

Startup guide

XSeries<sup>G4</sup>

6200/6201EX flow computer



## Introduction

This is a quick start guide designed for typical installations only. Installations must be performed by personnel knowledgeable with the Totalflow® XFCG4 6200/6201EX, the XFCG4 6200/6201EX User's Manual and with the installation requirements per local and national electrical codes.

Read and understand the contents of this start-up guide prior to beginning installation of the equipment. If for some reason there are questions that are not answered in this guide or other documentation listed in the following section, call the local Totalflow representative, or call the technical support number listed on the back page of this guide.

For the sake of this document, the XFC<sup>G4</sup> 6200/6201EX will be referred to as the G4 EX, unless otherwise indicated.

**Note:** The startup guide does not address any requirements for installation of product(s) in Classified Hazardous Locations. The XFCG4 6200/6201EX is rated for Class I, Division 1, Classified Hazardous Locations. Refer to the XFCG4 6200/6201EX User's Manual for information on these types of installations. If purchased, the Optional Equipment Unit (OEU) is rated for Class I, Division 2, Classified Hazardous Locations. Refer to the XFCG4 6200/6201EX User's Manual for information on installations involving the OEU and Classified Hazardous Locations.

The nameplate on all certified units refers to the drawing that stipulates installation specifications in hazardous areas. This drawing is provided electronically on the document index included with every order or may be located on ABB's website (provided in the next section).

## Additional reference material

Additional free publications for the XFCG4 6200/6201EX Flow Computer are available for free download from [www.abb.com/totalflow](http://www.abb.com/totalflow):

XFCG4 6200/6201EX Data Sheet	<a href="#">2104390DS</a>
XFCG4 6200/6201EX Flow Computer User's Manual	<a href="#">2104349MN</a>
XFCG4 6200/6201EX Parts Replacement Guide	<a href="#">2104385MN</a>
XFCG4 6200/6201EX AI to 2-Wire Transmitter User Drawing	<a href="#">2104334UD</a>
XFCG4 6200/6201EX Circuit board Elements User Drawing	<a href="#">2104217UD</a>
XFCG4 6200/6201EX Comm 1 & 2 Generic RS-232 Wiring	<a href="#">2104215UD</a>
XFCG4 6200/6201EX Comm 1 & 2 Generic RS-485 Wiring	<a href="#">2104216UD</a>
XFCG4 6200/6201EX Illustrated Parts Breakdown	<a href="#">2104346UD</a>
XFCG4 6200/6201EX Pole-mount Bracket	<a href="#">2104424UD</a>
XFCG4 6200/6201EX & $\mu$ FLOG4 System Reset & RTD Input Performance Deviation	<a href="#">TekBull197</a>

## Assumptions

As the G4 EX was designed for adaptability to a multitude of different scenarios, there can be several different installation configurations that can be performed, based on the user's specific site needs. For the purpose of this guide, the following will look at one possible standard configuration that is based on a common site scenario. If the presented scenario differs from the user's specific site needs, please reference the user's manual for additional scenario information.

**Note:** The G4 EX is shipped from the factory with the lithium battery disabled to prevent power drainage. Please refer to *3.7 Lithium battery connection* in this guide for instructions on how to enable the lithium battery.

## 1 Health & safety

### 1.1 Safety precautions

Read, comprehend, and follow instructions contained in this guide, before and during equipment installation. Failure to do so could result in bodily injury or equipment damage.

**Note:** Installation and maintenance must only be conducted by personnel authorized to work on electrical installations, and in accordance with relevant national and local codes.

### 1.2 Potential safety hazards

The G4 EX operates on 12 VDC. However, optional equipment may convert power from AC to DC.

The G4 EX includes a lithium battery. Avoid physical damage to battery. Do not short circuit the lithium battery. Improper use or damage to battery could create a risk of fire or explosion.

## 1.3 Safety conventions

**Warning:** A warning statement indicates a hazardous condition, improper access method, or improper work technique that could lead to personal injury or death. The warning text may state the hazard, what to do or not do to avoid the hazard, and what the result would be if not followed.

**Caution:** A caution statement indicates an action that could result in equipment damage or unfavorable results. The text may state the improper action, state what to do or not do to avoid the equipment damage, and what the result would be if not followed.

**Note:** A note is used to indicate useful information or to clarify a concept. It may also provide information for improved equipment operation, longevity, or troubleshooting.

## 2 Unpacking and inspection

Unpack the G4 EX and any optional equipment if purchased. Inspect for damage and missing or incorrect parts.

1. Unpack and inspect the XFCG4 6200/6201EX.
2. Unpack and inspect optional equipment, if purchased.
3. Check for missing, incorrect, or damaged parts.

Contact ABB Representative to replace missing, incorrect, or damaged parts.

## 3 Basic hardware installation

Although there are alternate methods of installation, it is recommended that technicians perform the guide procedures in the presented order.

### 3.1 Mounting the unit

The following will detail the steps for mounting the G4 EX to a 2" mounting pipe. This installation can be used for either a side pole mount or a stand-alone pole mount configuration.

Determine where to mount the G4 EX and OEU. The G4 EX should be installed before the OEU. The G4 EX comes supplied with a mounting kit assembly.

