Wayne
FUELING SYSTEMS

Installation & Operation

Wayne Helix™ 4000 and 5000 Fuel Dispensers
Standard, Enhanced Capacity and Super-High Capacity Models

WU017834
Rev 05   July 2023

Wayne Helix™ 5000 (left) and 4000 (right) Fuel Dispensers

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For the purpose of this manual: the product designated on the front cover will be defined herein after as the "Product;" and Dover Fueling Solutions ("DFS"), will reference different entities based on the point of origin for which the product is manufactured. For Products from North America, DFS references Wayne Fueling Systems LLC located in Austin, Texas. For Products from Brazil, DFS references Wayne Industria e Comercio Ltda. located in Rio de Janeiro, Brazil. For Products from the United Kingdom, DFS references Dover Fueling Solutions UK Ltd. located in Dundee, Scotland. For Products from China, DFS references Tokheim Hengshan Technologies Company, Ltd. located in Guangzhou, China. For Products from India, DFS references Dover Fueling Solutions India Private Limited.

⚠	**DANGER!** **READ THIS MANUAL BEFORE STARTING ANY WORK!**
🔥⚠	Fuel dispensers contain both electrical components and a hazardous, flammable and potentially explosive fuel. Failure to follow the below precautions and the Warning and Caution instructions in this manual may result in serious injury. IT IS YOUR RESPONSIBILITY to follow all rules, codes, regulations, and laws that apply to your location and the type of work being performed.

Safety Precautions

Before beginning work, block off the work area with safety cones. ALWAYS make sure that ALL power to the dispenser is turned OFF before opening the cabinet or starting work. Physically lock, restrict access to, and/or tag the circuit breakers that you turn off. In addition, be sure to trip (close) all emergency valves under the dispenser (if installed) BEFORE you begin.

Make sure that you locate the facility's emergency shut-off button, and know how to turn OFF power to the dispenser and submersible pumps (if any) in an emergency. Never allow a leaking pump to run! Use appropriate measures to clean up any fuel on the forecourt, and ensure that any leaks or issues that could cause a leak are attended to and repaired immediately.

Instructions within this manual may call for the removal and disposal of parts. Whenever removing or discarding any part, those parts should be properly disposed of or recycled according to Federal, State, and Local regulations.DFS always recommends that parts not under disposal regulations be recycled whenever possible.

Trouble with the installation of this product should be referred to your DFS ASO. An ASO with a technician number can receive assistance by calling Dover Technical Support (DTS) at:

1-800-926-3737

Customers, Installers or Distributors, who are not an ASO, needing help with the operation or installation of this product, should contact Dover Technical Support (DTS) at:

1-800-289-2963 OR support.austin@doverfs.com

For assistance with the DFS DX™ connected solutions platform, including DX Wetstock™, DX Monitor™, DX Promote™, DX Retail™ or DX Fleet™, contact DFS DX Global Support at:

1-844-991-3030 OR dfsdxsupport@doverfs.com

Indicators and Notations

NOTE!   *Indicates extra information or a tip.*

IMPORTANT!   Highlights an element of a procedure to ensure accuracy, completeness, and performance.

ⓘ **NOTICE!**	⚠ **WARNING!**
Highlights an essential element of a procedure to ensure accuracy, completeness, and appropriate performance.	Indicates a potentially hazardous situation, which if not avoided, MAY result in death or serious injury.

⚠ **CAUTION!**	⚠ **DANGER!**
Indicates a potentially hazardous situation, which if not avoided, may result in personal (non-lethal) injury or equipment damage.	INDICATES A HAZARDOUS SITUATION, WHICH IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.

Installation & Operation

Wayne Helix™ 4000 and 5000 Fuel Dispensers
Standard, Enhanced Capacity and Super-High Capacity Models

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1 INTRODUCTION

This manual covers information on the installation, operation and maintenance of the Wayne Helix™ dispenser models with the metal head outlined in *Dispensers Covered*, below. This manual also includes installation and footprint drawings that show locations of the product inlets and conduits. Computer function settings that are necessary for Helix dispenser start-up and operation such as setting prices, blend ratios, and fueling point IDs are also included. If additional information on function settings and statistics is required, refer to the *iGEM Computer Programming Manual* (P/N WM048524).

1.1 DISPENSERS COVERED

This manual covers Helix 4000 (narrow) and 5000 (wide) model dispensers excluding Ultra-High Capacity models, whose attributes can be determined by referring to the Model String Designation in *Figure 1-1*. The dispenser model number can be located on the serial number plate, receipts, or shipping documentation.

Helix models for ethanol blends up to E85 have the letter E on the model designation (e.g. H(W/LU)45-43ER) and use the Xflo meter, product tubes, and outlet castings that have been specially evaluated for E85. Internal fluid confining parts shall only be replaced with identical parts. External parts such as pipes, nipples, and fittings that come into contact with the ethanol fuel must be ethanol-compatible and made only with Schedule 40 pipe using UL-classified Saf-T-Lok Teflon pipe sealant. E85 dispensers may only use approved hanging hardware as specifically indicated on the dispenser label. Replacement filters should be 10 microns.

a STYLE C = C-style H = H-style S = Small Style **b DESIGN** W = Wide N = Narrow H = High Hose L = Low Hose **c ORIENTATION** ID = Island Dual Sided UI IS = Island Single Sided UI LM = Lane Mirrored LU = Lane UnMirrored* **d NO. GRADES IN** 1 - 5 **e NO. GRADES OUT 1 - 8** If blender, count up +1 per each blending possibility between 2 grades **f NO. HYDRAULIC POSITIONS** 0 - 5	**g NO. HOSES / NOZZLE POSITIONS PER SIDE** 1 digit = Symmetric. Same number, solution, and flows on both sides A & B. 2 digits = Asymmetric. Different number, solutions, or flows on Sides A & B. 1st Digit = Side A 2nd Digit = Side B **a b c d e f g h** **X (X / X) X X - X X X** **NOTE!** Positions **g** and **h** contain multiple digits. **Example: H(W/LU)23-21PR** **NOTE!** The position prior to and following the slash '/' contains two (2) digits as shown in this example. 'LM' & 'LU' specify 'Mirrored' & 'UnMirrored'.	**h BASIC TECHNICAL FEATURES** A = Additive B = Biodiesel C = CNG (Compressed Natural Gas) D = DEF (Diesel Exhaust Fluid) E = Ethanol F = Fleet G = Enhanced Capacity H = Super-High Capacity J = Ultra-High Capacity K = E25 and B20 Compatible L = LPG (Liquefied Petroleum Gas) M = Media P = Payment R = Remote S = Suction T = Terminal U = 4 Users V = Vapor Recovery W = Main (Back-to-Back) X = Back Y = SAT Master (Satellite) Z = SAT Slave (Satellite)

Figure 1-1 Helix Model String Designation

1.2 RELATED DOCUMENTS

These documents can be accessed on DFS Extranet by going to https://www.doverfuelingsolutions.com/login and clicking the "Log In" link under the DFS Extranet icon.

