each Location name. The information from the file is displayed on the main MasterLink screen in the form of a tree structure. See the Main Screen topic for more information.
Location Name	Location Name is the top of the hierarchy tree of a Location File. Included in the Location Name is the LevelMaster's name, ID, S/N, Sensor File and Configuration no.
Log Period	In a XFC, the specified length between writing the calculated accumulated volume to record. You may record volumes as often as every minute and as seldom as every hour. More frequent recording reduces the number of days of records possible between collection.
Long Term	For Totalflow's purpose, the application of this term refers to storing data over a period of time that is greater than a minimal time. Such as data collected weekly versus data collected weekly but stored indefinitely.
LPG	See Liquefied Petroleum Gas.
LSB	Least Significant Byte
M	Mega, the prefix for 1,048,576, or 220, when used with byte to quantify data or computer memory. Also 1000, as in MCF or 1000 Cubic Ft.
Manifold	The conduit of an appliance which supplies gas to the individual burners. Also, a pipe to which two or more outlet pipes are connected.
Man-Machine Interface	Software program that converts machine instructions and commands into a user interface.
Manometer	A two-armed barometer.
Manual Reset	The switch in a limit controller that manually resets the controller after the limit has been exceeded.
MasterLink	MasterLink is the name of the software program used to communicate with the LevelMaster for purposes of doing setup, calibration, troubleshooting, generating site files, monitoring levels and collecting data.
Mbytes/s	A unit for data transfer that means 1 million or 106 bytes/s.
Mcf	The quantity of natural gas occupying a volume of 1000 cubic feet at a temperature of 60° Fahrenheit and at a pressure of 14.73 psia.

Mean Temperature	The average of the maximum and minimum temperature of a process equilibrium.
Measurement Unit Assembly	μ FLO's measurement and operational features are housed in this single unit assembly. The main electronic board (μ FLO-195 Board), communication connection, power, SP, DP and Temperature readings are all housed in this unit.
Mega	Multiplier indicating that a quantity should be multiplied by 1,000,000.
Melting Point	The temperature at which a substance transforms from a solid phase to a liquid phase.
Membrane	The pH-sensitive glass bulb is the membrane across which the potential difference due to the formation of double layers with ion-exchange properties on the two swollen glass surfaces is developed. The membrane makes contact with and separates the internal element and filling solution from the sample solution.
Memory	Electronic devices that enable a computer to store and recall information. In its broadest sense, memory refers to any hardware capable of serving that end, e.g., disk, tape, or semiconductor storage.
Menu	The list of available functions for selection by the operator, usually displayed on the computer screen once a program has been entered.
MEPAFLOW	SICK Engineering's Menu-based Measurement and Parameterization Software for the TotalSonic system (MMI).
Mercaptans	Compounds of carbon, hydrogen and sulfur found in sour crude and gas; the lower mercaptans have a strong, repulsive odor and are used, among other things, to odorize natural gas.
Meter Manifold	Gas piping between gas service line and meter. Also, gas piping supplying two or more meters.
Meter, Orifice	A meter using the differential pressure across an orifice plate as a basis for determining volume flowing through the meter. Ordinarily, the differential pressure is charted.
Meter, PD	See Meter, Positive Displacement.
Meter, Positive Displacement	An instrument which measures volume on the basis of filling and discharging gas in a chamber.
Meter, Turbine	1) Pulse meter. 2) A velocity measuring device in which the flow is parallel to the rotor axis and the speed of rotation is proportional to the rate of flow. The volume of gas measured is determined by the revolutions of the rotor and converting them to a continuously totalized volumetric reading.
Methane (CH ₄)	A hydrocarbon (Alkane) with the lightest molecule. A gas under normal conditions. The first of the paraffin series of hydrocarbons. The chief constituent of natural gas. Pure methane has a heating value of 1012 Btu per cubic foot.
microFlo Computer	See μ FLO.
Microprocessor	This term is commonly used to describe the CPU. More specifically, it refers to the part of the CPU that actually does the work, since many CPUs now contain L1 and L2 caches on-chip.
Milli	One thousandth e.g. one milli-watt - 1mW. one milli-amp - 1mA. one milli-volt - 1mV.
MIPS	Million instructions per second. The unit for expressing the speed of processor machine code instructions.
MMBtu	A thermal unit of energy equal to 1,000,000 Btu's, that is, the equivalent of 1,000 cubic feet of gas having a heating content of 1,000 BTUs per cubic foot, as provided by contract measurement terms.
MMcf	A million cubic feet. See CUBIC FOOT. (1,000,000 CF)
MMI	See Man-Machine Interface.

