

G5 flow computers

μ FLO^{G5} (microFLO^{G5})

Component replacement instructions

Easy parts replacement in the most accurate and reliable single run gas flow computer



Introduction

This guide is designed for typical installations only. Maintenance must be performed by personnel knowledgeable of the ABB Totalflow[®] μ FLO^{G5} flow computer, the integral multivariable transducer (IMV), and the theory of natural gas electronic flow measurement. Maintenance personnel must also be knowledgeable of local and national codes as they apply to hazardous areas, communication wiring, and electrical wiring.

Read and consider the contents of this 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 ABB representative, or call the main office number listed on the back page of this guide.



CAUTION – Equipment damage. The μ FLO^{G5} flow computer operating temperature range differs from the μ FLO^{G4}. The μ FLO^{G5} is rated for ambient temperatures between -40 °F and +158 °F (-40 °C and +70 °C).

Purpose

This guide provides easy-to-follow instructions for replacement of all available spare part components.

Additional information

Additional free publications for the μ FLO^{G5} are available for download at www.abb.com/totalflow or by scanning this code:



<i>μFLO^{G5} flow computer user manual</i>	2105614
<i>μFLO^{G5} flow computer startup guide</i>	2105513
<i>μFLO^{G5} upgrade kit</i>	2105515
<i>μFLO^{G5} flow computer data sheet</i>	2102800
<i>μFLO^{G5} (2104939 BD) wiring guide</i>	2105507
<i>μFLO^{G5} enclosure measurements</i>	2105508
<i>μFLO^{G5} I/O expansion board (2104395 BD) installation and wiring guide</i>	2105506
<i>μFLO^{G5} (2104939 BD) solar panel connection</i>	2105509
<i>NRTL/C (Class 1, Div 2) 60 °C</i>	2015246
<i>NRTL/C (Class 1, Div 2) 70 °C</i>	2104615
<i>ATEX Cert, EX II 3G, Ex nA IIB (Zone 2)</i>	2104152
<i>IECEX Cert, Ex nA IIB (Zone 2)</i>	2100750

Assumptions

For any questions that are not answered in this guide or the other documentation listed in the previous section, call the local ABB representative, or call the main office number listed on the back page of this guide.

The following apply to the instructions in this guide:

- A μ FLO^{G5} flow computer is already installed and the replacement parts are suitable.
- The host computer is running PCCU32 version 7.58 or newer.
- Specific instructions about collecting data, shutting in the measurement sensor, disconnecting the high and low input lines, and manifold connections are outside the scope of this document. At the appropriate times, guidelines prompt when these procedures are to be performed.

1 Safety warning and note symbols

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

i **IMPORTANT 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.

1.1 Safety conventions



DANGER – Serious damage to health / risk to life. This symbol, in conjunction with the signal word "DANGER", indicates an imminent danger. Failure to observe this safety information will result in death or severe injury. The text may state the hazard, how to avoid the hazard, and what the result would be if not followed.



WARNING – Bodily injury. This symbol, in conjunction with the signal word "WARNING", indicates a potentially dangerous situation. Failure to observe this safety information may result in death or severe injury. The text may state the hazard, how to avoid the hazard, and what the result would be if not followed.



WARNING – Bodily injury. This symbol, in conjunction with the signal word "WARNING", indicates a potentially dangerous electrical situation. Failure to observe this safety information may result in severe injury. The text may state the hazard, how to avoid the hazard, and what the result would be if not followed.



CAUTION – Equipment damage. This symbol, in conjunction with the signal word "CAUTION", indicates a potentially dangerous situation. Failure to observe this safety information may result in minor or moderate injury. The symbol may also be used for property damage warnings. The text may state the hazard, how to avoid the hazard, and what the result would be if not followed.

i **IMPORTANT NOTE:** This symbol indicates useful information, important information, or information to clarify a concept. The signal words "IMPORTANT NOTE" do not indicate a dangerous or harmful situation.

1.2 Potential safety hazards

Pressurized natural gas is present in the measurement pipeline. Because of this, a possibility exists for natural gas to escape from the pipeline or tubing during installation or calibration, or following damage to the pipeline or tubing. Only properly trained and authorized personnel should work in hazardous locations.