1. Attach the pole mount bracket to the top of the 2" pipe with the U-bolts. Use the provided hex nuts, flat washers and spring load washers to tighten the pole mount bracket to the 2" pipe (Fig. 1).
2. The G4 EX will be mounted to the pole bracket in one of three ways based on the transducer supplied on the unit. Fig. 2 shows the three types of available transducers. Locate the picture that most closely matches the unit's transducer. Proceed to the associated instructions for mounting that unit type.

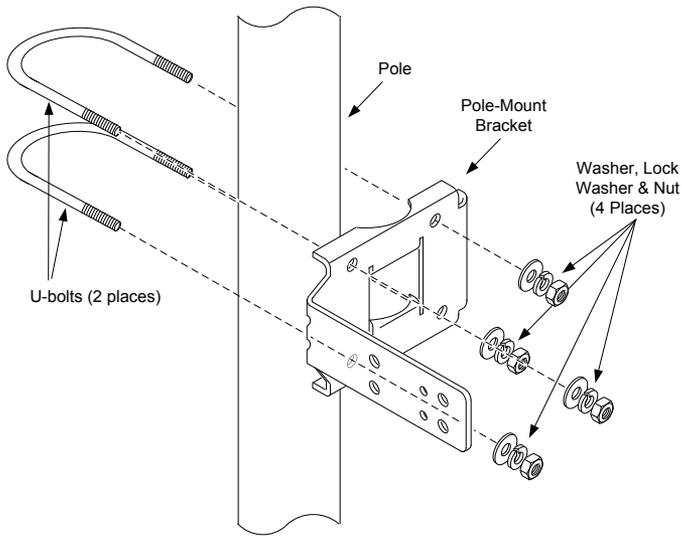


Fig. 1: Pole Mount Bracket

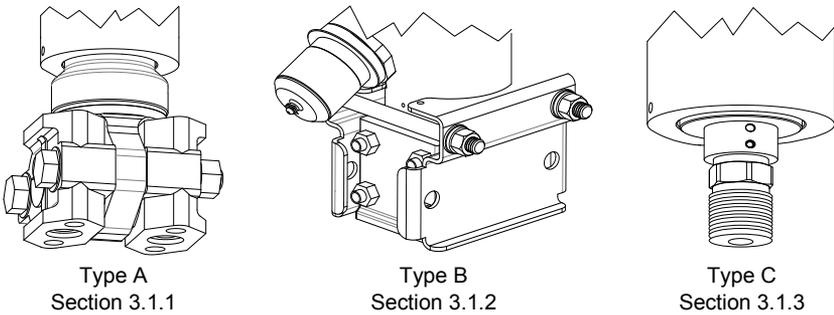


Fig. 2: Transducer Types/Mounting Options

### 3.1.1 Type A

1. Position and align the provided back clamp to the pole mount bracket (Fig. 3).
2. Set the G4 EX and transducer within the recessed grooves of the back clamp.
3. Attach the device to the brackets with the provided U-bolt and associated hardware.
4. Continue to 3.1.4 *Orient the unit and attach pressure tubing.*

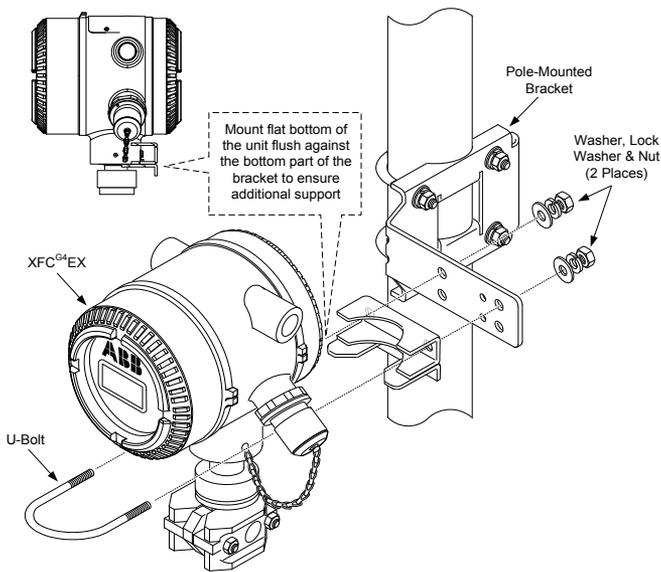


Fig. 3: Type A installation configuration

### 3.1.2 Type B

**Note:** The Type B installation configuration comes from the factory with the transducer already enclosed in two attached mounting brackets.

1. Remove the lower two hex screws and associated hardware from the transducer's attached mounting brackets. Align the transducer's bottom mounting holes with those on the pole mount bracket (Fig. 4).

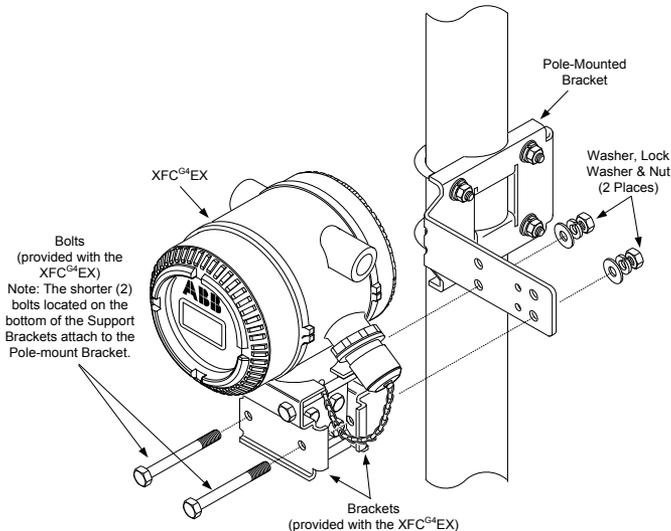


Fig. 4: Type B installation configuration

2. Replace the hex screws and associated hardware through their respective mounting holes on the mounting brackets and into the pole mount bracket and tighten.
3. Continue to 3.1.4 *Orient the unit and attach pressure tubing*.