Modbus	Messaging structure developed and used to establish master-slave/client-server communication between intelligent devices. Generic protocol supported by most process automation vendors.
Modem	Modulator-Demodulator. A device used to convert serial digital data from a transmitting terminal to a signal suitable for transmission over a common carrier, or to reconvert the transmitted signal to digital data for acceptance by a receiving terminal.
Module	Typically a board assembly and its associated mechanical parts, front panel, optional shields, and so on. A module contains everything required to occupy one or more slots in a mainframe.
Mole Percent	The number of moles of a component of a mixture divided by the total number of moles in the mixture.
MRB	Modbus Request Block. When requesting storage space after adding a new Modbus application, the file is saved as a *.mrb file.
MRM	Modbus Register Map. When requesting storage space after adding a new Modbus register, the file is saved as a *.mrm file.
MS	Milliseconds. One-thousandth of a second.
MSB	Most Significant Byte
Mueller Bridge	A high-accuracy bridge configuration used to measure three-wire RTD thermometers.
Multiplex	A technique which allows different input (or output) signals to use the same lines at different times, controlled by an external signal. Multiplexing is used to save on wiring and I/O ports.
Multi-tasking	A property of an operating system in which several processes can be run simultaneously.
Multi-tube Sites	Locations where many flow tubes are all within a prescribed distance allowing one flow meter with multitube capabilities, such as the XSeries product line, to monitor and maintain flow records for each tube in one Flow Computer.
Multivariable Transducer	Transducer supplying more than 1 variable. Totalflow uses this term to encompass units that read Static Pressure, Differential Pressure. Historically these units were coined AMU for Analog Measurement Unit. As a result of advanced technology, the unit no longer functions as only an analog measurement unit. Therefore the newer terminology, Multivariable Transducer, more aptly describes the functionality of this design. The abbreviation IMV refers to the Integral version of the multivariable. The abbreviation XIMV, refers to the XSeries IMV version of the multivariable, which contains the circuitry as part of the unit and the abbreviation IMVX, refers to the Explosion Proof IMV, where the required circuitry resides on the Main Processor Board. See each instance for additional explanation.
MW	Acronym for Molecular Weight.
N2	Nitrogen
NAK	See Negative Acknowledgement
NAMUR	Normenarbeitsgemeinschaft für Mess- und Regeltechnik in der chemischen Industrie (Standards study group for measurement and process control technology in the chemical industry).
Natural Gas	See Gas, Natural.
Natural Gas Distillate	Material removed from natural gas at the "heavy end" portion; that is, aliphatic compounds ranging from C4 to C8 (butanes and heavier).
Natural Gas Liquids	The hydrocarbon components: propane, butanes, and pentanes (also referred to as condensate), or a combination of them that are subject to recovery from raw gas liquids by processing in field separators, scrubbers, gas processing and reprocessing plants, or cycling plants. The propane and butane components are often referred to as liquefied petroleum gases or LPG.

NBS	National Bureau of Standards.
NC	See Normally Closed.
NEC	National Electrical Codes
Negative Acknowledgment	This refers to a response over a remote communication device, such as a PING. Basically, saying, "I don't acknowledge your request!" This is the opposite of ACK. NAK is a slang term that means that you disagree or do not acknowledge something.
NEMA	National Electrical Manufacturers Association.
NEMA-12	A standard from the National Electrical Manufacturers Association, which defines enclosures with protection against dirt, dust, splashes by non-corrosive liquids, and salt spray.
NEMA-4	A standard from the National Electrical Manufacturers Association, which defines enclosures intended for indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, and hose-directed water.
NEMA-7	A standard from the National Electrical Manufacturers Association, which defines explosion-proof enclosures for use in locations classified as Class I, Groups A, B, C or D, as specified in the National Electrical Code.
Network	A group of computers that are connected to each other by communications lines to share information and resources.
Newton Meter	Torque measurement unit equal to 8.84 Inch Pounds.
NGL	See Natural Gas Liquids.
Nm	Abbreviation for Newton Meter. Metric Torque measurement.
NO	See Normally Open.
Noise	An undesirable electrical signal. Noise comes from external sources such as the AC power line, motors, generators, transformers, fluorescent lights, soldering irons, CRT displays, computers, electrical storms, welders, radio transmitters, and internal sources such as semiconductors, resistors, and capacitors. Unwanted disturbances superimposed upon a useful signal that tends to obscure its information content.
Non-Persistent	Refers to data that is no longer available after a Warm Start.
Normally Closed	Designation which states that the contacts of a switch or relay are closed or connected when at rest. When activated, the contacts open or separated.
Normally Open	Designation which states that the contacts of a switch or relay are normally open or not connected. When activated the contacts close or become connected.
Norsok	Norwegian Certification Bureau
NPN	Negative-Positive-Negative (Transistor).
NPT	National Pipe Thread.
NRTL	Nationally Recognized Testing Laboratory.
Null	A condition, such as balance, which results in a minimum absolute value of output.
NX-19	American Gas Association Report referring to a specific method to calculate the Supercompressibility factor.
OCV	See Open Circuit Voltage.
ODBC	See Open Database Connectivity.
Offset	The difference in temperature between the set point and the actual process temperature. Also, referred to as droop.

OHM	The unit of resistance usually shown as the symbol "R". One thousand ohms is written "k" and one million ohms is written "M". Resistance is measured with a multimeter, set to the "ohms range".
Ohmmeter	An instrument used to measure electrical resistance.
OLE	Object Linking and Embedding. A set of system services that provides a means for applications to interact and interoperate. Based on the underlying Component Object Model, OLE is object-enabling system software. Through OLE Automation, an application can dynamically identify and use the services of other applications, to build powerful solutions using packaged software. OLE also makes it possible to create compound documents consisting of multiple sources of information from different applications.
Ole for Process Control	This is a data interchange format and supporting software. Typically, vendors (such as ABB) write OPC server drivers which can talk to their devices. SCADA system vendors (again like ABB) write OPC clients that can gather data from OPC Servers. The idea is to provide a universal way to collect data into a SCADA system regardless of the equipment vendor. This standard was developed and is maintained by the OPC Foundation. The Totalflow Driver, TDS32, supports OPC.
Ole for Process Control Database	A programming interface to databases. iVision supports the OLEDB interface.
OLEDB	See Ole for Process Control Database.
Olefins	Basic chemicals made from oil or natural gas liquids feedstocks; commonly used to manufacture plastics and gasoline. Examples are ethylene and propylene.
OOP	Object-Oriented Programming. The XFC/XRC architecture incorporates an object-oriented approach.
OPC	See Ole for Process Control.
Open Circuit	A complete break in a metal conductor path.
Open Circuit Voltage	The difference in potential between the terminals of a cell/battery when the circuit is open (no-load condition).
Open Collector	A single NPN transistor with the base connected to the logic driving circuitry and with the emitter grounded. The collector is the output pin of the gate.
Open Database Connectivity	A widely accepted application-programming interface (API) for database access. It is based on the Call-Level Interface (CLI) specifications from X/Open and ISO/IEC for database APIs and uses Structured Query Language (SQL) as its database access language. Using ODBC, you can create database applications with access to any database for which your end-user has an ODBC driver. This allows access for authorized users to databases over any network, including the Internet. The iVision SCADA system provides an ODBC driver, making the database accessible to authorized users anywhere on a corporate network, or even over the Internet if the network is properly configured.
Operating System	Base-level software that controls a computer, runs programs, interacts with users, and communicates with installed hardware or peripheral devices.
Orifice Meter	Device to record differential pressure measurement which uses a steel plate with a calibrated hole or orifice to generate a drop in pressure between the two sides of the plate. Also the primary element of the meter run.
Orifice Plate	A plate of non-corrosive material which can be fastened between flanges or in a special fitting perpendicular to the axis of flow and having a concentric circular hole. The primary use is for the measurement of gas flow.

