

Liquid level sensor LevelMaster 7100 Upgrade kit

Upgrade to support batteryless floats



Introduction

This guide is designed for typical installations only. Service and maintenance must be performed by personnel knowledgeable of the ABB Totalflow® LevelMaster. Maintenance personnel must also be knowledgeable of local and national codes as they apply to hazardous areas, communication wiring, and electrical wiring.

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IMPORTANT NOTE: This guide does not address any requirements for the removal or installation of product(s) in hazardous (classified) locations. Refer to the installation instructions and local and national electrical codes for installation requirements in hazardous (classified) locations.

Purpose

This guide provides instructions and information for upgrading an existing electronic headboard (2018546-005) and battery-driven (active) floats with the new headboard (2104836-001) and batteryless floats.

Additional information

Additional free publications and the software for the LevelMaster are available for download at www.abb.com/totalflow or by scanning this code:



Document name	Part number
LevelMaster user manual	2018374
LevelMaster startup guide	2103656
MasterLink software version 2.0	2100197-005

For questions that are not answered in this guide or other documentation, or if experiencing issues downloading the software, call a local ABB representative, or call the main office number listed on the back page of this guide.

Assumptions

The following apply to this guide:

- The LevelMaster to be upgraded is installed to measure levels for water, oil or both. The upgrade kit can be used to upgrade the unit for single or dual batteryless float operation.
- MasterLink software version 2.0 is used to configure the upgraded LevelMaster.
- If the LevelMaster is connected to an ABB flow computer or remote controller, the LevelMaster application should already be configured.

1 Safety warning and notes 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.

1.1 Safety conventions



WARNING – Bodily injury/property damage/equipment damage. 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, what to do or not do to avoid the hazard, and what the result would be if not followed.



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



IMPORTANT NOTE: This symbol indicates operator tips, particularly useful information, important information about the product, or to clarify a concept. The signal words "IMPORTANT NOTE" do not indicate a dangerous or harmful situation.

1.2 Potential safety hazards

Installation, commissioning, and maintenance of this equipment must only be conducted by personnel authorized to work on electrical installations, and in accordance with relevant national and local codes.

The LevelMaster operating voltage range is 9 Vdc to 15 Vdc.

There are no hazardous voltages present.

2 Upgrade kit overview

2.1 Upgrade kit contents

The batteryless float upgrade kit (part number 2105820) contains the following:

Table 1: Upgrade kit contents

Qty	Description	Part number	Notes
1	Batteryless float (oil level)	2103766-006	Float Kit part number (includes only floats): 2018392-017
1	Batteryless float (water level)	2103766-007	
1	Electronic headboard	2104836-001	Firmware version 7.0 Required for batteryless floats

2.2 Unpacking and inspecting

Unpack the upgrade kit and inspect for damage and missing or incorrect parts.



IMPORTANT NOTE: If there is any damage to the shipping carton, keep it and the packing materials until the contents are inspected and found to be free of damage.



CAUTION – Equipment damage. A static electric discharge can result in damage to the electronic board. Wear a grounding strap to eliminate static electricity when inspecting or handling the board.

1. Unpack and inspect each float.
2. Unpack and inspect the electronic board.



IMPORTANT NOTES: The new board (2104836-001) has two separate ports for both RS485 and power in contrast with the single port for the older board version (2018546-005).
Make sure the electronic board has two removable terminal connectors for power and the RS485 communication port. These connectors may be needed if the existing connection has a single port.

3. Unpack and inspect optional equipment, if purchased.
4. Check for missing, incorrect, or damaged parts. Contact the ABB Representative to replace missing, incorrect, or damaged parts.

3 Prepare before the upgrade

3.1 Plan for unit access removal and reinstallation

Upgrading the LevelMaster for batteryless float support requires removal of all connections and pulling the LevelMaster out of the tank. Plan for the following:

1. Removal of the unit requires access to the top of the tank. Follow company guidelines and safety procedures to access the sensor.
2. Determine the number of technicians required to remove and reinstall the unit. Removal or reinstallation may require more than one person depending on the length (height of the tank) and weight of the unit.

3.2 Install MasterLink version 2.0

The MasterLink version 2.0 software supports batteryless float configuration and is required for the upgrade. MasterLink version 2.0 is backwards compatible and therefore supports the older electronic boards as well as configuration files.

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- **1 IMPORTANT NOTE:** Installation of the MasterLink version 2.0 does not upgrade an existing MasterLink version. The new version is a new installation independent of the previous version and therefore there will be two separate instances of MasterLink in the same laptop. The new instance will not have the existing configuration files because they are not automatically available in the new installation directory. To continue managing all the installed LevelMasters with MasterLink 2.0, configuration files may be copied to the new installation directory.
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To install:

1. Go to the [Liquid level sensor LCM7100](#) page, click the **Downloads** tab.
 2. Scroll down to locate and select **Software**.
 3. Click the **PDF** icon to download the software.
 4. Install the software on the PC or laptop that will connect to the LevelMaster. Take note of the path of the installed directory.
 5. (Optional) Copy any required data (configuration) file from the older MasterLink installation to the new main installation folder. Data files have the .dat and .tln extensions and reside in the main MasterLink directory by default. The .dat files contain configuration and calibration data. The .tln files contain location files. The location files define the names of the location and the LevelMasters at those locations. The number of configuration or location files depends on the number of units and locations.
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- **1 IMPORTANT NOTE:** If the files from the old MasterLink directory were kept with their default names, they will overwrite files with the same default names in the new MasterLink main folder. To avoid overwriting any default files in the new installation, rename the files being copied or save into another folder.
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3.3 Determine which configuration to use

The new electronic board must be updated to reflect the upgrade. The board can be configured using the existing configuration or using a pre-defined configuration file provided with the MasterLink version 2.0 software.

Determine which configuration to use based on the upgrade scenario:

- Use the existing configuration if available. The configuration file of the LevelMaster contains calibration information for the internal sensor assembly (sensor coil). Since the sensor assembly is not being changed in the upgrade, the calibration data remains the same and it is still applicable to the unit.

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IMPORTANT NOTE: Because the existing configuration corresponds to an electronic board that is different than the new board, the accuracy of the unit will be affected by using an existing file.

- Use a pre-defined (default) configuration file if the existing configuration file cannot be obtained. MasterLink version 2.0 provides configuration files for dual batteryless float operation for different unit lengths. The files for the new electronic board are located in the MasterLink\DefaultDat\7.0 Head board folder. The names of the default files indicate which sensor length they apply to.

