



FuelMaster FMU-5xxx Installation Guide for the Upper Cabinet

3/20/2023

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Installation Guide for the Upper Cabinet**

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Trademark Acknowledgements

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WARNINGS, CAUTIONS, and NOTES

This manual emphasizes special operations with Warnings, Cautions, or Notes preceding the applicable procedure:

WARNING indicates a safety precaution that, if not followed, could result in personal injury

CAUTION indicates a safety precaution that, if not followed, could result in damage to equipment

NOTE indicates a procedure requiring special emphasis for the proper installation and operation of FuelMaster equipment

Warnings and Cautions in this manual are provided in both English and French to meet the needs of our French speaking customers in Canada.

Document Version History

Version	Date	Description
1.0	2023/03/20	Initial Release.

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Chapter 1 General Information

Introduction

This manual provides installation instructions for the Syntech Systems, Inc., FuelMaster Fuel Management Unit (FMU) for fixed fueling sites and Facilities (FMLive application). These instructions have been prepared for use by technicians who are qualified to complete electrical work in hazardous locations.

This installation manual focuses on models within the FMU-5xxx series. Notations identify the differences between models where applicable.

Related Articles

- FuelMaster FMU Installation Guide for 25xx, 35xx, & 45xx v1.01 with ATPs
- Acceptance Test Procedure - FMU 4500 FMLive.pdf
- PB-021 Solid State Relay Assembly Replacement Procedure.pdf
- PB-087_Installation of the Low Power-Dual Control Board
- PB-231_Field Installation of FMU Power Conditioner.pdf

FuelMaster System Overview

The FuelMaster system consists of hardware, supporting equipment, and applications that function to control access to the system, provide accountability for those using the system, and provide reports to track user activity, product usage (transaction data), system errors, and messaging should issues arise. FuelMaster restricts unauthorized user access while maintaining complete accountability of each transaction as it occurs. The FuelMaster equipment is assembled to fulfill specific site or facility requirements and must be installed accordingly.

The FuelMaster equipment may be adapted to control dispensing equipment for any metered product (not just fuel). Optional equipment is available that utilizes the same hardware and system access devices to activate electronic gate-door openers, and automated car washes.

FMU Initialization and configuration is required to make the system functional and may be performed in conjunction with the FMU hardware installation or performed later. See [Initialization Requirement](#) for more information.

Customer Relations and Training

It is highly recommended the installer spend some time with the customer training them about hardware setup and configuration, as well as organizing and building the

database. This will permit the customer time to develop necessary fuel management skills, understand the encoding process, and test the hardware after installation.

Safety Precautions

In addition to the safety precautions contained within this installation manual, the FuelMaster installer must be familiar with the guidelines contained within all other safety codes and standards applicable to the installation and operation of electrical equipment, particularly within hazardous locations. All FuelMaster and non-FuelMaster equipment supplied by Syntech Systems, Inc., complies with all applicable federal, state, and local safety codes and standards.

Handbook References

The following references, as a minimum, and as they apply to the installation, must be familiar to the technician performing a FuelMaster installation.

- **NFPA Handbook 30 - Flammable and Combustible Liquids Code** provides requirements for the safe storage and handling of flammable and combustible liquids.
- **NFPA Handbook 30A - Code for Motor Fuel Dispensing Facilities and Repair Garages** provides safeguards for dispensing liquid and gaseous motor fuels into the fuel tanks of automotive vehicles and marine craft.
- **NFPA Handbook 70 - National Electrical Code (NEC)** contains guidelines for the installation and operation of electrical equipment.
- **NFPA Handbook 407 - Standard for Aircraft Fuel Servicing** provides minimum fire safety requirements for procedures, equipment, and installations during ground fuel servicing of aircraft using liquid petroleum fuels. Knowledge of this reference is necessary when performing an installation in support of aircraft fuel servicing.
- **NIST Handbook 44 - Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices** provides technical requirements for the purpose of eliminating weights and measures and weighing and measuring devices that give false readings, that are of such construction that they are faulty, or that facilitate the perpetration of fraud. Knowledge of this reference is necessary when performing an installation in support of retail fuel sales.

Safety Guidelines

Use the following guidelines to help protect your FMU from potential damage and ensure your own personal safety.

WARNING Do not operate your FMU with any cover removed or door open.

AVERTISSEMENT N'actionnez pas votre FMU quand aucune couverture est déplacée ou aucune porte est ouverte.

CAUTION Do not open your FMU's doors during wet weather.

ATTENTION N'ouvrez pas les portes de Votre FMU par le temps de pluie.

As you use your FMU, observe the following safety guidelines:

- To avoid damaging your FMU, ensure the AC power available at your location is 120 volts, 60 hertz (Hz).
- To prevent electrical shock, connect the FMU into properly grounded sources.
- To avoid possible damage to the FMU and or other interfacing equipment, wait 5 seconds after turning off all interfacing equipment before disconnecting any interconnecting cables.
- To protect your FMU from sudden, transient electrical increases, your FMU is equipped with a Power Conditioner. All equipment interfacing your FMU needs to use a surge suppressor, line conditioner, or uninterruptible power supply (UPS).
- Be sure nothing rests on your FMU's cables and that the cables are not located where they can be stepped on or tripped over.
- Do not spill food or liquids on your FMU or interfacing equipment.
- Do not push any objects into the openings of your FMU. Doing so can cause fire or electrical shock by shorting-out internal components.
- Keep your FMU away from radiators and heat sources.

WARNING Do not attempt to service the FMU yourself, except as explained in this manual. Always follow installation and service instructions closely.

AVERTISSEMENT N'essayez pas d'entretenir le FMU vous-même, excepté comme expliqué en ce manuel. Suivez toujours les instructions d'installation et de maintenance précisément.

Protecting Against Electrostatic Discharge

Static electricity can harm delicate components inside your FuelMaster FMU. To prevent static damage, discharge static electricity from your body before you touch any of your FuelMaster FMU's electronic components. You can do so by touching an unpainted metal surface on the FuelMaster FMU chassis. As you continue to work inside your FuelMaster FMU, periodically touch an unpainted metal surface to remove any static charge your body may have accumulated. Use of a wrist-grounding strap is highly recommended.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

- Keep a static-sensitive component in its antistatic packing material until you are ready to install the component in your FuelMaster FMU. Just before unwrapping the antistatic packaging, discharge electricity from your body.
- Transport sensitive components in antistatic containers or packaging.
- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

Protecting Against Radio Interference

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning off and on the equipment, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the radio/TV's receiving antenna
- Increase the separation between the equipment and the radio/TV's receiver
- Connect the equipment into an outlet on a circuit different from that to which the radio/TV's receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Hold Harmless Agreement

The **Hold Harmless Agreement** on the next page is requested to be signed by the using customer. This agreement references the potential hazards associated with wireless network security and serves to remove liability from the seller (Syntech Systems, Inc., and its distributors) when wireless networking equipment is installed for communications to the FMU.

Hold Harmless Agreement Form

To be completed when installing wireless networking equipment

TO:

SUBJECT: Potential Security Breaches Through Wireless Network Connections to FuelMaster

FuelMaster Fuel Management Units (FMUs) and software do not contain personal information subject to the Privacy Act of 1974. However, when added to a network, the FMU may provide a link to other resources which do contain personal or privileged information. Cable or fiber optic network connections are not easily accessible. Wireless networks operate on radio waves that can be intercepted by anyone with the right equipment and within range of the transmitter. Without proper wireless network security, outside users can access your network to attain such valuable information as social security numbers, credit card numbers, bank account numbers, and countless other private information sources stored on your network. If accessibility is achieved, outside users can access anything stored in your network, not just FuelMaster® related information.

Though the physical installation of the equipment may be accomplished by anybody with the knowledge and experience, the responsibility for the network, IP addresses, wireless components and devices, access points and network configuration rests entirely on the customer and, where applicable, his/her Information Technology (IT) person(s) or Network Administrator(s) for that site.

Syntech Systems, Inc., cannot emphasize enough the potential damage that may result from a breach in network security. When a wireless network connection to FuelMaster is established, Syntech Systems, Inc, cannot prevent accessibility by outside users. As such, this HOLD HARMLESS AGREEMENT is prepared to remove liability from Syntech Systems, Inc., for any breach of security resulting from the development of a wireless network connection to FuelMaster. Please acknowledge receipt and concurrence with the terms of this agreement by signing below.

ACKNOWLEDGEMENT:

I acknowledge receipt and concurrence with the terms of this agreement:

Signature of Authorized Representative

Certifications and Approvals

FuelMaster FMUs have been tested and safety certified by the ETL SEMKO division of Intertek to ANSI/UL Specification 1238 for connection to UL-certified dispensers in NEC Class 1, Division 2, Group D locations. Equipment versions certified by ETL are identified by the ETL logo imprinted on the ID plate riveted to the FMU pedestal.

Boundaries of Hazardous Locations for Flammable Liquids

Figure 1 page 11 illustrates the boundaries of a hazardous location which dispenses flammable liquids such as gasoline and E85. Propane (liquefied petroleum gas) has the same basic boundaries.

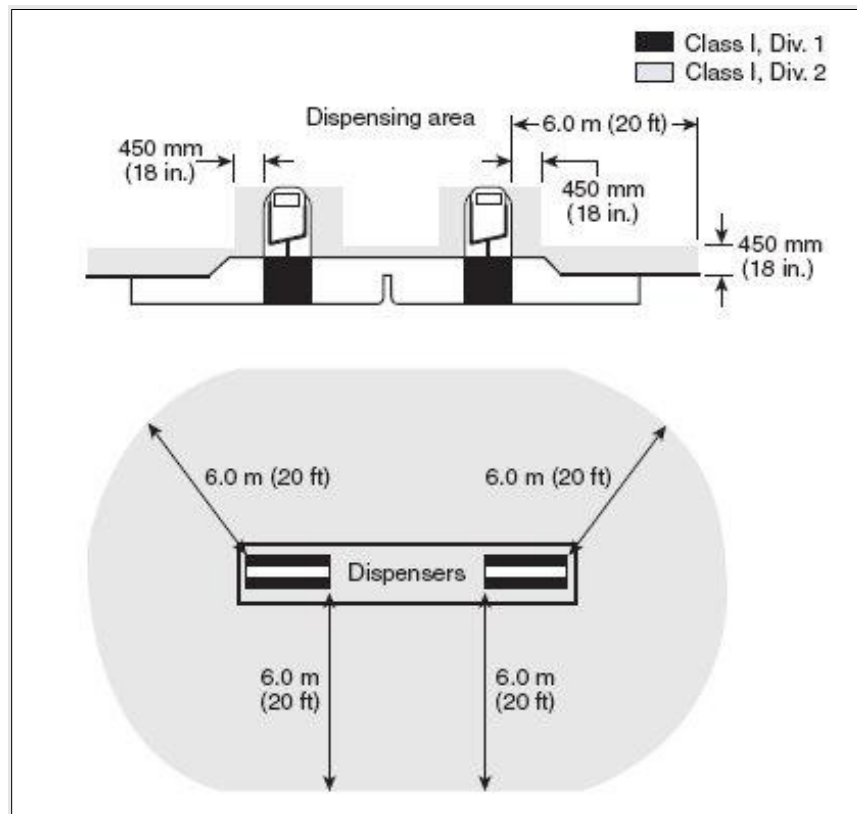


Figure 1 Boundaries of a Flammable Liquid Hazardous Location

The boundary area around a compressed natural gas (CNG) dispenser is different. It extends 5 feet from and above the dispenser. Any electrical device installed within these boundaries must be intrinsically safe or must be enclosed within an explosion-proof enclosure. Intrinsically safe devices are generally limited to very low voltage and low current devices, such as that portion of a pulser before the barrier. Examples of explosion-proof enclosures are rigid metal conduit, and junction boxes and conduit fittings approved for use in hazardous locations. If the electrical device is not

intrinsically safe or is not explosion-proof, then it must be installed outside the hazardous area.

Electrical Safety Spacing

Figure 2 page 12 illustrates an FMU and the distance from its mounting surface to where electrical components are installed. All internal electrical components are 28 inches above the mounting surface. This places all electrical components in the FMU a full 10 inches outside the hazardous location. This 10-inch separation provides additional spacing for the installation of outlet boxes or other devices which are not explosion-proof and cannot be installed in hazardous locations.

