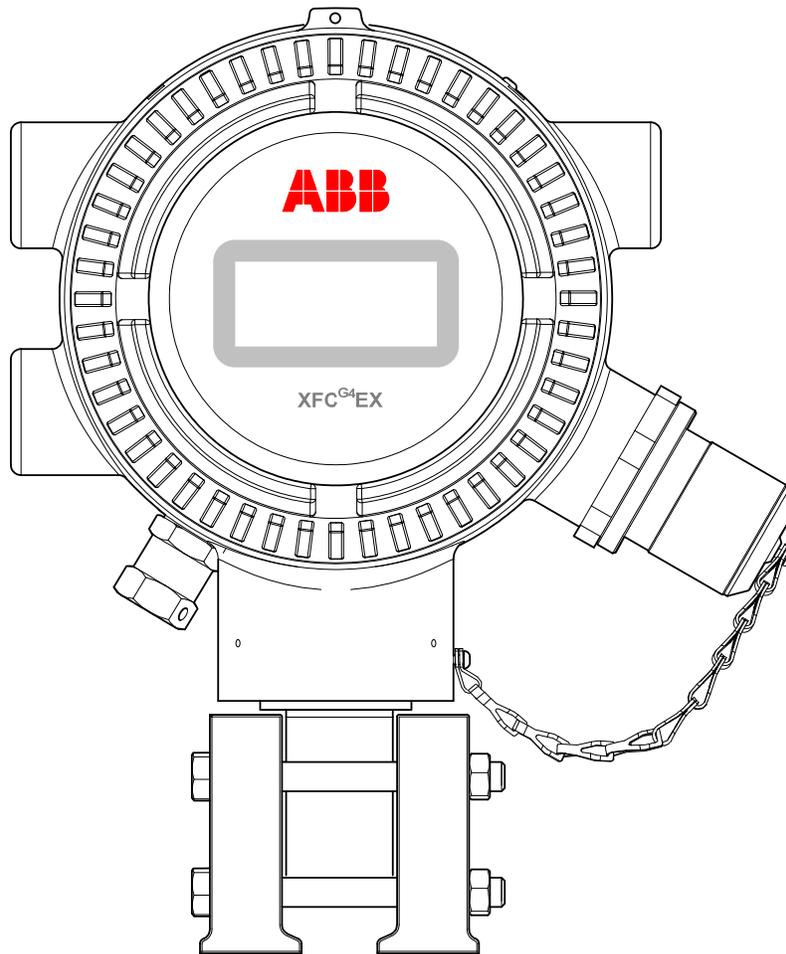2104385-001 – rev. AA

G4 6200/6201EX Parts Replacement

Application Information

XFC^G4^EX

TOTALFLOW

MEASUREMENT & CONTROL SYSTEMS

Power and productivity
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1.0   INTRODUCTION

1.1   Overview

The XFC^{G4} 6200/6201EX (G4 EX) is a next generation solution for the pre-existing generation 3 XFC 6200/6201EX. The G4 EX now incorporates the same 32-bit technology currently used by the G4 XSeries products. By using 32-bit technology, Windows® CE OS and memory capabilities, the G4 EX is a versatile product offering for production automation and measurement projects.

Along with this new functionality, the hardware capabilities have been expanded to meet the demands of targeted market applications in production automation and natural gas distribution. These hardware features are utilized to enhance the system integration capabilities with existing Totalflow products as well as existing third-party control SCADA systems.

Additionally, the use of Bluetooth technology for local MMI connectivity is poised to enhance the product for multi-tube application where this type of user interface has an advantage in Class I, DIV 1 locations.

The G4 EX offers a product for differential (orifice) or linear (pulse) metering and automation systems. The G4 EX is an accurate and reliable orifice gas flow computer with the capability to measure and monitor gas flow in compliance with AGA, API and ISO standards.

The G4 EX is a low power, microprocessor-based unit designed to meet a wide range of measurement, control, monitor and alarming applications for remote gas systems.

The XFC^{G4} 6200/6201EX system is certified as explosion-proof and flame proof for installation in hazardous locations classified as either Class 1, DIV 1 or Class I, Zone 1.

1.2   Purpose

The following information presented in this document will detail the steps for replacing various hardware component assemblies within the G4 EX. These hardware components are as follows:

- 2104353–501/503 – (501) Motherboard with Engine Card flashed; (503) Motherboard only.
- 2104199–001 – Lithium Battery Assembly
- 2101650–002 – Display Assembly
- 2103344–001 – Termination Board
- 2102955-xxx – I/O Daughter Card
- 2101465-xxx – EXIMV

2.0   INSTRUCTIONS

The following information will detail the steps for replacing the various assemblies as they currently exist within the G4 EX.

WARNING Remove power from the device, or insure the area is known to be non-hazardous before removing any enclosure cover. For further information, refer to the certification drawing indicated on the device's nametag, national and local electrical codes.

2.1   2104353–501/503 Motherboard Replacement

The G4 EX motherboard is mounted inside the front end cap, directly behind the Display assembly.

User applicable connections on this board consist of the following:

- uSD Card (J3)
- Contrast Display Potentiometer (R1)
- LCD Display Connector (J2)
- Lithium Battery Connector (J5)
- Engine Card Connector (XA1)
- Sensor Interface Connector (J6)
- Termination Board Connector (J1)

FYI The G4 EX transducer assembly utilizes a small electronic board that contains the factory characterization data. This allows the 2104353-501/503 or the EXIMV assembly to be individually field replaceable in the event of failures.

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.