3.4 Required tools and materials

The following items are needed to perform the upgrade

Tools and material:

- Phillips screwdriver
- Small slotted screwdriver
- 24 inch pipe wrench
- Wooden blocks or other means to support the sensor on the floor when removed from the tank
- Grounding strap

Cables:

Direct connection to the electronic board is required for configuration and monitoring during the upgrade. The cables and adapters listed in Table 2 (page 7) are used for this connection.

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IMPORTANT NOTES: Different cable adapters and RS485-to-RS232 converter cables are required for each, the new board (part number 2104836-001) and the previous board (part number 2018546-005). Make sure you select the correct cables.



CAUTION – Equipment damage. The RS485-to-RS232 converter cables have 1 or 2 batteries (9 Vdc) which supply power to the boards during direct connection. No additional voltage source is required during direct connection for configuration.

Do not use two batteries to supply power to the new board (part number 2104836-001). The board will be damaged when the supplied power is greater than 15 Vdc (2 fully charged 9 Vdc batteries can supply up to 18 Vdc).

To prevent battery drain when converter cables are not in use, make sure the red wire is removed from the positive terminal contact on the battery holder (Figure 1).

Table 2: Cable and adapters for direct connection to the LevelMaster

Board	Description	Part number	Notes
2104836-001 (New)	Cable adapter	2100250 - 002	Cable end connecting to the board has a 2-position terminal connector for power and a 4-position terminal connector for the communication port (RS485) See Figure 1.
	RS485-to-RS232 Converter cable	2100241 - 005	Contains 1 battery (9 Vdc). See Figure 1.
2018546-005 (Legacy)	Cable adapter	2100250 - 001	Cable end connecting to the board has a single 6-position terminal connector for both power and the communication port.
	RS485-to-RS232 Converter cable	2100241 - 002	Contains 2 batteries (9 Vdc).
Both boards	RS232 to USB converter cable	Third-party manufacturer	Use if connecting to a USB port on a laptop (if legacy RS-232 ports are not available on the laptop)

Figure 1 shows the cable converter and adapters required for connection to the new board (2104836-001).

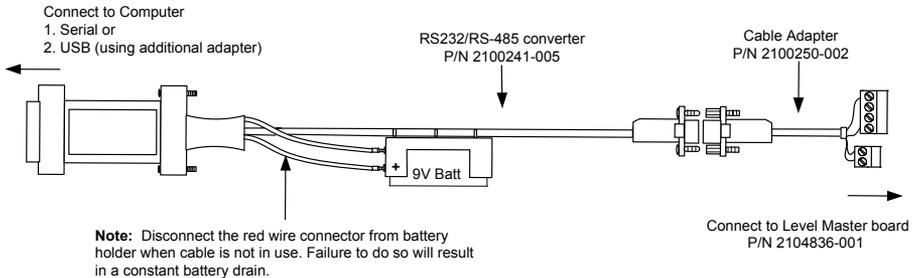


Figure 1: Cables required for connection with new board (P/N 2104836-001)

4 Upgrade procedures

4.1 Remove the sensor from the tank

Removal of the sensor requires removal of power and other connections from the LevelMaster. Devices that may be connected to the LevelMaster may include additional LevelMasters (RS485 bus), flow computers or controllers, an electronic barrier card for hazardous locations. For details on additional connections refer to the LevelMaster user manual (see the Additional information section).

In this procedure the existing electronic board is removed. Make sure it is removed carefully to avoid damage and loss of its configuration. The existing configuration is obtained for use on the new board if retaining sensor calibration data.

Figure 2 shows the top of an installed LevelMaster. Use as a reference for this procedure.

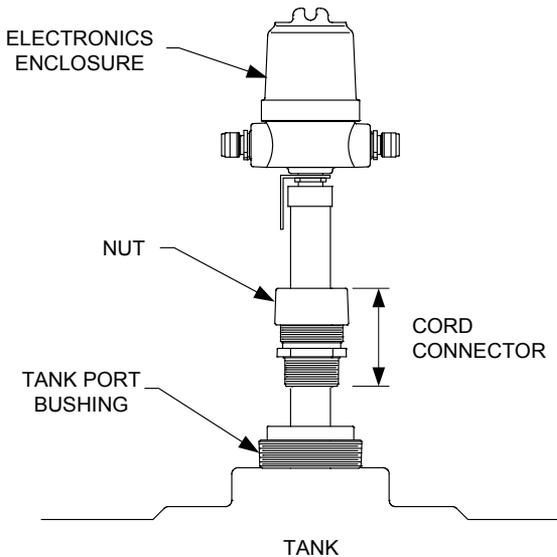


Figure 2: Top of the Level Master

To remove the LevelMaster from the tank:

1. Remove the cover from the electronic enclosure.
2. Use the small slotted screwdriver to remove the power and communication connector.

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IMPORTANT NOTE: There may be one or two connectors used to connect to the existing board. If using a single connector rewiring to two connectors will be required to connect to the new board. The communication pinout is also different on the new board.

3. Identify which wires connect to each connector pin. If not color coded, wires may be labeled or marked for easy identification.
 - a. Identify or label the two wires used for power (+V, -V).
 - b. Identify or label the wire pairs used for communication (+T, -T, +R, -R).

4. Remove the wires from the connector(s). If two connectors were removed, keep for rewire.
5. Hold the existing board by the edges, and pull it out slowly.
6. Unplug the 16-pin connector at the bottom of the board to detach the board from the sensor assembly inside the casing.
7. Place the removed board in a safe place (protect from static electricity). Connection to the board is required to obtain configuration.
8. Unscrew the conduit to detach from enclosure. Leave wire ends hanging.
9. Replace the cover on the electronics enclosure.
10. Loosen the nut on the cord connector.

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IMPORTANT NOTE: There should be no cord connector on high pressure units.

11. Unscrew the tank port bushing.
12. Remove the LevelMaster from the tank and lay it on the ground using the wooden blocks underneath for support (If no wooden blocks are available use any stable and even support to keep the unit from rotating while in horizontal position).
13. Proceed to replace the existing floats.

4.2 Replace the existing floats

To replace existing floats:

1. Remove the float clamp from the bottom of the casing.
2. Slide the float(s) off the bottom of the casing.
3. Slide the new float(s) onto the bottom of the casing. If using two floats, install in the correct order (Figure 3).

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IMPORTANT NOTE: Position the float(s) correctly so that the text on the float label would be in the upright position when the LevelMaster is inserted back into the tank.

- a. Install the oil level float first.
- b. Install the water level float second.

