1218CT Fuel Management System Translator Kit
Installation, Operation, and Maintenance Instructions

The 1218CT Fuel Management System Translator Kit is designed as an add-on to the 1218C Electronic Tank Gauge (also referred to as the 1218C Console), providing an interface between the 1218C Console and any fuel management system (FMS) that utilizes TLS protocol. This kit will include all electrical components and housings required to power the 1218CT Communication Module using the same power source already installed for the 1218C Console. The 1218CT is capable of receiving commands from any FMS communicating with TLS protocol and responding with live or historic data from the 1218C Console in real time.

⚠️ **Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.**

Contents

IMPORTANT: Not approved for use in explosive atmosphere locations.

IMPORTANT: Install in accordance with all applicable local, state and federal regulations.

IMPORTANT: Never use with highly flammable liquids as defined by OSHA/GHS.

Description

The 1218CT Fuel Management System Translator Kit contains two modules, the 1218CT Communication Module and the 1218CT Power Converter Module, along with assembly components to be used for installation. Both modules are intended to be installed in an indoor or outdoor non-hazardous location.
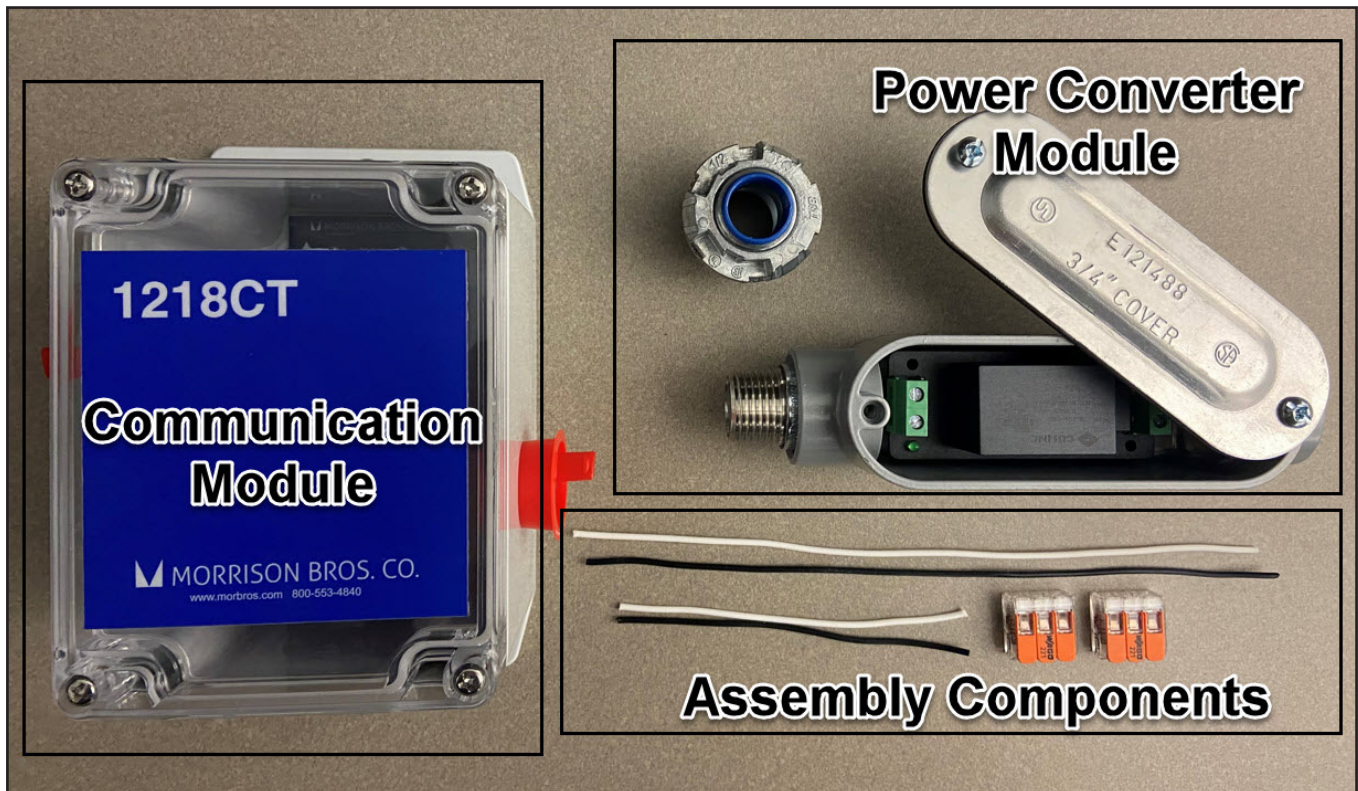