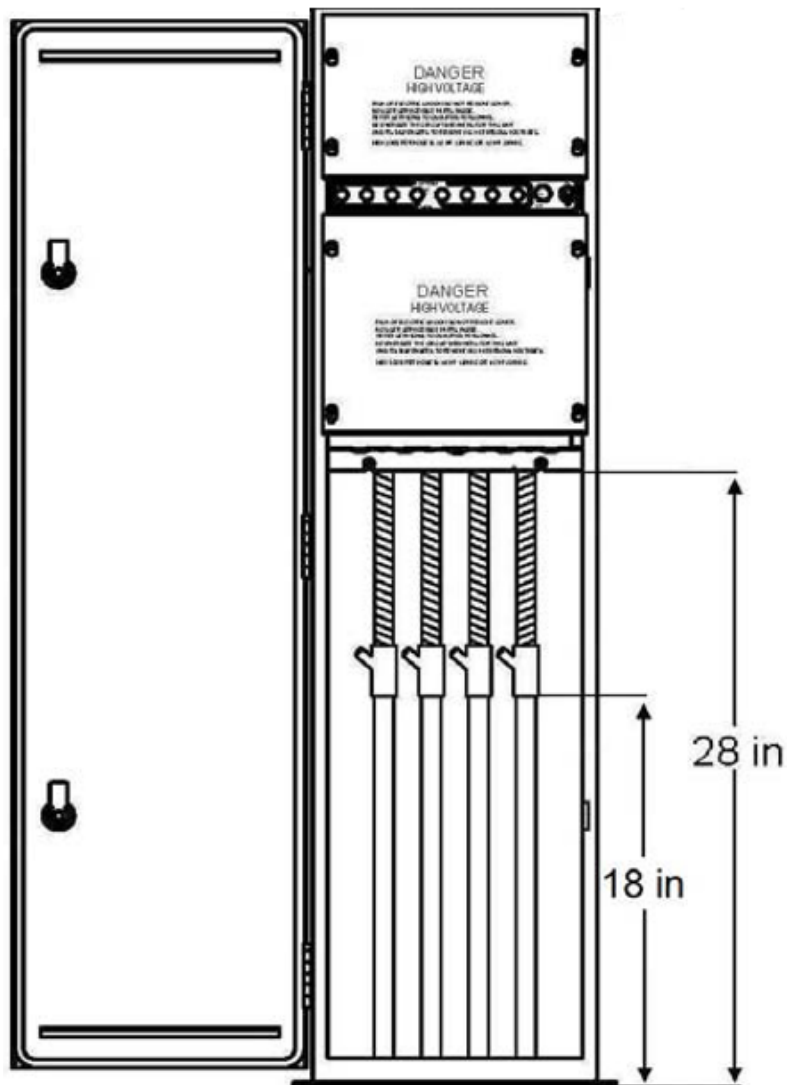


Figure 2 FMU Electrical Safety Spacing

FuelMaster has been certified for use in electrical installations in Canada and Europe as well as the United States. FMUs certified for use in Canada and Europe may be identified through the ID plate riveted to the FMU pedestal. See Figure 3 in the following section for examples of FMU ID plates for U.S., Canadian, and European certification.

ID Plates

An ID plate (see Figure 3 page 13 and Figure 4 FMU 5000 ID Plate page 14) is affixed to the side of the FMU pedestal closest to the pedestal door locks. The ID plate contains the serial number of the unit as well as certification information and a code to cross reference the key number used in the door locks (see Table 1 page 14).

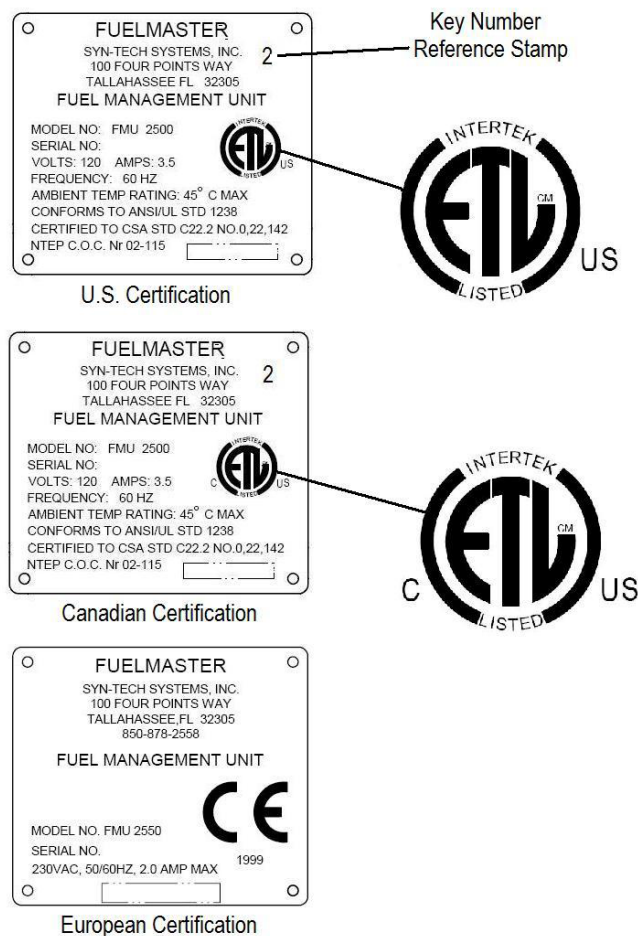


Figure 3 FMU ID Plates



Figure 4 FMU 5000 ID Plate

FMU Door Key Reference

Table 1 FMU ID Plate Code with Cross Reference

Key Number	ID Plate Code
300	0
325	1
350	2
275	3
400	4
425	5
450	6
475	7
500	8
523	9
333	10

ID Plate and Pedestal Replacement

If a pedestal is replaced due to an upgrade or damage, the new pedestal will not have an ID plate installed. Remove the ID plate from the older unit and install it on the newer unit using pop-rivets. Pop-rivets 1/8-inch-wide x 1/4 inch long should be used to secure the ID plates to the pedestal.

FMU Shipping – Bar Code Label – Serial Number

The FMU is shipped in two pieces, in two separate shipping containers. The upper cabinet has a bar code label inside the cabinet on the side wall closest to the door

hinges. The bar code label has the FMU serial number printed to match the serial number on the pedestal ID plate. The shipping containers are also marked with the FMU serial number. Refer to Serial Number on Matching Cabinet and Pedestal page 22 for more detail.

Basic FuelMaster FMU Warranty

The basic warranty for each FuelMaster FMU provides coverage for parts and customer support for a period of one year from date of initialization or fifteen months from date of shipment, whichever occurs first. Each Prokee is warranted against defects in material and workmanship for a period of five years. A toll-free number for technical assistance is also included. This line affords the customer access to product support personnel who will answer questions regarding operation of FuelMaster hardware or software and provide diagnostic capabilities when necessary.

Under terms of this agreement, upon calling Syntech's Customer Support Center, technicians may diagnose problems with the assistance of the customer to determine warrantable conditions and possible problem solutions. Syntech will replace all defective parts and aid the customer in installation of replacement parts to allow the unit to be repaired as expeditiously as possible.

NOTE

This warranty does not cover site visits by technicians for repair; however, the FuelMaster was designed in a modular manner to provide easy and rapid exchange of parts, even by non-technical personnel.

Damage resulting from acts of God, user abuse, accidents, faulty installation, or operation is not covered under this warranty. This warranty specifically excludes any indirect, special, or consequential damages to include, but not limited to, loss of product, profit, or litigation fees. Additionally, associated equipment including printers, personal computers, and other items not manufactured by Syntech Systems, Inc. are warranted only to the extent covered by the original manufacturer.

Additionally, this warranty is limited to approved locations (generally the continental United States) and is not transferable except by written permission of Syntech Systems, Inc.

Initialization Requirement

All FuelMaster Fuel Management Systems must be initialized to validate the warranty of the equipment.

- Initialization includes the startup, inspection, and tests performed to certify the installation.
- Initialization can be completed only by a Syntech FuelMaster technician, or a technician who has completed the Syntech FuelMaster Installation School.
- Final certification must be accomplished jointly by the Customer and Syntech factory-trained personnel.

NOTE

The prompt for the activation code may not appear if a credit card is inserted. If a newly installed FMU is being setup, insert a Prokee to bring up the prompt for the activation code. An activation code must be entered to begin normal FMU operation.

- When a Prokee is inserted after initial power-up, the FMU will prompt the initializing technician to call 1-800-888-9136, ext. 2, for an activation code. This number connects to Syntech's Customer Satisfaction Center.
- The caller will receive a link to a form that must be completed to initiate this process.
- The caller will be asked pertinent questions about the site (Legacy FMPlus) or Facility (FMLive) and FMU.
- CSC will attempt to validate the caller installing the Unit(s) is ASR certified. If any caller does not possess this level of certification, they will be forwarded to Syntech's Training department.
- Once CSC has all the necessary details, including the FMU serial number, CSC will generate and provide the caller with an activation code.

NOTE

It is very important the FMU is assembled with the correct upper cabinet which matches the pedestal with the serialized ID plate. If not, the activation code will not activate the FMU.

Table 2 FuelMaster Equipment Specifications

Rated Supply Voltage Limits	Standard Version: 120VAC +/- 10% International Version: 200-240VAC
Rated Supply Frequency	50/60 Hz
Rated Supply Current	4.00 Amps (Max Operating @120VAC) 2.00 Amps (Max Operating @230VAC)
Heaters (Optional)	1.00 Amp @120VAC
Receipt Printer (Optional)	1.00 Amp @120VAC
Other electronics	0.500 Amps @120VAC
Operating Altitude, Max	2000 meters
Max Operating Relative Humidity	100%
Installation Category (surge arrestor)	III
Installation Category (after surge arrestor)	II
Pollution Degree	2
Electronics Operating Temperature Range	-40° F (-40C) to 140° F (60C) Note: If fueling in temperatures below -0° F (-18C), Syntech recommends adding a cold weather kit for a better user experience.
Heater Operational Range	Turn on at temps below 41° F (5C)

Safety Related Inspections & Preventive Maintenance

FMUs require no preventive maintenance to retain its user safety features. Whenever an FMU is updated or repaired, a safety inspection should be performed including wiring integrity (power and grounds), board retention, and safety covers.

Cleaning Instructions

The FuelMaster chassis, keypad, & LCD glass should be washed with a mild detergent diluted with water. A soft sponge or cloth is recommended. Rinse and dry with a soft dry cloth. The FuelMaster FMU works well and presents no safety problems when dirty. Frequency of cleaning is left to the user's discretion.

The FMU Prokee and card receptacles will require cleaning (follow the manufacturer's instructions) when Prokees, smartcards, or credit cards are not being read correctly.

Some products used by Syntech in these applications are:

- Prokee: Electronic Contact Cleaner Spray
- Magstripe card: KIC Products KW3-H19B40

Fuse Reference

Every fuse application in the FMU has a fuse description silk-screened next to the fuse holder. All fuses are rated for 250 VAC. Listed below are the fuses used in an FMU.

Table 3 Fuses Rated for 250VAC

FMU Location	Syntech Systems Fuse			Commercial Equivalent	
	Description	Quantity	Part #	Manufacturer	Part #
Pedestal I/O Board	¼ amp Slo-Blo, 2AG	1	206672	Littelfuse	0229.250
Incoming Power Fuse	4 Amp Slo-Blo, 3AB	1	198609	Littelfuse	0325004

Battery Backup

No batteries are used in the FMU 5000. Refer to the section that describes Supercap assembly functionality.

Switch Ratings

The main power toggle switch and manual/automatic pump toggle switches are general purpose switches, rated for 15A @ 125VAC, 10A @ 250VAC, and 1 HP @ 125VAC - 250VAC.

The optional FMU Quick Stop switch is a heavy duty, oil and watertight switch, rated for 1.0A/300VAC CSA, 0.5A/220VDC, and 1.0A/24VDC.

Terminal Ratings (For External Component Connections)

CAUTION The following terminal ratings are as suggested by the component manufacturer as the maximum continuous voltage and current the component is designed to accept. These ratings do not necessarily correspond to the voltages normally applied to the component when integrated into FuelMaster as part of a complete system.

CAUTION Les cotes de terminaux suivants sont comme suggéré par le fabricant de composants comme la tension maximale et le courant le composant est conçu pour accepter. Ces notes ne correspondent pas nécessairement aux tensions normalement appliqué à l'élément lorsqu'ils sont intégrés dans FuelMaster dans le cadre d'un système complet.

Table 4 Components by Terminal Block Connection and Voltage

COMPONENT	TERMINAL BLOCK (TB) CONNECTION	VOLTAGE
Unused	J2 and J3 on PEDESTAL I/O BOARD	n/a
P_ P1, P3, P5, P7 Pulser Connections	J4-J7 on PEDESTAL I/O BOARD	12VDC
LN_ LN1 thru LN8 Incoming Voltage	TB1, TB2 on PEDESTAL I/O BOARD	300V, 25A
PHS_Pump Handle Sensing	TB3 on PEDESTAL I/O BOARD	300V, 25A

Parts Substitution and Modification

Modification of the equipment provided, substitution of any material requirements, or any deviation from these installation instructions must comply with all applicable safety codes and standards.