- *Wayne iX Pay™ EPP US Initial Start Up and Configuration Manual* (P/N W2940079)
- *Wayne iX Pay™ EMV 2.8.x Initial Start Up and Configuration Manual* (P/N W2940314)
- *Wayne iDPOS In-Dispenser Point-of-Sale (POS) Installation & Startup Configuration* (P/N WU023764)
- *iGEM Computer Programming Manual* (P/N WM048524)
- *Helix Service Manual* (P/N WU025076)
- *Helix Parts Manual* (P/N WM048522)
- *CAN Bus DIP Switch Settings Guide* (P/N WU018306)

1.3 TOOLS REQUIRED

The following items are required for the operation and maintenance of Helix dispensers:

- Infrared remote control (IR remote or IRC) (P/N WM002290)
- Printer door key - DHW1 key (P/N WM008096)
- Bezel U-Frame / DW2 key (P/N WU007681)
- Hydraulic door key / 3306 key (P/N WM003119)
- Lower bezel door - Tamper Resistant Torx Key - (P/N WU017636-0001)

1.4 CUSTOMER SUPPORT

Any questions concerning the installation and operation of the dispenser that are not covered in this manual or its related documents should be referred to your DFS ASO. An ASO with a technician number can receive assistance by calling Dover Technical Support (DTS) at:

1-800-926-3737

Customers, Installers, or Distributors who are not an ASO, needing help with the installation of this dispenser, should contact Dover Technical Support (DTS) at:

1-800-289-2963 or support.austin@doverfs.com

1.5 DISPENSER COMPUTER SOFTWARE

Helix dispensers are delivered pre-installed with Wayne iGEM™ computer software version 76 or later which can also be downloaded via laptop computer. ServTerm version 7.0.24 or later is required for servicing (loading the computer software or dispenser configuration template), however this is not required for installation or startup of the dispenser. If reloading a template is necessary, refer to Appendix C, *Hydraulic Configurations - Helix Models 4000 & 5000*, on page 104 of this manual for your specific model.

IMPORTANT!	***Verify that the standalone jumper is removed before loading software!*** Starting with iGEM software version 83.05, the dispenser will be disabled and show "Closed" on the display when in serial operation mode and the standalone jumper is installed. Standard templates set up dispensers in serial mode so remove the jumper to avoid disabling the dispenser.
IMPORTANT!	***Verify the iGEM computer board part number before loading software!*** The Wayne iGEM™ 1.5 computer (P/N WM001908-0013, WM001908-0014 and WU018951-0002) is used for new dispensers and service replacements. iGEM software version 82.00 is the *minimum* version for these boards and requires ServTerm version 7.0.37. *iGEM software versions lower than 82.00 will not work with these boards, and will require performing the bootstrap procedure to correct the issue!* Additionally, the CAN bus cable must be disconnected from the iGEM board before performing the bootstrap or the software download will fail.

1.6 PARTS OF THE DISPENSER
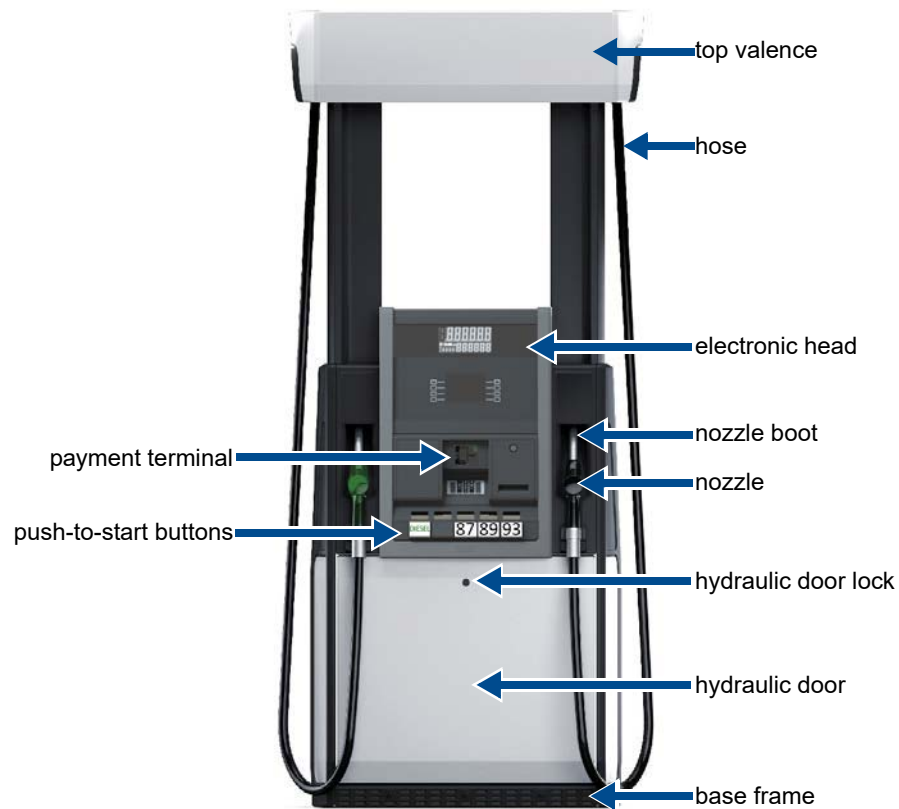
Figure 1-2 Helix 4000 Fuel Dispenser
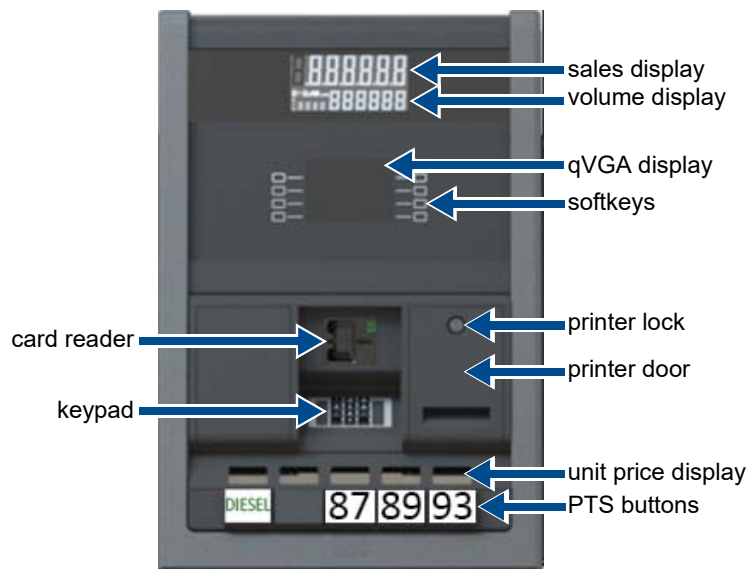
Figure 1-3 Dispenser Bezel

2 SAFETY PRECAUTIONS

2.1 READ THIS MANUAL BEFORE YOU BEGIN

This section provides guidance concerning the hazards associated with installing, servicing, operating, and maintaining this product. Read and understand these precautions as well as the installation instructions prior to performing any work on this product and the associated parts of the installation. Dispensers have both electricity and a hazardous, flammable, and potentially explosive liquid. Failure to follow the below precautions and the Warning and Caution instructions in this manual may result in serious injury or death. Read every tag attached to the dispenser before commencing installation. Follow all rules, codes, and laws that apply to your area and installation. Additional cautions are provided in other sections of this manual. Not following these precautions can result in environmental hazards, serious injury and/or death.