Figure 1: Fuel Management System Translator Kit Components

All components included with the Fuel Management System Translator Kit listed below:

1218CT Communication Module
- Communication Module enclosure with circuit board inside

1218CT Power Converter Module
- Conduit body assembly
- AC/DC converter
- Conduit hub

Assembly Components
- (2) Wago 3-position connectors
- (2) 4-inch lengths of conductor one white and one black
- (2) 8-inch lengths of conductor one white and one black

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1218CT Communication Module

Environment

Operating temperature -40°F to 140°F (-40°C to 60°C) to 100% humidity

Enclosure

NEMA 4X indoor/outdoor weather protected (non-hazardous location only)

Wiring

Maximum wiring distance between the 1218CT Communication Module and the 1218C Console is 1,000 ft.
Note: Shielded ethernet cable is required (not supplied) for wiring between the 1218CT and 1218C Console.

Maximum wiring distance between the 1218CT Communication Module and the FMS is 50 ft.
Note: Shielded 3 conductor cable required (not supplied), 18-24 AWG conductor recommended. Do not use twisted pair cable.

Input Voltage

5 VDC from Power Converter Module

TLS Protocol Supported Commands
- In-Tank Inventory Report (i20100)
- In-Tank Delivery Report (i20200)
- In-Tank Status Report (i20500)
- In-Tank Alarm History Report (i20600)

1218CT Power Converter Module

Environment

Operating temperature -40°F to 140°F (-40°C to 60°C) to 100% humidity

Enclosure

NEMA 4X indoor/outdoor weather protected (non-hazardous location only)

Wiring

4 conductors included in the kit are intended to be used for Power Converter Module installation.
Note: If replaced, 18AWG conductor is recommended.

Input Voltage

Nominal Input Voltage: 100 – 240 VAC, Line-to-Neutral

Output Voltage

5 VDC

⚠️ **WARNINGS**

- Any modification of this unit beyond what is outlined in this instruction will void product warranty.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Install in accordance with all applicable local, state, and federal regulations and codes.
- In the event of malfunction, remove from service immediately and contact Morrison Bros. Customer Service.

Power Coverter Module

Mounting

1. The Power Converter Module should be installed directly to the bottom of the 1218C Console using the H050-TB conduit hub provided in the kit to secure the module in place. This module should be installed in one of the 1/2-inch conduit openings, shown in Figure 2.

IMPORTANT NOTE: Only the 1218CT power and communications conductors are to be routed through the module. Use a junction tee above the module to divert all other conductors (i.e., AC power, ethernet, and relay outputs). If a junction tee is used, the 4 conductors included in the kit may be too short for installation and may need to be replaced.

Figure 2: 1/2-inch conduit openings

2. Ensure the conduit body cover is facing outwards when completing the installation, this is important for later steps.

Wiring
1218C Console Preparation Steps

⚠️ **WARNING**

- Shut off the AC power to the 1218C Console at the breaker before proceeding with wiring. Failure to do so may result in injury or death.

1. Open the front cover of the 1218C Console by releasing the two cover latches and swinging the cover open.
2. Remove and retain the two screws holding the shield for the Facilities section in place.
3. Remove and retain the shield.

1218C Power Converter Module Preparation Steps
1. Loosen the two screws on the conduit body and remove and retain the conduit body cover, along with the screws.
2. Take the AC/DC converter out of the conduit body and remove the packaging.

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Wiring Steps

Note: For steps 1-12 please refer to the Power Converter Module wiring diagram shown in Figure 3.