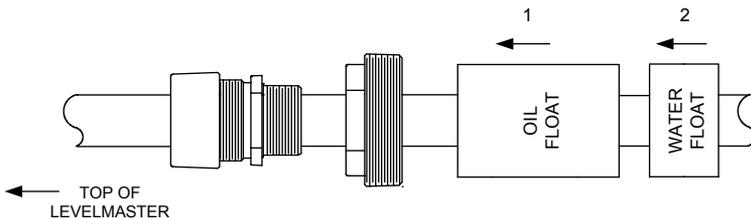


Figure 3: Positioning the floats for dual float configuration

4. Slide the float clamp back onto the bottom of the casing.
5. Use a Phillips screwdriver to tighten the clamp 1 inch above the bottom of the casing. Considerable force may be required to lock the clamp on tight.

4.3 Obtain existing configuration file

With this procedure use the MasterLink software to view or obtain the configuration of the unit if the configuration file was not previously saved. It is assumed that the existing board removed in section 4.1 is in working condition. If the board is defective or communication with it is no longer possible, proceed to section 4.4, *Insert the new electronic board*.

4.3.1 Connect to the existing board

To connect use the following (see Table 2 in section 3.4, *Required tools and materials* in page 6, for details):

- The RS485 to RS232 converter (2100241 - 002) with the cable adapter (2100250 – 001, the cable with a single terminal connector at one end)
- If using an USB port on the laptop, use the serial-to-USB adapter.



IMPORTANT NOTE: Make sure to connect the positive terminal (red wire) to the positive contact on the battery holder.

To obtain the configuration saved on the board:

1. Connect the laptop directly to the electronic board using the correct cable and adapters for the board.
2. Start the MasterLink software.
3. Click the Comm. Port drop down list.
4. Select the laptop communication port used.
5. Leave Baud Rate at 9600. It assumed the board was at the default baud rate. If not set at the default rate, select the other option (1200).
6. Click **Setup LevelMaster**.
7. Select **I have only one LevelMaster connected to communication port and I want to set it up**.
8. Click Setup **LevelMaster**.
9. Observe the messages displayed on the monitor screen. Verify that the communication is successful. The screen should indicate the number of tries and 100% success.
10. When prompted to add the LevelMaster to the list, click **No**.
11. If planning to use a generic (default) configuration file, proceed to view and take note of the configuration in section 4.3.2, *View configuration*.
12. If planning to use the existing configuration for the new board, proceed to save the configuration in section 4.3.3, *Save the configuration*.

4.3.2 View configuration

If not downloading an existing configuration, the LevelMaster must be configured manually to match the configuration in the existing board. Use this procedure to obtain the basic configuration values for the unit.

To view the configuration:

1. Select **Add Advanced Setup tabs**.
2. Select the **More Items** tab. The screen displays the Data from LevelMaster.
3. Under the Basic Items category locate the following parameters and take note of the values:

- a. Sensor name
 - b. Sensor unit number (or sensor or LevelMaster ID)
 - c. Baud Rate
 - d. Coil length (sensor assembly length in inches)
4. Determine the RS485 bus termination configuration by checking the positions of the jumpers on JP1 on the board (Figure 4):
- a. Pins 5-6 and 9-10 are jumpered (factory default). The unit is an intermediate sensor on the bus.
 - b. Pins 5-6, 7-8, and 9-10 are jumpered. The unit is the only sensor or the last sensor on the bus.

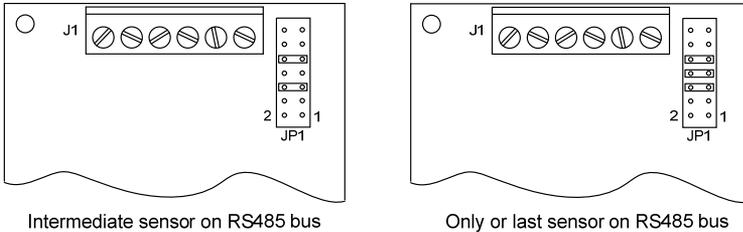


Figure 4: RS485 termination

4.3.3 Save the configuration

To save the configuration in the laptop:

1. Select the **Upload/Download** tab.
2. Under Read data from the LevelMaster and save them to file, use the default path and file name displayed or select a different path and/or user-defined file name (Ensure the file keeps the .dat extension).

1 **IMPORTANT NOTE:** The default path for the saved file depends on the MasterLink version used. The files are automatically saved in the main installation directory of each version. Make sure to take note of the name of the file and the location chosen.

3. Click **Read and Save Data to File**.
4. Click **OK** when saving the configuration is complete.
5. Disconnect the laptop from the board.

4.4 Insert the new electronic board

This procedure connects the electronic board to the sensor assembly and positions the board inside the enclosure. Make sure that the communication and power ports are accessible for local connection from the laptop for configuration.

To install the new board:

1. Remove the cover from the electronic enclosure.
2. Remove the new board from the bag.
3. With the small slotted screwdriver remove the terminal connectors from the power and communication (RS485) ports (Figure 5). Do not lose the connectors, they will be needed for final wiring of the unit when placed back in the tank.

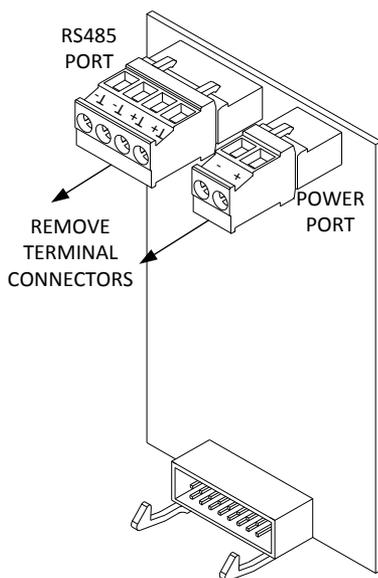


Figure 5: Removing terminal connectors

4. Plug the 16-pin connector from the sensor assembly into the new electronic board. The connector is keyed so it will only plug in one way. Push some of the excess cable back down through the bottom of the sensor assembly while sliding the electronic board back into position. Allow a small cable loop to fold back towards the top of the enclosure.
5. Brace the electronic board inside the housing by using the yellow fiberglass tab inserted into the enclosure.
6. Bend the tab gently into a semicircle using the thumb and forefinger, making sure the apex of the arch is placed against the board while the ends of the tab are braced to the inside of the housing.
7. Proceed to configure the board.

4.5 Configure the new board

MasterLink version 2.0 is required to configure the new board.