Commercially Available Products

This FuelMaster Installation Manual refers to commercially available equipment and materials that are required to complete an installation. Trade names and part numbers are also referenced to cite products that have been tested and are known to be serviceable with FuelMaster equipment. These references should not be construed as restrictions only to those referenced products. There may be other products which have not yet been tested but may be equally suitable.

Syntech Systems inventories commercially available products necessary to complete a FuelMaster installation. When these products are purchased from Syntech Systems, the manufacturer's warranty is honored and administered by Syntech Systems.

Support and Training

Syntech Systems strives to provide the best customer and distributor support possible. Free on-site distributor and customer training is provided quarterly (or more often as needed) at the FuelMaster factory in Tallahassee, Florida. Training at the distributor's location is available where it may be more cost effective to send trainer(s) from Syntech rather than send several technicians to Tallahassee for factory training.

Webinars are available through the internet for training sessions between a Syntech trainer in Florida, and customer representative(s) anywhere there is internet access. See the FuelMaster website at: <http://www.myfuelmaster.com/> for assistance scheduling training.

Syntech offers a well-staffed Customer Satisfaction Center (CSC) to take questions and calls from customers. In addition, a Distributor Support Center (DSC) provides

answers from experienced field technicians for distributors needing installation, startup, training, or troubleshooting assistance.

Questions for the CSC should be called in to 800-888-9136, ext. 2, or e-mailed to: support@myfuelmaster.com.

Syntech maintains an e-mail database of all FuelMaster distributors. Whenever a new publication or other pertinent information is published, it is forwarded to all distributors on the mailing list. If your e-mail address changes, or other e-mail addresses are added, forward the new address to: distributor_replies@myfuelmaster.com.

Improvements

Recommendations for improvement or corrections to this manual may be reported to Syntech's Customer Satisfaction Center (CSC) at support@myfuelmaster.com.

Glossary

Term	Meaning
43 CHAR	Refers to Keypad/Door configurations that uses the 43-character (4"x11") keypad assembly specifically.
DISCONTINUED	Available for service orders only until inventory is finally depleted.
EAPro	Embedded Application Processor
FMU	Fuel Management Unit
I/O	Input / Output
LCD	Liquid Crystal Display
LRU	Line Replaceable Unit
MPCB	Mechanical Pump Control Board
PEM	Pluggable Expansion Module
PID	Product ID
RUI	Remote User Interface
SPD	Surge Protection Device
UART	Universal Asynchronous Receiver/Transmitter
UIB	User Interface Board
VID	Vendor ID
BACKPLATE	Mounting plate that contains the MPC, EAPro, Supercap, and Power Supply

Chapter 2 FMU Receiving and Unboxing

FMU Shipping Procedure

After completing Syntech's manufacturing and quality assurance burn-in and verification process, the FMU upper cabinet and pedestal are separated for shipping.

Upper Cabinet

The power harness (Figure 5 page 21) which contains the white, green-yellow, and black conductors (also attached to the AC receptacle) and connects the backplate power supply to the Power Conditioner is disconnected.

The ground screw is also removed, and then shipped, reinstalled in the interface plate.

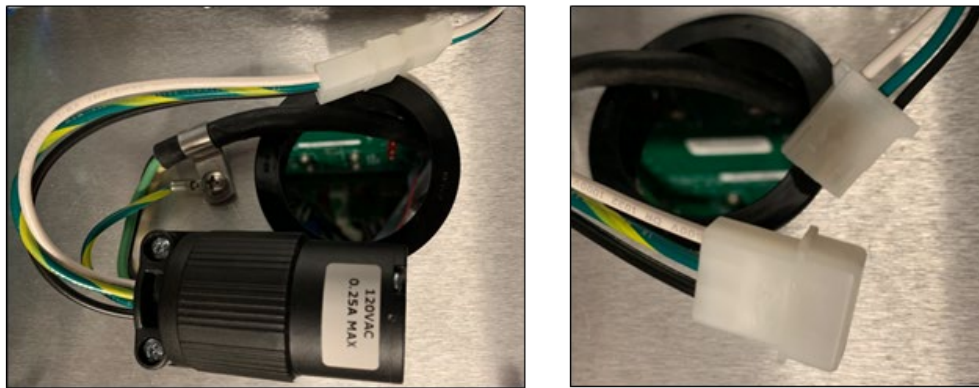


Figure 5 Power Harness

The AC receptacle and power harness are fed down through the hole in the interface plate and into the pedestal, where they are tie-wrapped (secured) to the pedestal insert that houses the Auto-Manual switches, main FMU power switch, etc.

The six (6) screws that hold the upper cabinet to the pedestal are removed (see Figure 6 page 21 and Figure 7 page 22).



Figure 6 FMU Front Screw Designations at Upper Cabinet Base Front



Figure 7 FMU Front Screw Designations at Upper Cabinet Base Back

The cabinet is then separated, and the six screws reinstalled securing the interface plate to the upper cabinet. The upper cabinet and pedestal are then boxed and shipped in separate containers.

NOTE Upgrades, depending on what model the end user currently has, may or may not contain the interface plate.

Serial Number on Matching Cabinet and Pedestal

The serial number is written on the outside of the shipping containers. (e.g., “3469”).

For each FMU, there will be only one pedestal box and one upper cabinet box - each with matching serial number. The FMU serial number will be found on the ID plate riveted to the side of the FMU pedestal. A bar code label containing the serial number is adhered to the inside of the upper cabinet.

Refer to section FMU Shipping - Bar Code Label - Serial Number on page 14 for additional details.

IMPORTANT The upper cabinet must be matched to the pedestal to successfully apply an FMU activation code after the installation is completed and power is applied.

Syntech Customer Satisfaction Center (CSC)

NOTE Contact Syntech Systems’ Customer Satisfaction Center at (800) 888-9136 Ext. 2 as soon as possible if any damage is noted or anything is missing.

FMU Receiving and Unboxing

- 1 Unbox and inspect both the upper cabinet (Figure 8 Unboxing Upper CabinetFigure 8 page 23) and pedestal boxes.

IMPORTANT Some loose material (DVD, manuals, encoder, etc.) may be shipped inside the upper cabinet box. Some items might be encased in the spray-foam used for packing. Verify that no material(s) are stuck to the spray-foam packing.



Figure 8 Unboxing Upper Cabinet

- 2 Compare all contents against the packing slip. If anything is missing or damaged, contact your Syntech Systems representative immediately. Do not discard any packing materials until the received components and materials have been verified, and all issues are noted or resolved.

Chapter 3 FMU 5000 Upper Cabinet Installation

Installation Summary

The upper cabinet and pedestal are shipped with all the major components installed. At site, the installer will:

- 1 Reassemble the FMU by attaching the upper cabinet to the pedestal (page 25).

NOTE FMU pedestal / Pedestal I/O Board wiring and connections are covered in: [FuelMaster_FMU_Installation_Guide_for_25xx_35xx_&_45xx_v1.01_with_ATPs.pdf](#)

- Pedestal Installation - pages 20-23
- Pedestal Dispenser wiring - pages 33-54
- Pedestal Pulser wiring - pages 59-66

- 2 Reconnect the Upper Cabinet Power Connection that exists between the upper cabinet and pedestal—ensuring the earth ground ring terminal is reattached to the interface plate (page 25).

NOTE Steps 3 & 4 must be addressed simultaneously.

- 3 Reconnect the Mechanical Pump Control Board (MPCB) to the hose control assemblies (aka mechanical dispensers), 50-amp Pump Relay Assembly, or Dual Control Relay Assembly (page 33).
- 4 Reconnect the MPCB to the Pedestal I/O Board (page 33).
- 5 Address communication method and connection (page 43).
 - a If relying on a Cell Modem Connection, skip this step. The cell service provider and cell modem type are known prior to FMU assembly. The FMU ships with the cell modem preinstalled and connected to the EAPro assembly. The cell antenna is preinstalled on the FMU sun cover, and its cables are routed and connected to the cell mode.
 - b If relying on Hard-wired Ethernet Network Connection... ([FuelMaster_FMU_Installation_Guide_for_25xx_35xx_&_45xx_v1.01_with_ATPs.pdf](#) for more information.)
 - (1) Run the ethernet cable through conduit feeding into the pedestal of the FMU, through the interface plate, and into the upper cabinet.
 - (2) Attach the ethernet cable into the blue surge protection device.
 - c Terminate the ethernet connection at the RJ-45 connector on the EAPro assembly.

- 6 Procedure: Connect Main Power page 47 (110V AC) from the breaker to the FMU and verify connections (page 47).
- 7 Turn FMU Power on, register, and configure the Unit (page 48).

NOTE From this point on, you will need the assistance of Syntech System's Customer Satisfaction Center and the FMLive Operations Team to walk you through registering the unit with FMLive and configuring the FMU for operation.

Installation Procedures

CAUTION Do NOT apply power to the FMU prior to verifying all connections are correct and secure. Otherwise, component damage may occur.

CAUTION NE PAS mettre sous tension le FMU avant d'avoir vérifié que toutes les connexions sont correctes et sécurisées. Sinon, des dommages aux composants peuvent survenir.

Procedure: Reassemble the FMU

- 1 Unscrew the six (6) screws securing the interface plate to the upper cabinet.
- 2 Place the upper cabinet on top of the pedestal, ensuring it is facing the correct way.
- 3 Align the mounting holes on the interface plate, cabinet, and pedestal.
- 4 Hand-tighten the six screws making sure there is no binding or resistance. If all screws move freely, continue to tighten all screws with a screwdriver.

Procedure: Reconnect the Upper Cabinet Power Connection

- 1 Cut the zip-tie securing the AC receptacle and power cable harness to the pedestal and feed them up through the hole in the interface plate into the upper cabinet.
- 2 Reconnect the power cable connector that connects the backplate power supply to the power conditioner (see Figure 9 page 25).

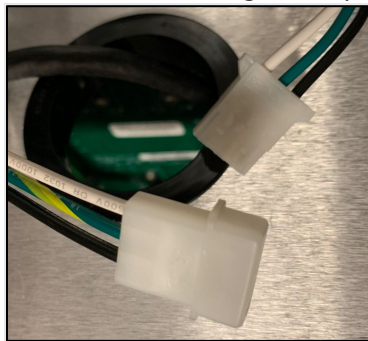


Figure 9 Power cable connector to be Connected to Backplate Power Supply

- 3 Unscrew the ground screw from the interface plate and secure the AC receptacle and green-yellow striped ground wire to the interface plate using the p-clamp and ground screw as shown (see Figure 10 page 26).

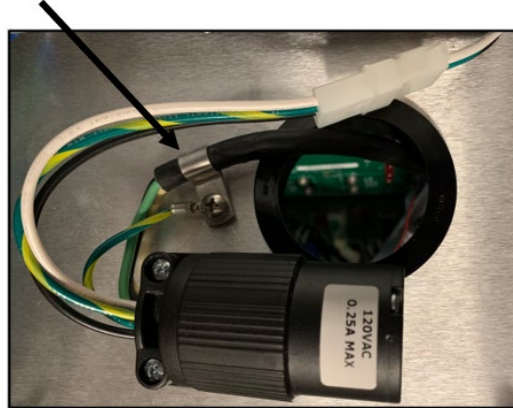


Figure 10 Power Supply with the Ground Screw Securing the P-clamp to the Interface Plate

Upper Cabinet Components - Images and Description

The EAPro Assembly, Supercap Assembly, and Mechanical Pump Control Board are all easily installed and removed without having to remove the entire backplate. Two easily accessible screws secure each of the assemblies to the front of the backplate.

For the Mounting Detail (see Figure 11 page 26), the board assembly has been removed. When installing or removing any assembly, first remove any cables attached to the assembly. Next remove the two screws (A) securing the assembly to the backplate. Then, slide upwards the assembly slightly to disengage it from the keyholes (B), and finally pull the assembly towards you to remove it from the backplate.