1. On the 1218C Console's interface board, locate the board's input power connecter and disconnect the mains line/hot wire (black) from the left-most position of the connector.
2. Strip the mains line/hot wire 11mm (1/2 inch) if not already stripped sufficiently. Use the Wago 3-position connector included in the kit as reference, shown in Figure 4.
3. Flip the first lever open on the Wago 3-position connector and insert the mains line/hot wire into the connector and close the lever, ensuring the wire is secured properly.
4. Locate the two black wires that were included in the kit and strip one end of the 4-inch wire approximately 11mm (1/2 inch). Flip the second lever open, insert the stripped wire into the connecter, then close the lever ensuring the wire is secured properly.
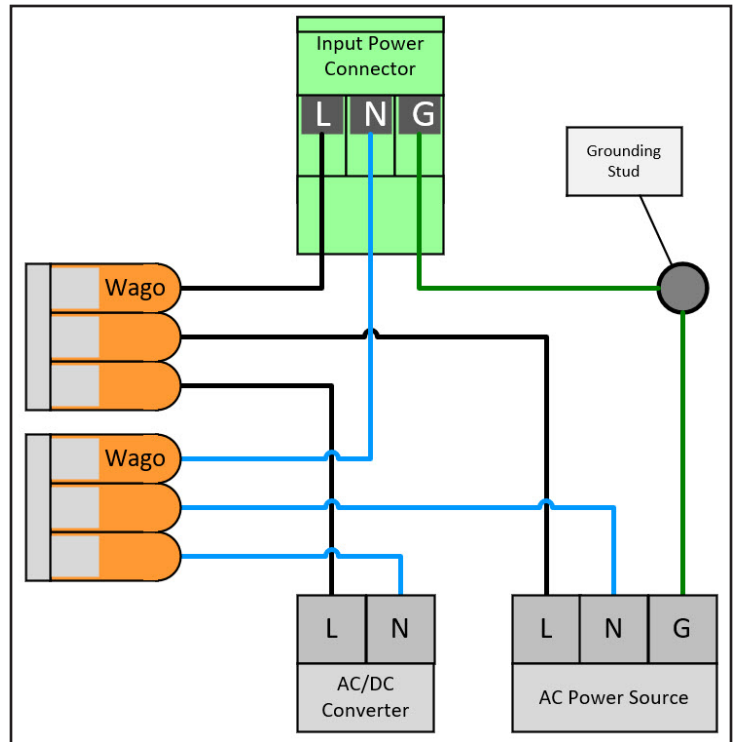

Figure 3: Power Converter Module Wiring Diagram

Figure 4: 5mm (approximately ¼ inch) stripped and 1218C input power connector connection.

5. Strip approximately 5mm (1/4 inch) off the other end of the 4-inch black wire and connect it to the line/hot pin on board's input power connector, the left-most position.
6. Next, strip the 8-inch wire approximately 11mm (1/2 inch). Flip the third lever open, insert the stripped wire into the connecter, then close the lever ensuring the wire is secured properly.
7. Back at the 1218C board's input power connector, disconnect the mains neutral wire (white) from the middle position.
8. Strip the mains neutral wire 11mm (1/2 inch) if not already stripped sufficiently.
9. Locate the second Wago connector and flip the first lever open. Insert the mains neutral wire into the connector and close the lever, ensuring the wire is secured properly.
10. Locate the two white wires that were included in the kit and strip one end of the 4-inch wire approximately 11mm (1/2 inch). Flip the second lever open, insert the stripped wire into the connecter, then close the lever ensuring the wire is secured properly.

Figure 5: 5mm (approximately ¼ inch) stripped and 1218C input power connector connection.

11. Next, strip the 8-inch white wire approximately 11mm (1/2 inch). Flip the third lever open, insert the stripped wire into the connecter, then close the lever ensuring the wire is secured properly.
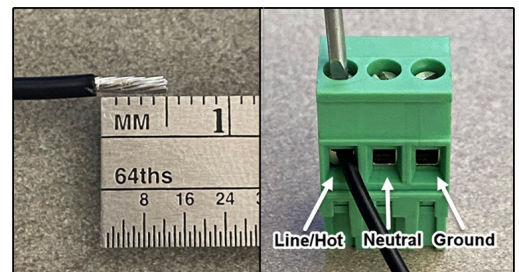12. Strip 5mm (1/4 inch) off both of the remaining 8-inch wires that are secured in the Wago connector.