The flow computer operates on 9 - 30 Vdc. However, optional equipment may convert power from alternating current to direct current. There are no hazardous voltages present.

2 Overview

The μ FLO^{G5} flow computer field-replaceable components are:

- I/O expansion board
- μ FLO^{G5} electronic board
- μ FLO^{G5} Transducer (differential or linear, without the μ FLO^{G5} electronic board)
- μ FLO^{G5} IMV assembly (complete)

2.1 Procedure overview

Disassembly and reassembly of the flow computer does not follow a linear pattern. However, to present the procedures in a linear manner, the following table will assist in determining which procedures will be required for component replacement, but not necessarily the order in which they should be followed. (Table 1). Each procedure will call out the specific section to be used in the order in which they should be used.

Table 1: Procedure and component instruction matrix

Section for procedures related to component replacement	Page	I/O expansion board	μ FLO ^{G5} electronic board	μ FLO ^{G5} transducer	μ FLO ^{G5} IMV assembly
3.1 Preserving data and configuration files	5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3.2 Disconnect power	5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3.3 Restore power	6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3.4.1 Remove the I/O expansion board	6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3.4.2 Reinstall the I/O expansion board	8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3.5.1 Remove the electronic board	10		<input checked="" type="checkbox"/>		
3.5.2 Reinstall the electronic board	12		<input checked="" type="checkbox"/>		
3.6.1 Remove the IMV assembly	12			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3.6.2 Reinstall the IMV Assembly	15			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3.7 Replacing the μ FLO ^{G5} transducer assembly (only)	17			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4 Considerations outside the scope of this document	18	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

2.2 Requisite tools

The following list of items are necessary to perform these procedures:

- Phillips screwdriver
- Small slotted screwdriver
- ¼ inch hex driver
- ½ inch socket with ratchet

3 Procedures

Prior to all component replacement procedures, the following sections must be completed:

- 3.1 Preserving data and configuration files
- 3.2 Disconnect power

Completion of these two sections indicates that all files have been protected from a loss of power and that the flow computer has been powered down and is deemed safe.

3.1 Preserving data and configuration files

If local communication is still possible, collect data from the flow computer and back up the station configuration files.

To back up the station files:

1. Collect all data. Use the *Data collection* procedure detailed in the user manual listed earlier in the *Additional information* section of this guide.
2. If not previously done, update the TFCold (Cold) configuration with the running (warm) configuration. Use the *Delete and Re-create TFCold* function of the *Update TFCold Start Configuration* procedure which is detailed in the user manual listed earlier in the *Additional information* section of this guide.
3. Back up all device software to the host computer operating PCCU32 software. Use the *Save the TFCold (Cold) configuration to the PC* procedure detailed in the user manual listed earlier in the *Additional information* section of this guide.

3.2 Disconnect power



CAUTION – Equipment damage. The external power/charger and battery connections must be removed before removing all other cables, boards, and field connections. Connecting or disconnecting cables and wires on the electronic board while power is applied can damage the electronic components.

To disconnect power from the μ FLO^{G5} electronic board:

1. Disconnect the external power / charger connector from J17 (Figure 1).
2. Disconnect the battery cable plug from J15.

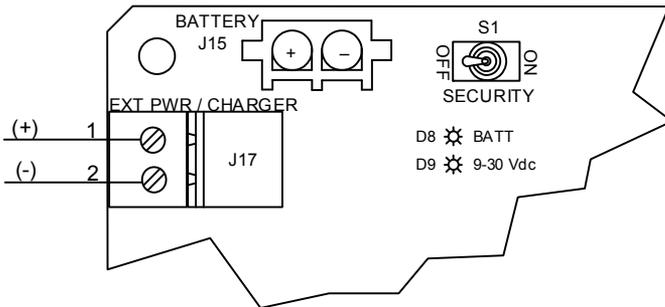


Figure 1: μ FLO^{G5} electronic board power connections

3.3 Restore power

To restore power to the μ FLOG⁶⁵ electronic board, all cables and onboard and field wiring connections should be complete. Do not restore power until ready to restart the flow computer.

