



Frontier

Single and Dual Installation Manual

Computer Programs and Documentation

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Federal Communications Commission (FCC) Warning

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 when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

Follow the Regulations

Relevant national regulations related to installation, inspection, maintenance, and service must be observed. Where a regulation may conflict with information in this manual, the regulation must be followed.

MID

The Frontier dispenser conforms to Measuring Instruments Directive (MID) 2004/22/EC.
The approval number is UK/0126/0170.

ATEX

The Frontier dispenser is ATEX certified. The approval number is ITS05ATEX53877.

Special Conditions for Safe Use:

If petrol dispensing pumps are supplied without hose, nozzle, breakaway coupling, sight glass, swivel or shear valve, in that case pumps will be suffixed with "X" in the certificate. Correct installation needs to be ensured. The petrol dispensing pumps are installed with certified components only as per European Directives.

Table of Contents

1 – Introduction	1-1
Purpose	1-1
Required Tools	1-1
Related Documents	1-1
Abbreviations and Acronyms	1-2
Common Terms	1-3
2 – Important Safety Information	2-1
3 – Hazardous Locations	3-1
Zoning Diagram	3-1
4 – Preliminary Installation Information	4-1
Required Equipment and Materials	4-1
Read NFPA 30A and NFPA 70	4-1
Important Considerations when Changing Fuel Types	4-2
Preparing for Installation	4-3
Gaining Access to and from Frontier Cabinet	4-4
Before Mounting Unit on Fuel Island	4-4
Verifying and Determining Plumbing Requirements	4-4
Adapting Pit Box	4-5
Units with Ground Fault Interrupt (GFI)	4-5
Installing Conduit at Pump/Dispenser	4-5
5 – Installing Units on Island	5-1
Mounting Unit to Island	5-1
Lifting Frontier Units	5-1
Installation Instructions for Frontier Suction System	5-3
Installation Instructions for Frontier Pressure System	5-7
Installation Diagram for Frontier	5-11
Connecting Pump/Dispenser Inlet Pipes	5-16
Connecting Vapor Return Line to Vapor Shear Valve	5-22
Anchoring Pump/Dispenser to Island	5-23
6 – Installing Conduit and Wiring in Unit	6-1
Preparing J-box Field Conduit	6-1
Installing Conduit Through Vapor Barrier	6-3
Installing Conduit Through Side of Electronics Cabinet	6-4
Installing Wiring	6-5
Operating Environment	6-5
Wiring External to Dispenser	6-5
Supplying Connections for Three-phase Pump	6-8
Supplying Connections for One-phase Pump	6-9
Completing Field Wiring	6-9
Potting Conduit Stubs	6-10
Potting up to Unit	6-10
Potting Within Unit	6-10

Table of Contents

Connecting to In-station Diagnostic (ISD) Vapor Flow Meter	6-12
At Dispensing Unit.	6-12
Epoxy Sealing	6-13
 7 – Installing Breakaways, Hoses, Swivels, and Nozzles	 7-1
Units Without Hose Retractors	7-2
 8 – Completing Installation	 8-1
Do Not Turn on AC Power	8-1
Installation Checklists	8-1
Mechanical and Hydraulic Related Items	8-2
Electrical Related Items	8-3
Purging Air from System and Testing	8-4
For New Dispensers (Purging Through Shear Valve)	8-4
Special Steps to Purge Air from Underground Lines	8-4
For New and Existing Pumps and Dispensers with Fuel in Lines (Purging Through Nozzle)	8-5
Verifying Shear Valve, Nozzle, and Dispenser Shutoff Operation	8-6
Calibration Procedure for Frontier Units	8-7
Frontier (Liter Unit of Measure)	8-7
 9 – Reference Information	 9-1
Reference Contents	9-1
Installation Differences when Replacing The Advantage Series	9-2
Electrical Requirements	9-3
Plumbing Requirements	9-11
Pipe Installation	9-11
Pipe Size	9-12
 Appendix A: Elevation Diagrams	 A-1
 Appendix B: Wiring Diagrams	 B-1
 Index	 Index-1

1 – Introduction

Purpose

This manual contains step-by-step instructions for installing Gilbarco® Frontier pumps and dispensers. Installation of these pumps as a group is similar except for some differences in field wiring, calibration, parameter setting, and hydraulic connections. This manual does not include site preparation instructions. After the installation is complete, a Gilbarco Authorized Service Contractor (ASC) must commission the unit to activate the warranty. Proper completion of the checklist is required for commissioning of the unit.

IMPORTANT INFORMATION

Read and follow all safety precautions outlined in [“Important Safety Information”](#) on [page 2-1](#) and save it in a readily accessible location.

Biodiesel greater than 5% and ethanol greater than 10% is not evaluated.

Required Tools

The following tools are required for installing the Frontier pumps and dispensers:

- Flat-blade and Phillips® Screwdrivers
- 1/4-inch Nut Driver
- 5/16-inch Nut Driver
- 7-mm Nut Driver
- Putty knife
- Static Guard Wrist Strap
- Cutters
- Pliers
- Electronic Multimeter

Related Documents

Document Number	Title	GOLD SM Library
MDE-2755	Gilbarco STP Control and Dispenser Isolation Relay Box PA0287	Environmental Products
MDE-5077	Frontier Owner's Manual	Frontier
MDE-5078	Frontier Technical Manual	Frontier
FE-321	Gilbarco STP Isolation Relay Box PA0287	Engineering Diagrams
577013-796	In-station Diagnostic Vapor Flow Meter Installation Guide	-

Abbreviations and Acronyms

Term	Description
ASC	Authorized Service Contractor
ASTM	American Society for Testing and Materials
ATEX	Atmosphere Explosible
CAT5	Category 5
CIM™	Customer Interface Module
CRIND®	Card Reader in Dispenser
GFI	Ground Fault Interrupt
GOLD	Gilbarco Online Documentation
IFSF	International Forecourt Standards Forum
ISD	In-station Diagnostic
J-box	Junction Box
MPD	Multi Product Dispenser
NEC®	National Electrical Code
NFPA	National Fire Protection Association
NPT	<ul style="list-style-type: none">• National Pipe Taper• National Pipe Thread
PEI	Petroleum Equipment Institute
POS	Point of Sale
PTFE	PolyTetraFluoroEthylene (chemical name for Teflon®)
PVC	Polyvinyl Chloride
RCD	Residual Current Device
STP	Submersible Turbine Pump
TCP/IP	Transmission Control Protocol/Internet Protocol
TLS	Tank Level Sensor
UL®	Underwriters Laboratories
UST	Underground Storage Tank
W&M	Weights and Measures

Common Terms

Term	Description
CIM Door	CIM Door - Main pump and CRIND displays are mounted on this door.
Combo	This unit is configured as Master on one side and Satellite on the other.
Dispenser	A dispensing device that receives fuel under pressure from the Submersible Turbine Pump (STP) at the Underground Storage Tank (UST).
Grade	Fuel that is dispensed and has an assigned price.
Listed	Products bearing authorized Listing Mark of Underwriters Laboratories (UL) as manufacturer's declaration that product complies with UL's requirements in accordance with terms of UL's Listing and Follow-up Service agreement.
Master	This unit dispenses fuel to one saddle tank and to a second saddle tank through a satellite unit.
Product	Refers to fuel in storage tank.
Pump	A dispensing device that utilizes a self-contained pumping unit and motor to move fuel from the storage tank using suction.
Satellite	A dispensing unit that receives product from, and registers at the Master unit allowing both saddle tanks on a vehicle to be filled at the same time.
SMART Meter™	Electronic device that measures the flow of product from the UST to the end user.
Teflon	The DuPont™ trade name for PolyTetraFluoroEthylene (PTFE).

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2 – Important Safety Information

Notes: 1) *Save this Important Safety Information section in a readily accessible location.*

- 2) *Although DEF is non-flammable, Diesel is flammable. Therefore, for DEF cabinets that are attached to Diesel dispensers, follow all the notes in this section that pertain to flammable fuels.*




This section introduces the hazards and safety precautions associated with installing, inspecting, maintaining, or servicing this product. Before performing any task on this product, read this safety information and the applicable sections in this manual, where additional hazards and safety precautions for your task will be found. Fire, explosion, electrical shock, or pressure release could occur and cause death or serious injury, if these safe service procedures are not followed.

Preliminary Precautions

You are working in a potentially dangerous environment of flammable fuels, vapors, and high voltage or pressures. Only trained or authorized individuals knowledgeable in the related procedures should install, inspect, maintain, or service this equipment.

Emergency Total Electrical Shut-Off

The first and most important information you must know is how to stop all fuel flow to the pump/dispenser and island. Locate the switch or circuit breakers that shut off all power to all fueling equipment, dispensing devices, and Submerged Turbine Pumps (STPs).

 WARNING	
	The EMERGENCY STOP, ALL STOP, and PUMP STOP buttons at the cashier's station WILL NOT shut off electrical power to the pump/dispenser. This means that even if you activate these stops, fuel may continue to flow uncontrolled.
	You must use the TOTAL ELECTRICAL SHUT-OFF in the case of an emergency and not the console's ALL STOP and PUMP STOP or similar keys.

Total Electrical Shut-Off Before Access

Any procedure that requires access to electrical components or the electronics of the dispenser requires total electrical shut off of that unit. Understand the function and location of this switch or circuit breaker before inspecting, installing, maintaining, or servicing Gilbarco equipment.

Evacuating, Barricading, and Shutting Off

Any procedure that requires access to the pump/dispenser or STPs requires the following actions:



- An evacuation of all unauthorized persons and vehicles from the work area
- Use of safety tape, cones, or barricades at the affected unit(s)
- A total electrical shut-off of the affected unit(s)

Read the Manual

Read, understand, and follow this manual and any other labels or related materials supplied with this equipment. If you do not understand a procedure, call the Gilbarco Technical Assistance Center (TAC) at 1-800-743-7501. It is imperative to your safety and the safety of others to understand the procedures before beginning work.

Follow the Regulations

Applicable information is available in National Fire Protection Association (NFPA) 30A; *Code for Motor Fuel Dispensing Facilities and Repair Garages*, NFPA 70; *National Electrical Code (NEC)*, Occupational Safety and Health Administration (OSHA) regulations and federal, state, and local codes. All these regulations must be followed. Failure to install, inspect, maintain, or service this equipment in accordance with these codes, regulations, and standards may lead to legal citations with penalties or affect the safe use and operation of the equipment.

Replacement Parts

Use only genuine Gilbarco replacement parts and retrofit kits on your pump/dispenser. Using parts other than genuine Gilbarco replacement parts could create a safety hazard and violate local regulations.

Federal Communications Commission (FCC) Warning

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Safety Symbols and Warning Words

This section provides important information about warning symbols and boxes.

Alert Symbol



This safety alert symbol is used in this manual and on warning labels to alert you to a precaution which must be followed to prevent potential personal safety hazards. Obey safety directives that follow this symbol to avoid possible injury or death.

Signal Words

These signal words used in this manual and on warning labels tell you the seriousness of particular safety hazards. The precautions below must be followed to prevent death, injury, or damage to the equipment:



DANGER: Alerts you to a hazard or unsafe practice which will result in death or serious injury.



WARNING: Alerts you to a hazard or unsafe practice that could result in death or serious injury.



CAUTION with Alert symbol: Designates a hazard or unsafe practice which may result in minor injury.



CAUTION without Alert symbol: Designates a hazard or unsafe practice which may result in property or equipment damage.

Working With Fuels and Electrical Energy Prevent Explosions and Fires

Fuels and their vapors will explode or burn, if ignited. Spilled or leaking fuels cause vapors. Even filling customer tanks will cause potentially dangerous vapors in the vicinity of the dispenser or island.

DEF is non-flammable. Therefore, explosion and fire safety warnings do not apply to DEF lines.

Important Safety Information

No Open Fire



Open flames from matches, lighters, welding torches or other sources can ignite fuels and their vapors.

No Sparks - No Smoking



Sparks from starting vehicles, starting or using power tools, burning cigarettes, cigars or pipes can also ignite fuels and their vapors. Static electricity, including an electrostatic charge on your body, can cause a spark sufficient to ignite fuel vapors. Every time you get out of a vehicle, touch the metal of your vehicle, to discharge any electrostatic charge before you approach the dispenser island.

Working Alone

It is highly recommended that someone who is capable of rendering first aid be present during servicing. Familiarize yourself with Cardiopulmonary Resuscitation (CPR) methods, if you work with or around high voltages. This information is available from the American Red Cross. Always advise the station personnel about where you will be working, and caution them not to activate power while you are working on the equipment. Use the OSHA Lockout/Tagout procedures. If you are not familiar with this requirement, refer to this information in the service manual and OSHA documentation.

Working With Electricity Safely

Ensure that you use safe and established practices in working with electrical devices. Poorly wired devices may cause a fire, explosion or electrical shock. Ensure that grounding connections are properly made. Take care that sealing devices and compounds are in place. Ensure that you do not pinch wires when replacing covers. Follow OSHA Lockout/Tagout requirements. Station employees and service contractors need to understand and comply with this program completely to ensure safety while the equipment is down.

Hazardous Materials

Some materials present inside electronic enclosures may present a health hazard if not handled correctly. Ensure that you clean hands after handling equipment. Do not place any equipment in the mouth

WARNING

In the event of inclement weather, including snow, ice, or flooding that makes driving conditions dangerous, please avoid servicing units. Always use available door stops to secure upper doors against unwanted/unexpected movement, especially during high winds. If necessary, reschedule service to avoid damage to the equipment. Weather may change unexpectedly; be aware of local weather conditions. During service, if conditions develop making service unsafe, close the unit(s) and proceed to a safe location.

WARNING

The pump/dispenser contains a chemical known to the State of California to cause cancer.

WARNING

The pump/dispenser contains a chemical known to the State of California to cause birth defects or other reproductive harm.



Gilbarco Veeder-Root encourages the recycling of our products. Some products contain electronics, batteries, or other materials that may require special management practices depending on your location. Please refer to your local, state, or country regulations for these requirements.

In an Emergency

Inform Emergency Personnel

Compile the following information and inform emergency personnel:

- Location of accident (for example, address, front/back of building, and so on)
- Nature of accident (for example, possible heart attack, run over by car, burns, and so on)
- Age of victim (for example, baby, teenager, middle-age, elderly)
- Whether or not victim has received first aid (for example, stopped bleeding by pressure, and so on)
- Whether or not a victim has vomited (for example, if swallowed or inhaled something, and so on)

WARNING



Gasoline/DEF ingested may cause unconsciousness and burns to internal organs. Do not induce vomiting. Keep airway open. Oxygen may be needed at scene. Seek medical advice immediately.

WARNING

DEF generates ammonia gas at higher temperatures. When opening enclosed panels, allow the unit to air out to avoid breathing vapors. If respiratory difficulties develop, move victim away from source of exposure and into fresh air. If symptoms persist, seek medical attention.

WARNING



Gasoline inhaled may cause unconsciousness and burns to lips, mouth and lungs. Keep airway open. Seek medical advice immediately.

WARNING



Gasoline/DEF spilled in eyes may cause burns to eye tissue. Irrigate eyes with water for approximately 15 minutes. Seek medical advice immediately.

WARNING



Gasoline/DEF spilled on skin may cause burns. Wash area thoroughly with clear water. Seek medical advice immediately.

WARNING




DEF is mildly corrosive. Avoid contact with eyes, skin, and clothing. Ensure that eyewash stations and safety showers are close to the work location. Seek medical advice/recommended treatment if DEF spills into eyes.

IMPORTANT: Oxygen may be needed at scene if gasoline has been ingested or inhaled. Seek medical advice immediately.

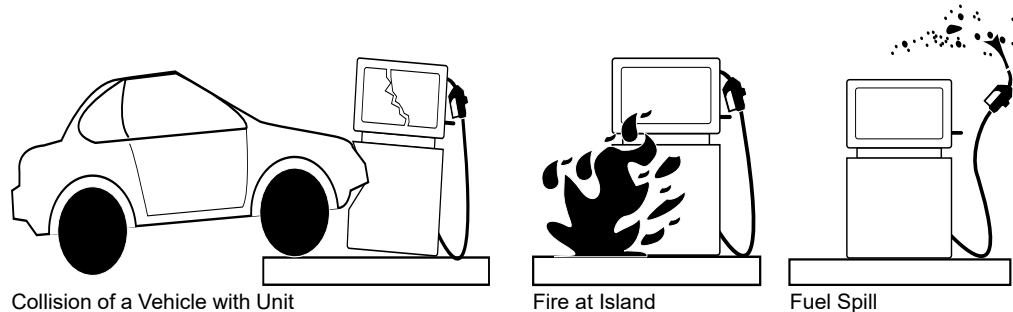
Lockout/Tagout

Lockout/Tagout covers servicing and maintenance of machines and equipment in which the unexpected energization or start-up of the machine(s) or equipment or release of stored energy could cause injury to employees or personnel. Lockout/Tagout applies to all mechanical, hydraulic, chemical, or other energy, but does not cover electrical hazards. Subpart S of 29 CFR Part 1910 - Electrical Hazards, 29 CFR Part 1910.333 contains specific Lockout/Tagout provision for electrical hazards.

Hazards and Actions

 WARNING	
	Spilled fuels, accidents involving pumps/dispensers, or uncontrolled fuel flow create a serious hazard.
	Fire or explosion may result, causing serious injury or death. Follow established emergency procedures.

The following actions are recommended regarding these hazards:



- Do not go near a fuel spill or allow anyone else in the area.
- Use station EMERGENCY CUTOFF immediately. Turn off all system circuit breakers to the island(s).
- Do not use console E-STOP, ALL STOP, and PUMP STOP to shut off power. These keys do not remove AC power and do not always stop product flow.
- Take precautions to avoid igniting fuel. Do not allow starting of vehicles in the area. Do not allow open flames, smoking or power tools in the area.
- Do not expose yourself to hazardous conditions such as fire, spilled fuel or exposed wiring.
- Call emergency numbers.

General Exclusion

Problems caused by faulty installation are not covered by this warranty. This warranty applies only if equipment has been installed, used, and maintained in-accordance with Gilbarco installation, operating, and service instruction.

Use of service personnel other than qualified Gilbarco ASCs without prior approval of Gilbarco product support department will void payment of the warranty claim in question.

Damage suffered by Gilbarco equipment resulting from shipping, accident, power surges, neglect, misuse, act of God, or abuse is not covered by this warranty.

Use of non-Gilbarco replacement parts, defect caused by the unauthorized addition of non-Gilbarco equipment or unauthorized alteration of Gilbarco equipment voids this warranty.

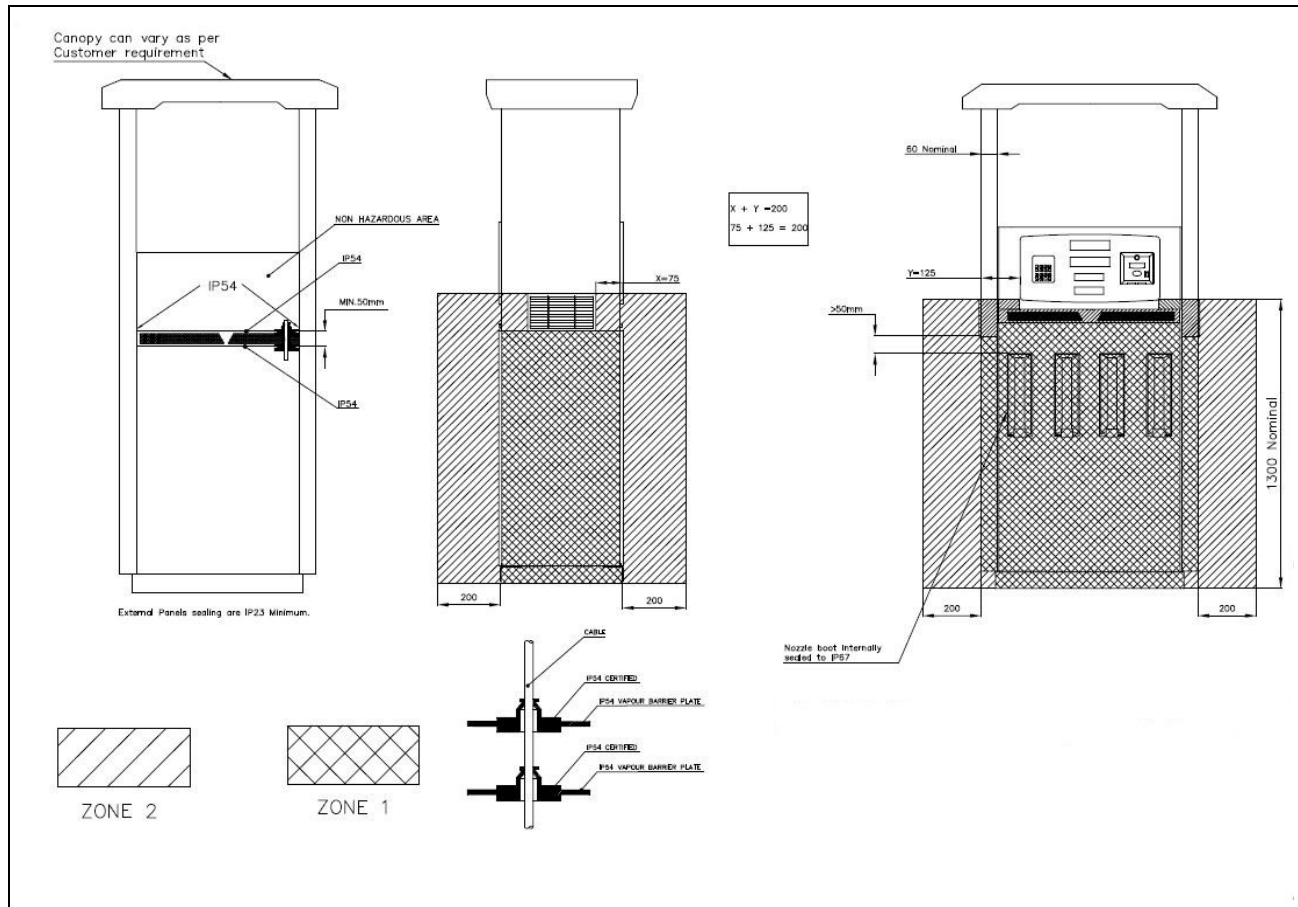
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3 – Hazardous Locations

Zoning Diagram

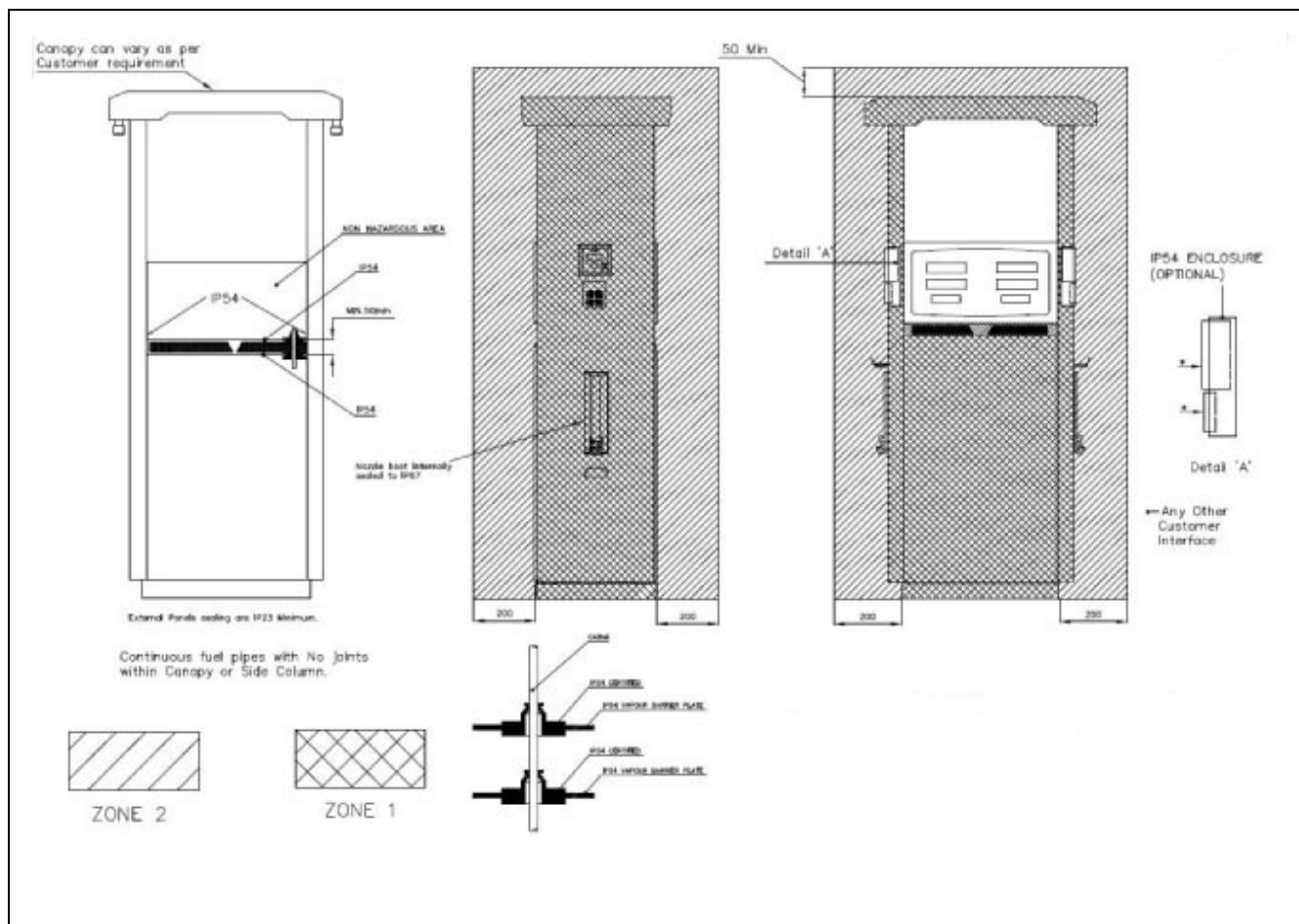
The dispenser must be installed to not compromise the zones illustrated in [Figure 3-1](#) and [Figure 3-2](#) on [page 3-2](#).

Figure 3-1: Zoning Diagram with Grill



Frontier pumps and dispensers are Atmosphere Explosible (ATEX) approved. Zoning diagram is as per ATEX.

Figure 3-2: Zoning Diagram Without Grill



Frontier pumps and dispensers are ATEX approved. Zoning diagram is as per ATEX.

WARNING

National Fire Protection Association (NFPA) 70® section 514 table 3 defines the area under the dispenser as a Class 1 Division 1 hazardous location.

4 – Preliminary Installation Information

Required Equipment and Materials

The following items are required to properly install the equipment:

- Anchor bolts.
- U-bolts for fastening piping to braces.
- Sealant that is UL-approved for use with fuels being encountered.
- Pit box cover plates. Use when required to adapt the unit to pre-existing pit boxes.
- Lifting device (crane, backhoe, forklift, and so on) to move and lift the pump/dispenser.
- Nylon slings (with a safety lift factor of 5) and screw-pin anchor shackles to lift high hose pump/dispenser.
- Breakaways, hoses, nozzles, and swivels.
- Barricades.
- Potting compound and fiber dam material to allow potting of the conduit in accordance with class I, Division II locations as specified in the National Electrical Code (NEC).
- Any kits required for upgrading the unit to the customer's requirements, such as hose retrievers, and so on.

Read NFPA 30A and NFPA 70

WARNING

Where fuels are involved, you are working in a dangerous environment of gasoline, gasoline vapor, and electricity.

Failure to install this equipment in accordance with NFPA 30A and NFPA 70 could result in severe injury or death.

Read, understand, and follow NFPA 30A and NFPA 70.

Before installing the equipment, read, understand, and follow:

- The NEC (NFPA 70).
- The Automotive and Marine Service Code (NFPA 30A).
- Any national, state, and local codes that may apply.

Failure to install the equipment in accordance with NFPA 30A and NFPA 70 may adversely affect the safe use and operation of the system.

Accurate, sound installations reduce service calls. Experienced, licensed contractors must perform the installation and follow accurate and safe installation techniques. Careful installation can eliminate potential problems.

The equipment manufacturer must provide instructions for other equipment such as STP, shear valves, and underground tanks. Gilbarco does not provide complete installation instructions for other manufacturer's equipment.

Important Considerations when Changing Fuel Types

WARNING

Certain special alternative fuels such as E25 and E85 and additives can degrade pump/dispenser performance or integrity if the dispensers are not designed for use with such fuels. Additionally, converting to certain standard fuels (gasoline, diesel, kerosene, and so on) from alternative fuels such as those with ethanol (E25 and E85), methanol, or biodiesel or from alternative fuels to standard fuels can degrade dispenser performance or integrity. Similar effects can also occur when converting units to different standard fuel types. **As per UL 87A requirements, units dispensing E25 and E85 fuel must not be used to dispense any other type of fuel such as gasoline.**

Leaks and potential environmental hazards can result or components may fail prematurely.

To avoid these issues, follow the guidelines in this section.

The following guidelines must be followed when changing fuel types for a pump/dispenser or using alternative fuels or fluids:

- Verify with your Gilbarco ASC or Distributor if the fuel which you will be using is compatible with the pumps/dispensers to be dispensing the fuel.
- For flexible fuel dispensers, do not use standard hydraulic parts used in other Gilbarco pumps/dispensers for service parts in these units. Standard dispenser parts may not be compatible with fluids.
- Biodiesel fuels must be of American Society for Testing and Materials (ASTM) standards for Biodiesel fuels. Mixes of diesel with cooking oils, other plant or animal derived oils, and so on are not considered Biodiesel. Use of such mixes may void warranty on the hydraulic components of the unit.
- Review the latest copy of the unit's warranty statement regarding the use of fuel.
- Certain fuels (especially fuels enhanced with alcohol) when first used in tanks previously containing a different fuel may clean out the tanks and force a large amount of contaminant into the dispenser. Other than abnormally clogging filters, this large quantity of contaminant may damage certain dispenser components. Do not run units without filters at such times. It is normally required that tanks and lines be cleaned of all water, sediment, and contaminant before such conversions to minimize potential pump/dispenser downtime or damage. Damage to hydraulic components from contamination when not using filters is not covered by Warranty. Consult your ASC or Gilbarco Distributor for recommendations.
- Although conversions from one fuel to an equivalent fuel (say from another supplier) generally do not create issues, it is recommended that after making any fuel type conversions (including those to alternative fuels such as E25 and E85 or back), all units be visually inspected for leaks two days, one week, and one month after fuel conversion. Have your ASC repair any leaks found. This must also be performed for standard fuels when significant new additives are incorporated.
- Whenever non-equivalent fuel conversions are performed, it is recommended that all units be checked for calibration within one month of fuel conversion.
- Some non-equivalent fuel conversions will necessitate the requirement to change the pump/dispenser filter type previously used. Consult your ASC or Gilbarco Distributor for any changes required.
- In flexible fuel dispensers, Gilbarco recommends the use of 10 micron filters for gasoline-based flexible fuels. Although the use of finer filtration is allowable, filters will tend to clog prematurely, causing excessive filter maintenance cost.
- An anti-siphon valve must be installed on aboveground storage tanks where the DEF level can be at a higher elevation than the supply piping or the dispenser. The valve will prevent a potential leak in the piping from creating a siphon that can cause a product release.

Preparing for Installation

To prepare for the installation, proceed as follows:

- 1 Read all instructions before you begin.
- 2 Follow all safety precautions:



- Barricade the area.
 - Do not allow vehicles in the work area.
 - Do not smoke or allow open flames in the work area.
 - Do not use power tools in the work area.
 - Do not allow unauthorized people into the work area.
 - Wear eye protection during the installation.
 - Ensure that there is no power supplied to the units until required, as per later installation steps.
- 3 Use circuit breakers to turn off all power to pumps/dispensers and STPs. Multiple disconnects may be required.
 - 4 Check the following for proper installation, as recommended by other manufacturers:
 - Emergency power cut off switch
 - Circuit breakers
 - STP control relay boxes - dispensers only (see Note 3)
 - Isolation relays - dispensers only (see Note 3)
 - Conduit and wiring (see Note 1)
 - Grounding
 - Shear valves - dispensers only (see Notes 2 and 3)
 - Piping and fittings
 - Fuel storage tanks
 - Pressure regulating valves (aboveground tanks only)
 - STP - dispensers only
 - Tank and/or line leak detectors
 - Pit boxes
 - Components must be compatible with the fluid being dispensed. Consult the manufacturer for information.

Notes: 1) If you are replacing an existing unit, the installer may connect and extend the existing field wires to the electronics cabinet using an explosion proof Junction Box (J-box). For details, refer to “Before Mounting Unit on Fuel Island” on page 4-4.

2) A shear valve is a safety device required for every product line at each dispenser. Shear valves may also be required for aboveground tank installations and other installations with pumps. Follow local and state requirements.

3) Some locations require shear valves for vapor lines. Follow local and state regulation.

- 4 Inspect the pump/dispenser cartons and contents for shipping damage. Gilbarco does not cover shipping damage under its warranty policy. Notify the shipper of any damage.
- 5 Remove the lower panels (doors) of the pump/dispenser.
- 6 Ensure that the fuel grade for product lines matches the pump/dispenser brand panels and the foundation layout. Product lines from the island pit box must have labels.

Gaining Access to and from Frontier Cabinet

Frontier cabinets are designed to protect the equipment inside the unit from the elements. The doors and covers must be installed as directed. For more information, refer to *MDE-5077 Frontier Owner's Manual* and *MDE-5078 Frontier Technical Manual* provided by the ASCs during commissioning.

Frontier units have features that prevent water intrusion into the dispenser's interior. However, the doors and covers must be opened or replaced in a specific order - the bottom panel first, which provides access, allowing the release of the security latch on the top door and opening of the door.

Before Mounting Unit on Fuel Island

WARNING

DEF, flexible fuels such as biodiesel, high alcohol percentage fuels, such as E25 and E85, and so on, may be incompatible with certain plumbing materials and hydraulic components.

Use of incompatible materials or components with alternative fuels such as E25 and E85 or DEF can result in leaks or unexpected failures of components resulting in fire or explosion or environmental damage.

When dispensing alternative fuels such as E25 and E85 or DEF, verify with the manufacturer if the material of all plumbing components are compatible with the fuels such as E25 and E85 or DEF being dispensed.

Note: Before mounting the unit on the fuel island, read and understand this section completely. This information is essential to avoid installation errors.