13. Locate the shielded ethernet cable to be used to wire the 1218C to the Communication Module.
14. Carefully strip one end of the ethernet cable approximately 12 inches, ensuring none of the twisted pair conductors are damaged in this process.
    Note: If a junction tee was required for the conduit mounting procedure above, the strip length for the ethernet cable will be longer.
15. Next, remove the drain wire and the shielding by cutting it off at the base of the stripped ethernet cable.
16. Lead the stripped end of the ethernet cable through the opening in the bottom of the 1218CT Power Converter Module, continue leading only the blue and green twisted pairs through the bottom of the 1218C console, while leading the orange and brown twisted pairs outside of the front opening in the middle of the conduit body, as shown in Figure 6.
17. Cut the orange and brown twisted pairs, leaving approximately 3-4 inches and strip each pair 5mm (1/4 inch).
18. Lead both of the 8-inch white and black wires through the opening in the bottom of the 1218C Console that the 1218CT Power Converter Module is secured to. Wire them to the AC/DC converter, ensuring that the black wire is secured to the hot/line "AC(L)" terminal and the white wire is secured to the neutral "AC(N)" terminal, shown in Figure 7.
19. Connect both orange twisted pair wires of the ethernet cable leading to the +Vo pin of the AC/DC converter, shown in Figure 7.
20. Connect both brown twisted pair wires of the ethernet cable to the -Vo pin of the AC/DC converter.
    Important Note: Ensure the orange and brown twisted pair wires are connected to the terminal block next to the Power LED, referenced in Figure 7. Failure to connect these wires correctly could result in damages to the AC/DC Converter.
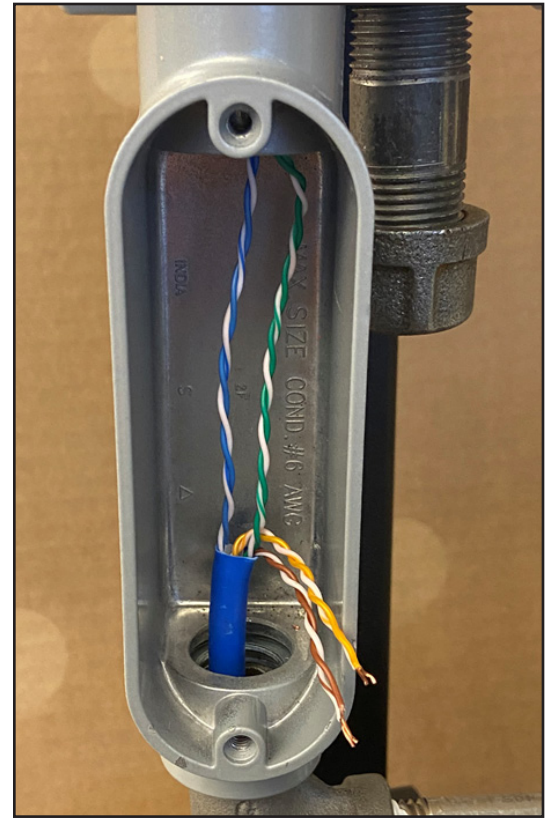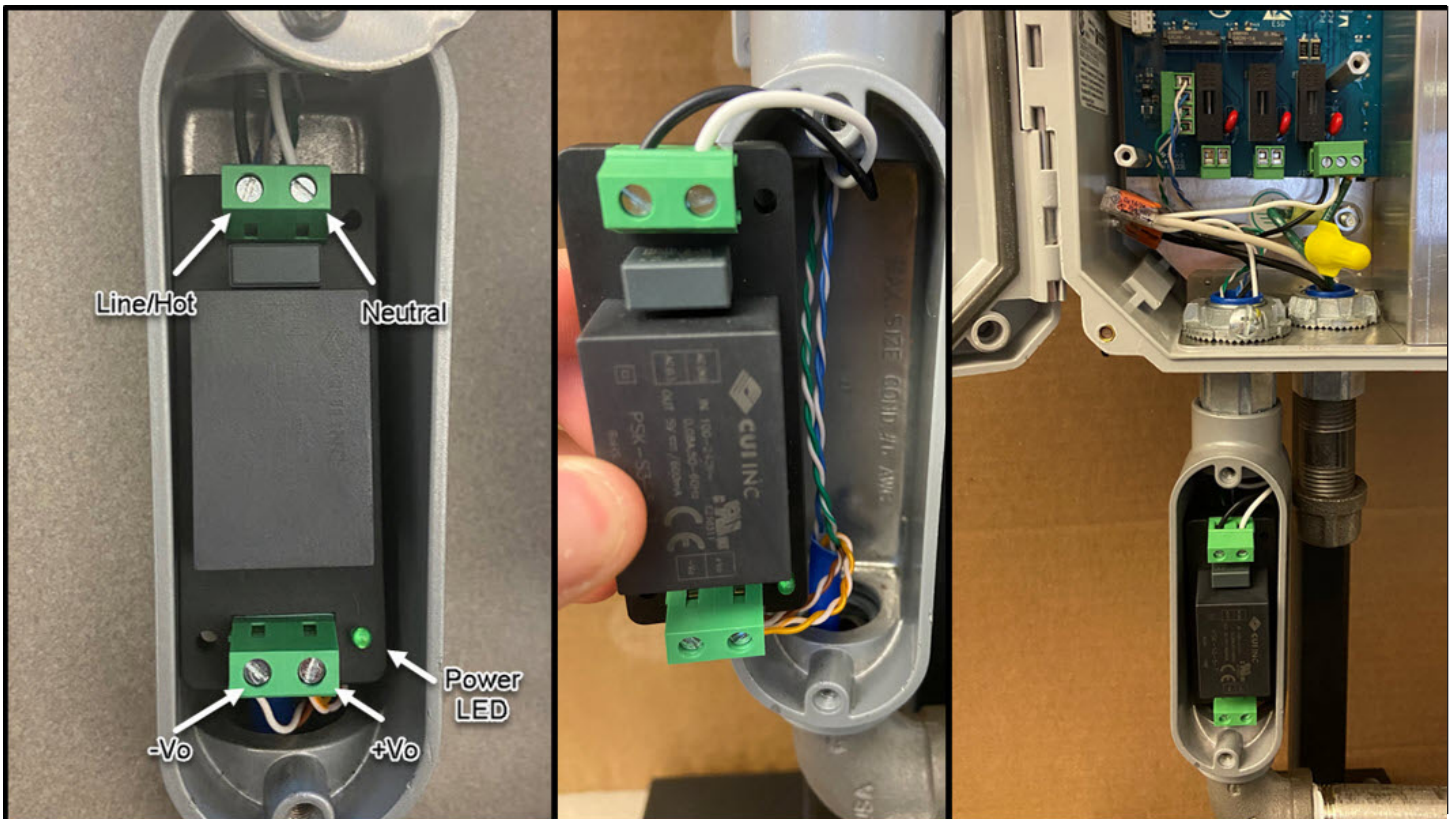