[1]NFPA 30A states that:

"When maintenance to Class 1 dispensing devices becomes necessary and such maintenance may allow the accidental release or ignition of liquid, the following precautions shall be taken before such maintenance is begun:

1. Only persons knowledgeable in performing the required maintenance shall perform the work.
2. All electrical power to the dispensing device and pump serving the dispenser shall be shut off at the main electrical disconnect panel.
3. The emergency shut-off valve at the dispenser, if installed, shall be closed.
4. All vehicle traffic and unauthorized persons shall be prevented from coming within 20 ft. (6 m) of the dispensing device."

2.2 SAFETY SYMBOLS

Outside of this section, the following symbols will appear throughout the manual to bring attention to a potentially hazardous condition:

⚠	CAUTION!
	Indicates a potential hazardous situation, which if not avoided, may result in personal (non-lethal) injury or equipment damage.

⚠	WARNING!
	Indicates a potential hazardous situation, which if not avoided, MAY result in death or serious injury.

⚠	DANGER!
	Indicates a hazardous situation, which if not avoided, WILL result in death or serious injury.

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1. Reprinted with permission from NFPA 30A-2012, *Automotive and Marine Service Station Codes.* Copyright ©2012, National Fire Protection Association, Quincy MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association on the referenced subject, which is represented only by the standard in its entirety.

2.3 TRAINED PERSONNEL

Only personnel trained, authorized, and knowledgeable in this field should be directing and performing work on these products. This includes the installation, inspection, and servicing of this equipment.

2.4 WORKING ALONE

It is highly recommended that service personnel not work alone at a site when installing or servicing the site. Always make other personnel at the site aware of where you will be working when not working with another person. It is also recommended that someone be at the site with knowledge of basic first aid and CPR.

2.5 FUEL SHUTOFFS

If applicable, trip (close) and test the emergency valve(s) under the dispenser BEFORE beginning maintenance.

2.6 ELECTRICAL SHUTOFFS

Before performing any work at a site, know where the electrical shutoffs are located. Find the circuit breakers that control the electric for ALL of the equipment including the submersible pumps associated with the site so that power to the island and components supplying fuel to the island can be shut off in case of an emergency or for normal service/installation work. Be aware that the integral POS or integral dispenser E-stop buttons WILL NOT remove all power to the island.

Always make sure ALL power to the dispenser (submersible pumps and electronic head) is turned OFF before you open the dispenser cabinet for maintenance.

⚠	**WARNING!**
	More than one disconnect switch may be required to de-energize the dispenser for maintenance and servicing. Use a voltmeter to make sure ALL circuits in the dispenser are de-energized. Failure to do so may result in serious injury. Be aware that in some situations activating a different dispenser can cause power to flow to the dispenser you are servicing.

2.7 LOCKOUT TAGOUT

The term "lockout tagout" refers specifically to procedures used to ensure that equipment is shut down and inoperable until maintenance or repair work is completed. They are used to keep employees safe from equipment or machinery that could injure or kill them if not managed correctly. Consult the OSHA standard for The Control of Hazardous Energy (Lockout/Tagout), Title 29 Code of Federal Regulations (CFR) Part 1910.147. In addition, 29 CFR 1910.333 sets forth requirements to protect employees working on electric circuits and equipment.

2.8 FIRE AND EXPLOSION PROTECTION

Fuels and their vapors can explode or burn if provided with an ignition source. Fuel spills can create vapors that can explode or burn. Avoid the use of open flames and equipment that can generate sparks in an area where vapors are present. This includes the use of tools that are not designated for use in a hazardous location.

2.9 PROTECT THE SITE WORKPLACE

Before performing any work that requires access to the dispenser or submersible pumps barricade the area and have any unauthorized people removed from the area prior to opening the dispenser for service. The use of safety cones, barricades or safety tape is highly recommended.

2.10 PERSONAL PROTECTION

Wear safety goggles and protective clothes when dispensing any liquid that may be potentially harmful or hazardous. Change saturated clothing and wash skin promptly with soap and water.

2.11 HEALTH NOTE

Petroleum fuel and fuel vapors can damage your health. Consult medical help immediately if petroleum products are ingested, come in contact with your eyes or your skin. Do not induce vomiting if ingested. If petroleum product comes in contact with your eyes, wash your eyes with water for approximately 15 minutes. If in contact with your skin, wash your skin. Seek medical advice immediately.

2.12 REPLACEMENT PARTS

Use only genuine Dover Fueling Solutions parts and retrofit kits on your Wayne dispenser. The use of alternate parts can create a hazardous situation, can violate local regulations, and could void warranty.

2.13 CHANGES TO THE PRODUCT

For product warranty/liability to be valid, no changes may be made to the equipment without the written consent of Dover Fueling Solutions.

2.14 FOLLOW LOCAL, STATE, AND FEDERAL CODES

Wayne dispenser models are only part of a combination fuel dispensing system. A dispensing system typically comprises equipment and safety devices from a variety of manufacturers. It is the responsibility of the dispenser owner to have a qualified installer ensure that all of the necessary equipment and accessories are included to meet the requirements of the application and all tanks (both underground and aboveground), piping and fittings, check valves, leak detection and corrosion protection devices, wiring, venting systems, filtration devices, safety valves, submersible pumps, etc. are installed in accordance with the manufacturers' instructions and in compliance with local and regional building codes and requirements pertaining to fueling facilities or other locations where the dispenser may be installed.

These requirements may include references to the National Electrical Code (NFPA 70); Code for Motor Fuel Dispensing Facilities and Repair Garages (NFPA 30A); Flammable and Combustible Liquids Code (NFPA 30); Code of Federal Regulations, Title 40, Section 280 (40 CFR 280); United States Environmental Protection Agency (U.S. EPA) Technical Regulations of 9-23-88 and U.S. EPA Financial Responsibility Regulations of 10-26-1988; and other various codes.

Where local requirements do not specify applicable codes, DFS recommends using the codes listed above. These codes are comprehensive and detailed, often requiring interpretation to cover unusual situations, and, therefore, the associated handbooks (where applicable) should also be consulted. (The handbooks are also available from the same sources.)

Wayne fuel dispensers are listed by Underwriters Laboratories (UL), a Nationally Recognized Testing Laboratory (NRTL).

Due to the variety of locations encountered, further information on installation cannot be dealt with in this document except as the codes relate directly to the installation of the dispenser. Therefore, it is strongly recommended that a qualified engineer or contractor familiar with local regulations and practices be consulted before starting installation.

2.15 PORTABLE FUEL TANKS AND CONTAINERS

Portable fuel containers of 12 gallons (45 liters) or less shall not be filled while they are in or on a motor vehicle. Filling portable containers, especially when they are sitting on a non-conductive surface such as a floor mat or a plastic bedliner in the back of a pick-up truck, can present a possible safety hazard and should be avoided as so stated in the following:

⚠️	WARNING!
⚠️🔥	The flow of gasoline through the dispenser nozzle can produce static electricity, which can cause a fire if gasoline is pumped into an ungrounded gasoline container. To avoid static buildup and the possible resulting serious injury: • Place approved container on the ground. Do not fill the container in the vehicle or truck bed. • Keep the nozzle in contact with the can or container while filling. Do not use an automatic pump handle (latch-open) device. • Never fill containers that are not designated for use with the type of product being dispensed.