Verifying and Determining Plumbing Requirements

Before placing a unit on an island, determine the correct location of piping for the unit involved and the proper orientation of the unit. A common installation error is to install the units backwards, which will require expensive modifications. This section contains information regarding plumbing requirements for various models of Frontier dispensers.

IMPORTANT INFORMATION

Do not make assumptions about configurations based on previous experience, hose positions, or layout of the unit that you are replacing, whether it is a Gilbarco unit or that of any other manufacturer.

Model grade mapping (inlet piping) for Frontier units is different from The Advantage® Series and Multi Product Dispenser (MPD)-3 Series as well as other manufacturers units. Incorrect matching of unit piping to supply lines can cause costly rework and time delays.

The first Grade/product is always left when facing J-box of Frontier units.

Adapting Pit Box

For installation using an existing pit box, some modifications may be required. The following list highlights the changes that may be required. For more information, refer to [“Installation Differences when Replacing The Advantage Series”](#) on [page 9-2](#). These installation considerations may also apply when you are replacing competitive units.

To adapt the plumbing/conduit to Frontier stub up locations:

- Use care in sizing and routing flexible piping to avoid bends that restrict flow. This is especially critical for pumps which may have serious issues with flow or noise if the flexible pipe cross section becomes significantly restrictive.
- Use flexible piping in the pit box for plumbing adaptation. If piping in the previous box is rigid, use the adaptability of the Frontier hydraulic cabinet inlets and conduit entry points instead of making modifications to rigid plumbing and conduit in the pit box.
- When adapting plumbing in the dispenser cabinet, remember that the lower piping cross brace must be used to secure plumbing above the shear valve and that rigid piping must be used within the dispenser.
- Modify the pit box rain lip when required (for boxes designed for The Advantage Series wide frame units). Modifications will also typically be performed to the Frontier base.
- When adapting an Frontier unit to an existing pit box or one that is not specifically designed for the unit, the rain lip may require modification or removal. If the rain lip is removed, the entire base of the dispenser must be sealed to the island. Study the foundation layouts and the existing pit box to determine if modifications are required before mounting the unit on the island. For working in this area, refer to the following Warning.

WARNING

Where fuels are involved, you are working in a potentiality hazardous environment where fuels and their vapors may be present and could be ignited with sparks from grinding and cutting tools.

Always conduct work at the required safe distance away from a hazardous area and use the appropriate tools.

Units with Ground Fault Interrupt (GFI)

A GFI consists of a sensor that detects changes in the current to the load, by comparing the current flowing **to** the load and the current flowing **from** the load. A drop-off in the current equivalent to about 5 milliamperes, turns off all power by tripping a relay within the GFI within a few hundredths of a second.

When powering a dispenser with a GFI, the return neutral of any device to which the dispenser supplies power must be the same neutral as that of the dispenser. For example, the STP control relay.

Installing Conduit at Pump/Dispenser

Options exist for installing the conduit up to the units:

- Use existing conduit commonly through the pit box.
- Conduit not penetrating the pit box but entering the pump dispenser through the side column(s) of the unit.

The first method is commonly found with existing applications. The second is recommended for new ground and up installations to reduce installation cost.

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5 – Installing Units on Island

Mounting Unit to Island

Before placing the unit on an island, determine the correct location of piping for the unit involved and verify the proper orientation of the unit. A common installation error is to install the unit backwards, resulting in required modifications or delay in installation.

Mount the unit using mounting bolt locations specified.

Fill in any openings from the smaller length Frontier cabinet to the potentially longer pit box opening for other units. Seal as required.

Where low temperatures are expected, dispensing equipment including hanging hardware, must be insulated, heated, or located in a temperature-controlled enclosure suitable for UL class 1 division 2 environment to prevent from freezing.

The unit must be located in class 1 where high ambient temperatures are common, consider insulating the dispenser or placing it in a location where it is out of direct sun to maximize shelf life.

When mounting dispensers for DEF directly to the island, install sumps to prevent leaks and spills from migrating off site.

Lifting Frontier Units



WARNING

Lifting heavy equipment can be hazardous.

Equipment could fall and cause severe injury or death.

Use lifting equipment of proper capacity and factor of safety when moving or positioning the unit. Stand clear from pump/dispenser when lifting and lowering.

Before mounting the unit to the island, verify if the pit box and unit base are compatible. Some pit box plates have rain lips that require modifications before placing the Frontier unit on the plate. If the Frontier unit does not fit properly onto the pit box plate, the unit will have to be lifted according to the instructions in this section and moved to a safe work area. If this modification is not required, do the following, and then proceed to [“Before Mounting Unit on Fuel Island”](#) on [page 4-4](#).

To lift Frontier units, proceed as follows:

Note: Frontier units have hoisting brackets mounted on top of the upper housing.

- 1 Verify if the hoisting brackets are tight. Use the bolts provided with the brackets or grade 8 bolts.

CAUTION

Do not run slings around columns or under the upper piping housing. This will damage the columns or sheathing.

- 2 Lift and position the unit to the work area for modification or onto the island.
- 3 Remove the slings and shackles.

Installation Instructions for Frontier Suction System

Figure 5-1: Frontier Suction System - 1

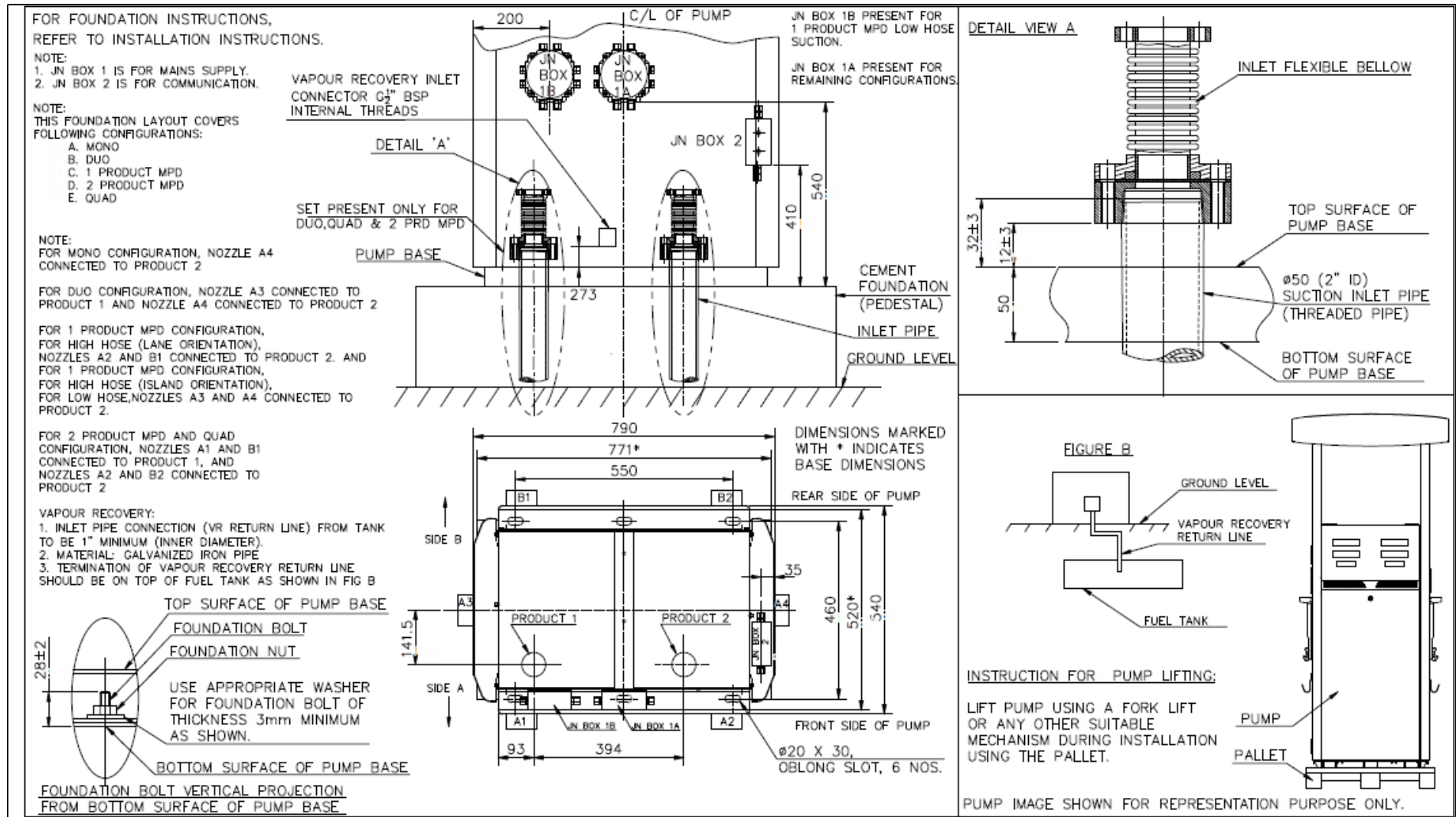


Figure 5-2: Frontier Ultra-High Flow Single Three-Phase- Continued

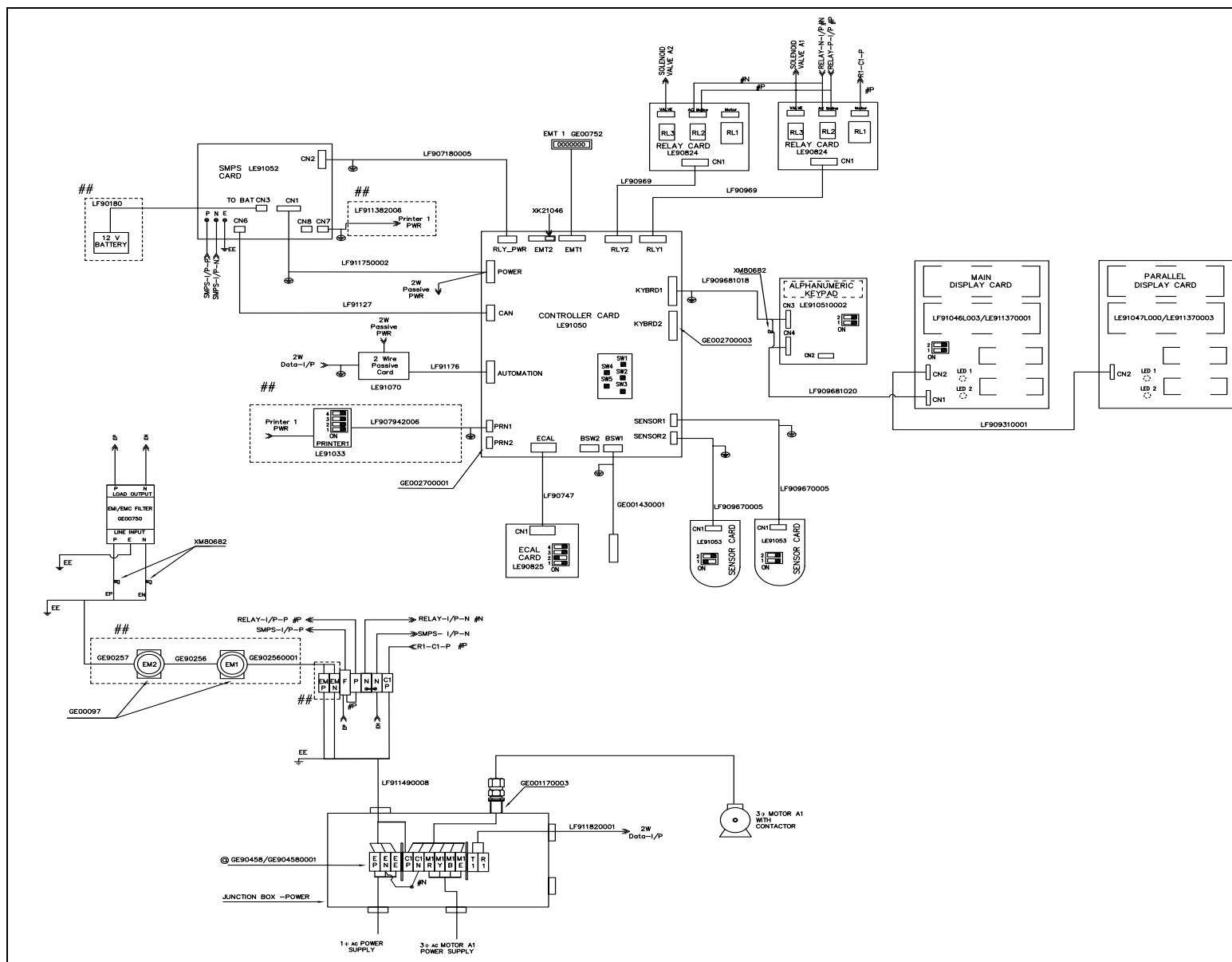


Figure 5-3: Frontier Ultra-High Flow Dual Three-Phase - 1

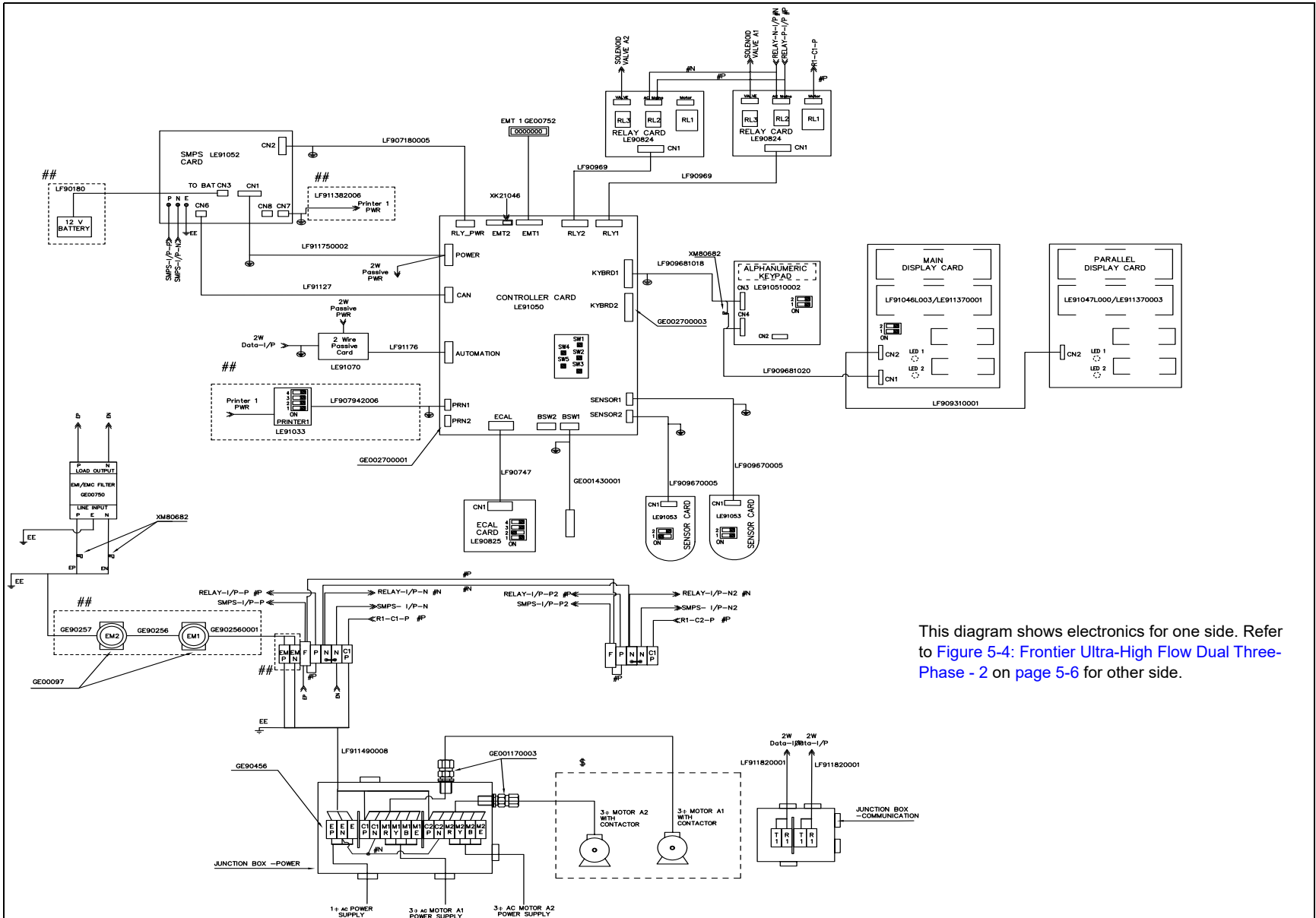
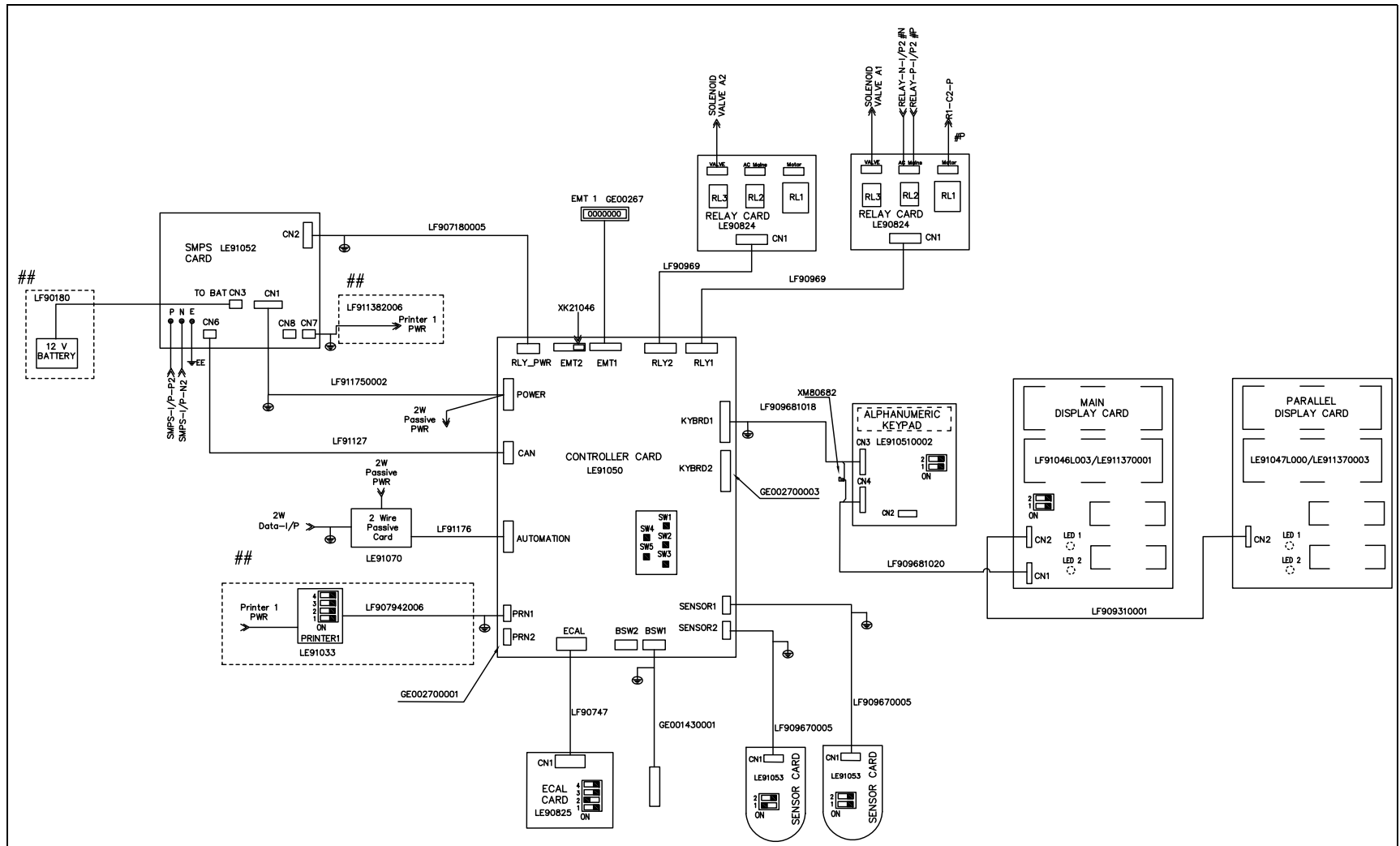


Figure 5-4: Frontier Ultra-High Flow Dual Three-Phase - 2



Installation Instructions for Frontier Pressure System

Figure 5-5: Frontier Pressure System - 2

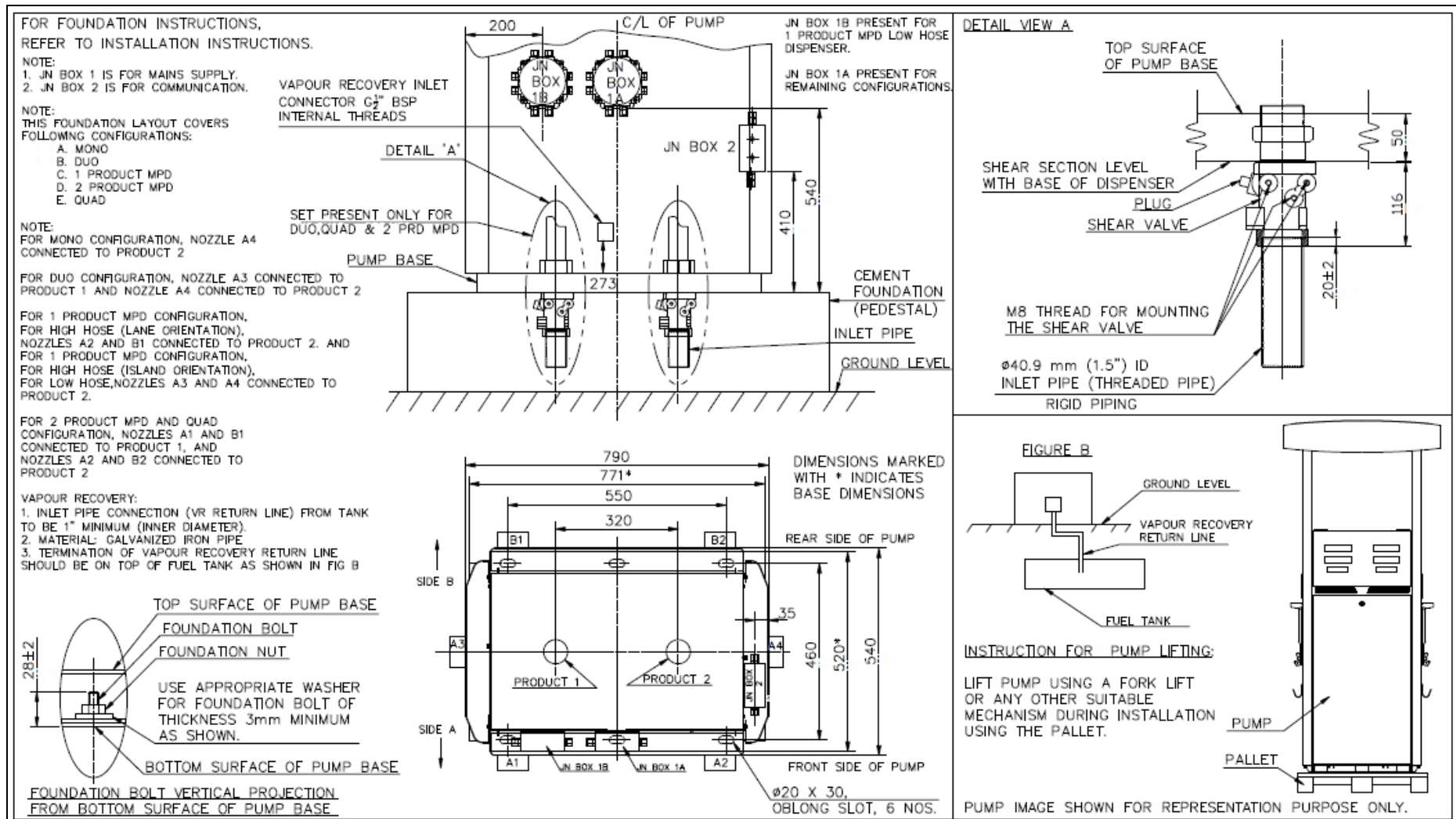


Figure 5-6: Frontier Pressure System for Ultra-High Flow Single Unit

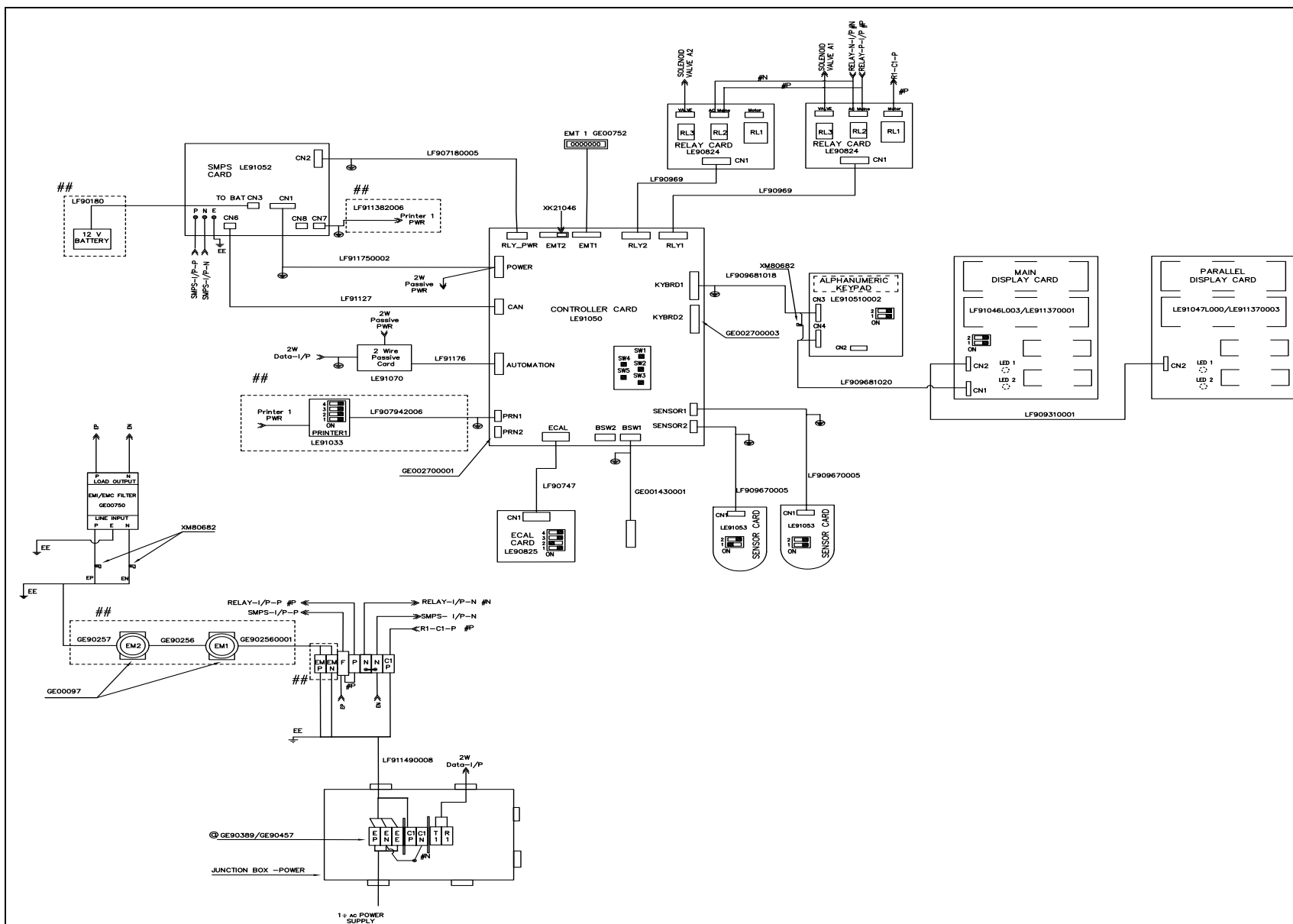


Figure 5-7: Frontier Pressure System for Ultra-High Flow Dual Unit - 1

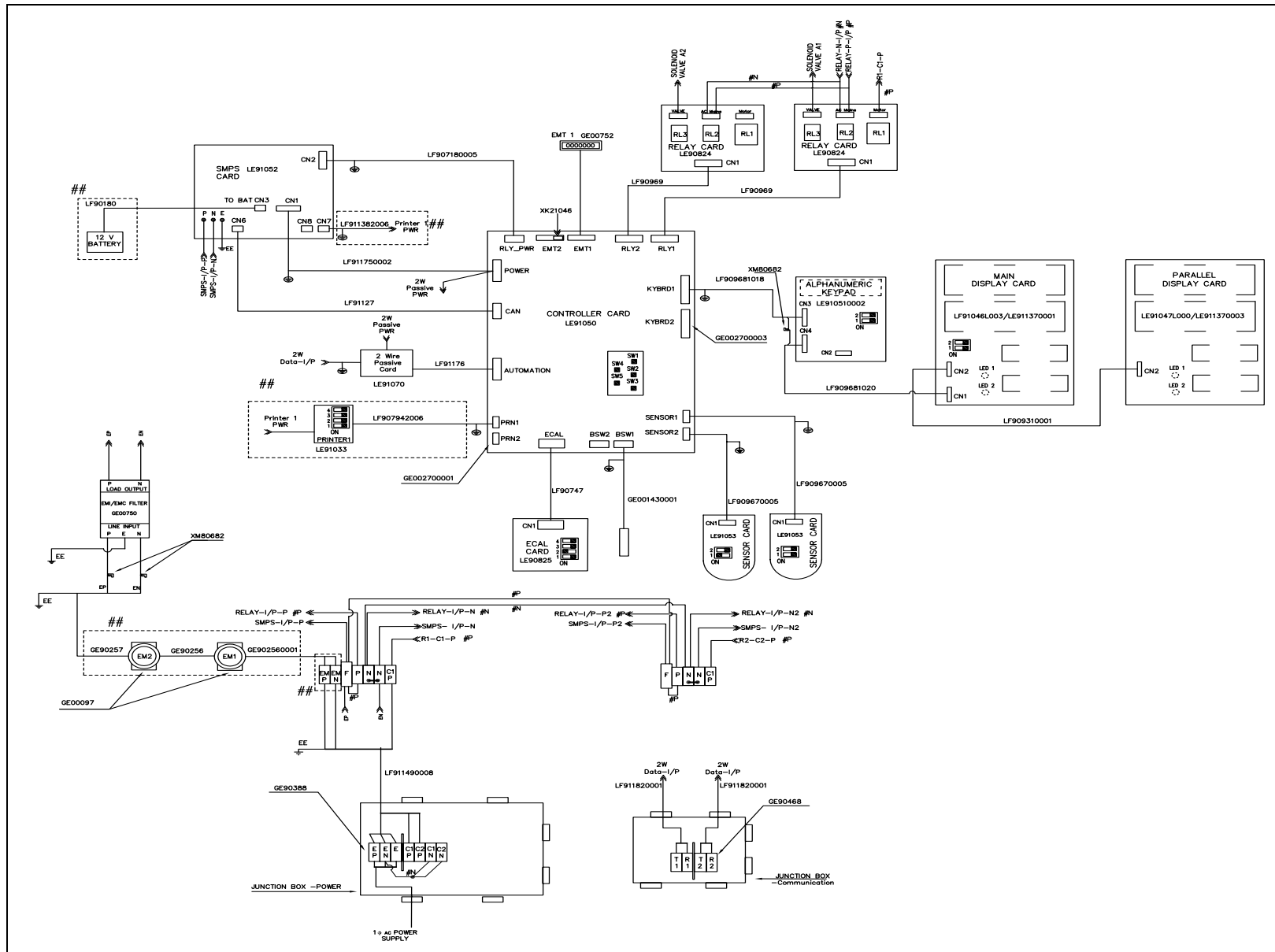
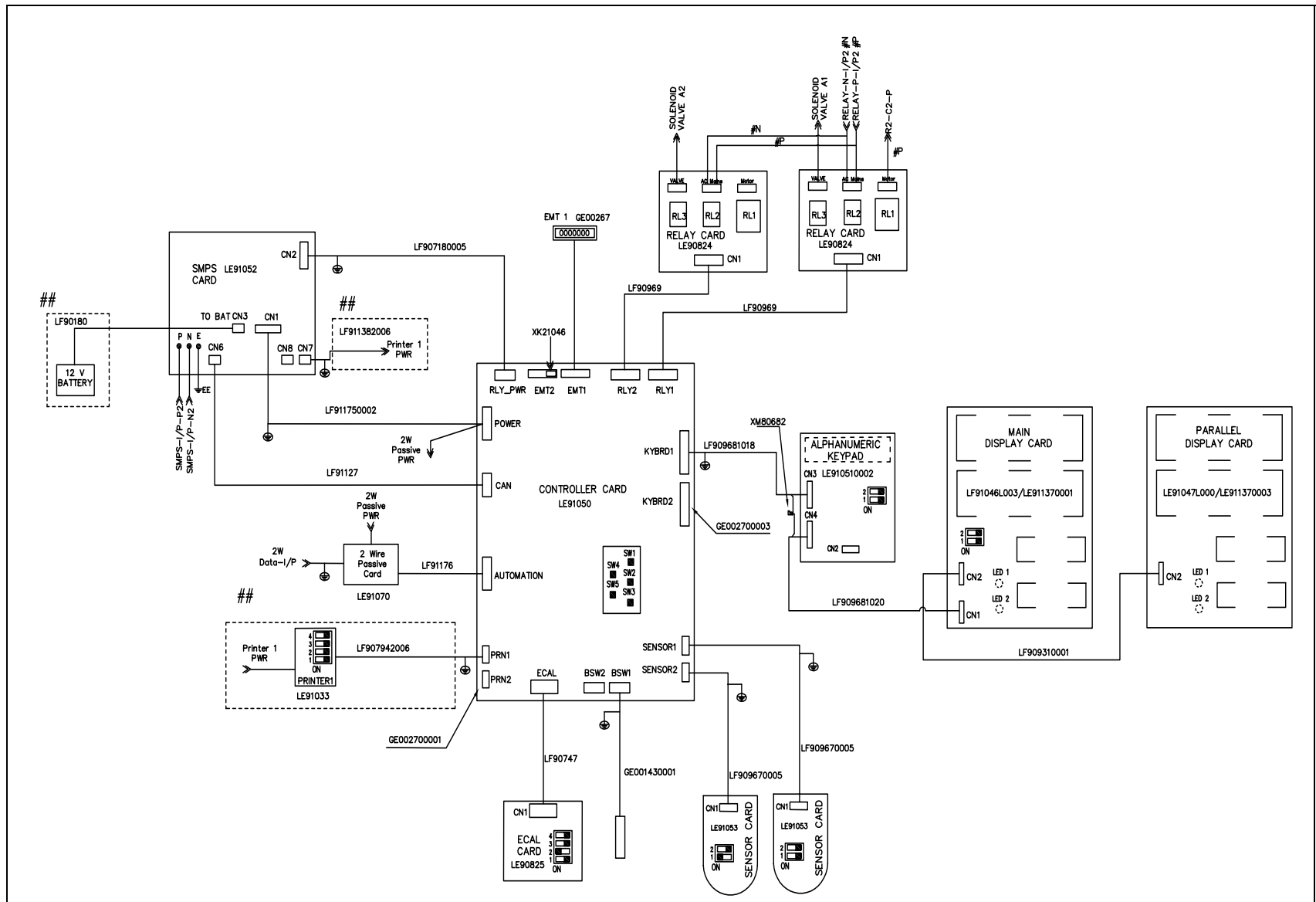