ORing	Boolean algebra logical function. Described as the addition or summing of switches or inputs, in the case of Boolean elements, the 0 and 1 represent two possible states of a premise or hypothesis: True or False, On or Off. When adding Boolean elements not real numbers, you will find these results: 1 or 1 = 1 1 or 0 = 1 0 or 1 = 1 0 or 0 = 0
O-Ring	A flat ring made of rubber or plastic, used as a gasket.
Output	That part of a circuit where the processed signal is available.
Output Impedance	The resistance as measured on the output terminals of a pressure transducer.
Output Noise	The RMS, peak-to-peak (as specified) ac component of a transducer's dc output in the absence of a measurand variation.
P/I	See Pulse Input.
Parameter	(1) Characteristic. For example, specifying parameters means defining the characteristics of something. In general, parameters are used to customize a program. For example, file names, page lengths, and font specifications could all be considered parameters. (2) In programming, the term parameter is synonymous with argument, a value that is passed to a routine.
Parity	A technique for testing transmitting data. Typically, a binary digit is added to the data to make the sum of all the digits of the binary data either always even (even parity) or always odd (odd parity).
Passive Analog Output	Analog Output to a host that is powered by an outside source.
PCCU	Portable Collection and Calibration Unit.
PCCU32	Windows version of PCCU communications software to process, archive and collect data from the Totalflow equipment. Generally run from a laptop.
Peak Area	The retention time the element takes to exit the column. This is used in calculating the amount of each component in the sample or Mole %.
Pentane (C ₅ H ₁₂)	A saturated hydrocarbon (Alkane) with five carbon atoms in it's molecule (C ₅ H ₁₂). A liquid under normal conditions.
Peripheral	The input/output and data storage devices attached to a computer such as disk drives, printers, keyboards, displays, data acquisition systems, etc.
Persistent	Refers to data that remains available after a Warm Start.
PEX	A flexible material used for LevelMaster sensors.
Phase	A time based relationship between a periodic function and a reference. In electricity, it is expressed in angular degrees to describe the voltage or current relationship of two alternating waveforms.
Phenol	Hydrocarbon derivative containing an [OH] group bound to an aromatic ring.
Physical Change	A change in which a substance changes from one physical state to another but no substances with different composition are formed. Example Gas to Liquid - Solid.
PID	Proportional, Integral, Derivative. A three mode control action where the controller has time proportioning, integral (auto reset) and derivative rate action.
Piezoceramic	A ceramic material that has piezoelectric properties similar to those of some natural crystals.
PLC	See Programmable logic controller
Plunger Lift	A technique used to optimize gas production. A Steel plunger is inserted into the production tubing in the well. The flow is turned off and this shut-in causes plunger to fall allowing fluid to collect above plunger. Different techniques are used to decide how long to shut in and flow the well.

Polarity	In electricity, the quality of having two oppositely charged poles, one positive one negative.
Polling	A snapshot view of the readings taken by the Totalflow equipment.
Port	A communications connection on a computer or a remote controller. A place of access to a device or network, used for input/output of digital and analog signals.
Positive Temperature Co-efficient	An increase in resistance due to an increase in temperature.
Positive Temperature Co-efficient Fuse	Opens circuit when high current condition occurs. Closes when condition no longer exists. Replaces typical fuses, which require replacement when blown.
POU	Program Organization Unit. This is Softing's term for an 'independent programming unit'. Programs, functions, etc.
Power Supply	A separate unit or part of a circuit that supplies power to the rest of the circuit or to a system.
Pressure Differential	Difference in pressure between any two points in a continuous system.
Pressure Markers	Pressure testing at different levels of pressure. Used for comparison purposes.
Pressure, Absolute	See PSIA.
Pressure, Atmospheric	See Atmospheric Pressure.
Pressure, Gas	In the natural gas industry pressure is measured by the force applied to a designated area. PSI and OSI refer to how much pressure (pound or ounce) is applied to one square inch. Inches Water Column (In.W.C.) is also used to express gas pressure and is measured using a manometer for lower pressure readings. 1 PSIG=27.21 Inches Water Column.
Pressure, Gauge	See PSIG.
Primary Cell (or Battery)	A cell or battery which is not intended to be recharged and is discarded when the cell or battery has delivered all its electrical energy.
PRM	Acronym for Pressure Regulator Module.
Probe	A generic term that is used to describe many types of temperature sensors.
Process Gas	Gas use for which alternate fuels are not technically feasible, such as in applications requiring precise temperature controls and precise flame characteristics.
Program	A list of instructions that a computer follows to perform a task.
Programmable Logic Controller	A highly reliable special-purpose computer used in industrial monitoring and control applications. PLCs typically have proprietary programming and networking protocols, and special-purpose digital and analog I/O ports.
Programmable Read Only Memory	Computer memory in which data can be written to. ROM is used for storing programs (e.g. operating systems) and characteristic files on a permanent basis. (non-volatile)
Programmed I/O	The standard method a CPU uses to access an I/O device-- each byte of data is read or written by the CPU.
PROM	See Programmable Read Only Memory
Propane (C3H8)	A saturated hydrocarbon (Alkane) gas, the molecule of which is composed of three carbon and eight hydrogen atoms. Propane is present in most natural gas and is the first product refined from crude petroleum. It has many industrial uses and may be used for heating and lighting. Contains approximately 2,500 Btu per cubic foot.
Proportional, Integral, Derivative	PID Controllers are designed to eliminate the need for continuous operator attention. An example would be the cruise control in a car or a house thermostat. These controllers are used to automatically adjust some variable to hold the measurement (or process variable) at the set-point. The set-point is where you would like the measurement to be. Error is defined as the difference between set-point and measurement.