FYI The default flash and configuration files that come with the 2104353-501/503 is Selectable Units. If the user requires the US flash and configuration files, they will need to contact Customer Service at 800-442-3097 or +1918-338-4880.
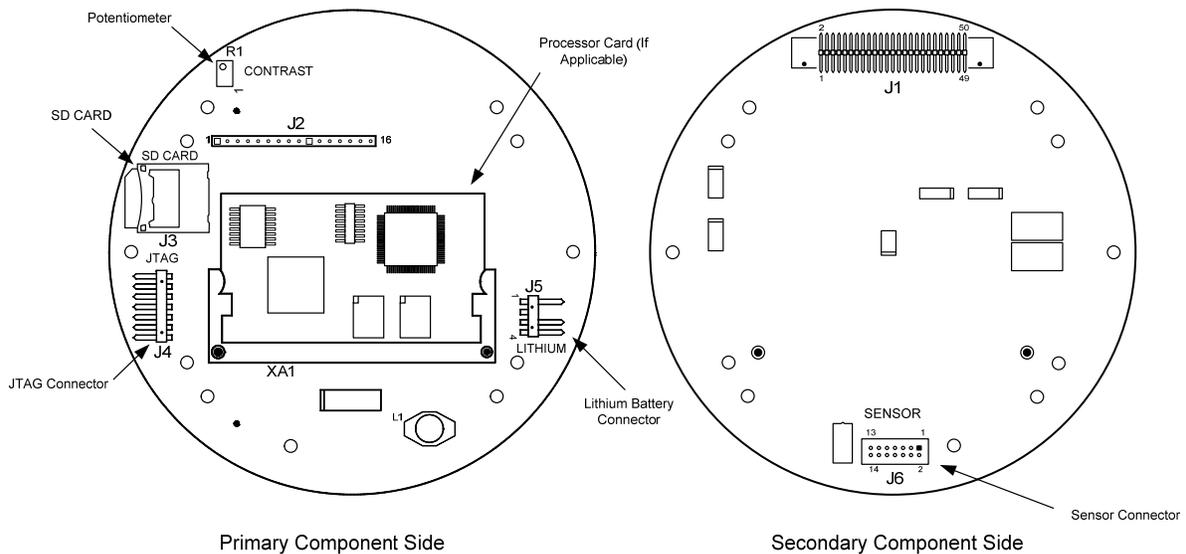

Primary Component Side   Secondary Component Side
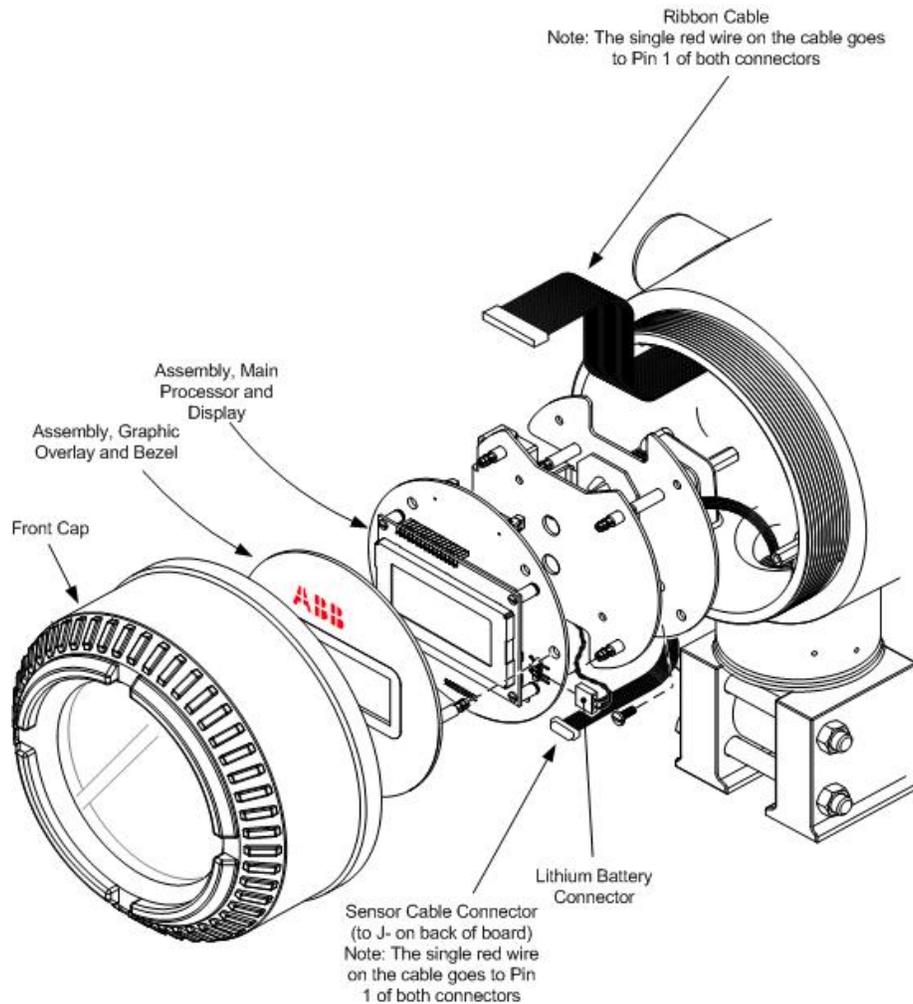
Figure 2–1 G4 EX Motherboard

Figure 2–2 G4 EX Front End Exploded View

1) Collect data from the unit.

2) Back up the configuration files.

3) Verify that the "LL" battery alarm is not being displayed on the G4 EX LCD.

WARNING Remove power from the device, or insure the area is known to be non-hazardous before removing any enclosure cover. For further information, refer to the certification drawing indicated on the device's nametag and national and local electrical codes.

4) Gain access to the rear termination board by loosening the countersunk hex socket locking set screw in the rear end cap. Use a 1/16" hex wrench to perform this task. Upon completion, unscrew the end cap.