2.16 HAZARDOUS AREA CLASSIFICATIONS

The hazardous zones are identified by NFPA 30A and the design of the equipment. While the areas surrounding the outside of the dispenser are commonly identified by NFPA 30A, the exact zones within the dispenser are influenced by the dispenser design. Class I hazardous locations are areas where flammable gases, vapors, or liquids may exist that have the potential to ignite or explode. Class I, Division 1 areas are those areas where these flammable gases, vapors, or liquids can exist under normal operating conditions. This area is generally the same as a Zone 0 or Zone 1 area. Class I, Division 2 areas are those areas where these flammable gases, vapors, or liquids are not likely to exist under normal operating conditions. These flammable gases, vapors, or liquids are typically only present under abnormal or failure operating conditions. This area is generally the same as a Zone 2 area.
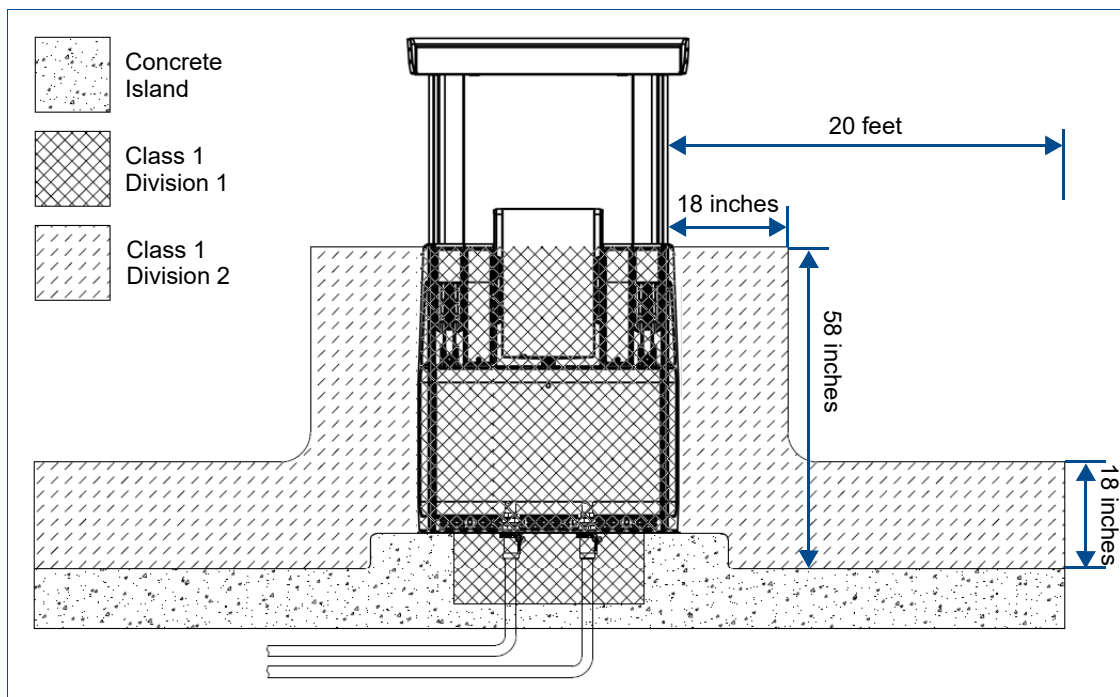
2.17 Site Warnings and Product Postings

Clearly post the required safety warnings and product identification according to the local, state and federal regulations.

2.18 Other General Safety Precautions

● Use the dispenser for appropriate applications. The dispensers are only designed for low viscosity motor fuels.

● Make sure the dispenser is equipped with the proper accessories for the application and product dispensed.

● Use the correct filters according to the fuel being dispensed, the application, and the relevant regulatory requirements.

● Inspect regularly, all external fluid carrying components such as, hoses, nozzles, breakaways, etc., for damage or leaks.

● Inspect regularly, the internal components for damage or leaks.

● Have all leaks or defects repaired immediately.

● Test the emergency (shear) valves, which can be manually opened and closed, by opening and closing several times, at least once per year. The test should include pressurizing the line to make sure the valve holds back the pressure.

● Use of automatic safety nozzles prevents overfilling fuel tanks and avoids spilling fuel.

● Sufficient lighting must be provided to allow safe nighttime use of the pump.

● A clearly visible and identifiable Site Emergency Stop Switch must be provided at the site to shut OFF power to all of the site's dispensers and submersible pumps in case of an emergency.

● Stow hoses to prevent tripping.

● Always keep an operating nozzle attended and do not re-enter the vehicle after beginning the fueling sequence. Static build-up can be created from sliding in and out of the vehicle seat. Static discharge by subsequently touching an operating fuel nozzle can create a hazardous situation.

● Do not operate the dispenser in the presence of any source of ignition including lighted cigarettes, electrical equipment, or running/hot engines.

2.19 In an Emergency

● **Dial 911 or the local emergency number**
● Describe the nature of the accident
● Provide the location of the accident including where the accident took place on the site
● Provide the nature of any injuries and any information about the victim that you can (age, etc.)
● Indicate if first aid is being provided
● Provide your name

3 SITE DESIGN AND PREPARATION

The information in this section is a quick list of items to consider when preparing to install a Wayne dispenser. Always refer to the other sections in this manual for additional details.

IMPORTANT!   Be sure to read and follow all safety precautions found in .

3.1 EXISTING INSTALLATIONS

If the dispenser is to be installed on an existing installation, it is still the responsibility of the installer to read and follow this installation manual in its entirety and make sure the existing installation meets the requirements and satisfies local, state, and federal codes.

3.2 DISPENSER CONFIGURATION

Review the base layout for the model(s) of dispensers to be installed to properly identify the location of inlet piping and conduit connections. Be sure to properly identify and associate Side A with the orientation desired for the island.

3.3 DISPENSER LOCATION

To maximize flow, position the remote dispenser and tank as close together as possible and minimize the number of turns in the piping. Consult the submersible pump manufacturer for the proper sizing of the submersible pump, any necessary leak detection equipment, and installation details.

Sufficient clearance must be allowed around the dispenser to permit service access. DFS recommends at least 30 in. in-front of and behind the dispenser to allow the door to fully swing open.

3.4 SUCTION PUMPS

For information regarding Helix dispensers with Compact Pumping Units (CPUs) and supply piping recommendations, refer to in the back of this manual.

3.5 SUBMERSIBLE PUMP SIZE

Consult the submersible pump manufacturer for the proper sizing of the submersible pump, any necessary leak detection equipment, and installation details. When blending, the two submersible pumps supplying product should be the same size to prevent cross-contamination between the products. If one pump is stronger than the other it can over-power the smaller pump.

Product piping must avoid the creation of vapor in the lines and deliver a minimum pressure of 25 psi at the remote dispenser inlet when all when all dispensers connected to the same Submersible Pump are operating. The dispenser's maximum operating pressure is 50 psi.

3.6 DISPENSING E25, E85 AND/OR B20

When dispensing products other than gasoline containing 10% ethanol or less or standard diesel fuels, be sure that the hanging hardware and fluid handling components are designed and listed for use with the product being dispensed. This includes the fluid handling components connecting the dispenser to the fuel source, the hanging hardware, and joint sealant.

External parts such as pipes, nipples, and fittings that come into contact with ethanol fuel must be ethanol-compatible and made only with Schedule 40 pipe using UL-classified Saf-T-Lok Teflon pipe sealant.