Protocol	A formal set of conventions governing the formatting and relative timing of message exchange between two communicating systems.
PSI	Pounds per Square Inch.
PSIA	Pounds per Square Inch Absolute. Absolute pressure uses a perfect vacuum as the zero point. A perfect vacuum is 0 PSIA. PSIA=PSIG + Atmospheric Pressure.
PSID	Pounds per square inch differential. Pressure difference between two points.
PSIG	Pounds per Square Inch Gauge. Gauge pressure uses the actual atmospheric pressure as the zero point.
PSIS	Pounds per square inch standard. Pressure referenced to a standard atmosphere.
PTB	Physikalisch Technische Bundesanstalt (Federal Physical Technical Office) or Technical Institute for Certification.
PTC	See Positive Temperature Co-efficient Fuse.
Pulse Input	Any digital input to a meter (usually a turbine) that is used to measure pulses over a time period. This calculates volume and flow rate for each period of time.
Pulse Mode	An operational mode used by the LevelMaster for measuring single float levels by transmitting a pulse to the primary windings, reading the voltage level on both the primary and secondary windings and using a calculation whereby one is subtracted from another to determine the single fluid level.
Pulse Output	Any digital output that is used to measure pulses over a period of time. Frequency of Pulses in a predetermined time frame represents a value to be used in calculating volume and flow rate.
Radio Frequency	RF for short. That part of the spectrum from approx. 50kHz to gigahertz.
Radio Frequency Interference	Electromagnetic radiation which is emitted by electrical circuits carrying rapidly changing signals, as a by-product of their normal operation, and which causes unwanted signals (interference or noise) to be induced in other circuits.
RAM	See Random Access Memory.
RAM Disk	A lithium backed storage chip. Also see Random Access Memory.
Random Access Memory	Onboard read/write volatile memory, generally used for application variables and the file system. Data stored is lost if power is removed (volatile).
Range	Those values over which a transducer is intended to measure, specified by its upper and lower limits.
Rangeability	The ratio of the maximum flowrate to the minimum flowrate of a meter.
Rated Capacity	The number of ampere-hours a cell/battery can deliver under specific conditions (rate of discharge, cut-off voltage, temperature).
RBUS	Communication abbreviation for Results Bus.
RCV	Communication abbreviation for Received.
RD	Acronym for Relative Density.
RDrive	Refers to Totalflow's SRam Drive (solid state memory chip) located on the main board, used to store data and configuration files. The RDrive is a lithium backed, volatile memory chip and is not affected by a warm start.
Read Only Memory	Computer memory in which data can be routinely read but written to only once using special means when the ROM is manufactured. ROM is used for storing data or programs (e.g. operating systems) on a permanent basis.
Real Time	Data acted upon immediately instead of being accumulated and processed at a later time.

Real Time Data Base	The iVision SCADA system has an in-memory RTDB for the data it collects from various devices. Real-time generally means that the data is acquired often enough that the user can make operational changes to the process while it is still useful to do so. On a factory floor, this can be in milliseconds. For remote devices which may require a couple of hours of drive time to reach, real-time can be thought of in tens of minutes or even hours. The iVision data base can meet either of these requirements.
Real Time Operating System	Any operating system where interrupts are guaranteed to be handled within a certain specified maximum time, thereby making it suitable for control of hardware in embedded systems and other time-critical applications. RTOS is not a specific product but a class of operating system.
Recharge/Charge	The conversion of electrical energy, provided in the form of a current from an external source (charger), into chemical energy within a cell/battery.
Recommended Standard 232	This is the standard interface for full-duplex data communication conducted with two way independent channels. It employs unbalanced signaling and refers to point-to-point communications between one driver and one receiver in a 4-wire bus system. The RS-232 (single-ended) transmits at a relatively slow data rate (up to 20K bits per second) and short distances (up to 50 Ft. @ the maximum data rate).
Recommended Standard 422	This is the standard interface for half-duplex communications conducted with a dual-state driver. It employs balanced signaling and refers to multi-drop communications between one driver and up to ten receivers, known as "straight-through" cabling in a 4-wire bus system. The RS-422 (Differential) transmits a much faster data rate (up to 100K bits per second) and longer distances (up to 4000 Ft. @ the maximum data rate).
Recommended Standard 485	This is the standard interface for half-duplex communications conducted in the tri-state or common mode. It employs balanced signaling and refers to true multi-point communications between up to 32 drivers and 32 receivers, in 2-wire bus system. The RS-485 (Differential) transmits a much faster data rate (up to 100K bits per second) and longer distances (up to 4000 Ft. @ the maximum data rate). It also supports more nodes per line because it uses lower impedance drivers and receivers.
Record	A collection of unrelated information that is treated as a single unit.
Register	A storage device with a specific capacity, such as a bit, byte or word.
Relay	Electromechanical device containing a coil and set of contacts. The contacts close when the coil is activated.
Remote	Not hard-wired; communicating via switched lines, such as telephone lines. Usually refers to peripheral devices that are located a site away from the CPU.
Remote Controller, XSeries.	Totalflow's XSeries Remote Controller is a low power, microprocessor based unit designed to meet a wide range of automation, monitor, control, alarming and measurement applications.
Remote Terminal Unit	An industrial data collection device similar to a PLC, designed for location at a remote site, that communicates data to a host system by using telemetry (such as radio, dial-up telephone, or leased lines).
Repeatability	The ability of a transducer to reproduce output readings when the same measurand value is applied to it consecutively, under the same conditions, and in the same direction. Repeatability is expressed as the maximum difference between output readings.
Resistance	The measure of the ability of a material to pass a current.
Resistance Temperature Characteristic	A relationship between a thermistor's resistance and the temperature.
Resistant Thermal Detector	A metallic probe that measures temperature based upon its coefficient of resistivity.