Figure 5-8: Frontier Pressure System for Ultra-High Flow Dual Unit - 2



Installation Diagram for Frontier

Figure 5-9: Installation Diagram for Frontier

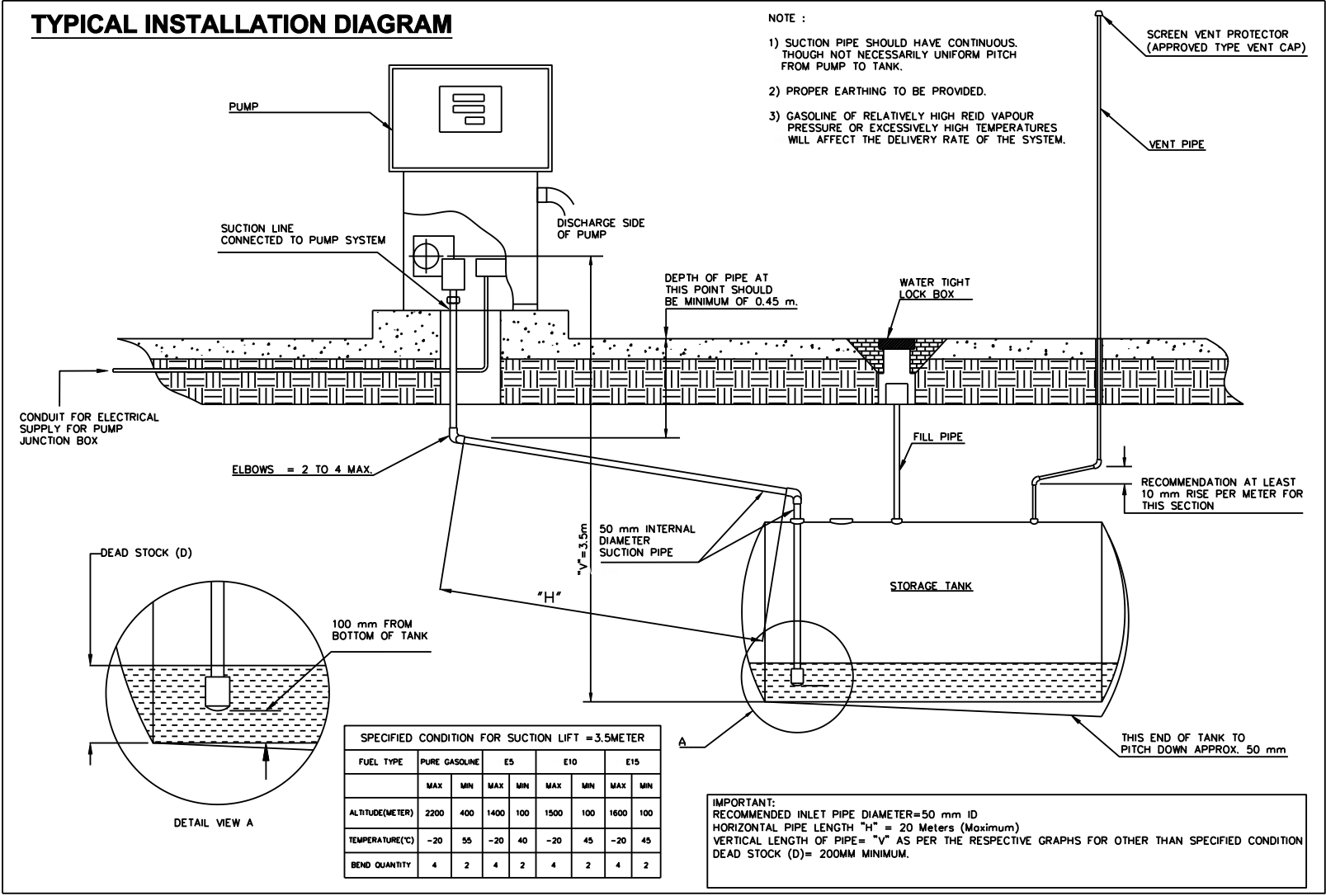


Figure 5-10: Installation Diagram for Frontier (Pure Gasline)

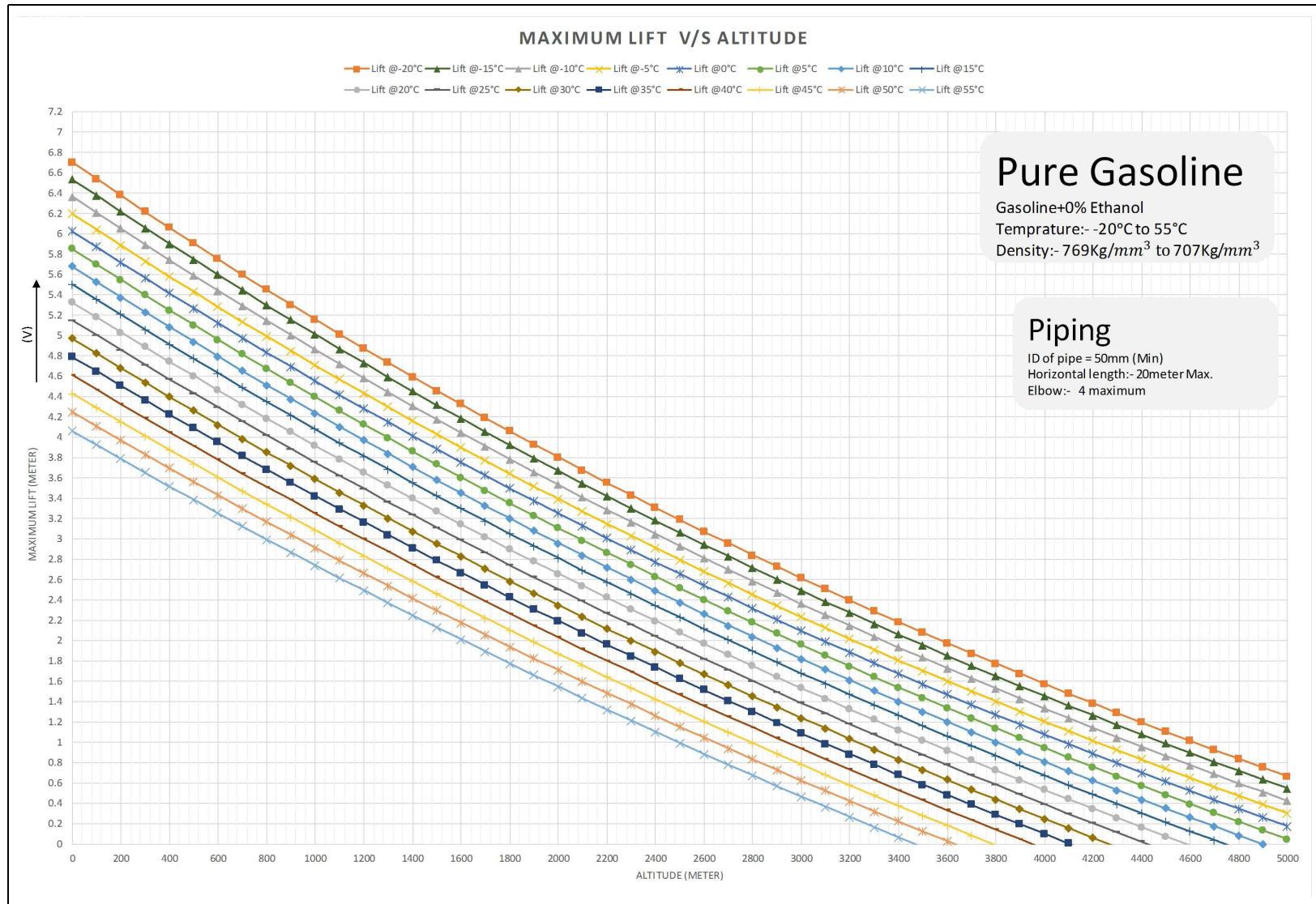


Figure 5-11: Installation Diagram for Frontier (E5)

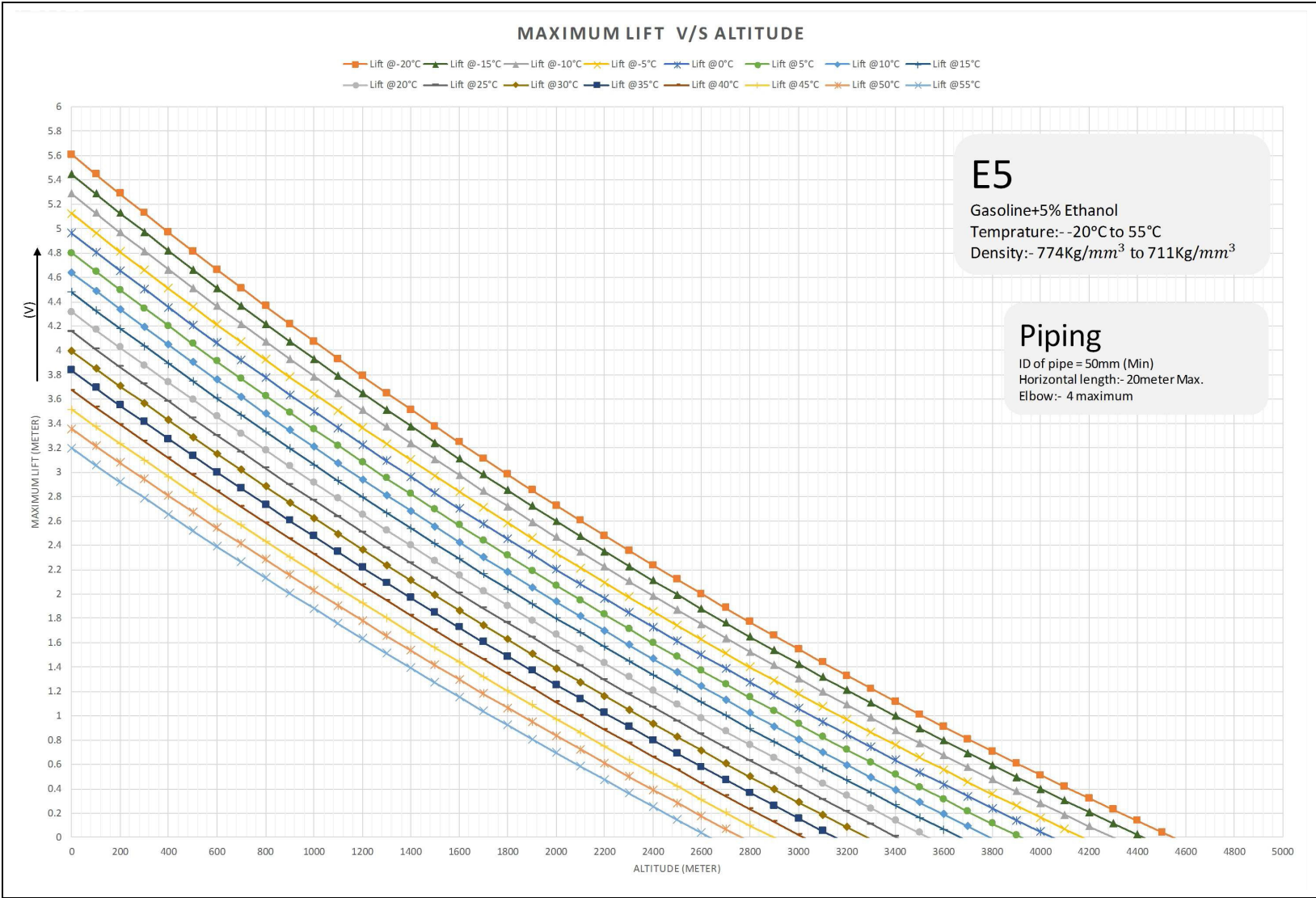


Figure 5-12: Installation Diagram for Frontier (E10)

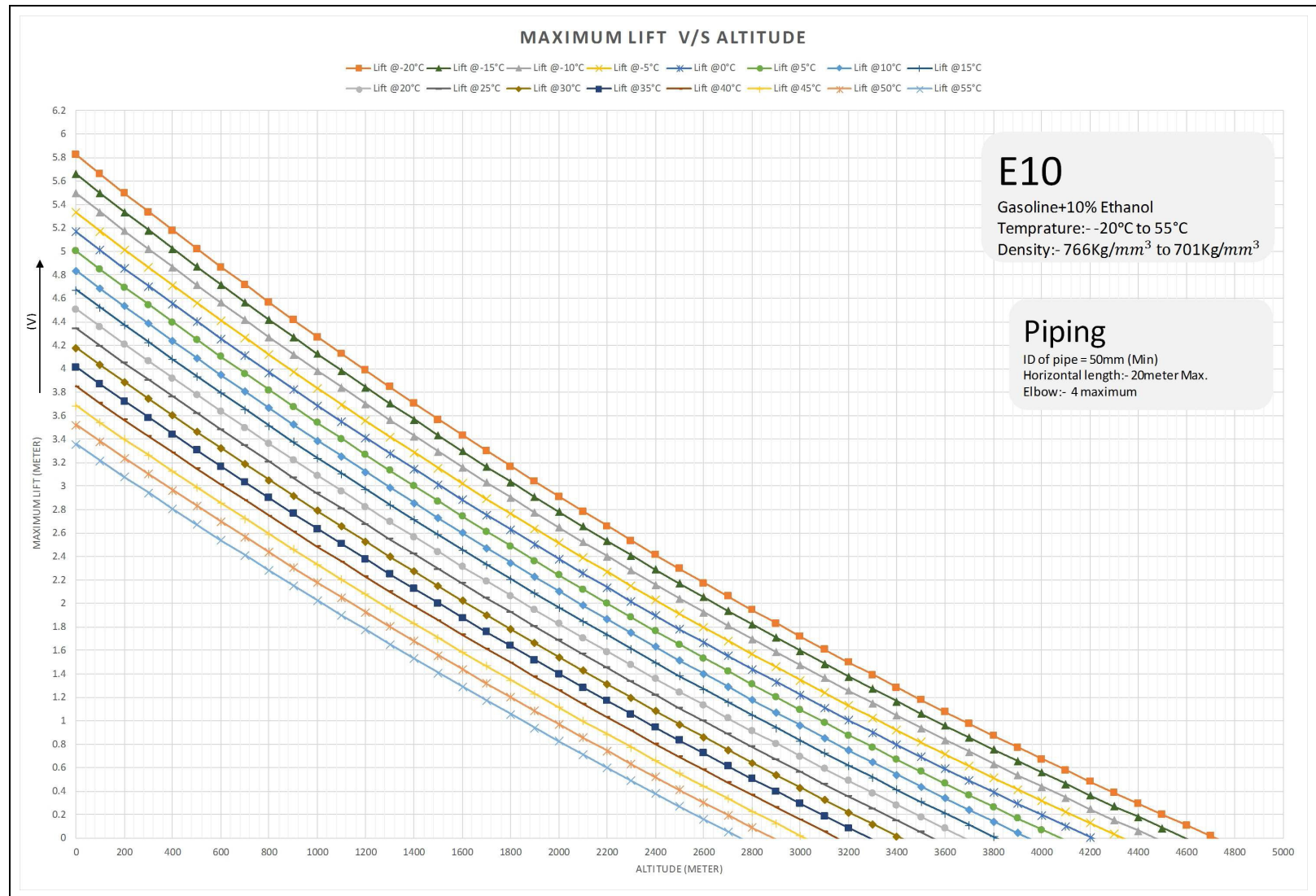
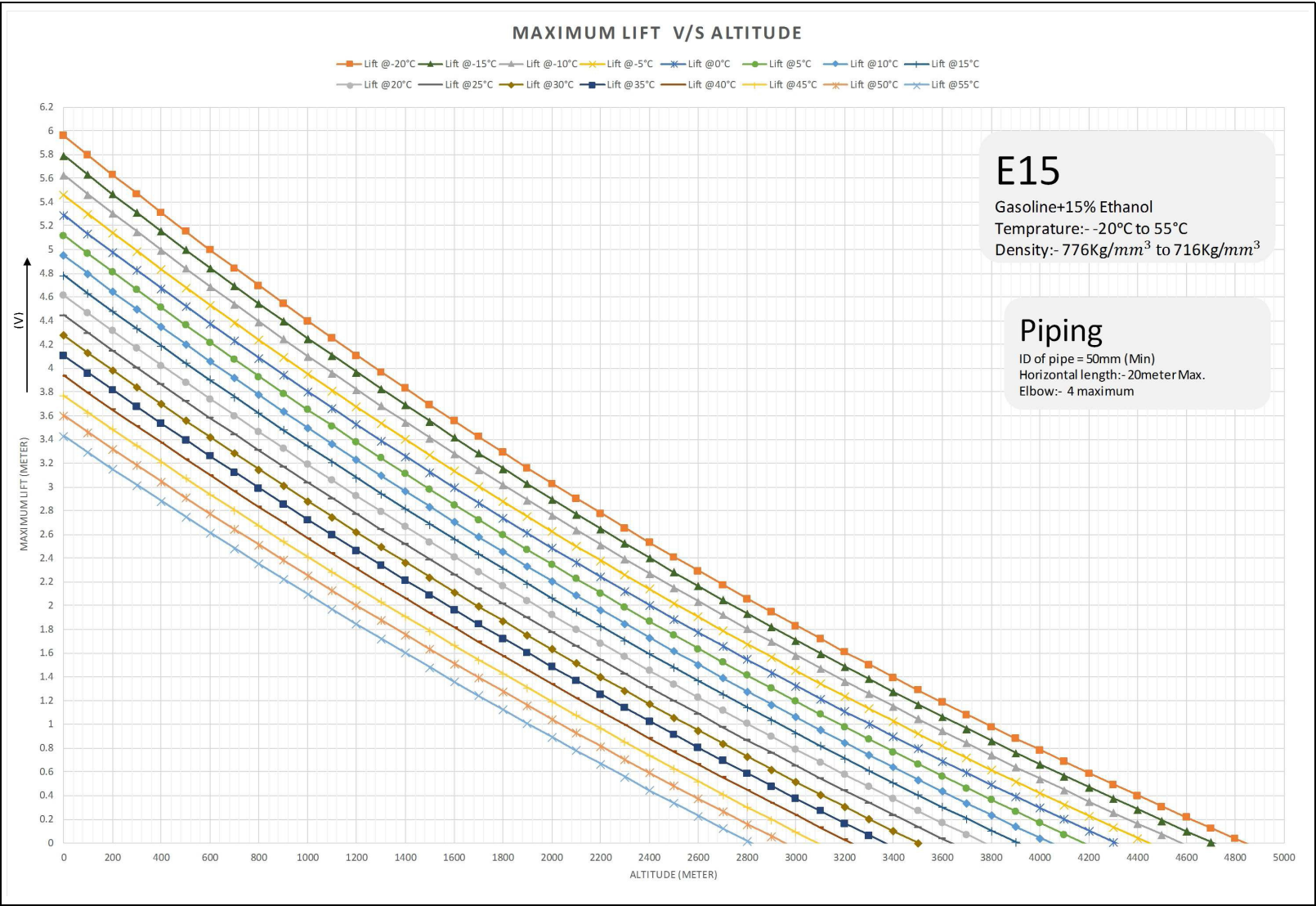


Figure 5-13: Installation Diagram for Frontier (E15)



Connecting Pump/Dispenser Inlet Pipes

WARNING

Flexible fuels such as biodiesel, high alcohol percentage fuels, and so on, may be incompatible with certain plumbing materials and hydraulic components.

Use recommended sealant, Loctite® #567 (Part Number 56747) and Loctite Primer-N 7649 (Part Number 21347) for pipe threads. **Do not use thread tape.**

Use of incompatible materials or components with alternative fuels such as E25 and E85 or DEF can result in leaks or unexpected failures of components resulting in fire or explosion or environmental damage.

When dispensing alternative fuels such as E25 and E85 or DEF, verify with the manufacturer of the material or component that all plumbing components are compatible with the fuels or DEF being dispensed. Do not replace the dispenser or pump parts with those incompatible with the fuel or DEF involved.

WARNING

The shear valves must be installed correctly.

Improperly or insufficiently anchored shear valves can lead to fire or explosion that could result in severe injury or death.

Anchor all the shear valves as per the manufacturer's instructions.

Note: Pumps do not have to use shear valves, except in special circumstances. The following procedure for a pump is identical to that of a dispenser, except that a shear valve may not be used. The contractor must provide and install pipe unions whether shear valves are used or not.

IMPORTANT INFORMATION

National Pipe Taper (NPT) pipe threads can at times be difficult to seal during installation or later, because of various conditions such as minor thread damage, contamination, slight thread imperfections, poor assembly practice and other reasons. Gilbarco has found that although NPT threads can be sealed normally with a good quality pipe sealant alone (the normal recommendation), on many occasions, fewer issues are created during installation by using a combination of sealant and Teflon pipe tape. The additional expense incurred to apply both will save money for the installer in the long run by spending less time correcting leaks during installation.

When using a Teflon pipe tape, it is extremely important to apply it properly so that no tape stringers are created to enter the hydraulic system. Tape stringers can cause serious issues with valves, nozzles, and other hydraulic components. For information on how to properly use the Teflon pipe tape and thread sealant to ensure fewer installation issues and fewer subsequent pump/dispenser problems, refer to ["Inlet Pipe Assembly" on page 5-18](#).

This information and recommendation does not apply to hanging hardware connections. Damage to aluminum parts of the hanging hardware or dispenser can occur since it is very difficult to control proper torque tightening because of the thread-assembly friction.

To connect pump/dispenser inlet pipes, proceed as follows:

- 1 Remove the vertical low hydraulic cabinet brace (found only in some units) to gain access during the installation of plumbing. Reinstall this brace after you complete the installation of the plumbing.

For units with a shear valve, a contractor-provided union must be installed on the shear valve. For proper tightening of the union to the shear valve, refer to the shear valve manufacturer's instructions. For units without shear valves, a contractor-provided union must be installed on the ground stub pipe.

For additional shear valve information, see [Figure 5-16](#) on [page 5-20](#). Since Frontier units require special considerations, ensure that you read and understand the information on shear valves later in this section for those units.

CAUTION

The shear valves or other dispenser components can be damaged or broken if improper wrench techniques are used. The installer must use two wrenches so that stress is not applied to the shear portion of the valve during tightening.

- 2 To maximize installation ease, Standard Frontier units are shipped with inlet plumbing. The installer provides and installs the plumbing in the lower Hydraulics Cabinet when required. Where required, use a approved sealant suitable for the applicable fuel type.

CAUTION

Units used with alternative fuels such as ethanol (E25 and E85), biodiesel, or others require contractor-supplied plumbing components to be suitable for use with such components. Consult your part suppliers for recommendations for their hydraulic parts based on the fuel types to be utilized.

Fuel leaks or component failure may occur if the components are not compatible with these fuels.

- 3 Ensure that you remove any shipping plugs or caps that may be present in the pipes, shear valves, and unions. Leave the mounting bolts a little loose at this time to allow more adjustment when aligning the piping.

Notes: 1) The contractor-supplied pipe and fittings must be 1-1/2-inch NPT Schedule 40 black iron. The Frontier pipe and fittings must be 2-inch NPT Schedule 40 black iron. Vapor Recovery is 1-inch NPT.

2) Flexible pipes are not allowed within the dispenser.

For information regarding the valves or shear valves required for vapor recovery return lines consult the Local Regulatory Agencies.

To ensure proper operation of the shear valve during a vehicle collision, all piping above the shear valve must be secured to the lower cross brace using U-bolts sized according to the plumbing involved.

Inlet Pipe Assembly

To ensure proper sealing during installation, assembly of pipe nipples to all 1-1/2-inch NPT inlet tubes must follow the following guidelines.

- Ensure that the threads are of good quality, full-NPT threads without obvious damage for all pipe nipples.
- Assemble using 1/2-inch wide Teflon thread-seal tape.
- Assemble using a high quality, UL-approved sealant that will not harden or wash out with the fuel being dispensed. Use Loctite PN 56747 (TM 567) PST Pipe Sealant with PTFE (also known as Loctite 567) or equivalent.

To assemble the inlet pipe assembly, proceed as follows:

- 1 From the pipe nipple end (about 2 to 3 threads), wrap the inlet pipe with Teflon tape [12 to 15 revolutions (see [Figure 5-14](#))].

CAUTION

Do not use tape at the very end of the pipe nipple to avoid tape entering the dispenser hydraulics. Tape in the hydraulics can cause failures of valves, nozzles, or other significant problems.

Pipe Threads: Use recommended sealant, Loctite #567 (Part Number 56747) and Loctite Primer-N 7649 (Part Number 21347) for pipe threads. **Do not use thread tape.**

CAUTION

Applicable to Dispensers Rated for E25 and E85 Use:

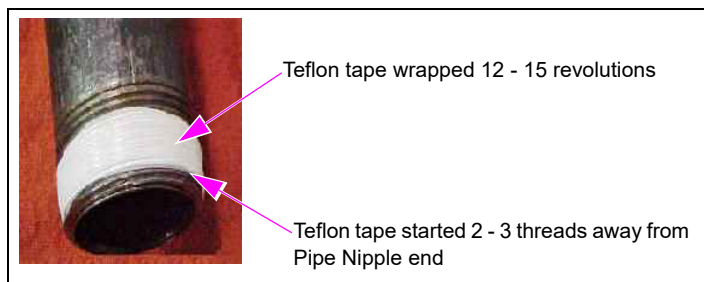
Do not use tape at the very end of the pipe nipple to avoid tape entering the dispenser hydraulics. Tape in the hydraulics can cause failures of valves, nozzles, or other significant problems.

Use only UL-listed TPS PTFE Pipe Sealant manufactured by SAF-T-LOC International Corp.

Use only UL-listed Taega Technologies Inc. Teflon tape.

*Note: Teflon tape must be used **only** at the inlet pipe connection.*

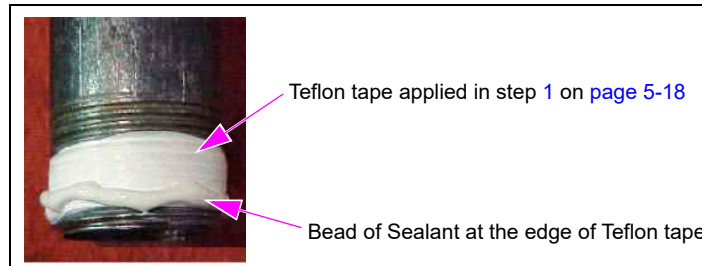
Figure 5-14: Inlet Pipe Wrapped with Teflon Tape



- 2 Apply a moderate bead of sealant completely around the nipple end at the edge of the Teflon tape (see [Figure 5-15](#)).

Note: For pipe threads, ensure that you apply the primer before applying the sealant. Follow the manufacturer's instructions.

Figure 5-15: Bead of Sealant at Teflon Tape Edge



- 3 After the sealant has been properly applied, tighten the connection to 130 foot-pounds.

WARNING

Always use the provided adjustable cross brace to secure plumbing in the dispenser, or the shear valve may not operate properly during a vehicle collision.

The cross brace is not an optional feature!

Also, use of non-rigid piping materials such as field-bendable tubing to connect to the inlet may also result in the shear valve not operating properly during a collision.

Use of black iron pipe inside the dispenser is required for fuel lines at the outlet of the shear valves.

- 4 Loosely connect the union halves together.

CAUTION

Do not use pry (crow) bar to position pump/dispenser over conduit or pipes. This could damage valves, conduit, or other parts of the unit.

- 5 Double-check the alignment of the frame, conduit, and pipes. Secure the piping to the safety brace using U-bolts or pipe clamps that are supplied by the contractor.

Note: Misaligned piping can result in a leak.

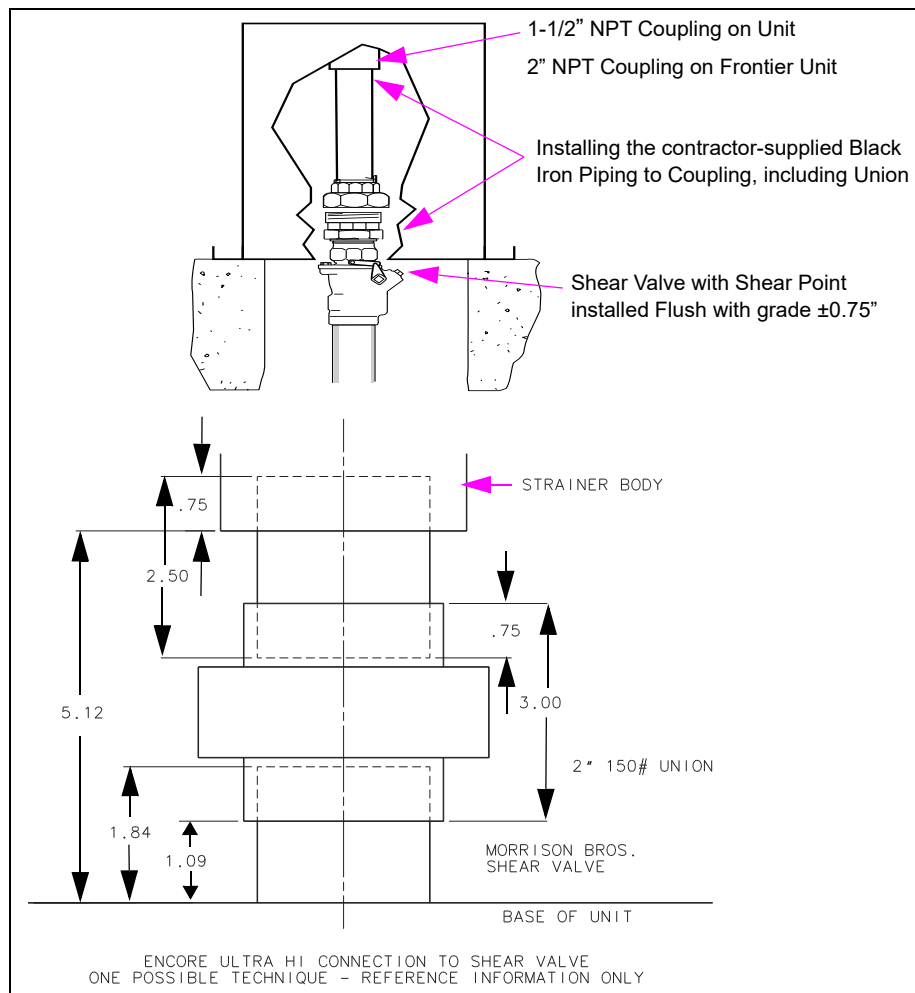
WARNING

For Frontier units, do not permanently remove the strainer under any circumstances to accommodate the shear valves from certain manufacturer's that may not properly position the shear section of the valve as shown in [Figure 5-16](#) on [page 5-20](#).

Use a Morrison or equivalent shear valve to ensure proper position of the shear section of the shear valve.

Failure to use the strainer could result in failure of the valves or meters, void warranty, and create a safety hazard with an improperly operating valve.

Figure 5-16: Shear Valve at Grade



Notes: 1) Regular (non-double wall) shear valve is shown.

2) OPW® supplies an Frontier compatible double poppet shear valve with a union top (OPW part # 10RUP-2006).

3) It is a mandatory code requirement that the shear section of the shear valve be within $\pm 3/4$ -inches (or to shear valve manufacturer's requirement, whichever is tighter) from the plane of the bottom of the base of a dispenser. Not all shear valve styles allow the maintenance of this tolerance for Frontier units. A N23047 single poppet male top Morrison 2 X 2 636M-0200AV or a code-approved equivalent shear valve meets the code requirements. Do not modify the dispenser plumbing (for example, remove the strainer housing) to accommodate other model valves, or install units such that the shear groove of the shear valve is not within $\pm 3/4$ inches of the base plane of the dispenser. Use a Check Valve (N23274) between the union and strainer housing to ensure that the shear section is properly located.

6 Tighten the union halves together.

7 Tighten the anchor bolts at this time. Verify if the shear valves are properly tightened to the pit box or shear valve anchor bracket, as required. If removed earlier, reinstall the vertical cabinet brace in the lower hydraulic cabinet.

For Frontier installations:

- Selection of proper components mounted to the bottom of the strainer housing is critical in maintaining the proper location of the shear valve groove of the shear valve to the base plane of the dispenser. You must follow the shear valve manufacturer's required positioning for this groove.
- A check valve is strongly recommended. When installed, Gilbarco recommends using N23274, which is approximately 2-1/2-inch long and can take the place of the close nipple located above the union. Failure to install a check valve here can result in fuel sale indication when the fueling position is activated with the nozzle closed and the check valve back at the STP is leaking.
- A union is required above the shear valve.
- A Morrison male end Shear Valve [N23047 (Morrison # 636M-0200AV)] can be used to properly maintain the position of the shear groove. The installer must verify if other manufacturer's shear valves will ensure proper positioning of the shear groove as per their specifications.
- Not all double poppet shear valve models or styles will fit the Frontier unit.
- Other combinations of unions, check valves, and shear valves may be possible and still maintain proper location of the shear groove.
- Removal of a strainer from the system will void warranty.

Follow the shear valve manufacturer's instructions for installation procedures, testing, and so on.

- Install the shear valve on each product inlet pipe.