4.5.1 Connect to the new board

To connect use the following (see Table 2 in section 3.4, *Required tools and materials*, in page 6, for details):

- The RS485 to RS232 converter (2100241 – 005) with the cable adapter (2100250 – 002, the cable with two separate terminal connectors at one end)
- If using an USB port on the laptop, use the serial-to-USB adapter.



IMPORTANT NOTE: Make sure to connect the positive terminal (red wire) to the positive contact on the battery holder.

To configure the new board:

1. Connect the laptop directly to the electronic board using the correct cable and adapters for the board.
2. Start the MasterLink version 2.0 software.
3. Click the Comm. Port drop down list.
4. Select the laptop communication port used.
 1. Leave Baud Rate at 9600 (factory default).
 2. Click **Setup LevelMaster**.
 3. Select **I have only one LevelMaster connected to communication port and I want to set it up**.
 4. Click Setup **LevelMaster**.
 5. Observe the messages displayed on the monitor screen. Verify that the communication is successful. The screen should indicate the number of tries and 100% success.
 6. When prompted to add the LevelMaster to the list, click **No**. The unit can be added later.
 7. If using the existing configuration, proceed to section 4.5.2, *Configure the new electronic board with the existing configuration*.
 8. If using a default configuration file, proceed to section 4.5.3, *Configure the new electronic board with a default configuration*.

4.5.2 Configure the new electronic board with the existing configuration

Use this procedure if configuring the new board with the existing configuration file saved in section 4.3.3, *Save the configuration*.

In this procedure the existing configuration is downloaded to the new board. The ID, baud rate, and calibration data from the previous board are saved in the unit. The float configuration must be changed to reflect the batteryless floats.

To download the existing configuration:

1. Select the **Upload/Download** tab.
2. Under Send data to the LevelMaster from the file, click the browse ([...]) button.
3. At the browser, navigate to the folder where the existing configuration file was saved (for example, C:\Program Files (x86)\ABB\MasterLink).
4. Locate and select the configuration file.
5. Click **Open**.
6. Click **Download Data to LevelMaster**.
7. Click **OK** when download is complete.
8. Click the **Setup** tab.
9. Under Make Hardware change, click **Hardware change**.
10. In the Select category drop down list, select Float Configuration.
11. Click **Next**.
12. Select Float mode Dual Batteryless.
13. Click **Next**.
14. Click **Next** again to confirm that the float configuration will be changed.
15. Click **OK** when configuration change is complete.

16. Click the Monitor tab.



IMPORTANT NOTE: Before the configuration to batteryless floats is completed, the monitor screen displays errors because the existing configuration does not support or recognize the floats.

17. If errors are displayed, clear the errors and make sure no additional errors are displayed. If errors do not clear see section 5, *Troubleshooting*.
18. If errors cleared, verify that the level and temperature readings display expected values based on the float position and temperature. See section 4.6, *Verify measurements*.
19. If the LevelMaster is the only unit installed or it is the last unit on a RS485 bus, proceed to section 4.5.4, *Configure RS485 termination*.

4.5.3 Configure the new electronic board with a default configuration

Use this procedure if configuring the new board with one of the default files included with the MasterLink software. Using the default file provides only calibration data for the specific length of the unit. Other basic parameters must be manually configured to match the existing configuration. Use the information obtained in section 4.3.2, *View configuration*.

To configure:

1. Click the Upload/Download tab.
2. Under Send data to the LevelMaster option, click Browse [...].
3. At the browser, navigate to the default files folder applicable to the new board. For example, C:\Program Files (x86)\ABB\MasterLink\DefaultDat\7.0 Head board.
4. Locate the file for the correct length of sensor and click **Open**. For example, for a 20 foot sensor, select the "Dual_20ft_batteryless.dat" file (Figure 6).

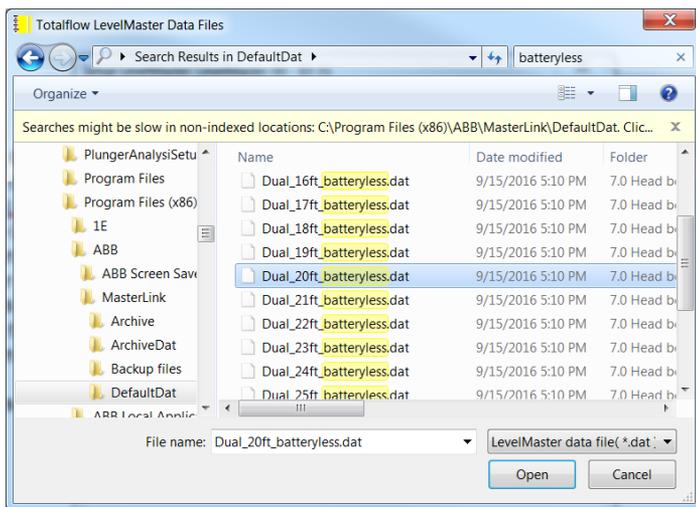


Figure 6: Locating the correct configuration file

5. Under Send Data to the LevelMaster from file, verify that the file path displays correctly (Figure 7).

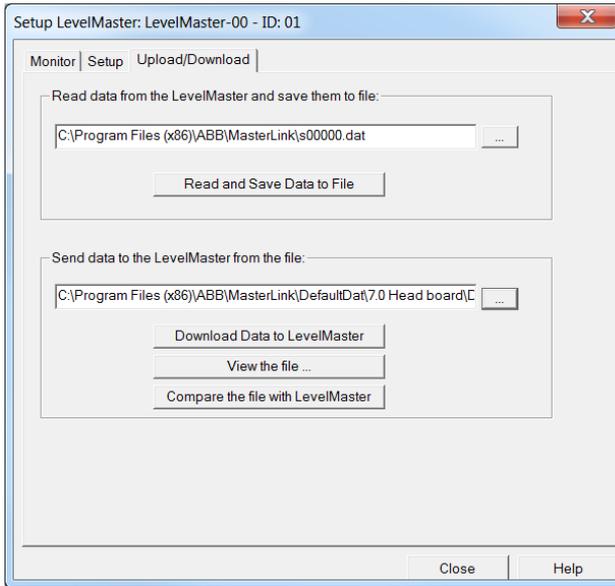


Figure 7: Downloading correct configuration to the LevelMaster

6. Click **Download Data to LevelMaster**.
7. Click **OK** when the download is complete.
8. Click the **Setup** tab (Figure 8).