Resistor	Passive component with a known resistance. The value of resistance is usually shown by a set of colored bands on the body of the component.
Resolution	The smallest significant number to which a measurement can be determined. For example, a converter with 12-bit resolution can resolve 1 part in 4096.
Response Time	1) The length of time required for the output of a transducer to rise to a specified percentage of its final value as a result of a step change of input. 2) The time required by a sensor to reach 63.2% of a step change in temperature under a specified set of conditions. Five time constants are required for the sensor to stabilize at 600 of the step change value.
Restore	This refers to a Totalflow procedure in which all the Station or Configuration files are restored to the SDRIVE from the file located on the laptop. This process is very helpful prior to doing a Cold Start when you want to continue using the Configuration and Station files.
Reynolds Number	The ratio of inertial and viscous forces in a fluid defined by the formula $Re = rVD/\mu$, where: r = Density of fluid, μ = Viscosity in centipoise (CP), V = Velocity, and D = Inside diameter of pipe.
RFI	See Radio Frequency Interference.
Ribbon Cable	A flat cable in which the conductors are side by side rather than in a bundle.
ROM	See Read Only Memory
RRTS	Communication abbreviation for Remote Ready To Send.
RS-232	See Recommended Standard 232.
RS-422	See Recommended Standard 422.
RS-485	See Recommended Standard 485.
RT	See Runtime.
RTD	See Resistant Temperature Detector.
RTDB	See Real Time Data Base.
RTOS	See Real Time Operating System.
RTS	Communication abbreviation for Ready To Send.
RTU	See Remote Terminal Unit
Runtime	The time required for an acoustic signal to travel from point A to point B. This measurement is used in calculating the speed of Sound, gas velocity and volume in the TotalSonic Meter.
RXD	Communication abbreviation for Receive Data.
S/N	Serial Number. The whole Serial Number is made up of a prefix of 5 digits and the suffix, a 10 digit configuration number.
Saddle	A fitted plate held in place by clamps, straps, heat fusion, or welding over a hole punched or drilled in a gas main to which a branch line or service line connection is made. The saddle also may serve as a reinforcing member for repair.
Sample Loop	A tube with a given volume used in conjunction with a valve for measuring and holding the sample gas before pushing it into the chromatograph column.
Saturated Hydrocarbons	Hydrocarbons that contain only single bonds. They are also called Alkanes or paraffin hydrocarbons.
Save	This refers to a Totalflow procedure in which all the Station or Configuration files are copied from the RDRIVE or the SDRIVE, to a file created on a laptop.
Savitsky-Golay Smoothing	Digital Signal Smoothing. A special class of a digital signal processing filter. Specifically determines the coefficients that are used for signal processing.
SCADA	See Supervisory Control and Data Acquisition
Schematic	Another name for a circuit diagram.

SCM	Acronym for Sample Conditioning Module.
Scroll	To move all or part of the screen material up to down, left or right, to allow new information to appear.
SDRIVE	Totalflow's Serial E2 PROM solid state memory chip, located on the Main Board (volatile memory, affected by a cold start), used to store configuration or station files.
Selectable Units	Selectable measurement units for various international and specialized application needs.
Self-Calibrating	A property of a DAQ board that has an extremely stable onboard reference and calibrates its own A/D and D/A circuits without manual adjustments by the user.
Semiconductor	Material that is neither a conductor nor insulator. Its properties can be altered by a control voltage.
Sensing Element	That part of the transducer which reacts directly in response to the input.
Sensor	A device that responds to a physical stimulus (heat, light, sound, pressure, motion, flow, and so on), and produces a corresponding electrical signal.
Sensor File	The Sensor File contains all the setup/calibration information of the unit. The Sensor File is a (.dat) file and by default is named after the base serial number preceded by an "s", such as s00108.dat. Although the name can be overwritten, it is recommended that the default name be kept.
Serial I/O	A common form of data transmission, in which the bits of each character are sent one at a time over the line.
Serial Port	A communications interface that uses one data line to transfer data bits sequentially. On the IBM PC the serial port refers to a standard asynchronous serial interface which uses the 8250/16450/16550 family of UART's.
Service Life	The period of useful life (usually in hours or minutes) of a primary cell/battery before a predetermined cut-off voltage is reached.
Set Point	The temperature at which a controller is set to control a system.
Set-Point	A "level" or control point in a feedback system.
SFC	Sequential Function Chart (IEC supported programming language)
SG	Acronym for Specific Gravity.
Short Circuit	A connection of comparatively low resistance accidentally or intentionally made between points on a circuit between which the resistance is normally much greater. Also called a "bridge" or "short" such as when solder from two tracks touch on a PC board.
SIG	See Signal.
Signal	Any communication between message-based devices consisting of a write to a signal register.
Signal Generator	A circuit that produces a variable and controllable signal.
Signed Integer	Can represent a number half the size of a "unsigned integer", including a negative number.
Sink	Device such as a load that consumes power or conducts away heat.
Skip Days	Extra Daily records for recording events that require the start of a new day. i.e. Volume Reset, Backward Time change over the hour, and Contract Hour change.
SNAM	Italy's Certification Board
SNR	Signal to Noise Ratio.
SoftCONTROL	Softing's IEC compiler environment
Softing	Maker and distributor of the IEC compiler softCONTROL
Software	The non-physical parts of a computer system that include computer programs such as the operating system, high-level languages, applications programs, etc.

