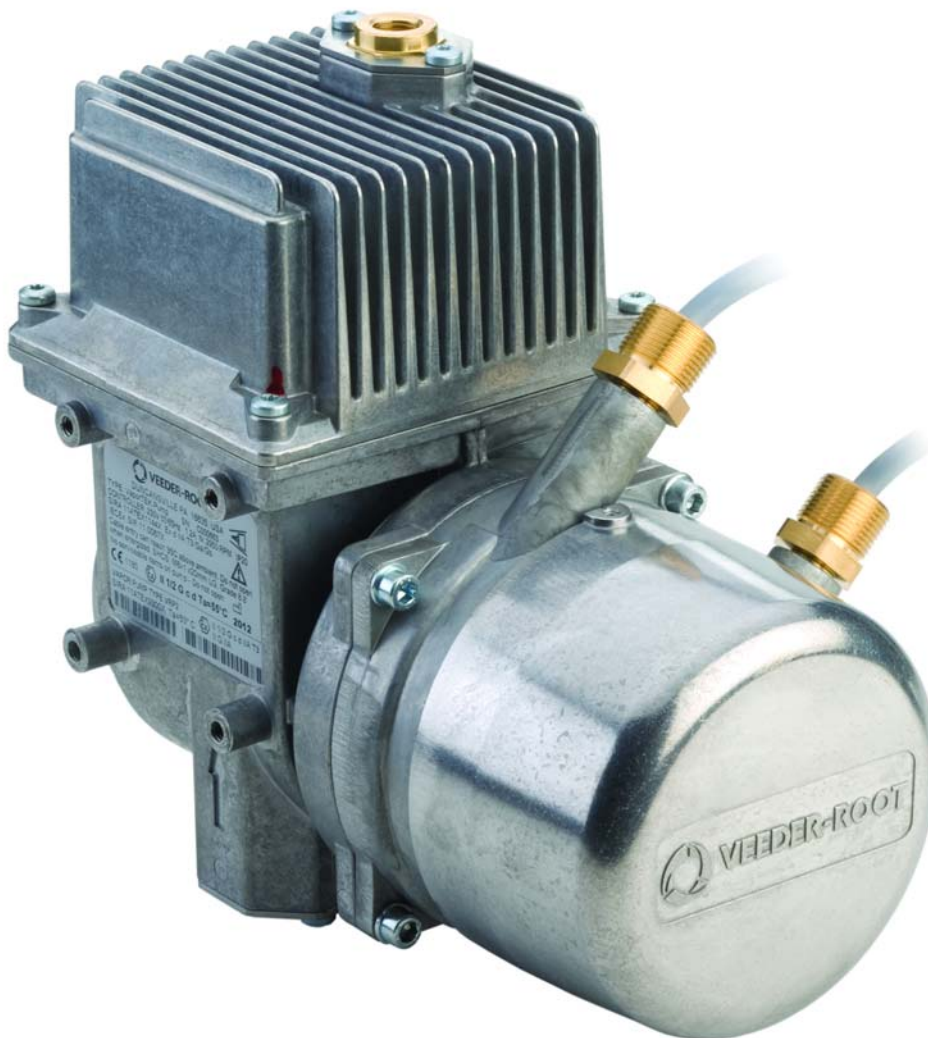


VaporTEK

Installation, Setup and Troubleshooting Manual



Notice

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DAMAGE CLAIMS / LOST EQUIPMENT

Thoroughly examine all components and units as soon as they are received. If any cartons are damaged or missing, write a complete and detailed description of the damage or shortage on the face of the freight bill. The carrier's agent must verify the inspection and sign the description. Refuse only the damaged product, not the entire shipment.

Veeder-Root must be notified of any damages and/or shortages within 30 days of receipt of the shipment, as stated in our Terms and Conditions.

VEEDER-ROOT'S PREFERRED CARRIER

1. Contact Veeder-Root Customer Service at 800-873-3313 with the specific part numbers and quantities that were missing or received damaged.
2. Fax signed Bill of Lading (BOL) to Veeder-Root Customer Service at 800-234-5350.
3. Veeder-Root will file the claim with the carrier and replace the damaged/missing product at no charge to the customer. Customer Service will work with production facility to have the replacement product shipped as soon as possible.

CUSTOMER'S PREFERRED CARRIER

1. It is the customer's responsibility to file a claim with their carrier.
2. Customer may submit a replacement purchase order. Customer is responsible for all charges and freight associated with replacement order. Customer Service will work with production facility to have the replacement product shipped as soon as possible.
3. If "lost" equipment is delivered at a later date and is not needed, Veeder-Root will allow a Return to Stock without a restocking fee.
4. Veeder-Root will NOT be responsible for any compensation when a customer chooses their own carrier.

RETURN SHIPPING

For the parts return procedure, please follow the appropriate instructions in the "General Returned Goods Policy" pages in the "Policies and Literature" section of the Veeder-Root **North American Environmental Products** price list. Veeder-Root will not accept any return product without a Return Goods Authorization (RGA) number clearly printed on the outside of the package.

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Introduction

This manual contains installation and operation instructions for Veeder-Root's VaporTEK. VaporTEK is a dispenser based, Stage II vapor recovery system that collects vapor during vehicle fueling and returns vapor to the underground storage tank (UST). Each VaporTEK system is designed to accommodate two active fueling points simultaneously.

VaporTEK System Components:

- VaporTEK Pump
- VaporTEK Controller
- VaporTEK Interface



VaporTEK Pump



VaporTEK Controller



VaporTEK Interface

Figure 1. VaporTEK System Components

Contractor Certification Requirements

Veeder-Root requires the following minimum training certifications for contractors who will install and setup the equipment discussed in this manual:

Installer Certification (Level 1): Contractors holding valid Installer Certification are approved to perform wiring and conduit routing; equipment mounting; probe, sensor and carbon canister vapor polisher installation; wireless equipment installation; tank and line preparation; and line leak detector installation.

Technician Certification (Level 2/3): Contractors holding valid Technician Certifications are approved to perform installation checkout, startup, programming and operations training, system tests, troubleshooting and servicing for all Veeder-Root Series Tank Monitoring Systems, including Line Leak Detection. In addition, Contractors with the following sub-certification designations are approved to perform installation checkout, startup, programming, system tests, troubleshooting, service techniques and operations training on the designated system.

- Wireless 2
- Tall Tank

VR Vapor Products Certification: Contractors holding a certification with the following designations are approved to perform installation checkout, startup, programming, system tests, troubleshooting, service techniques and operations training on the designated system.

- ISD – In Station Diagnostics
- PMC – Pressure Management Control
- CCVP - Veeder-Root Vapor Polisher
- Wireless – ISD/PMC Wireless
- A current Veeder-Root Technician Certification is a prerequisite for the VR Vapor Products course.

Warranty Registrations may only be submitted by selected Distributors.

Related Manuals

577014-018 Encore 500 Stage II Vapor Recovery Retrofit/Commissioning Installation and Start-Up Instructions
577013-988 MPV 10 Valve Installation and Maintenance Manual
577013-985 AVRN Vacuum Assist Nozzle Installation and Maintenance Manual
MDE-5064 Encore 500 VaporTEK Service and Troubleshooting Manual

Safety Precautions








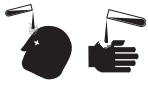


The following safety symbols may be used throughout this manual to alert you to important safety hazards and precautions.

**EXPLOSIVE**









Fuels and their vapors are extremely explosive if ignited.

**FLAMMABLE**

Fuels and their vapors are extremely flammable.

 <p>ELECTRICITY High voltage exists in, and is supplied to, the device. A potential shock hazard exists.</p>	 <p>TURN POWER OFF Live power to a device creates a potential shock hazard. Turn Off power to the device and associated accessories when servicing the unit.</p>
 <p>NO OPEN FLAMES Open flames from matches, lighters, welding torches, etc. can ignite fuels and their vapors.</p>	 <p>NO SMOKING Sparks and embers from burning cigarettes or pipes can ignite fuels and their vapors.</p>
 <p>NO VEHICLES Moving vehicles in the area during service can create a potential for personal injury to you or others. Sparks from starting vehicles can ignite fuels and their vapors.</p>	 <p>USE SAFETY BARRICADES Unauthorized people or vehicles in the work area are dangerous. Always use safety cones or barricades, safety tape, and your vehicle to block the work area.</p>
 <p>CLEAN WORK AREA Dispose of fuel soaked materials properly and not into trash barrels that may be used by customers.</p>	 <p>INJURY TO EYES AND SKIN Unauthorized people or vehicles in the work area are dangerous. Always use safety cones or barricades, safety tape, and your vehicle to block the work area.</p>
 <p>WARNING Heed the adjacent instructions to avoid damage to equipment, property, environment or personal injury.</p>	 <p>READ ALL RELATED MANUALS Knowledge of all related procedures before you begin work is important. Read and understand all manuals thoroughly. If you do not understand a procedure, ask someone who does</p>

Safety Warnings

 WARNING	
      	<p>This product is to be installed and operated in the highly combustible environment of a gasoline dispenser where flammable liquids and explosive vapors may be present. FAILURE TO COMPLY WITH THE FOLLOWING WARNINGS AND SAFETY PRECAUTIONS COULD CAUSE DAMAGE TO PROPERTY, ENVIRONMENT, RESULTING IN SERIOUS INJURY OR DEATH.</p> <p>The following hazards exist:</p> <ol style="list-style-type: none"> 1. Electrical shock resulting in serious injury or death may result if power is on during installation and the device is improperly installed. 2. Product leakage could cause severe environmental damage or explosion resulting in death, serious personal injury, property loss and equipment damage. <p>Observe the following precautions:</p> <ol style="list-style-type: none"> 1. Read and follow all instructions in this manual, including all safety warnings before installing this equipment. 2. Before installing this device, turn Off, tag/lock out power to the affected dispenser, including submersible pumps. 3. Evacuate of all unauthorized persons and vehicles from the work area. 4. To protect yourself and others from being struck by vehicles, block off your work area with cones, safety tape or barricades during installation or service. 5. Do not operate this equipment in hazardous locations with any securing screws or covers removed. Comply with all applicable codes including: the National Electrical Code; federal, state, and local codes; and other applicable safety codes.

Veeder-Root maintains a continuous process of product development and therefore product specifications may not be as described in this manual. Please contact the Veeder-Root office nearest you, or visit our website at www.veeder.com for information on new or updated products. Changes affecting products or procedures described in this manual will be reported in subsequent revisions.

Veeder-Root has taken every care in the compilation of this manual; however, it is the installers' responsibility to take every precaution to safeguard themselves and others. Every person working with Veeder-Root equipment is expected to take every safety precaution possible and to have read this manual.







NOTE Deviation from the specifications contained in this manual can result in rework, delays in system installation and additional installation charges.

Contractors are advised to contact their nearest Veeder-Root office where local conditions may preclude using the specifications contained in this manual.

VaporTEK Configurations

VaporTEK is available in four different configurations depending on required A/L (air to liquid) performance, compatibility with localized A/L monitoring requirements and performance A/L thresholds (see table below).

- VaporTEK Basic
- VaporTEK Plus
- VaporTEK Enhanced
- VaporTEK Ultra

		A/L Performance	GOOD	BETTER	BEST
		VaporTEK Basic	VaporTEK Plus	VaporTEK Enhanced	VaporTEK Ultra
	VaporTEK Pump	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
	VaporTEK Controller	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
	VaporTEK Interface		<div><div></div></div>		
	MPV 10			<div><div></div></div>	
	Electronic Proportional Valve				<div><div></div></div>
	VRC390/3 Controller Board				<div><div></div></div>
	Pulse signal required		<div><div></div></div>		<div><div></div></div>
	Compatible with VDI 4205 A/L monitoring		<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
	A/L performance thru entire flow range w/1 fueling point	<div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div></div>
	A/L performance with simultaneous fueling	<div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div>
	*Site uptime	<div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div></div>
	Energy efficiency	<div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div></div>
	TUV certificates	VDI 4205	21 st BlmSchV	21 st BlmSchV	21 st BlmSchV

*Installation errors due to system complexity, nuisance A/L monitoring alarms, contractor visits for periodic adjustments.

VaporTEK Pump Certifications & Markings

Safety Certification

Product	ATEX	IECEX
VaporTEK Pump	SIRA 11ATEX1144X	IECEX SIR11.0067X
VaporTEK Controller	N/A	N/A

Certificates can be obtained upon request. The IECEX certificates can be obtained online at:

<http://iecex.iec.ch/iecex/iecexweb.nsf/Home?OpenForm>


TUV Certification

Product	TUV Certificate Number	Hose	Nozzle
VaporTEK Basic	A/L 13.1	Goodyear Flex Steel	Veeder-Root AVRN
VaporTEK Plus	85-13.2	Goodyear Flex Steel	Veeder-Root AVRN
	85-2.172	ELAFLEX Conti	ELAFLEX Slimline 2
VaporTEK Enhanced	85.13.3	Goodyear Flex Steel	Veeder-Root AVRN
VaporTEK Ultra	85.13.4	Goodyear Flex Steel	Veeder-Root AVRN

Hazardous area installation Instructions


1. VaporTEK Pump may be used with flammable gases and vapors with apparatus group II and temperature class T3.
2. VaporTEK Pump is certified for maximum operating ambient temperature of +55°C.
3. The VaporTEK Pump assembly certificate number has an "X" suffix, indicating that special conditions are for safe use application.
4. The VaporTEK Pump is equipped with a temperature cut-off switch for thermal protection.

Equipment Marking

Product	ATEX/IECEX
VaporTEK Pump	Ex d IIA T3 Ga/Gb  II 1/2 G c d Ta=55°C



VaporTEK Kits

VaporTEK Pump Kit - P/N 900612-001



	Quantity	Description
	1	VaporTEK PUMP, P/N 900621-001
	1	VaporTEK DATASHEET, P/N 576047-180

VaporTEK Controller Kit - P/N 900634-001

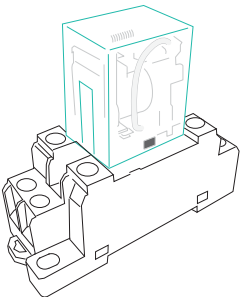
	Quantity	Description
	1	VaporTEK Controller, P/N 900628-001
	1	Controller - Interface Mounting Bracket, P/N 900852-001
	1	Controller - Cover, P/N 900850-001
	1	Controller - Label High Voltage Warning, P/N 900853-001
	4	Support Post, M4.0 X 6MM LG (Plastic), P/N 579081-001
	3	Hex Nut, M6 X 1, Steel, P/N 579082-001

	Quantity	Description
	3	Socket Head Cap Screw M6X1 X 20MM LG, P/N 579281-001
	2	M3.5 x 12 mm, Lockwasher M3, PH. Screw (Bracket ground), P/N 579158-001
	1	18AWG, 3 Conductor Power Cable with Connector – 3 FT Long, P/N 900651-001
	1	18AWG, 2 Conductor Hook Signal Cable (110-230V) – 4 FT Long, P/N 900644-001
	1	18AWG, 1 Conductor Wire – 4 FT Long (For Grounding To Dispenser), P/N 616343-024

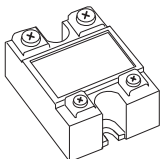
VaporTEK Interface Kit - P/N 900635-001

	Quantity	Description
	1	VaporTEK Interface, P/N 900630-001
	4	Support Post, M3.5 X 4MM LG (Plastic), P/N 579080-001
	1	RJ12 Cable – 3 FT Long, P/N 579084-001
	1	18AWG, 2 Conductor Power Cable with Connector – 4 FT Long, P/N 900652-001
	1	24AWG, 8 Conductor Signal Cables – 3 FT Long, P/N 900643-001

VaporTEK High Voltage Relay Kit - P/N 900664-001

	Quantity	Description
	1	High Voltage Relay

VaporTEK Low Voltage Relay Kit - P/N 900665-001

	Quantity	Description
	1	Low Voltage Relay

VaporTEK Pump Characteristics

1. The VaporTEK Pump is driven by the VaporTEK Controller.
2. The VaporTEK Pump has integrated flame arrestors at the inlet and outlet ports that prevent flame transmission.
3. The inlet/outlet ports have standard G 1/4" female threads (ISO – 228-1).



Warning! DO NOT remove the flame arrestors. DO NOT install piping which can stress the pump housing.

4. Vapor flow is from the nozzle through the vapor pump to the UST (See Figure 2 for flow direction).
5. The following conditions must apply according to EN13463-1 for the maximum pipe and hose lengths between the nozzle and the VaporTEK Pump.
 - a. An inner diameter ≤ 10 mm in the coaxial hose of length ≤ 6 m, OR
 - b. Coaxial hose of length ≤ 6 m with an outer diameter ≤ 8 mm together with a DN15 pipe (G 1/2"), length ≤ 3 m.