1. Reconnect the battery cable plug from J15.
2. Reconnect the external power / charger connector from J17 (Figure 1, on page 5).

3.4 Replacing the I/O expansion board

3.4.1 Remove the I/O expansion board

To remove the I/O expansion board:

1. Follow the procedure in section 3.1, *Preserving data and configuration files*, on page 5. Return here when completed.
2. Follow the procedure in section 3.2, *Disconnect power*, on page 5. Return here when completed.
3. If removing the I/O expansion board as part of another service procedure, it may not be necessary to disconnect the field wiring. Otherwise, disconnect the following field wiring connections on the I/O expansion board (Figure 2):
 - a. Communication wiring from J2
 - b. DI wiring from J9
 - c. DO wiring from J5
 - d. AI #1 wiring from J4
 - e. AI #2 wiring from J8.

i

IMPORTANT NOTE: Do not unplug the lithium battery connector from the electronic board unless or until instructed to do so.

To maintain the continuity of the flow computer date and time stored in RAM memory and for the purposes of record keeping, the lithium battery must remain connected.

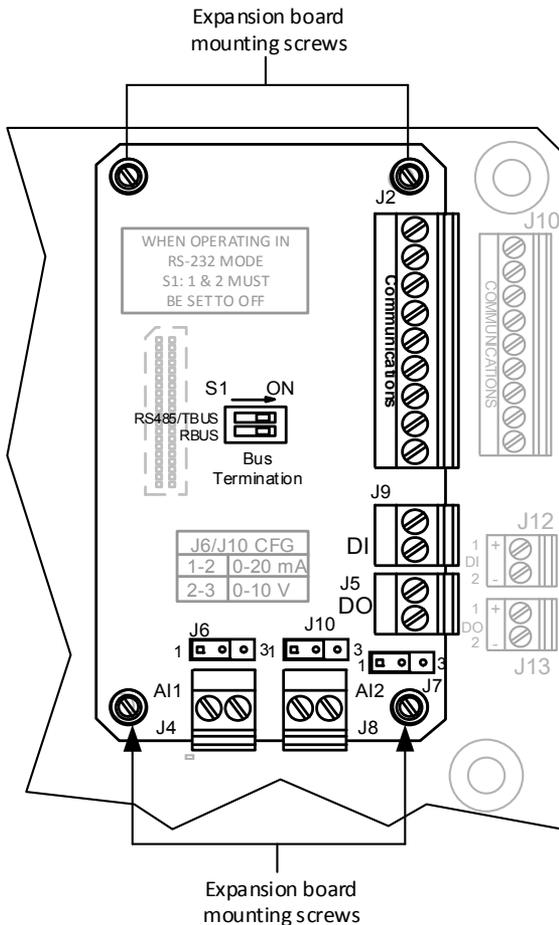


Figure 2: μ FLO^{G5} I/O expansion board

4. Use a small slotted screwdriver to loosen the four (4) mounting screws that attach the I/O board to the μ FLO^{G5} board. Alternate between the four screws, one to two turns each. As the screws are loosened, the J2 connector is gradually disconnected from the electronic board socket. The mounting screws are held in place with a screw keeper.
5. Grasp the expansion board on either side and gently lift up from the μ FLO^{G5} electronic board.

If only replacing the I/O expansion board, continue to section 3.4.2, *Reinstall the I/O expansion board*, on page 8. Otherwise, set the board aside to reinstall at a later time.

3.4.2 Reinstall the I/O expansion board



WARNING – Bodily injury and property damage. Wiring peripheral devices to the flow computer electronic board should be performed prior to applying power. Do not apply power until instructed to do so.

1. Fit the I/O expansion board connector (J1) onto the expansion port (J2) on the electronic board, but do not push down to seat the expansion board.