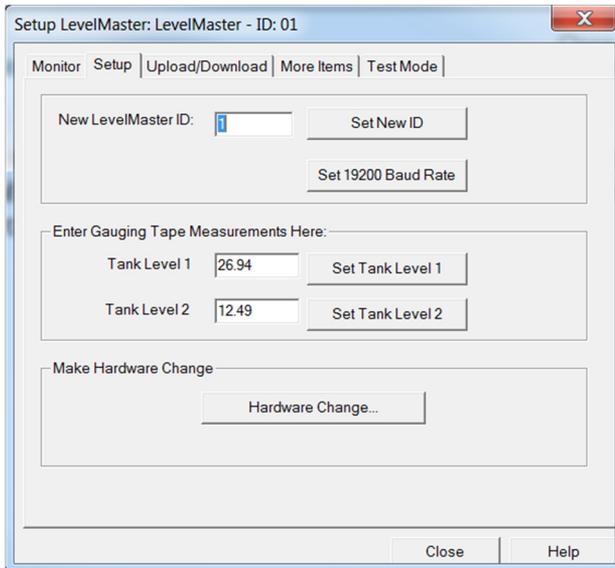


Figure 8: Configure the ID and Baud Rate

9. Change the LevelMaster ID by typing the correct ID into the New LevelMaster ID field and clicking **Set New ID**.
10. If needing to set another Baud rate, click **Set <...>Baud Rate**. The next applicable value for the baud rate is the one shown on the button. For example, if the value shown is 19200, clicking on the button, will set the rate to 19200.

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IMPORTANT NOTES:

- Baud rates for units connected to a RS485 bus must match.
- Power to the unit must be reset for the new baud rate to take effect.
- Take note of the rate defined. The new rate is needed to connect to the unit again and must be selected prior to establishing communication.

11. From the monitor screen verify that the level and temperature readings display expected values based on the float position and temperature. See section 4.6, *Verify measurements*.
12. If the LevelMaster is the only unit installed, or it is the last unit on a RS485 bus proceed to section 4.5.4, *Configure RS485 termination*.

4.5.4 Configure RS485 termination

Use this procedure if the LevelMaster is the only unit or the last unit on a RS485 bus. Termination configuration can only be done on software (no jumpers are available on the new board).

1. Click on the **Monitor** tab and select **Add Advanced Setup tabs**.
2. Click the **More items** tab.
3. Select **Show memory map**.
4. Scroll down to locate the 844 memory address. The description of this memory location is RS485 bus termination (Figure 9).

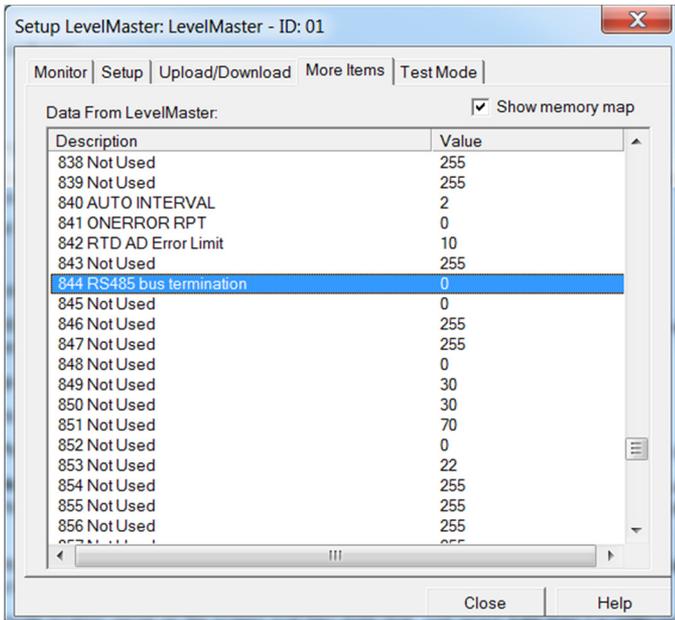


Figure 9: RS485 termination

5. Double-click on RS485 bus termination.
6. When the edit box displays (Figure 10), if the value is 0, change the value to one (1). The value of 1 configures the unit as the last sensor on the RS485 bus.

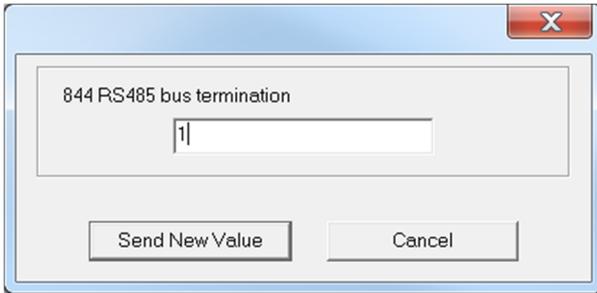


Figure 10: Configure the LevelMaster to terminate RS485 bus

7. Click **Send New Value**.
8. Verify that the RS485 termination address is now set to 1 (Figure 11).

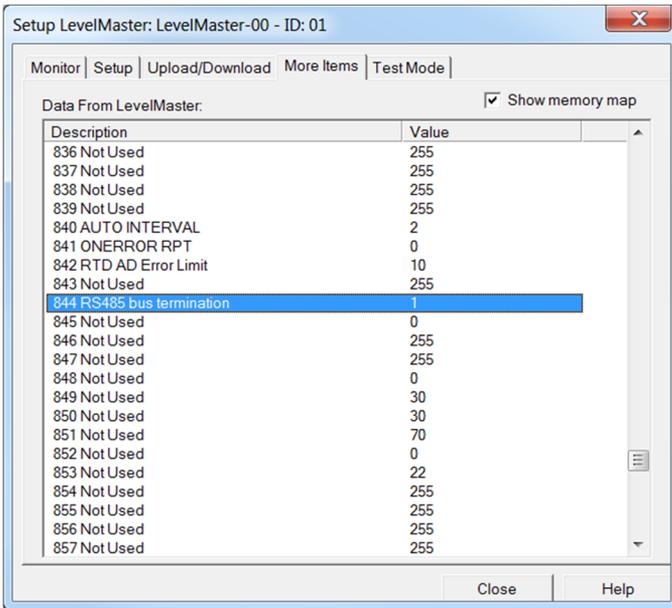


Figure 11: RS485 termination for the last sensor



IMPORTANT NOTE: The RS485 bus termination value for intermediate LevelMasters on the RS485 bus should be 0. Units are configured as intermediate sensors by default.

4.6 Verify measurements

Before reinstalling the tank, make sure that the new electronic board is functioning correctly and the sensor is able to detect and measure the temperature and the float

positions. There should not be errors displayed and the monitor tab should display the correct level measurement.