NOTE!   *The footprint drawings for E85 Helix models are the same as the standard models if a 1.5 in. offset adaptor is used (OPW part number PA15-15 or equivalent). If an offset adapter is not used, the footprint on all hydraulics inlets should be moved by 1.5 in. to the right as viewed from Side A (J-box side).*

3.7 ISLAND CONSTRUCTION AND CRASH PROTECTION

It is recommended that dispensers be mounted on a raised concrete island and that adequate crash protection be provided to prevent a vehicle from coming into contact with the dispenser. DFS recommends that island height should not exceed 6 in. (15.24 cm), if possible, due to Americans with Disabilities Act (ADA) requirements.

A concrete foundation must be provided for the dispenser. Do not pour concrete around product lines or electrical conduit risers. Allow for the proper dispenser containment box (a.k.a. sump) if required by local, state, or federal regulations. For dispenser dimensions, reference the applicable installation drawings in Appendix A, *Installation Drawings*, on page 79.

3.8 DISPENSER ANCHORING

Anchor bolts must be installed in the island to allow the dispenser to be bolted down in accordance with NFPA requirements. The base of the dispenser contains eight bolt hole slots for anchoring the dispenser to the island. ALL anchor bolt locations should be used. Position the anchor bolts in accordance with the dimensions shown on the Installation Instruction drawings for the applicable dispenser model located in the back of this manual. Use a minimum of 3/8 in. diameter bolts.

3.9 PIPING

Vertical supply risers and electrical conduits must be located per the Installation Instruction for the appropriate model. Proper height must be maintained to avoid undue stress on the dispenser. For wiring and conduit requirements, refer to Section 4.6, *Electrical Wiring*, on page 26.

Supply piping should be selected and installed based on the product dispensed and in accordance with local, state, and federal regulations. The piping manufacturer's instructions should be followed for the proper trenching, connection, sealing, corrosion prevention, pressure relief, leak detection, containment, and testing.

Supply lines should extend a minimum of 18 in. (46 cm) straight down from the dispenser (more in hot climates and high altitudes to prevent product vaporization) and then slope downwards to the tank at approximately 1/4 in. per ft. (1 cm drop per 48 cm run). Be sure there are no traps and minimize the number of bends and elbows.

Helix 4000 and 5000 dispensers are supplied with 1-1/2 in. inlets. Use 1-1/2 in. piping for the 1-1/2 in. inlets if the distance to the tank is 60 feet or less. For distances greater than 60 feet, 2 in. piping is recommended to reduce friction.

3.10 EMERGENCY SHUTOFF VALVE

For dispenser inlets, a listed double-poppet emergency shutoff valve is required. The bottom half of the emergency shutoff valve must be rigidly secured. The shear groove of the emergency shutoff valve must be ±½ inch of the top of the island. Emergency shutoff valves are to be installed per the manufacturer's requirements.

⚠️	**WARNING!**
⚠️	Failure to install the proper emergency shut-off valve will present a hazardous condition that could result in serious injury. For remote dispensers, a UL-Listed[a], rigidly-anchored double-poppet emergency shut-off valve must be installed, in accordance with the manufacturer's instructions in each supply line at the base of each dispenser. For a typical emergency shut-off valve installation, refer to Figure 3-1.

a.   "Listed" means published on a list by a nationally-recognized testing laboratory (NRTL) which is responsible for product evaluation and is acceptable to the authority having jurisdiction. Underwriter Laboratories, Inc. (UL) is one example of an NRTL. For more information on NRTLs, see Title 29, Parts 1907 and 1910 of the Code of Federal Regulations, Safety Testing, or Certification of Certain Workplace Equipment and Materials.

⚠️	**WARNING!**
🔥	Installation of a rotating emergency shear valve instead of a rigidly-mounted double-poppet emergency shut-off valve will result in malfunction and possible injury. The double-poppet emergency shut-off valve must be rigidly-secured according to manufacturer's instruction. The piping directly above the valve must be securely anchored and not able to rotate.

dispenser inlet (1-1/2 in.)

dispenser base frame

anchor bolt

valve actuator level (1-1/2 in.)

shear point (should be level with top of island)

top of concrete island

trip lever (pull down to close valve)

pipe plug for bleeding product lines

product inlet

under pump cavity

The emergency shut-off valve is designed to close the product line due to shock or fire. The shear section, shown above, functions if the dispenser is knocked out of position.

Figure 3-1 Typical Emergency Valve Installation

NOTE!   *The double-poppet emergency shut-off valve's shear point must always be at ground plane. The pedestal is considered an extension of the dispenser, not the island.*

NOTE!   *The dispenser is not to be changed from its original application by switching fuel types once installed. For example, if the dispenser is installed and used for gasoline/ethanol blends such as E85, the dispenser shall not be changed to traditional gasoline at a later date.*

NOTE!   *On E85 dispensers, use only shear valves approved for that fuel. For E85 models, use shear valve P/Ns 10P-0152E85 and 10P-4152E85 manufactured by OPW.*

3.11 VAPOR RETURN PIPING

Wayne dispensers provide 1 in. NPT pipe connections at the base of the dispenser for vapor return connections. (See the applicable installation footprint for location in Appendix A, *Installation Drawings*, on page 79.) A minimum 1 in. riser at each dispenser is connected to a minimum 2 in. return piping to the underground tank. If more than six (6) Fueling Points are connected, then underground piping must be a minimum of 3 in. All lines should be sloped at a minimum of 1/8 in. per ft. (1/4 in. per ft. preferred) from the dispenser to the tank to avoid liquid traps.

NOTE!   *There is no vapor recovery for Ethanol product on E85 Helix dispensers.*

On dispensers with vapor recovery, all hoses, nozzles, and breakaways, etc., must be CARB certified. DFS recommends using the CARB-certified balance vapor recovery nozzle VST-EVR-NB and associated hanging hardware.

Do not use sealant on balanced or inverted hoses used with vapor recovery.

3.12 WIRING

Using the correct wire size and type is important for the correct and consistent operation of the site. Table 4-2 on page 30 provides guidance concerning the wire size as compared to the amount of power being handled along with the distance of the wire run. Emergency shutoff systems that remove all power from the lines feeding the dispenser (including data lines) are required by code.

3.13 CONDUIT

Rigid metal conduit is required for electrical wiring connecting to the dispenser and when running conduit through any of the hazardous locations. Conduit size should be determined by the site layout and the wiring that the conduit needs to contain.The tables found in Section 4.6.14 on page 31 provide details to assist in choosing the correct conduit size. Listed Seal-offs must be used on any conduit entering or exiting the Class I, Division 1 area.

3.14 OPERATING PRESSURE

The dispenser's minimum operating pressure is 25 PSI and the maximum operating pressure is 50 PSI.

⚠️	CAUTION! EQUIPMENT DAMAGE!
	Wayne dispensers are specified to work at a maximum normal operating pressure of 50 PSI. Normal operation can create pressure spikes which may exceed 50 PSI. These normal spikes are easily handled by the dispenser. Wayne dispensers are designed and tested to withstand pressures up to 250 PSI, for short durations, without rupture or permanent distortion. Certain extreme conditions, such as installations with above-ground tanks and very long runs of pipe, can create pressure spikes that may damage the dispenser and its accessories. If these conditions exist, measures must be taken to reduce or dampen these pressure spikes to prevent damage to the equipment.

4 INSTALLATION

4.1 INSPECT THE EQUIPMENT

Examine the shipment immediately upon arrival to ensure there has been no damage or loss in transit. Make sure that all the component parts, including keys and optional equipment (if any), are accounted for.