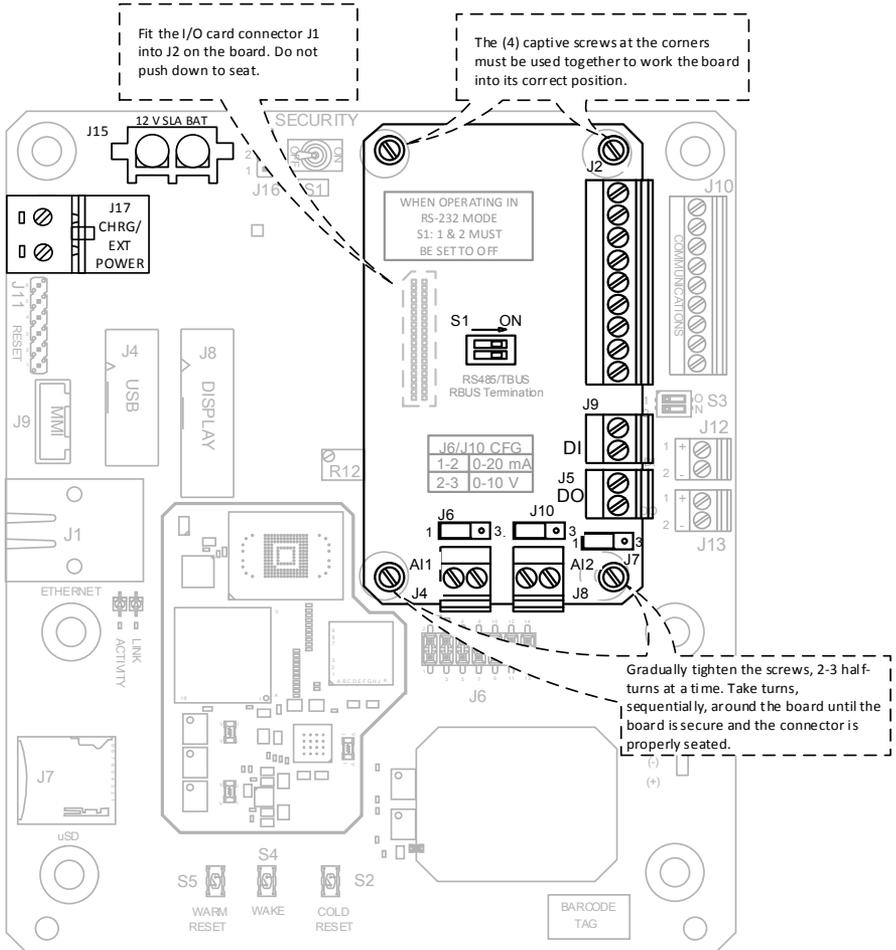


Figure 3: μ FLO^{G5} Board – J2 Connector

2. Using a small slotted screwdriver, begin turning each captive screw a few turns each, moving sequentially to each of the 4 (four) corners of the board, to slowly seat the board into the onboard connector. Continue until the board is fully seated.

3. Reconnect field terminations, if removed:
 - a. Communication wiring from J2
 - b. DI wiring from J9
 - c. DO wiring from J5
 - d. AI #1 wiring from J4
 - e. AI #2 wiring from J8.
4. If performing additional procedures, return to those instructions. Otherwise, follow the procedure in section 3.3, *Restore power*, on page 6.

3.5 Replacing the μ FLO^{G5} electronic board

3.5.1 Remove the electronic board

This procedure is applicable only for the direct replacement of the μ FLO^{G5} electronic board. If removal of the electronic board is required during another procedure, those instructions will be addressed in that procedure.

To remove the μ FLO^{G5} electronic board:

1. Follow the procedure in section 3.1, *Preserving data and configuration files*, on page 5. Return here when completed.
2. Follow the procedure in section 3.2, *Disconnect power*, on page 5. Return here when completed.
3. Follow the procedure in section 3.4.1, *Remove the I/O expansion board*, on page 6. Return here when completed.
4. Disconnect the following, if connected, from the μ FLO^{G5} electronic board:
 - a. LCD display cable from J8 connector.
 - b. Communication connections:
 - MMI communication cable plug from J9
 - USB cable plug from J4
 - Ethernet cable plug from J1
 - c. Field wiring connections:
 - Communication wiring from J10
 - DI wiring from J12
 - DO wiring from J13
 - RTD sensor from J3
5. On the transducer housing assembly, use a phillips screwdriver to remove the four (4) screws that attach the cover plate that contains the transducer information. Remove and set the plate aside (Figure 4). The cover plate should always stay with the IMV.