**Note:** If the user received this type of configuration from the factory, there may be additional parts within the provided mounting kit assembly that are not used.

### 3.1.3 Type C

1. Position and align the provided back clamp to the pole mount bracket (Fig. 5).
2. Set the G4 EX and transducer within the recessed grooves of the back clamp.
3. Attach the device to the brackets with the provided U-bolt and associated hardware.

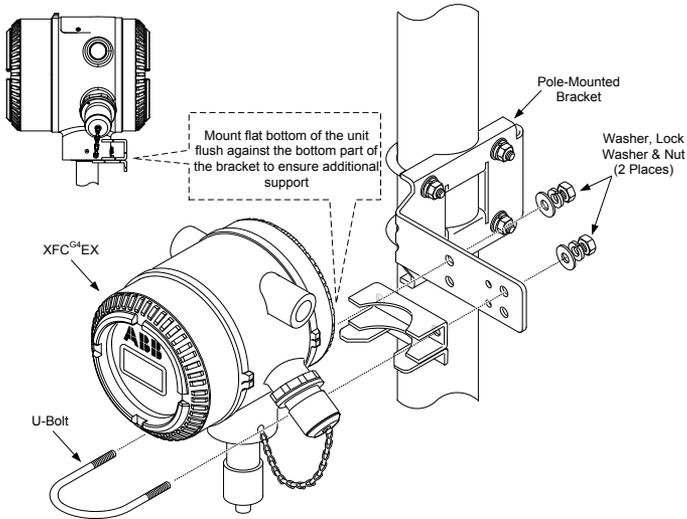


Fig. 5: Type C installation configuration

4. Continue to the next section.

### 3.1.4 Orient the unit and attach pressure tubing

1. To verify direction of flow, look at the (+) sign on the transducer tag. Plus (+) indicates high side (upstream), while the opposite side will indicate the low side (downstream); therefore, flow is from (+) to downstream. The user will not be able to see these without removing the 4" bolt clamp. If this mounting causes the device to face the wrong direction, loosen the Allen head set screw on the neck of the device, and turn the unit clockwise until the unit is facing the correct direction. If the unit becomes tight before achieving the correct position, turn counterclockwise (no more than 360 degrees) until the correct position is obtained. Re-tighten the set screw.
2. Connect the stainless steel tubing from the manifold to the tap valve(s). Use large bore, short, equal length gauge lines with a downward slope to taps (at least 1" per foot). With the manifold equalized to avoid damaging the device's transducer, apply pressure to the manifold. Upon completion, check for leaks.

## 3.2 Installing and wiring the RTD

RTD kits are available through ABB Totalflow. If the user orders the RTD but provides their own thermowell, the U-length must be provided. Various sizes of thermowells are available from Totalflow, but the U-length or insertion depth is required.

The following procedure assumes a Totalflow kit was provided.

1. Install the thermowell into the meter run, and tighten (Fig. 6). Install the  $\frac{1}{2}$ " stainless steel nipple into the thermowell, and tighten. Separate the union, and install the female end of the union along with its nut onto the nipple. Once completed, tighten. With the RTD head still loose, screw the male end of the union into the bottom of the head, and tighten.

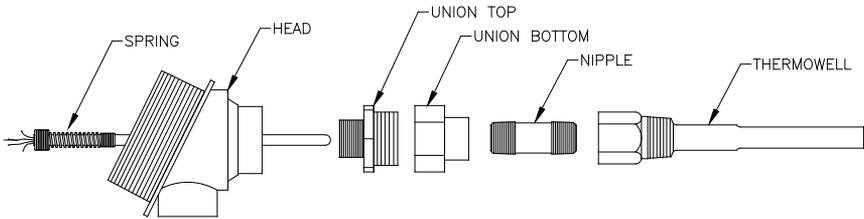


Fig. 6: RTD probe assembly

2. Insert the RTD sensor probe down through the top of the RTD head. Hold the sensor probe from underneath the head, turn the probe and screw the spring into the threaded hole in the terminal block. If the probe came with a terminal block, remove it since there should be a terminal block already mounted inside the RTD head.
3. Guide the sensor probe down through the bottom half on the union. As the two halves of the union come together, the user should feel some resistance when the sensor probe contacts the bottom of the thermowell. The user should see the top of the probe ( $\frac{3}{4}$ " max.) right above the terminal block as they push the two halves of the union together. If the assembly is too long or too short, the user may need to change-out the nipple for one of a differing length.
4. Slide the union nut up, and screw onto the top half of the union. Do not tighten. Align the RTD head so that the connecting conduit or cable is pointing in the desired direction, and then tighten the union.
5. Wire the RTD probe at the terminal block (Fig. 7). Install the probe wire spade lugs under the small screw heads. One color (typically white) is one side of the RTD and will go to the RTD **Out & +** connections on the G4 EX J8 connector. The other color (typically red) is the other side of the RTD and will go to **In & -** connections on J8.
6. Remove J8 connector from the G4 EX termination board and begin field wiring (Fig. 11).