Check and save the Packing Slip, Bill of Lading, Invoice, and all other documents included in the shipment.

Damaged or lost equipment must be reported to the carrier. Any damage or loss that may occur in transit is not covered under the Wayne Fuel Dispensers Warranty.

4.2 HELPFUL TIPS

NOTE!   *It is recommended to shut down power to all dispenser installation locations at the site prior to installation instead of shutting down power to each dispenser location individually as each installation occurs.*

4.2.1 Determining Dispenser Sides A & B

- Looking at the dispenser, if the name plate is to your right, you are facing Side A.
- Remove the hydraulic cabinet door from both sides of the dispenser. The side containing the Junction box (J-box) is Side A.
- Open the electronics cabinet doors on both sides of the dispenser. The side containing the Wayne iGEM™ board is Side A.

4.2.2 Determining HI & LO Product Piping

Refer to the applicable dispenser model installation drawing in Appendix A, *Installation Drawings*, on page 79 and to the hydraulic configurations in Appendix C on page 104.

4.2.3 Pump Control Wiring at Junction Box for Remote Dispensers

Pump control wiring at the Junction Box Terminal Strip is outlined in the following table. The Junction Box Terminal Strip Wiring tables in Appendix A, *Installation Drawings*, on page 79 provide a complete list of wiring designations.

NOTE!   *Single-valve dispensers include both non-blending dispensers, and traditional blending dispensers that produce blended grades using only the designated HI and LO feedstocks.*
Multi-valve dispensers include "dual blending" and "double dual blending" dispensers that produce one set of blended grades using the designated HI and LO feedstocks AND produce a second set of blended grades using the designated LO feedstock and a single product.

Terminal	Color	Connection	Product Description Single-valve	Product Description Multi-valve
3	White/Red	Pump Control 1	LO (X)	HI (X)
4	White/Brown	Pump Control 2	HI (Y)	LO (Y)
5	White/Black	Pump Control 3	Special (Z)	Special (Z)
6	White/Blue	Pump Control 4	Special (AA)	Special (AA)

4.3 LIFTING AND INSTALLING THE DISPENSER

DFS recommends the use of slings and a spreader bar to lift the dispenser. The spreader bar should be able to handle 2000 pounds and each strap should be able to handle 1000 pounds. Caution should be taken to protect the paint on the side columns from any rubbing of the slings. If the equipment is equipped with optional valance, DFS recommends installing it after the dispenser is installed, if practical, to protect it from installation damage. Refer to the lifting instructions in Appendix A on page 79 of this manual.

⚠	CAUTION! Handle with Care!
	When handling the dispenser, lifting by the computer enclosure, nozzle boot, hose outlet, operating lever, or any external panels may result in dispenser damage and/or personal injury.

- The dispenser should have already been unpacked when the equipment was received and inspected in accordance with Section 4.1, *Inspect the Equipment*, on page 23.
- Use door key to unlock and then remove the lower doors.
- Lift the dispenser onto the island as per the Lifting Instructions provided in Appendix A on page 79 of this manual. When handling fuel dispensers, LIFT ONLY PER LIFTING INSTRUCTIONS! Do not lift by the electronic enclosure, nozzle boot, or any external panels.
- Raise the dispenser up even with the island and slide the dispenser onto the island or lower the dispenser over the anchor bolts.
- Using a minimum of 3/8 in. bolts, secure the dispenser into place, remove the shipping discs from the meter inlets, and connect the product piping per the appropriate Installation Instruction drawing in Appendix A on page 79. When installing a blending dispenser, make sure the LO and HI product inlets (and, if applicable, the single product inlet) are correctly located. Refer to Appendix C, *Hydraulic Configurations - Helix Models 4000 & 5000*, on page 104.
- To ensure tight, leak-proof connections when making piping connections, wash all cutting oils off the threads and use a UL-Listed pipe joint sealing compound, rated for use with petroleum based products.

4.4 SITE SIGNAGE

Install the proper signage at the site as required by federal, state and local codes. This also includes the proper identification of products on the dispenser.

4.5 CONNECTING INLET PIPING

- Prior to making any fluid connections remove all shipping plugs or discs from the meter inlets.

- Use the appropriate UL listed sealant on the NPT threads for the product being dispensed. The use of sealants not rated for the product being dispensed can result in leaks, fires, and environmental damage.

- Use black pipe with quality NPT threads that show no sign of damage. Poor or damaged threads can prove to be difficult to seal against leaks.

- Supply piping should be selected and installed suitable for the product dispensed and in accordance with local, state, and federal regulations. The piping manufacturer's instructions should be followed for the proper trenching, connection, sealing, corrosion prevention, pressure relief, leak detection, containment, and testing.

- For inlet piping, connect the dispenser to a rigidly anchored double-poppet emergency shutoff valve. See Section 3.10. This can be accomplished through the use of a union. It may be helpful to keep the dispenser mounting bolts slightly loose until the piping is in place and tightened.

- Connect the product piping per the appropriate Installation Instruction drawing in Appendix A, *Installation Drawings*, on page 79.

- When installing a blending dispenser, make sure the LO and HI product inlets (and, if applicable, the single product inlet) are correctly located. Refer to the hydraulic configurations in Appendix C, *Hydraulic Configurations - Helix Models 4000 & 5000*, on page 104.

- To ensure tight, leak-proof connections when making piping connections, wash all cutting oils off the threads and use a UL-Listed pipe joint sealing compound, rated for use with petroleum-based products.

⚠	**WARNING!** **Explosive or Flammable Vapors!**
	Explosive or flammable vapors may accumulate within the dispenser housing. All piping connections in the final installation must be accurately fitted and all threaded joints tightly made up with a Listed gasoline-resistant pipe joint compound. Put the compound on male threads only, being careful not to get excess inside the pipe or fittings. Failure to perform the above will present a hazardous condition that could result in serious injury.

⚠	**CAUTION!** **Risk of Product Spillage!**
	To avoid product spillage and potential environmental damage. All NPT piping connections in the final installation must be accurately fitted and all threaded joints tightly made up with a suitable pipe joint compound rated for the product dispensed or product spillage and/or environmental damage may occur.

4.5.1 Connecting Vapor Lines for Vapor Recovery Systems

When the dispenser is supplied with a vapor recovery system, a vapor shear valve must be used to make the connection to the vapor piping. Follow the manufacturer's installation information supplied with the valve. Be careful to not create liquid traps that will prevent the flow of vapors back through the piping.

4.6 ELECTRICAL WIRING

4.6.1 General

- All wiring should be UL-Listed, rated for a minimum 90° C, (194° F), 600V, and gasoline and oil resistant.

- DFS recommends employing a qualified licensed electrician familiar with the codes and installation methods associated with hazardous locations.

- It is extremely important to ensure that all wiring and conduits are in accordance with all federal, state and local regulations, including, but not limited to, the National Electrical Code (NFPA 70), NFPA 30, and NFPA 30A.

NOTE!   *UL requires that all electrical connections to the dispenser be made with threaded, rigid conduit and properly sealed conductors. All dispensers and electrical connection boxes must be grounded per NFPA 70.*

4.6.2 Full Service (Stand-Alone) Dispenser Wiring

For full service operation, make electrical connections as shown on the appropriate Installation Wiring Diagrams in Appendix A on page 79. The Site Interconnection Diagrams in Appendix B on page 99 also show optional data wires for connecting the dispenser(s) to a DFS or third party control system. These optional data wires are not required for full service (stand-alone) dispensers; however, if a control system might be installed at a later time, the optional data wires should be pulled at initial installation.