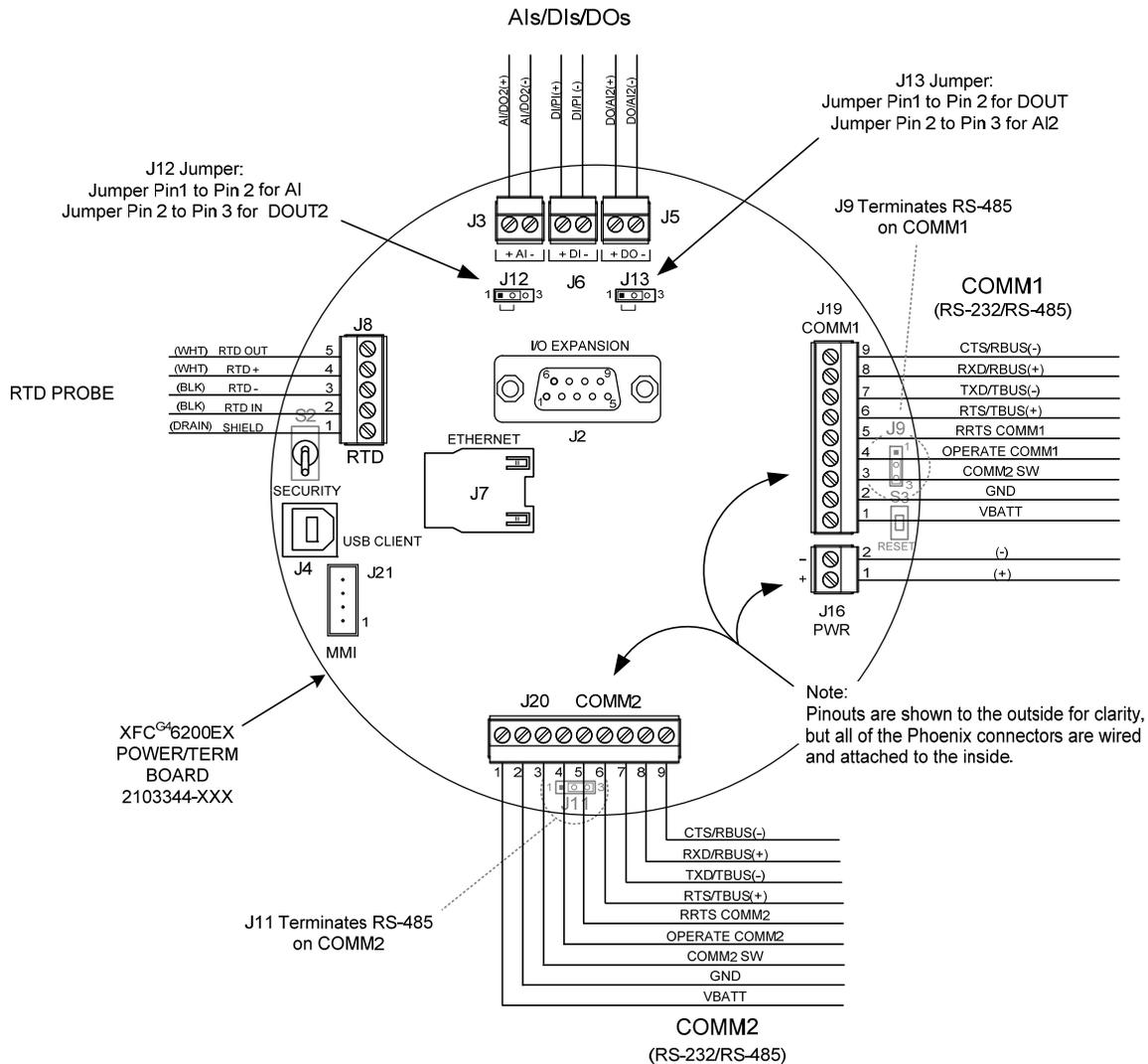5) Disconnect the power connector (J16) from the board mounted connector.

Figure 2–3 Termination Board

6) Gain access to the G4 EX motherboard by loosening the countersunk hex socket locking set screw in the front end cap. Use a 1/16" hex wrench to perform this task. When completed, unscrew the end cap.

7) After the end cap has been removed, gently pull the display overlay and graphic overlay plate away from the snap-on standoffs.

8) Using a small slot head screwdriver, remove the four screws that hold the LCD board to the G4 EX device.

9) Gently disconnect the LCD board from the G4 EX motherboard, J2 connector. Lift the board from the device.
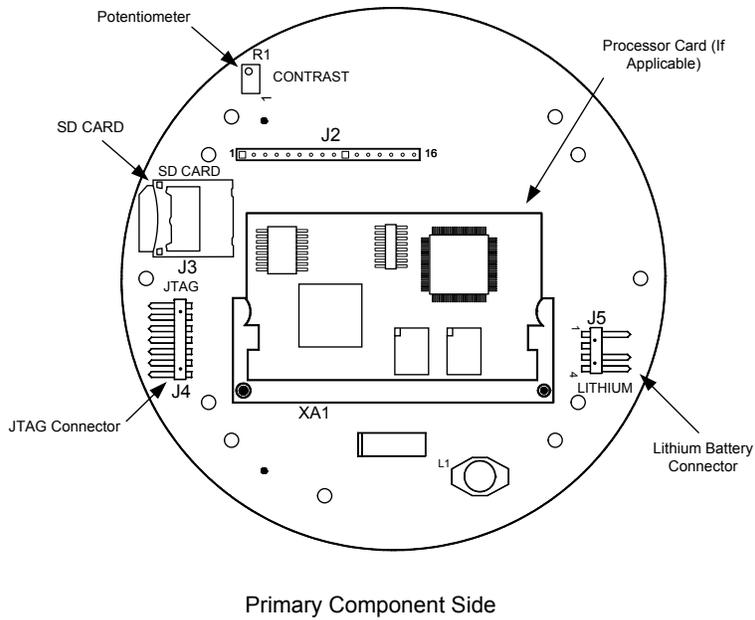
Primary Component Side

Figure 2–4 G4 EX Motherboard

10) After the LCD board is disengaged, gently remove the lithium battery connector (J5) from the G4 EX motherboard.

11) Upon removal of the lithium battery connector, snap the board out of the device. Please note that the board is still connected to the device through the cables in the back.

12) Unplug the sensor connector cable (J6) and the ribbon cable (J1) from the G4 EX motherboard. Remove the motherboard from the G4 EX device.
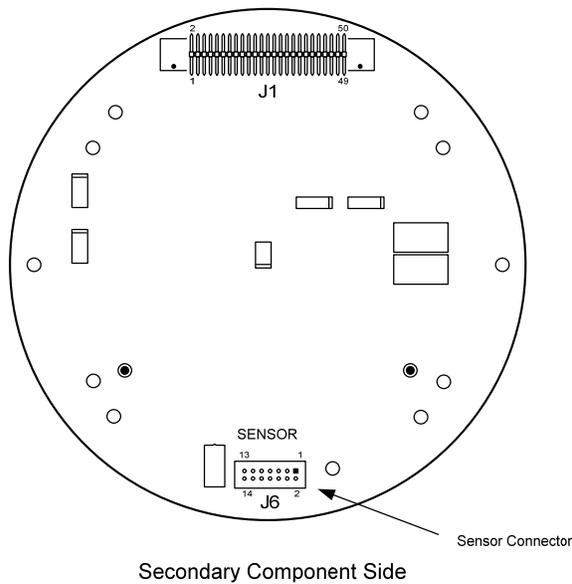

Secondary Component Side

Figure 2–5 G4 EX Board Secondary Component Side.

FYI If the user has the 2104353–503 motherboard, they will need to remove the processor card from the removed motherboard and place it into the new one. This is accomplished by pulling back the attachment brackets and gently unsnapping the processor card from its housing. Once completed, take the processor card and snap it into the replacement motherboard. Continue to step 13.

13) Take the replacement G4 EX motherboard and attach the sensor cable and the ribbon cable to their corresponding connectors.

CAUTION Please note that both the sensor cable and ribbon cable pin 1 wire is red. The red edge (pin 1) of the cable should plug into the outer most edge of the connector (pin 1).

14) Take the lithium battery cable and attach the cable to its corresponding connector (J5).