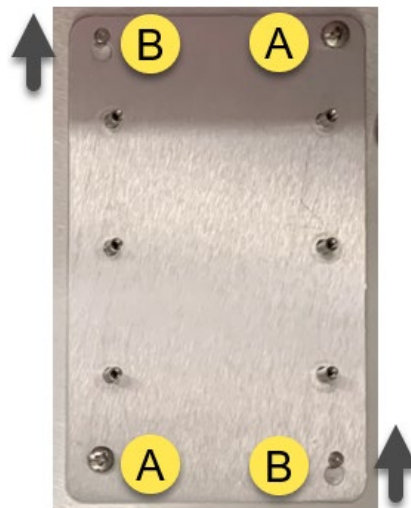


Figure 11 Mounting Detail with Board Assembly Removed

	Indication
A	Mounting Screws
B	Keyhole Mount

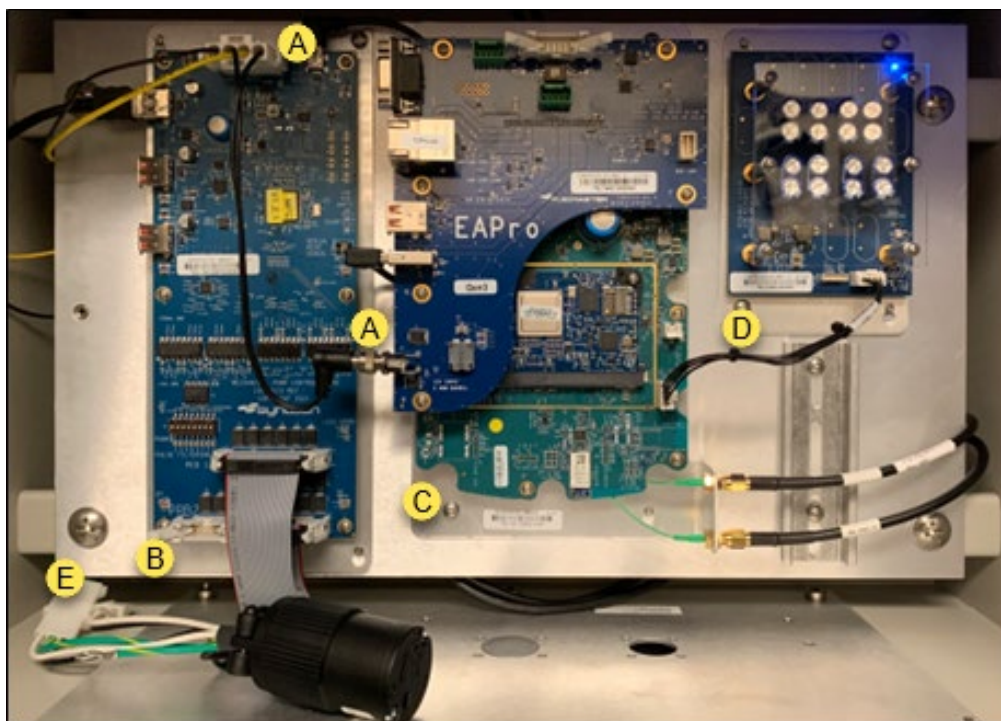


Figure 12 Placement of Assemblies on the Backplate

	Component	Description
A	Incoming power from the AC-DC Power Supply on back of LRU	An AC-DC Power Supply, which converts incoming AC voltage to DC voltage is housed on the rear of the backplate. Replacing the power supply requires removing the four (4) large screws securing the backplate to the cabinet. There are no user serviceable parts on the power supply (fuses, etc.). See an alternate view of this image in Figure 13 page 28
B	Mechanical Pump Control (MPC) Board	The interface between the main processor (the EAPro assembly), mechanical dispenser hose control options (50 Amp Pump Relay Assembly, and/or Dual Control Relay Assembly), and the Pedestal I/O Board.
C	EAPro Assembly	Heart of the system; the main processor, handling communication with FMLive servers, storing authorization and configuration data, controlling the user experience, authorizing transactions, displaying messages, etc.
D	Supercap Assembly	Provides backup power for the EAPro assembly during normal shutdown of the system, as well as during an unscheduled loss of power event.
E	Backplate Assembly	

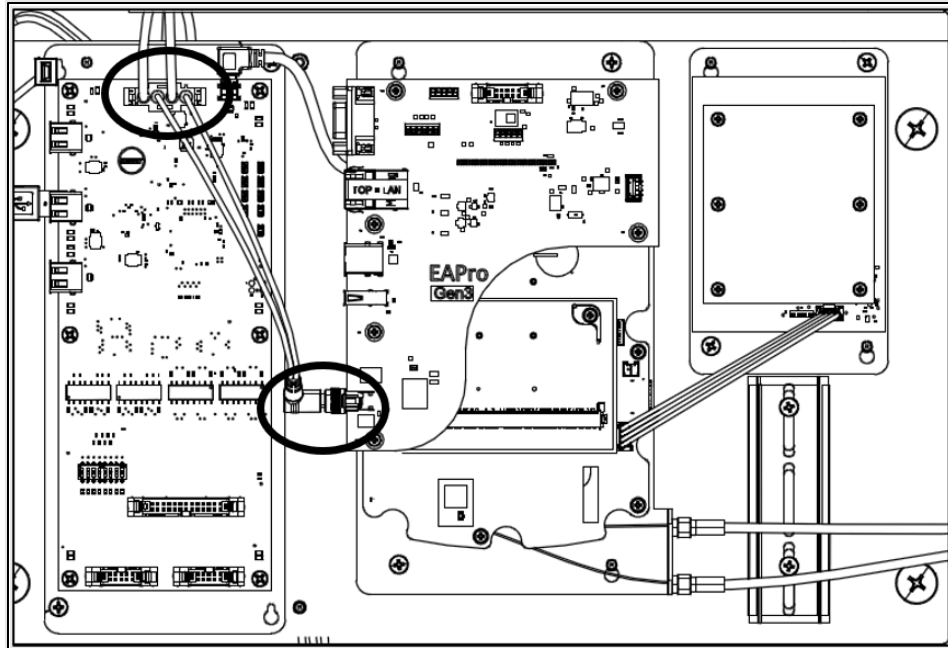


Figure 13 Incoming Power from AC-DC Power Supply on Back of LRU (Alternate View)



Figure 14 LRU Cable Connections

	Component
A	USB and Power Cable Connection to Door Components
B	Cell Modem Antenna Cable Connections to EAPro/Cell Modem

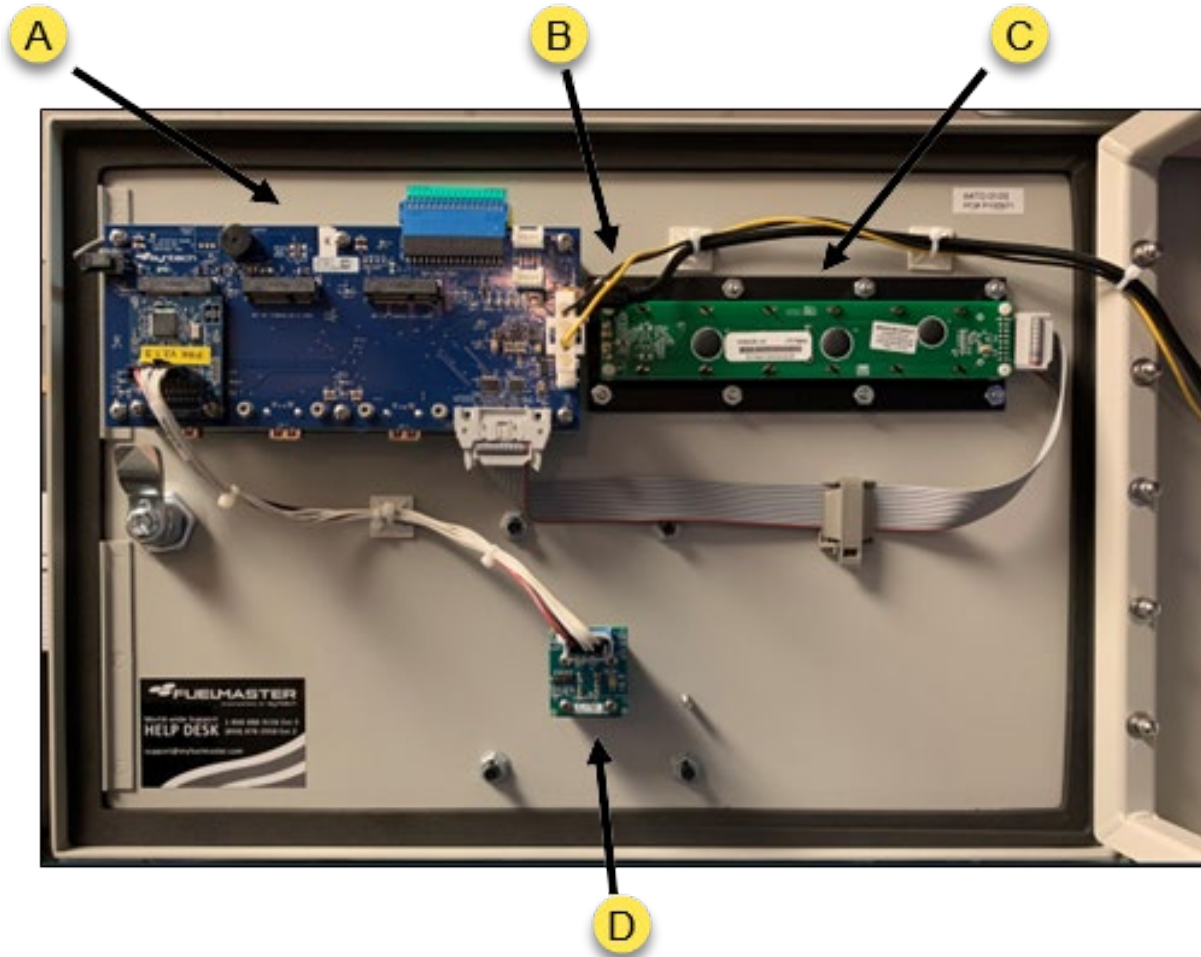


Figure 15 Back of Front Panel Door Components

	Component
A	User Interface Board (UIB)
B	Power and USB Cable Connections
C	LCD Display
D	Prokee Encoder