Solar cell	A cell that produces current under sunlight.
Solenoid	A coil of wire that is long compared to its diameter, through which a current will flow and produce a magnetic flux to push or pull a rod (called an armature).
SOS	See Speed of Sound.
Source	Device that provides signal power or energy to a load.
SP	See Static Pressure
Span	The difference between the upper and lower limits of a range expressed in the same units as the range.
Specific Gravity	The ratio of the mass of a solid or liquid to the mass of an equal volume of distilled water at 4°C (39°F) or of a gas to an equal volume of air or hydrogen under prescribed conditions of temperature and pressure. Also called relative density.
Speed of Gas	Rate at which gas travels through the pipeline. Used in flow calculations in the TotalSonic Meter. Calculations follow AGA 9 Report.
Speed of Sound	Rate at which sound travels through the medium. Used in flow calculations in the TotalSonic Meter. Calculations follow AGA 10 Report.
SPU	Signal Processing Unit (measurement transducer).
SQL	See Structured Query Language.
SRAM	See Static Random Access Memory
SSM	Acronym for Stream Selector Module.
ST	Structured Text (IEC supported programming language)
Stability	The quality of an instrument or sensor to maintain a consistent output when a constant input is applied.
Stable Gas	Is a vapor containing less than 0.1 PPM of liquid when vapor is cooled to 18.3°F (10°C) below the coldest ambient temperature possible at any point in the system.
Static Pressure	Equals PSIA or PSIG. Referenced to atmospheric pressure versus absolute pressure in a vacuum. It is defined as the pressure exerted by a non-moving liquid or gas. In the case of a gas well this would be the natural PSI of the gas inside of the well.
Static Random Access Memory	The place in your computer that programs reside when running. You can access any part of the memory, and it can easily be overwritten with new values. SRAM is much more expensive and physically larger than DRAM but much faster.
Status Output	Any digital output that uses "On" or "Off" conditions to determine the status of the assigned description. Changing from one to the other represents a change in the condition.
STP	Standard Temperature and Pressure
Structured Query Language	IBM developed this language in the 60's as a way of accessing data from a relational database. It has a very simple syntax for simple functions but can become complex for sophisticated applications. This language is standardized by international standards bodies, and is almost universal in application. Almost all databases support SQL. The iVision RTDB supports SQL and this makes it extremely flexible within a corporate network. Authorized users throughout the organization can write SQL statements to acquire data from this database that they need for Marketing, Accounting, Engineering, or other functions.

Supercompressibility Factor	A factor used to account for the following effect: Boyle's law for gases states that the specific weight of a gas is directly proportional to the absolute pressure, the temperature remaining constant. All gases deviate from this law by varying amounts, and within the range of conditions ordinarily encountered in the natural gas industry, the actual specific weight under the higher pressure is usually greater than the theoretical. The factor used to reflect this deviation from the ideal gas law in gas measurement with an orifice meter is called the "Supercompressibility factor Fpv". The factor is used to calculate corrected from volumes at standard temperatures and pressures. The factor is of increasing importance at high pressures and low temperatures.
Supervisory Control and Data Acquisition	A common PC function in process control applications, where programmable logic controllers (PLCs) perform control functions but are monitored and supervised by a PC.
Surge	A sudden change (usually an increase) in the voltage on a power line. A surge is similar to a spike, but is of longer duration.
SW VBATT	Switched Battery Voltage. Cycles power to equipment to save power.
Switch	An electrical device for connecting and disconnecting power to a circuit, having two states, on (closed) or off (open). Ideally having zero impedance when closed and infinite impedance when open.
Synchronous	(1) Hardware - A property of an event that is synchronized to a reference clock. (2) Software - A property of a function that begins an operation and returns only when the operation is complete.
Syntax	Comparable to the grammar of a human language, syntax is the set of rules used for forming statements in a particular programming language.
System Noise	A measure of the amount of noise seen by an analog circuit or an ADC when the analog inputs are grounded.
TankMaster	Totalflow Control System for LevelMaster Tank Units.
Tap	To cut threads in a round hole so that other fittings or equipment can be screwed into the hole. Also to make an opening in a vessel or pipe.
TBUS	Communication abbreviation for Transmit Bus.
TCD	See Thermal Conductivity Detector.
TCP/IP	TCP/IP – This is the basic communication format for the Internet, and for much of what happens on a corporate network. Virtually all networked PCs and other computers have an "IP address" having the format xxx.xxx.xxx.xxx (xxx can range from 0 to 255 in most cases). You can see the ip address of your PC by going to the start menu, selecting run, and entering cmd. A "DOS Box" will be displayed on your screen. Type ipconfig to get the ip address. When you enter a URL (e.g., www.totalflow.com) in a browser, a DNS server (on the network) resolves this into an IP address and directs your request to the machine with that address.
TDS32	Totalflow DDE Server that allows Microsoft Windows applications with DDE capabilities to communicate with Totalflow's equipment. For example data can be retrieved and placed in an Excel spreadsheet.
Temperature Coefficient	An experimental number used to modify the calibration of a device (Totalflow transducer) to account for changes in environmental temperature.
Temperature Error	The maximum change in output, at any measurand value within the specified range, when the transducer temperature is changed from room temperature to specified temperature extremes.
Temperature Range, Compensated	The range of ambient temperatures within which all tolerances specified for Thermal Zero Shift and Thermal Sensitivity Shift are applicable (temperature error).