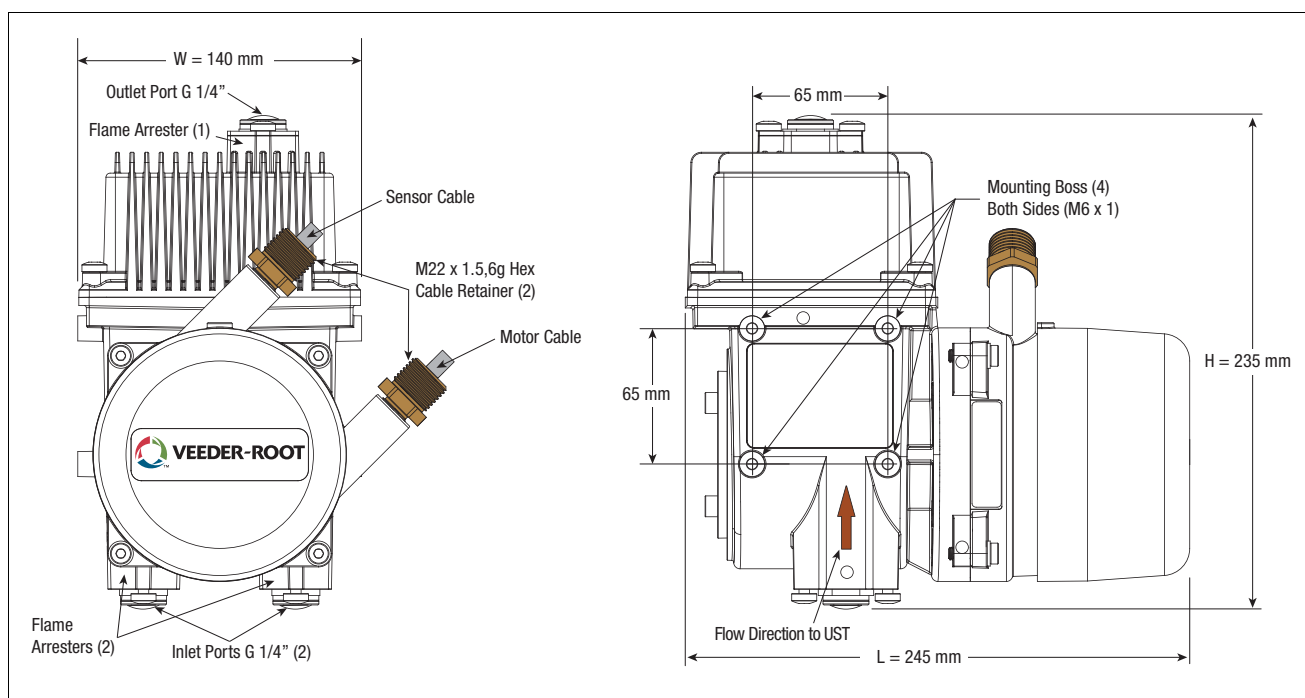


Figure 2. VaporTEK Pump Dimensions

VaporTEK Pump Specifications

Function	Description
Flow medium	Gasoline vapor
Flame Arrestors	Type: Ex IIA; Inlet & Outlet Ports
Mounting	Four M6 X 1 Mounting Boss (Either side of the pump)
Motor Type	Synchronous BLDC (Brushless DC) Motor
Voltage (Single Phase)	230 VAC ($\pm 10\%$)
Frequency	50/60 Hz
Amps	1.2 A

Function	Description
Motor Speed	2500 rpm max.
Maximum flow rate	Up to 120 lpm
Noise Level	59 dB (A)

VaporTEK Controller

The VaporTEK Controller board is shown in Figure 3. Mode selections for the VaporTEK Controller board require a jumper in the JP4 position(s) shown below:

Configuration Type	VaporTEK Controller Input Type	Mode Selection Jumpers in JP4				
		0	1	2	3	4
VaporTEK Basic VaporTEK Enhanced VaporTEK Ultra	High Voltage Hook Signal	No	Yes	Yes	No	No
VaporTEK Basic VaporTEK Enhanced VaporTEK Ultra	Low Voltage Hook Signal	Yes	No	No	No	No
VaporTEK Plus	Pulse Signal	Yes	No	No	No	No

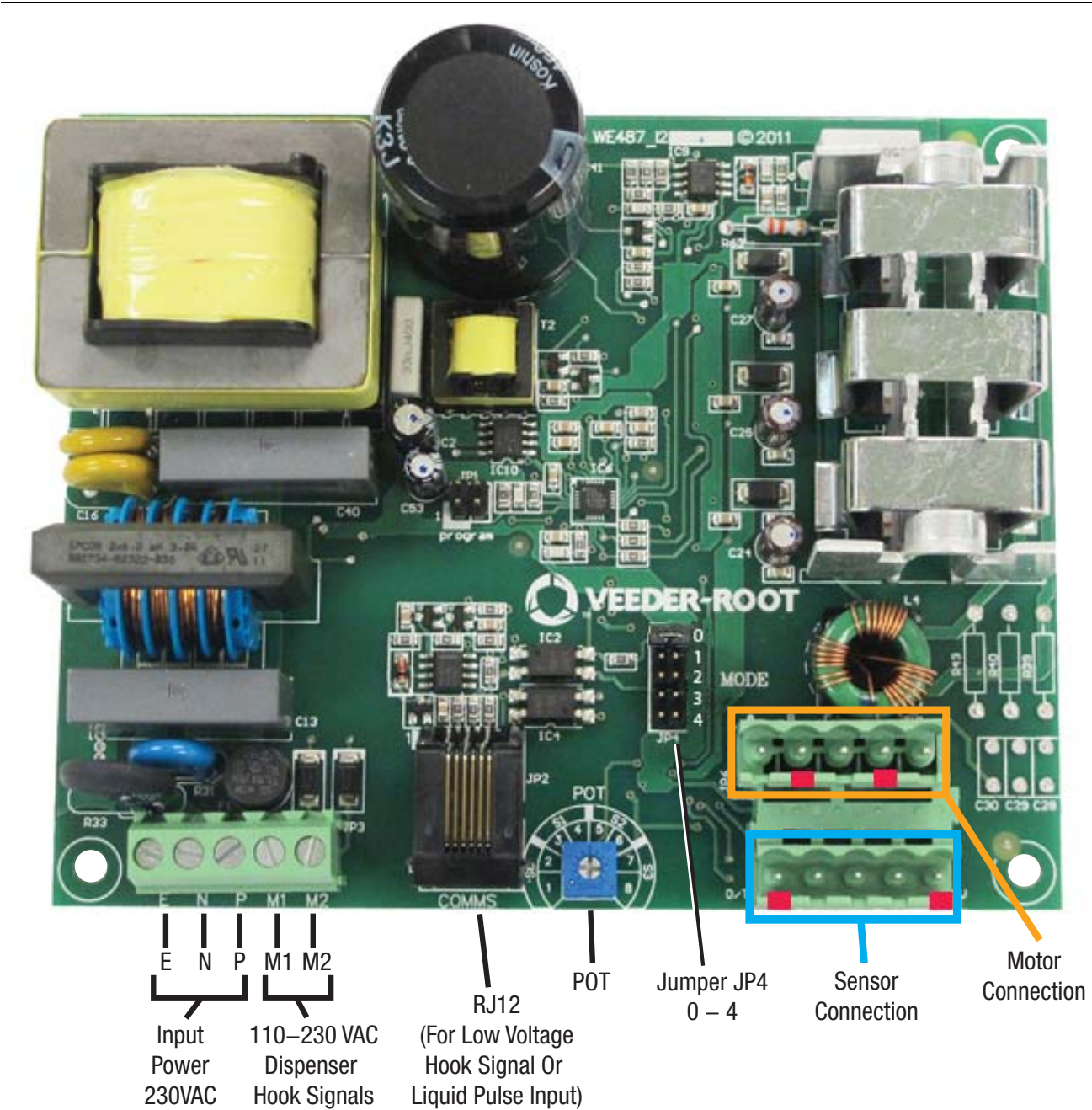


Figure 3. VaporTEK Controller

VaporTEK Interface

The VaporTEK Interface is a dual-sided board which provides an electrical interface between the fuel dispenser and the VaporTEK Controller. The VaporTEK Interface has four input channels per side which can be configured as pulse train, low voltage nozzle hook signals (0-24V) and diesel disable inputs.

For the pulse input configuration, a fuel flow rate higher than 6 liter/min is required for the VaporTEK Controller to start the VaporTEK pump.

The VaporTEK Interface board is shown in Figure 4.

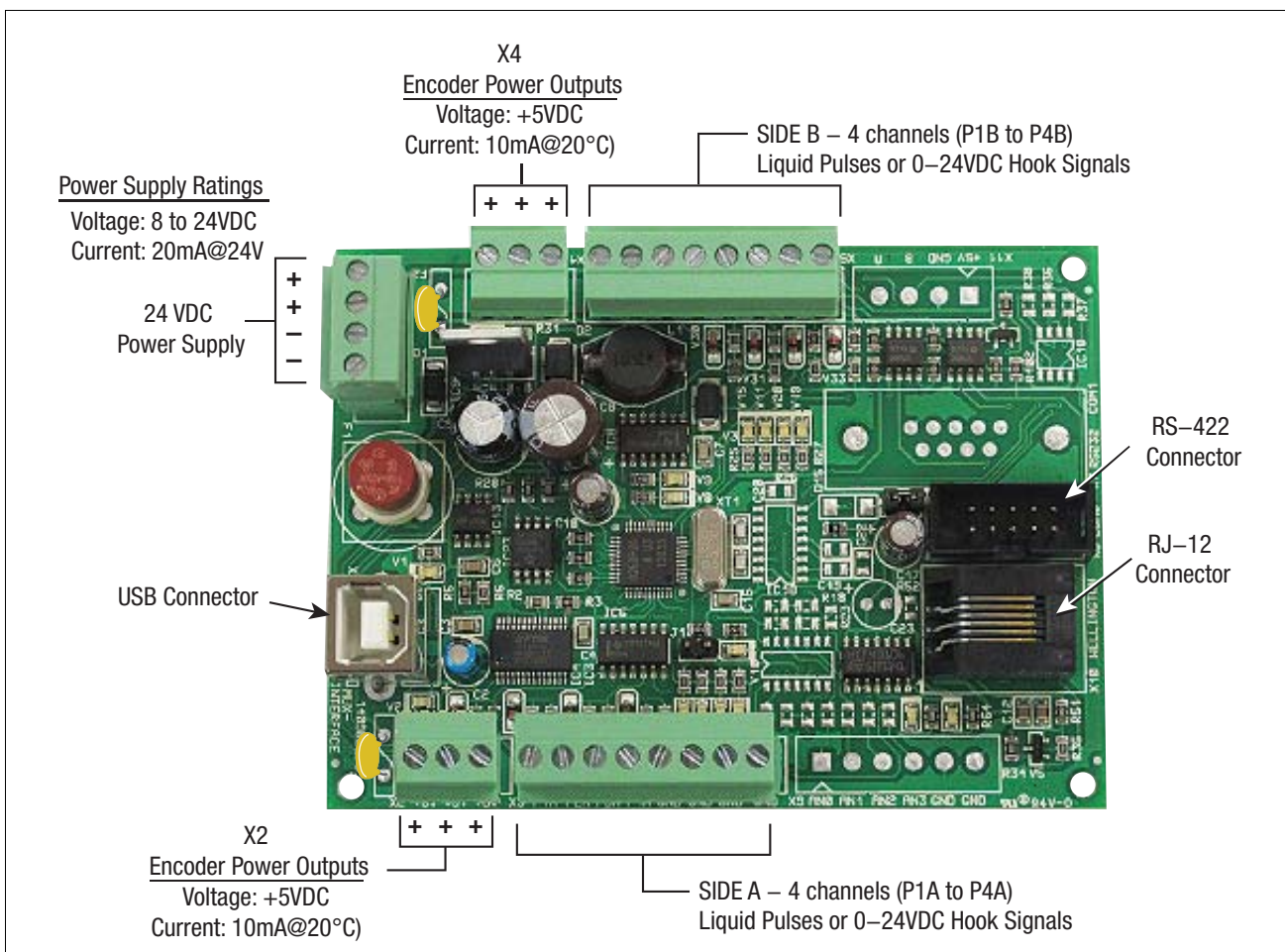


Figure 4. VaporTEK Interface

VaporTEK Interface I/O

I/O Interface	Description	Function
USB	Connection between laptop and VaporTEK Interface	Diagnose or setup VaporTEK Interface using laptop
RJ12	Connection between VaporTEK Interface and VaporTEK Controller	Transmits pulse rate or low voltage hook signal information to the VaporTEK Controller
RS422	Connection to FB1 Terminal	Used to perform system calibration with hand held FB1 Terminal

VaporTEK Interface LEDs

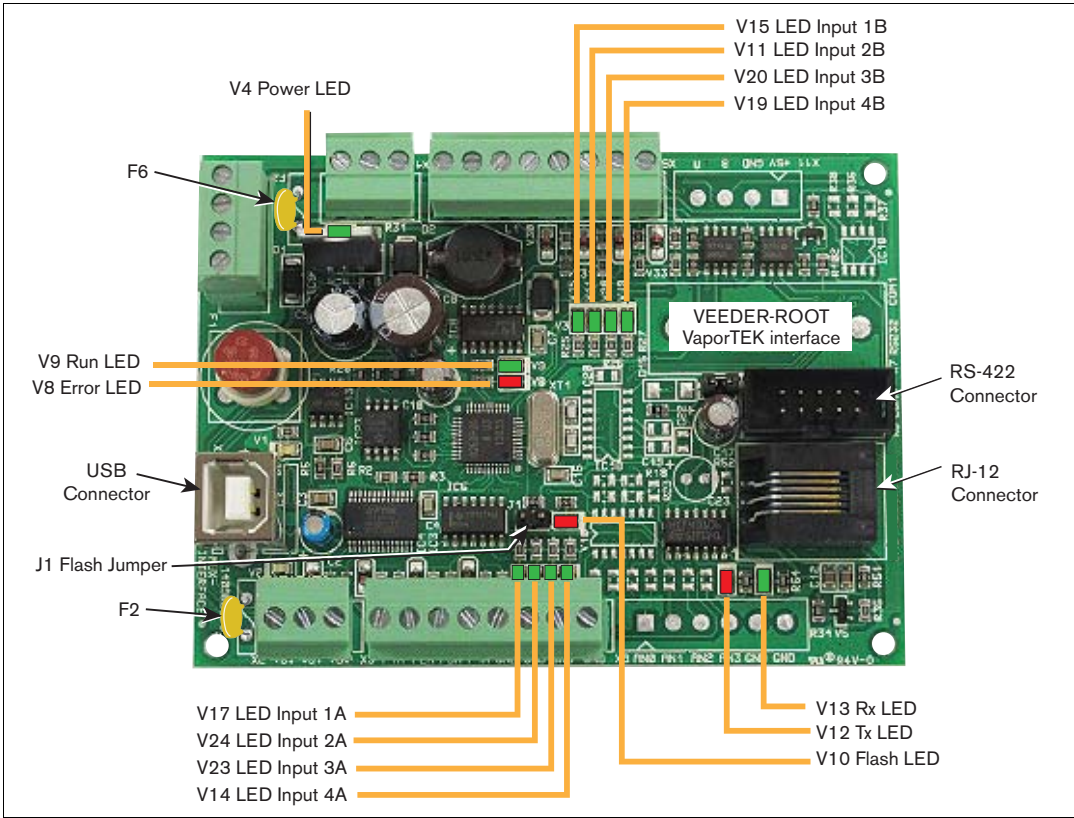


Figure 5. VaporTEK Interface LEDs

VaporTEK LEDs

LED	Function	Description
V4	Power Status	Illuminates when the internal 24V power is present.
V17 V24 V23 V14	Side A Input Status P1A P2A P3A P4A	Illuminate when input voltage is between 4V- 24VDC, Off when input voltage is less than 4VDC

LED	Function	Description
V15 V11 V20 V19	Side B Input Status P1B P2B P3B P4B	Illuminate when input voltage is between 4V- 24VDC, Off when input voltage is less than 4VDC
V12 V13	Communication Status	Both LEDs flash simultaneously when communicating properly. Any other status for the LED means communication to the VaporTEK Controller has been interrupted.
V9	Run Status	LED flashes with "1 sec On-Off cycle" when there is no transaction. It starts flashing faster during an active fuel transaction. (Flow rate > 6 l/min).
V8	Error Status	Normal operation is OFF. When it flashes, a communication error has occurred.
V10	Programming LED	Engineering use only.
J1	Flash Jumper	Engineering use only.

VaporTEK Pump Configuration

The VaporTEK Pump can be configured to operate in either a 2-Speed or a Variable-speed mode depending on the configuration type and available dispenser inputs/signals.