15) Align the mounting holes on the G4 EX motherboard with the standoffs, and snap the board into place within the device.

16) Once in place, line up the LCD board mounting holes to the G4 EX motherboard. Gently connect the LCD board into the G4 EX motherboard via the J2 connector.

17) Take a small slot head screwdriver and attach the LCD board to the G4 EX motherboard using the four mounting screws.

2.2 2103344–001 Termination Board Replacement

The termination board is mounted inside of the G4 EX back end cap. To access and remove the termination board, perform the following procedures:
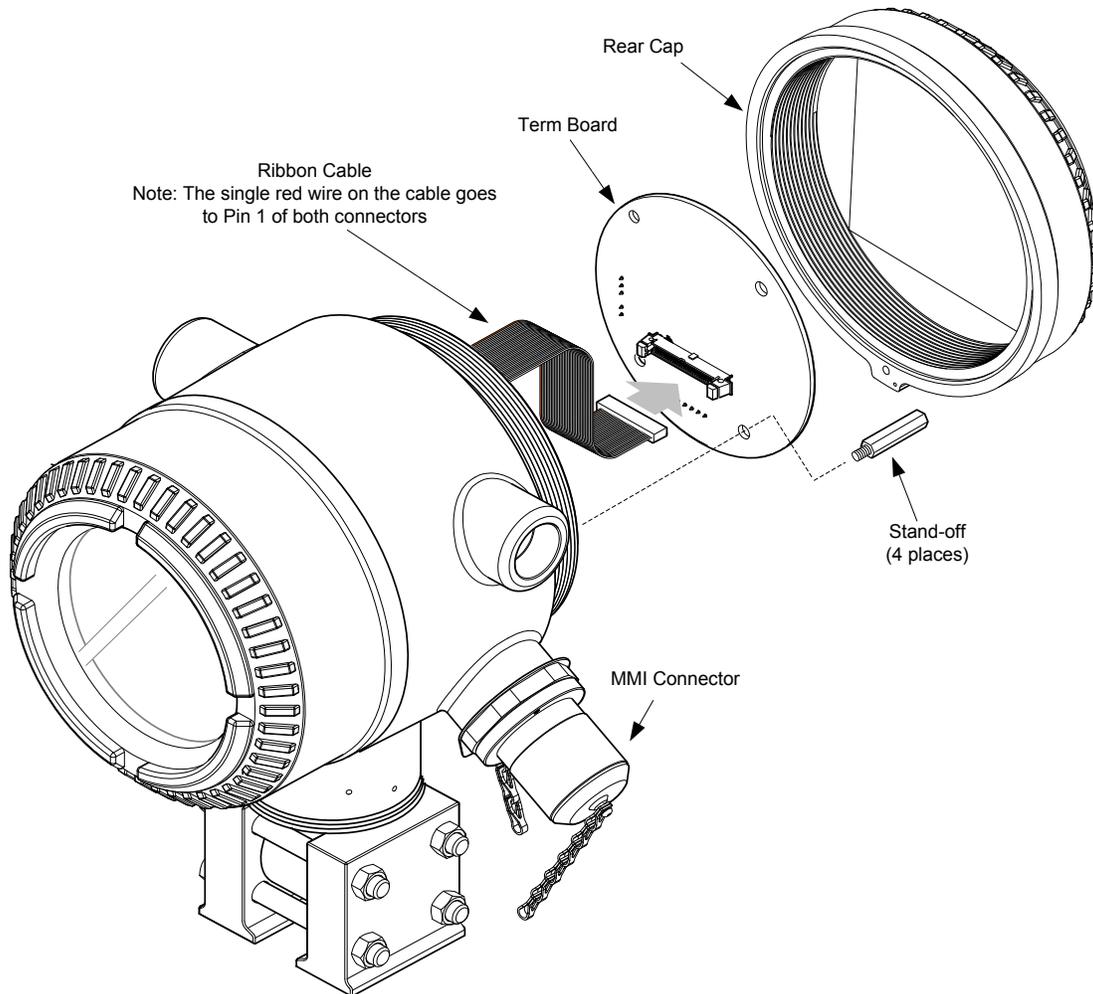
Figure 2–6 G4 EX Back End Exploded View

1) Collect data from the unit.

2) Back up the configuration files.

3) Verify that the "LL" battery alarm is not being displayed on the G4 EX LCD.

WARNING Remove power from the device, or insure the area is known to be non-hazardous before removing any enclosure cover. For further information, refer to the certification drawing indicated on the device's nametag and national and local electrical codes.

4) Gain access to the rear termination board by loosening the countersunk hex socket locking set screw in the rear end cap. Use a 1/16" hex wrench to perform this task. Upon completion, unscrew the end cap.

5) Upon unscrewing the end cap, the user will see the termination board. Using a ¼" socket wrench, unscrew the four socket mounting screws that hold the Termination board in place.

6) Depending on the configuration that the user selected from the factory, remove either the USB cable (J4), Ethernet cable (J7) or MMI cable (J21).

7) Next, remove the Comm 1 (J19), Comm 2 (J20) and power (J16) connectors.

8) Upon completion, remove the ribbon cable from the J1 connector. This will enable the user to remove the Termination board from the G4 EX device.
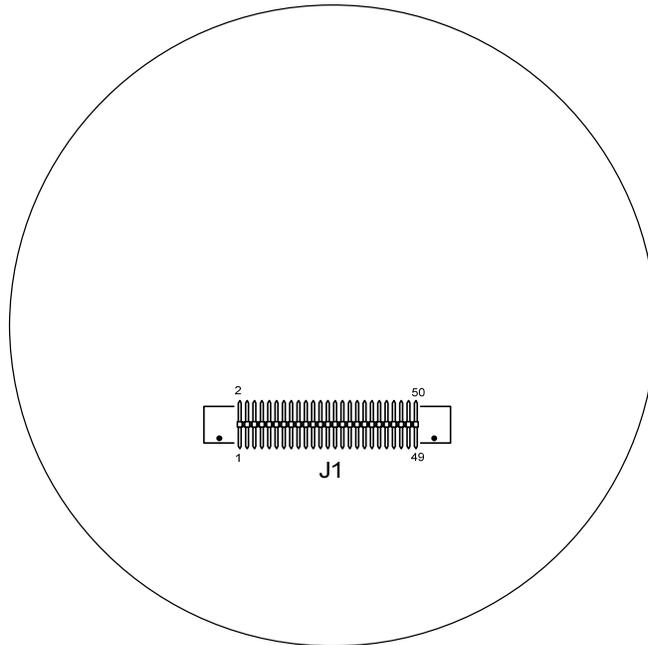

Figure 2–7 Termination Board Secondary Component Side

9) Take the replacement Termination board, and attach the ribbon cable to the J1 connector.