Temperature, Ambient	The temperature of the air, atmosphere or other fluid that completely surrounds the apparatus, equipment or the work piece under consideration. For devices which do not generate heat, this temperature is the same as the temperature of the medium at the point of device location when the device is not present. For devices which do generate heat, this temperature is the temperature of the medium surrounding the device when the device is present and generating heat. Allowable ambient-temperature limits are based on the assumption that the device in question is not exposed to significant radiant-energy sources such as sunlight or heated surfaces.
Temperature, Flowing	Temperature of the flowing fluid. Usually gas and measured by an RTD.
Terminal Mode	Man-Machine interface tool used as and engineering interface with equipment.
Termination	Placement of a connector on a cable.
Termination Panel	A circuit board with screw terminals or other connector system that allows convenient connection of field signals to a data acquisition or communication system.
TF.NET	Totalflow network used to access iVision/web data.
TFIO Module	Totalflow Input/Output module (i.e. quad AO)
Thermal Conductivity Detector	Universal detector that shows a response to all compounds. An electrical component that changes resistance based on the components ability to conduct heat. In chromatography, two TCDs are used, 1)as a reference detector and 2) as the sensor detector. The reference detector is exposed to only the carrier gas and the Sensor detector is exposed to the sample.
Thermistor	A temperature-sensing element composed of sintered semiconductor material which exhibits a large change in resistance proportional to a small change in temperature. Thermistors usually have negative temperature coefficients.
Thermistor Bead	See Thermal Conductivity Detector.
Thermocouple	A temperature sensor created by joining two dissimilar metals. The junction produces a small voltage as a function of the temperature.
Thermowell	A closed-end tube designed to protect temperature sensors from harsh environments, high pressure, and flows. They can be installed into a system by pipe thread or welded flange and are usually made of corrosion-resistant metal or ceramic material depending upon the application.
Therms Master	Totalflow application for Gas Analyzer.
Tolerance	The allowable percentage variation of any component from that stated on its body.
Totalflow	Product line of ABB Inc. Maker and distributor of the XSeries Flow Computers (XFC) and Remote Controllers (XRC).
TotalSonic MMI	TotalSonic's Man Machine Interface software program. May also be called MEPAFLOW 600.
Transducer	A device for converting energy from one form to another, specifically the measurement of pressure differential in natural gas gate stations. I.e. Pressure to voltage or current.
Transfer Rate	The rate, measured in bytes/s, at which data is moved from source to destination after software initialization and set up operations; the maximum rate at which the hardware can operate.
Transient	An abrupt change in voltage, of short duration (e.g. a brief pulse caused by the operation of a switch).
Transistor	A three leaded device (Collector, Base, Emitter) used for amplifying or switching. Also called a bi-polar transistor to distinguish it from Field Effect Transistor etc.
Transmitter	A device that converts audio, video or coded signals into modulated radio frequency signals which can be propagated by electromagnetic waves (radio waves).

Tranzorb	Transient Voltage Suppression device.
TRB	Tank Request Block Editor. When requesting storage space after adding a LevelMaster application, the file is saved as a *.trb file.
Tube	Cylinder for transporting or storing liquids: any long hollow cylinder used to transport or store liquids.
Tuned Radio Frequency	An amplitude modulated (AM) receiver with one or more stages of radio frequency before the detector.
TXD	Communication abbreviation for Transmit Data.
UDINT	Unsigned Double Integer
UL	Underwriters Laboratories, Inc. An independent laboratory that establishes standards for commercial and industrial products.
Union	A form of pipe fitting where two extension pipes are joined at a separable coupling.
Unsigned Integer	Can represent a number twice the size of a "signed integer", but cannot represent a large negative number.
Upload	This refers to a Totalflow procedure in which any file(s) located in the on-board memory of a Totalflow Host is copied to a file created on a laptop PC.
UPS	Un-interruptible power supply. A power conditioning unit placed between the commercial power service and the protected device. The UPS uses line power to charge batteries, which, in the case of a power failure, can drive electronic circuitry to produce the appropriate AC requirements for some time period.
Upstream	Oil and natural gas exploration and production activities; plus gas gathering, processing and marketing operations.
Upstream Pipeline	The first pipeline to transport natural gas en route to an inter-connect point for delivery to another pipeline. See DOWNSTREAM PIPELINE.
USX	Provider of the RTOS used by the XSeries product line
VAC	Volts of alternating current.
Vacuum	A pressure less than atmospheric pressure, measured either from the base of zero pressure or from the base of atmospheric pressure (PSIA).
Valve	A mechanical device for controlling the flow of fluids and gases; types such as gate, ball, globe, needle, and plug valves are used.
Valve Control	This feature provides automatic feedback control of Differential Pressure (DP), Static Pressure (SP), and Flow Rate for the purpose of positioning a flow valve to maintain a desired value of DP, SP, or Flow Rate.
VAS32	Totalflow's Voice Alarm System. A software program that receives and transmits alarm notifications via cell, telephone or pager systems.
VBATT	Battery Voltage. The voltage output from the battery source.
VCI	Valve Control Interface.
VDC	Volts of direct current.
VDE	Verband der Elektrotechnik Elektronik Informationstechnik [Association for Electrical, Electronic & Information Technologies]
Velocity	The time rate of change of displacement; dx/dt.
Vent	A normally sealed mechanism which allows for the controlled escape of gases from within a cell.
Virtual Memory	A method of making disk storage appear like RAM memory to the CPU, thus allowing programs that need more RAM memory than is installed to run in the system. This technique is slow compared to "real" memory.
Viscosity	The inherent resistance of a substance to flow.
VOG	Velocity of Gas.