**Warning:** All wiring must meet local and national electrical codes.

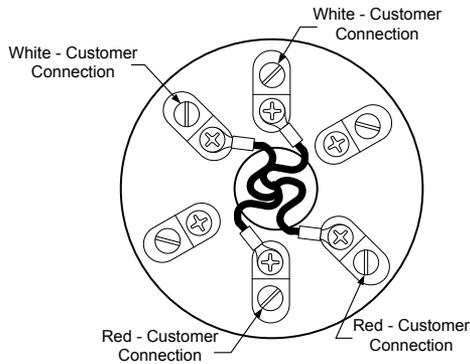


Fig. 7: RTD terminal block

### 3.3 Installing ABB OEU (optional)

The ABB OEU (if purchased) may contain the power supply, battery and any optional communication equipment. If the user is providing their own power and/or communications enclosure, refer Fig. 11 for field wiring.

**Warning:** All wiring between the G4 EX and the OEU must be installed per local and national electrical codes.

1. Using the supplied installation kit, mount the OEU on a 2" pipe or flat surface.

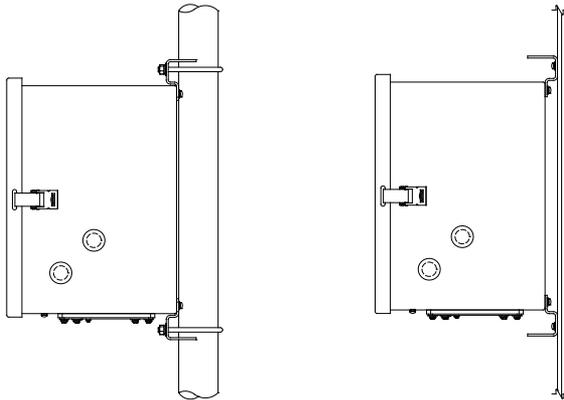


Fig. 8: OEU pipe or panel mount

2. If using an external AC power supply, run the DC output wiring to the OEU. Remove one of the rubber plugs, and using an approved cord connector, install DC cable into the OEU. If using Totalflow's external AC power supply, it can be connected directly to the side of the enclosure. Refer to the User Manual listed in the front of this guide for additional instructions if needed. Do not apply power.
3. Mount fully charged battery inside the optional enclosure or customer supplied equipment if required (Fig. 9). Do not make the connection.

**Note:** To extend the life of the battery pack, fully charge the battery prior to installation. A system using solar panels may not fully charge the battery. Also, a fast charge, which the solar panel cannot provide, improves the life of the battery.