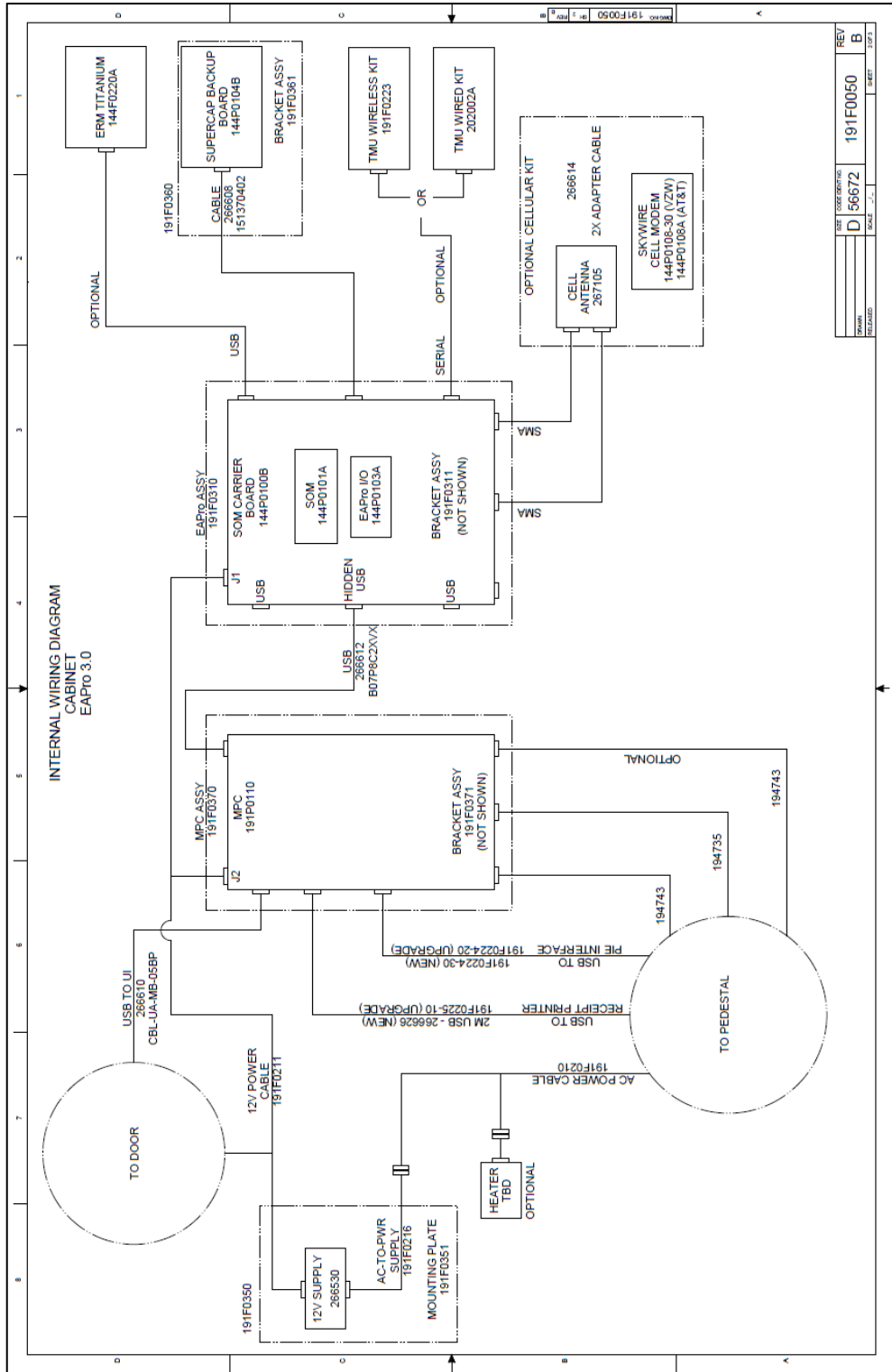


Figure 16 FMU Internal Wiring Diagram - Upper Cabinet

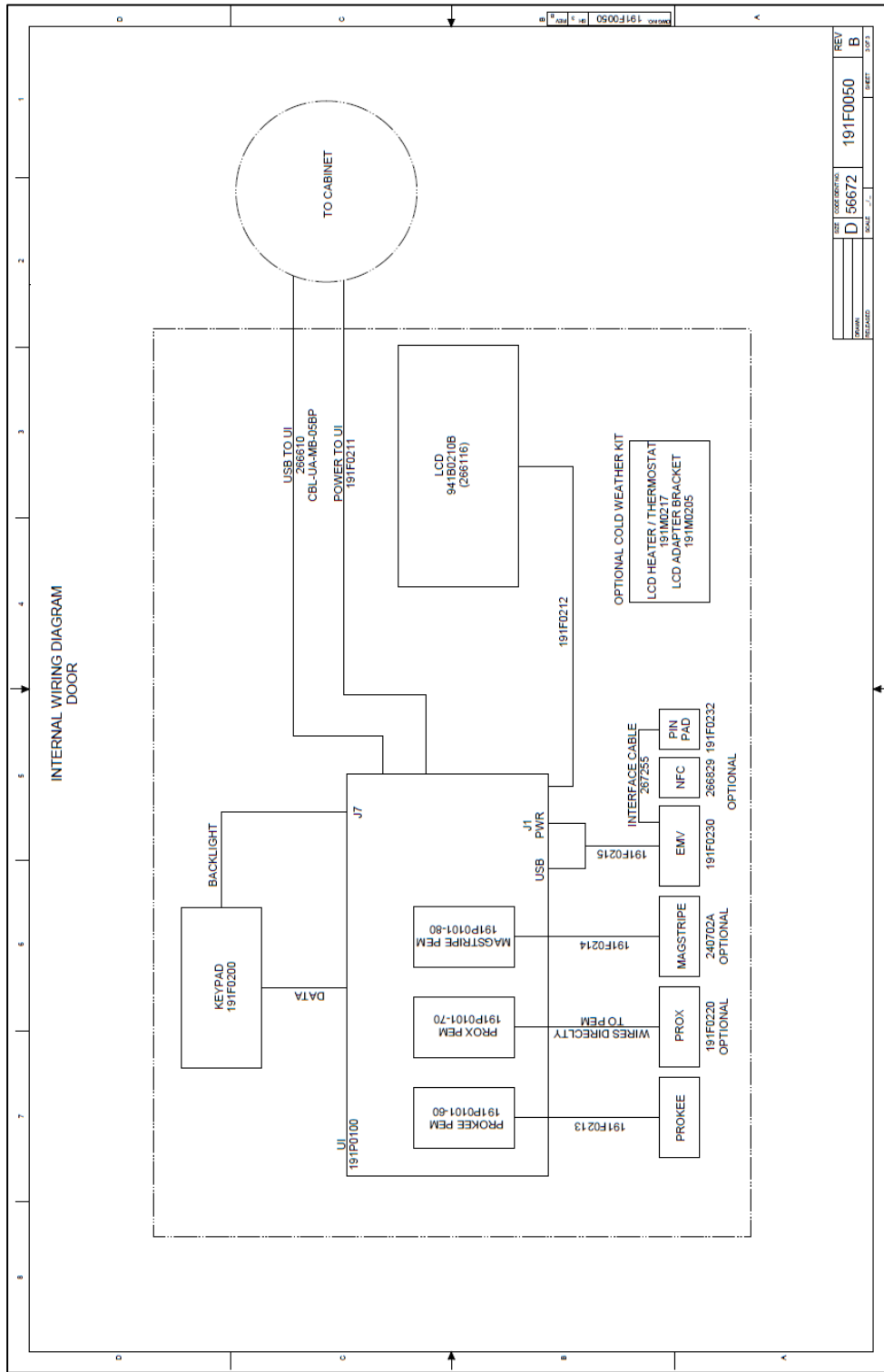


Figure 17 FMU Internal Wiring Diagram - Door Components

In the FMU 5000, the Mechanical Pump Control (MPC) Board is the interface between the main processor (the EAPro assembly), mechanical dispenser hose control options (50 Amp Pump Relay Assembly, and/or Dual Control Relay Assembly), and the Pedestal I/O Board.

Below is an overview of the connectors on the board.

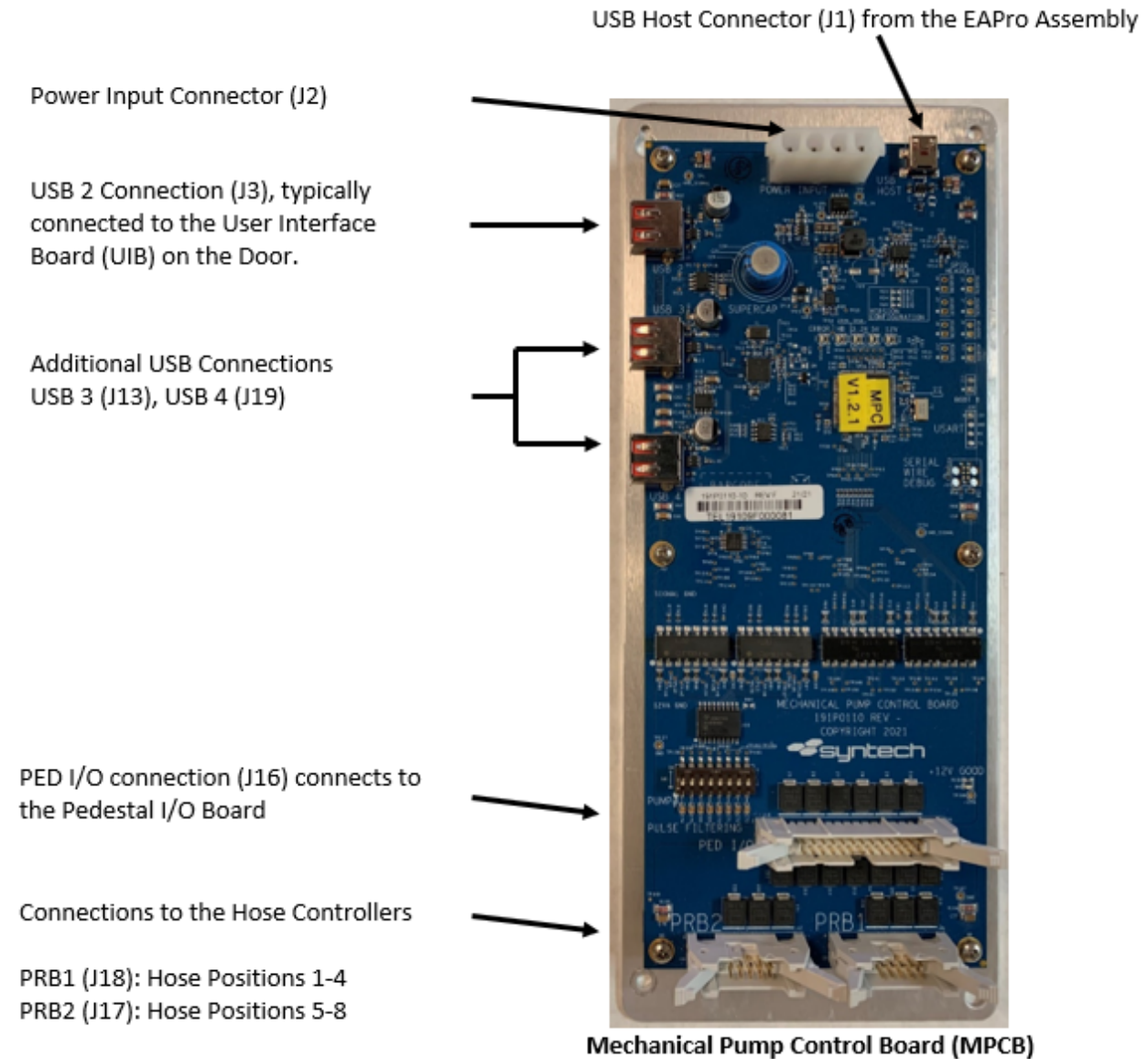


Figure 18 Mechanical Pump Control Board (MPCB) - Connector Overview

Standard Hose Control - Power Conditioner Configuration

The FMU upper pedestal (Figure 19 page 33) can house one hose control option (50-amp Pump Relay Assembly or Dual Control Relay Assembly) on the left side. The right side houses the power conditioner.