VaporTEK Configuration	Input Type	Mode of Operation	Required Components	Method of Operation
Basic, Enhanced, and Ultra	High Voltage Hook Signal (110-230VAC)	Two Speed	VaporTEK Controller	The VaporTEK Controller receives nozzle hook signals from either side of the dispenser. With one fueling point active, the pump operates in low speed. With two fueling points active, the pump operates in high speed.
	High Voltage Hook Signal (220/240VAC)	Two Speed	VaporTEK Controller, Switch Relay	In this configuration a high voltage hook signal from either side of the dispenser operates a relay switch which in turn control's the high voltage input to the Vapor TEK Controller. Note: One relay switch is required for each gasoline nozzle in the dispenser. With one fueling point active, the pump operates in low speed. With two fueling points active, the pump operates in high speed. This configuration is typically used for Multi Product dispensers with high voltage hook signals and more than one nozzle grade per side
	Low Voltage Hook Signal (0-24VDC)	Two Speed	VaporTEK Controller, VaporTEK Interface	The VaporTEK Interface receives low voltage hook signals from either side of dispenser and transmits this signal to the VaporTEK Controller. With one fueling point active, the pump operates in low speed. With two fueling points active, the pump operates in high speed. Refer to VaporTEK Wiring section to set up low voltage liquid pulse inputs.
	Low Voltage Hook Signal (0-24VDC)	Two Speed	VaporTEK Controller, Switch Relay	In this configuration a low voltage hook signal from either side of the dispenser operates a relay switch which in turn controls the high voltage input to the VaporTEK Controller. Note: One relay switch is required for each gasoline nozzle in the dispenser. With one fueling point active, the pump operates in low speed. With two fueling points active, the pump operates in high speed. This configuration is typically used for Multi Product dispensers with low voltage hook signals.
Plus	Liquid Pulse Signal	Variable Speed	VaporTEK Controller, VaporTEK Interface	VaporTEK Interface receives liquid pulses from an active encoder (from either side of the dispenser) and calculates the petrol flow rate. This flow rate value is then transmitted to the VaporTEK Controller to determine the pump speed. Refer to VaporTEK Wiring section to set up pulse rate inputs.

Installation

VaporTEK Pump



Before installing this device, turn off, tag/lock out power to the dispenser.

1. Remove the dispenser's hydraulic cabinet sheet metal doors to access the dispenser hydraulics area.
2. Find a suitable location to install the VaporTEK Pump.
3. Ensure correct orientation of the pump, suction ports and discharge ports prior to installing in the dispenser. See Figure 6 for allowable VaporTEK Pump orientations (red arrows indicate direction of flow). Also ensure the electrical cables of the VaporTEK Pump's location will reach the VaporTEK Controller installed in the electronic cabinet of the dispenser (Unclassified Area).
4. After identifying the desired pump orientation, secure the VaporTEK Pump onto the dispenser support structure. Excessive vibration may require additional support and vibration mounts to secure the VaporTEK Pump.
5. Route the two cables (Motor and Signal) from the VaporTEK Pump into the dispenser's electronic cabinet. Tie wrap the cables neatly and securely against fixed support members away from moving parts.
6. Reinstall and secure the lower hydraulic doors.

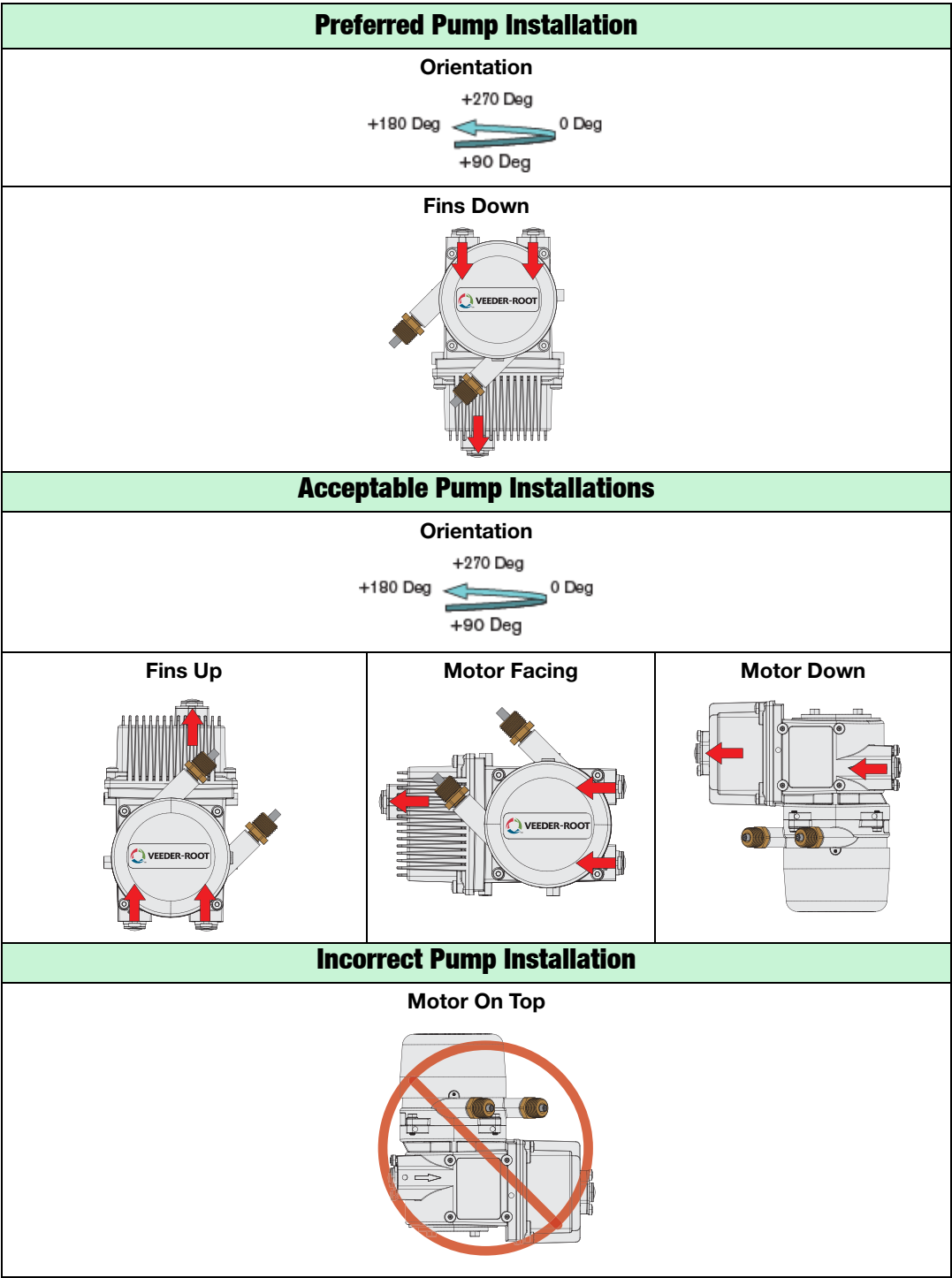


Figure 6. VaporTEK Pump Installation Orientations

VaporTEK Controller and VaporTEK Interface



Before installing this device, turn off, tag/lock out power to the dispenser until all steps in this section are complete.

The VaporTEK Controller and VaporTEK Interface must be installed in the non-hazardous location of the dispenser (unclassified area), and protected from weather.

1. Mount the VaporTEK Controller board to the sheet metal bracket 900852-001 with the 4 stand offs (579081-001) from the kit (Figure 7).

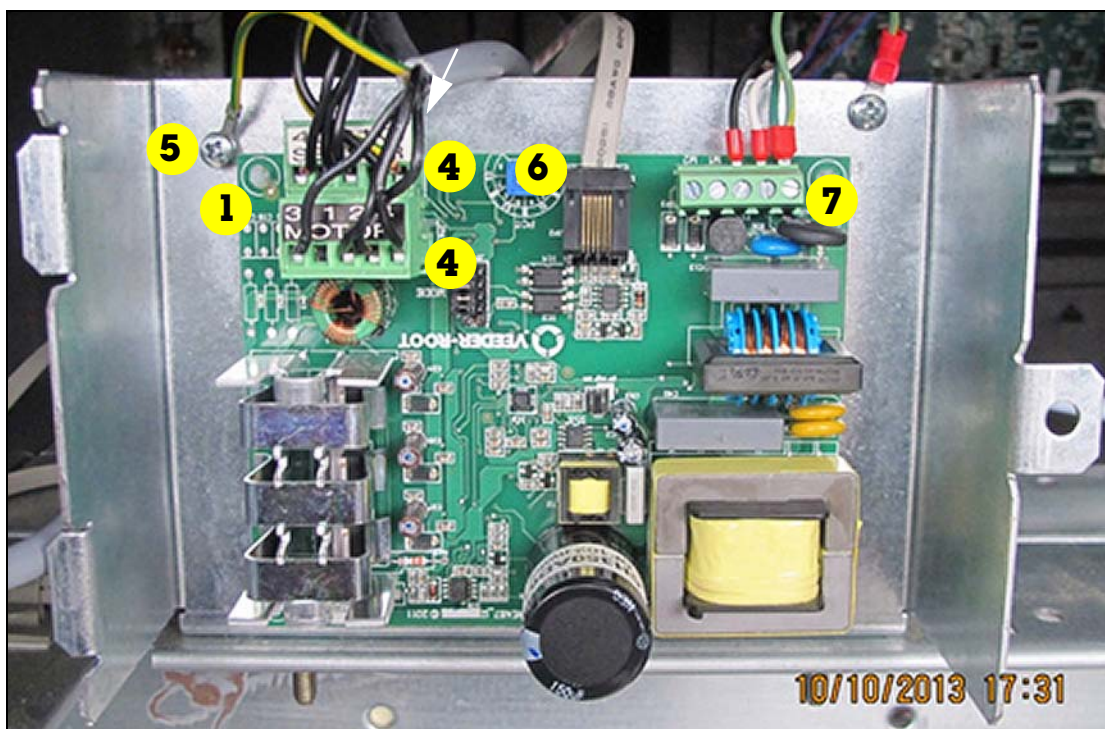


Figure 7. Mount The VaporTEK Controller To The Inside Of The Support Bracket

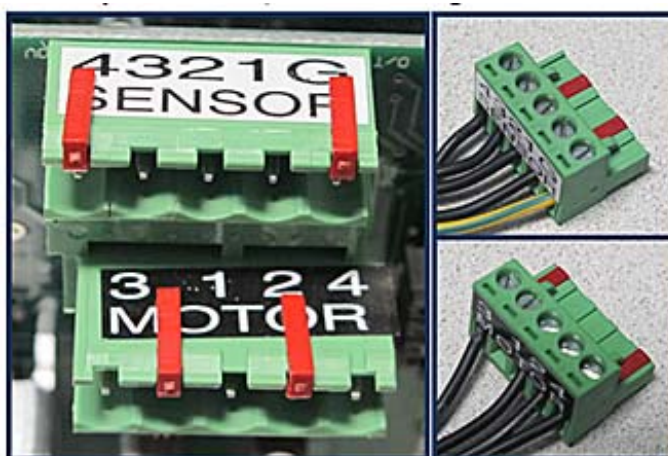


Figure 8. VaporTEK Motor/Sensor Connector's Labeling And Poke Yoke

2. Mount the VaporTEK Interface board to the new sheet metal bracket 900852-001 with the 4 stand offs (579080-001) from the kit (Figure 9).

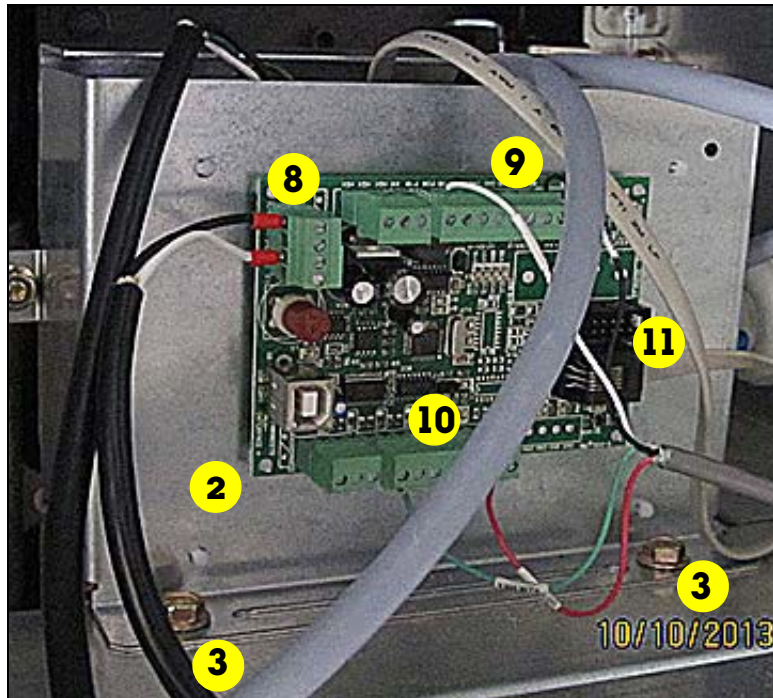


Figure 9. Mount The VaporTEK Interface To The Back Side Of The Support Bracket

3. Attach VaporTEK Controller/Interface sheet metal bracket 900852-001 to the dispenser with M6 socket head bolt and M6 nut (Figure 9).
4. Plug the VaporTEK motor and sensor connectors to the VaporTEK Controller board (Figure 7).
5. Attach the motor ground wire to the sheet metal bracket with M3 screw (579158-001) included in the kit (Figure 7).
6. Plug the RJ12 cable socket to the VaporTEK Controller (Figure 7).
7. Attach the 900651-001 input power cables to the VaporTEK Controller (Black: phase; White: Neutral; Green-Yellow: Ground) and attach the Green-Yellow ground wire with the ring terminal to the sheet metal bracket with M3 screw (579158-001). The other end of the cable should be connected to the 230V power source (Figure 7).
8. Plug the 24V cable with connector to the VaporTEK Interface board (Figure 9).
9. Plug the Pulse Side B cables with connector to the VaporTEK Interface (Figure 9).
10. Plug the Pulse Side A cables with connector to the VaporTEK Interface (Figure 9).
11. Plug the RJ12 cable socket to the VaporTEK Interface (Figure 9).

12. Attach the cover 900851-001 included in the kit (Figure 10.).



Figure 10. Attach The VaporTEK Controller Safety Cover

13. Use M6X12 socket head screw (579281-001) & M6 nut (579082-001) to attach the cover to the bracket (Figure 10).
14. Paste the High Voltage warning label 900853-001, included in the kit (Figure 10).
15. if the controller bracket mounting base plate is not grounded, connect the 18AWG, 1-conductor cable (616343-024) from the VaporTEK Controller kit as the ground wire between the mounting bracket and the dispenser frame (use ground screw and nut included in the kit).

Wiring Schematics

VaporTEK Wiring

1. Depending on the configuration used to actuate the pump, follow steps 2, 3, 4, 5 or 6.
2. VaporTEK with High Voltage Hook Signal (see Figure 11)
 - a. Refer to the dispenser manufacturer's manual, to determine where to tap into the 110-230 VAC hook signal. Using the 18AWG, 2 conductor cable included in the VaporTEK Controller Kit, connect the hook signal from Side A to M1 on the VaporTEK Controller and connect the hook signal from Side B to M2.
 - b. Set two jumpers in positions 1 and 2 on JP4 (see Figure 11).
3. VaporTEK with Low Voltage Hook Signal - Requires VaporTEK Interface Kit (see Figure 12)
 - a. Refer to the dispenser manufacturer's manual, to determine the dispenser type (Blended or Multi product), the number of available nozzle hooks and where to tap into the hook signals (0-24VDC).
 - b. The VaporTEK Interface can be connected to a maximum of four nozzle hooks per side.
 - c. Connect the available nozzle hook signal inputs to the VaporTEK Interface using 24AWG, 8 conductor signal cables included in the Kit. (Note: 2 conductors used per hook signal input, see wiring diagram in Figure 13.)
 - d. Set one jumper in position 0 on JP4 (see Figure 12).
4. VaporTEK with Pulse Signal - Requires VaporTEK Interface Kit (see Figure 12).
 - a. Refer to the dispenser manufacturer's manual, to determine the dispenser type (Blended or Multi product), the number for available pulse signals and where to tap into the pulse signals.
 - b. The VaporTEK Interface can be connected to a maximum of 4 pulse signals per side.
 - c. Connect the pulse signal inputs to the VaporTEK Interface using the 24AWG, 8 conductor signal cables included in the Kit. (Note: 2 conductors used per pulse signal input, see wiring diagram in Figure 14.)
 - d. Set one jumper in position 0 on JP4 (see Figure 12).