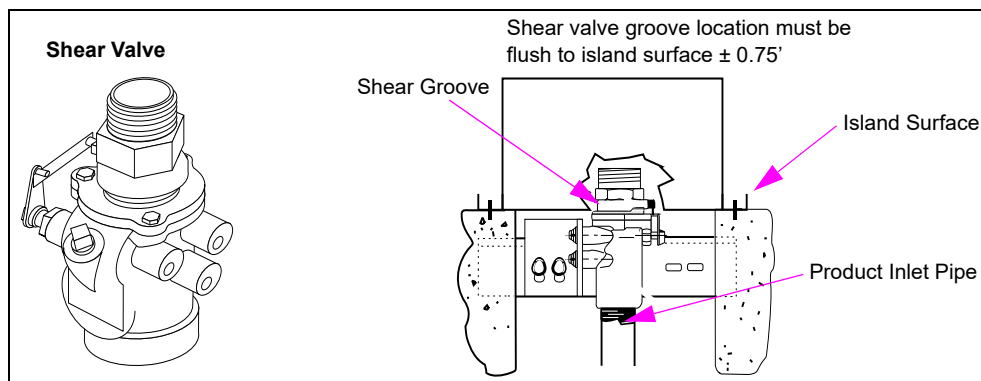
Note: Frontier dispensers require 1-1/2-inch male top shear valves. Gilbarco strongly recommends using double poppet shear valves that shut off flow from both storage tanks and internal to the unit (for example, OPW #10BHMP or Exxon® - OPW # 10RMSP). The Frontier dispensers use 2-inches male top shear valve (for example, Morrison Bros. 2" 636 m).

- For Frontier units, install the shear valve on each 2-inch inlet and outlet.
- Install a shear valve on the master dispenser satellite outlet and at satellite inlet.
- Do not mount the shear valve upside down.
- Ensure that the valve linkage is accessible and has no interference to open or close from other piping, structure, or components.

Note: The dispenser product inlet pipes must be aligned with the shear valve. Do not restrict shear valve linkage with pipes, braces, and so on.

- Test shear valve operation.
- Close the shear valve until equipment start-up. Cap the inlet pipe. This prevents dirt and other particles from entering the product line. It also prevents fuel spillage.

Figure 5-17: Shear Valve

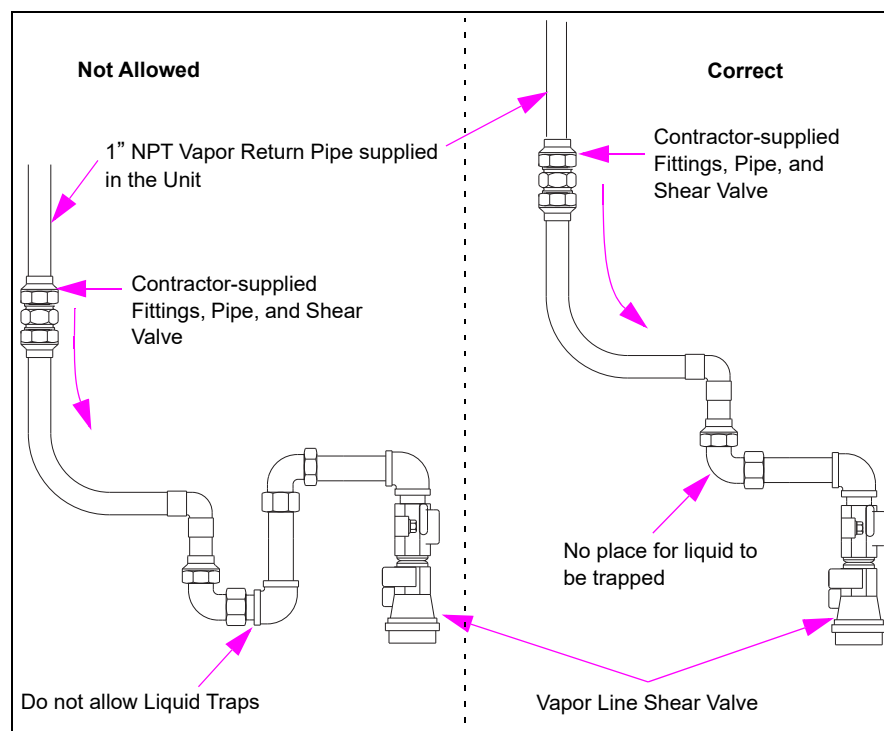


Connecting Vapor Return Line to Vapor Shear Valve

Do not create any liquid traps when connecting the vapor return line to the Vapor Line Shear Valve (see [Figure 5-18](#)). A liquid trap is a low spot in the vapor return line that can accumulate fuel and cause blockage, which can cause a system to fail vapor recovery certification tests or create operation issues with vapor balance nozzles.

- Notes:*
- 1) The contractor must provide and install the pipe union for connecting to the 1-inch NPT coupling in the unit.
 - 2) Follow the Vapor Line Shear Valve's manufacturer information regarding mounting of the shear valve to the unit.

Figure 5-18: Correct Vapor Line Connection Method



Anchoring Pump/Dispenser to Island

Note: Pumps do not normally require shear valves. The following procedure for a pump is identical to that of a dispenser, except that the shear valve may not be used.

⚠ WARNING

Improper anchoring of units could cause damage, severe injury, or death resulting from the unit tipping over from the impact or drive-off.

NFPA 30A requires the anchoring of pumps/dispensers.

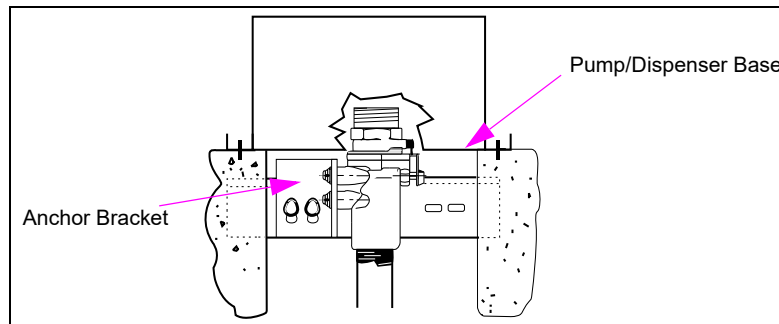
Securely install anchor bolts at all anchoring locations as shown on foundation diagrams for safe operation of shear valves and hose breakaways.

To anchor pumps/dispensers to the island, proceed as follows:

- 1 Verify if the shear valves are firmly anchored to the island form [concrete or pit box (see [Figure 5-19](#))].

Note: If the shear valve is not anchored properly, it may not operate correctly during a severe impact. Follow the shear valve manufacturer's instructions.

Figure 5-19: Anchoring Shear Valves Using Anchor Brackets

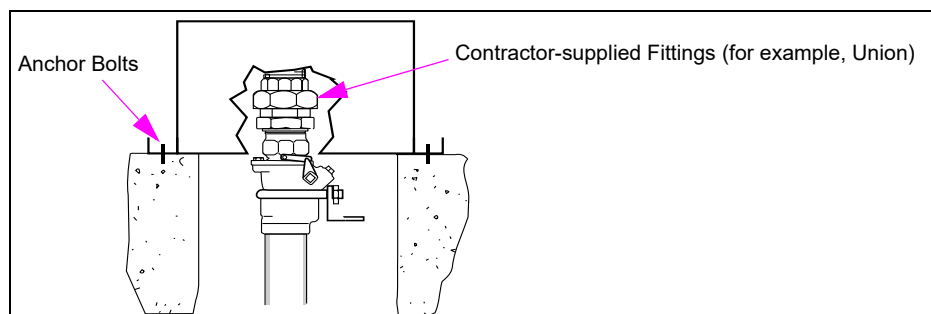


- 2 Loosely anchor the pump/dispenser to the island according to the foundation layout locations, using all the required anchoring points as follows:
 - Use 1/2-inch anchor studs with heavy duty large washers (slot designed for that size).
 - Use bolts or studs that are of 5-grade steel.
 - Use hardware that is corrosion-protected or resistant.

Note: Do not use plastic, low strength, or pallet bolts.

 - Studs/bolts must be securely anchored to the island or pit box (see [Figure 5-20](#)).
 - For additional important information, refer to the anchor or pit box manufacturer's instructions.

Figure 5-20: Anchors for Pump/Dispenser



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6 – Installing Conduit and Wiring in Unit

- 1 For units with the J-box, run a 1-inch rigid conduit to the J-box entering the unit from Side 2. Run any existing wiring to the main J-box through the 1-inch J-box conduit that enters the unit from Side 2. Connect the 1-inch conduit with class 1 Division 1 explosion-proof conduit union.

If the conduit is entering the unit from outside the dispenser pit box, refer to “[Electrical Related Items](#)” on [page 8-3](#) and “[Reference Information](#)” on [page 9-1](#) before proceeding.

Use an 8 X 1-inch diameter conduit, to run to the electronics cabinet of the unit from Side 2. Use additional conduits and coupling, if required.

- 2 If required, install the conduit for call buttons, Ethernet®, and speaker wires using similar procedures as outlined for the power conduit. However, when facing Side 1, call button, and so on, the conduit must be to the right side of the unit and power wiring to the left. Ensure that you follow earlier steps and warnings for installing the conduit through the air gap plate or side of the electronics cabinet.

Note: Call button, Ethernet, and speaker wires cannot be in the same conduit as the power and two communication wiring to the unit. They must be in a separate conduit.

Preparing J-box Field Conduit

To prepare the field wiring, proceed as follows:

- 1 Open the CIM door on Side 1 of the unit.
Note: Side 1 has electronics module access to the field connections, boards, and wiring. The main J-box is installed on Side 1.
- 2 Commonly, a field connection conduit runs through the side column to the J-box with a 1-inch NPT male end. Run all the field wiring through this field conduit. All wiring connections may take place in the factory-installed J-box. Before proceeding, refer to “[Electrical Related Items](#)” on [page 8-3](#) and “[Reference Information](#)” on [page 9-1](#).
- 3 In all units where a J-box is used (factory or contractor-supplied), the following are mandatory requirements:
 - The connection of the conduit to the J-box must be made with a clearance of at least 9 inches from the pump/dispenser base to the bottom of the J-box connection stub. To accomplish this, the conduit can be routed to enter the J-box from the side or top.
 - The J-box must be securely fastened to the unit by means of a bracket or brace. It must not be held in place only by a conduit. Factory-supplied boxes are fastened only by a conduit.
 - Installation of the J-box and all fittings must be performed to allow the installer to turn any and all threaded fittings by a minimum of 45° in a single movement using appropriate tools (for example, pipe wrench).

WARNING



The bottom plate of the electronics cabinet and the top plate of the hydraulics cabinet are separated to provide an air gap between the electrical and hydraulic housings.



Loss of air gap integrity due to improper installation can allow fuel vapors into areas where they may ignite. The resulting fire and/or explosion can lead to serious injury or death.

Running the conduit through the air gap requires strict compliance with procedures outlined in this manual. No holes in air gap plates can be left unsealed the following installation.

WARNING



The electronics cabinet is an unclassified area and as such must be protected against flammable vapor entry.



Improper installation of the conduit through the side of the electronics cabinet may result in flammable vapors penetrating the electronics cabinet where it may ignite resulting in fire and/or explosion that can lead to serious injury or death.

Running the conduit through the side of the electronics cabinet requires strict compliance with the procedures outlined in this manual.

IMPORTANT INFORMATION

For conduit entry through the vapor barrier, the air gap penetration conduit must not be longer than 8 inches. This will allow removal of the dispenser (if required) in the future and accommodate wiring a new dispenser without pulling a new wire.

When a dispenser without a J-box is removed from the island, the conduit and wires will be cut immediately below the potting dam. This will leave enough wire to splice into a class 1, Div 1, Group C, and D explosion-proof J-box when a new (or previously removed) unit is installed/reinstalled over the containment box.

For conduit entry through the vapor barrier, the Frontier unit contains eight sets of conduit knockout holes (four on the right and four on the left) for access to the electronics cabinet. Knock out the aligned (top and bottom air gap plate) 1-inch plugs for the required number and positions of contractor-supplied conduits (do not use conduits smaller than 1 inch with the conduit plate provided). For field installations, only two conduits at opposite corners can be installed per plate. Use the knockouts on the left (facing Side 1) for all power and two-wire connections. Ethernet, International Forecourt Standards Forum (IFSF), speaker, intercom, and/or call button wiring must use knockouts on the right. For conduit entry through the side of the electronics cabinet, the Frontier unit contains eight sets of conduit knockout holes (four on the right and four on the left) for access to the electronics cabinet. Knock out the 1-inch plugs for the required number and positions of contractor-supplied conduits.

Note: Do not use conduits smaller than 1 inch size.

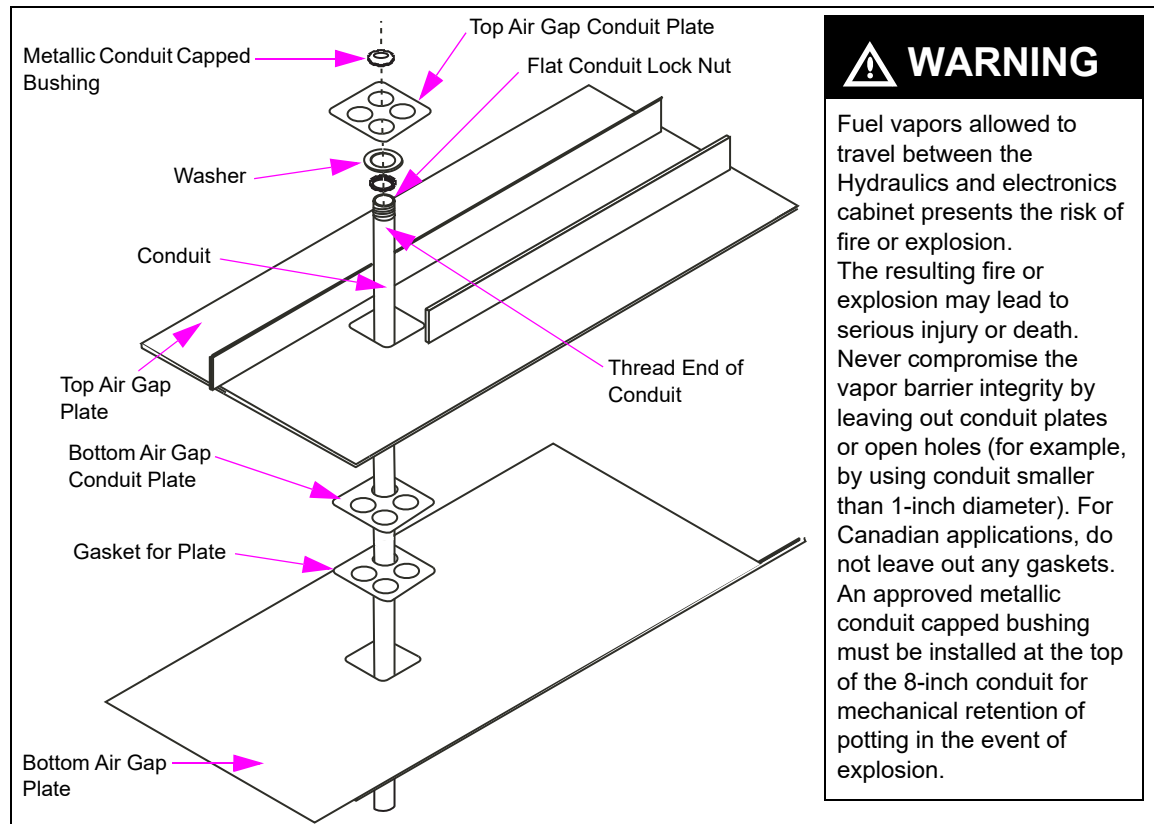
Installing Conduit Through Vapor Barrier

Note: This is not required for units with factory-installed J-boxes.

To seal the air gaps and conduits in Frontier units, proceed as follows:

- 1 Install the contractor-supplied 1 listed metal, rigid, threaded conduit through both the top and bottom air gap conduit plate holes according to the following procedure (see [Figure 6-1](#)).

Figure 6-1: Frontier Conduit Sealing Plates



- 2 From the electronics cabinet, remove two screws (not shown) and the upper conduit plate from the top air gap plate. Retain all parts for reassembly.
- 3 Thread end of conduit approximately 1-1/2-inches from the end.
Note: The conduit can be installed to the top air gap conduit plate away from the unit.
- 4 Fasten the conduit to the conduit plate removed using a machined flat conduit lock nut and washer on the bottom of the plate. Fasten a listed, metallic conduit capped bushing on the top of the plate.
- 5 Remove the two screws (not shown) and the bottom air gap conduit plate from the bottom air gap plate. Retain all parts for reassembly.
Note: (Canada only) The gasket for the plate will come off with the plate. The gasket must be reinstalled with the plate.

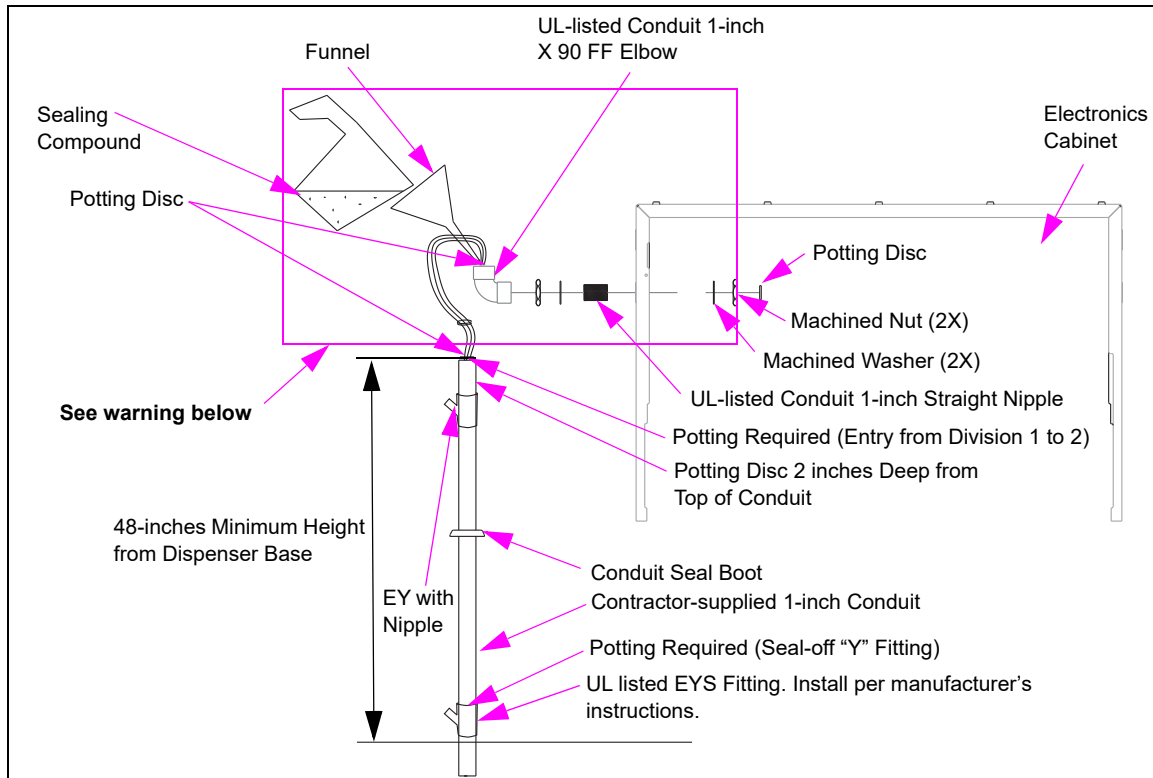
- 6 Remove the aligned knockout plugs from the bottom air gap conduit plate as required, and reinstall the plate and screws.
- 7 From the electronics cabinet, slide the conduit down through the knockout in the bottom air gap plate.
- 8 Reinstall the top air gap conduit plate onto the top air gap plate using screws, to secure the conduit in place.

Installing Conduit Through Side of Electronics Cabinet

WARNING

Installation using this method requires Gilbarco Installation Kit (M07838K001). Failure to use the kit will result in damage or injury.

Figure 6-2: Conduits and Potting Discs



WARNING

Installation using this method requires Gilbarco Installation Kit (M07838K001). Failure to use the kit will result in damage or injury.

- Notes:*
- 1) Conduit seal boots and liquid deflectors are not used on all dispensers.
 - 2) Use UL-listed metallic conduit capped bushing for wire protection.
 - 3) On dispensers without the factory-installed J-box, run conduits for:
 - The power and two-wire communications.
 - Speakers and call buttons (if required), and
 - SMARTConnect™ (if required) through the side column into the electronics cabinet as shown in [Figure 6-2](#) on [page 6-4](#).

Installing Wiring

Note: The wiring must be gas and oil-resistant, color-coded, or tagged for identification purposes, and rated for 300 V or higher. Data wires for new installations must be a twisted-pair (unshielded) with 10 to 12 twists per foot.

Operating Environment

Environment	Range
Relative Humidity	20 to 95% (non-condensing)
Minimum outside ambient temperature	-4 °F (-20 °C)
Maximum outside ambient temperature	140 °F (60 °C)*

*Electronics have been evaluated and are rated for use at a maximum of 131 °F (55 °C) outside ambient temperature.

To ensure proper unit performance, operation under severe environmental conditions may require special options such as card reader heaters and so on.

Wiring External to Dispenser

To install the wiring external to the dispenser, proceed as follows:

- 1 Pull the wiring through the stub up and sealing fitting.

Notes:

- 1) Ensure that enough extra wire length (minimum of 5 feet or 2 meters) is provided to make the run to the stub up location at the bottom of the electronics cabinet.




- 2) Remember that you may be routing the conduit over to come up at the stub up to the electronics cabinet. Depending on which end of the unit the stub up is on, you may be routing across the entire unit length.

- 2 For the side column conduit entry, install a short two-inch threaded nipple into the top of the sealing fitting.
- 3 For the side column conduit entry, install a capped pulling elbow. The use of a Killark® Y-3 fitting is recommended.
- 4 The remaining conduit must be made up to match the installation layout for the unit at the site.

The following is the list of the most common procedures for conduit entry to the right when facing Side 1:

- The length of the conduit must extend straight out from the capped Y fitting or pulling elbow.
- For the side column entry, the conduit must then be turned by 90°, vertical under the air gap plate knock out.
- Use the required air gap plate knock out. Do not knock out any knock out plugs that will not be used as an opening for conduit.
- All the conduits that enter into the electronics cabinet must be potted.
- At least 1 inch of conduit must extend above the bottom shelf of the electronics cabinet.
- Complete the conduit run with a conduit nut on the inside of the cabinet.
- Pull all wires properly through the conduit. Finalize the procedure by potting the conduit end.
- Allow 18 inches of wire in the electronics cabinet for field connections. The wire must be trimmed as required on field connection.
- All the conduits and fittings must be listed and suitable for use in class 1, Division 1 hazardous locations from the seal off fitting to the potted conduit.

Testing New Field Wiring

 WARNING	
	Sparks can ignite fuel/vapors. Fire/explosion can result in severe injury or death.
	Use caution when testing wires. Do not test when exposed fuel and vapors are present.
	Only use a Megger® tester on new field wiring.
	For existing wiring, use a digital multimeter to test for continuity/resistance.

Test the insulation of the new wiring from the station and to the electronics cabinet before connecting the wires. Refer to the Warning above. This checks for damage that can occur while pulling wires through the conduit.

To test the new field wiring, proceed as follows:

- 1 Ensure that wires are disconnected at both ends. If you do not disconnect wires at both ends, you can damage the pump/dispenser electronics.
- 2 Test the conduit wiring ends by using an insulation/Megger tester.
- 3 Connect one tester lead to the wire under test.
- 4 Connect the other tester lead to the ground.
- 5 Measure the resistance. Follow the test equipment manufacturer's instructions. Insulation resistance of more than 50 megohms is satisfactory. Check the local authority requirements.
- 6 Repeat steps 1 through 5 for all the new wires.
- 7 Repeat the test between all the new wires.
- 8 When all wiring tests are complete, the wiring may be potted.

Wiring Frontier Dispenser

Depending on the application, Frontier units require that a specific set of cables be installed. These cables are used to intercept the existing cables and provide connection points from the master and/or satellite units.

Preparing Field Wiring

To prepare for the field wiring, proceed as follows:

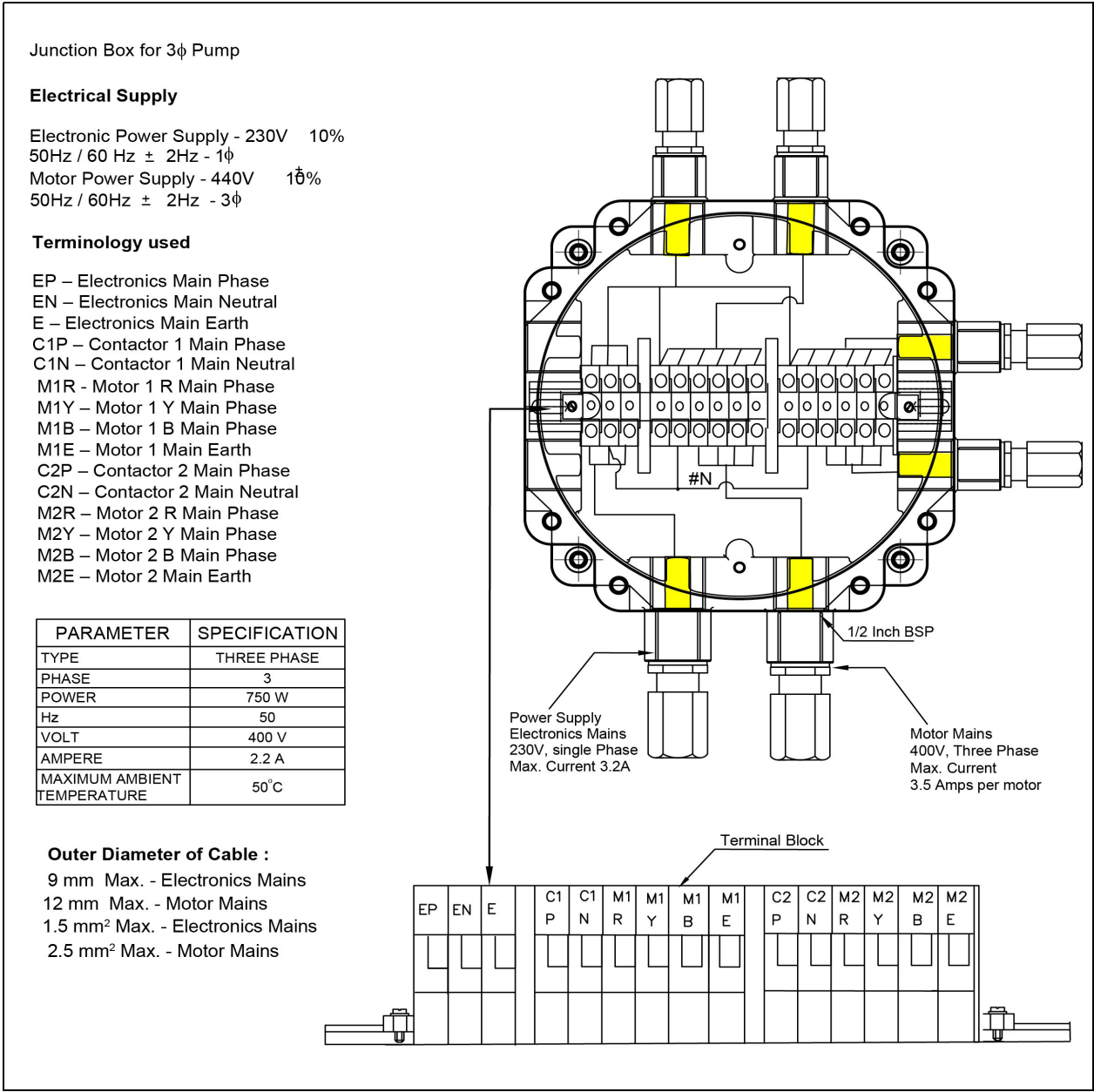
- 1 Open the door on Side 1 of the unit.
Note: Side 1 has electronics module access to field connections, boards, and wiring.
- 2 For units with the J-box installed, remove the box cover and save for reassembly.
Note: For Frontier units that are replacing older units, if the existing wire is too short to reach the installed J-box and a splice must be made, the contractor must provide and use a class 1 Division 1 explosion-proof J-box to make connections according to the code. Refer to “Before Mounting Unit on Fuel Island” on page 4-4.
- 3 The following table contains information on cables that are used for specific applications.

Description	Part Number	Application
Main AC	M02338	All Frontier Master Units
Valve Intercept	M02372	Master of Combo Unit - for Satellite Light Only
Combo Neutral	M02384	Satellite Side of Combo Unit, Satellite
Transformer Subassembly	M02370	Master of Combo Unit ~ OR ~ Frontier Satellite - for Satellite Light Only ~ OR ~ Legacy Satellite
Combo Pump Handle	M02385A001	Frontier Satellite, Combo
Combo 9 VAC	M02386A001	Frontier Satellite, Combo

- 4 Some cable configurations require that one of the existing connectors be cut off the wires. This allows the wire to be secured to other wires with wire nuts. For more information, see “Appendix B: Wiring Diagrams” on page B-1 and for illustrations noted in the table refer to step 3.

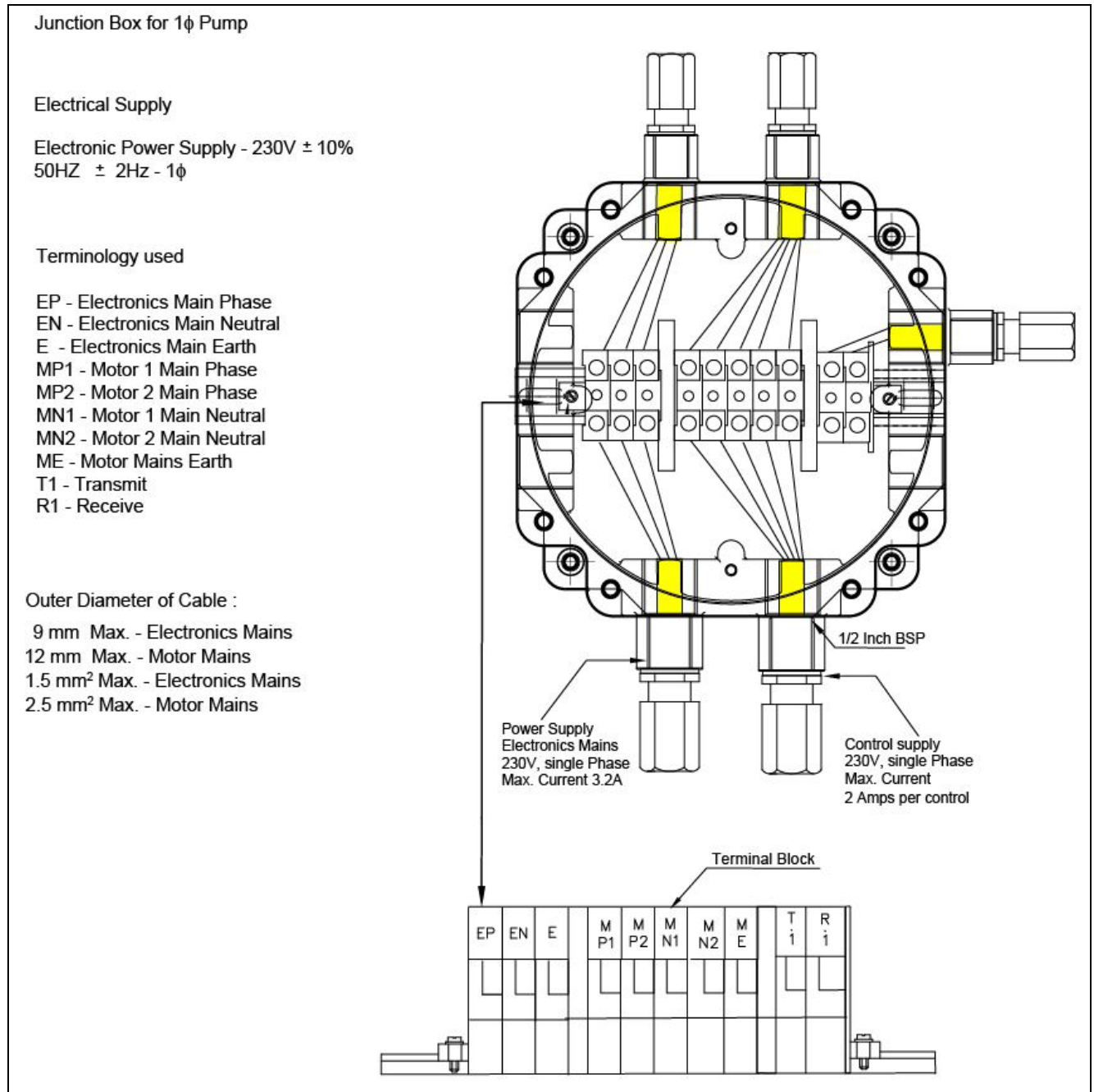
Supplying Connections for Three-phase Pump

Figure 6-3: Connections for Three-phase Pump



Supplying Connections for One-phase Pump

Figure 6-4: Connections for One-phase Pump



Completing Field Wiring

To complete the field wiring, proceed as follows:

- 1 Remove the cover of the J-box for models so equipped.
- 2 Make the connections as shown in [Figure 6-3 on page 6-8](#) and [Figure 6-4 on page 6-9](#). Do not disturb the factory wiring in the J-box and electronics cabinet.
- 3 For units with J-boxes, use pipe plugs to seal the unused openings in all J-boxes. Replace the cover on the boxes.
- 4 Double-check all wiring connections for wire nuts, lugs, caps, and so on. Reinstall the J-box cover. Ensure that you do not pinch the wires and use all J-box bolts.
- 5 Replace the lower doors and close the doors to the electronics cabinet.

Potting Conduit Stubs

Before potting, ensure that all conduits have been installed, wires pulled, and all wires are tested. All conduits entering the electronics cabinet on dispensers or pumps must be potted. Any contractor-supplied conduits entering the electronics cabinet must be potted.

Potting up to Unit

Fill the sealing fitting with potting compound to seal the pathway of the field wiring to the station building. Refer to [“Completing Field Wiring” on page 6-10](#).