CAUTION Please note that the ribbon cable pin 1 wire is red. The red edge (pin 1) of the cable should plug into the outer most edge of the connector (pin 1).

10) Depending on the configuration that the user selected from the factory, attach either the USB cable (J4), Ethernet cable (J7) or MMI cable (J21) to their respective connection.

11) Next, attach the Comm 1 (J19), Comm 2 (J20) and power (J16) connections to their respective connectors.

12) Upon completion, take the four socket mounting screws and attach the Termination board in the G4 EX device.

2.3   2101650–002 Display Replacement

The G4 EX display has a dedicated interface to the motherboard from the 4x16 Liquid Crystal Display (LCD) via a 14-pin connector.

The LCD board is mounted inside of the G4 EX front end cap. To access and remove the display board, perform the following procedures:

CAUTION Do not remove the lithium battery, since it provides power to the RAM. It is recommended that historical flow data be downloaded before accessing and removing the LCD board to prevent the potential loss of stored data.
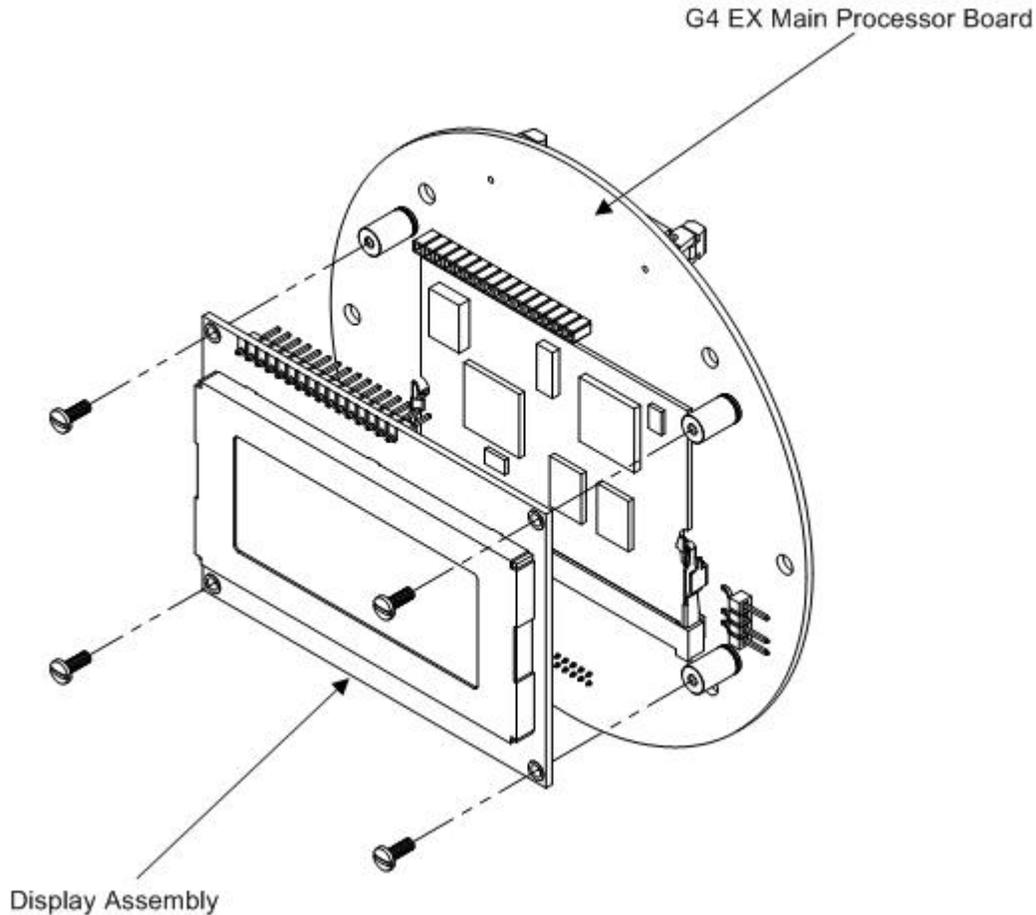
G4 EX Main Processor Board

Display Assembly

Figure 2–8 Display Assembly

1) Collect data from the unit.

2) Back up the configuration files.

3) Verify that the "LL" battery alarm is not being displayed on the G4 EX LCD.

WARNING Remove power from the device, or insure the area is known to be non-hazardous before removing any enclosure cover. For further information, refer to the certification drawing indicated on the device's nametag and national and local electrical codes.

4) Gain access to the rear Termination board by loosening the countersunk hex socket locking set screw in the rear end cap. Use a 1/16" hex wrench to perform this task. Upon completion, unscrew the end cap.

5) Disconnect the power connector (J16) from the board mounted connector.

6) Gain access to the LCD assembly by loosening the countersunk hex socket locking set screw in the front end cap. Use a 1/16" hex wrench to perform this task. When completed, unscrew the end cap.

7) After the end cap has been removed, gently pull the display overlay and graphic overlay plate away from the snap-on standoffs.

8) Using a small flat head screwdriver, remove the four screws that hold the LCD board to the G4 EX device.

9) Gently disconnect the LCD board from the G4 EX motherboard, J2 connector. Lift the board from the device.

10) To reinstall the LCD board, repeat steps 8 through 9 in reverse order. Do not over tighten screws.

11) Once the LCD board is reinstalled, apply power to the G4 EX (step 5), and verify that the information displayed on the LCD is correct.

12) Adjust the contrast potentiometer, R1, for optimal display.

TIP To adjust the display contrast, use an extra small screwdriver to turn the potentiometer, R1, completely clockwise. After completing this, turn the screw back counter clockwise until the screen is readable.

13) Replace the graphic overlay plate that was removed earlier.

2.4 2104199–001 Lithium Battery Assembly Replacement

CAUTION Do not remove power from the unit. Loss of power to the unit will initiate a cold start. All data and configuration files will be lost.

1) Collect data from the unit.

2) Back up the configuration files following the instructions.

CAUTION Remove power from the device, or insure the area is known to be non-hazardous before removing any enclosure cover. For further information, refer to the certification drawing indicated on the device's nametag and national and local electrical codes.

3) Gain access to the G4 EX motherboard by loosening the countersunk hex socket locking set screw in the front end cap. Use a 1/16" hex wrench to perform this task. When completed, unscrew the end cap.