To verify that measurements are correct:

1. Click the Monitor tab to observe the temperature and level measurements using the newly downloaded setup information.
2. Verify that the measurements reflect expected values:
 - a. The temperature should be approximately the temperature at the location of the LevelMaster. If configuring the unit outside, then the ambient temperature should display.
 - b. The level(s) should indicate the position of the float(s).
3. Slide the floats to several positions on the sensor and verify that the screen updates and reflects the correct level for the floats.
4. Proceed to ground the unit if required (section 4.7) or reinstall the unit as described in section 4.8, *Reinstall the LevelMaster into the tank*.

4.7 Ground the electronic board



WARNING – Bodily injury/ property damage. Grounding the LevelMaster 7100 in a hazardous location must meet the requirements as specified in the National Electrical Code (NEC) or the Canadian Electrical Code (CEC).

If an earth ground is available, ground the electronic board as follows:

1. Connect the EARTH connector to the ground connector as shown in Figure 12.

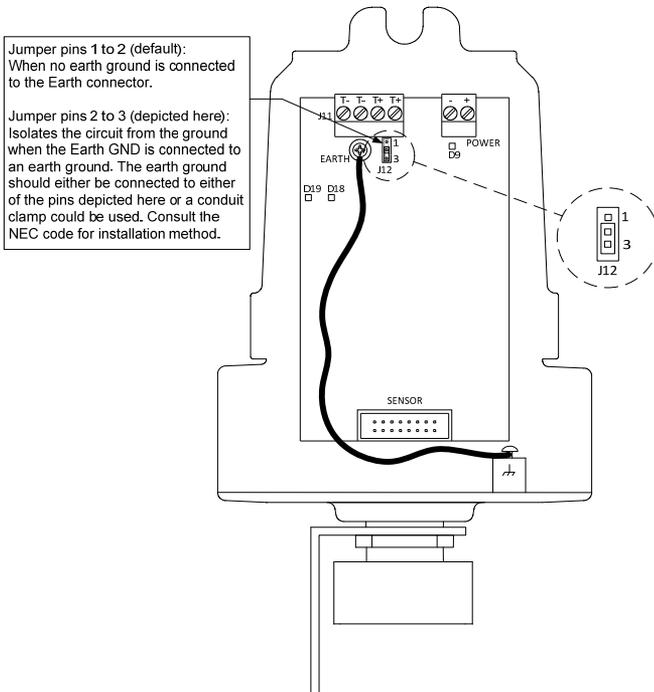


Figure 12: Grounding the electronic board

2. Jumper pins 2 and 3 on J12.

4.8 Reinstall the LevelMaster into the tank

For additional details and scenarios for reinstalling the sensor into the tank refer to the LevelMaster user manual (see the Additional Information section).

To reinstall the unit:

1. Secure the cover back on the electronic enclosure.
2. Lift the unit from the floor and prepare to reinsert it into the tank.
3. Once positioned for reinsertion, slowly lower the LevelMaster down through the hole in the tank. Make sure that the unit is vertical until it is resting on the bottom. If there is sludge at the bottom, work the unit up and down a few times to reach the bottom.
4. Screw the tank port bushing into the tank port opening.
5. Tighten the nut on the cord connector.
6. Plumb the cable or conduit into the electronics enclosure for the communications and power wiring.
7. Proceed to restore the field wiring next.

4.9 Restore field wiring

The new electronic headboard has two separate ports for communication and power in contrast with the single port on the previous board (Figure 13).

If a single connector was wired to connect to the previous board, replace it with the two connectors that came with the new board and were removed in section 4.4, *Insert the new electronic board*.

If two connectors were already in use, rewire the connector for communication. The pinout for RS485 in the previous board does not match that of the new board.

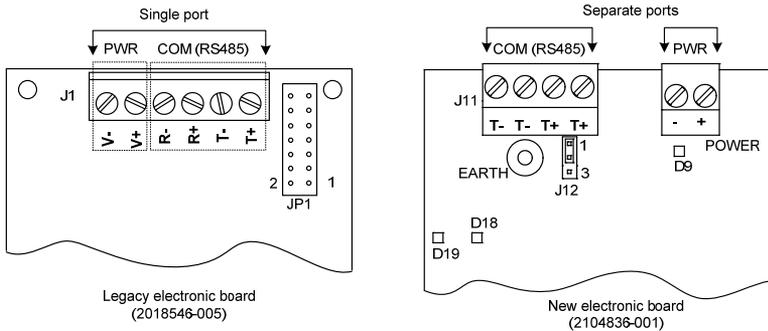


Figure 13: Electronic ports pinouts

For additional details on the connections to other ABB equipment refer to the LevelMaster user manual (see Additional Information section).

4.9.1 Wiring for power

To rewire for power:

1. Remove the cover from the enclosure.
2. Loosen the screws on the power connector (2-position terminal connector).



CAUTION – Equipment damage. The LevelMaster can be powered from the serial (COM) ports on an ABB Totalflow flow computer or remote controller. The output voltage at these ports is dependent upon the external power supply connected to the device.

Before connecting the LevelMaster to these ports, ensure that the flow computer or remote controller input voltage does not exceed 15 Vdc.

Connecting the LevelMaster to devices with an input power larger than 15 Vdc (for example devices powered by 24 Vdc voltage sources) will result in damage to the LevelMaster because the output power from the serial port (VOUT) will also be larger than 15 Vdc. Use an independent power source if unable to power the unit from the flow computer or controller.

3. Insert the wires in the power connector observing correct polarity (Figure 14).
 - a. Connect to flow computer/remote controller COM port if VOUT is 12 Vdc.
 - b. Connect to alternate power source if VOUT at the COM port is greater than 12 Vdc.

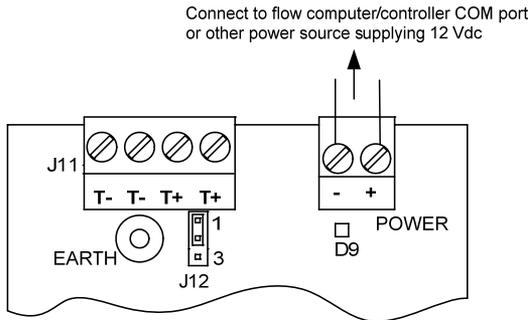


Figure 14: Wiring for power

4. Insert the power connector back into the board.
5. Verify that the power LED (labeled D9 and located below the power connector) is not lit. If it is lit, it indicates that the wrong polarity has been used and it must be rewired to correct polarity.

4.9.2 Wiring for communication

To wire for communication:

1. Loosen the screws on the communication connector (4-position terminal connector).
2. Insert the wires in the connector observing the pinout.
 - a. If the unit is the only unit connected to a flow computer or remote controller wire as shown in Figure 15.