Figure 6: Routed ethernet cable

Figure 7: Connected AC/DC converter

Communication Module

Mounting

1. Mount the enclosure to a stable vertical surface in a non-hazardous location using the mounting flanges of the enclosure. Do not make additional holes in the enclosure.
2. Morrison has provided two openings on the sides of the NEMA 4X enclosure for connection and wiring. To ensure the enclosure maintains its NEMA 4X rating, only use Thomas & Betts Cat. No. H050GR-TB or H050-TB or equivalent ½" hubs in these openings. Failure to follow these instructions voids any assurance that the enclosure is NEMA 4X.

Wiring

Preparation

1. Open the front cover of the Communication Module by first loosening the captive screws at each corner, then fully unscrewing them. This allows the front cover to be carefully removed.

> **NOTE:** The corner screws that hold the front cover in place are captive screws and are not intended to be removed from the front cover.

Wiring Steps

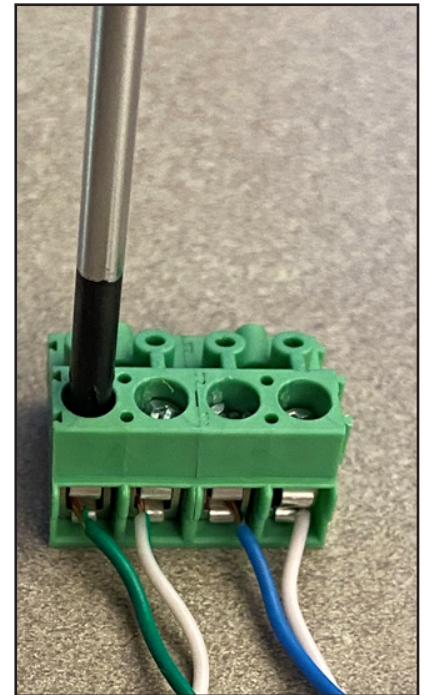Figure 8: 1218C Console Interface Board, J4 connector