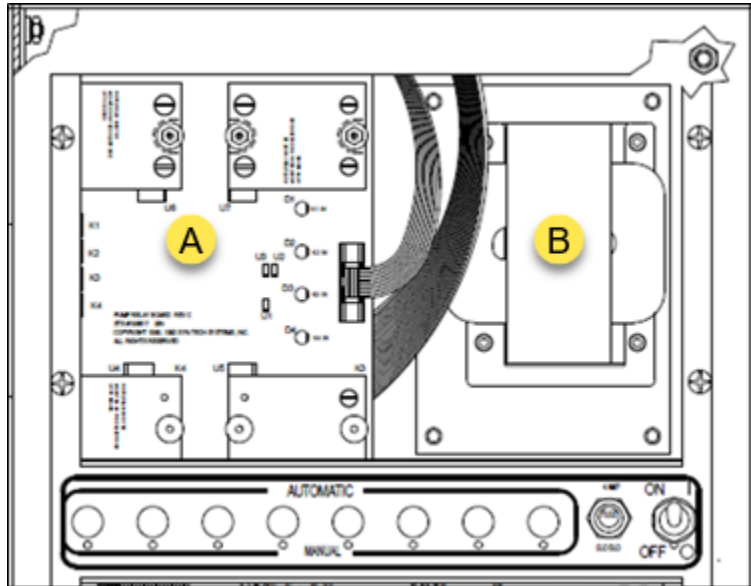


Figure 19 FMU Upper Pedestal

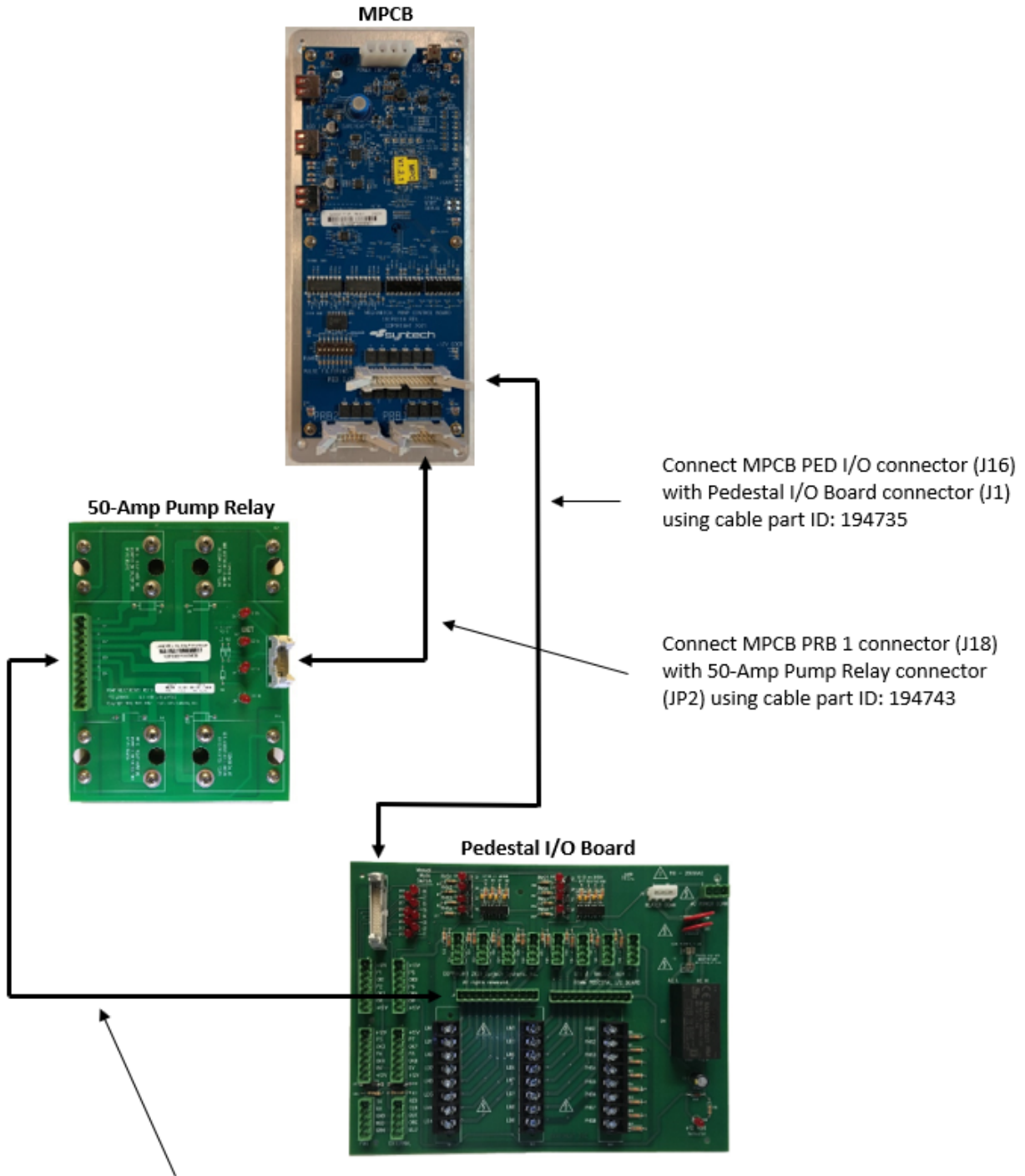
	Indication
A	Hose Control Option
B	Power Conditioner (144F0250)

NOTE The FMU supports using both a 50-Amp Pump Relay Assembly (50 Amp - P/N 198633B) and a Dual Control Relay Assembly (2Amp - P/N 234257) simultaneously. They can co-exist in the same FMU.

Procedure: Reconnect the Mechanical Pump Control Board (MPCB) to the Hose Control Assemblies

Procedure: Reconnect the MPCB to the Pedestal I/O Board

Scenario: Controlling 1-4 Hoses Using the 50-Amp Pump Relay Assembly (198633B)



NOTE - Cable 198730 connecting the 50-Amp Pump Relay Assembly and Pedestal I/O Board should already be in place.

NOTE For wiring of the Pedestal I/O Board, dispensers, pulsers, etc., refer to the document: FuelMaster_FMU_Installation_Guide_for_25xx,_35xx,_&_45xx_v1.01_with_ATPs.pdf

Hose Kits

Every FMU comes standard with two hose kits. Each hose kit supports one hose position. If additional hose kits are required, they must be specified on the order.

The 50-Amp Pump Relay Assembly ships fully populated with four 50 Amp relays. To make full use of the assembly, two additional hose kits must be ordered.

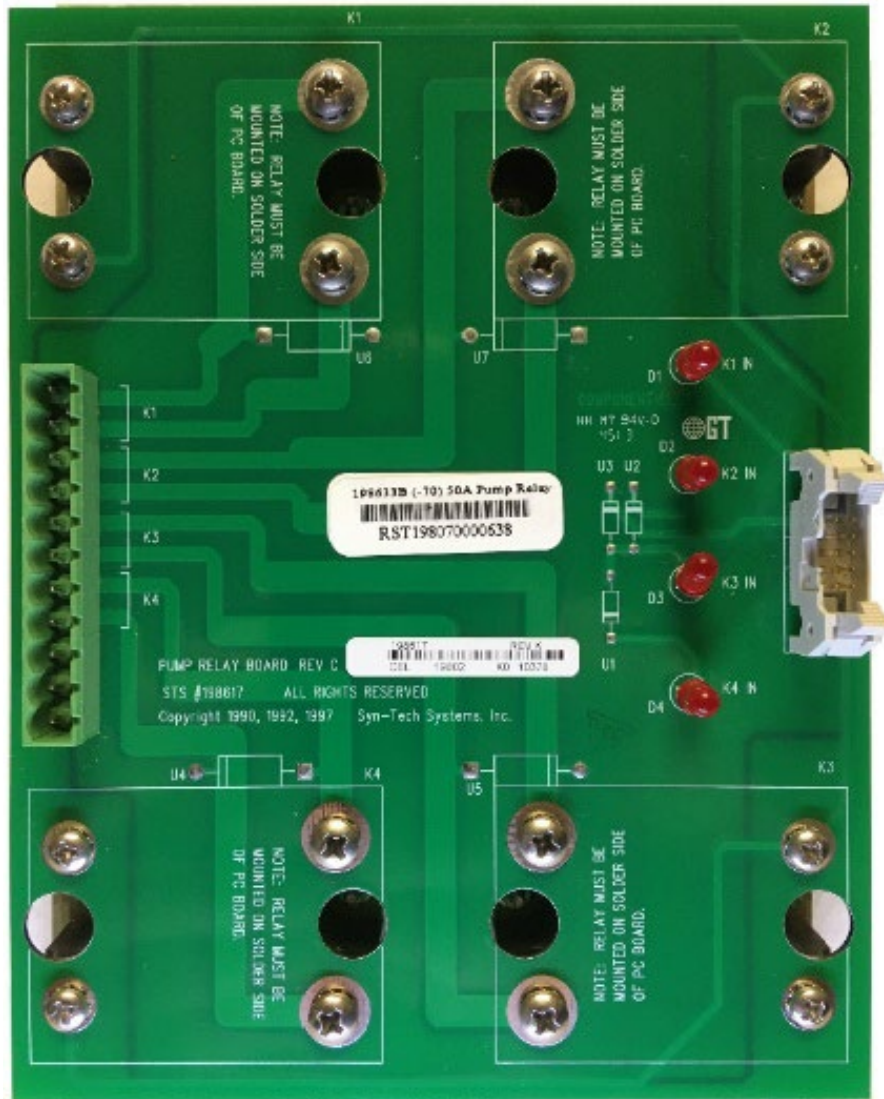


Figure 20 Pump Relay Assy, 50A (198633B)

NOTE

Related documentation for this assembly: PB-021 Solid State Relay Assembly Replacement Procedure.pdf

Controlling 5-8 Hoses Using the 50-Amp Pump Relay Assembly (198633D)

To achieve hose control for hose positions 5-8, additional parts must be ordered.

A second 50-Amp Pump Relay Assembly mounted to the upper pedestal cover must be installed (part ID: 198633D).

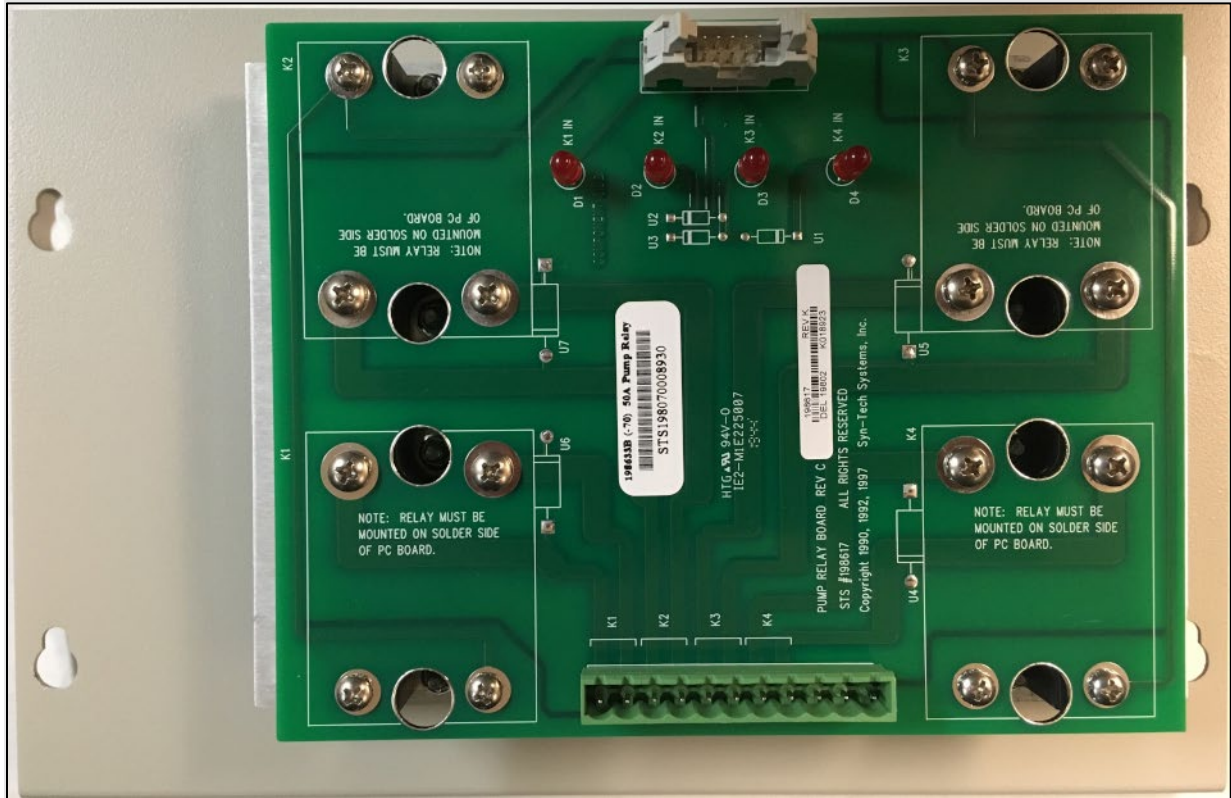


Figure 21 Pump Relay Assy, 50A, attached to Pedestal Cover (198633D)

A second ribbon cable (part ID: 194743) must be connected from PRB 2 (J17) on the MPCB to the 50-Amp Pump Relay Assembly connector (JP2).

A second Pump Relay to Pedestal I/O Cable harness (198730) must be connected from (JP1) on the 50-Amp Pump Relay Assembly to the (J9) connector on the Pedestal I/O Board.

To see a completed install, see Figure 22 page 37.



Figure 22 Completed Install of 50-Amp Pump Relay Assembly (198633D)

NOTE

Related documentation for Pedestal Cover Assembly: PB-231_Field Installation of FMU Power Conditioner.pdf

Additional Hose Kits must be specified on the order and installed to support the additional hose positions. See below for a breakdown of these parts.

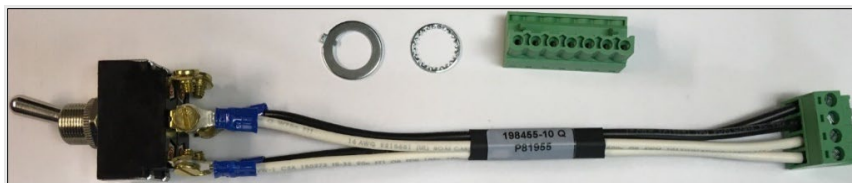


Figure 23 Hose Kit, Pump Relay Board, 50 Amp (199001)

PART ID	DESCRIPTION
199001	HOSE KIT, COMMERCIAL, 50 AMP

NOTE

Toggle switch part ID is 198455.