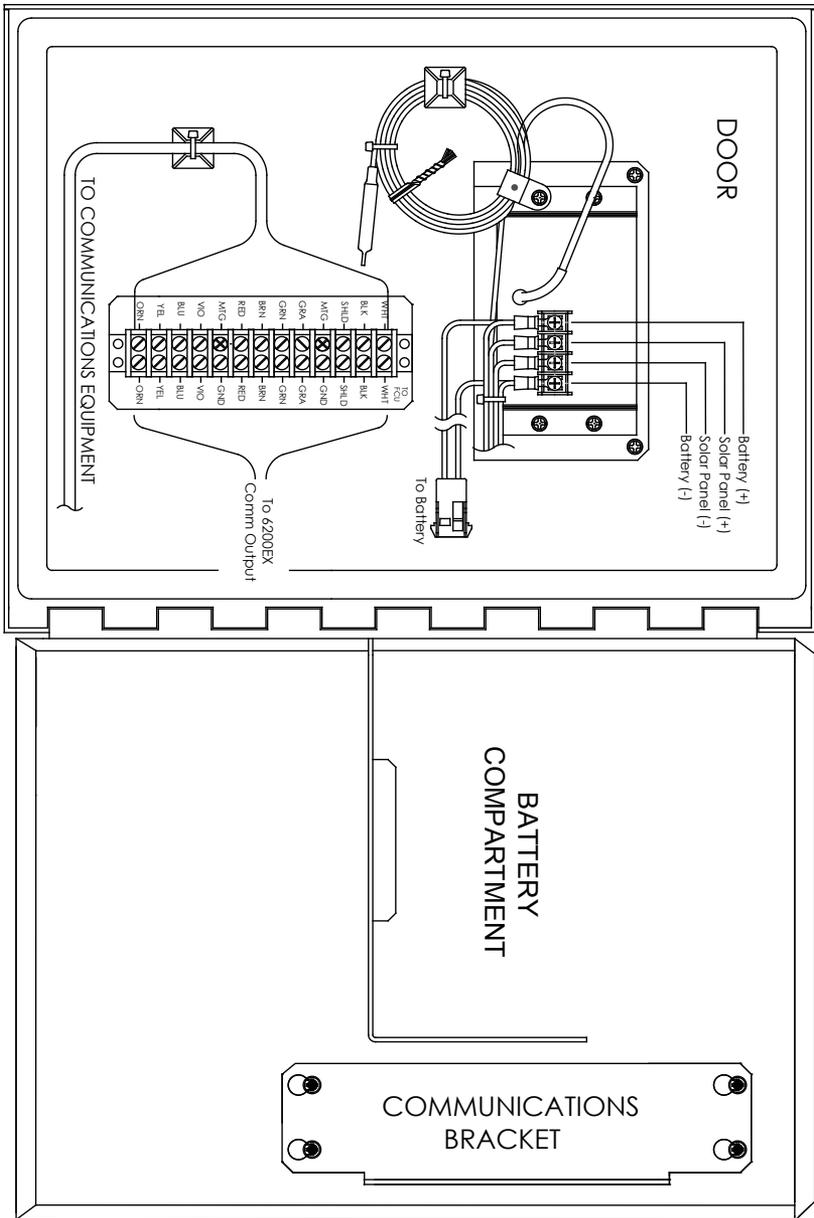


Fig. 9: OEU rotated 90 degrees for enlargement

### 3.4 Installing solar panel (if applicable)

Totalflow materials supplied	One solar panel and cable Two U-bolts and fastening hardware One solar panel bracket
Customer materials supplied	Cable ties One 9-inch or greater extension of 2-inch pipe One 2-inch collar

**Note:** Step 1 is not required if the pipe is tall enough without the extension.

1. Attach 2-inch pipe collar and pipe extension to the top end of the OEU mounting pipe or install mounting pipe (Fig. 10).
2. Install the solar panel on the mounting bracket with the provided hardware. Attach the solar panel mounting plate to the top end on the 2-inch pipe with the U-bolts and associated mounting hardware. Do not tighten the U-bolts until the solar panel has been correctly oriented.
3. If needed, connect the solar panel power cable to the solar panel connector on the back of the unit. Do not connect the other end of the solar panel wiring to the OEU until all the steps are completed and the main battery pack has been connected.
4. Position the solar panel to face south in the northern hemisphere and north in the southern hemisphere. Tighten the U-bolts securely to avoid movement by wind or vibration.
5. Check the solar panel polarity using a digital voltmeter to insure that (+) and (-) wires are properly identified.

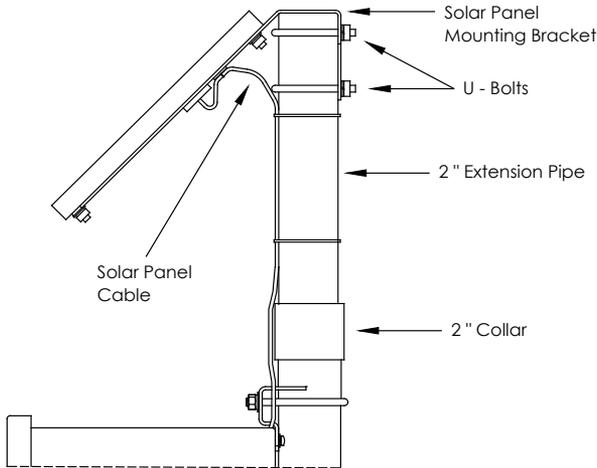


Fig. 10: Solar panel mounting

6. Remove one of the hole plugs from the OEU, and install the cord connector. Remove the nut, sealing ring and rubber grommet from the cord connector. Slide the nut, sealing ring and rubber grommet over the cable, and insert the cable through the body of the cord connector.

**Note:** To prevent moisture from entering the enclosure, allow the cable to dip below and then rise to the access hole. This provides a path for rainwater away from the access hole.

- Allow enough power cable to extend into the unit for connection to the Array Input +/- terminals. Do not make connection.
- Secure the solar panel cable using the grommet, sealing ring and nut.

### 3.5 Install conduit, cabling, and field wire connections

- Run the appropriate conduit and wiring between the G4 EX and the OEU or customer supplied equipment for power, IO, and optional communication equipment.
- Verify the wiring is correct, per drawings. If the enclosed wiring interconnect drawings (WIs) or user drawings (UDs) conflict with illustrations in this start-up guide, the drawing should take precedence.

**Warning:** All wiring must meet local and national electrical codes.

- Wire all connections inside of the G4 EX using Fig. 11, Table 1 and Table 2. This may include communication to COMM1 (J19), COMM2 (J20), input/output (J3–J5), optional IO expansion (J2), Ethernet (J7) and Power (J16).
- Set appropriate communication terminations and onboard security to proper positions.