Figure 9: J4 connector wiring

1. Locate the J4 connector on the 1218C Console interface board and remove the pluggable connector, shown in Figure 8.
2. Locate the green and blue twisted pairs from the previously stripped ethernet cable and strip each pair approximately 5mm (1/4 inch).
3. Wire the green twisted pair to pins 1 and 2 of the J4 connector on the 1218C, the green wire connected to pin 1 and the white/green wire connected to pin 2, shown in Figure 9.
4. Wire the blue twisted pair to pins 3 and 4 of the J4 connector on the 1218C, the blue wire connected to pin 3 and the white/blue wire connected to pin 4.
5. After completing the wiring, ensure the J4 connector is connected to the 1218C in the correct orientation.
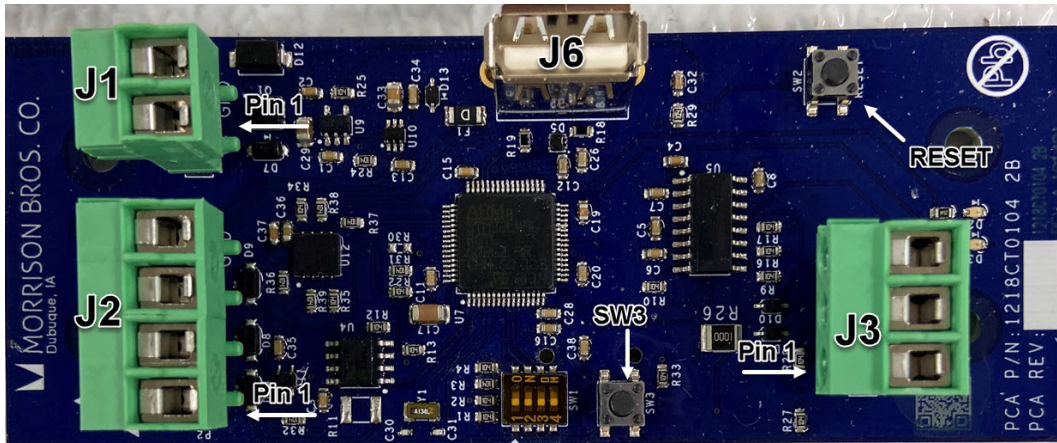
Figure 10: 1218CT Communication Module Board

6. Once the ethernet wire is routed through the conduit leading to the Communication Module, carefully strip this end of the et hernet cable approximately 4 inches, ensuring none of the twisted pair conductors are damaged in this process.

7. Strip the ends of all 4 twisted pairs approximately 5mm (1/4 inch).

8. Wire the green twisted pair to pins 1 and 2 of the J2 connector on the Communication Module, the green wire connected to pin 1 and the white/green wire connected to pin 2, table shown in Figure 11.

9. Wire the blue twisted pair to pins 3 and 4 of the J2 connector on the Communication Module, the blue wire connected to pin 3 and the white/blue wire connected to pin 4. The drain wire should be connected to pin 4 along with the white/blue wire.

J2 Pin Assignments		
Postion	**Description**	**Color**
1	Data + (A)	Green
2	Data - (B)	White/Green
3	Wakeup Signal	Blue
4	Ground	White/Blue and Drain

Figure 11: J2 Pin Assignments Table

10. The J3 connector is reserved for communication with the fuel management system, table shown below in Figure 12. This should be wired using a 3-conductor shielded cable, do not use twisted pair cable.

J3 Pin Assignments	
Position	**Description**
1	TX
2	RX
3	Ground

Figure 12: J3 Pin Assignments Table

11. The J1 connector is reserved for power coming from the Power Converter Module. Locate the brown and orange twisted pair conductors in the ethernet cable.
12. Wire both orange twisted pair conductors to the +5V terminal and both brown twisted pair conductors to the GND terminal.