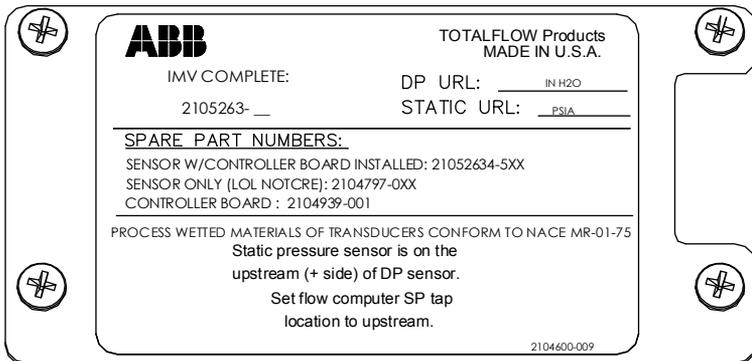


Figure 4: Cover plate with transducer information

6. Using a ¼ inch hex driver, remove the six (6) hex standoffs that attach the μ FLO^{G5} electronic board to the transducer housing.

7. Loosen the lithium battery unit from the head of the transducer assembly (Figure 5, *μFLOG⁵ assembly, exploded view*, page 11). The battery will need to remain connected to, and moved with, the electronic board.

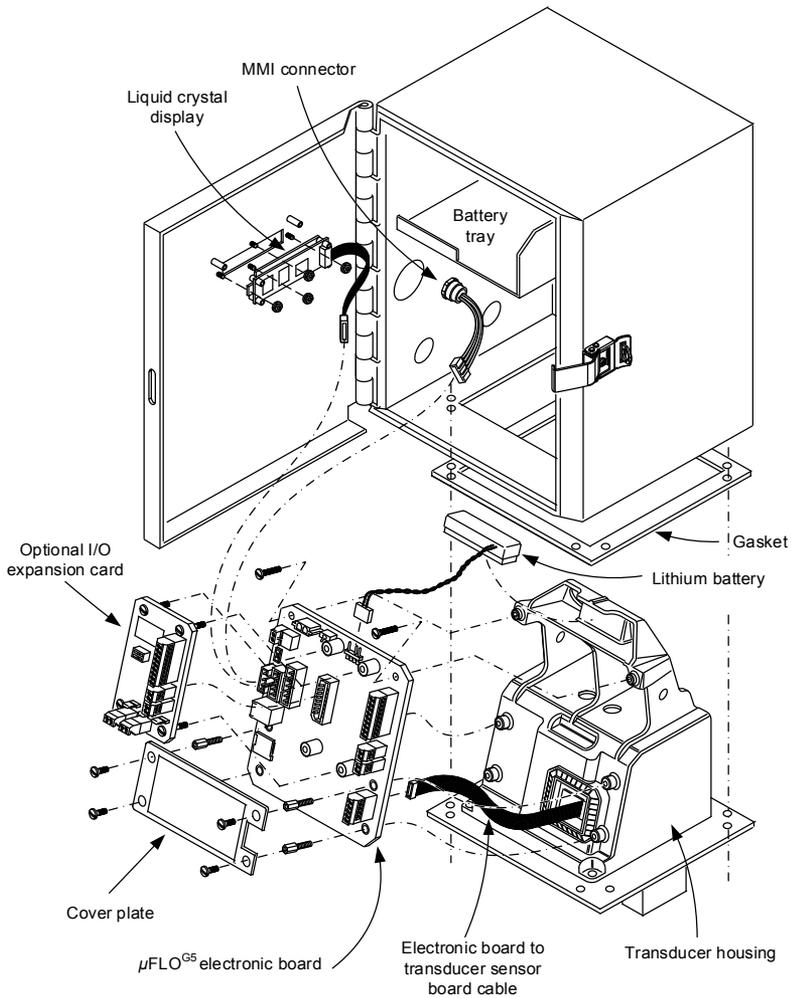


Figure 5: *μFLOG⁵ assembly, exploded view*

8. Lift the board away from the transducer housing carefully. The electronic board to transducer sensor cable is very short, approximately 3 inches. Do not pull the board completely away until the cable has been disconnected from the back of the board.
9. Grasp the electronic board to transducer sensor cable at the back of the board and disconnect it.