Potting Within Unit

To pot within unit, proceed as follows:

Potting to Electronics Cabinet Through Vapor Barrier

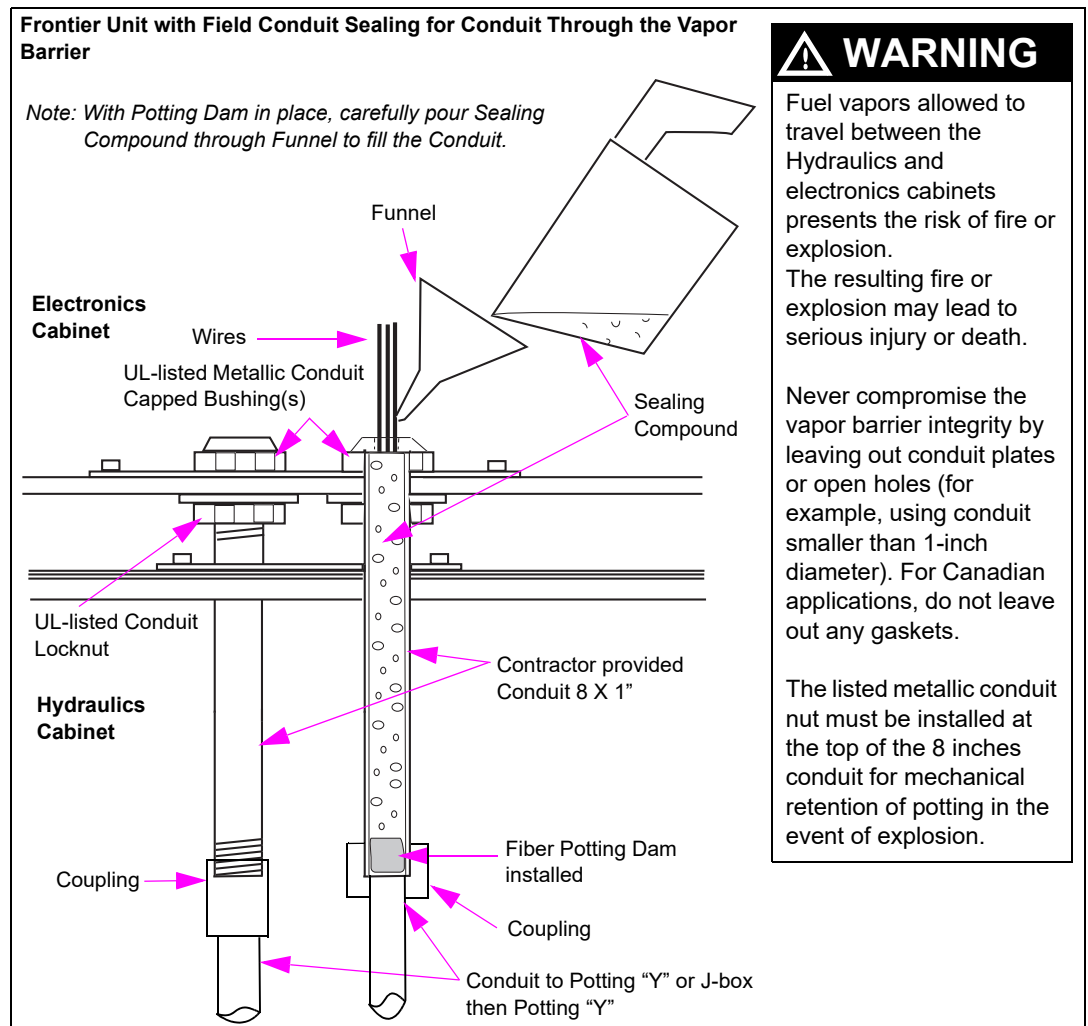
In all Frontier units, for conduit entry through the vapor barrier, each of the contractor provided 8- X 1-inch conduits entering and exiting the electronics cabinet must be sealed with a sealing compound through the full length of the conduit. This fill-to-length is mandatory according to UL requirements. Refer to [“Important Safety Information” on page 2-1](#).

To pot the conduit, proceed as follows:

- 1 Mix the compound in a clean vessel according to the compound manufacturer’s instructions. Mix only as much potting compound as can be used before the compound hardens.
- 2 Using a funnel, carefully pour the sealing compound into the conduit from the top until the compound is within 1/4-inch from the top of the conduit (see [Figure 6-5 on page 6-11](#)).
Note: Ensure that you pour slowly to prevent air bubbles from forming in the compound and wires around.
- 3 Immediately clean the spilt compound from the conduit threads and cabinet surfaces.

- 4 Install the UL-listed metallic conduit capped bushing.

Figure 6-5: Potting Conduits

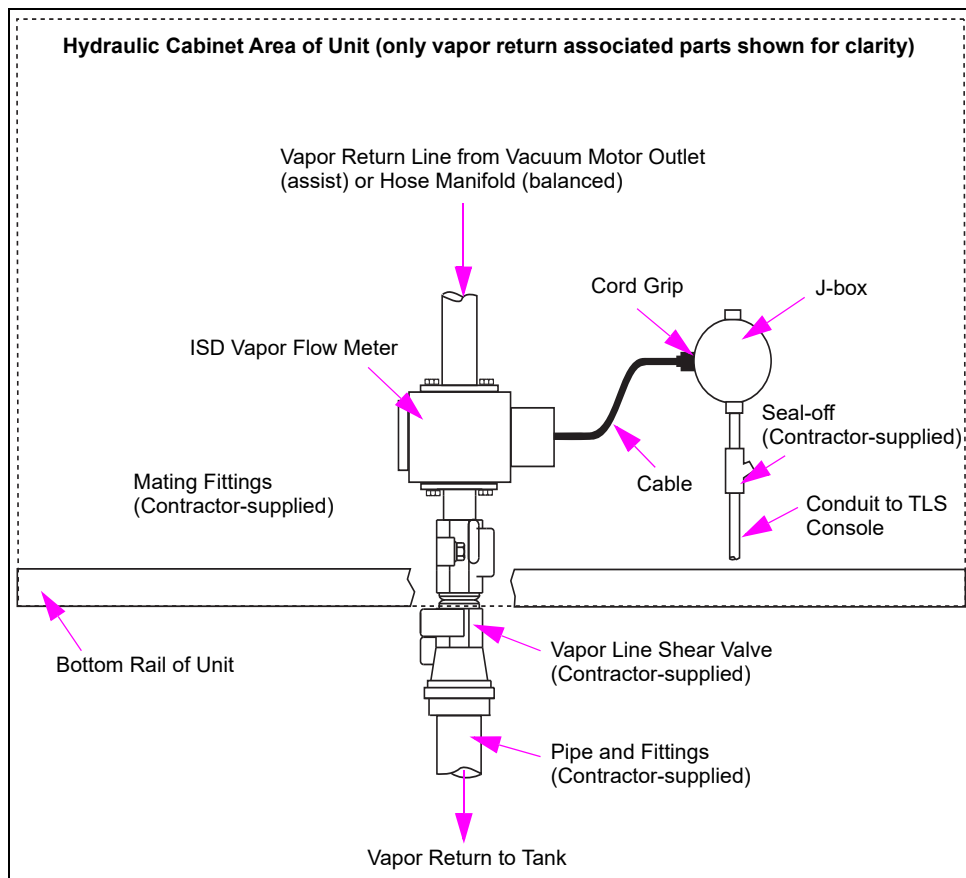


Connecting to In-station Diagnostic (ISD) Vapor Flow Meter

At Dispensing Unit

The Vapor Flow Meter is part of an ISD system that measures the amount of vapor returning to the UST. The wiring for this device is intrinsically safe and must be run in a separate conduit to the Veeder-Root® monitoring equipment or as per other allowable Veeder-Root recommendations. The conduit must be potted where it enters and leaves any designated hazardous zones. The potting requirements for hazardous zones must be followed so that fuel vapors do not migrate to other areas. The ISD Vapor Flow Meter wiring terminates at the Tank Level Sensor (TLS) console. The flow meter is in-line and near the vapor return shear valve in the hydraulic area of the unit. Do not create any liquid flow traps. For more information on liquid traps, see [Figure 5-18](#) on [page 5-22](#).




Figure 6-6: ISD Vapor Flow Meter



Epoxy Sealing

Sealing of wiring connections is required to ensure proper performance of intrinsically safe devices where minor corrosion can affect communication to the device.

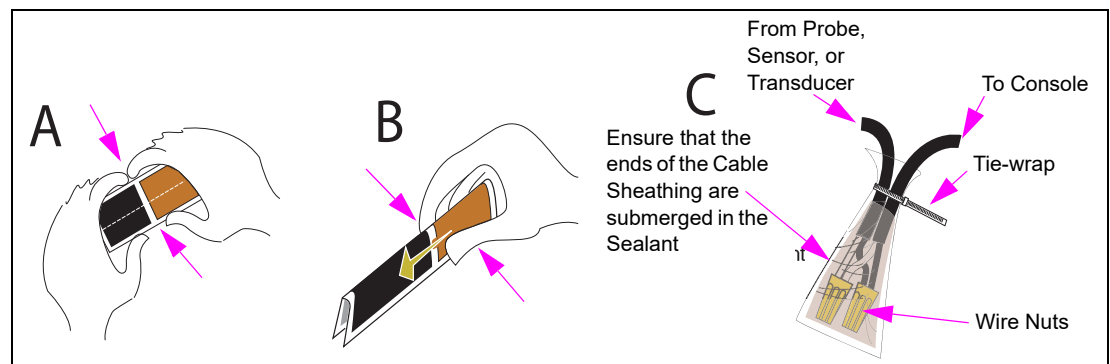
⚠ CAUTION

Epoxy sealant is irritating to the eyes, respiratory system, and skin. It can cause an allergic skin reaction. It contains epoxy resin and cycloaliphatic epoxycarboxylate.

Precautions: Wear suitable protective clothing, gloves, eye, and face protection. Use only in well ventilated areas. Wash thoroughly before eating, drinking, or smoking.

Figure 6-7: Epoxy Sealing Field Wiring



Note: When the temperature is below 50 °F (10 °C), keep the resin in a warm place before mixing (for example, in an inside pocket next to the body).

To seal the wire nuts with an epoxy sealant, proceed as follows:

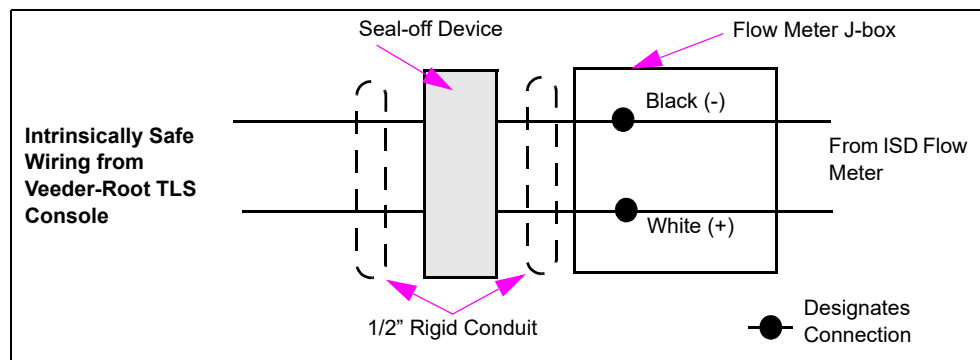
- 1 Open the epoxy sealant package, and remove the resin pack.
- 2 Hold the resin pack as shown in A (see [Figure 6-7](#)), and bend the pack along the length.
- 3 Firmly squeeze the red side of the resin as shown in B (see [Figure 6-7](#)), forcing it through the center seal and into the black side.
- 4 Mix thoroughly to a uniform color by squeezing the contents back and forth 25-30 times.
- 5 Squeeze the mixed, warm resin into one end of the bag, and cut off the other end.
- 6 Slowly insert the wiring connections into the sealing pack until they fit snugly against the opposite end as shown in C (see [Figure 6-7](#)).
- 7 Twist the open end of the bag and use the tie-wrap to close it. Position the tie-wrapped end upwards until the resin solidifies.
- 8 Push the epoxy sealed bag into the J-box. Replace and tighten the J-box cover.

To TLS Console

Wiring from the ISD Flow Meter J-box terminates at the TLS console. For additional information, refer to the *In-station Diagnostic Vapor Flow Meter Installation Guide* (Veeder-Root document number 577013-796). For correct polarity connections, see [Figure 6-8](#).

Note: Correct polarity must be observed when making the connection.

Figure 6-8: Field Wiring ISD Flow Meter Polarity



7 – Installing Breakaways, Hoses, Swivels, and Nozzles

Teflon tape must not be used for hanging hardware. Sealant must not be used for sealing connections unless the threads involved are pipe threads. O-ring seals do not require sealant. However, a small amount of silicone sealant can be used to avoid rolling or damaging of the O-ring during assembly.

WARNING

Hold-open devices on nozzles that are not of the pressure activated type, can allow flow to occur through the nozzle for an activated fueling position, without the subsequent customer manually opening the nozzle.



Spilt or uncontrolled dispensed fuel may result in potential fire, explosion, fuel chemical burns, or environmental contamination. Serious injury or death may result.



As per Gilbarco and certain standard requirements, pressure activated nozzles must be used for installations that use pump/dispenser or Point of Sale (POS) activated pre-set operation, or alternately, where a latch hold open device is used on a non-pressure activated nozzle, the latch hold open device must be removed. Consult the nozzle manufacturer for their recommended nozzle model types and safety recommendations.

WARNING

The hose pulled away from the pump/dispenser could drain fuel or pull the unit over during a drive-off. Explosion and fire or pull off of the dispenser during a drive-off could result in severe injury or death.

Installation of breakaways is required according to NFPA 30A.

WARNING

Use of hoses other than standard lengths may create a tripping hazard.

Tripping could result in severe injury or death.

Do not use excessively long hoses without a hose retractor.

WARNING

Flexible fuels such as Biodiesel, high alcohol percentage fuels, and so on, may be incompatible with certain plumbing materials and hydraulic components.

Use of incompatible materials or components with alternative fuels can result in leaks or unexpected failures of components resulting in fire or explosion or environmental damage.

When dispensing alternative fuels, verify with the manufacturer of the material or component that all plumbing components are compatible with the fuels being dispensed.

CAUTION**Hose Torque**

Recommended torque when installing hoses is 40-50 N.m (30-35 ft-lbs). DO NOT OVER TIGHTEN or damage to the nozzle could occur. Applicable when connecting hoses to the skid tank, during internal repairs, and nozzle replacement.

Units Without Hose Retractors

To install breakaways, hoses, and swivels in pumps/dispensers without extended reach or hose retractors, proceed as follows:

- 1 Install the breakaway whip hose to the pump/dispenser outlet casting (see [Figure 7-1](#) on [page 7-3](#)).
- 2 Install the listed breakaways to the whip hoses. Follow the breakaway manufacturer's instructions:
 - Clean all threads.
 - Place the sealant on male threads only. Follow the sealant manufacturer's instructions.
Note: Use only UL-classified pipe sealant approved for use with petroleum products. Remove the sealant if it is found inside the hose or fittings. Clean off the excess sealant. Do not use Teflon tape as it may damage the unit.
 - Use a smooth-faced wrench to tighten all fittings securely. Do not overtighten.
Note: Do not tighten the breakaway by twisting the hose. This can damage the coupling.

- 3 Install the hose to the breakaway.

Figure 7-1: Hanging Hardware




- 4 Install the swivel (if used) to the hose. Follow the swivel manufacturer's instructions.
- 5 Install the nozzle to the swivel or the hose. Follow the nozzle manufacturer's instructions.
Note: Check for the correct nozzle cradle/hook type (vapor, non-vapor, and so on). It must not be possible to activate the nozzle boot switch with the nozzle properly held in place in the nozzle boot.
- 6 Use an ohm meter to check for continuity from the end of the nozzle to the conductive metal surface in the unit (applies to both types of hose-retrievers or non-retrievers).



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8 – Completing Installation

Do Not Turn on AC Power

 **WARNING**

Applying power before electrical and mechanical inspections have been completed can be hazardous. Hazardous high voltage, fuel, and fuel vapors may be present or the equipment may be damaged.

 Serious fires, explosions, and electrical shocks could result in injuries or deaths. Power must not be applied to the unit and associated STPs when installing, servicing or making electrical wiring connections, or replacing any electrical components, including light bulbs. Multiple disconnects may be required.

Power must only be applied to the unit after the commissioning Gilbarco ASC checks wiring and so on. The installer must inspect the unit per [“Installation Checklists”](#) before contacting the commissioning ASC. Incorrect installation could result in an unsafe unit condition. Damage from improper wiring or installation will not be covered by warranty.

When all installation procedures are complete up to this point, the unit must be inspected by a Gilbarco ASC.

After the inspection is complete, the system must be purged by the installing contractor. Irrespective of when the purging operation is performed, proceed to [“Installation Checklists”](#).

Installation Checklists

To ensure proper and safe operation of all equipment and to ensure warranty coverage, installers must inspect the installation. The [“Mechanical and Hydraulic Related Items”](#) on [page 8-2](#) checklist and [“Electrical Related Items”](#) on [page 8-3](#) checklist may be used as a guide (many of the items on the lists must already have been checked by the electrician as covered earlier).

Follow the checklists and perform all the required inspections. The forms must be provided with each unit, if not, contact the Gilbarco Distributor. It is only required to complete the station electrical inspection portions of the form (List 3) in every form, (for every unit at the station).

Note: To preserve the originals for future use, make several copies of all the checklists in this manual.

Mechanical and Hydraulic Related Items

Item	Procedure	Refer To	Checked	MDE-4226 Related Item
1	Shear valves must be installed according to the valve manufacturer's recommendations. Shear point is $\pm 0.75"$ of grade and properly mounted. Vapor line shear valves are required for many localities.	page 5-23 of this manual		List 1, Item 1
2	The lower piping brace must be installed according to the installation manual and all product pipes must be properly anchored to it.	page 5-16 of this manual		List 1, Item 13
3	Flexible pipes must not be used within the dispenser. However, flexible pipes that meet the local and state codes can be used below the pump/dispenser, when allowed by regulatory authorities.	-		List 1, Item 2
4	Pumps (self-contained units) must have a vacuum actuated pressure regulating valve (Gilbarco Model 52 or equivalent) to prevent positive pressure at the pump base when used with above ground tanks.	-		List 1, Item 3
5	Hose breakaways must be used and installed according to the manufacturer's recommendations. For units with retrievers, breakaways, and whip hoses must be attached to the nozzle end. For units without retrievers, it is attached to the dispenser end.	Manufacturer's specifications		List 1, Item 5
6	All hanging hardware must be checked for continuity.	page 7-1 of this manual		List 1, Item 6
7	The unit must be properly anchored to the island or skid tank.	page 5-23 of this manual		List 1, Item 7
8	Vapor recovery piping at the pump/dispenser must have no traps or sags. Unit must be mounted using proper quantity, size, and strength mounting hardware.	page 5-22 of this manual		List 1, Item 8
9	Verify correct nozzles, piping and brand panels for each grade. Also, verify if correct product lines are connected to each pump/dispenser inlet.	Unit order specific		List 1, Item 9
10	All code, regulatory agency, or customer-specified safety warning signs, labels, or decals have been installed.	As provided with and for unit		List 1, Item 10
11	Long hose lengths beyond Gilbarco recommendations must not be used without special retrievers. <ul style="list-style-type: none"> • For VaporVac hoses, no more than 6" of hose length may rest on the ground when the nozzle is resting in the boot. • For Balance Vapor Recovery hoses, no portion of the hose may be on the ground. 	NFPA 30A		List 1, Item 11
12	Verify shear valve, Nozzle, and Dispenser proper shutoff operation.	page 8-6 of this manual		N/A

Electrical Related Items

Item	Procedure	Refer To	Checked	MDE-4226 Related Item
1	Conduit entries into the electronics cabinet must be installed according to the installation manual. No unplugged openings must be allowed between the electronics cabinet interior and the vapor barrier or at the side of the electronics cabinet.			List 2, Item 1
	Field conduit into the electronics cabinet must be properly potted according to the local, state, and national codes as per the installation manual. This is in addition to potting requirements for the conduit below the base of the pump/dispenser.			List 2, Item 2
2	Field conduit installed in dispenser hydraulics cabinet must be securely fastened to the brace supplied with the unit, using appropriately sized U-bolts or pipe clamps.			List 2, Item 3
3	Equipment must be installed in conjunction with an emergency power cutoff to remove all power from the equipment in case of an emergency.	"Grounding" on page 9-9		List 3, Item 2
4	STP isolation relays are required for all dispensers.			List 3, Item 3
5	Use twisted-pair wires as specified for two-wire communication for new installations or where a new wire is pulled. Do not use shielded wires for video feed, for SMARTConnect and Applause Media System.			List 2, Item 5
6	Use twisted-pair wires for color display communication wiring.			List 2, Item 5
7	All wiring must be of stranded copper of the gauge and insulation casing specified.			List 2, Item 6
8	All grounds must be properly connected according to the installation manual requirements as well as the state, local, and national codes.			List 2, Item 7
9	Conduit and J-boxes must be approved for hazardous locations and properly sized for the wiring involved.	• NFPA 30A • NFPA 70 • UL 87 • NEC		List 2, Item 8
10	Properly size all circuit breakers for the units/unit options involved.	NEC and local codes		List 3, Item 5
11	All pump/dispenser wiring must be properly spaced and isolated from wiring for electrically noisy devices such as variable speed STPs, station equipment motors, and other devices.			List 3, Item 6
12	All power wiring and circuit breakers to Gilbarco equipment must be dedicated and not be shared with other equipment.			List 3, Item 7
13	All circuit breakers to Gilbarco equipment must be clearly labeled and readily accessible.			List 3, Item 8
14	All distribution boxes must be clearly labeled showing the pump/dispenser number connections.			List 3, Item 9
15	All pumps/dispensers must be wired to the same phase of electrical power.			List 3, Item 10
16	New site wiring must be Megger-tested and wired to the same phase, unless isolation relays are used to protect it against cross phasing. Old site wiring must be continuity and short-tested with a digital meter.			List 3, Item 11
17	Wiring must be color-coded or tagged, sized for distance and application, and resistant to gas and oil.			N/A
18	J-boxes must be secured with all bolts and have no unplugged openings.			List 2, Item 9

Purging Air from System and Testing

For New Dispensers (Purging Through Shear Valve)

The Frontier dispensers must have some programming changes completed before purging can be started.

Frontier Units

The Frontier units are received precalibrated, but must be checked for calibration before use. Purging requires the unit to be configured for gallons, liters, or imperial gallons.

IMPORTANT INFORMATION

When purging Frontier units, if you exceed more than 250 volume units for any meter on a side, the startup technician will not be able to reset the volume totals to zero or any other value for opening the station. Avoid purging of more than 200 units of volume per meter as a result. Purging, calibration, and calibration verification can be performed within this limit and totals reset, if required.

Programming Units of Measure

For Frontier units, this procedure is referred to as setting the Conversion Factor. For other Encore units, this is referred to as setting Volume Units.

Special Steps to Purge Air from Underground Lines

For sites with underground lines not filled with fuel, air must be purged from the lines before purging the dispenser.

CAUTION

Do not attempt to purge these lines using the dispenser nozzle as the dispenser meters may suffer damage due to overspeed.

To prepare for purging, use the following steps for each shear valve in all units. Be observant during purging and check for plumbing leaks as you move toward the tank. For blender nozzles, select a blend grade. Ensure that the prices are set (by the ASC) before you begin.

- 1 Turn off all power to the STPs involved.
- 2 Start with the unit farthest from the tank.
- 3 Use a UL-approved sealant to connect a “gasoline suitable, conductive hose” to the shear valve test port.
- 4 Install the mechanical valve (petcock) to the hose.
- 5 Place the drain end of the closed valve in an approved metallic container. Clean up any spills promptly.
- 6 Turn on power to STPs. Activate the STP for the line being purged.

- 7 Slowly open the mechanical valve until you obtain a slow, constant stream of fuel flow. Maintain contact between the metallic valve and the can during fuel flow.
- 8 Turn off STP, bleed pressure using the mechanical valve, remove the valve and hose, and reinstall the pipe plug to the shear valve using UL-approved sealant suitable for the fuel involved.
- 9 For purging air from the system with fuel in lines, perform all steps in [“For New and Existing Pumps and Dispensers with Fuel in Lines \(Purging Through Nozzle\)”](#).

For New and Existing Pumps and Dispensers with Fuel in Lines (Purging Through Nozzle)

CAUTION

Purging air at high flow rates through the meter can permanently damage them. Noise is not an indication of overspeed in many cases.

Overspeed meter damage is not covered by warranty. Follow all instructions carefully.

CAUTION

Meters and other hydraulic devices can be permanently damaged by contamination if units are not equipped with filters during purging and other installation processes.

Non-use of filters during installation is considered abuse. Meters and other components that fail due to the contamination introduced during installation are not covered by warranty.

Never remove filters during installation. Do not substitute.

To purge air in new and existing pumps/dispensers where underground product lines are full with fuel, proceed as follows:

- 1 Lift the nozzle handle for the hose being purged.
Note: For purging in Frontier units, perform the procedure for purging in [“For New Dispensers \(Purging Through Shear Valve\)”](#) on page 8-4 for the selected meter.
- 2 Place the nozzle in the approved container.
- 3 Slowly open the nozzle until you obtain a slow, constant stream of fuel flow.
Note: For SMART Meter-equipped units, never exceed the nozzle slow latch setting until fuel flow is steady.

- 4 Purge the system with the amount of fuel specified in the following table:

For	Pump this Amount
Start-ups (installing new systems)	35 gallons (130 liters) per hose
Existing sites where the product lines are full	50 gallons (186 liters) per hose*

**This value depends on the following procedures in the sequence listed (especially for new sites). Also, a lot can depend on line lengths, unusual plumbing situations (air traps), and so on, what may be good for most sites may not work for all. Generally, you can observe the effect of air if successive calibration checks read plus. After they stop reading plus, you have purged all the air.*

- 5 Return the nozzle to the nozzle boot.
- 6 Empty the approved container into an appropriate product tank.
- 7 Repeat steps 1 on [page 8-5](#) through 6 for each affected hose and each meter.

Frontier units have enhanced security software. You must periodically spin the pulser to maintain a higher purging flow rate.

WARNING

Do not substitute the pulser while power is being supplied to the unit. Lethal voltages exist within the dispenser and damage to the unit could occur if certain critical steps are not followed. It is recommended that only Gilbarco-certified ASCs, who are trained in the service and operation of Frontier dispensers perform this procedure.

Note: Dispense a minimum of 75 gallons (341 liters) through each DEF hose. For overhead lines where no air bleed is used at a high point, purge amount can sometimes run into hundreds of gallons.

Verifying Shear Valve, Nozzle, and Dispenser Shutoff Operation

To verify correct shutoff function of the shear valve, nozzle, and dispenser, perform the following after purging air for all nozzles:

- 1 Close the shear valve.
- 2 Activate the fueling position associated with the shear valve.
- 3 Open the nozzle. Fuel must not continue to dribble out of the nozzle for more than a few seconds. If fuel continues to flow for a longer period, check the shear valve or nozzle for problems.
- 4 Close the nozzle.
- 5 Open the shear valve.
- 6 Activate the fueling position for the same fuel on the opposite side of the unit.

- 7 For the side to be tested (opposite activated side), remove the nozzle from the boot but do not activate the boot switch by raising the nozzle boot lever or allowing the auto on flapper to activate.
- 8 Open the nozzle. Fuel must not continue to dribble out of the nozzle for more than a few seconds. If fuel continues to flow for a longer period, check the nozzle or inform the ASC to check the dispenser valve or valve O-rings.

Calibration Procedure for Frontier Units

IMPORTANT INFORMATION

Units must be properly purged before calibration or calibration verification. Incomplete purging of air can result in inaccurate calibration or errors in calibration verification testing (normally, subsequent calibration checks will read plus). Always verify any calibration after setting.

The Frontier meters are precalibrated, but calibration must be verified. Depending on the type of unit, the procedure is slightly different. After calibration, the Weights and Measures (W&M) switch must be seal-wired to prevent calibration tampering. Ensure that you draw the seal wire tightly.

Frontier (Liter Unit of Measure)

Temporary pricing must be entered into the unit, as outlined in [“Installation Checklists”](#) on [page 8-1](#) to allow dispensing and calibration.

The currently produced Frontier units are precalibrated to Litre and programmed to default programming values.

Note: Perform the calibration verification procedure after calibration.

Programming Instructions - Level 1 Command Codes (Setting PPU)

For more information, refer to *“Frontier Commissioning Document”*.

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9 – Reference Information

Information in this section is provided for the installing contractor's reference. The contractor may or may not be required by individual contract to perform all or any of the requirements outlined. However, all installations must conform to the requirements of this section.

Reference Contents

Section and Information	Location
Installation Differences when Replacing The Advantage Series	page 9-2
Electrical Requirements	page 9-3
Emergency Power Cutoff Switch	
Circuit Breakers	page 9-3
STP Control Relay Boxes for Dispensers	
STP Isolation Relays for Electronic Dispensers	
Conduit	page 9-4
Wiring	
Twisted-pair Wiring - Data Wire Lengths	page 9-6
Twisted-pair Conduit	
Twisted-pair Cable	
Ethernet Cable	page 9-7
Cable Ordering Information	
Ethernet Cable Installation Personnel and Procedures	
Grounding	page 9-9
Sealing 'Y' Fittings	page 9-10
Plumbing Requirements	page 9-11
Pipe Installation	
Pipe Size	
Pumps (Standard Flow)	
Pumps (High Flow)	
Dispensers (Standard Flow)	page 9-13
Dispensers (High Flow)	
Dispensers (Frontier High Gallon)	
Check Valves (Used on Pumps and Frontier Units only)	page 9-13
Shear Valves (Generally Used on Dispensers Only)	

Installation Differences when Replacing The Advantage Series

The following table shows critical differences between The Advantage Series and Frontier Series that will affect installation:

Item	Description
Side Identification	<p>To emphasize plumbing differences between the Frontier Series and The Advantage Series, the nomenclature has been changed. There is no longer a reference to the sides as A and B as with The Advantage Series. The serial plate front of the Frontier Series (manufactured on or before December, 2002) is now Side 1 and the back is Side 2. Units manufactured after December, 2002 have the serial plate (label) mounted on the main door behind the CIM door on Side 1. Side 1 is the primary service access side for electronics. Importantly, Side 1 on an Frontier unit replacing an existing The Advantage Series unit does not always replace The Advantage Series A Side. In most cases:</p> <ul style="list-style-type: none"> • The Advantage A Side and Frontier Side 1 are reversed for Frontier Single-hose and Blender units. • The Advantage A Side and Frontier Side 1 are the same for Multi-hose units. <p>Also, the Frontier Series uses letters (W, X, Y, and Z) to differentiate the product pipes. The Advantage Series units are typically labeled as low and high or A, B, and so on.</p>
Piping Layout	<p>Do not assume piping connections for the Frontier unit based on The Advantage Series or other unit piping.</p> <p>Dispensers: Frontier product plumbing, in some cases, is in the reverse order from The Advantage Series, is spaced differently and has other differences. For more information, see "Plumbing Requirements" on page 9-11.</p> <p>Pumps: Frontier product inlet and electrical connection locations on self-contained pumps are different from The Advantage Series.</p>
Piping installation	<p>Dispensers: The Frontier unit is provided with a lower piping brace. The installer must secure plumbing to the lower brace as per the installation document else, improper operation of the shear valves may result if a unit is knocked over. Flexible pipe cannot be used within the dispenser, but may be used below the dispenser. The Frontier inlet plumbing only extends partially into the Hydraulics Cabinet. This allows much greater installation adaptability by using rigid piping when retrofitting to competitive equipment pit boxes and plumbing layouts. In addition to side-to-side inlet adjustment capability, the lower piping brace can be mounted forward or rearward for additional adaptation.</p> <p>Pumps: Pumping units in self-contained pumps are shipped without inlet fittings. At installation, the protective closure in the pumping unit inlet must be removed and replaced with proper inlet fittings.</p>
Frame width	<p>There is only one frame width for the Frontier. The Advantage Series units come in wide and narrow frame types. The Frontier width is intermediate between the wide and narrow frame width of The Advantage Series. However, it is recommended to use a pit box designed or adaptor for the Frontier for new stations or major renovations.</p>
J-box	<p>Dispensers: The Frontier units may ship with or without a J-box or field conduit. The conduit and J-box not part of an order is provided by the installer. This allows more versatility for electrical conduit routing. As the installer may install the J-box towards the front or rear of the unit, it is not recommended to use the location of the J-box openings as an indication of front or rear of the unit. Always use the serial plate to identify Side 1.</p> <p>Pumps: The Frontier Pumps have a factory-installed J-box, located on Side 1, but the electrical power connection is a 1" NPT conduit inlet located on Side 2. All electrical power wiring to the unit must enter the conduit on Side 2 and feed to the J-box. The Ethernet and intercom connections must enter the unit on Side 2. Refer to "Appendix A: Elevation Diagrams" on page A-1.</p> <ul style="list-style-type: none"> • J-boxes, conduit, and fittings must conform to all requirements listed and referenced in this manual. • For new installations, with proper pull of additional wire, it is possible for Frontier to eliminate a J-box. The Advantage Series units always have a J-box.
Electronics Cabinet	<p>The Frontier electronics cabinet has two field conduit inlets. Facing Side 1, the ones to the center left are for power wiring while the ones to the center right are for intercom/Ethernet/call button/speaker wiring. In The Advantage Series, the power goes into the J-box and intercoms, and so on, usually in a special conduit up a side column. Ethernet will be an option for future Frontier units with installation of an optional board in the electronics cabinet. All the Encore units have knockouts for Ethernet wiring although the option board is not currently available. Ethernet wiring can share the conduit with a speaker/intercom/call button.</p>

Item	Description
Wiring in Electronics Cabinet	The Encore Series units use wiring terminal blocks, as appropriate, for field wiring whereas The Advantage Series units use wire nut connections.
Mandatory conduit potting requirements	The installer must pot each conduit entering the electronics cabinet in two locations as specified in this manual. One is at the entry into the electronics cabinet and the other is in the pit box. The Advantage Series units only require potting below the unit.
Calibration	All the Frontier meters are electronically calibrated. The Advantage meters are mechanically calibrated.

Electrical Requirements

Electrical requirements are as follows:

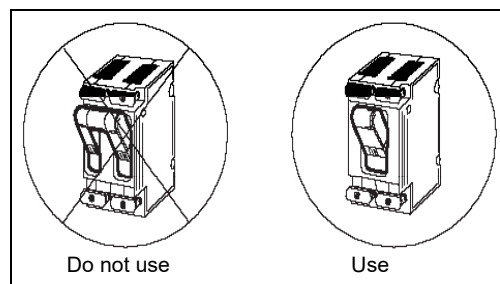
- Sites must be prepared according to NFPA 30A, NFPA 70, and applicable national, state, and local codes/regulations.
- All circuit breaker panels and relay boxes must be mounted securely to the wall.
- Only UL-recognized/approved components and/or systems may be used.
- Licensed electricians experienced with pump and dispenser installations must be used to make all electrical connections.
- Installation requires a dedicated circuit phase system. All electronic units must be wired to the same power leg.
- An earth ground is required for all circuits.