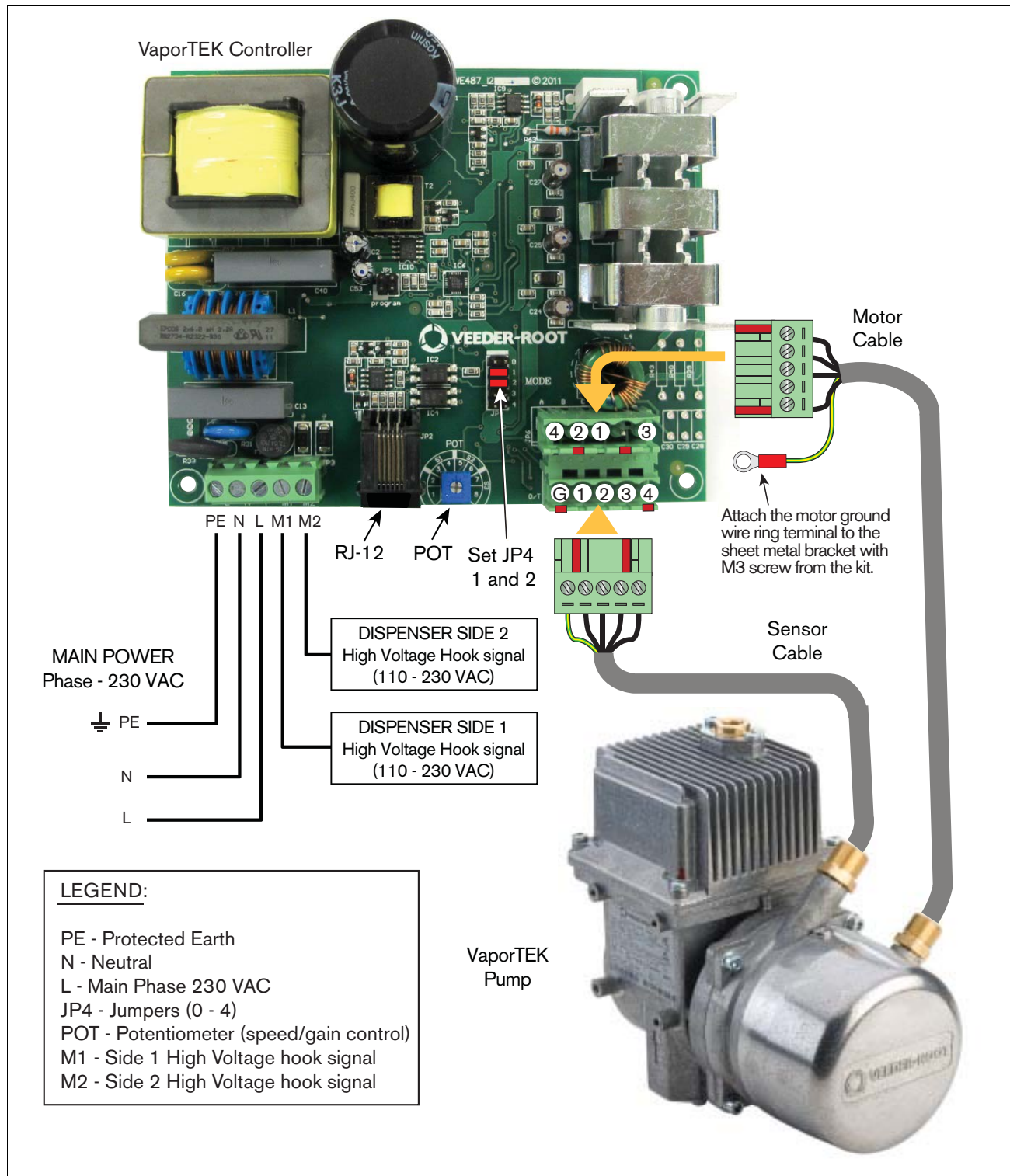


Figure 11. VaporTEK System - High Voltage Hook Signal Input

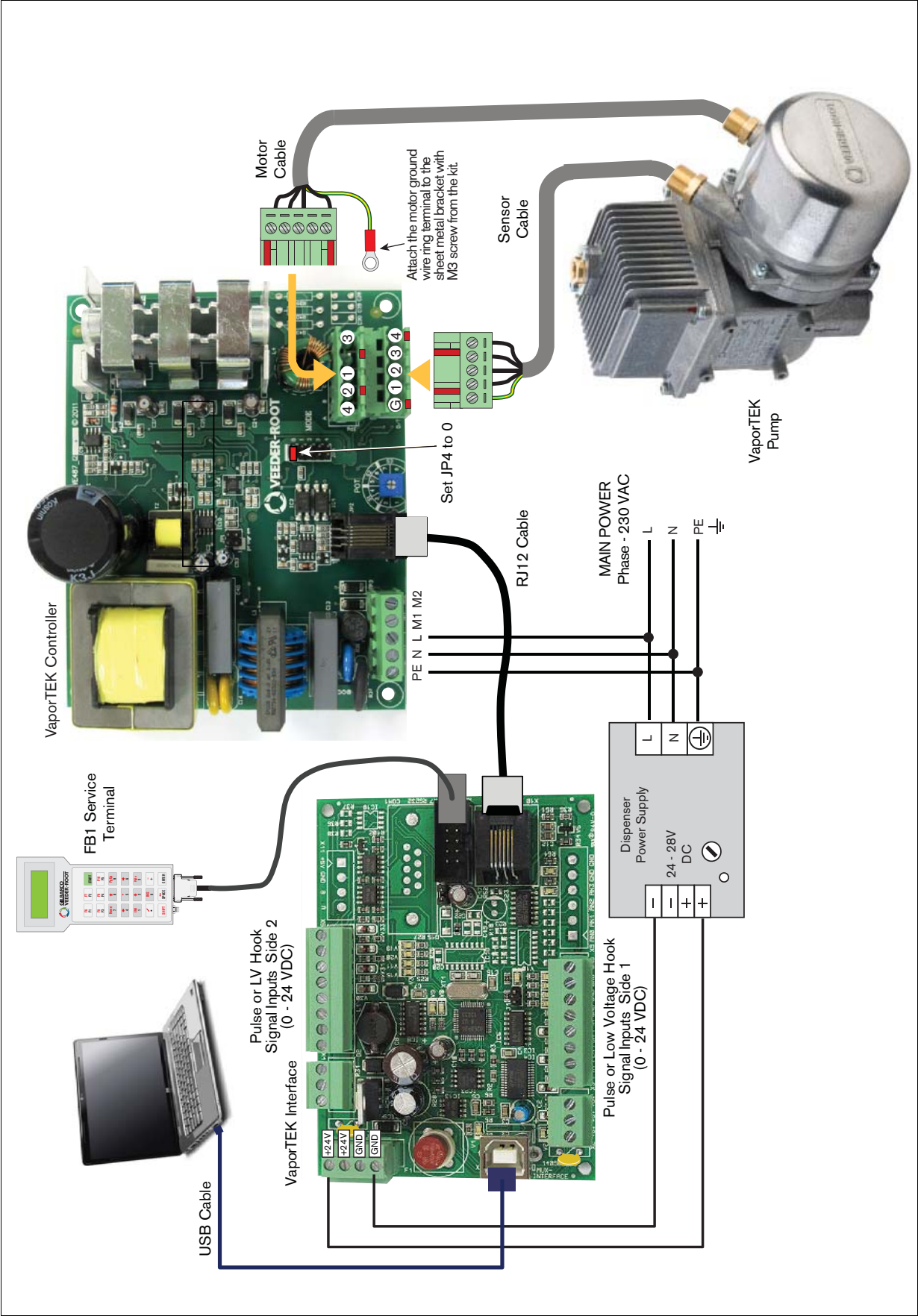


Figure 12. VaporTEK System - Liquid Pulse Signal and Low Voltage Hook Signal Input

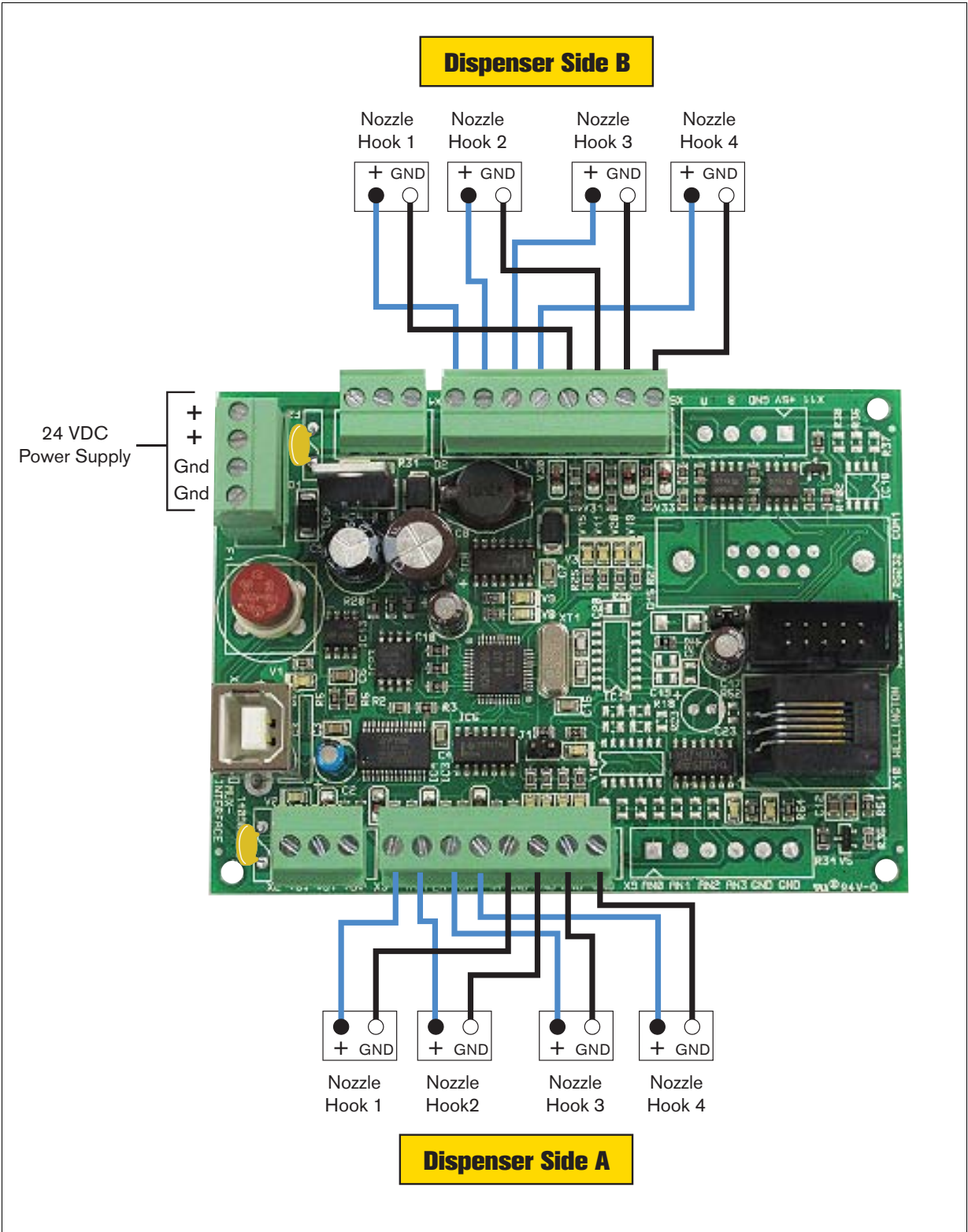


Figure 13. VaporTEK Interface - Low Voltage Nozzle Hook Signal Connections

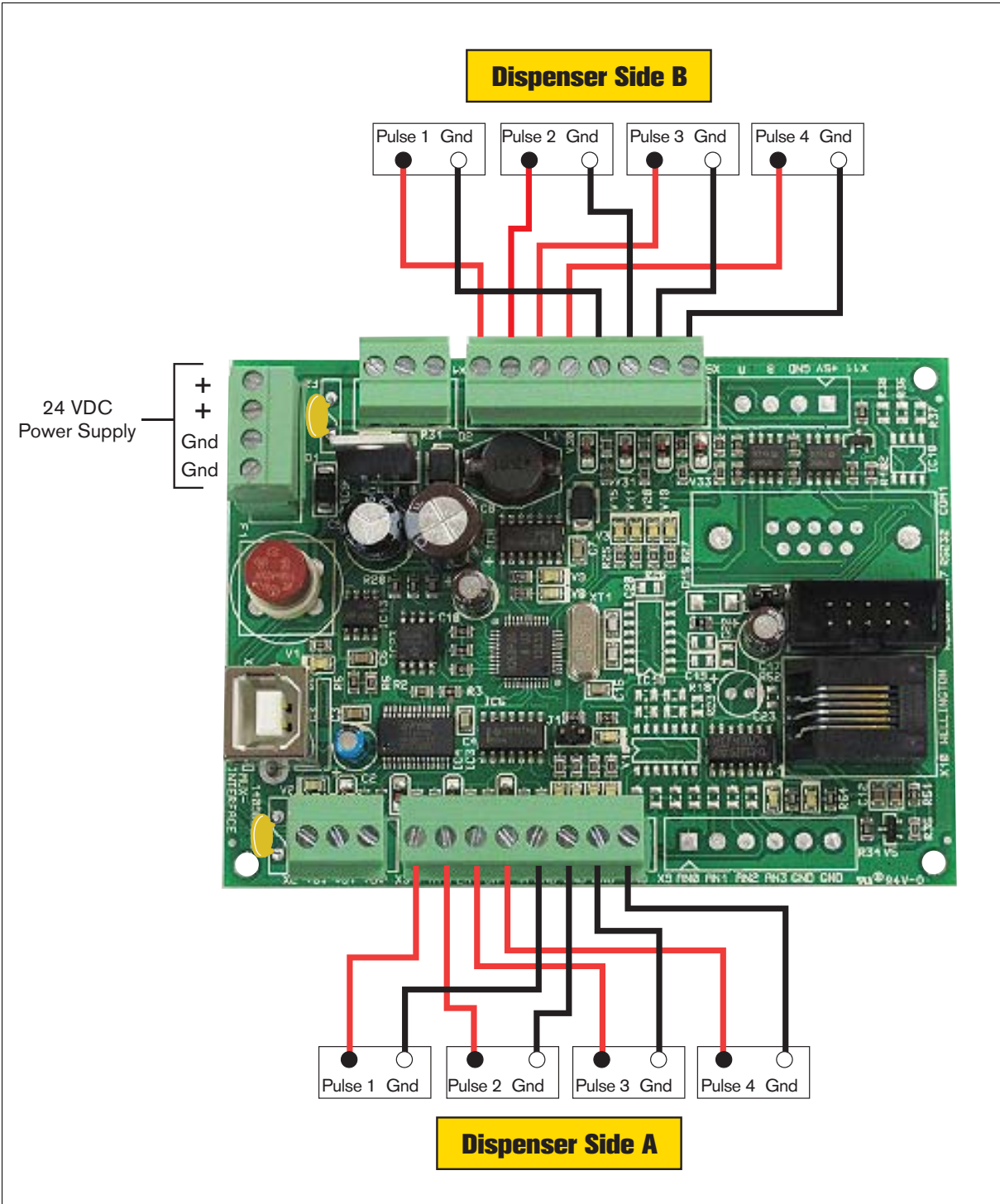


Figure 14. VaporTEK Interface - Liquid Pulse Signal Connections

5. VaporTEK with Low Voltage hook signal with relay switches (see Figure 15)
 - a. Refer to the dispenser manufacturer's manual to determine the dispenser type (Blended or Multi product), the number of available nozzle hooks and where to tap into the hook signal (Verify the low voltage hook signal voltage rating is 3-32 VDC).
 - b. Using the 18AWG, 2 conductor cable from the kit, connect each nozzle hook signal on Side A of the dispenser to one relay circuit.
 - c. A High Voltage source (110-230VAC) is connected to the M1 on the VaporTEK Controller through all the relay circuits on Side A (See Figure 17 for low voltage relay wiring diagrams).
 - d. Make similar connections on Side B and connect to M2 on the VaporTEK Controller.
 - e. Set two jumpers in positions 1 and 2 on JP4 (see Figure 15).
6. VaporTEK with High Voltage hook signal with relay switches (see Figure 16)
 - a. Refer to the dispenser manufacturer's manual to determine the dispenser type (Blended or Multi-product), the number of available nozzle hooks and where to tap them (Verify the hook signal voltage rating is 220/240 VAC).
 - b. Using the 18AWG, 2 conductor cable from the kit, connect each nozzle hook signal on Side A of the dispenser to one high voltage relay circuit.
 - c. A High Voltage source (110-230VAC) is connected to the M1 on the VaporTEK Controller through all the relay circuits on Side A (See Figure 18 for high voltage relay wiring diagrams).
 - d. Make similar connections on Side B and connect to M2 on the VaporTEK Controller.
 - e. Set two jumpers in positions 1 and 2 on JP4 (see Figure 16).