J1 Pin Assignments		
Position	Description		Color
1	Vo+	+5V	Orange and White/Orange
2	Vo-	Ground	Brown and White/Brown

Figure 13: J1 Pin Assignments Table

Configuration

1218 Console

No configuration of the 1218C Console is required.
Note: The 1218CT cannot be used with MODBUS or remote console devices.

Fuel Management System

The fuel management system communication requires no configuration set up from the Communication Module. For further configuration and setup instructions please refer to the fuel management system manual.

⚠ Failure to follow any or all of the warnings and instructions in this document could result in a hazardous liquid spill, which could result in property damage, environmental contamination, fire, explosion, serious injury or death.

Operation

⚠ WARNINGS

- Any modification of this unit beyond what is outlined in this instruction will void product warranty.
- For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
- Install in accordance with all applicable local, state, and federal regulations and codes.
- In the event of malfunction, remove from service immediately and contact Morrison Bros. Customer Service.

The 1218CT allows a Fuel Management System to query the 1218C Electronic Tank Gauge for current inventory. Inventory changes are not reported to the FMS in real-time and must never be relied upon to prevent a tank overfill.

> **IMPORTANT:** The system operator must continuously monitor the 1218C Electronic Tank Gauge for tank level and alarms to prevent tank overfill. Refer to the 1218C Electronic Tank Gauge Installation, Operation, and Maintenance Manual for more details.

Upon powering up the Communication Module all LEDs on the board will begin flashing for 5 seconds to check to see if a firmware update is being initiated, then it will run the normal application.

Fuel Management System
Communication between the Communication Module and the FMS will be initiated by the FMS. The FMS will send a command to the Communication Module, then it will reply with data based on the command that was sent. Supported commands are listed in Appendix A at the end of this document.

Figure 14: LED location, 1218C communication

1218C Console Communication
Communication status to the 1218C Console is indicated to the user through the two LEDs D1 and D4, closest to the J2 connector, shown in Figure 14.

- If the Green LED is ON and pulsing and the Red LED is OFF, this is an indication of successful communication.
- If the Green LED is ON and the Red LED is blinking this indicates there is a communication error. Refer back to the Communication Module Wiring section on page 7 to ensure wiring was completed correctly.
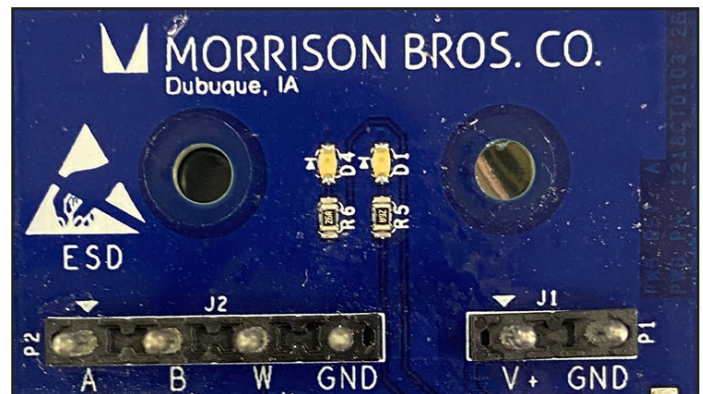
Firmware Update
Firmware updates to the Communication Module are initiated by loading the latest firmware from the Morrison Brothers Co. website on to a USB drive. This drive is to be inserted into the USB port on the board, connector J6 in Figure 10, and pressing and releasing the button on the board labeled 'RESET'. The bootloader is configured to look for a USB drive and update the firmware on power up.

Firmware Revert
Reverting the firmware on the Communication Module should be understood to be a last resort measure in the event that the current firmware is not functioning correctly. Before the revert process can begin, ensure any USB drive is removed from the USB port. Reverting the firmware is initiated by pressing and holding SW3 while pressing and releasing the RESET (SW2). Once the RESET button has been pressed, continue to hold SW3 until the Green LEDs start flashing. This will indicate that the revert process has begun.

Maintenance

> ⚠️ **WARNINGS**
> - Any modification of this unit beyond what is outlined in this instruction will void product warranty.
> - For your safety, it is important to follow local, state, federal and/or OSHA rules that apply to working inside, above, or around the storage tank and piping area. Use all personal protective equipment required for working in the specific environment.
> - Install in accordance with all applicable local, state, and federal regulations and codes.
> - This device is intended to be used as an auxiliary warning to the operator of an abnormal condition of the system, such as a possible overfill situation and should not be the only system in place to prevent an unwanted condition, such as preventing a tank from overfilling. It is the sole responsibility of the operator to continuously prevent any spillage regardless of the situation.
> - In the event of malfunction, remove from service immediately and contact Morrison Bros. Customer Service.