WARNING Remove power from the device, or insure the area is known to be non-hazardous before removing any enclosure cover. For further information, refer to the certification drawing indicated on the device's nametag and national and local electrical codes.

4) After the end cap has been removed, gently pull the display overlay and graphic overlay plate away from the snap-on standoffs.

5) Upon completion, gently remove the lithium battery connector (J5) from the G4 EX motherboard.
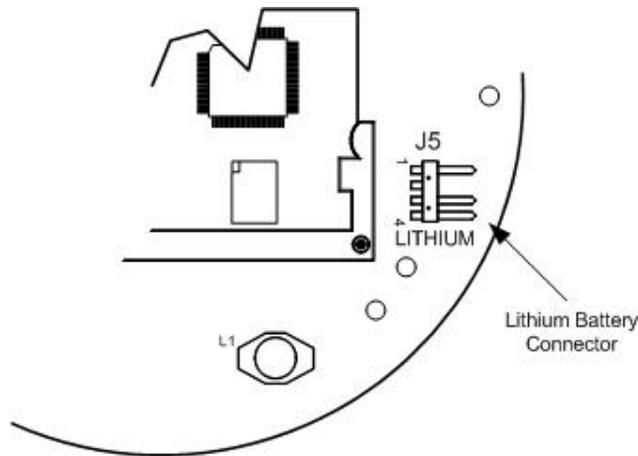
Figure 2–9 Lithium Battery Connector

6) Once the lithium battery connector is removed, snap the board out of the device. Please note that the board is still connected to the device through the cables in the back.

7) After the G4 EX motherboard has been partially removed, unplug the sensor connector cable (J6) and the ribbon cable (J1) from the G4 EX motherboard. This will allow the board to be completely removed from the device.

8) The user will now see a manufacturing plate. The lithium battery assembly is located on the back of this plate in a small battery enclosure. Carefully remove the plate from the snap-on standoffs.

9) The lithium battery assembly is attached to the manufacturing plate by a Velcro strip. Gently remove the lithium battery from the Velcro strip.

10) Take the new lithium battery and attach the Velcro edge of the battery to the Velcro strip in the battery enclosure on the manufacturing plate.

11) Once the lithium battery is attached to the manufacturing plate, snap the plate back into the device using the appropriate standoffs.

12) Take the G4 EX motherboard and attach the sensor cable and the ribbon cable to their corresponding connectors.

CAUTION Please note that both the sensor cable and the ribbon cable pin 1 wire are red. The red edge (pin 1) of the cable should plug into the outer most edge of the connector (pin 1).

13) Attach the lithium battery cable to its corresponding connector.

14) Align the mounting holes on the G4 EX motherboard with the standoffs, and snap the board into place within the device.

15) Replace the display and graphic overlays that were removed earlier.

2.5 I/O Daughter Card Replacement

The following information provides an outline for the installation and application of the I/O daughter card within the G4 EX.

The I/O daughter card may already be installed in new units, if configured, or can be added as an upgrade kit to pre-existing units. The following information will address the installation for the upgrade kit.

CAUTION Do not install the I/O daughter card until told to do so in these instructions. Installation prior to flashing the unit may cause some older model units to not boot.

This card expands the capabilities of the explosion-proof flow computer by adding an additional 12 points of fixed analog and digital I/O points. Specifications for the I/O daughter card are as follows:

- Analog Points
  - 3 each 0-10V (10K ohm impedance) analog inputs
  - 1 each 0-20 mA (SINK mode) analog output
- Digital Points
  - 4 each digital inputs/pulse inputs
  - 4 each digital outputs (optically-isolated type 1A switches capable of switching 200 mA of 48 VDC or 40 VAC)

If the unit is currently operating, data must be collected from the unit and the configuration files saved prior to beginning this procedure.
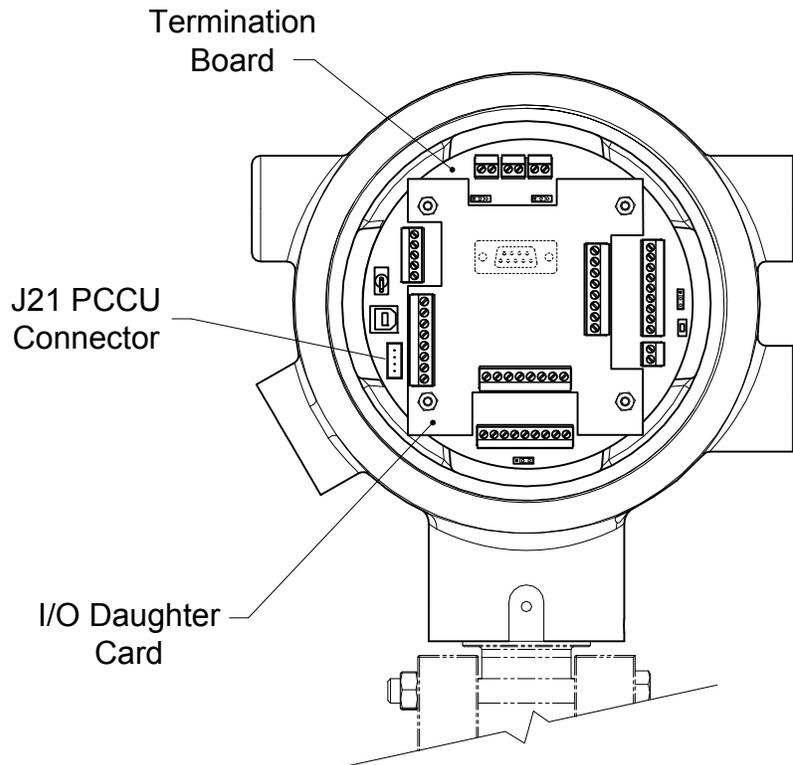

Figure 2–10 I/O Daughter Card

2.5.1   I/O Daughter Card Installation

WARNING Remove power from the device, or insure the area is known to be non-hazardous before removing any enclosure cover. For further information, refer to the certification drawing indicated on the device's nametag and national and local electrical codes.

1) Gain access to the Termination board by loosening the countersunk hex socket locking set screw in the rear end cap. Use a 1/16" hex wrench, and then unscrew the end cap.

2) Remove the four existing 6-32 x .625 standoffs and washers (if installed). Do not misplace as they will be needed later in this procedure.

3) Install the new standoffs (6-32 x .75") and washers supplied in the kit into the four corner mounting holes in the Termination board.

4) Center the I/O card over the Termination board (green phoenix connectors facing out). Align the four screw holes at each corner. This should allow the I/O card to interconnect with the I/O Expansion connection on the Termination board. Gently apply pressure to the I/O card in the two areas located on either side of the connector until the board is seated.