3.5.2 Reinstall the electronic board

1. On the back of the replacement board, attach the electronic board to transducer sensor cable to the connector.
2. Carefully feed the excess cable back into the transducer housing, and align the board mounting holes with their respective standoffs.
3. Using a ¼ inch socket driver, reinstall the six hex standoffs and tighten.
4. Using a phillips screwdriver, reinstall the cover plate set aside previously.
5. Reinstall the I/O expansion board, if uninstalled, using the instructions in section 3.4.2, on page 8.
6. Reconnect the following, if disconnected:
 - a. LCD display cable to J8 connector.
 - b. Lithium battery cable to J18 connector
 - c. Communication connections:
 - MMI communication cable plug to J9
 - USB cable plug to J4
 - Ethernet cable plug to J1
 - d. Field wiring connections:
 - Communication wiring to J10
 - DI wiring to J12
 - DO wiring to J13
 - RTD sensor to J3
7. Follow the instructions in section 3.3, *Restore power*, on page 6, to apply power to the flow computer. Return here when completed.

This completes replacement of the electronic board. If necessary, follow instructions, located in the user manual, listed under *Additional information*, to restore station configuration files.

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IMPORTANT NOTE: The μ FLO^{G5} electronic board spare part may be ordered in two configurations: new or refurbished. Both configurations are delivered with the latest operating system, standard configuration file, and standard applications loaded. Non-standard application and configuration files are outside the scope of this document. If the device software is backed up, it may be restored to the flow computer electronic board after startup.

3.6 Replacing the μ FLO^{G5} IMV assembly

3.6.1 Remove the IMV assembly

Removal of the complete IMV assembly is necessary and applicable in two component replacement procedures:

- Transducer assembly replacement (either differential or linear assemblies)
- IMV assembly replacement (complete)

To remove the IMV assembly

1. Follow the procedure in section 3.1, *Preserving data and configuration files*, on page 5. Return here when completed.
2. Follow the procedure in section 3.2, *Disconnect power*, on page 5. Return here when completed.
3. Follow the procedure in section 3.4.1, *Remove the I/O expansion board*, on page 6, if installed.
4. Disconnect the following, if connected, from the μ FLO^{G5} electronic board:
 - a. LCD display cable from J8 connector.
 - b. Communication connections:
 - MMI communication cable plug from J9
 - USB cable plug from J4
 - Ethernet cable plug from J1
 - c. Field wiring connections:
 - Communication wiring from J10
 - DI wiring from J12
 - DO wiring from J13
 - RTD sensor from J3



DANGER – Serious damage to health / risk to life. Preparation for removing the IMV should include shutting in the measurement sensor and disconnecting the high and low input lines or manifold connections. Depending on company policy, other steps may be required, but are outside the scope of this document. Complete all requirements before continuing.

5. Shut in the measurement sensor:
 - a. Using the manifold high/low control valves, equalize the pressure to the IMV.
 - b. Using the high and low tap valves, close off both lines. These two valves connect the meter run high/low output lines to the μ FLO.
 - c. Vent the manifold to atmosphere using the vent valve.
 - d. Completely disconnect the high and low manifold lines from the IMV.

6. Rotate the enclosure, if necessary, to allow removal of the IMV:
 - a. Using a ½ inch hex socket with ratchet, loosen the μ FLO enclosure mounting clamp bolts and rotate the enclosure a sufficient distance to allow removal of the IMV, approximately 11 inches (28 cm).
-



CAUTION – Equipment damage. When rotating the enclosure, be careful to not stress or damage the wires and cables connected through the enclosure access points.