Emergency Power Cutoff Switch

- NFPA 30A and Gilbarco require the installation of one or more emergency power cutoff switches.
- An emergency power cutoff switch is a single control that removes AC power to all island equipment [pumps/dispensers, STPs, canopies, lights, and so on (see [Figure 9-1](#))].
- The emergency power cutoff switch must be accessible, labeled clearly, and installed away from any hazard that may occur at the pumps/dispensers. Cutoff switches must not be located more than 100 feet away from the pumps/dispensers.

Circuit Breakers

Figure 9-1: Switched Neutral Circuit Breaker



- A dedicated UL/CUL/CSA/IEC 60947-2-listed switched neutral breaker is required for each circuit leading to a pump/dispenser or dispenser and STPs. It must be able to disconnect hot and neutral conductors simultaneously. Single-pole breakers with handle ties cannot be used.
- Only UL/CUL/CSA-listed circuit breaker panels are permitted for use.

- Circuit breakers must be installed away from the pumps/dispensers, readily accessible and clearly marked.
- A separate circuit breaker is required for each STP (dispenser models) or each pump motor (self-contained models).
- One circuit breaker is required for each pump/dispenser to allow the isolation of the pump/dispenser.

Units with Ground Fault Interrupt (GFI)/Residual Current Device (RCD)

A Ground Fault Interrupt (GFI), also referred to as Residual Current Device (RCD) in some regions, consists of a sensor that detects changes in the current to the load, by comparing the current flowing to the load and the current flowing from the load. A drop-off in the current equivalent to about 25 mA can turn off all power by tripping a relay within the GFI/RCD within a few hundredths of a second.

When powering a dispenser with a GFI/RCD, the return neutral of any device to which the dispenser supplies power must be the same neutral as that of the dispenser. For example, the STP control relay.

STP Control Relay Boxes for Dispensers

- Gilbarco requires installation of STP isolation relays in addition to STP control relays. Combined STP Control Relay/Isolation Relay boxes are recommended.
- Each STP requires a separate control relay for each STP.
- Dispenser relay must not be used to power the STP.

STP Isolation Relays for Electronic Dispensers

STP isolation relays provide electrical isolation between dispensers and prevent damage from cross phasing. Refer to *MDE-2755 Gilbarco STP Control and Dispenser Isolation Relay Box PA0287* and *FE-321 Gilbarco STP Isolation Relay Box PA0287*.

Note: For 3-phase STP, use isolation relay at the input of the 3-phase STP control box.

- Gilbarco requires installation of STP isolation relays in addition to STP control relays. Combined STP Control Relay/Isolation Relay boxes are recommended.
- Isolation relays must be installed for each STP control line at each dispenser or dispenser grouping on a single circuit breaker.
- Neutral wire must be routed to the control relays from the dispenser circuit breaker (For more information, see [“Appendix B: Wiring Diagrams”](#) on [page B-1](#)).

Conduit

Gilbarco recommends that spare conduits be run for future high speed communications. For details, refer to [“Twisted-pair Conduit”](#) on [page 9-6](#).

- Use a minimum of 1-inch conduit for all Frontier pumps/dispensers except for Frontier, where you must use 3/4-inch conduit to connect wires to the pump/dispenser. Infoscreen® and Two-wire data wires can share this conduit (For model-specific wiring diagrams, see [“Appendix B: Wiring Diagrams”](#) on [page B-1](#)).

- Use separate 1-inch conduit for e-CRIND or intercom wiring. This is required for higher data rate Transmission Control Protocol/Internet Protocol (TCP/IP) communication.
- Run all power and light wires in threaded, rigid metal conduit or in a rigid non-metallic conduit. The conduit must conform to national and local electrical codes. If non-metallic conduit is used, it must be at least two feet underground. The last two feet of the underground run to the J-box must be a rigid metal conduit or threaded steel intermediate metal conduit.
- Never share the conduit or wire troughs with other manufacturer's equipment (that is, speaker wires, and so on).
Note: The same conduit may be used for routing power to the pump/dispenser and the two-wire data loop (class 1 circuit). The two-wire data loop is a class 1 circuit.
- Metal conduit is not sufficient to provide an equipment ground. A separate ground wire must be used.
- Knock-out boxes or flexible conduit are not permitted for installation.
Note: Extra J-boxes added to the pump/dispenser must be listed class 1, Div. 1, Group C and D explosion-proof.
- All electrical fittings must be listed for class 1, Group C and D hazardous locations, as required by NFPA 30A and NFPA 70.
- A Seal-off 'Y' fitting (for example, Killark Type EY) must be installed on all units as a first connection where the conduit leaves the ground.

Wiring

For high speed communications information, refer to [“Twisted-pair Conduit”](#) on [page 9-6](#).

- All pumps/dispensers must be wired according to NFPA 30A, NFPA 70, and applicable national, state, and local codes/ regulations.
- All circuits must be class 1 N.E.C wired except the speaker (intercom) circuit which must be class 2 N.E.C. The speaker (intercom) circuit requires a separate 1-inch conduit.
- Only stranded gas and oil-resistant copper wire rated for 300 Volts (up to 240 VAC source) and 176°F (80 °C) may be used.
- In the main conduit, for communications, only twisted-pair, Two-wire data pairs may be used.
- All dispensers must be wired on the same phase.
Note: If the Gilbarco isolation relay box is installed, dispensers are not required to be on the same phase.
- Only listed wire nuts may be used for connections. Tape is not permitted.
- Seal-off Y fitting(s) must be potted after all wires are run and tested to termination points.

Twisted-pair Wiring - Data Wire Lengths

Refer to the following table to determine maximum data wire lengths.

For this Distribution Box	The Distance Between the Distribution Box and Dispenser	The Distance Between the Distribution Box and Console/Controller
PA0133, PA0187 G-SITE®	"Total" data wire system run no more than 2600 feet with 14 AWG.	
PA0242 Transac® System 1000	No more than 2600 feet with 14 AWG.	No more than 2600 feet with 14 AWG.
PA0261 Universal Distribution Box (Two-wire Mode)	No more than 2600 feet with 14 AWG.	No more than 2600 feet with 14 AWG.
PA0306 Distribution Box	No more than 2600 feet with 14 AWG.	No more than 2600 feet with 14 AWG.
PA0409 Distribution Box	No more than 2600 feet with 14 AWG.	No more than 2600 feet with 14 AWG.
PA0261 (RS-422 Mode)	No more than 50 feet with 14 AWG.	No more than 2600 feet with 14 AWG.
PA0409 (RS-422 Mode)	No more than 50 feet with 14 AWG.	No more than 2600 feet with 14 AWG.

Note: When installing new two-wire communication wiring, use unshielded twisted-pair data wires. Do not use shielded wires. Wiring specifications: two-wire twisted-pair (UTP) with 10 to 12 twists per foot, stranded annealed copper tinned with 18 AWG minimum required for runs up to 1000 feet or 14 AWG minimum for runs up to 2600 feet. Do not use daisy chain communications wiring. Insulation specifications: Polyvinyl chloride (PVC) insulation of type TFFN or MTW, UL-approved gasoline and oil-resistant. Refer C&M Corporation Part #27525 (18 AWG) or equivalent. Gilbarco part number for the wire is Q13221-02.

Twisted-pair Conduit


Gilbarco recommends the use of 1-inch rigid conduit and fittings (refer to [“Conduit”](#) on [page 9-4](#)) for twisted-pair cable(s). This will allow up to two speakers and two call/stop buttons per side, plus Ethernet.

Note: Terminate the conduit in the dispenser containment pan consistent with all national and local electrical codes.


Twisted-pair Cable

Gilbarco-specified cable must be used to permit issuance of a Certificate of Conformance and/or warranty. Use of cables of other types may also create a hazardous situation.

⚠ WARNING



Petroleum vapors may migrate inside the cable insulation between conductors and sheathing of various cables, including twisted-pair cables. Vapors may ignite, leading to serious injury or death.



Use only twisted-pair cables specified by Gilbarco.

Cable Ordering Information

Refer to the following table for cable ordering information:

Type	Comments
Q13221-02	Wire - 600V Stranded, Annealed Copper Tinned with PVC Insulation ~OR~
Type TFFN or NTW, 18 AWG	UL-approved Gasoline and Oil-resistant, Wire with 10-12 twists per foot

Ethernet Cable

Gilbarco requires use of 10 Base-T or Category 5E (CAT5E) Cable as specified in this document.

Ethernet Cable Installation Personnel and Procedures

IMPORTANT INFORMATION

A copy of the ANSI/TIA/EIA TSB 67 Certification of Conformance from the wiring personnel must be provided to the ASC before the site can be commissioned. The certificate is part of the documentation that must be on the file at the installation site. A certification of the field test will be required at equipment start-up. For any questions regarding this procedure, contact Gilbarco.

Ethernet Cables must be installed by certified telecommunications technicians in accordance with ANSI/TIA/EIA 568-A Commercial Building Telecommunication Cabling Standards (and Amendments). The installing technician must read and understand the following:

Document	Title
ANSI/IEEE 142-1991	Recommended Practice for Grounding of Industrial and Commercial Power Systems (IEEE Green Book).
ANSI/IEEE 1100	Recommended Practice for Powering and Grounding Sensitive Electronic Equipment (IEEE Emerald Book).
ANSI/TIA/EIATSB67	Transmission Performance Specification for Field Testing of Unshielded Twisted-pair Cabling Systems.
ANSI/TIA/EIA568-A	Commercial Building Telecommunication Cabling Standards (with amendments).

The following are the two ways to connect high-speed data to the dispenser:

- a** An Ethernet or Category 5 (CAT5) cable installation.
- b** FlexPay Connect
 - POS controls CRIND on dedicated twisted-pair
 - POS controls CRIND with pump data on same wire
 - Applause on dedicated twisted-pair
 - Applause with pump data on same wire

Ethernet or CAT5 Cable Installation

Note: An Ethernet or CAT5E cable cannot be installed in power conduit as the maximum cable length is 300 feet.

IMPORTANT INFORMATION



Petroleum vapors may migrate inside the cable insulation between conductors and sheathing of various cables, including 10 Base-T or CAT5 E Cable. Vapors may ignite, leading to serious injury or death.



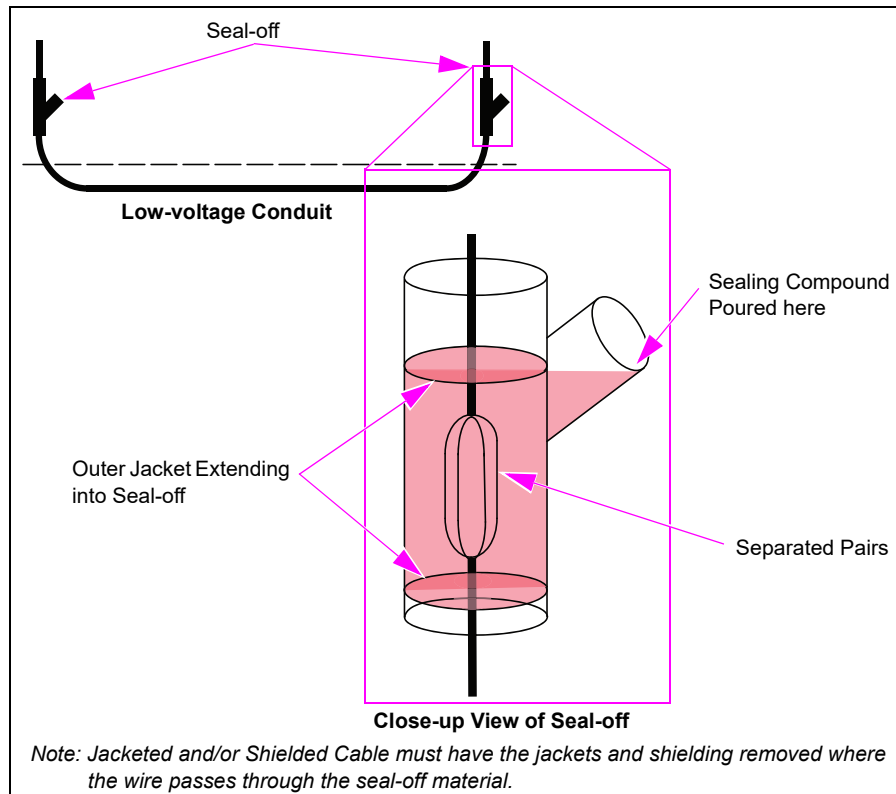
It is crucial that the installer follow NECs, article 501 requirements by removing the outer jacket and spreading the wire pairs at the seal-off points of the CAT5E Cable, so that a good vapor seal is achieved. This is required because all CAT5E Cables will conduct vapors inside their outer jacket.

Use gas-oil resistant CAT5 or CAT5E. For example, Belden® 7928a.

Conduit seal-offs required as per National Electric Code, section 514.9. As the outer jacket defeats the seal-off, the jacket must be removed and the conductor pairs separated to allow a good seal (see [Figure 9-2](#)).

For non-US installations, consult local regulations.

Figure 9-2: Low-voltage Conduit

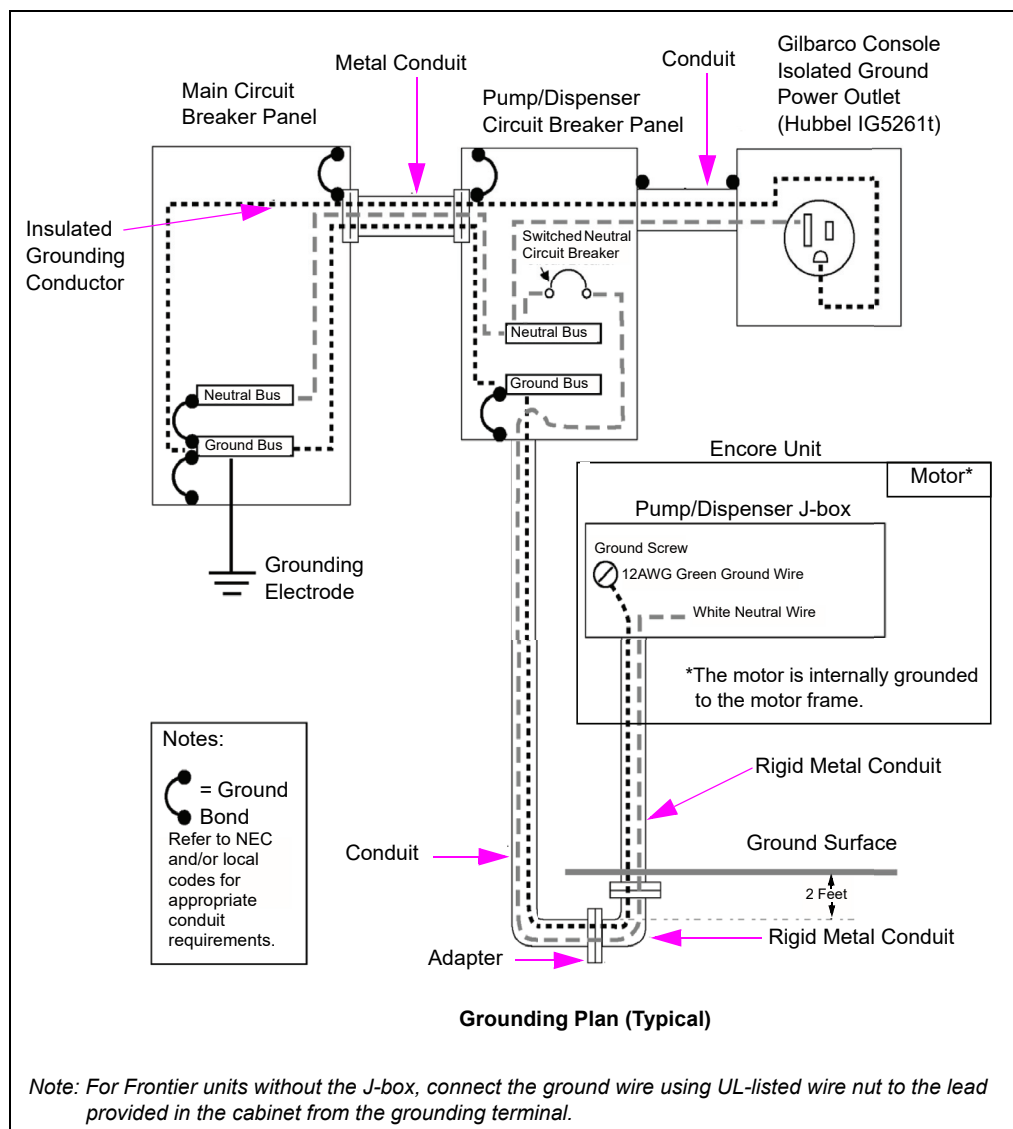


Grounding

Grounding requirements are as follows:

- NFPA 70 requires connecting the following to the system ground:
 - Consoles
 - Pumps and dispensers
 - Submerged turbine pumps
 - Relay control boxes
 - Circuit breaker panel
 - Electronic leak detectors
- Gilbarco requires connecting each pump/dispenser to an equipment grounding conductor (see [Figure 9-3](#)) located in the conduit per NFPA 70, Article 250. The following applies to ground conductor:
 - Use of wire no smaller than 12 AWG.
 - Use of wire with green or green and yellow striped insulation.
 - Connection to green grounding screw in the J-box.
 - Grounding the providing power under NFPA 70, Article 250.
 - Bonding the neutral bus to an approved grounding electrode.

Figure 9-3: Grounding Plan



Sealing 'Y' Fittings

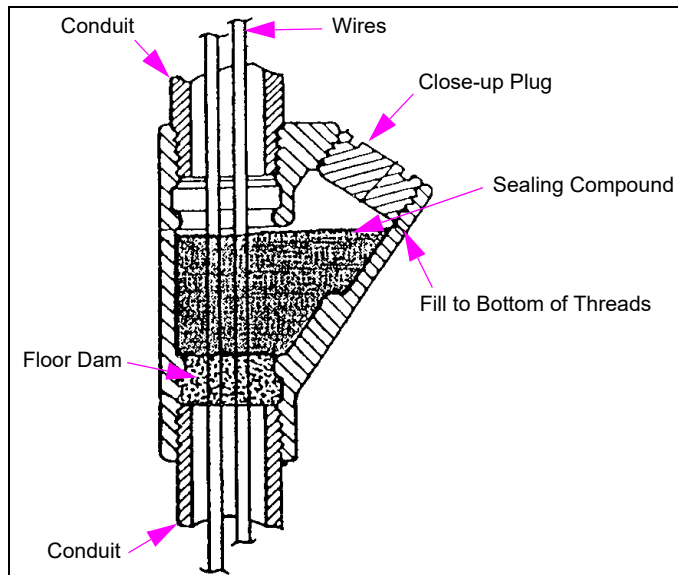
'Y' seals are installed in the conduit runs to minimize passage of vapors, gases, or flames from one portion of the electrical installation to another through the conduit. Fittings must be installed in accordance with Articles 501-5 and 502-5 of the NEC and fitting manufacturer's instructions.

Gilbarco uses Killark type EY fittings and recommends them or their equivalent for vertical conduit runs. The following sealing directions are for Killark fittings only, and instructions may vary for other manufacturer's fittings. Read and understand all instructions completely before you begin.

To seal 'Y' fittings, proceed as follows:

- 1 Remove the close-up plug (see [Figure 9-4](#)).

Figure 9-4: Typical 'Y' Sealing



- 2 Separate conductors and fill the conduit in and around conductors using Killark type "PF" packing fiber to make a floor dam to hold the fluid sealing compound.
Note: Floor dam must be even with the conduit stop in the lower hub of the fitting. Ensure that the conductor insulation is not damaged. Force pack between conductors and hubs, pushing any shreds of packing fiber away from conductors to prevent leakage path.
- 3 Use only Killark type "SC" sealing compound with Killark fittings, and do the following:
 - a Use a clean mixing vessel for every batch of sealant.
 - b Mix the compound at the rate of three parts compound to one part water by volume.
 - c Sprinkle the compound in water while stirring, until a thick paste is formed.
 - d Do not mix more compound than can be used in 15 minutes.
 - e Continue mixing for at least three minutes, until consistency is just fluid enough to pour slowly, like thick gravy (not watery).

- 4 Slowly pour the fluid compound till it fills the bottom of the Close-up plug threads.

Note: Be careful to pour slowly, to avoid trapping air bubbles in the seal.

- 5 Immediately wipe off any spilled compound and close the seal with a close-up plug.

Note: Initial setting of the sealing compound will occur within 30 minutes. Compound requires a minimum of eight hours above 32 °F (0 °C) to develop sufficient strength to withstand explosion pressures.

Plumbing Requirements

Pipe Installation

For Installation of underground liquid storage systems (Chapter 9), refer to Petroleum Equipment Institute (PEI) publication RP100 Recommended Practices and for installation of above-ground storage systems for motor vehicle fueling, refer to *PEI publication RP200 Recommended Practices*.

Product inlet pipes and vapor pipes for Gilbarco pumps/dispensers vary in location between models. Product piping order differs from blenders to previous Advantage Series models. See model-specific footprint before installing pipes.

- Check national, state, and local regulations for installation of the pipe system.
- Use containment system as required by national, state, and local regulations.
- Below the unit, use UL and code-approved flexible pipe (constructed of UL-approved pipe material and UL-approved fittings).

Note: Some local regulatory agencies do not allow the use of a galvanized piping component when diesel is involved. Consult local regulators. Also, galvanized piping is not usable for certain Alternative fuels, such as E25 and E85 or Biodiesel.

IMPORTANT INFORMATION

Gilbarco supplies galvanized **Tubing** (not pipe). However, no zinc or galvanizing is present on the inner circumference of any tubing or piping supplied by Gilbarco.

- Use 1-1/2-inches pipe for riser-to-pump or dispenser.
- Alternative fuels such as E25 and E85 may require special piping materials or components. Consult the manufacturer to determine whether the piping material is compatible with the fluid being used.
- Use 2-inches risers on Frontier units which use a 2-inches shear valve.
- Leak detectors may not detect leaks reliably in plumbing between master and satellite Frontier units. Secondary containment and likely specialized leak detection equipment is required. Consult codes.

Pipe Size

The required pipe size depends on the number of units sharing lines, size of the STPs (dispensers only), and length of the run. The following guidelines must be followed:

Pumps (Standard Flow)

Use new pipes of 2, 2-1/2, or 3 inches.

- Pipe of 2 inches for runs up to 50 feet to a single pump
- Pipe of 2-1/2 or 3 inches for longer runs up to 75 feet to a single pump with maximum lift condition

Note: A dedicated line is recommended to supply each self-contained pump.

Pumps (High Flow)

Use new pipes of 3, 3-1/2, or 4 inches.

- Pipe of 3 inches for runs up to 50 feet to a single pump
- Pipe of 3-1/2 or 4 inches for longer runs up to 75 feet to a single pump with maximum lift condition

Note: A dedicated line is recommended to supply each self-contained pump.

Dispensers (Standard Flow)

Use new pipes of 2, 2-1/2, or 3 inches.

Notes: 1) If the distance from the STP to the farthest dispenser is 200 feet or less, use a pipe of 2 inches.

2) If the distance exceeds 200 feet, use a pipe of 2-1/2 or 3 inches to the first dispenser and a pipe of 2 inches along the rest of the way. Trunk lines supplying multiple dispensers must be larger and must be sized to provide low pressure drops for an anticipated flow rate. Use of smaller size pipes may result in lower flow rates than normally accepted.

Dispensers (High Flow)

Use new pipes of 3, 3-1/2, or 4 inches.

Notes: 1) If the distance from the STP to the farthest dispenser is 200 feet or less, use a pipe of 3 inches.

2) If the distance exceeds 200 feet, use a pipe of 3-1/2 or 4 inches to the first dispenser and a pipe of 3 inches along the rest of the way. Trunk lines supplying multiple dispensers must be larger and must be sized to provide low pressure drops for an anticipated flow rate.

Dispensers (Frontier High Gallon)

Use new 3- or 4-inch pipe.

Notes: 1) If the distance from the STP to the farthest dispenser is 75 feet or less, use a pipe of 3 inches.

2) If the distance exceeds 75 feet, use a pipe of 4 inches to the first dispenser and a pipe of 3 inches along the rest of the way. Trunk lines supplying multiple dispensers must be larger and must be sized to provide low pressure drops for an anticipated flow rate.

Check Valves (Used on Pumps and Frontier Units only)

For information on installing the check valves for pumps, refer to *PEI publication RP100* and manufacturer's installation instructions. Install the check valve as close as practically possible to the suction unit. It must be gravity-activated with minimal, or no spring load. Check valves for use internal to the pumping unit are available from Gilbarco as an order entry item.

Ensure that there is only one check valve in each dedicated line (preferred method). Use of multiple check valves can restrict flow and cause cavitation, resulting in significant flow rate reductions. If installation necessitates placing more than one unit on a single dedicated product line, then check valves must be placed at each pumping unit. Check valves must be accessible for service.

The inlet check valve for Frontier units is required for accuracy in metering fuel. Use a factory-installed option or installation-installed check valve of low pressure drop.

Note: Components must be compatible with the fluid type being dispensed. For more information, consult the concerned manufacturer.

Shear Valves (Generally Used on Dispensers Only)

Note: For some locations, shear valves are required for pumps.

For installation of underground liquid storage systems (Chapter 9), refer to *PEI publication RP100 Recommended Practices* and for installation of above-ground storage systems for motor vehicle fueling refer to *PEI publication RP200 Recommended Practices*. A shear valve (see [Figure 5-17](#) on [page 5-21](#)) is an NFPA 30A required safety device. It closes automatically to stop product flow during a fire or if the dispenser gets knocked off the island. It also provides a means of manually closing inlet pipes.

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Appendix A: Elevation Diagrams

Figure A-1: Elevation Details

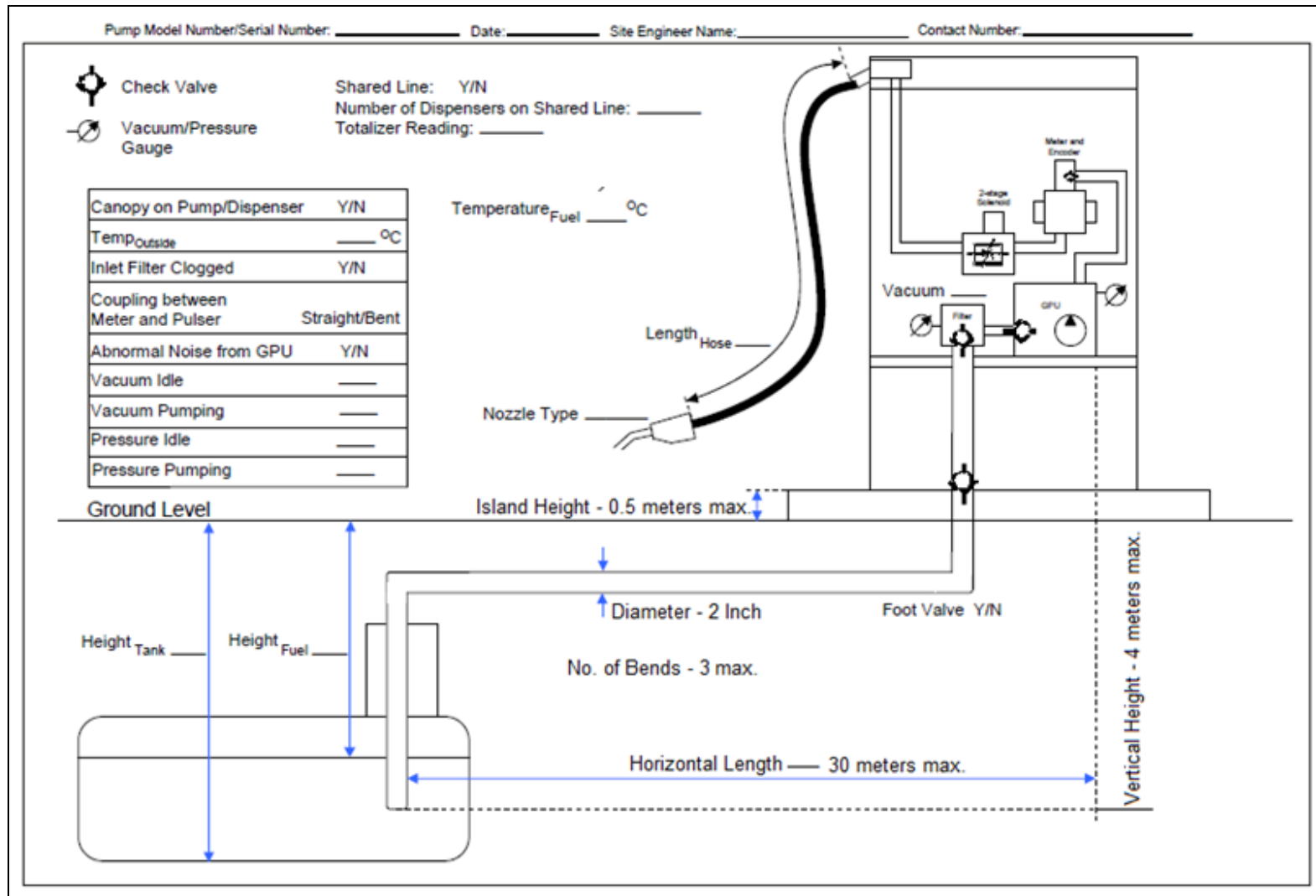
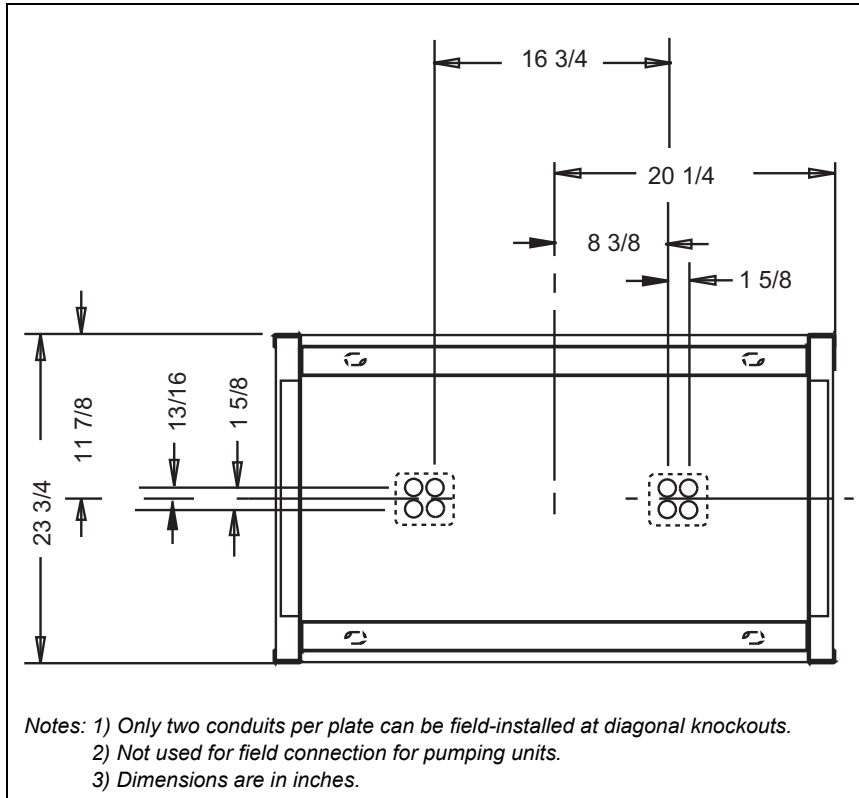