Figure 24 Ribbon Cable Assy, 10-Pin, Satellite IO to Pump Relay (180556-20)

PART ID	DESCRIPTION
194743-10	Ribbon Cable Assy, 10-Pin, Satellite IO to Pump (16-inch)
180556-20	Ribbon Cable Assy, 10-Pin, Satellite IO to Pump (20-inch) <i>Alternate Part</i>

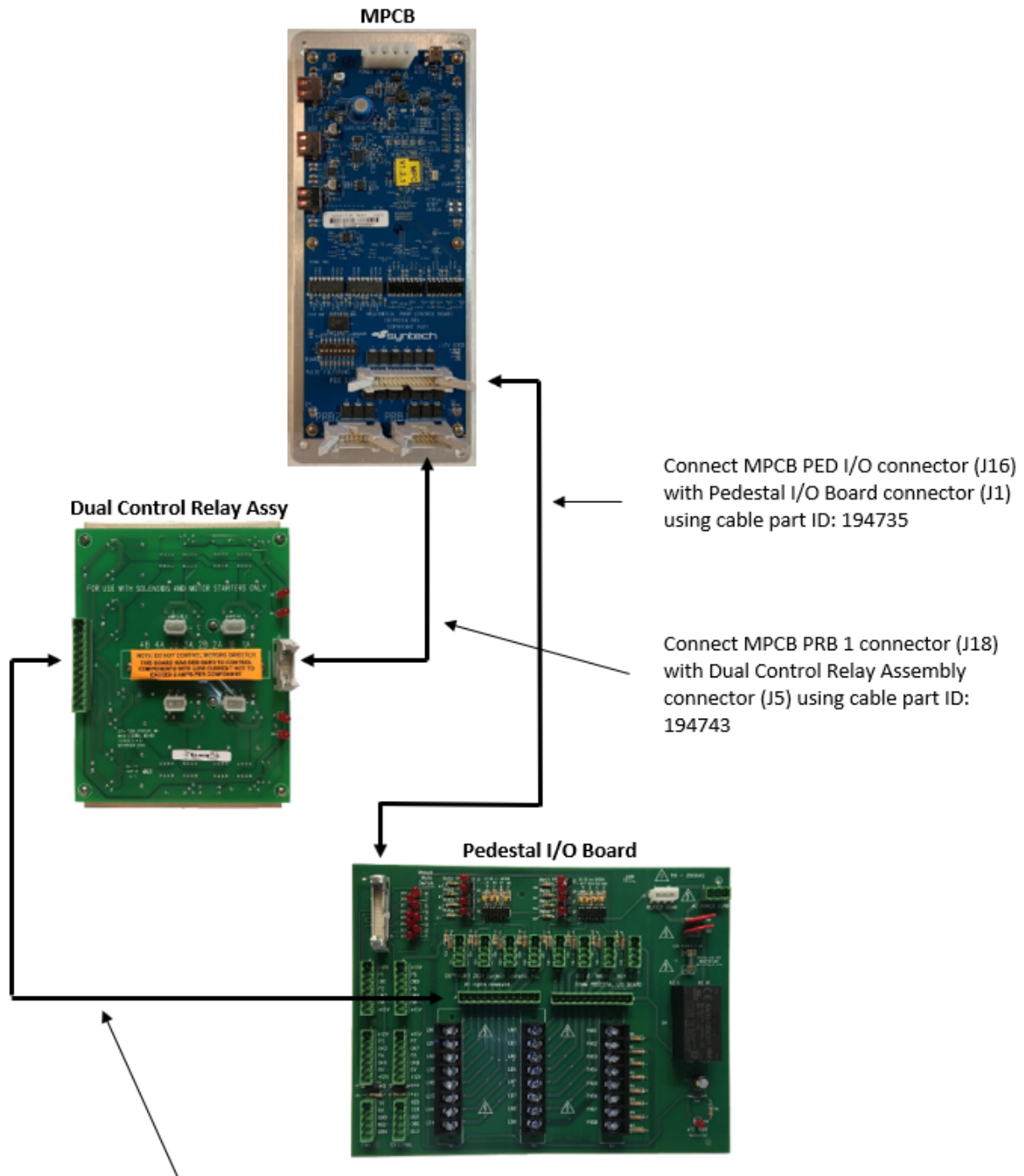
Used with Pump Relay Assy or Dual Control Relay Assy.



Figure 25 Cable Assy, Pump Relay to Pedestal I/O (198730-10)

STS PART #	MFG PART ID	DESCRIPTION
198730	198730-10	Cable Assy, Pump Relay to Pedestal I/O, (17 in long)

Scenario: Controlling 1-4 Hoses Using the Dual Control Relay Assembly (234257)



NOTE - Cable part ID: 198730 connecting the Dual Control Relay Assembly and Pedestal I/O Board should already be in place.

NOTE For wiring of the Pedestal I/O Board, dispensers, pulsers, etc., refer to the document: FuelMaster_FMU_Installation_Guide_for_25xx,_35xx,_&_45xx_v1.01_with_ATPs.pdf

Hose Kits

Every FMU comes standard with two hose kits. Each hose kit supports one hose position. If additional hose kits are required, they must be specified on the order.

The Dual Control Relay Assembly (DCRA) ships fully populated with four transistor-style relays. To make full use of the assembly, two additional hose kits must be ordered.

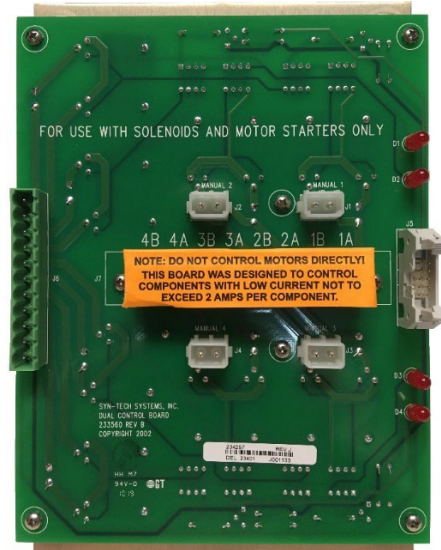


Figure 26 Dual Control Relay Board Assy, 2A, (234257)

IMPORTANT Do not control motors directly! This board was designed to control components with low current (solenoids, motor starters) not to exceed 2 amps per component.

What this means:

- You *cannot* control motors directly using the Dual Control Relay Assembly.
- The Dual Control Relay Assembly was designed to connect with *low current* devices (i.e., motor contact starters, solenoid valves, etc.) with the devices or the circuit not exceeding 2 Amps.
- The Dual Control Relay Assembly can support two (2) low current devices on each of the four dedicated positions on the board.

Hose or Fueling Position J1	1A-1B
Hose or Fueling Position J2	2A-2B
Hose or Fueling Position J3	3A-3B
Hose or Fueling Position J4	4A-4B

- Two (2) Dual Control Relay Assemblies can be supported by an FMU.
 - Each assembly supports (up to) four positions each; a total of eight (8) hose/fueling positions can be supported per FMU.
 - Each hose/fueling position can support two (2) low current devices; a total of sixteen (16) low current devices per FMU.

NOTE Related documentation: PB-087_Installation of the Low Power-Dual Control Board

Controlling 5-8 Hoses Using the Dual Control Relay Assembly (234257B)

To achieve hose control for hose positions 5-8, additional parts must be ordered:

A second Dual Control Relay Assembly mounted to the upper pedestal cover must be installed (part ID: 234257B).



Figure 27 Dual Control Relay Board Assy, 2A, attached to Pedestal Cover (234257B)

A second ribbon cable (part ID: 194743) must be connected from PRB 2 (J17) on the MPCB to the 50-Amp Pump Relay Assembly connector (JP2).

A second Pump Relay to Pedestal I/O Cable harness (198730) must be connected from (JP1) on the 50-Amp Pump Relay Assembly to the (J9) connector on the Pedestal I/O Board. The completed install will look like the image on page 37.

NOTE Related documentation for Pedestal Cover Assembly: PB-231_Field Installation of FMU Power Conditioner.pdf

Additional Hose Kits must be specified on the order and installed to support the additional hose positions. See below for a breakdown of these parts.

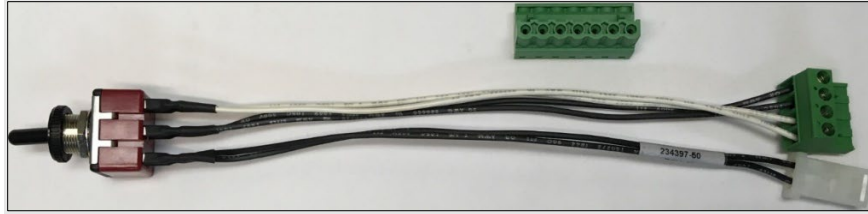


Figure 28 Hose Kit, Dual Control Relay Board, 2 Amp Max (199001A)

PART ID	DESCRIPTION
199001A	HOSE KIT, DUAL CONTROL

NOTE Toggle switch part ID is: 234397C. *The same toggle switch is used in CE certified FMU's.



Figure 29 Visual Comparison of Kit Switches for 199001 (Left) and 199001a (Right)



Figure 30 Ribbon Cable Assy, 10-Pin, Satellite IO to Pump Relay (180556-20)

PART ID	DESCRIPTION
180556-20	Ribbon Cable Assy, 10-Pin, Satellite IO to Pump; used with Pump Relay Assy or Dual Control Relay Assy



Figure 31 Cable Assy, Pump Relay to Pedestal I/O (198730-10)

STS PART #	MFG PART ID	DESCRIPTION
198730	198730-10	Cable Assy, Pump Relay to Pedestal I/O, (17 in long)

Procedure: Address Communications Method and Connection

The information here was previously mentioned under the Installation Summary on page 24.

Cellular Modem Connection

If relying on a Cell Modem Connection, skip this step. The cell service provider and cell modem type are known prior to FMU assembly. The FMU ships with the cell modem preinstalled and connected to the EAPro assembly. The cell antenna is preinstalled on the FMU sun cover, and its cables are routed and connected to the cell mode.

Hard-Wired Ethernet Network Connection

If relying on Hard-wired Ethernet Network Connection, perform the following:

- 1 Run the ethernet cable through conduit feeding into the pedestal of the FMU, through the interface plate, and into the upper cabinet (Figure 32 page 43).
- 2 Terminate the ethernet connection at the RJ-45 connector on the EAPro assembly (Figure 33 page 44).
- 3 Attach the ethernet cable into the blue surge protection device (Figure 34- Figure 36 page 44-45).
- 4 Refer to [FuelMaster_FM_Installation_Guide_for_25xx_35xx_&_45xx_v1.01_with_ATPs.pdf](#) for more information.

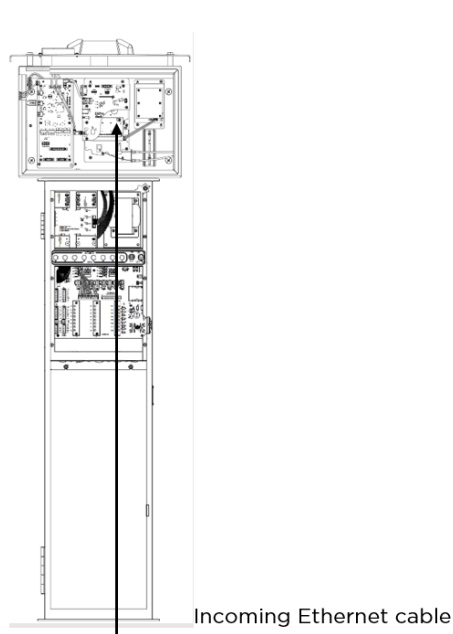


Figure 32 Conduit Run into FMU

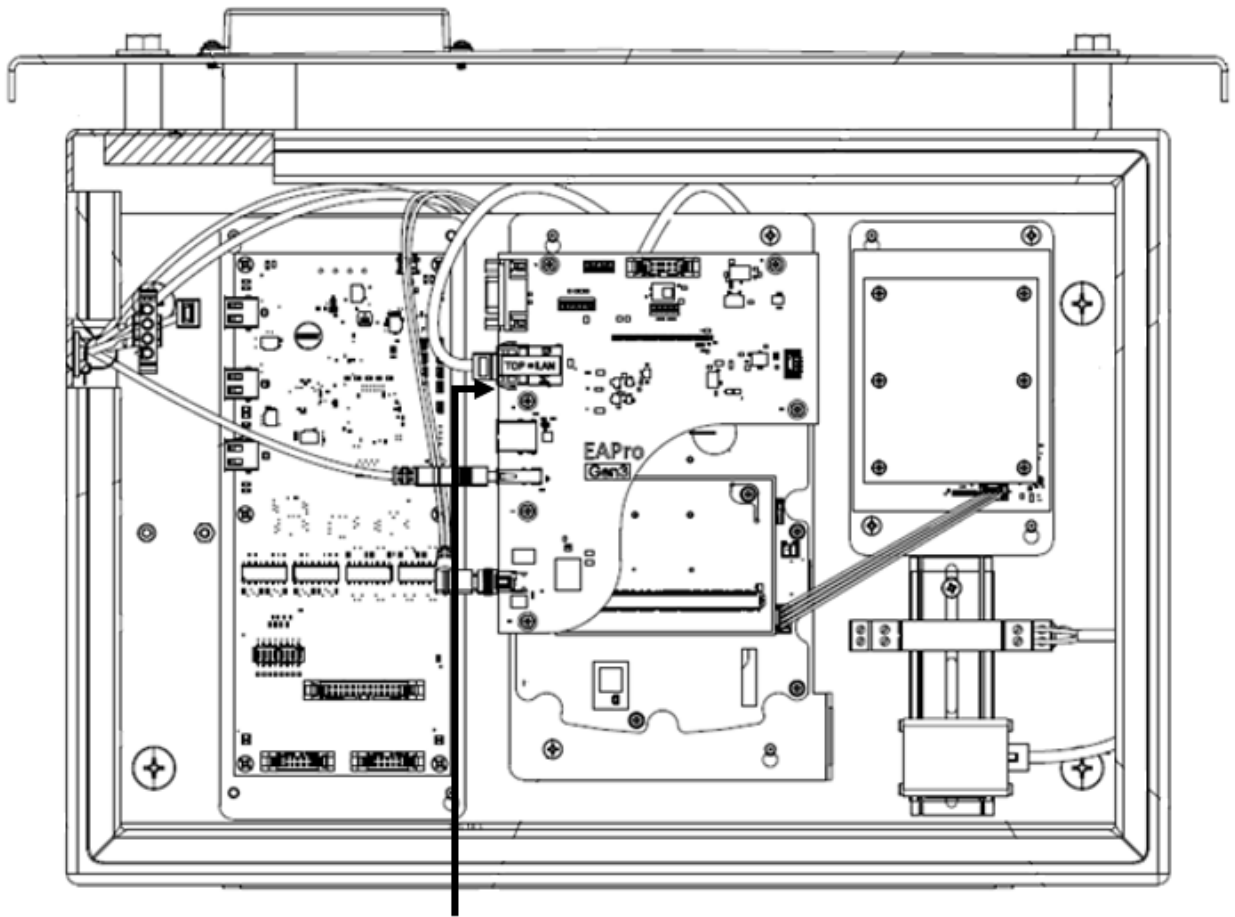


Figure 33 Ethernet Connection Terminated with an RJ-45 Connector on the EAPro Assembly