The Communication Module and Power Converter Module do not require routine maintenance after the installation is completed. If either of these modules require maintenance due to a operational related issue, please follow the troubleshooting guide below.

Troubleshooting Guide				
Reference Number	Problem	Cause	Steps	Solution
1	Red LED on Communication Module is blinking.	This indicates that the Communication Module is not receiving any data from the 1218C	1	Ensure that the Modbus feature on the 1218C is disabled.
			2	Check the wiring on connector J4 on the 1218C and connector J2 on the Communication Module. Refer to the Communication Module wiring section beginning on page 7.
			3	If the Red LED continues to blink, contact customer service.
2	Tank data read from the FMS is incorrect.	No new data is being communicated between the 1218C and the Communication Module.	1	Check the LEDs on the Communication Module, if the Red LED is blinking this confirms there is a communication issue. Refer to step 1 in this guide.
			2	If Red LED is not blinking, check the wiring of the J3 connector on the Communication Module, ensure that the RX and TX are in the correct position with respect to the FMS. Refer to the Commmunication Module wiring section on page 7.
			3	If the Red LED is not blinking and this problem persists, contact customer service.
3	FMS not receiving reports	Communication error	1	Check the wiring of the J3 connector on the Communication Module, ensure that the RX and TX are in the correct position with respect to the FMS. Refer to the Commmunication Module wiring section on page 7.
			2	Refer to the troubleshooting guide for the FMS system that is being used.
4	Green LEDs not illuminated	Power error	1	Check the 1218C to see if this has power. If this is not powered the Communication Module will not have power.
			2	If 1218C has power unscrew the front panel of the Power Converter Module, if the LED is not illuminated on the AC/DC converter it is not receiving power or has malfunctioned. Refer back to the Power Converter Module wiring steps on page 4.
			3	If AC/DC converter still does not have power, contact customer service.
			4	If AC/DC converter does have power and the Communication Module does not, refer back to the Communication Module wiring instructions starting on page 7.
			5	After checking the wiring if the Green LEDs on the Communication Module are still not illuminated, contact customer service.

Appendix A:
Supported TLS Protocol Commands

The 1218CT recognizes the following TLS protocol commands from a third-party fuel management system (FMS).
Note: All commands listed are in computer format, the 1218CT does not support any commands in display format.

In-Tank Inventory Report (i20100)

Returns real-time data to the FMS from the 1218C console for the following data fields:
- Tank number
- Delivery in progress status
- Volume
- Ullage
- Liquid height

In-Tank Status Report (i20500)

Returns real-time alarm statuses to the FMS from the 1218C console for the following alarms:
- Tank number
- Number of alarms currently active for the respective tank
- Alarm type
    - Low product alarm
    - High product alarm
    - Tank setup data warning

In-Tank Delivery Report (i20200)

Returns a log of past deliveries reports to the FMS. Each delivery report contains the following data fields:
- Tank number
- Number of deliveries in the history log for the respective tank
- Starting date/time and ending date/time
- Starting volume and ending volume
- Starting height and ending height

Note: The 1218CT Communication Module will keep this log stored in its own internal memory created from data sent over from the 1218C, storing up to 50 delivery reports. This log utilizes First In, First Out (FIFO) order of operations to prioritize the memory space available on the board (rather than clearing all the memory).

In-Tank Alarm History Report (i20600)

Returns a log of past alarms to the FMS with each alarm report containing the following data fields:
- Tank number
- Number of alarms in the history log for the respective tank
- Date/time the alarm occurred
- Alarm type
    - Low product alarm
    - High product alarm
    - Tank setup data warning

Note: The 1218CT Communication Module will keep this log stored in its own internal memory created from data sent over from the 1218C, storing up to 100 alarm reports. When these reports are pulled by the FMS, the 1218CT Communication Module will automatically clear the log of alarm reports. This alarm report log will also utilize FIFO in the event the reports reach 100 in number before the FMS pulls them.