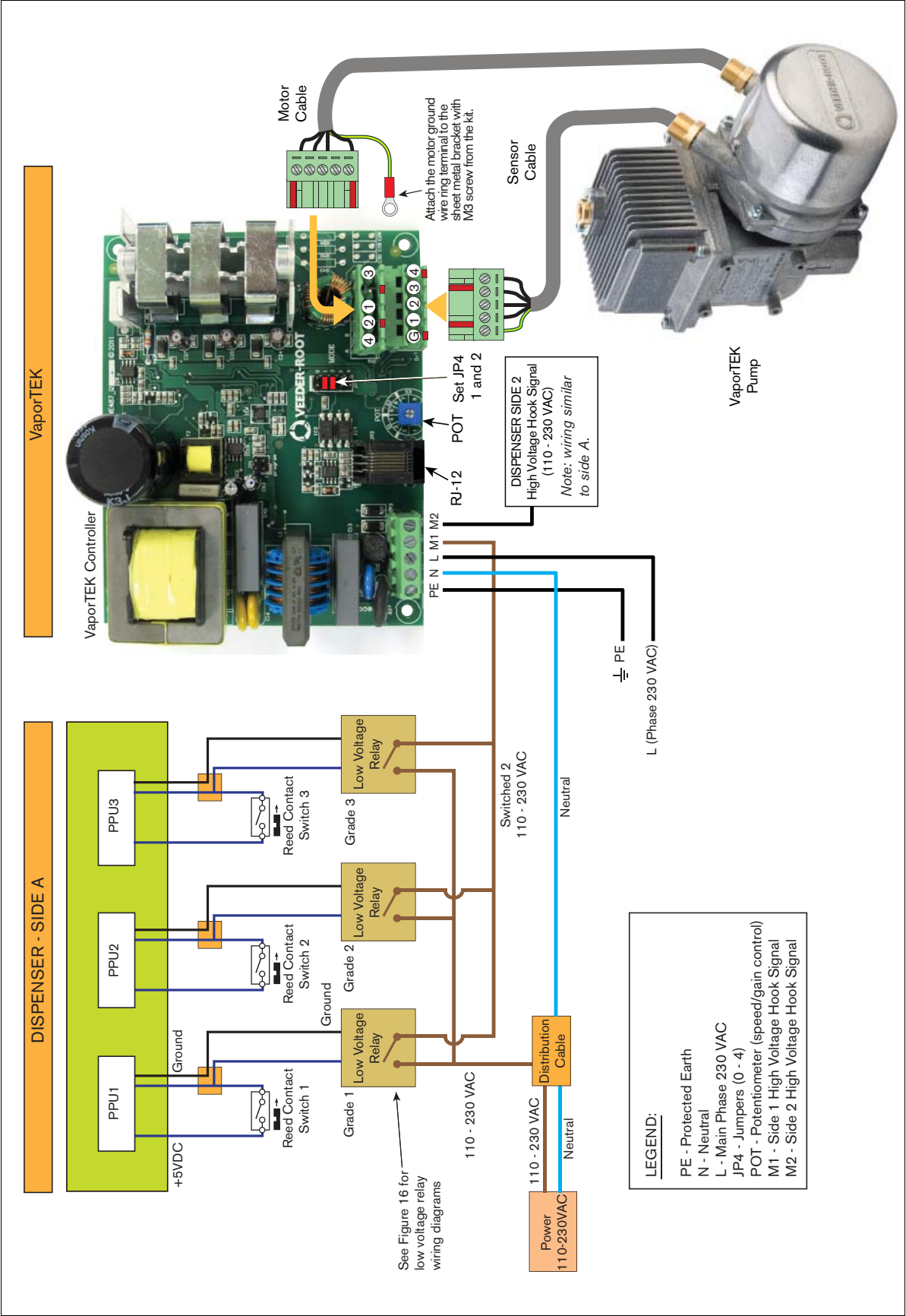
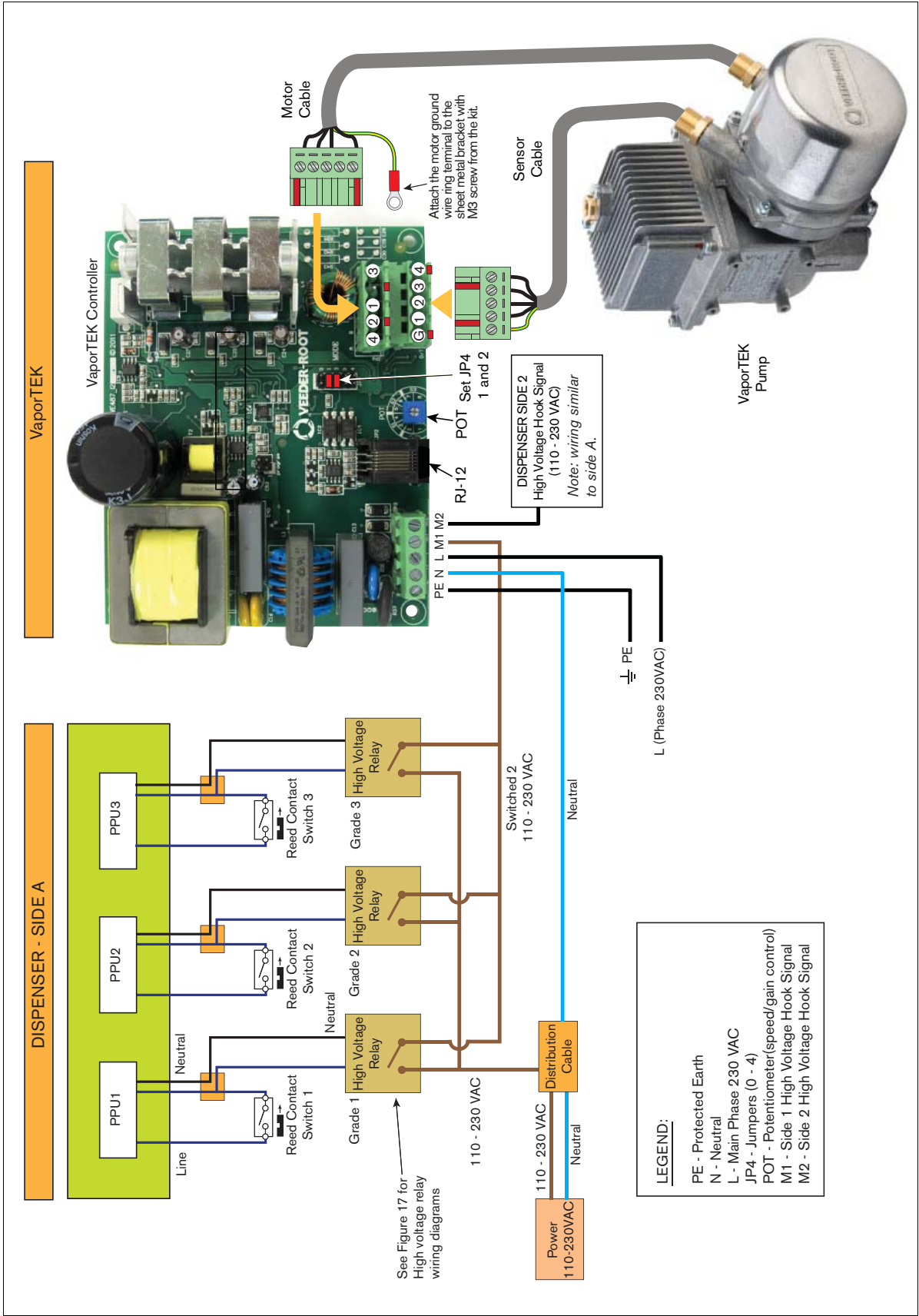


Figure 15. VaporTEK System - Low Voltage Hook Signal With Relay Switches



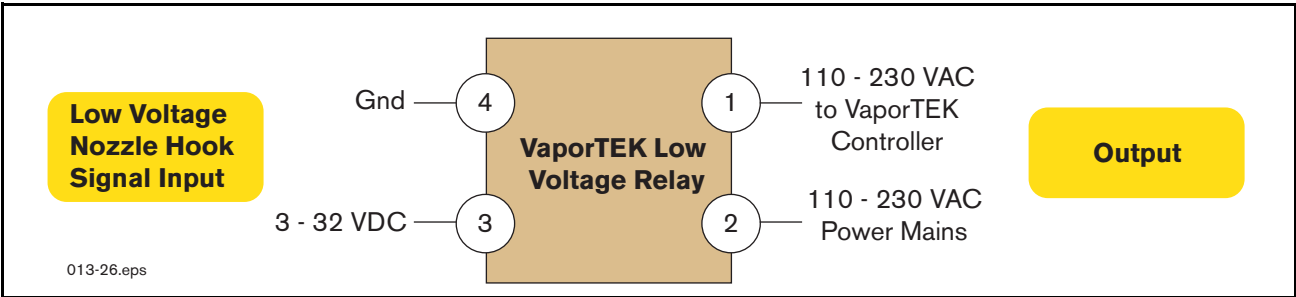


Figure 17. VaporTEK Low Voltage Relay Diagram

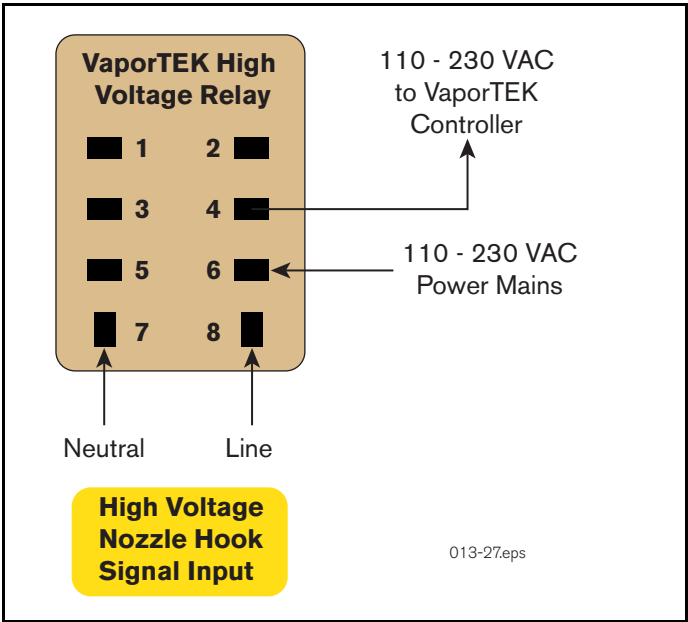


Figure 18. VaporTEK High Voltage Relay Diagram

Communication Setup - VaporTEK Interface

Setup with Laptop

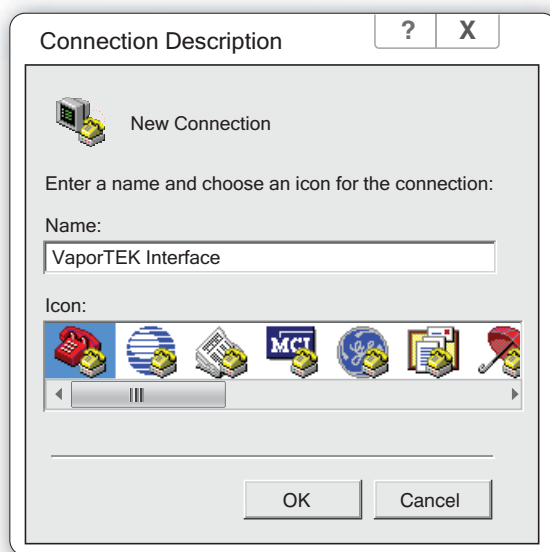
Connect your laptop to the VaporTEK Interface using a USB cable (see Figure 12).

1. On your laptop, go to Start / All Programs / Accessories / Communications / HyperTerminal.

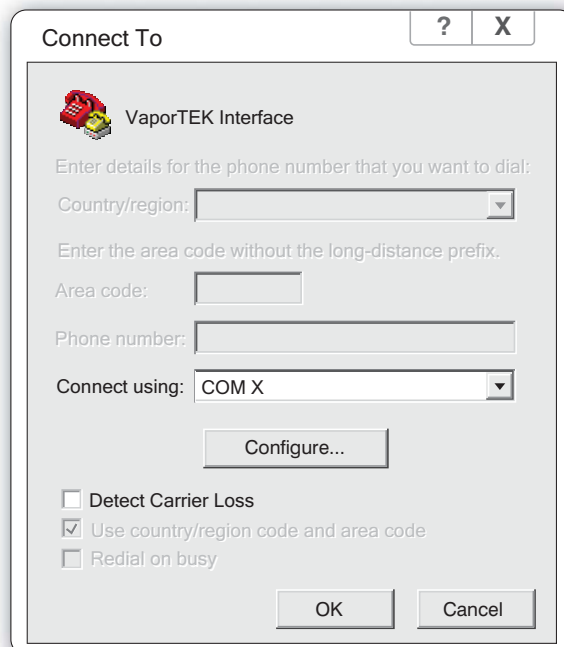
Note: “HyperTerminal” is an inbuilt program for Windows XP and earlier operating systems. It is not readily available on Windows 7 and needs to be downloaded from the internet. Also, a non-commercial program like “M16 -Terminal” can be downloaded and used instead of HyperTerminal.

Once the Hyperterminal menu screen appears, click on **File** in the menu bar and select **New Connection**.

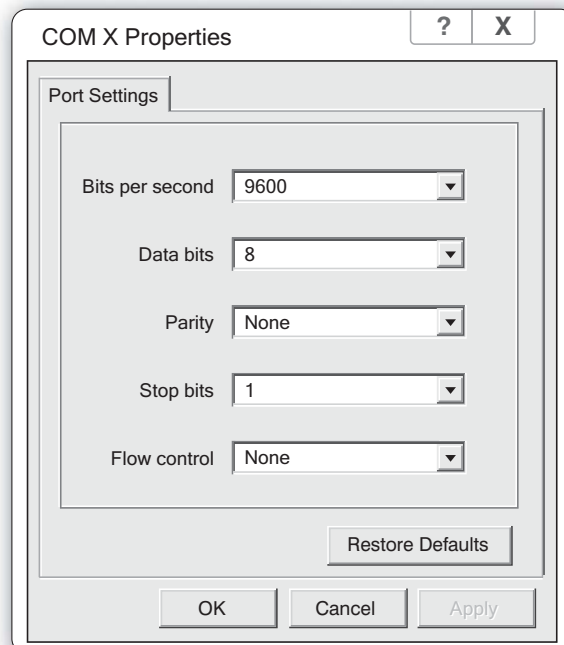
2. In the Connection Description dialog box Name field, enter **VaporTEK Interface**. Click **OK** (see example below).



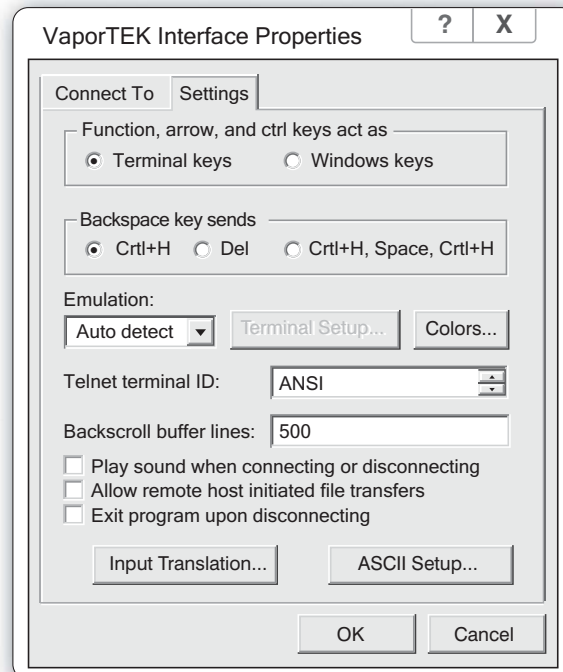
3. Select the appropriate COM port on your laptop (COM X in example below). To verify COM port, go to Control Panel/System/Device Manager and select ports. Check to see which COM port says USB 2.0. Click **OK**.



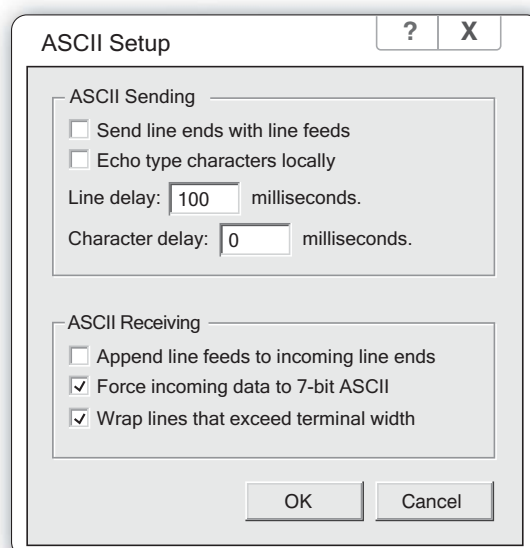
4. In the COM Properties dialog box (COM X in the example below, set the all of the port setting fields as shown and click **OK**.



- Click **File** in the HyperTerminal window and select Properties, then click the **Settings** tab to open the dialog box shown below. Double check and make sure all settings match the example below.

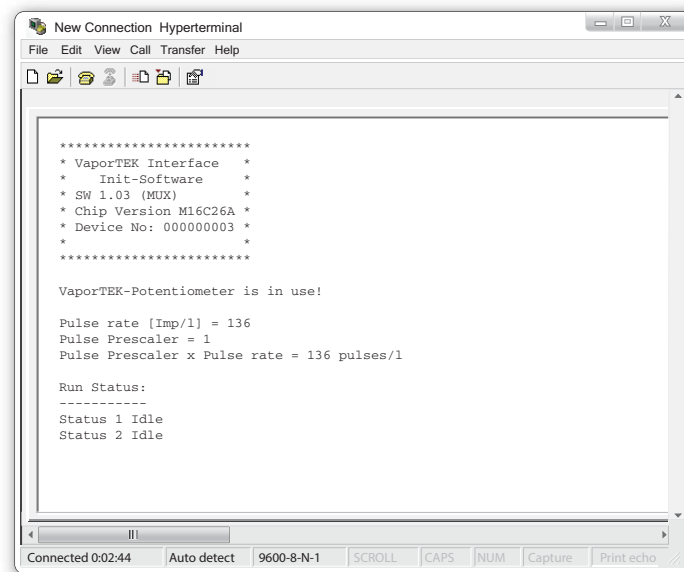


- Click the **ASCII Setup** button to and set the properties shown below:



- Click **OK** to return to the main window of HyperTerminal.