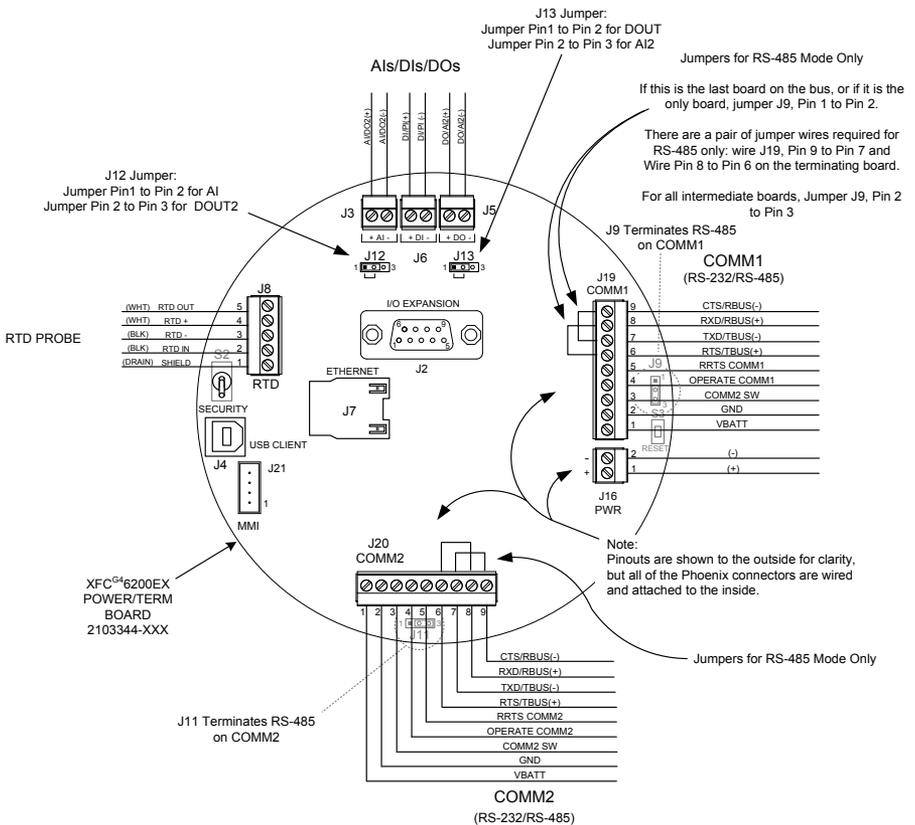


Fig. 11: G4 EX termination board

### 3.6 Termination board, pin outs and communication

The following represents the G4 EX Termination board (2103344) communication pin outs. Make any required connections for communication in both the G4 EX and inside the optional OEU or customer supplied equipment.

Table 1: Comm 1 board pin outs

	Comm 1 (J19) – RS232	COMM1 (J19)		
			RS485	RS422
Pin 1	VBATT (12V +)	VBATT (12+)		
Pin 2	Ground	Ground		
Pin 3	Switched Output	Switched Output		
Pin 4	Operate	Operate		
Pin 5	Mirror RTS	Remote Request To Send		
Pin 6	Request to Send (RTS)	Transmit Bus +	TBUS+	TBUS+
Pin 7	Transmit Data (TXD)	Transmit Bus -	TBUS-	TBUS-
Pin 8	Receive Data (RTD)	Receive Bus +	RBUS+	RBUS+
Pin 9	Clear to Send (CTS)	Receive Bus -	RBUS-	RBUS-

Table 2: Comm 2 Board pin outs

	Comm 2 (J20) – RS232	COMM2 (J20)		
			RS485	RS422
Pin 1	VBATT (12V +)	VBATT (12+)		
Pin 2	Ground	Ground		
Pin 3	Switched Output	Switched Output		
Pin 4	Operate	Operate		
Pin 5	Mirror RTS	Remote Request To Send		
Pin 6	Request to Send (RTS)	Transmit Bus +	TBUS+	TBUS+
Pin 7	Transmit Data (TXD)	Transmit Bus -	TBUS-	TBUS-
Pin 8	Receive Data (RTD)	Receive Bus +	RBUS+	RBUS+
Pin 9	Clear to Send (CTS)	Receive Bus -	RBUS-	RBUS-

### 3.7 Lithium battery connection

The following are the steps for installing and verifying the connection on the lithium battery. The lithium battery is disabled when shipped from the factory. The user will need to connect the battery before continuing.

1. To connect the battery, locate battery connector behind and to the lower right side of the display (Fig. 12).
2. On the G4 EX main electronic board, line up the lithium battery cord connection with J5. Ensure the lithium (+) red is on top (pin 1) and the (-) black (pin 4) is on the bottom. Slide the cable connector onto the pins carefully.

**Note:** For testing the battery voltage in a confined space, place the ground lead of a voltmeter on bare metal, such as the plate behind the display, and put the positive lead on the bottom solder pad. Be careful to not place the lead against ground.

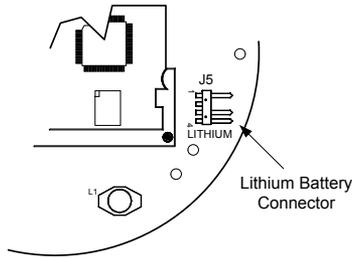


Fig. 12: Lithium battery connection on main electronic board

### 3.8 Power up the G4 EX

1. Verify that the front and back covers are screwed onto the G4 EX.
2. Apply power:
  - a. If using optional OEU with battery power, connect battery to battery connector mate.
  - b. If using optional external AC/DC power supply, connect DC power to charger regulator inside the OEU. Apply external AC power to power supply.
  - c. If using customer supplied power to the G4 EX, make power connection.
3. Observe the LCD on the G4 EX; the display should power up, display Warm Start information and then begin scrolling through the default display items. This insures that the components and wiring are good. If the unit does not scroll as expected or an alarm symbol is displayed, additional information is presented later in this guide.
4. If using the optional solar panel, connect the solar panel power cable to the Array inputs on the charger/regulator inside the OEU.

## 4 PCCU configuration, setup, and startup

The following information details the steps that are necessary for the user to set up the flow computer parameters within PCCU.

1. Connect the laptop running PCCU to the unit. Configure the G4 EX using Entry mode in PCCU:
  - Set the date/time
  - ID
  - Location
  - AGA setup
2. In Calibration mode, verify the registers for static pressure (7.4.1), differential pressure (7.4.0) and temperature (7.4.2). Select TF Device Connected and uncheck Use Fixed TF, if a temperature input device is used.