FMU 5000 Wired Ethernet Surge Protection Kit for Wired Ethernet Models Only

FMU 5000 units configured for hardwired Ethernet are built with an Ethernet surge protection device (SPD) pre-installed on the DIN rails inside the upper cabinet.

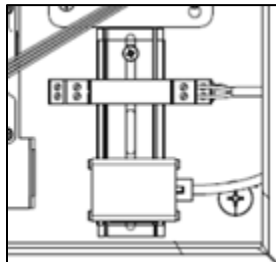


Figure 34 Ethernet Surge Protection Device



Figure 35 Citel Ethernet Surge Protection Device with Frontal and Side Views

If using the Ethernet Surge Kit Option, connect the incoming Ethernet cable to the 'Line' input on the surge protector.

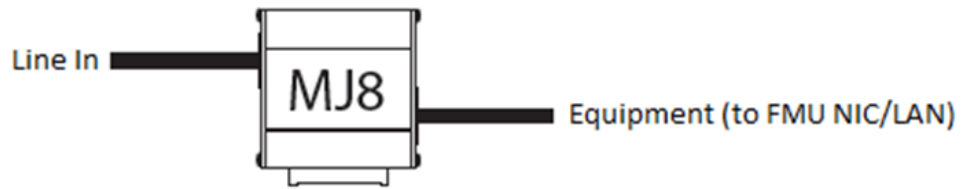


Figure 36 Ethernet Cable Connected to the 'Line' Input on the Surge Protector

EAPro Board Connections

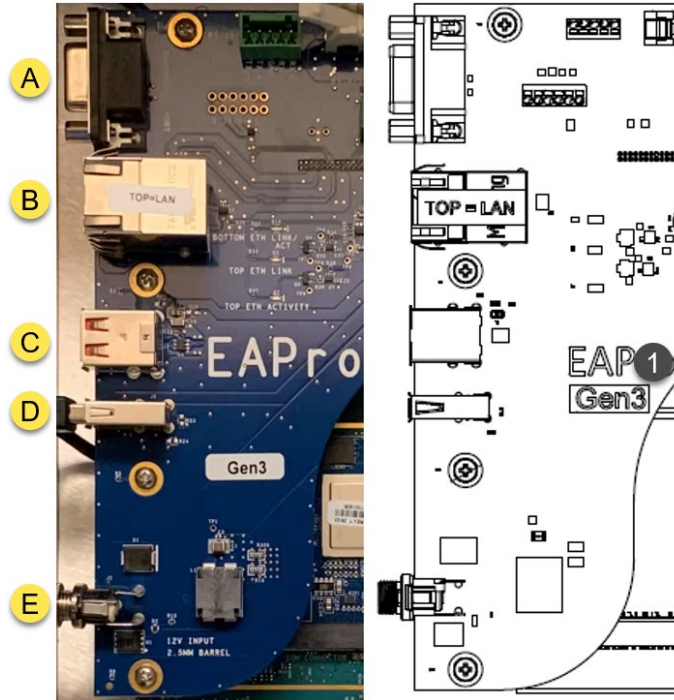


Figure 37 EAPro (191F0310) Left-side Connections, Top to Bottom Detail

	Connector	Connection	Comments
A	J5	Diagnostic Port	<i>Syntech usage only</i>
B	J4	Ethernet	Top = LAN Bottom = <i>Not Used</i>
C	J3	USB	<i>Expansion USB port</i>
D	J2	USB	<i>Expansion USB port</i>
E	J1	EAPro Power Connector	12V DC Supply (fed from the Power Supply Board on the backplate)

FMU Pedestal Wiring Connections with Dispensers, Pulsers, etc.

FMU pedestal / Pedestal I/O Board wiring and connections are covered in the document:

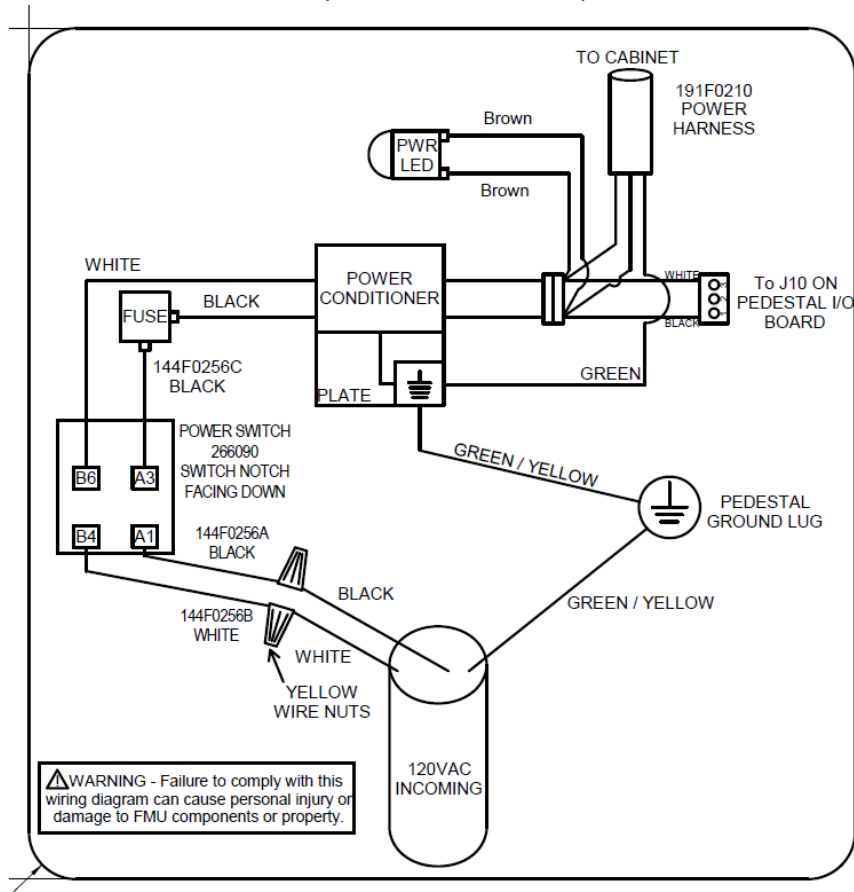
[FuelMaster_FMU_Installation_Guide_for_25xx,_35xx,_&_45xx_v1.01_with_ATPs.pdf](#)

The latest guide is dated 2022-12-16.

- Pedestal installation starts on pages 20-23
- Pedestal-Dispenser wiring is covered on pages 33-54
- Pedestal-Pulsar wiring is covered on pages 59-66

Procedure: Connect Main Power

Figure 38 page 47 shows how to wire incoming power (110V AC) and clarifies how the power conditioner and its components are incorporated into the wiring scheme.



263376-4

Figure 38 How to Wire Incoming Power (110AC)

NOTE

The wiring diagram can also be found in document: PB-231_Field Installation of FMU Power Conditioner.pdf.

For the FMU 4000 and FMU 5000 with Powervar, modify the pedestal (931C0100-110 &-130) wiring harness (144F0257-10 or 191F0210-10) as shown in the Figure 39 on page 48.

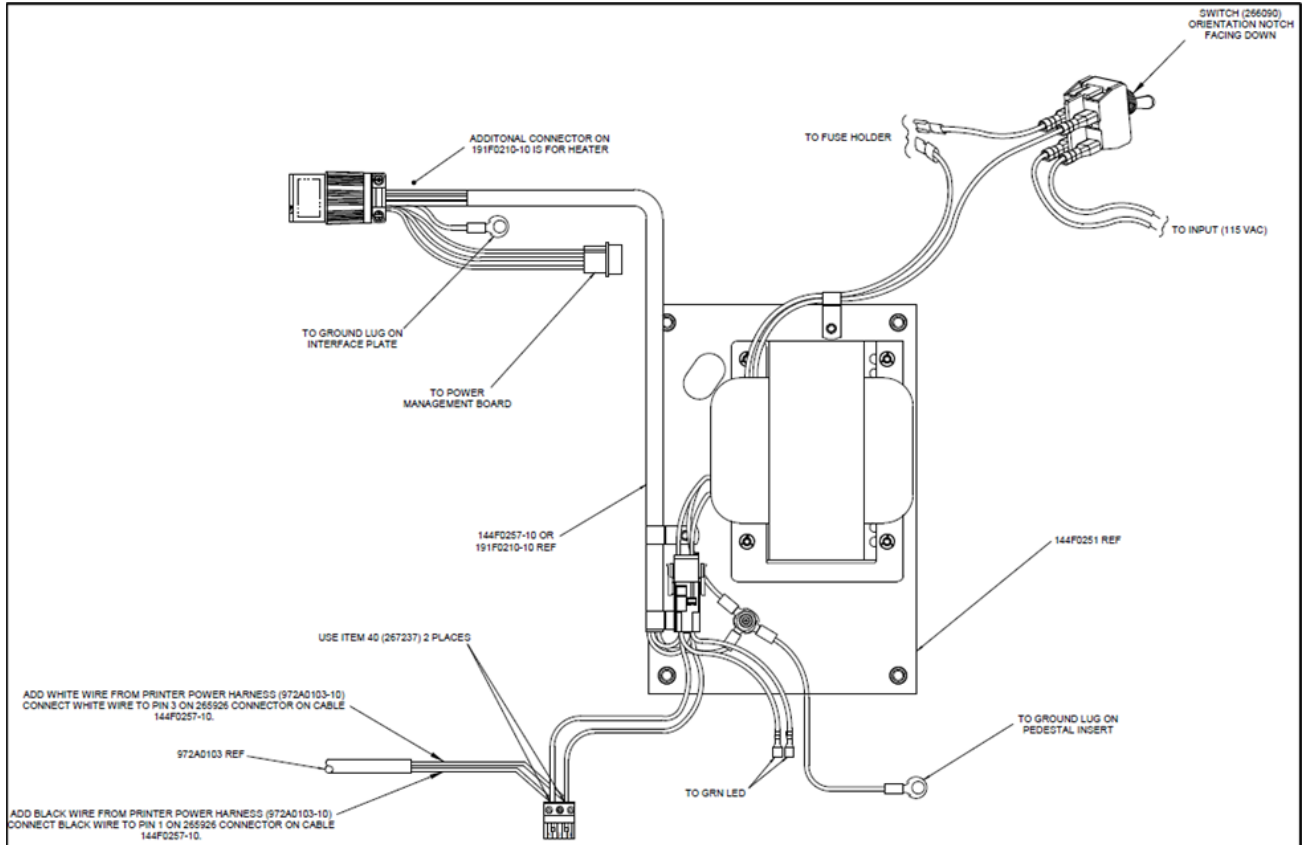


Figure 39 FMU 5000 Receipt Printer Connections

Procedure: Turn FMU Power On, Registration, and Configure the Unit

When you are ready to power on the unit, please contact Syntech Systems Support at (800) 888-9136 Ext. 2, so they can assist with registration and configuration of the FMU 5000 unit.