5) Using the four 6-32 x .625 standoffs removed previously, connect the I/O card to the Termination board. Do not over tighten.

6) Reapply power to the unit.

2.5.2   Generic Wiring Diagram

WARNING This drawing does not completely illustrate the installation methods required for hazardous locations. Prior to any installation in a Classified Hazardous Location, verify the installation methods by the Control Drawing referenced on the product's name tag and national and local codes.
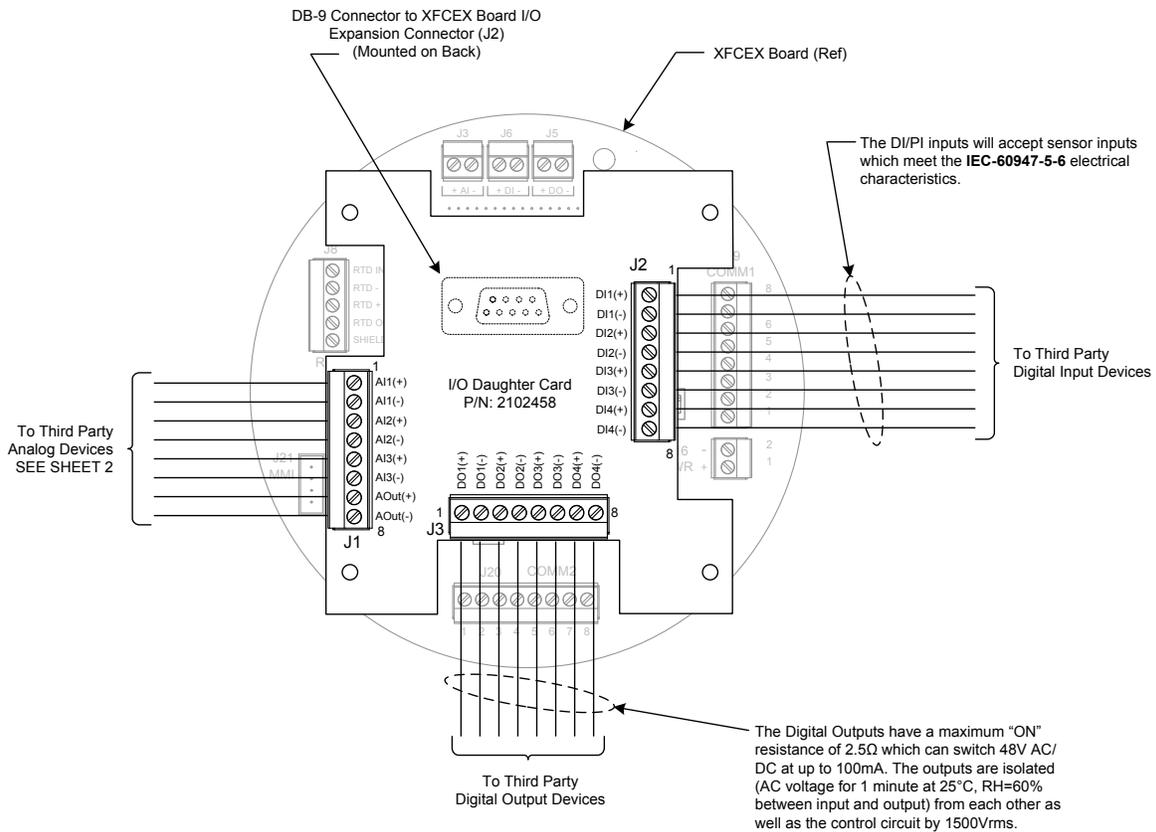
DB-9 Connector to XFCEX Board I/O
Expansion Connector (J2)
(Mounted on Back)

XFCEX Board (Ref)

The DI/PI inputs will accept sensor inputs which meet the **IEC-60947-5-6** electrical characteristics.

J3 J6 J5
+ AI - + DI - + DO -

J8
RTD IN
RTD -
RTD +
RTD O
SHIEL

J2
1
DI1(+)
DI1(-)
DI2(+)
DI2(-)
DI3(+)
DI3(-)
DI4(+)
DI4(-)
8

COMM1
8
6
5
4
3
2
1

To Third Party
Digital Input Devices

I/O Daughter Card
P/N: 2102458

1
AI1(+)
AI1(-)
AI2(+)
AI2(-)
AI3(+)
AI3(-)
AOut(+)
AOut(-)
8
J1

To Third Party
Analog Devices
SEE SHEET 2

J21
MMI

DO1(+)
DO1(-)
DO2(+)
DO2(+)
DO3(+)
DO3(-)
DO4(+)
DO4(-)
1 8
J3

J20 COMM2

The Digital Outputs have a maximum "ON" resistance of 2.5Ω which can switch 48V AC/DC at up to 100mA. The outputs are isolated (AC voltage for 1 minute at 25°C, RH=60% between input and output) from each other as well as the control circuit by 1500Vrms.

To Third Party
Digital Output Devices

Figure 2–11 I/O Daughter Card Generic Wiring

2.6 EXIMV Replacement

The EXIMV is specifically designed for the G4 EX device. The transducer characterization files are stored in the G4 EX raw sensor interface board. As such, replacement/repair involves removing both the transducer and the G4 EX raw sensor interface board from the actual G4 EX device. Contact Totalflow to return the assembly for replacement under warranty or for repair.