**Note:** If calibration is needed or required by company policy, follow the calibration procedure detailed in the *User Manual* via link provided under *Additional reference material* inside the front cover of this guide.

3. Verify that the unit is calculating the volume correctly. Watch the display, or look at the Current Values in the Entry mode of PCCU. Collect data, and review the event and characteristic files to insure all parameters are set properly.

4. **Optional** – When the user is sure that all setup and calibration has been completed and the unit is on line and calculating volume, it is recommended that a Reset Volume command be sent within PCCU Entry mode. This allows the unit to have a starting point for good, live data. The Reset Volume will be recorded in the Events file to mark the date and time.
5. **Optional** – If remote communication and/or onboard/expansion IO is used, additional setup may be required in PCCU to make applications function properly. PCCU Help files are available by clicking the Help button in the lower right corner of each screen. Likewise, Help files may be searched by entering a search parameter in the Help window search field.

## 5 General information

**Note:** To recharge a battery, a quick charge removes the buildup in the battery much more effectively than a “trickle charge.” A battery slowly drained by low light conditions on a solar charged system or setting in storage is less likely to recover than a battery pack that was discharged quickly. Store batteries in a cool environment for less drainage.

### 5.1 Wiring documentation

Specific wiring drawings are sent with each G4 EX, based on the options ordered. Many wiring diagrams, including communications, are available on the internet at <http://www.abb.com/totalflow>. To see if a diagram is available, move to the web site, and select Services. Next, click the Customer Service Download Section link and then the Various Drawings link. Navigate to the desired drawing, and select.

### 5.2 Remote communication/WinCCU

The following information pertains to the communication between the G4 EX and the host (typically, WinCCU).

To communicate with the host, the G4 EX uses the remote communications port (COMM 1) that can function as RS-232 or RS-485. If the 6270 OEU was ordered, the user has several communication options to choose from.

After installation of the G4 EX, and with the communications path complete, the user needs to enter the appropriate communication parameters. In most instances, the G4 EX was shipped with COMM 1 set up for Totalflow (TF) Remote Protocol. If not, select the protocol using the Entry mode within PCCU (Figure 10). The protocol must be selected first for the appropriate communication parameters to be displayed. A blinking telephone poll symbol "☎" in the annunciator position A8 (default) indicates that the COMM 1 port is active. The symbol may not be visible, if the baud rate is above 2400. See the Alarms and Status Codes section for a full description of the alarm characters, locations and descriptions.

### 5.3 Other communication options

After selecting the protocol, verify the other communication parameters. All communication parameters, with the exception of modems, are found on the Setup and Advanced tabs (Fig. 13). Modem parameters have their own tab. Systems are shipped with default settings for communications but may need fine tuning. The Schedule tab parameters are only required if the user wants to power up the communication port and communication device on and off at designated times to conserve power.

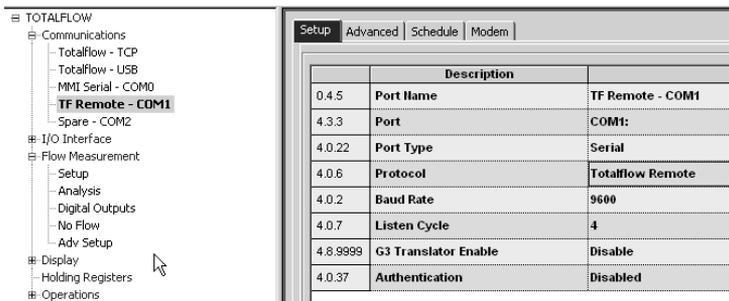


Fig. 13: Communications Setup

## 5.4 Standard displays

Items that appear on the device's display are user-configured; however, based on the measurement application, units will be shipped with some default display items. The following table is a typical set of default displays for an AGA-3 application. Engineering units may vary from those shown, if the device supports the Selectable Units feature.

Description	Standard display
Current Date and Time (24 hour clock)	DATE/TIME MM/DD/YY HH:MM:SS
Yesterday's Percent DP Low Limit Percent time below DP Low Set Point	Yest DP Low NN PERCENT
Yesterday's Percent DP High Limit Percent time above DP High Set Point	Yest DP High NN PERCENT
Current Flow Rate Programmable SCF, MCF or MCMF	Flow Rate NNNNNN.N SCF/HR
Total Accumulated Volume Programmable SCF, MCF or MCMF	Total Accum. Volume NNNNNN.NN MCF
Battery Voltage (displayed in volts)	Battery Voltage NN.N VOLTS
Station ID (ID of the box)	Station ID
Differential Pressure Inches H2O	Diff. Pressure NNN.N IN. H2O
Static Pressure Absolute PSIA	Static Pressure NNN.N PSIA
Flowing Temperature °F	Temperature NN.N DEG. F
Yesterday's Volume Programmable SCF, MCF or MCMF	Yesterday's Volume NNNN.N MCF
Previous Calculation Period Volume	Last Calc. Volume NNNN.N SCF
Device ID (Individual application ID)	Device ID
Orifice Diameter	Orifice Diameter N.NNNN Inches