8. On power up the current settings display:



```
New Connection Hyperterminal
File Edit View Call Transfer Help

*****
* VaporTEK Interface *
*   Init-Software   *
* SW 1.03 (MUX)     *
* Chip Version M16C26A *
* Device No: 000000003 *
*****

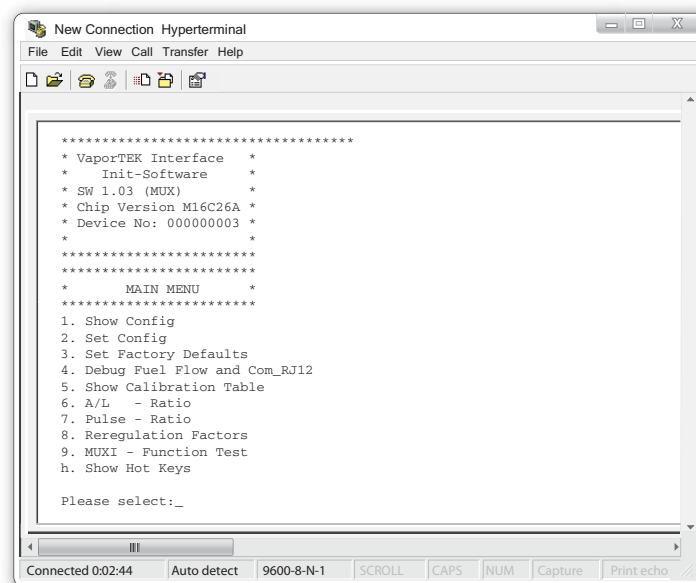
VaporTEK-Potentiometer is in use!

Pulse rate [Imp/l] = 136
Pulse Prescaler = 1
Pulse Prescaler x Pulse rate = 136 pulses/l

Run Status:
-----
Status 1 Idle
Status 2 Idle

Connected 0:02:44 Auto detect 9600-8-N-1 SCROLL CAPS NUM Capture Print echo
```

9. Type **m** on your keyboard to display the following menu:



```
New Connection Hyperterminal
File Edit View Call Transfer Help

*****
* VaporTEK Interface *
*   Init-Software   *
* SW 1.03 (MUX)     *
* Chip Version M16C26A *
* Device No: 000000003 *
*****
*****
* MAIN MENU *
*****
1. Show Config
2. Set Config
3. Set Factory Defaults
4. Debug Fuel Flow and Com_RJ12
5. Show Calibration Table
6. A/L - Ratio
7. Pulse - Ratio
8. Reregulation Factors
9. MUXI - Function Test
h. Show Hot Keys

Please select:_

Connected 0:02:44 Auto detect 9600-8-N-1 SCROLL CAPS NUM Capture Print echo
```

10. Show Config: Press **1**

Shows the input configuration currently set.

```

1. Show Config
-----
*****      Inputs      *****
Side A                               Side B
1      Pulse Input      1
2      Pulse Input      2
3      Pulse Input      3
4      Pulse Input      4

VaporTEK-Potentiometer is in use!

```

11. Set Configuration: Press **2**

- Choose "Input Type": Press 1 for "Pulse", Press 2 for "Nozzle" or Press 3 to select "Diesel Disable" on Inputs 3 & 4.
- Select "Nozzle Logic" in case a nozzle input has been chosen: Press 0 for "L – Low", Press 1 for "H – High".
- Choose "Control Mode": Press 0 for "Potentiometer" - The A/L Ratio is controlled adjusting the Pot setting on the VaporTEK Controller or Press 1 for "Auto Calibration tables" - The A/L Ratio is controlled by the auto calibration tables in the VaporTEK Interface.

The control mode will be set automatically to 'Auto Calibration Table' mode when the auto calibration has been accomplished. Please consider that the auto calibration needs to be accomplished for each side separately.

```

2. Set Config
-----
*****      Inputs      *****
Side A                               Side B
1      Pulse Input      1
2      Pulse Input      2
3      Pulse Input      3
4      Pulse Input      4

VaporTEK-Potentiometer is in use!

Input 1  what type?(1-Pulse,2-Nozzle):1
Input 2  what type?(1-Pulse,2-Nozzle):1
Input 3  what type?(1-Pulse,2-Nozzle, 3-D_Disable):2
Input 4  what type?(1-Pulse,2-Nozzle, 3-D_Disable):3

you've set Input(s) as a Nozzle Input
what logic do you need H or L active? (0=1, 1=H):1

Please select the VaporTEK Control Mode
(0 = Potentiometer, 1 - Auto Calibration Tables):1

Config has been stored successfully

*****      Inputs      *****
Side A                               Side B
1      Pulse Input      1
2      Pulse Input      2
3      Nozzle Input 38l/min(H) 3
4      Diesel disable Input(H) 4

Auto Calibration Tables are in use!

```

12. Set Factory Defaults: Press **3**

This function sets all configuration parameter into default conditions.

- All inputs are pulse inputs
- The Pulse Ratio is set to 136p/l
- The A/L - Ratio is set to 100% and the Speed offset is set to 0
- The control mode is set to Potentiometer

```
1. Set Factory defaults
-----
Are you sure? [Y.N]:N!
```

13. Debug Fuel Flow and Com_RJ12: Press **4**

This sub-menu allows a debug mode selection. If fuel flow debug mode is selected the screen will show the fuel flow rate when a transaction is running. Pressing **f** again will disable the flow debug mode. During flow debug mode no other mode can be activated.

Press **d** to activate Com port message prints to the VaporTEK – Controller. This feature is useful to analyze the quality of communication between VaporTEK – Interface and VaporTEK – Controller. To toggle between speed and flow message press **t**. Both messages should be supported by the VaporTEK – Controller.

```
4. Debug Com_RJ12
-----
Press 'f' to toggle to real time fuel flow
Press 'd' to debug RJ12 Com Port Messages
Press 't' to toggle between flow and speed messages
```

14. Show Calibration Table: Press **5**

Displays factory set calibration table when connected for the first time; thereafter shows the latest calibrated table.

```
5. Calibration Table
-----
```

MP	Flow A	Flow B	Speed
[No]	[l/min]	[l/min]	[rpm]
0	0	0	0
1	4	4	80
2	8	8	160
3	12	12	240
4	16	16	320
5	20	20	400
6	24	24	480
7	28	28	560
8	32	32	640
9	36	36	720
10	40	40	800
11	44	44	880
12	48	48	960
13	52	52	1040
14	56	56	1120
15	60	60	1200

15. A/L – Ratio: Press **6**

Sub item 6 can be used to modify the A/L – Ratio. Set A/L – Ratio according to value which is mentioned on the certificate. NOTE: Set Speed Offset to "0".

```
6. A/L - Ratio
-----
Recover-Ratio      Speed-Offset
    104%           1

do you want to change it [Y/N]? Y
Recover Ratio = 104
    new Ratio = 100
Speed Offset = 1
    new Offset = 0

Data have been written successfully

Recover-Ratio      Speed-Offset
    100%           0
```

16. Pulse – Ratio: Press **7**

This sub items allows a modification of Pulse Ratio. The pulse ratio defines the fuel flow rate which has to match the dispenser flow rate. Refer to the dispenser manufacturer's manual to input the correct pulse ratio.

```
7. Pulse - Ratio
-----
Pulse rate [Imp/l] = 100
Pulse Prescaler = 1
Pulse Prescaler x Pulse rate = 100 pulse/l

do you want to change these [Y/N]? Y

Input Pulse Ratio [pulse/l] (10 - 250):132
Neuer Impulsvorteiler(1...10):1

Data have been written successfully

Pulse rate [Imp/l] = 132
Pulse Prescaler = 1
Pulse Prescaler x Pulse rate = 132 pulse/l
```

17. Reregulation factors: Press **8**

Use item 8 to review the reregulation factors those will be controlled by the intelligent reregulation of monitoring. The permitted reregulation range is (85 – 125)%. A factor value of 100 represents 100%.

```
8. Show Reregulation factors
-----
side A = 100
side B = 100

do you want to change these [Y/N]? N
```

18. Function Test - menu option **9**

Do not select - the function test requires special testing equipment and is for factory use only.

19. Show Hot Keys: Press **h**

This item shows all other available hot keys.

```

****   Hot-Keys   ****
-----
'm' show the Main Menu
'h' show this Help Menu
'f' toggle ON/OFF real time fuel Flow
'd' debug ON/OFF RJ12 Com Port messages
't' toggle between flow/speed messages

```

VaporTEK Interface for Input Configuration

The VaporTEK Interface has four inputs per side and each of them can be configured separately. This configuration setup applies to both sides of the dispenser. For instance if the Input 1 is configured as a pulse input, then Input 1 side A and B are set to the same input configuration.

It is recommended that you determine the current configuration before making changes. As explained in the previous section, type **m** in the HyperTerminal to retrieve the VaporTEK Interface Menu.

Press **1** "Show Config" to determine the current configuration. If this setup doesn't match the system application, change the configuration by pressing **2** "Set Config" (see Figure 19).

When in the Set Config screen, all four Inputs can be configured as either Pulse or Nozzle by pressing **1** or **2** respectively. Inputs 3 and 4 can also be configured as Diesel Disable by pressing **3** (see Figure 19).

1. Pulse Input: VaporTEK pump starts only with fuel flow (>6 liters/min)
Liquid pulses from an active encoder calculates the petrol flow rate. This flow rate value is then transmitted to the VaporTEK Controller to operate the pump. NOTE: Set any unused inputs as "pulse input" to avoid malfunction on these inputs.
2. Nozzle Input: VaporTEK pump starts when nozzle hook signal is energized.
In order to setup the correct nozzle logic when nozzle is removed from the cradle, the logic signal needs to be identified as either high (H) or low (L) as shown in the table below.

Remove The Nozzle And Measure Its Status Voltage, Or Check Its VaporTEK Interface Nozzle Status LED		Nozzle Input Selection	Remarks
Nozzle Status Voltage (Logic Signal)	VaporTEK Interface Nozzle Status LEDs: V17, V24, V23, V14, V15, V11, V20 and V19 (see Figure 5)		
> 4VDC	ON	H	The active nozzle Logic = High (H)
< 1VDC	OFF	L	The active nozzle Logic = Low (L)

Note: An open input is always on low (L) state.

3. Diesel disable Input: VaporTEK pump will never start.
This option suppresses the diesel signal. When a pulse train output from the encoder sends all gasoline grade and diesel signals, the diesel nozzle hook signals are connected to the VaporTEK Interface and set to "Diesel Disable". In this configuration when diesel hook is activated, all generated flow rate will be ignored. If this input becomes active (H or L), the VaporTEK Interface will ignore the incoming pulse train and any active nozzle inputs for the dedicated side.

```

2. Set Config
-----
*****      Inputs      *****
Side A                               Side B
1      Pulse Input        1
2      Pulse Input        2
3      Pulse Input        3
4      Pulse Input        4

VaporTEK-Potentiometer is in use!

Input 1  what type?(1-Pulse,2-Nozzle):1
Input 2  what type?(1-Pulse,2-Nozzle):1
Input 3  what type?(1-Pulse,2-Nozzle, 3-D_Disable):2
Input 4  what type?(1-Pulse,2-Nozzle, 3-D_Disable):3

you've set Input(s) as a Nozzle Input
what logic do you need H or L active? (0=1, 1=H):1

Please select the VaporTEK Control Mode
(0 = Potentiometer, 1 - Auto Calibration Tables):1

Config has been stored successfully

*****      Inputs      *****
Side A                               Side B
1      Pulse Input        1
2      Pulse Input        2
3      Nozzle Input 381/min(H) 3
4      Diesel disable Input(H) 4

Auto Calibration Tables are in use!

```

Figure 19. Set Configuration Example

VaporTEK Calibration

Note: Refer to dispenser manufacturer's manual for VaporTEK system commissioning before conducting the A/L calibration procedure.

Manual Calibration using the POT on the VaporTEK Controller board

The flow rate of VaporTEK pump can be adjusted by changing the position of the POT setting in the VaporTEK Controller. The flow rate will increase as the POT is rotated CW from 1 to 8 (see Figure 20).

To adjust the POT (potentiometer) on the VaporTEK Controller use a non-conductive mini-screwdriver until the desired flow rate is achieved. Note: changing the pot position impacts both low and high speeds.



Warning! Use a non-conductive screwdriver while setting the POT.

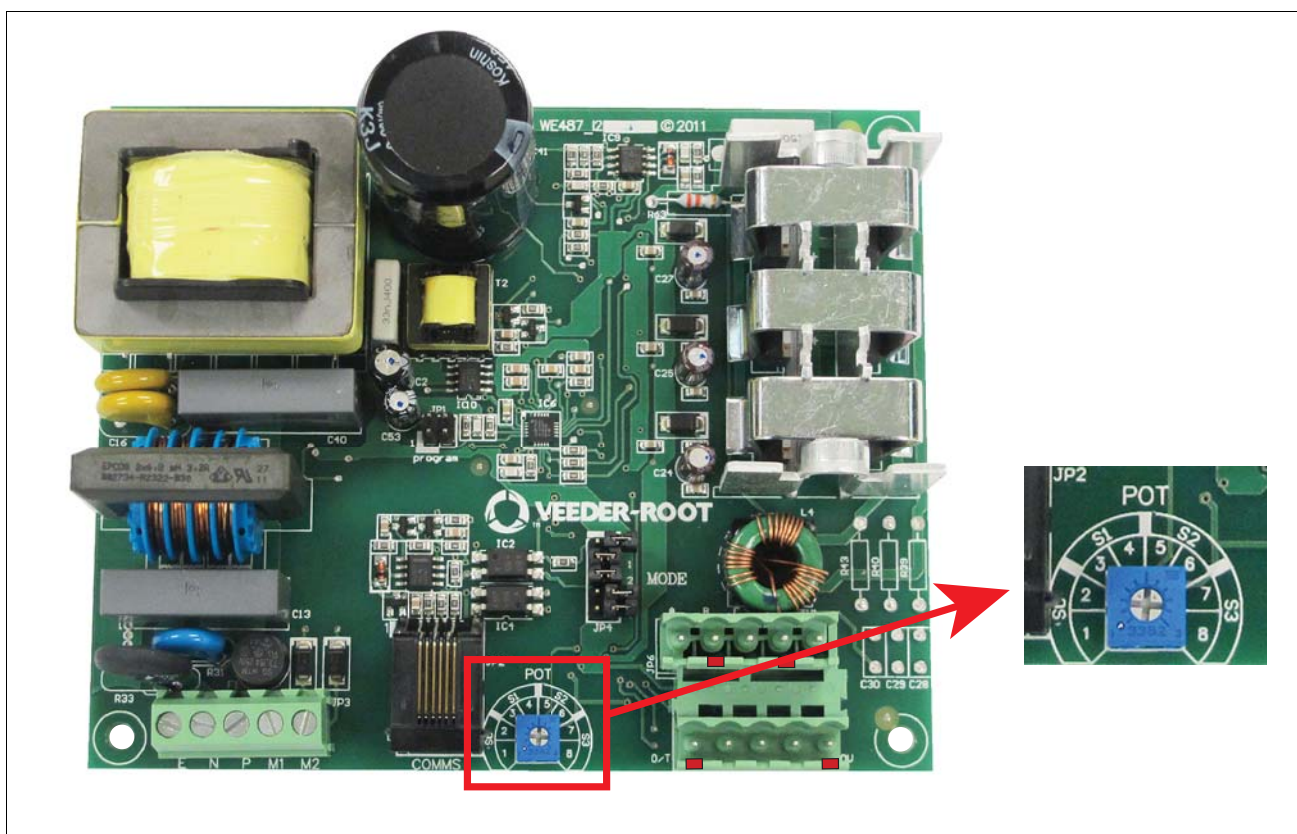


Figure 20. POT (Potentiometer)

Dry Calibration - A/L Adjustment

A/L adjustment using dry calibration can be performed only with the VaporTEK Plus or VaporTEK Ultra configurations.

Equipment Required

- FB1 hand held terminal with 15-pin to RS422 cable
- Gas meter
- A/L nozzle adapter (varies by nozzle manufacturer)
- Hoses

Initial Setup

1. Verify power is available at the VaporTEK Interface by confirming V4 LED is RED (see Figure 5).
2. Connect the FB1 Terminal to the RS422 connector on the VaporTEK Interface (see Figure 21).
3. Connect the gas meter encoder cable to the FB1 Terminal.
4. Connect the hoses to the gas meter.
5. Remove the nozzle from the dispenser holder and secure the A/L nozzle adapter to the spout of either the ARVN or Elaflex nozzle as appropriate. The A/L adapter o-rings prevent air leakage into the nozzle's vapor collection holes (see nozzle close up detail in Figure 21). After ensuring the nozzle shutoff port is not covered by the adapter body, tighten the two knurled end rings to secure the adapter to the nozzle.
6. See manufacturer's nozzle manual on method to open the nozzle vapor valve for dry calibration.
7. FB1 Terminal key description:.