NOTE!   *If optional data wires are run for future use, they should not be physically connected to the data terminals in the dispenser junction box. Instead they should be properly terminated individually using wire nuts.*

4.6.3 Submersible Pump Control Relays

The submersible pump control output provides 120VAC (Int'l – 240VAC) for controlling a submersible control relay. A control relay is required to interface to a submersible pump. According to the configuration parameters, the electronic register supplies power on this line to close the submersible control relay in order to activate the submersible pump. The submersible control relay must be UL Listed, have a minimum turn on voltage of 102VAC and release voltage no lower than 12VAC for 120VAC applications and a minimum turn on voltage of 204VAC and a release voltage no lower than 24VAC for 240VAC applications.

When more than one dispenser activates the same submersible pump, the Relay Select lines should be connected to the submersible control relay such that each feed is isolated from the others so that they do not feedback to each dispenser. Turning off power to that dispenser must assure that the submersible feed from a different dispenser will not back feed to this dispenser.

Ensure that the submersible pump receives its power from its own separate circuit breaker. The submersible pump control board uses solid state relays. Solid state relays have a "bleed current" of up to 1.5mA for 120 VAC applications and 1.9mA for 240VAC applications. This bleed current on the dispenser's relay control signals may cause a logical device such as a power interruption system to misinterpret the control signals as being "on" when they are not. Consult the manufacturer of the control device on how to properly load their system to prevent false-positive signals.

⚠	**WARNING!** **ELECTRIC SHOCK HAZARD!**
⚡	Failure to suppress the bleed current in applications where a false signal may be detected can cause the submersible pump to run when it should not, and thereby may result in equipment damage, a fuel spill, or personal injury. No connections (including neutral) may be shared between groups of dispensers. A separate Control Power Circuit Breaker must be provided for each group. Failure to do so may result in serious injury.

4.6.4 Suction Pump Motor Switch

If you have a suction pump, ensure the suction pump motor switch is set to match the site input voltage. Loosen the screw at the switch and set it to LOW (110 VAC) or HIGH (240 VAC) as applicable. Refer to the image below.

Low Volts (110 VAC)

High Volts (240 VAC)
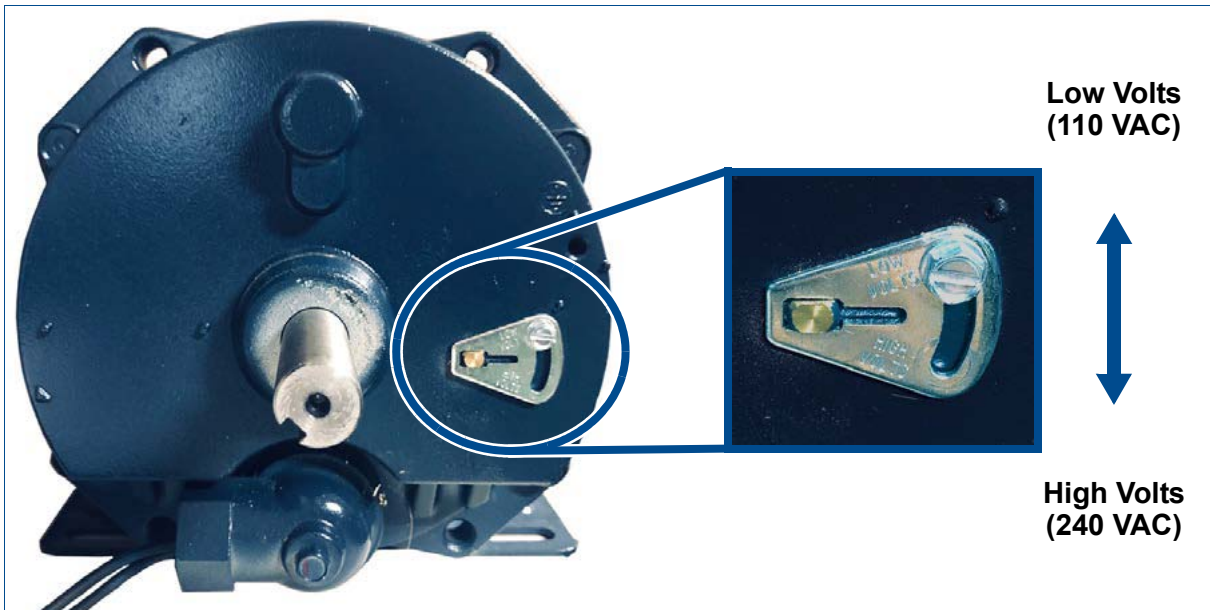
Figure 4-1 Suction Pump Motor Switch

4.6.5 Multiple Dispenser Wiring

A primary requirement in dispenser installation wiring is to provide a means for disconnecting all power connections, including the neutral, to the dispensers for safe shutdown and servicing of the units. Each dispenser should be provided with a separate control Power Circuit Breaker. If this is not desirable or practical, several dispensers can be grouped together and tied to the same Control Power Circuit Breaker according to the dispenser power requirements (special attention must be paid to the input power requirements as you cannot do this with every dispenser model).

⚠️	**WARNING!** **Electric Shock Hazard!**
⚡	No connections (including neutral) may be shared between groups of dispensers. A separate Control Power Circuit Breaker must be provided for each group. Failure to do so may result in serious injury.

4.6.6 Dispenser to Control System Wiring (Current Loop)

Communications from the control device to the dispenser is accomplished through a 2-wire current loop connection. The installation wiring diagrams in Appendix B on page 99 show connections to various control/connections devices for controlling the dispenser from a device capable of communicating to the dispenser via the current loop.

NOTE!   *The Dispenser Current Loop wiring may be installed in the same conduit containing the AC power wiring to the dispenser (NEC Class 1).*

4.6.7 Payment Terminal to Control System Wiring - iX Technology Platform

Communications from the control device to the Payment Terminal (sometimes referred to as Customer Activated Terminal or CAT) in the dispenser can be accomplished by several different methods according to the type of payment terminal, the security mode in which it is being run, "Encrypted Pin Pad" (EPP) or "EuroPay, MasterCard and VISA" (EMV), and the optional hardware supplied. EPP Mode always requires an RS-485 connection while EMV and/or Media always requires some type of Ethernet connection.

Payment Terminal	Mode	RS-485 Wired	Wayne Connect	Ethernet Wired	Wayne Connect Wireless
EPP CAT	EPP	X			
EPP CAT w/ Media	EPP	X	X		
EMV Ready CAT	EPP	X			
	EMV	X	X		
				X	
					X
EMV Ready CAT w/ Media	EPP	X	X		
		X		X	
		X			X
	EMV	X	X		
				X	
					X

RS-485 Wired – iX Pay Payment Terminals that are being run in EPP mode (whether they are EMV ready or not) communicate through the RS-485 wiring. These payment terminals are connected directly to the control device via 2 wire RS-485 connections. You cannot run media or EMV via an RS-485 direct wired connection.

Wayne Connect – iX Pay EPP Payment Terminals and EMV Ready Payment Terminals (running as EPP or EMV devices) can be connected to the control device via 2 wire RS-485 connections through a Wayne Connect System. This method of connection also supports the ability to run media and EMV.