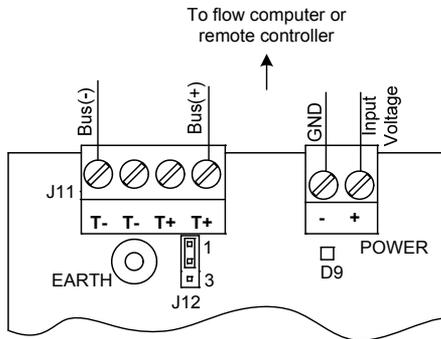


Figure 15: Wiring for communication: new board as the only sensor

- b. If the unit is connected to a multiple-unit RS485 bus, wire as shown in Figure 16, Figure 17 (page 22) or Figure 18 (page 22).

i **IMPORTANT NOTE:** Review the Phoenix Contact® terminal connection specifications for acceptable wire gauge and type when connecting multiple wires to a single contact point. There are limits defined for the wire conductors cross section area based on whether stranded or solid wires are used.

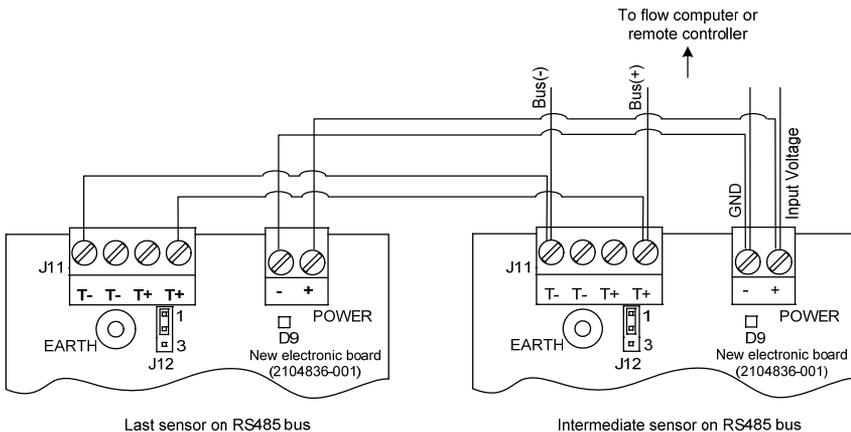


Figure 16: RS485 bus connections for same board types

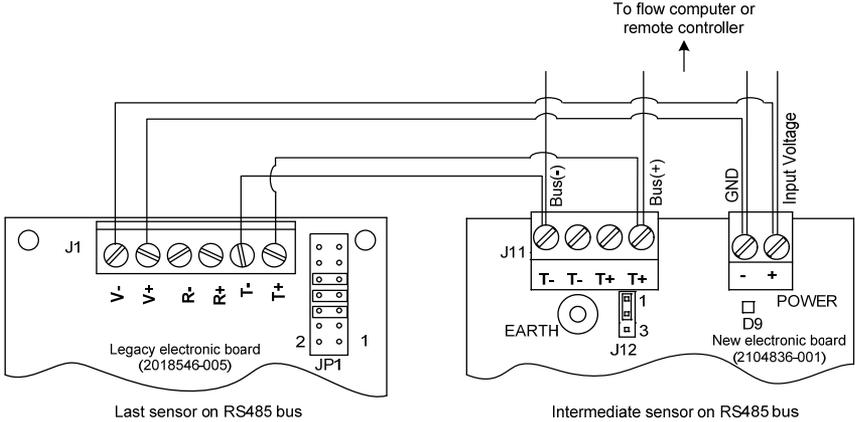


Figure 17: Connections of mixed board types: new board as intermediate sensor

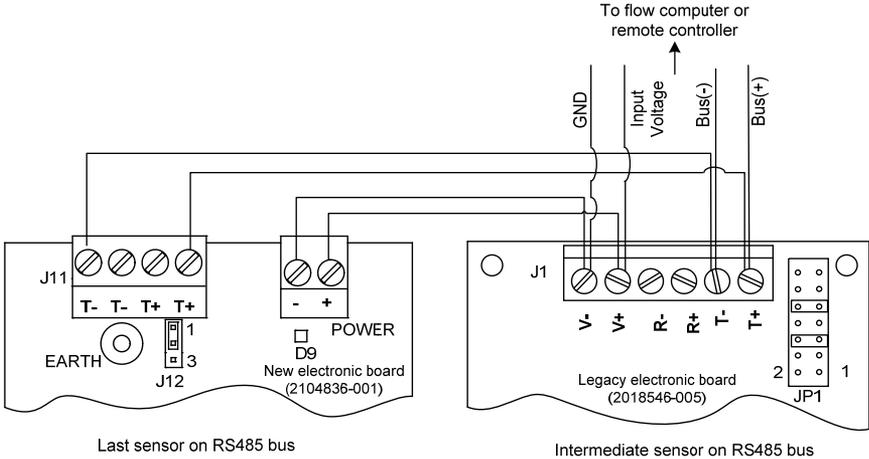


Figure 18: Connection of mixed board types: new board as last sensor

3. Verify that the communication LEDs (D18 and D19) lit up intermittently as the unit receives and transmits signals on the communication port. If these LEDs do not lit up, check the wiring.

4.10 Verify installation using PCCU

If the LevelMaster is connected to an ABB Totalflow flow computer or remote controller, verify that the LevelMaster communication interface is able to detect the unit and that the correct measurements are being displayed.

To verify from PCCU:

1. Start PCCU.
2. Connect to the flow computer or remote controller.
3. On the tree view, click on **LevelMaster**.

4. Select the tank tab. For example Tank1 tab. The tank measurements, sample time stamp, poll and error counts should display (Figure 19).