Table 3: Visual alarm/status codes

Codes	Description
System	
L <sub>L</sub>	Low Lithium Battery Alarm: When L <sub>L</sub> (low lithium) is displayed, the lithium battery voltage is below 2.5 VDC. A new lithium battery measures approximately 3.6 VDC.
Communications	
→	Transmitting Data.
←	Receiving Data.
!	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.
‡	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.
M	MODBUS ASCII: Modbus ASCII protocol is 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 PCCU32 port is active and running TOTALFLOW Local Protocol.
n	Network (Ethernet)
u	USB
Measurement application	
B <sub>F</sub>	Back Flow Condition: Visible only when the DP variable is being displayed.
Z	Zero Flow Condition: Visible only when the Flow Rate variable is being displayed.
H	Hold: Displayed when PCCU32 is in Calibration Mode and has a measurement application in Hold mode.
A	Alarm Condition. Need to view alarm. The user may need to compare application limits to current values to determine where the alarm condition is present.
A <sub>D</sub>	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.
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.

## 6.2 G4 EX display does not scroll as expected

When power is first applied, the unit should quickly move through its startup routine and begin cycling through the pre-programmed display items. If the display does not scroll after startup and/or looks similar to the following (part numbers are example only), perform the next steps.

XFC6200EX Prom  
2101715-001  
(Copyright)

1. Disconnect the main power, and then re-connect it.
2. After power is reconnected, the user should see something similar to the following:

Verifying Flash	or	COLD FLASH
XXXXX		Flash 2101715-001
Checksum = Passed		6200EX Flash
XXXX = XXXX		2101715-001
		(COPYRIGHT)

3. If the display still does not scroll, try disconnecting the power and re-connecting it again.
4. If still no success, perform the following:
  - a. With PCCU, connect to the unit, and establish communication.
  - b. Move into Terminal mode, and type: 0.0.0=COLD. The unit should go through a Cold Start procedure and then begin scrolling. If this does not happen, it may be necessary to call a Totalflow customer service representative for additional assistance. Refer to the contact information on the back of this guide.

## 6.3 Communications troubleshooting

A new radio or modem system that does not communicate is often difficult to troubleshoot because proper operation has never been proven, and all the initial hardware and software settings are suspect. More than one problem can be present. This causes component replacement to be an inadequate troubleshooting technique. A checklist follows to serve as an aid in pinpointing potential causes:

- Does the “†” symbol flash (Totalflow Remote Protocol only) with the Listen Cycle time in the A8 display (default position)? If no:

**Note:** The user may not see the “†” symbol flashing where baud rates are set higher than 2400. The user may need to set the baud rate to 1200 to see if the port is active and then set it back to the desired baud rate.

- The protocol needs to be selected in the Entry mode using PCCU.
- Inadequate DC voltage (9 volts minimum) or as specified by the user in the Station Setup of PCCU Entry mode.
- Insure the base radio is working for other locations.
- Verify the Station ID and Device ID matches with WinCCU and is the only device with that ID.
- Verify baud rate, stop bits, security code and listen cycle time are the same as WinCCU.
- Verify WinCCU is using packet protocol. The G4 EX only supports DB2 packet protocol.

- Verify the wiring from the G4 EX to the OEU enclosure terminal strip and terminal strip to radio (if used) or verify wiring from and to the customer supplied equipment.
- Verify the cable from the radio to the antenna.

**Note:** To check for wiring shorts or opens with two or more wire connections, use a multimeter set on continuity (resistance). Check two wires at a time from one device to another. If the black and white wires are to be tested, disconnect both wires at both ends, and put one probe on black and the other on white. The meter should read OL or OFL (over range), if no shorts. Jumper the two wires at the other end. The meter should read a low resistance, if no opens. This method requires only one end of the wiring to be tested, no matter how far the devices are apart.

- If a radio is used, verify the directional antenna with the correct frequency range is pointed toward the base  $\pm 6^\circ$ . The antenna should be mounted vertically with the vanes perpendicular to the ground. Verify that the radio is good with the same frequencies used to the base radio and remote.
- If a modem is used, verify the dial tone on line at the telephone company's termination box by checking Tip and Ring. Check the wiring from the phone company's box to the dial-up modem. If cellular, also check for proper Tip and Ring voltage availability. Insure the phone number is correct in the G4 EX and WinCCU.

**Note:** The telephone company uses a 48 volt power supply, so the typical on-hook voltage between Tip and Ring wires should be something less than 48 volts. Measuring another way, Tip to ground is approximately zero volts, and Ring to ground is approximately -48 volts.

In the off-hook condition, Tip to ground will be approximately -20 volts, while Ring to ground will be approximately -28 volts or approximately 8 volts between Tip and Ring.

## 6.4 Low power caused by communication drain

In situations where radio communication is required, the power requirements of some radios might comprise the autonomy of the system. This problem can be handled in the following ways:

- Upgrade to a 42-amp-hour battery or two 26-amp-hour batteries (or as enclosure allows).
- Use low power radios such as the FreeWave® Spread Spectrum radio.
- Use radios that have a Sleep feature which allows the radio to go to sleep via a control line going low and wakes up when the control line is driven high or allowed to float. Totalflow has a Power Scheduler application that runs in the G4 EX and switches an output called COM1SW on COMM 1 and COM2SW on COMM 2. This is a FET output which, when turned ON, provides +12VDC.

## 6.5 Additional troubleshooting

Additional troubleshooting materials may be found in the user manual referenced earlier in this guide.

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