- b. After rotation, tighten the clamp bolts to hold the μ FLO in place.
 7. Remove the IMV assembly:
 - a. Using a phillips screwdriver, remove the eight (8) mounting screws, washers and lock washers, located on the bottom of the enclosure, that secure the IMV to the μ FLO cabinet (Figure 5, μ FLOG5 *assembly, exploded view*, page 11). Be careful not to drop the screws.
 - b. Loosen the IMV by tilting it slightly forwards and then backwards. Carefully slide the upper body of the assembly down through the bottom access cutout until clear.
 - c. The weather-sealing gasket is affixed to the top side of the IMV mounting flange and may be stuck to the bottom of the enclosure. Remove any remaining gasket that is adhered to the bottom of the cabinet.
-



CAUTION – Equipment damage. The gasket area should be clean and free of any materials that may hinder the seal of a new gasket. An improper gasket seal may allow moisture or dirt to enter the enclosure and damage the electronic components.

3.6.2 Reinstall the IMV Assembly

Replacing the complete IMV assembly is necessary and applicable in two component replacement procedures:

- Transducer assembly replacement (either differential or linear assemblies)
- IMV assembly replacement (complete)

To install the complete IMV assembly, perform the following steps:

1. Place the clean weather sealing gasket over the upper body of the IMV assembly and move the gasket down to the mounting plate just below the electronic board (Figure 6).

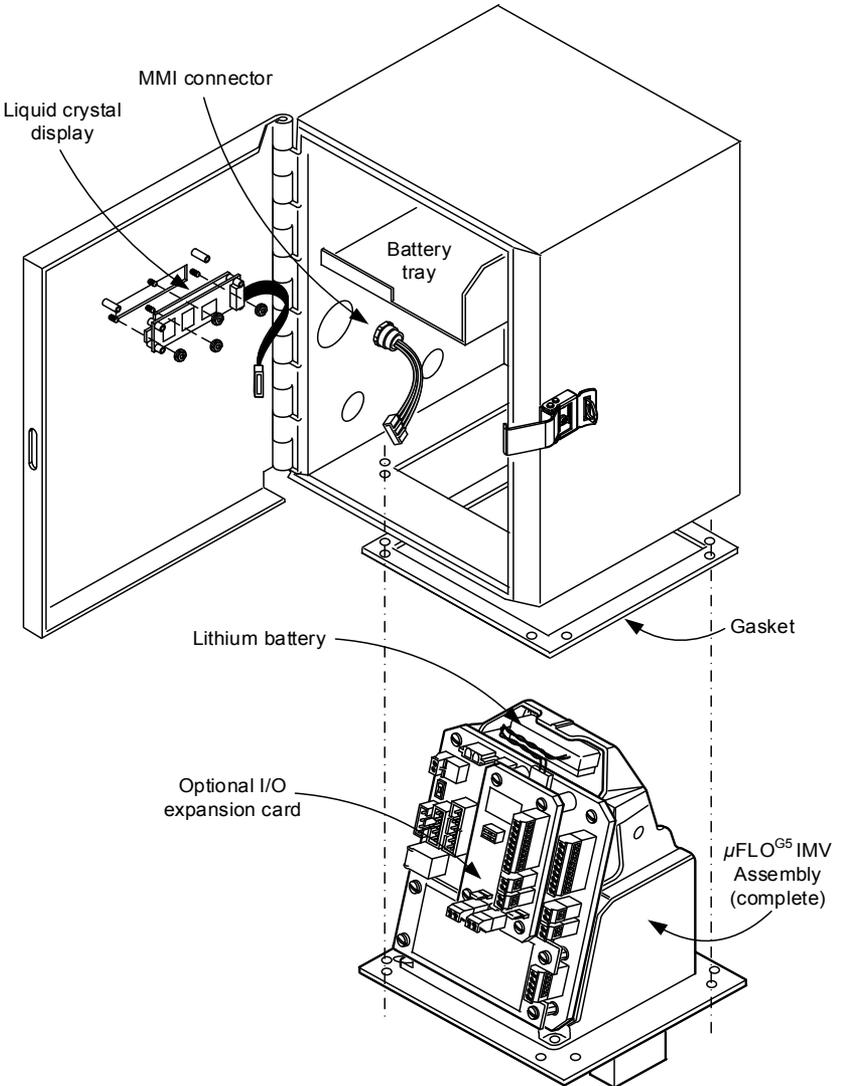


Figure 6: μ FLO IMV replacement

2. Carefully move the IMV up into the access cutout.
3. Place the split washer, then the flat washer on the screw and screw into the mounting plate and up into the corresponding screw hole.
4. Repeat step 3 for the remaining mounting screws.
5. Securely tighten all eight mounting screws to keep out external environmental elements.
6. If the enclosure was previously rotated to allow for removing the IMV, rotate the enclosure back to its original position:
 - a. Using a ½ inch hex socket with ratchet, loosen the enclosure mounting clamp bolts and rotate the enclosure back to the original position.