START	Power ON the FB1 Terminal
ENTER	Confirm selection
SHIFT	Cancel selection

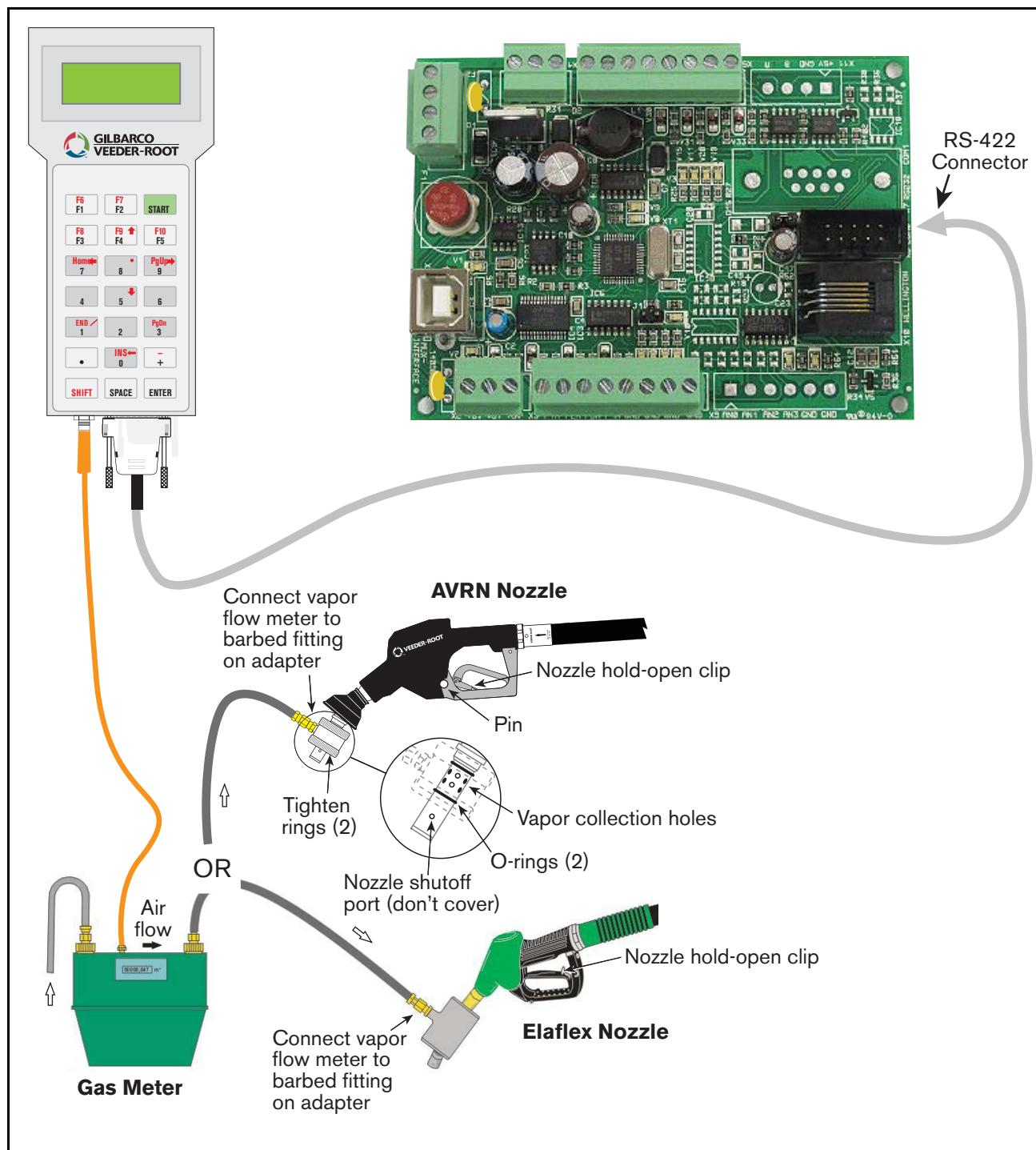
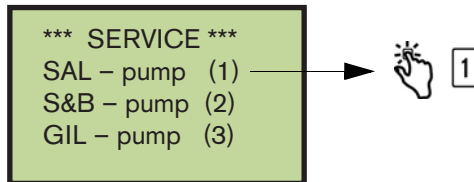


Figure 21. Calibration Setup

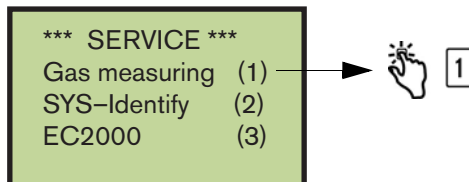
Gas Meter Calibration

Gas meter calibration must be completed before conducting simulation.

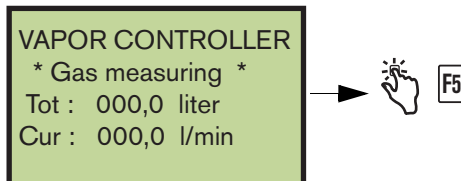
1. Press the **Start** button until below screen appears. Press the keys as shown:



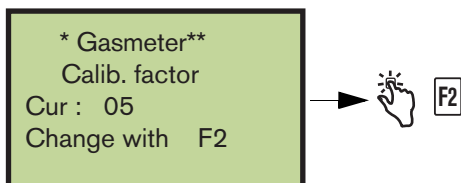
2. When the display below appears, press the keys shown:



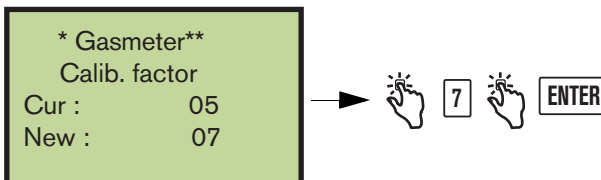
3. When display below appears, press the key shown:



4. Match the calibration factor on the gas meter (see Figure 15) with the following display on the FB1 Terminal. If the calibration factor already matches, press **ENTER**. If not, press **F2** to change the calibration factor.



5. When display below appears, input the calibration factor shown on the gas meter (example: **07** is now the New factor) and press **ENTER**.



Refer to the Burkert Gas meter product manual for the calibration factor. It is typically marked "K-Factor" (see Figure 22).

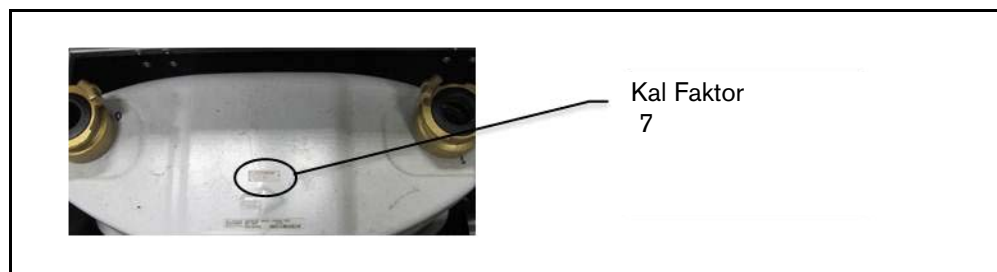


Figure 22. Locate the Burkert Gas Meter Calibration Factor

Pulse Rate Setup With FB1 Terminal

Pulse rate setup on VaporTEK Interface

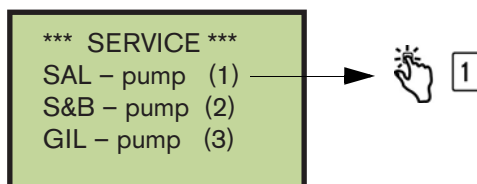
The VaporTEK Interface receives pulses from an active encoder and calculates the current flow rate by using of the adjusted pulse rate - Range: 50 to 200 Pulses/liter (1 US Gallon = 3.785 liters). For example, the pulse rate for a VaporTEK Interface should be set to 136 pulses/litre for Gilbarco Encore 500S.

If the dispenser is running, the FB1 Terminal will show the current petrol flow rate on the FB1's display by using the FB1 - Sub menu item "Petrol flow (3)" (see step 4 below).

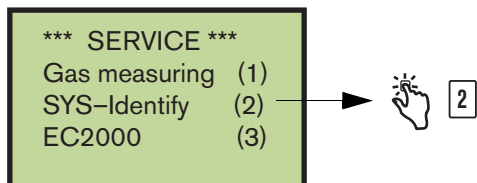
The pulse rate adjustment can be setup either using the service terminal FB1 connected to the VaporTEK Interface, or a Laptop connected to the VaporTEK Interface.

Pulse Rate Setup with FB1

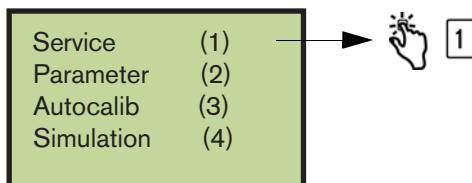
1. Switch on the FB1. Press the **Start** button until below screen displays, then press the keys shown:



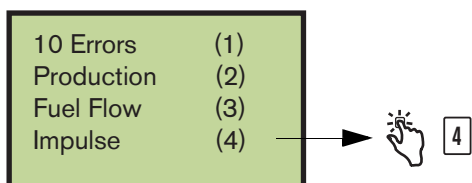
2. When the display below appears, press the keys shown:



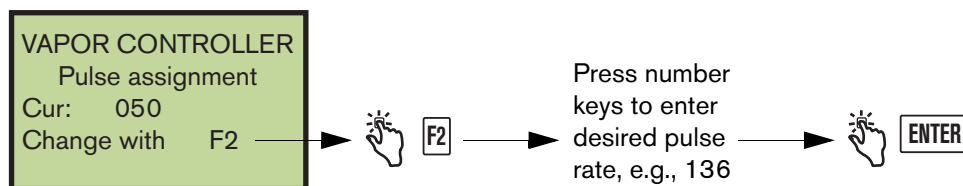
3. When the display below appears, press the keys shown:



4. When the display below appears, press the keys shown:



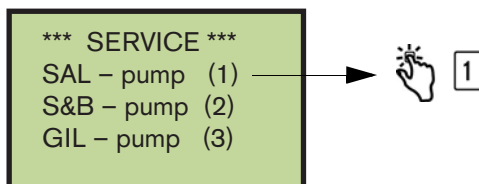
5. When the display below appears, if necessary to change the pulse rate, press the keys shown:



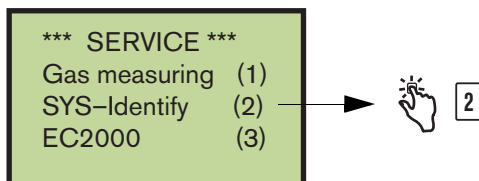
6. Enter Pulse Rate 136 for Encore 500S/500/300 dispensers.

Auto-Calibration using FB1 Terminal

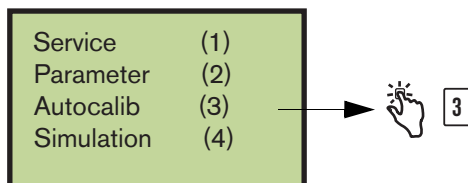
1. Press the **Start** button until below screen appears. Press the keys as shown:



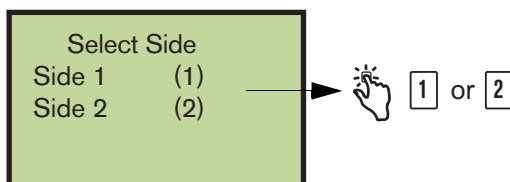
2. When the display below appears, press the keys shown:



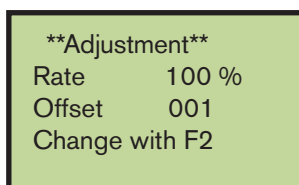
3. When the display below appears, press the keys shown to start the auto-calibration:



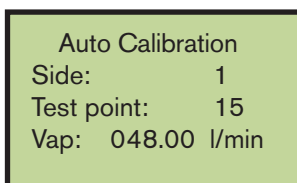
4. At the display below, select the dispenser side (1 or 2) that you want to calibrate:



5. Set the A/L Ratio rate:

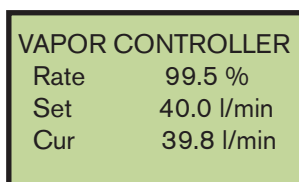


6. Wait while the auto-calibration is calibrating through 15 points:



The auto calibration procedure will complete at test point 1.

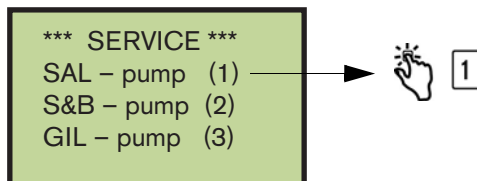
After the auto-calibration has been accomplished the result of calibration needs to be verified using dry simulation. Follow the steps 1- 6 of the Simulation section and verify the A/L – Ratio which is shown as “Rate”:



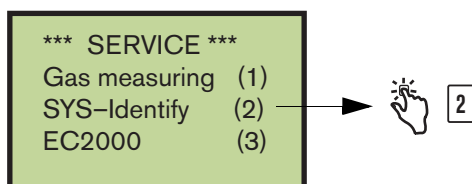
The Rate as displayed on the FB1 Terminal shall be within the legislated range established by local regulation.

Simulation with FB1 Terminal

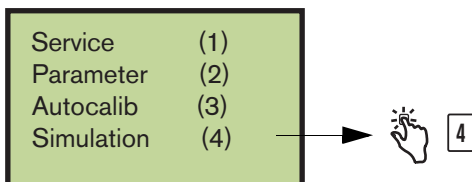
1. Press the **START** green button on the FB1 Terminal until the below screen appears. Press the keys as shown:



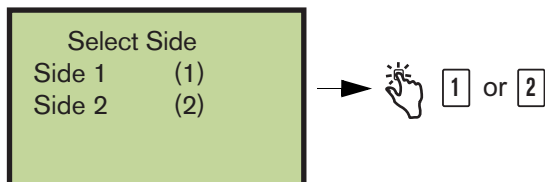
2. When the display below appears, press the keys shown:



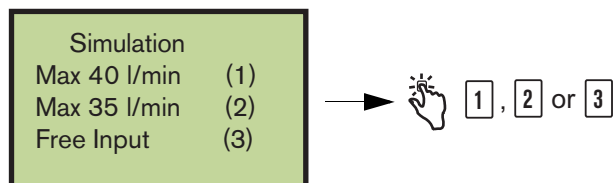
3. When the display below appears, press the keys shown to start the simulation:



4. At the display below, select the dispenser side (1 or 2) that you want to simulate:



5. At the display below, select the simulation rate of petrol you want to check by pressing the keys shown:



When the flow rate input is provided through the FB1 Terminal the VaporTEK pump will start if greater than 6 liters/minute. The flow rate achieved by the VaporTEK Pump will be displayed in the FB1 Terminal.

6. The FB1 Terminal will start the simulation and display the results as in the example below:

VAPOR CONTROLLER	
Rate	99.5 %
Set	40.0 l/min
Cur	39.8 l/min

Where:

- Rate is the ratio of current vapor flow (Cur) divided by the simulated petrol flow (Set).
- Set is the simulated petrol flow established in Step 5 above. NOTE: Set value must be greater than 6 lpm to start the VaporTEK Pump.
- Cur is the vapor or air flow measured by the gas meter.

Adjust the POT until the Rate as displayed on the FB1 Terminal is within the legislated range established by local regulation (see Figure 20).