CAUTION Entry into the interior of the transducer voids the transducer warranty. If the transducer requires servicing, the entire assembly must be removed from the unit, packaged securely for shipping and returned to Totalflow. Contact Totalflow Customer Service for instructions.
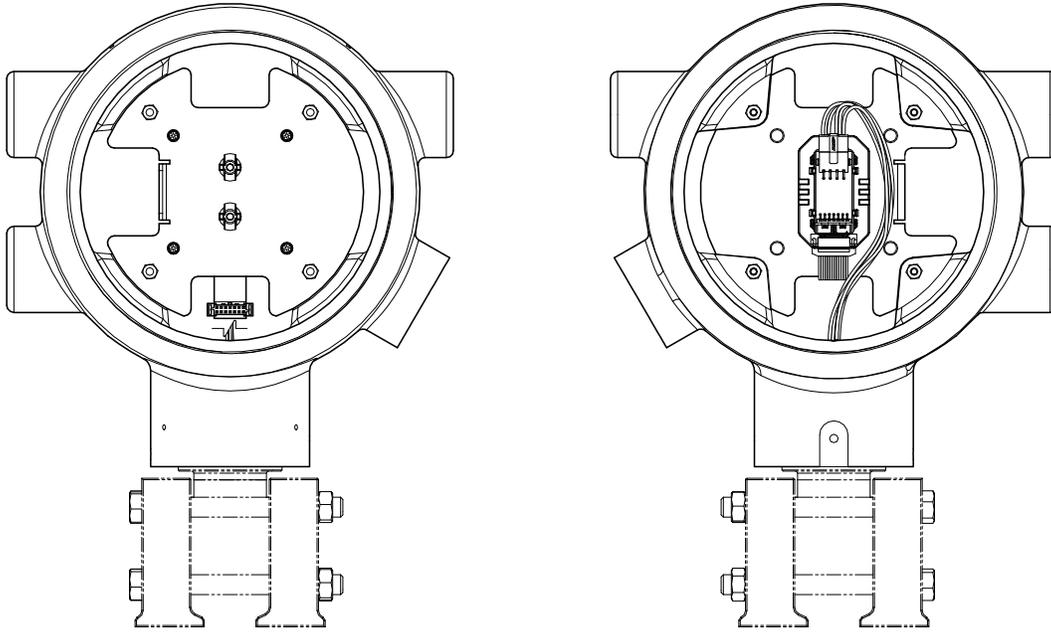
Figure 2–12 EXIMV Installation Overview

1) Collect data from the unit.

2) Back up the configuration files following the instructions listed previously in this chapter.

3) Once the user has finished backing up the configuration and data files, they will need to open the manifold high/low equalizer valves.

4) Using the orifice tap valves, close off both upstream and downstream. These two valves connect the meter run high/low output lines to the transducer.

5) Open the vent valve to atmosphere.

6) Completely disconnect the high/low manifold lines from the transducer.

7) If the user is able to do so at this point, remove the external power that is feeding the unit. If this can be done, skip to step 10; otherwise, continue to the next step.
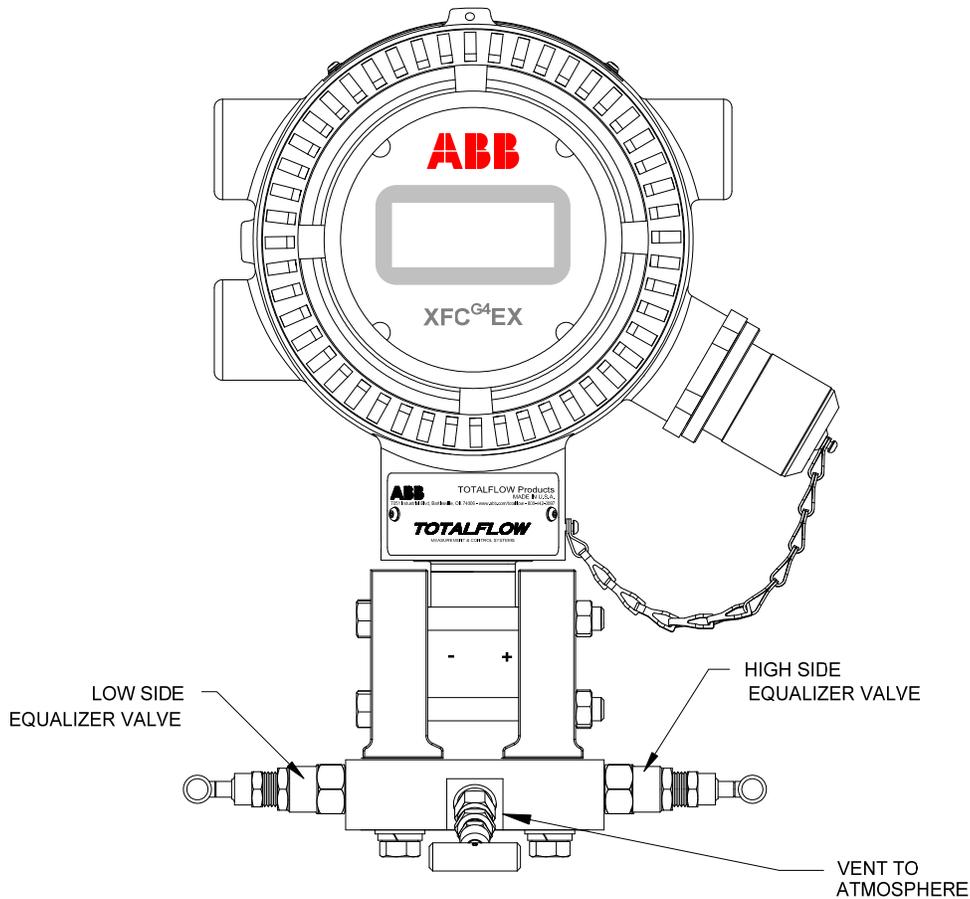
Figure 2–13 G4 EX with Block Manifold

> **WARNING** Remove power from the device, or insure the area is known to be non-hazardous before removing any enclosure cover. For further information, refer to the certification drawing indicated on the device's nametag and national and local electrical codes.

8) Gain access to the rear Termination board by loosening the countersunk hex socket locking set screw in the rear end cap. Use a 1/16" hex wrench to perform this task. Upon completion, unscrew the end cap.

9) Disconnect the power connection (J16) from the Termination board mounted connector.

> **WARNING** Remove power from the device, or insure the area is known to be non-hazardous before removing any enclosure cover. For further information, refer to the certification drawing indicated on the device's nametag and national and local electrical codes.

10) Gain access to the G4 EX board by loosening the countersunk hex socket locking set screw in the front end cap. Use a 1/16" hex wrench to perform this task. When completed, unscrew the end cap.

11) After the end cap has been removed, gently pull the display overlay and graphic overlay plate away from the snap on standoffs.

12) After the graphic overlay plate is off, gently remove the lithium battery connector (J5) from the G4 EX board.

13) Upon removal of the lithium battery connector, snap the board out of the device. Please note that the board is still connected to the device through the cables in the back.

14) Unplug the raw sensor connector cable (J6) and the ribbon cable (J1) from the G4 EX board.

15) Gently remove the board from the G4 EX device.

16) Loosen the 2" mounting pole U-bolts. Rotate/lower the unit a sufficient distance so that the transducer can be removed.

17) Loosen the hex socket head set screws on the neck of the unit using a 3/32" hex wrench. Continue until the transducer turns freely. Gently turn counter-clockwise until the transducer is free from the enclosure.

18) Replace the transducer and raw sensor board with a new/repaired/spare unit of the same type and pressure rating.

19) Reconnect the high/low manifold lines, and restore pressure.

20) Reassemble the unit by performing steps 10-14 in reverse order.

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