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IMPORTANT NOTE: Manifold and tubing connections, power application, and unit startup will be addressed in the startup guide included in this kit. Complete the remaining procedures in this guide before beginning startup procedures.

- b. After rotation, tighten the clamp bolts to hold the μ FLO in place.
7. Follow the procedure in section 3.4.2, *Reinstall the I/O expansion board*, on page 8, if previously removed.
8. Reconnect the following, if disconnected, to the μ FLO^{G5} electronic board:
 - a. LCD display cable from J8 connector.
 - b. Communication connections:
 - MMI communication cable plug from J9
 - USB cable plug from J4
 - Ethernet cable plug from J1
 - c. Field wiring connections:
 - Communication wiring from J10
 - DI wiring from J12
 - DO wiring from J13
 - RTD sensor from J3

This completes replacement of the IMV assembly. Begin startup procedures as detailed in the Startup guide included in this kit. If necessary, follow instructions, located in the user manual, listed under *Additional information*, to restore station configuration files.

3.7 Replacing the μ FLO^{G5} transducer assembly (only)

When replacing either the differential or linear transducer assembly only, the electronic board must be removed and reinstalled on the replacement assembly. This procedure is applicable for either a differential or linear transducer assembly.

1. Follow the procedure detailed in section 3.6.1, *Remove the IMV assembly*, on page 13. Return here when completed.
2. Remove the the μ FLO^{G5} electronic board from the old transducer assembly:
 - a. On the old transducer assembly, remove the cover plate and set aside separately to reinstall on the old transducer assembly after the board has been transferred (Figure 5, *μ FLOG5 assembly, exploded view*, page 11).
 - b. On the old assembly, use a ¼ inch socket driver to remove the six (6) hex standoffs that attach the μ FLO^{G5} electronic board to the transducer housing.
 - c. Lift the board away from the transducer housing carefully. The electronic board to transducer sensor cable is very short, approximately 3 inches. Do not pull the board completely away until the cable is disconnected from the back of the board. Grasp the electronic board to transducer sensor cable at the back of the board and disconnect it.
3. Transfer the electronic board to the replacement transducer assembly:
 - a. On the new transducer assembly, use a phillips screwdriver to remove the four (4) screws that secure the transducer cover plate containing the new transducer information. Remove and set the plate aside.
 - b. Move the electronic board to the new replacement assembly. Attach the electronic board to transducer sensor cable to the connector on the back of the electronic board.
 - c. Carefully feed the excess cable back into the transducer housing, and align the board mounting holes with their respective standoffs.
 - d. Using a ¼ inch socket driver, reinstall the six (6) hex standoffs and tighten.
 - e. Remount the cover plate that came with the new transducer assembly onto the electronic board using a phillips screwdriver.
4. Remount the old cover plate onto the old transducer assembly.
5. Follow the procedure detailed in section 3.6.2, *Reinstall the IMV Assembly*, on page 15 to complete the replacement of the transducer assembly.

4 Considerations outside the scope of this document

4.1 μ FLO^{G5} startup

Now that the spare part or component is properly installed, the flow computer may require additional setup. The μ FLO^{G5} startup guide, included with this kit, addresses startup from installation through setup and operation. For the purposes of this kit, review the entire guide and then begin with the first applicable section for your installation.



DANGER – Serious damage to health/risk to life. Manifold and tubing connection leaks could create a build-up of explosive gases in the immediate vicinity. Power should not be applied before the tubing and connections are leak-free, the area is ventilated, and explosive gases have dissipated.

In some instances, it may be desirable to restore station and configuration files, previously saved, to the flow computer. The user manual listed in the front of this guide under *Additional information*, includes detailed instructions for restoring files.

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