VaporTEK Pump Troubleshooting and Quick Help

Problem	Cause	Corrective Procedure
Pump Fails To Start	Electrical system fuse or circuit breaker tripped	Replace fuse or reset the breaker
	No power to VaporTEK Controller	Verify power circuit breaker is switched on. Restore input power. Verify input voltage rating.
	F1 fuse blown out on the VaporTEK Controller	Replace Controller if F1 fuse blown out.
	No Power to VaporTEK Interface	Verify the V4 light is illuminated. If not, check wire schematic per Figure 12. Restore input power. Verify input voltage rating.
	F1 fuse (T250mA) blown out on the VaporTEK Interface	Replace F1 fuse rated for 250V/250mA.
	VaporTEK Pump and VaporTEK Controller wired incorrectly	Incorrect wiring will damage both VaporTEK Pump and the Controller. Check cable connections. Verify the cables are connected per the appropriate schematic in the Equipment Wiring Schematics Section. Replace both VaporTEK Pump and Controller if wired incorrectly.
	VaporTEK Interface inputs wired incorrectly	Verify wiring connection per the appropriate schematic in the Equipment Wiring Schematics Section.
	No hook signal input	Verify wiring and hook signal input voltage rating.
	No input fuel pulses	Check pulse input wiring on VaporTEK Interface. Also verify input LED's (Refer VaporTEK Interface LED section).
	RJ 12 cable missing or incorrectly connected between VaporTEK interface and Controller	Refer to the equipment wiring schematic and connect RJ 12 cable.
	No Communication between VaporTEK Interface and Controller	Verify if LED V12 and V13 are flashing simultaneously. Defective RJ12 Cable. Replace RJ12 cable.
	Pot setting too low	Increase pot setting.
	Flow Rate below 6 lpm	Increase fuel flow rate beyond 6 lpm
	VaporTEK Interface inputs configured incorrectly	Configure inputs correctly. Refer to the VaporTEK Interface setup.
	Blocked outlet/discharge	Clean outlet/discharge line. Replace flame arrestors if clogged.
	Low Voltage hook signal wired directly to VaporTEK Controller	VaporTEK Controller requires high voltage hook signals (110-220 VAC). Add VaporTEK Interface or Switch Relays as discussed in "VaporTEK Pump Configuration" on page 17.
	Temperature in the hydraulics area of the dispenser is below the VaporTEK pump's rating and is creating too much starting torque friction.	Install appropriate heater as defined by the dispenser manufacturer.
Pump Fails To Start	Pump Thermal protector Trips	Ambient temperature above rated temperature of the product. Verify proper ventilation for the VaporTEK Pump. Wait a couple of minutes before starting the pump again.
	Defective VaporTEK Controller or, if equipped, VaporTEK Interface Board	Replace VaporTEK Controller or VaporTEK Interface Board.

Appendix A: VaporTEK System Reference Wiring Diagrams

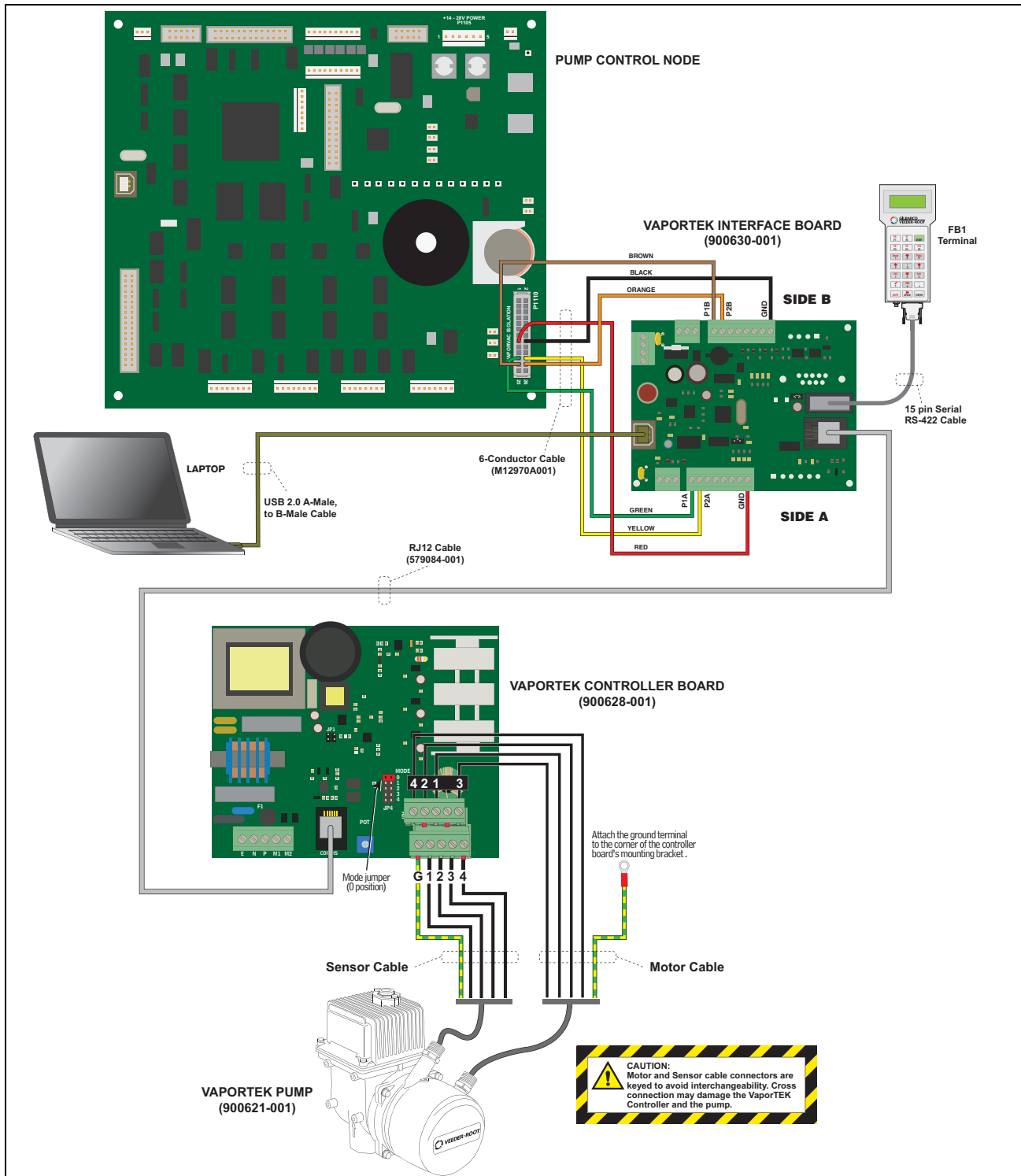


Figure A-1. VaporTEK System Plus For Collection Only - Encore 500S Dispenser

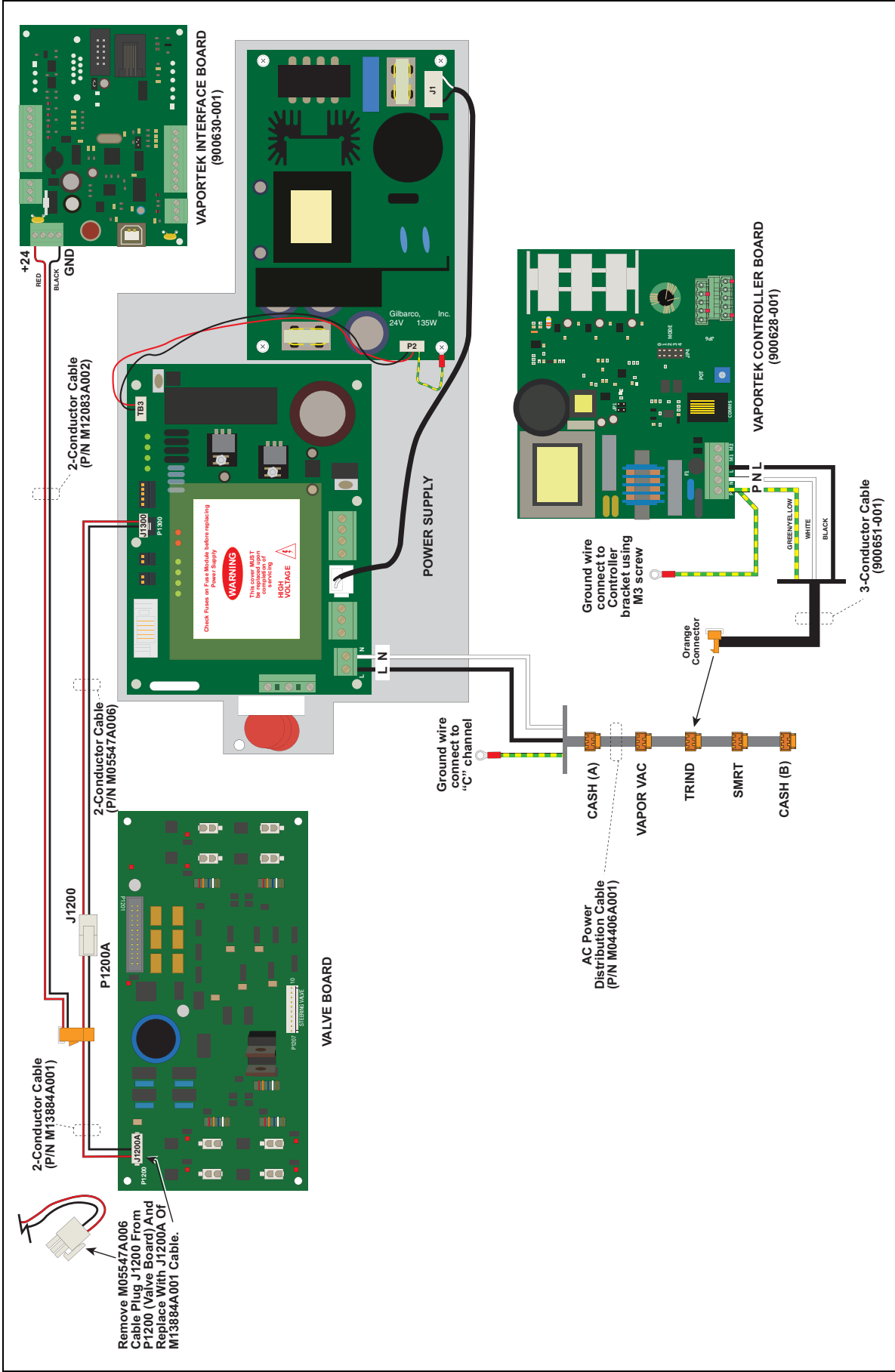


Figure A-2. VaporTEK System Plus For Collection Only - Encore 500S Dispenser

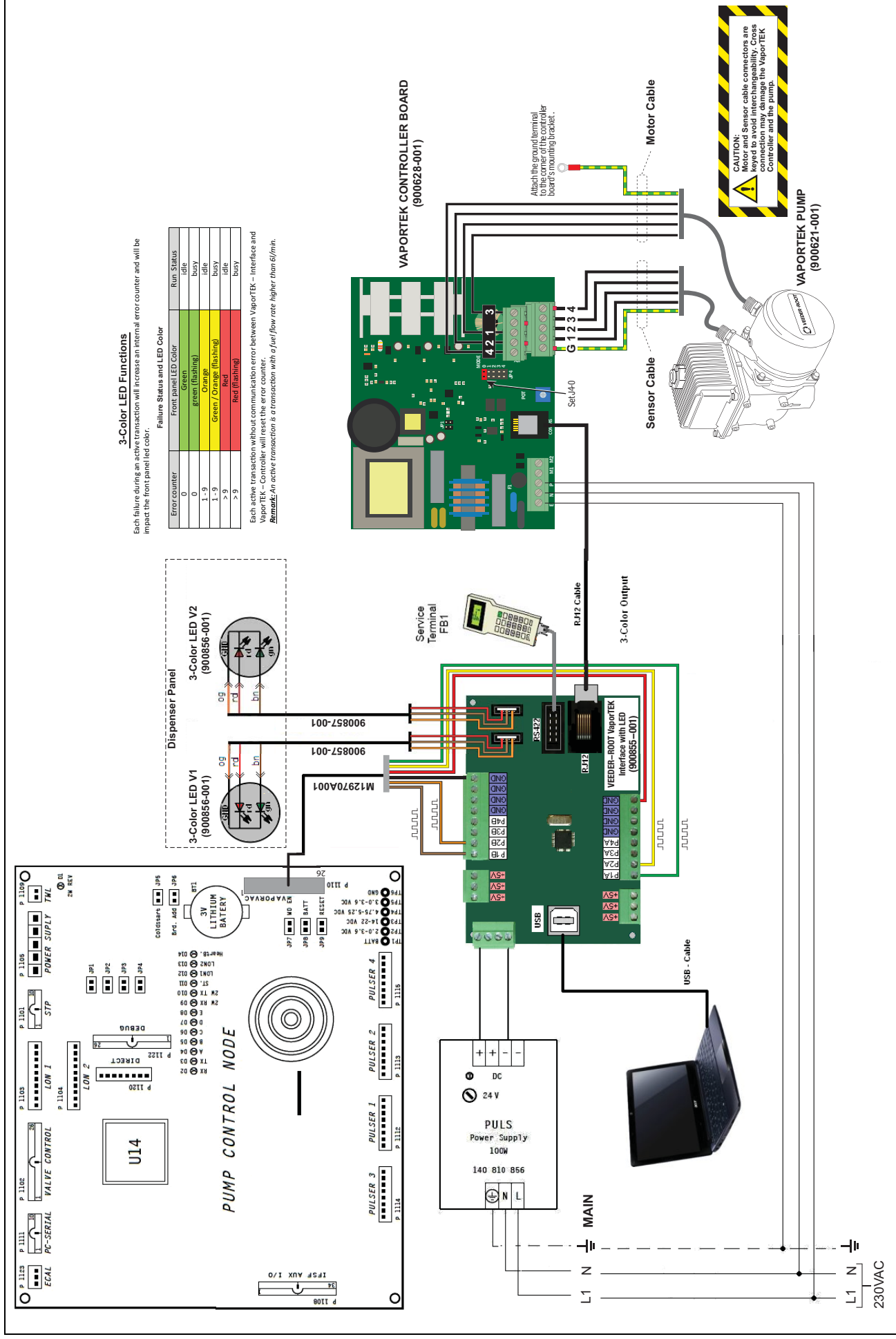


Figure A-3. VaporTEK System Plus for collection only with 3 color LED - using 900855-001 Interface Board for Encore 500S Dispenser

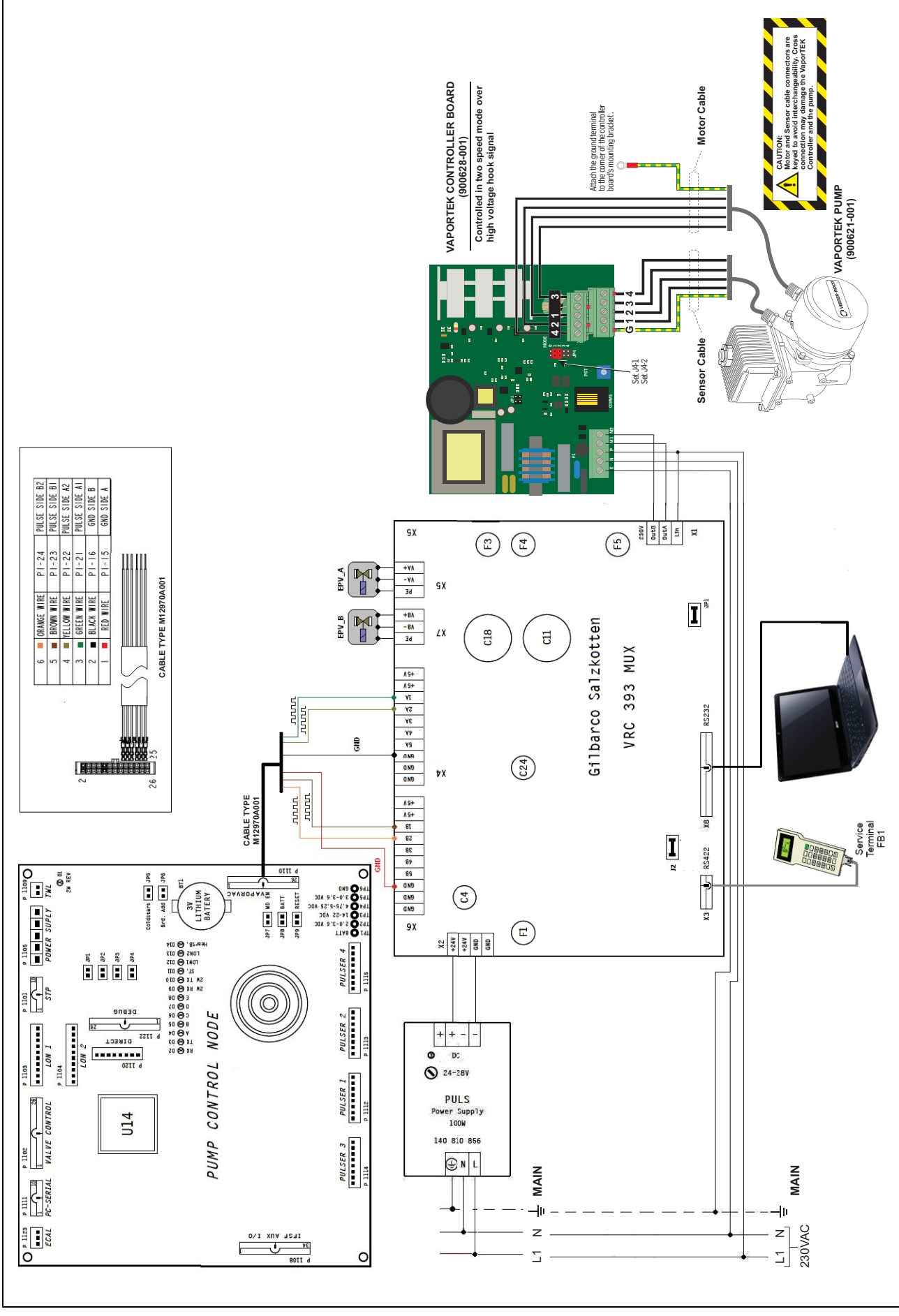


Figure A-4. VaporTEK System Ultra for Collection only Using VRC 390/3 Board for Encore 500S Dispenser