Figure A-2: Main Cabinet Conduit Knockouts



Appendix B: Wiring Diagrams

Figure B-1: Frontier Mono 1 Phase Suction Wiring Diagram

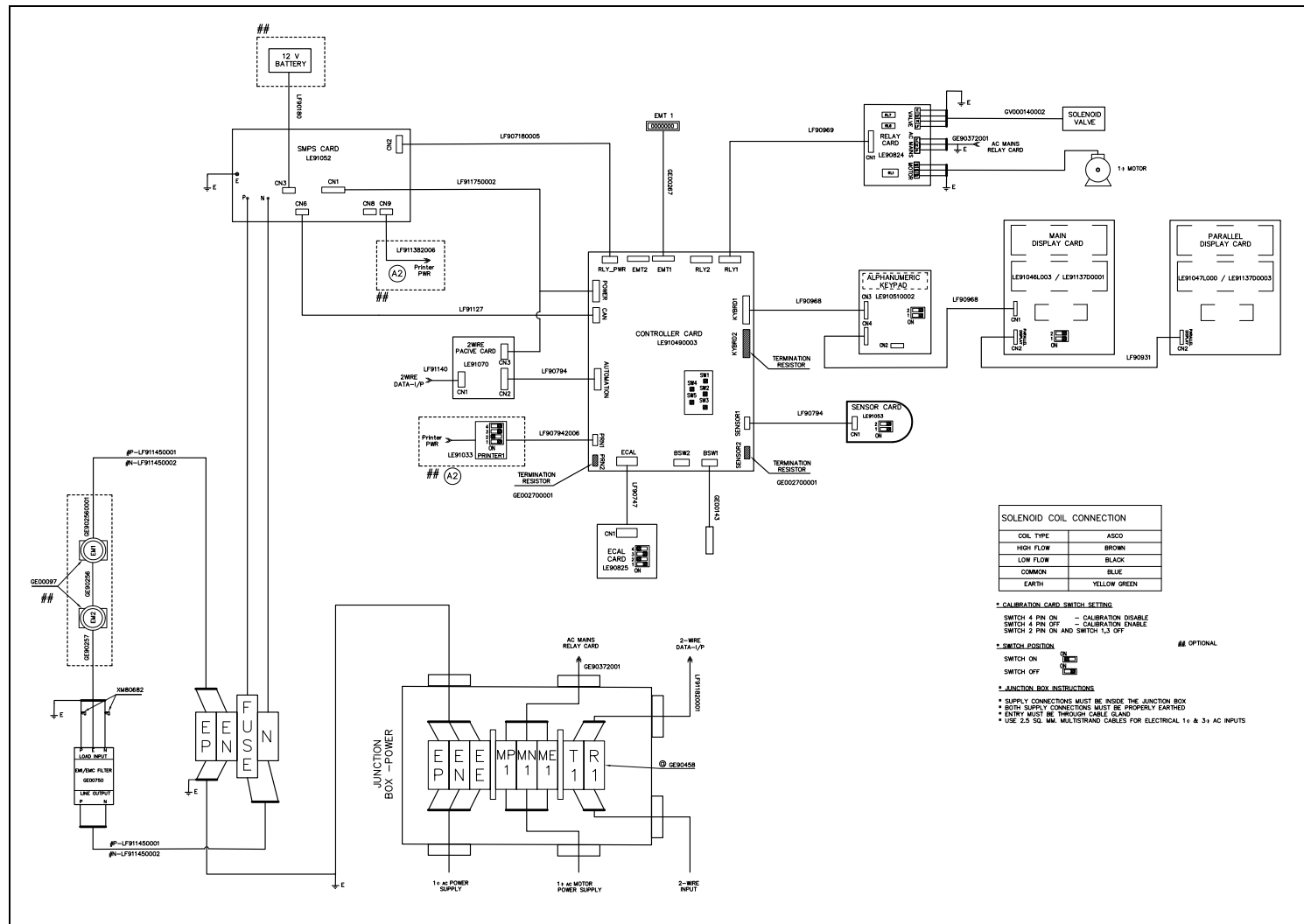


Figure B-2: Frontier 1 PRD MPD Dispenser Model Wiring Diagram

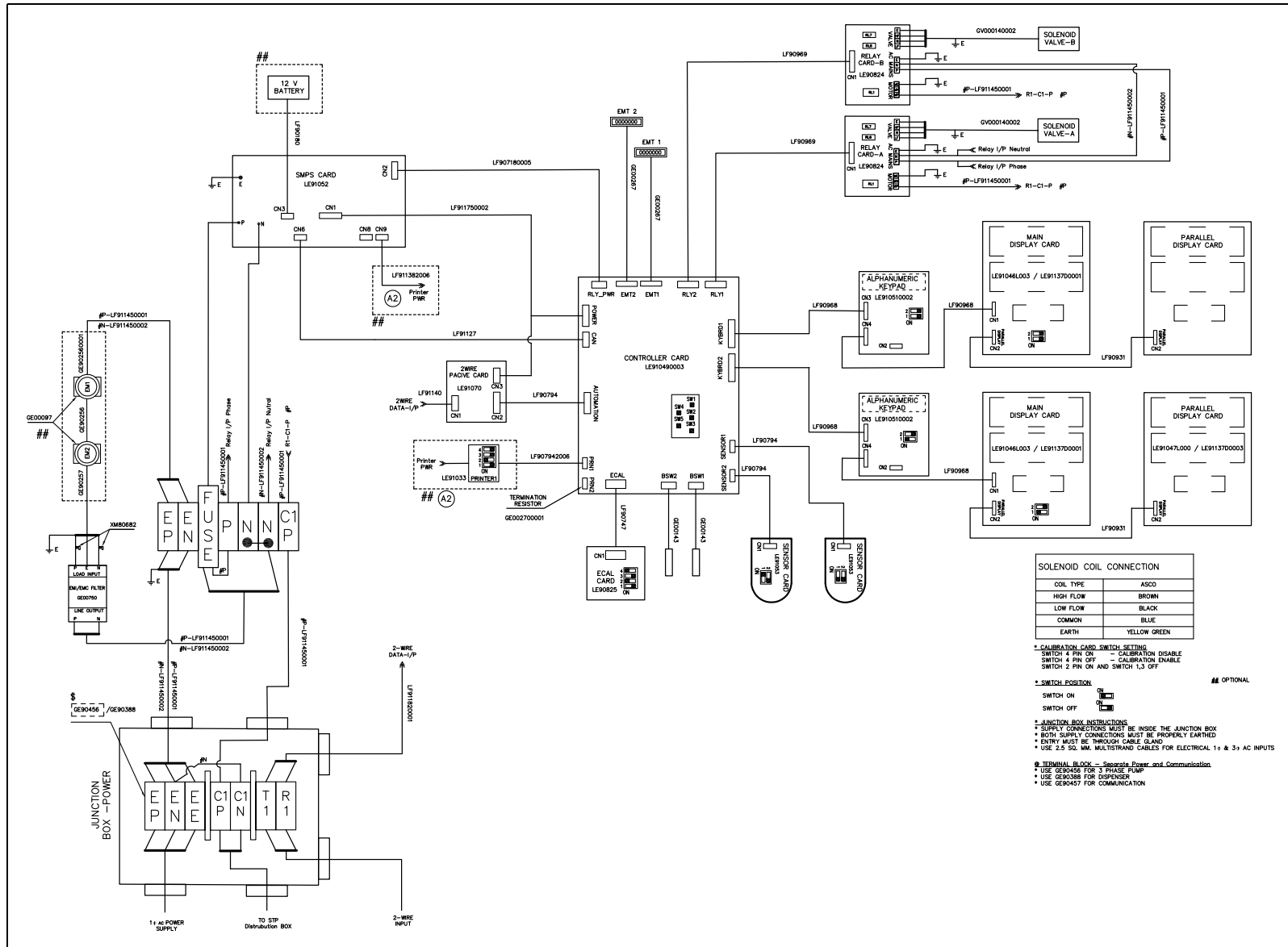


Figure B-3: Frontier Duo Dispenser Model Wiring Diagram

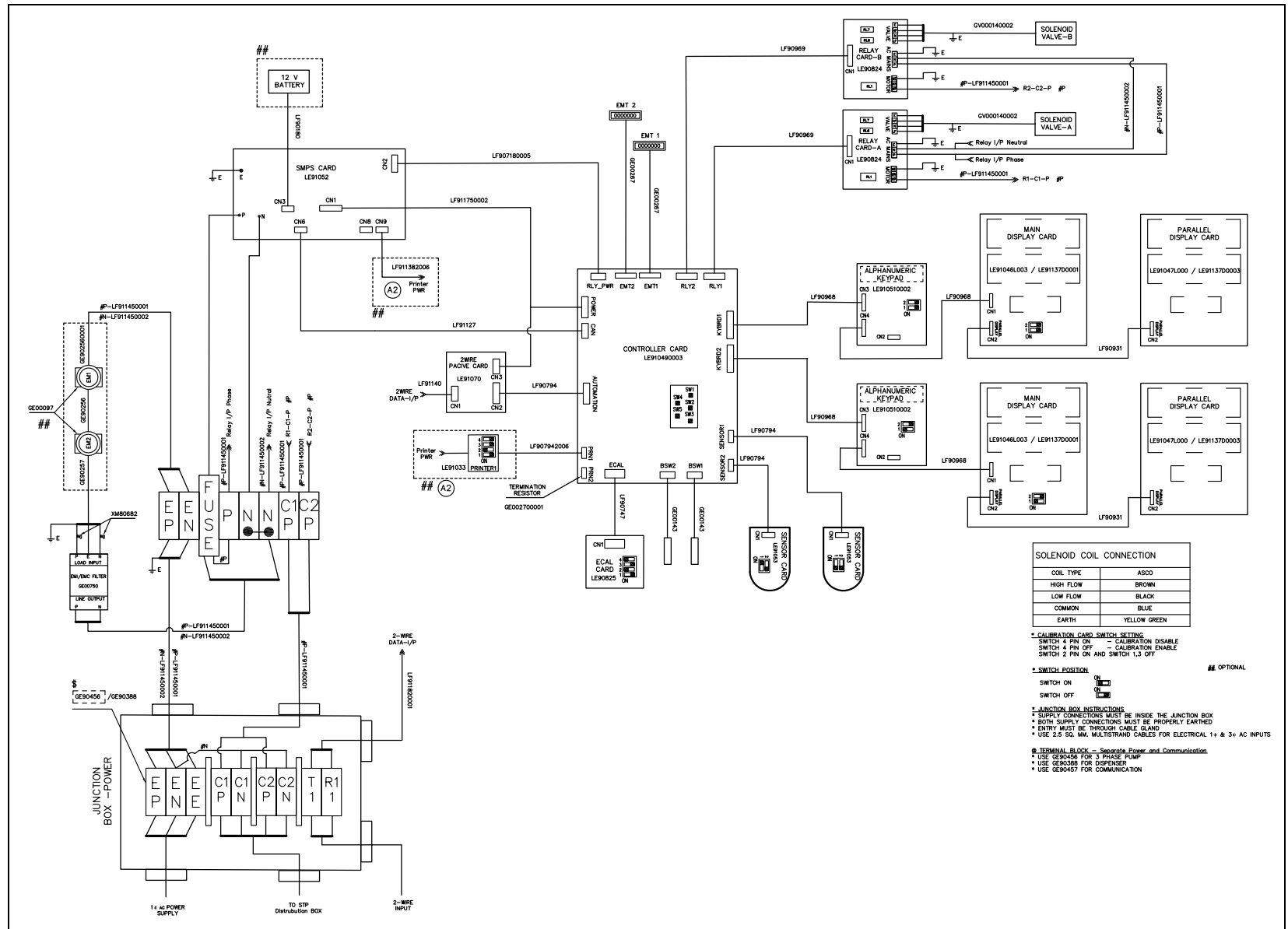
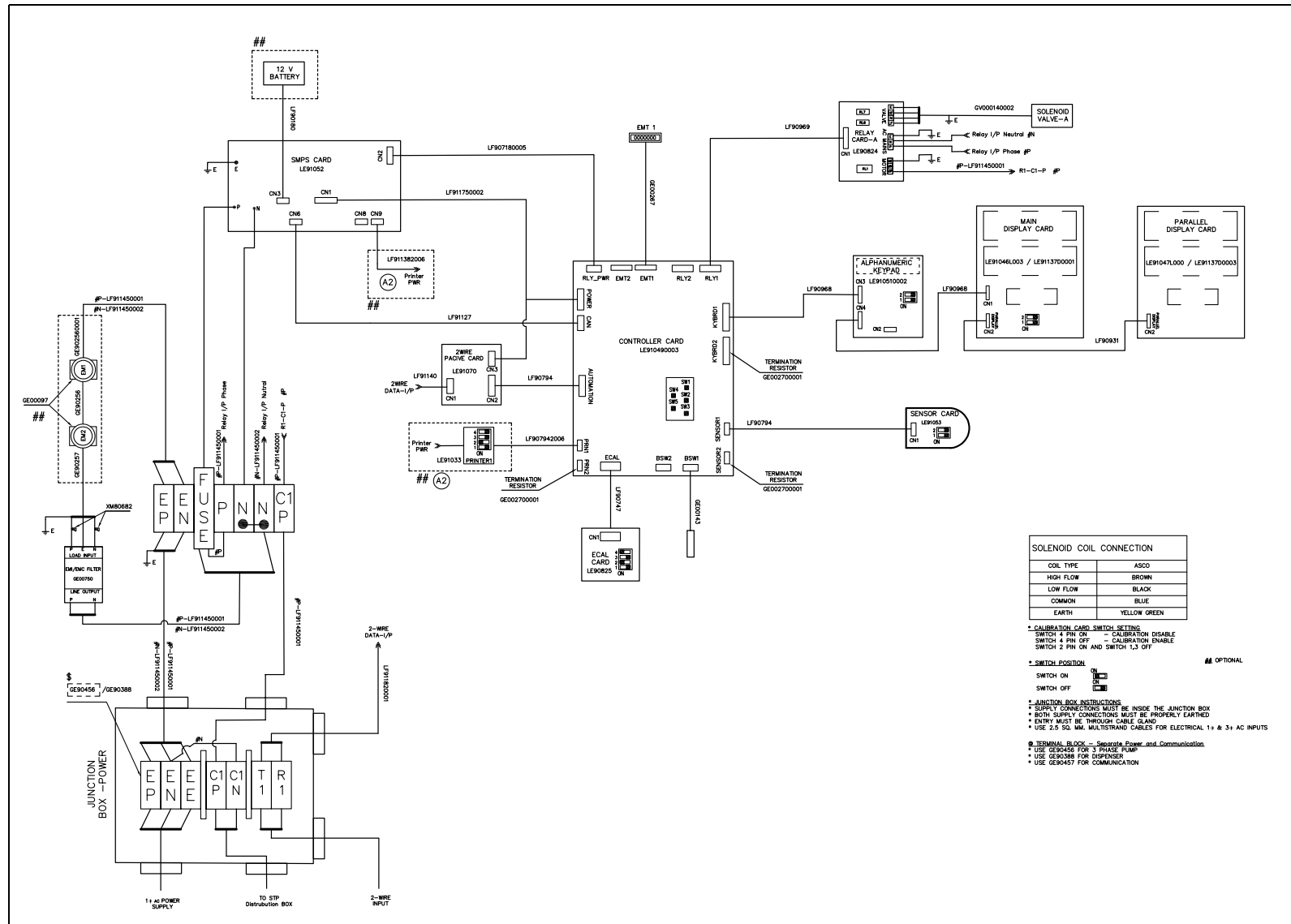
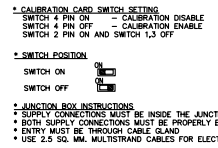


Figure B-4: Frontier Mono Dispenser Model



Page B-5



Appendix B: Wiring Diagrams

Figure B-6: Frontier 1P MPD 3 Phase Suction Model Wiring Diagram

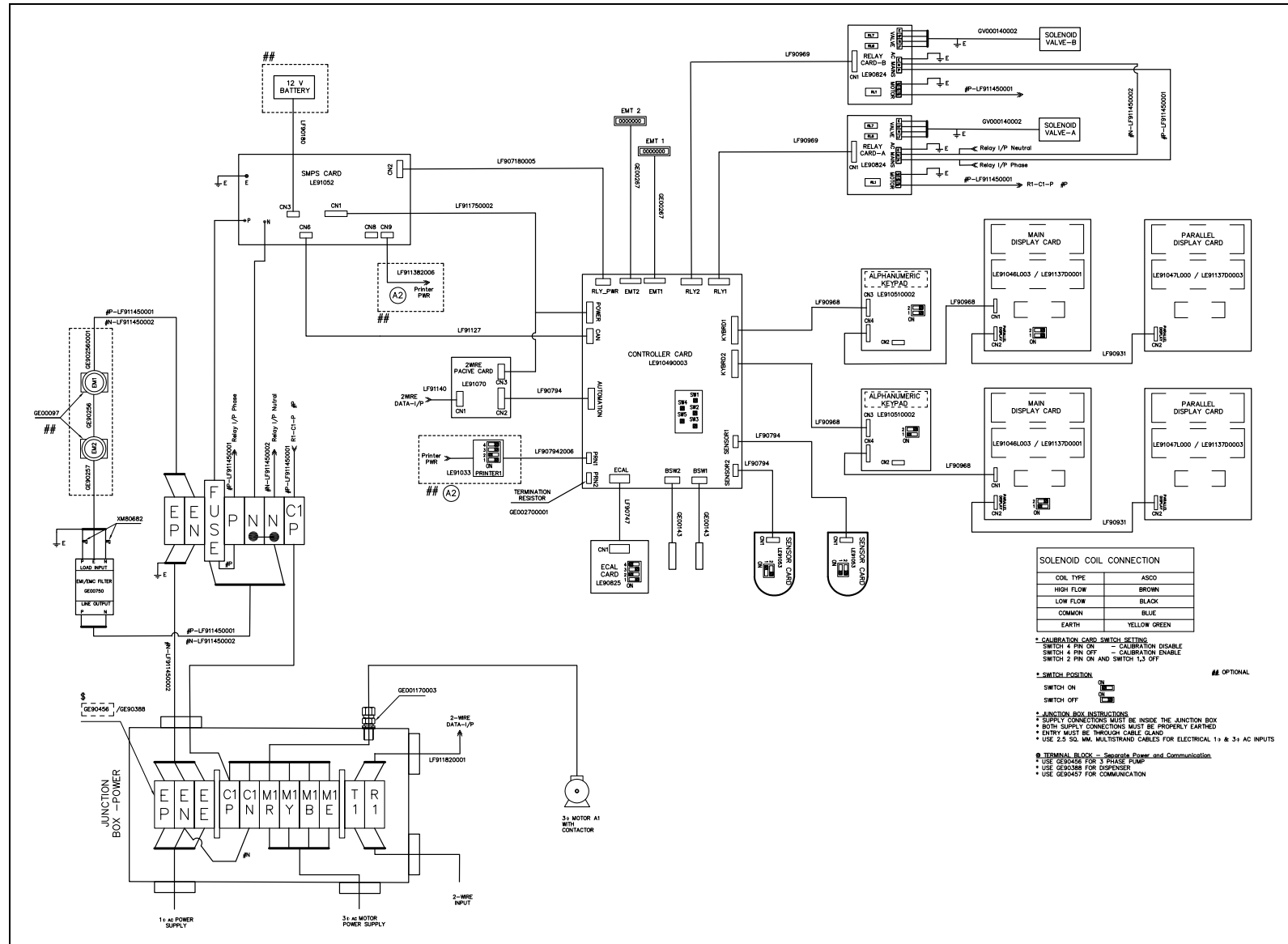
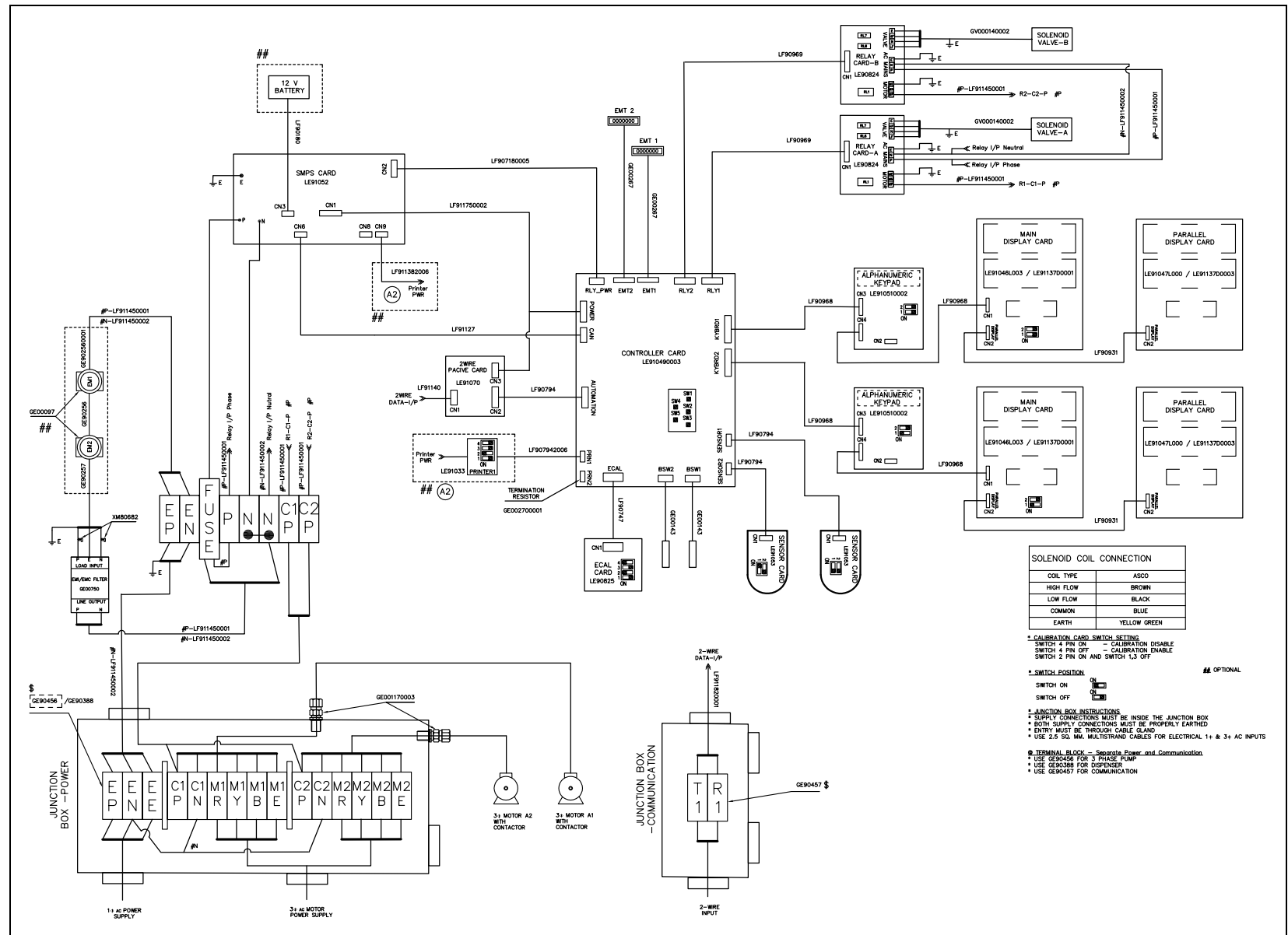