Volatile Memory	A storage medium that loses all data when power is removed.
Volt	The unit of voltage or potential difference.. One thousand volts = 1kV.
Voltage	Electrical pressure, the force, which causes current to flow through a conductor. Voltage must be expressed as a difference of potential between two points since it is a relational term. Connecting both voltmeter leads to the same point will show no voltage present although the voltage between that point and ground may be hundred or thousands of volts.
Voltmeter	A meter for reading voltage. It is one of the ranges in a multimeter.
Volume Calculation Period	The specified length between reading and calculating volume data.
Volume Flow Rate	Calculated using the area of the full closed conduit and the average fluid velocity in the form, $Q = V \times A$, to arrive at the total volume quantity of flow. Q = volumetric flowrate, V = average fluid velocity, and A = cross sectional area of the pipe.
VOS	Velocity of Sound.
Warm Start	A rebooting technique which will clear most operational errors, without damaging either the data or configuration files. This causes the equipment to boot from the RDRIVE, which is a solid state memory chip.
Watt	Symbol W. The unit of power. One watt is the product of one volt and one amp. Power (W) = Current (I) X Energy (E). (E = Volts)
Wavelength	The distance between two points of corresponding phase in consecutive cycles
Web Page	All the text, graphics, and sound visible with a single access to a Web site; what you see when you request a particular URL.
Web Server	The hardware and software required to make Web pages available for delivery to others on networks connected with yours.
Web Site	A collection of electronic "pages" of information on a Web server
Well, Development	A well drilled in order to obtain production of gas or oil known to exist.
Well, Disposal	A deep well in which to inject waste chemicals, etc., such as a well to dispose of salt brine from the solution mining of salt dome gas storage caverns.
Well, Exploratory	A well drilled to a previously untested geologic structure to determine the presence of oil or gas.
Well, Gas	A well which produces at surface conditions the contents of a gas reservoir; legal definitions vary among the states.
Well, Marginal	A well which is producing oil or gas at such a low rate that it may not pay for the drilling.
Well, Stripper	Non-associated gas well capable of producing no more than 90 Mcf/day at its maximum rate of flow.
Well, Wildcat	An exploratory well being drilled in unproven territory, that is, in a horizon from which there is no production in the general area.
Wellhead	The assembly of fittings, valves, and controls located at the surface and connected to the flow lines, tubing, and Casing of the well so as to control the flow from the reservoir.
Wheatstone Bridge	Circuit design using two TCDs to measure components in chromatography.
WINCCU	Windows Central Collection Unit. Windows version of software to process, archive and manipulate data collected from the Totalflow products.
Window	In computer graphics, a defined area in a system not bounded by any limits; unlimited "space" in graphics.
Witness	In the field, where hydrocarbons are changing hands and actual cash register transactions being performed, it is not uncommon for one party or the other to request / require a representative or company employee be present during calibrations and or routine maintenance. Often this arrangement is contractually linked.

Wobbe Index	Calculated from the energy content, or a higher heating value of the gas, and the relative density of the gas (Btu/RD ^{1/2}).
Wobbe Number	A number proportional to the heat input to a burner at constant pressure. In British practice, it is the gross heating value of a gas divided by the square root of its gravity. Widely used in Europe, together with a measured or calculated flame speed, to determine interchangeability of fuel gases.
Working Voltage	The highest voltage that should be applied to a product in normal use, normally well under the breakdown voltage for safety margin. See also Breakdown Voltage.
World Wide Web	An Internet service facilitating access to electronic information - also known as the Web, WWW, or W3.
Write	To record data in a storage device or on a data medium.
XDCR	See External Transducer.
XFC	See Flow Computer, XSeries.
XFC-195 Board	The main electronic board used in XSeries flow computers. The XFC-195 Board mounts on the inside of the enclosure's front door.
XFC6200EX	Totalflow's Class 1 Div 1 Flow Computer.
XIMV	See XSeries Integral Multivariable Transducer.
XMV	See Multivariable Transducer.
XRC	XSeries Remote Controller. Also see Remote Controller, XSeries.
XSeries	Totalflow's new extendable equipment series featuring technology that is expandable and flexible for ever changing needs.
XSeries Integral Multivariable	Abbreviated XIMV. A smart Multivariable Transducer that is an integral part of the XSeries Flow Computer, measuring Static Pressure (SP), Differential Pressure (DP) and Flowing Temperature (Tf). This refers to both the transducer portion of the device and the circuitry required to supply measurements to the Main Processor Board, which is housed in a factory sealed unit. See Multivariable Transducer for more information.
Y	Expansion factor.
Zero Gas	Gas at atmospheric pressure.
Zero Offset	The difference expressed in degrees between true zero and an indication given by a measuring instrument.

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Chapter 7

User Drawing & Diagrams

This Chapter of the manual has been provided as a location for the user to place drawings that accompanies their new Totalflow units.

Totalflow recommends that a complete set of all drawings that accompany a Flow Computer be placed in this Chapter. This would ensure that the user have only drawings applicable to their units and drawings that are at the latest revision level.

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