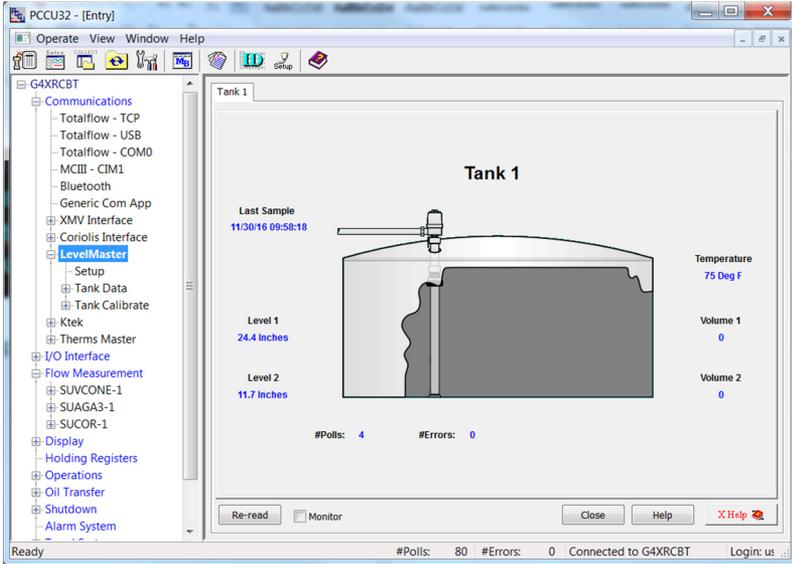


Figure 19: Verify sensor measurements from PCCU

5. Verify that the temperature measurement is the expected value. It must reflect the temperature in the tank.
6. Verify that the Level measurements display. If level measurement do not display correctly, see section 5.2, *Errors observed on PCCU*.

5 Troubleshooting

Review the common error messages and solutions included in this section. If unable to resolve problems after the upgrade, refer to the LevelMaster user manual or see the contact information in the back of this guide to call for support.

5.1 Errors observed on the MasterLink

The following are common errors displayed when using the MasterLink software to connect with the LevelMaster.

5.1.1 Communication when using MasterLink (local connection)

The errors described in Table 3 display when communication cannot be established with the LevelMaster.

Table 3: Communication errors on MasterLink

Description	Cause	Solution
Device did not respond		Select correct comm port and baud rate
	MasterLink is unable to establish communication with the unit for the following reasons:	Verify wiring.
	Incorrect port (Comm. Port) selected	Check cabling:
	Incorrect baud rate selected	Verify converter cable and adaptors are securely attached.
	Faulty cabling	Verify batteries on converter cable are charged and connected correctly (positive voltage terminal must be connected to red wire)
	USB port not assigned to virtual COM port on laptop	Install drivers for the serial-to-USB adapter and verify that a virtual serial port is assigned. USB ports are usually identified as COM 4 or higher. Legacy serial ports are normally assigned COM3 or lower.
The following message is displayed: "The COM port you selected does not exist or is used by another application"	MasterLink did not find the laptop communication port to communicate with.	On the main MasterLink screen: Make sure the com port is detected Select the correct port.

5.1.2 Measurement errors displayed by MasterLink

The errors described in Table 4 display on the monitor tab.

Table 4: Measurement errors on MasterLink

Description	Cause	Solution
Incorrect Tank Level measurement (temperature reading is correct) Error code= 30, Warn code= 0 Analog to digital converter saturation, gain set too high	Incorrect float configuration (wrong configuration chosen or wrong default file downloaded)	Select Setup tab, select Hardware change, select correct float configuration

Description	Cause	Solution
Error code = 1111, Warn code = 0 Float (1 or 2): Detection of broken primary coil Broken primary coil No temperature reading	Electronic board is not communicating with the sensor assembly Defective sensor assembly	Connect the board to the sensor assembly or verify that the connector is properly attached. Replace sensor

5.2 Errors observed on PCCU

The following errors are displayed on the LevelMaster application screens on PCCU.

5.2.1 Communication errors displayed by the LevelMaster application

The errors described in Table 5 display when the RS485 connection between the LevelMaster and a flow computer or remote controller is not working.

Table 5: Communication errors on the LevelMaster application (PCCU)

Description	Cause	Solution
Measurements (Level 1 and Level 2, and Temperature) display a value of -1 and there are # Errors displayed. The number of errors increases with the poll count (#Polls).	Incorrect wiring Faulty wiring or poor contact	Verify pinouts, correct wiring or ensure wires are inserted securely in the connectors (tighten terminal connector screws to ensure there are no loose wires).

5.2.2 Measurement errors displayed by the LevelMaster application

The errors described in Table 6 display on the LevelMaster Tank <number> tab. If multiple tanks are configured under the LevelMaster application, select the tab corresponding to the LevelMaster being upgraded. The screen defaults to Tank1.

Table 6: Measurement errors on the LevelMaster application (PCCU)

Description	Cause	Solution
Incorrect level or erratic level measurements	Incorrect default file used. The default file length does not match the actual sensor length.	Locate the default file for the length of the unit and download the configuration. Click Re-read to verify the new configuration yields correct measurements.
Measurements (Temperature, Level 1 and Level 2) display a value of 0. Error: 1111 may display on the screen (Figure 20)	The electronic board is not communicating with the sensor assembly. No measurement data available. This may be due to a faulty connection, faulty cable, or failure of the sensor assembly. Polls or requests are issued from the LevelMaster application to the unit successfully, but correct measurements are not received back.	Ensure the electronic board sensor port (16-pin port) is connected to the sensor assembly cable. Ensure the cable connector has snapped into place and is securely attached. Click Re-read to verify the problem is cleared.

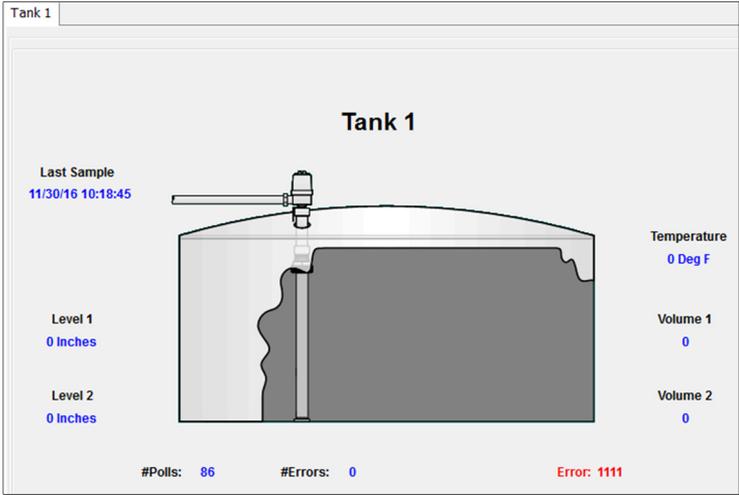


Figure 20: Measurement errors

Notes:

Contact us

**ABB Inc.
Measurement & Analytics**

Main Office
7051 Industrial Blvd.
Bartlesville, OK 74006

USA

Tel: +1 918 338 4888

+1 800 442 3097

Fax: +1 918 338 4699

**ABB Inc.
Measurement & Analytics**

Sales Office
3700 W Sam Houston Pkwy South
Suite 600
Houston, TX 77042

USA

Tel: +1 713 587 8000

Fax: +1 713 266 4335

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