Figure B-7: Frontier Duo 3 Phase Suction Model Wiring Diagram



Appendix B: Wiring Diagrams

Figure B-8: Frontier 1P MPD 1 Phase Suction Model Wiring Diagram

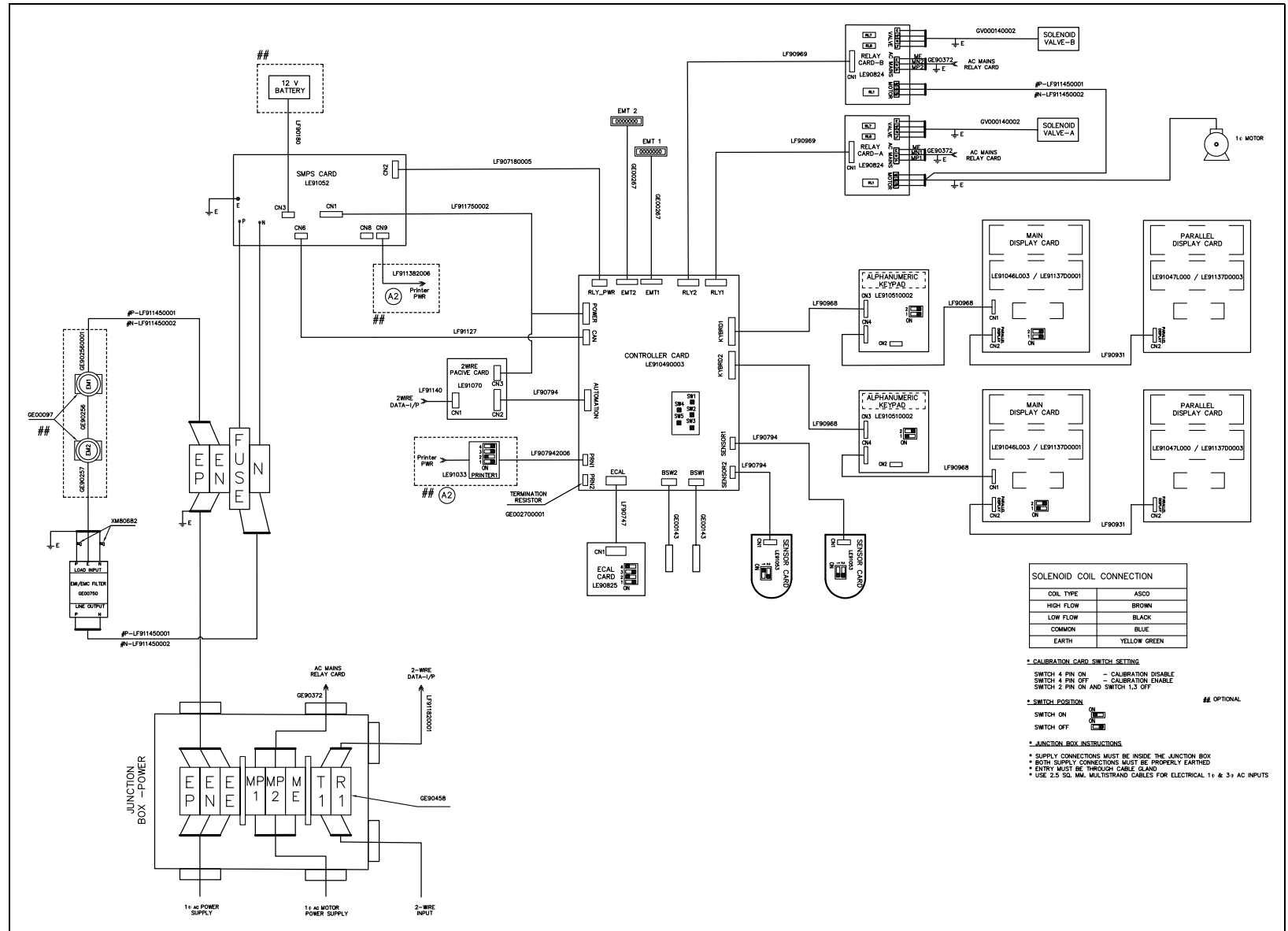


Figure B-9: Frontier Duo 1 Phase Suction Model Wiring Diagram

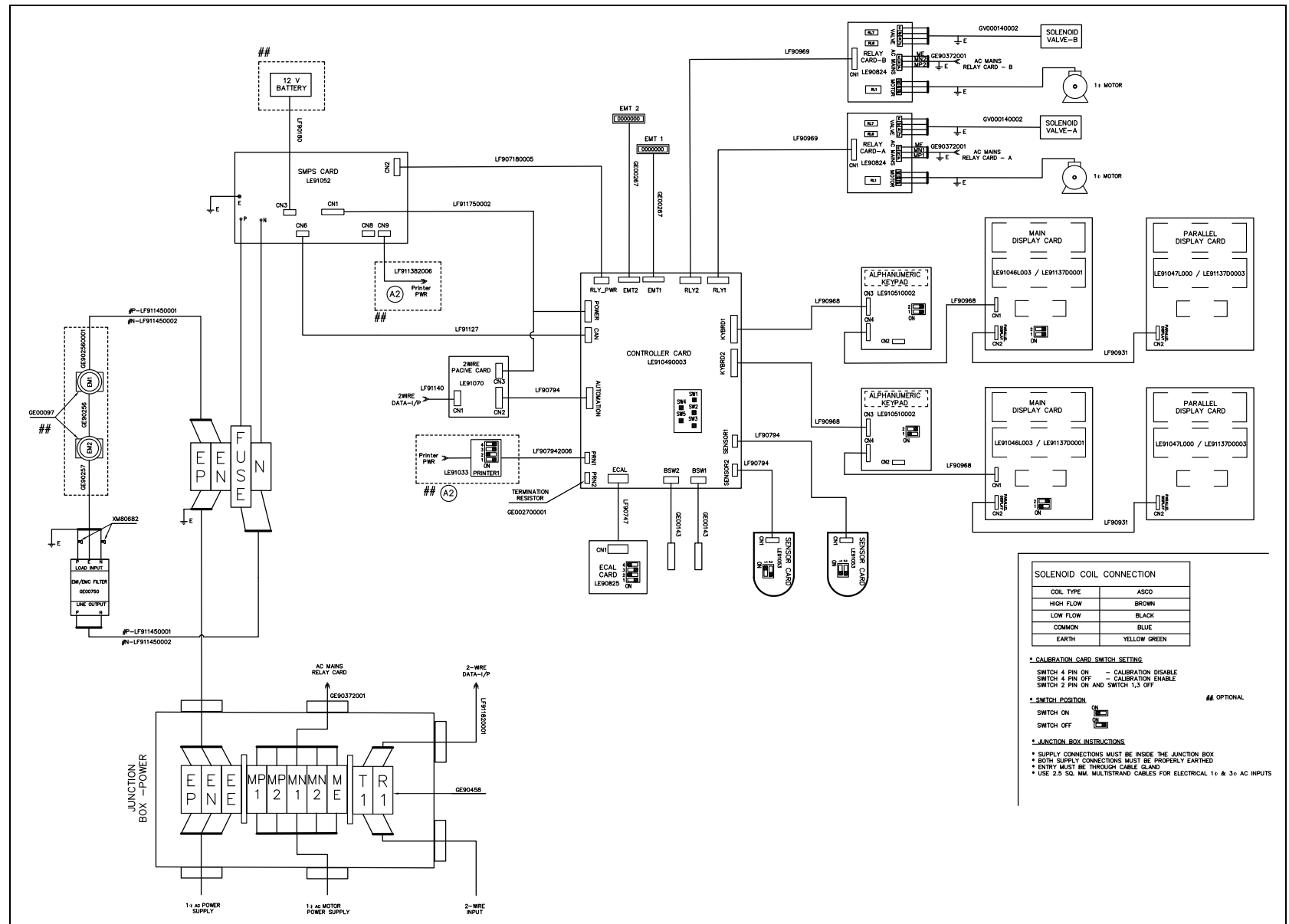


Figure B-10: Frontier QPD Dispenser Model - 1

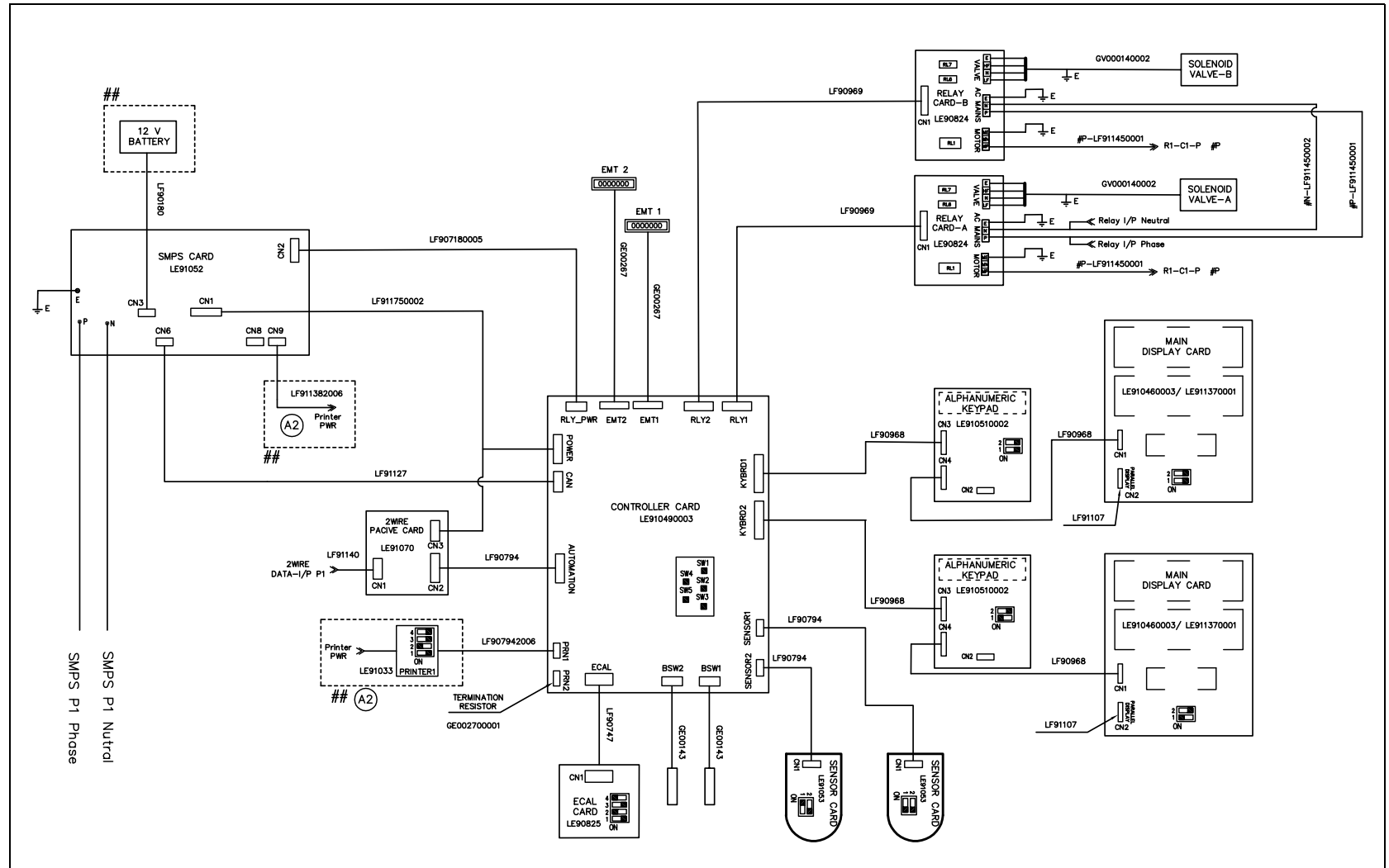


Figure B-11: Frontier QPD Dispenser Model - 2

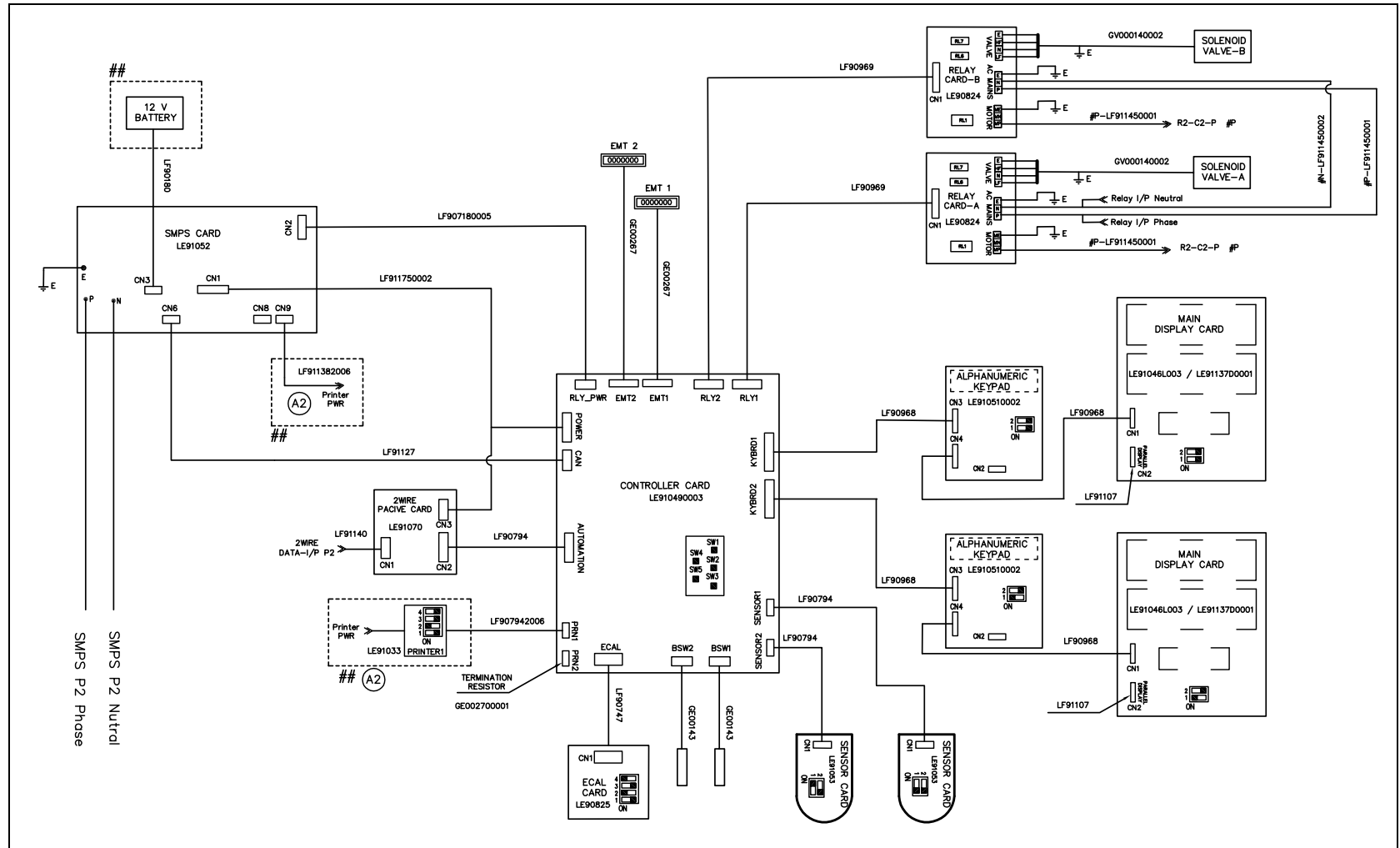


Figure B-12:Frontier QPD Dispenser Model - 3

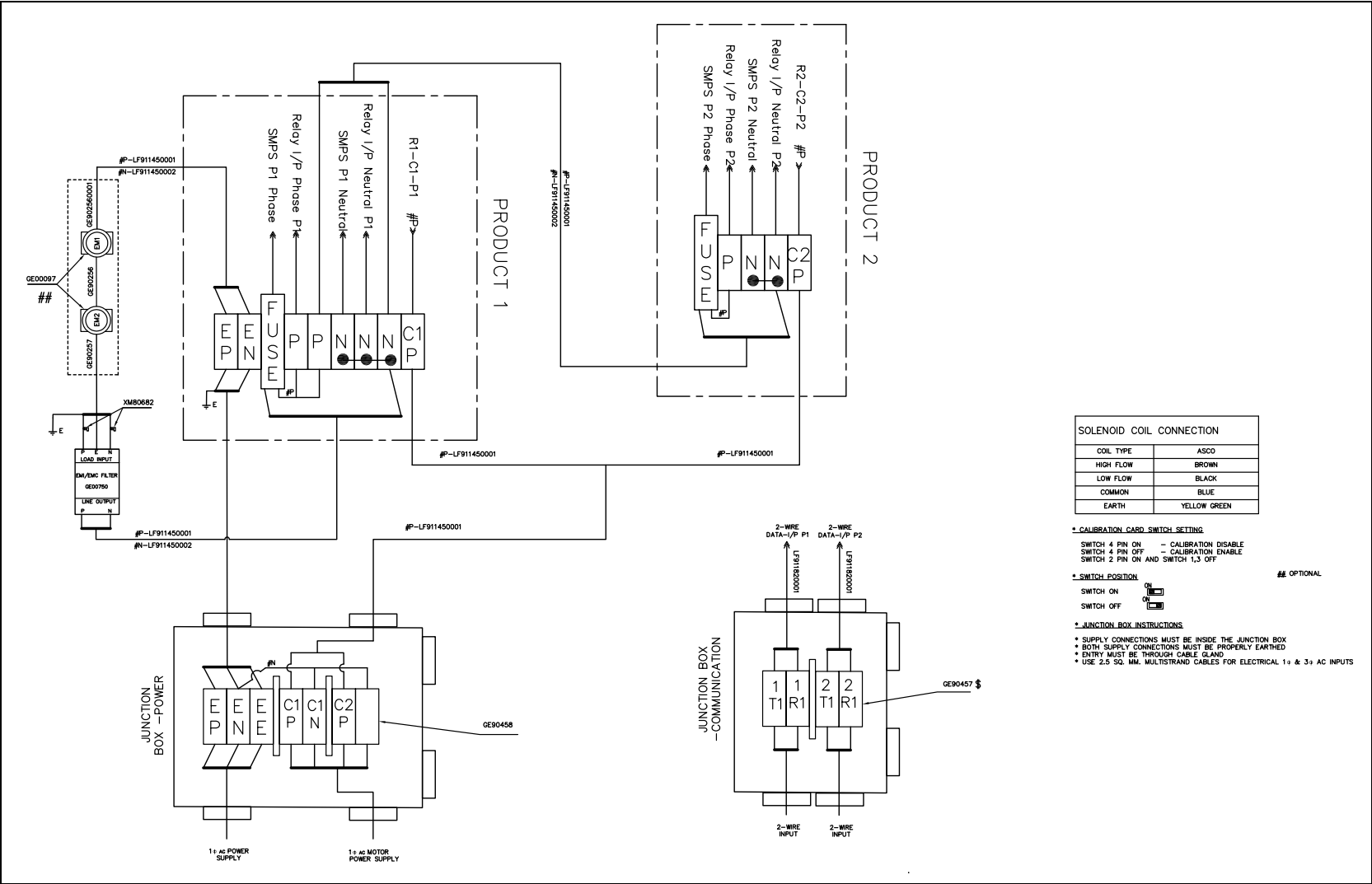


Figure B-13: Frontier QPD 1 Phase Suction Model - 1

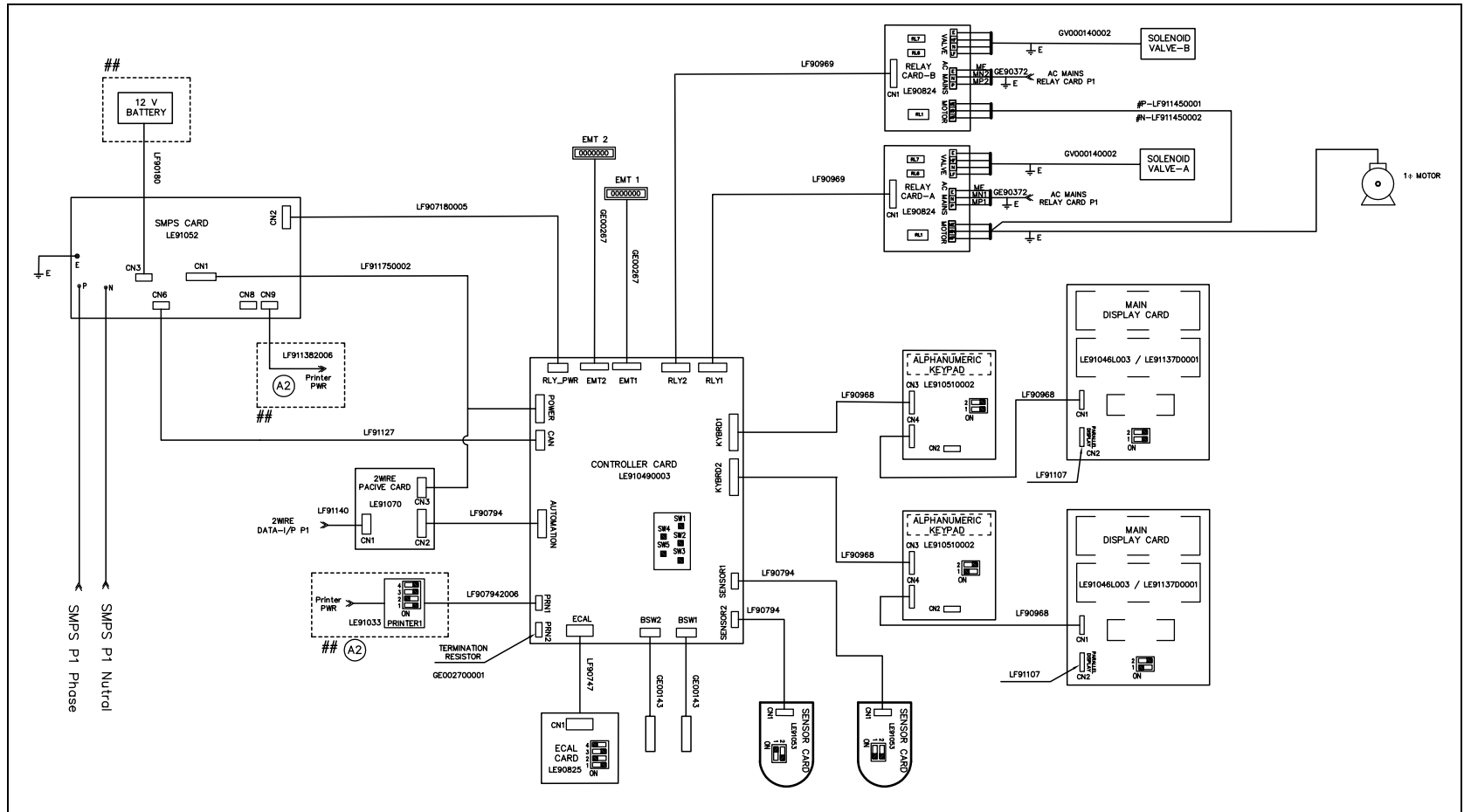


Figure B-14:Frontier QPD 1 Phase Suction Model - 2

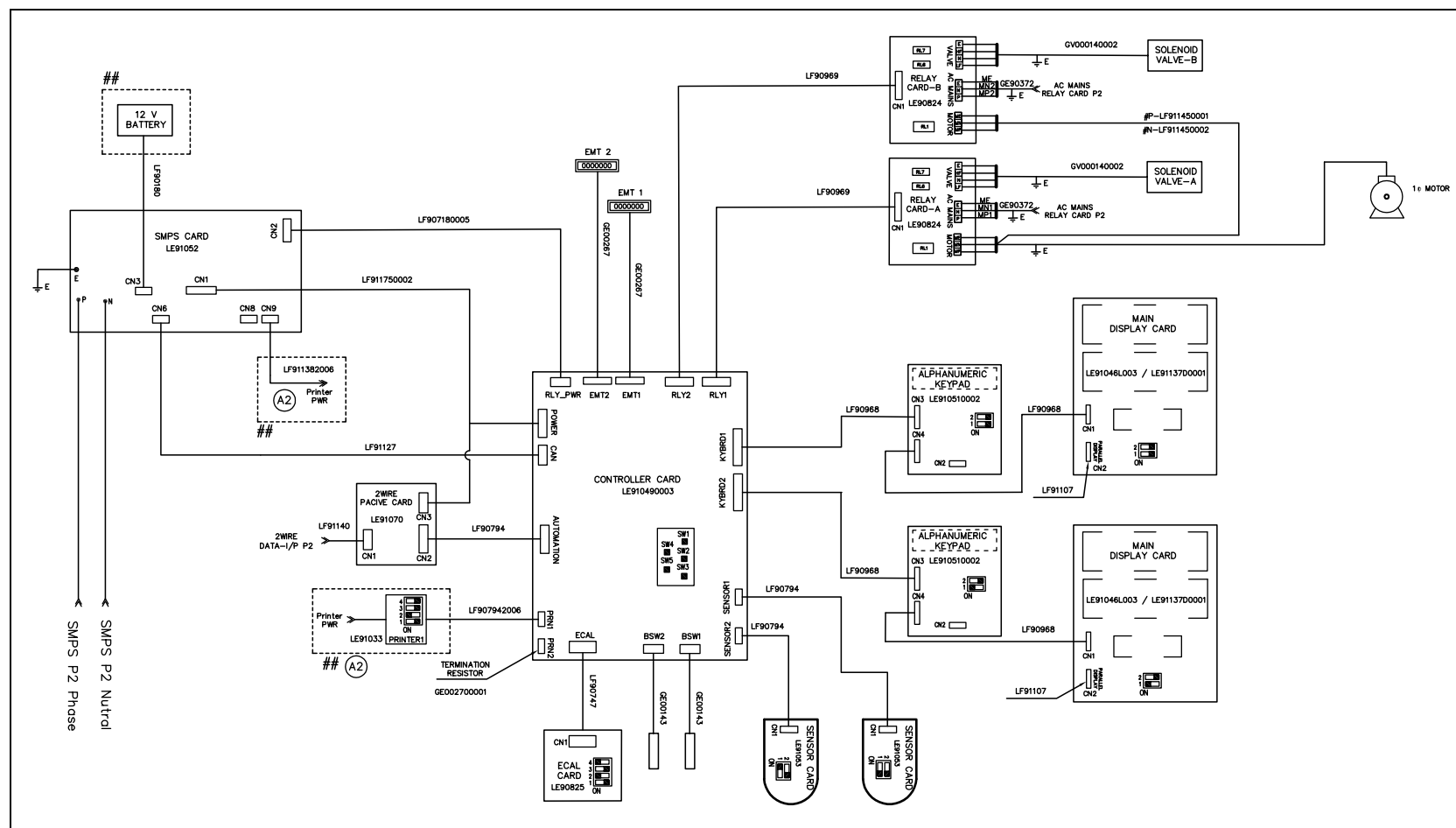


Figure B-15: Frontier QPD 1 Phase Suction Model - 3

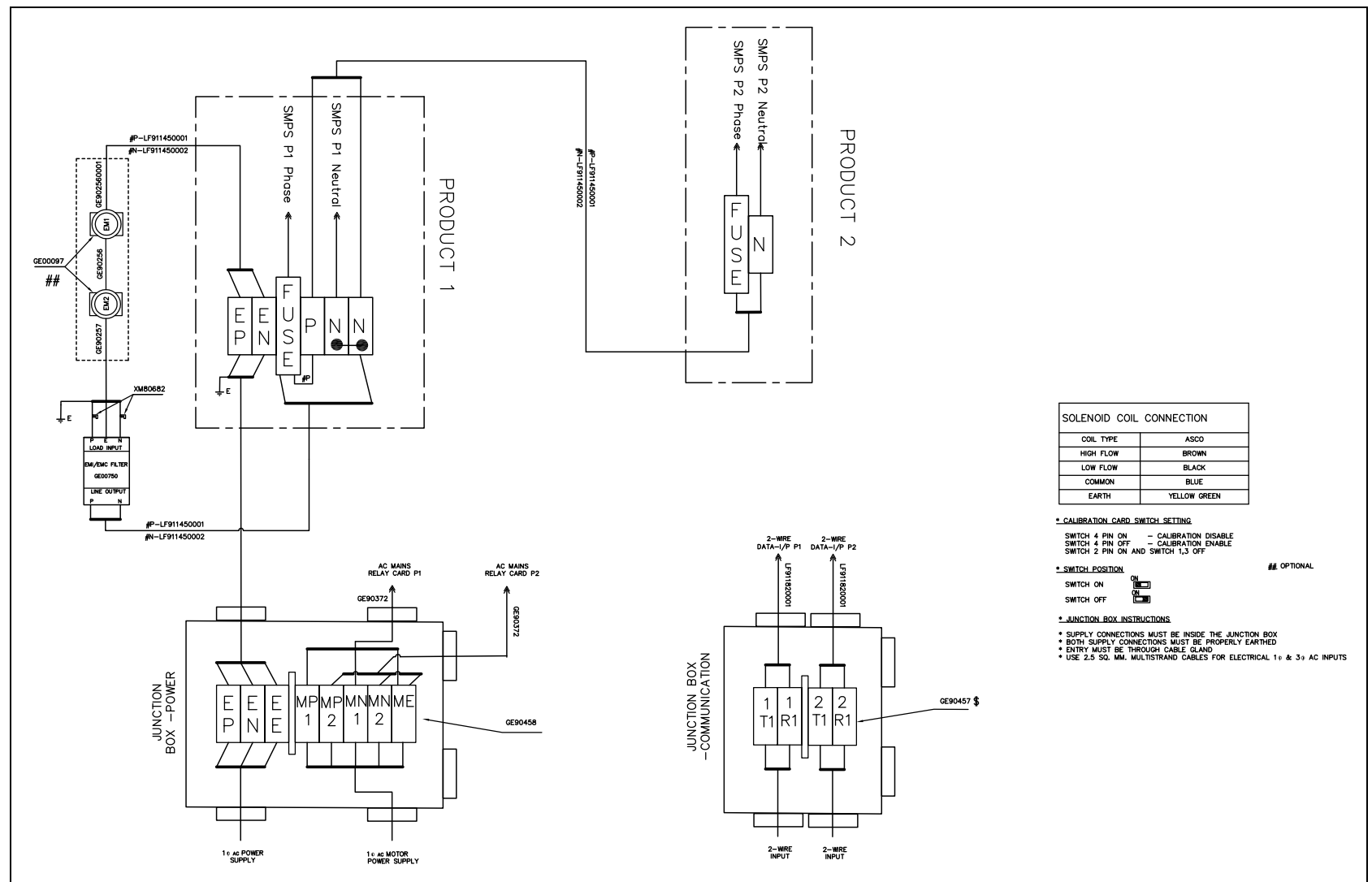


Figure B-16: Frontier Vapor Recovery Mono Three-phase Suction and One-Phase Pressure

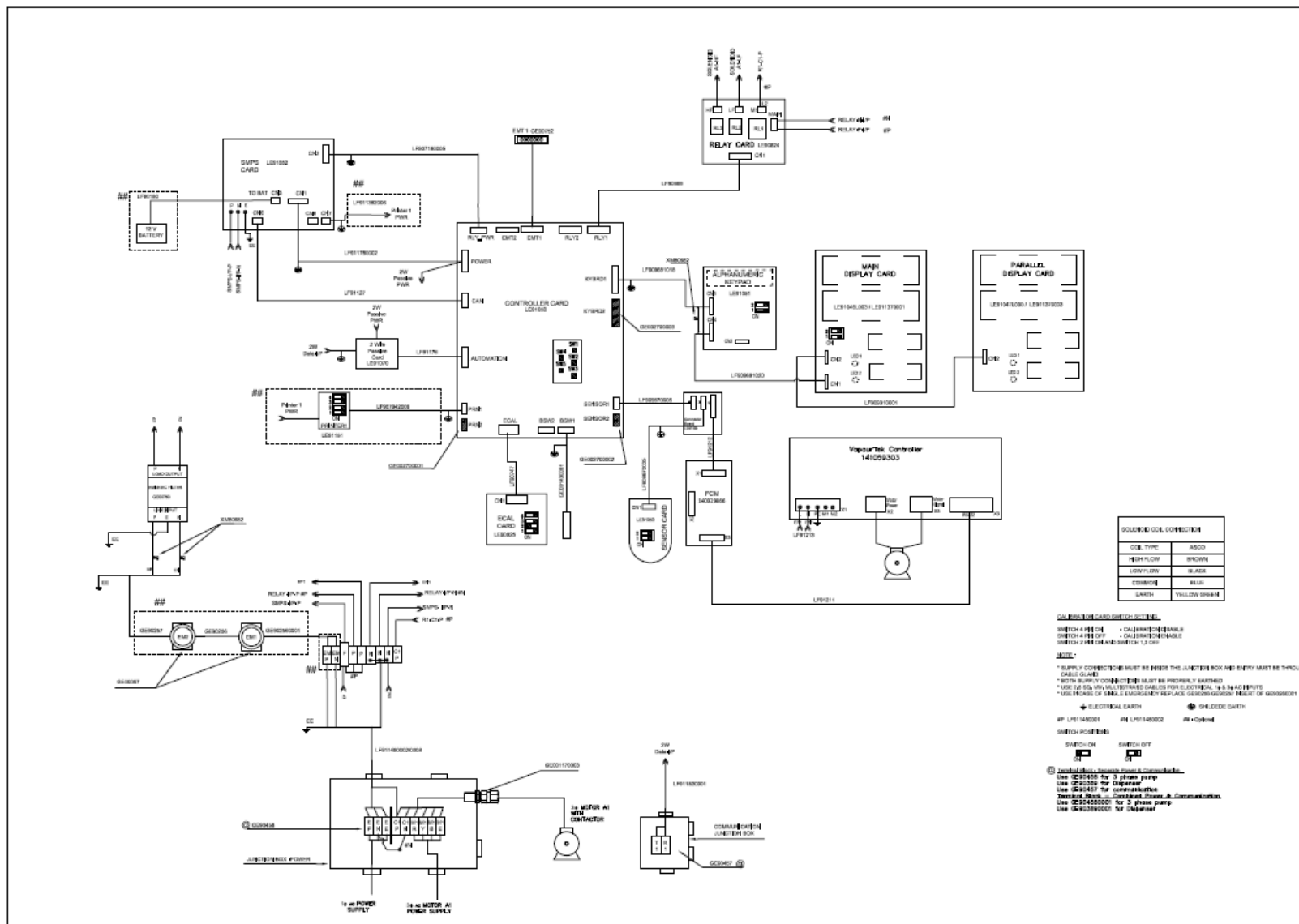


Figure B-17: Frontier Vapor Recovery Mono One-phase Suction

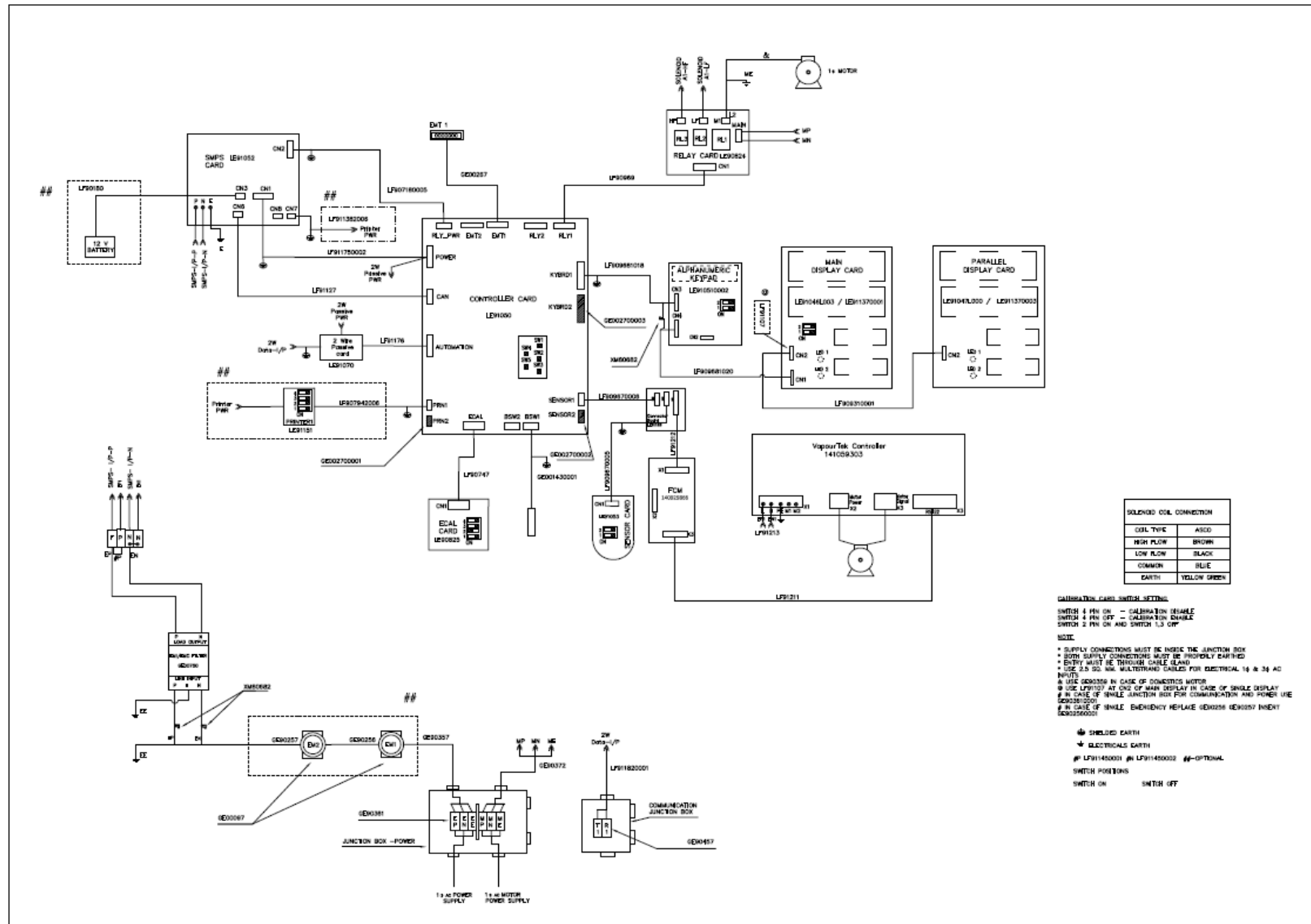
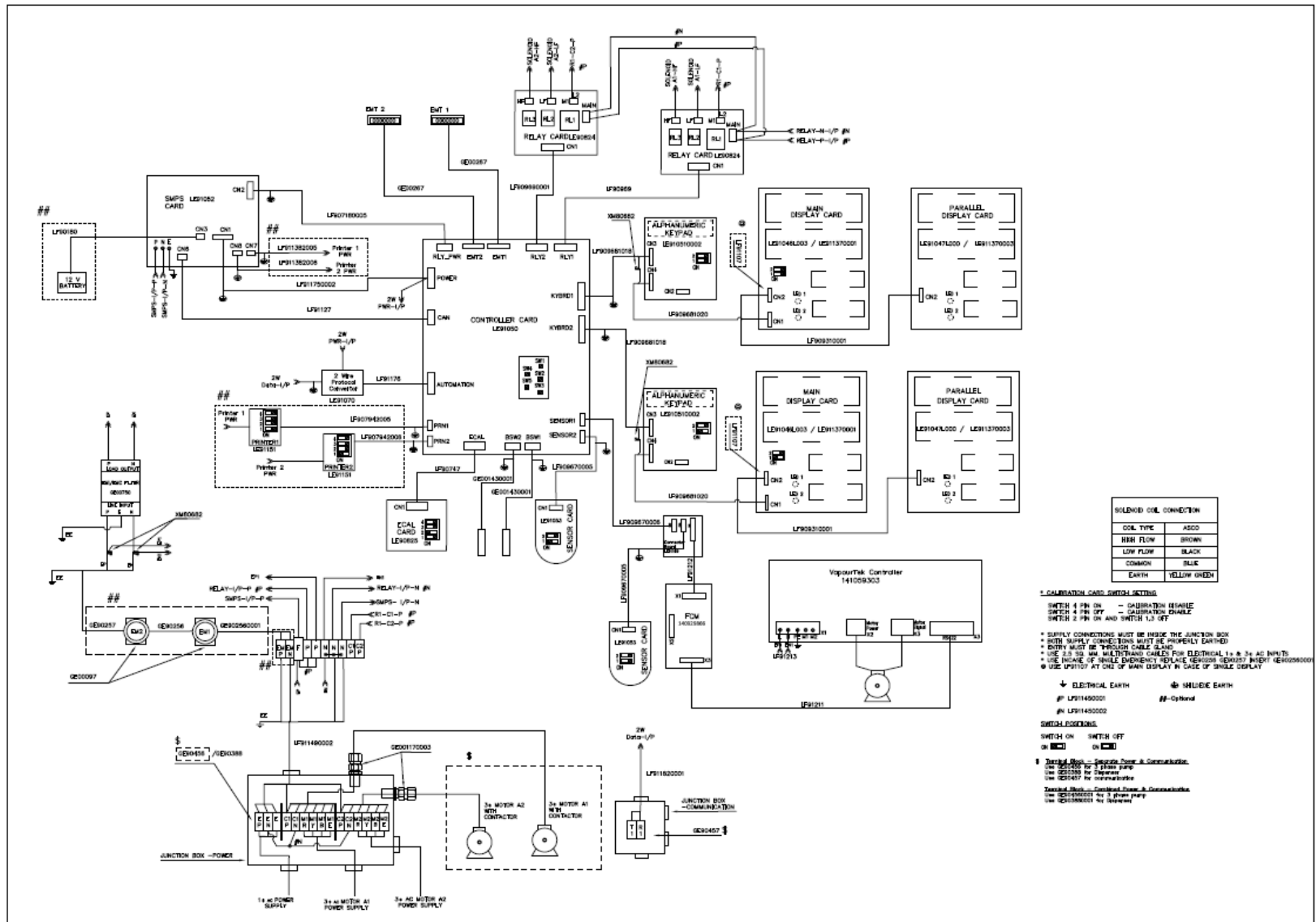
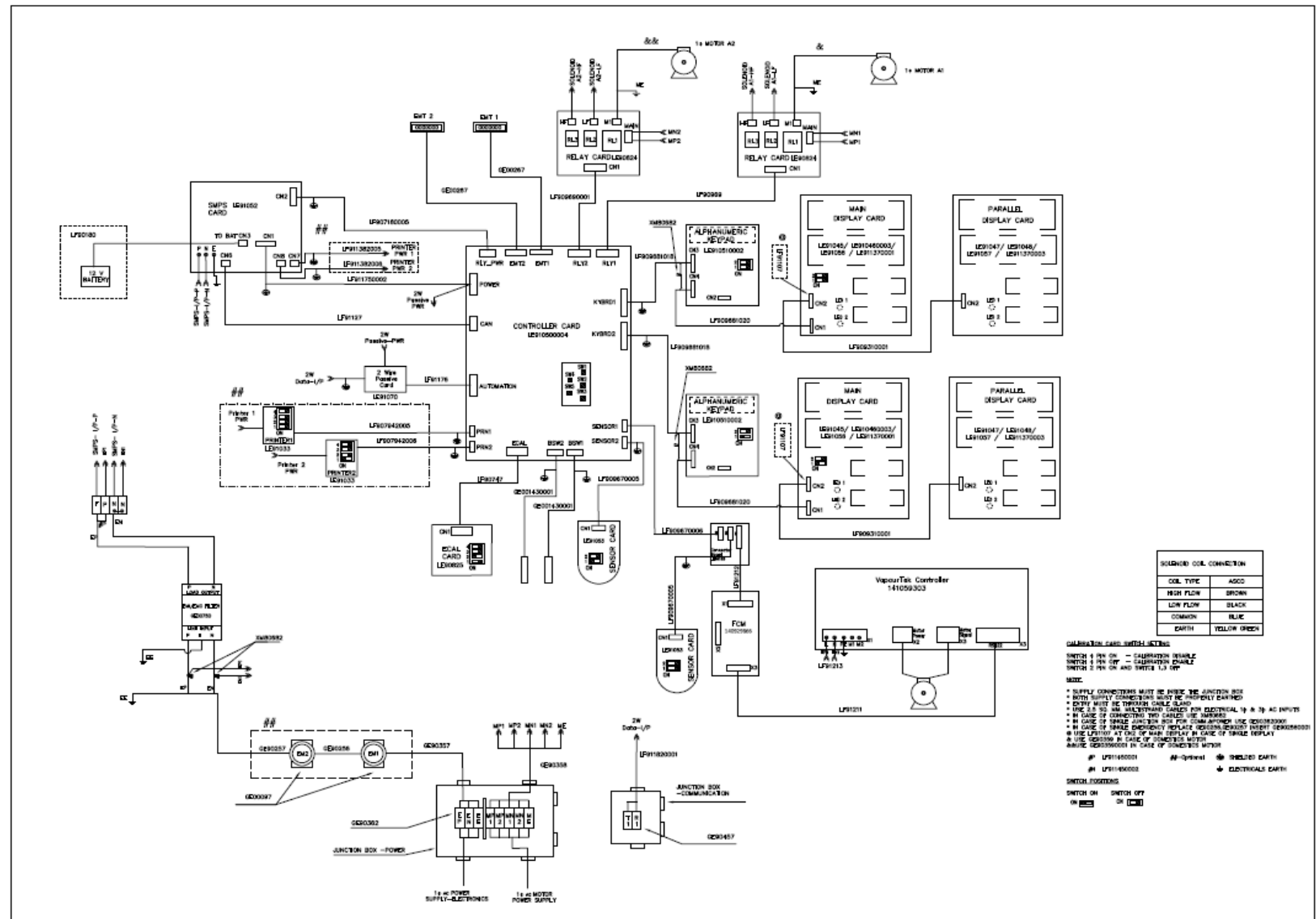


Figure B-18: Frontier Vapor Recovery Duo Three-phase Suction and Pressure



Page B-19



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Index

A

Air, Purging From System 8-4–8-6
 Anchoring
 Pump/Dispenser 5-11
 ASC 8-1, 8-4, 8-7

C

Calibration 9-3
 CAUTION 5-6, 5-7, 5-8, 8-5
 Changing Fuel Types 4-1
 Alternative fuels 4-1
 Conduit Installation 4-6
 Vapor Barrier 6-3
 Conduit, electrical 9-4

D

DANGER 9-6

E

Electric, Electrical, Electricity 9-3
 Electrician 9-3
 Electronics Cabinet 9-3
 Wiring 9-3
 Encore Cabinet 4-4
 Epoxy Sealing 6-14
 Ethernet Cable 9-7

F

For New and Existing Pumps and
 Existing Dispensers With Fuel
 In Lines 8-5
 For New Dispensers 8-4

G

Ground 9-5, 9-9
 Ground Fault Interrupt 4-6
 Grounding 9-9

H

Hazardous Locations 3-1

I

IMPORTANT 4-5, 5-5, 6-2, 8-7
 Inlet Pipes 5-5
 Installation Checklists
 Hydraulic Related 8-2
 Mechanical 8-2
 Installing Units
 Flexible fuels 5-5

J

J-Box 9-2

L

Lifting Encore Units 5-1

M

Mounting the Unit 4-4, 5-1
 Pit Box 4-5
 Plumbing Requirements 4-5

P

Pipe 9-11
 Pipe, plumbing 5-10, 9-11, 9-12
 Piping Layout 9-2
 Plumb 9-11
 Potting Discs 6-4
 Purging
 Underground Lines 8-4
 Purging Air From The System 8-4–8-6

S

Service Procedures
 Purging Air 8-4–8-6
 Setting PPU 8-7
 Shear Valve 9-13
 Shutoff Operation 8-6
 SMART Meter 1-2
 STP 4-3, 5-10

T

The Advantage Series
 Installation differences 9-2
 TLS Console 6-15

V

Vapor Return Line 5-11

W

WARNING 5-1, 5-8, 5-12, 6-2, 6-3,
 6-6, 6-12, 7-2, 8-1
 Wiring 9-5
 Field Wiring 6-10
 Operating Environment 6-5

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