Ethernet Wired – EMV Payment Terminals (with or without media) can be connected to the control device via an Ethernet connection. These runs can be point to point or you can loop from one dispenser to the next if an optional Ethernet board is installed in the dispenser. EPP mode cannot be run using an Ethernet connection. If you are running the payment terminal in EPP mode using the RS-485 wiring and plan to run media, you can use this Ethernet connection to do that in addition to the existing RS-485 connection. See note below.

NOTE!   *Ethernet wiring (NEC Class 2) must be installed via a separate conduit to the electronic head, and can be run with other Class 2 wiring. The connections for these wires are made in the electronic head.*

Wayne Connect Wireless – EMV Payment Terminals (with or without media) can be connected to the control device via Avalan wireless modems. If you are running the payment terminal in EPP mode using the RS-485 wiring and plan to run media, you can use this wireless connection to do that in addition to the existing RS-485 connection.

4.6.8 Dispenser Optional Equipment Wiring

Installation wiring diagrams showing the connections points for optional dispenser equipment such as an intercom or lighted valance are provided in <u>Appendix B</u> on page 99.

The letter "I" in the first suffix position of the dispenser model number indicates an intercom call button. The Yellow wires are call button connections and the Brown wires are speaker connections. Both circuits are low voltage NEC class 2 only.

NOTE!   *Speaker and Call Button wiring (NEC Class 2) must be installed via a separate conduit to the electronic head. This wiring can be run with other Class 2 wiring. The connections for these wires are made in the electronic head. Power to the Intercom Speaker is not to exceed 4 watts.*

4.6.9 Circuit Breakers

A primary requirement in dispenser installation wiring is to provide a means for protecting and disconnecting all power connections, including the neutral, to the dispensers for safe shutdown and servicing of the units. Each dispenser should be provided with a separate control power circuit breaker. If this is not desirable or practical, several dispensers can be grouped together and tied to the same control power circuit breaker according to the dispenser power requirements (special attention must be paid to the input power requirements as you cannot do this with every dispenser model). The number of dispensers that can be included on one breaker is determined by analyzing the options to determine the load for each dispenser.

If the dispenser is equipped with a payment terminal which includes a 290 W heater, a separate breaker is recommended for each dispenser; however, there should never be more than two (2) dispensers per breaker in this situation.

A separate circuit breaker must be provided for each submersible pump.

4.6.10 Emergency Electrical Shutoff

NFPA 30A requires that an emergency electrical shutoff system be installed that removes all power to the dispenser in the case of an emergency. This includes data communication wires connected to the dispenser. An emergency shutoff switch must be located no closer than 20 feet from the dispenser and no more than 100 feet from the dispenser. This switch is to be clearly identified. If multiple shutoffs are installed, they must be tied together such that tripping one switch will trip all systems.

4.6.11 Grounding

All dispensers and electrical connection boxes must be grounded per NFPA 70. Connect a ground wire between the AC junction box ground lug and the main electrical service panel. Do not rely on electrical conduits as the grounding connection.

Make sure a ground rod is properly installed and wired to the ground bus strip of the main electrical service panel in accordance with the National Electrical Code. Unless prohibited by local regulations, it is recommended that the neutral and ground bus strips be tied together on the main breaker panel.

4.6.12 Wire Type

All wiring should be UL-Listed, rated for a minimum 90ºC (194ºF), 600V, and gasoline and oil resistant. All AC wire terminations must be made in the junction box. Take care when handling the junction box cover. Keep the mating flange clean and free of burrs and scratches. Make sure all wire connections are tightly spliced and secured with a wire nut.

Use electrical tape to close the open end of the wire nut. After completing the wiring terminations, securely fasten the junction box cover using all of the supplied bolts. Make sure that any unused conduit entry openings are properly plugged.

4.6.13 Wire Size

For suction pump models, the following table is provided as a guide for selecting the proper wire size for the motor feed and return lines based on the motor voltage. The feet/meters rows are the distance from the dispenser to the circuit breaker panel. If multiple pumps are powered from the same breaker and wires, the gauge of the wires must be increased taking into account the additional load and distance.

Table 4-1 Recommended Wire Size (AWG) - One (1) HP Motor

	Distance						
Feet	**1 - 25**	**26 - 50**	**51 - 100**	**101 - 150**	**101 - 150**	**151-200**	**201-250**
Meters	**1 - 8**	**9 - 15**	**16 - 31**	**32 - 46**	**47 - 61**	**47 - 61**	**62 - 76**
120 VAC	14	12	10	8	6	6	4
240 VAC	14	12	12	10	10	10	8

The wire size for each set of control wires must be determined by the dispenser's features (which determine maximum power requirements) and the length of the run from the breaker panel to the dispenser. The chart below shows recommended wire sizes based on keeping the voltage drop across the wire to 5% or less.

Table 4-2 Recommended Wire Size (AWG) - Control Wiring

	Distance (in feet)							
Current	**1-25**	**26-50**	**51-75**	**76-100**	**101-150**	**151-200**	**201-250**	**251-300**
2.5 A	14	14	14	14	14	14	14	14
5.0 A	14	14	14	14	14	14	12	12
7.5 A	14	14	14	14	12	12	10	10
10.0 A	14	14	14	14	12	10	10	8
12.5 A	14	14	14	12	10	10	8	8
15.0 A	14	14	12	12	10	8	8	6

4.6.14 Electrical Conduit

- Use UL-Listed threaded, rigid, metal conduit and properly sealed connectors. Threaded connections must be drawn up tight and have a minimum of five threads engaged.
- Do not use flexible conduit or knockout boxes.
- When connecting to a fuel control system, consult the manufacturer's instructions for conduit requirements for AC and DC lines.

Use the following procedure as a guide to help determine the proper conduit sizes:

1. Determine the square area for each wire by looking up the desired wire gauge in the following table and writing down the corresponding square area from the Square Area column. Calculate the total area by adding the square area for each of the wires.

Table 4-3 THHN/THWN Wire Gauge Square Area

Wire Gauge	Diameter		Square Area	
	in	mm	in²	mm²
18	0.090	2.29	0.007	4.1
14	0.118	2.95	0.011	6.8
12	0.135	3.43	0.014	9.2
10	0.169	4.29	0.022	14.5
8	0.216	5.49	0.037	23.7
6	0.259	6.60	0.053	34.2
4	0.331	8.41	0.086	55.5
3	0.359	9.14	0.102	65.6
2	0.394	10.01	0.122	78.7

2. In the 25% fill area column below, find the square area that is closest to, without exceeding, the calculated total area. The value listed on the same row in the Trade Size Conduit column is the diameter of the required conduit.

Table 4-4 Trade Size Conduit Square Area

Trade Size Conduit	Internal Diameter		Square Area		25% Fill Area	
	in	mm	in²	mm²	in²	mm²
1/2 in.	.629	16	.311	201	.078	50
3/4 in.	.826	21	.536	346	.134	86
1 in.	1.063	27	.887	572	.222	143
1 1/4 in.	1.378	35	1.491	962	.373	240
1 1/2 in.	1.614	41	2.046	1320	.512	330
2 in.	2.087	53	3.421	2207	.855	552

NOTE!   *The calculated conduit size may need to be increased to allow for long runs or a large number of bends.*

4.6.15 Dispenser Electrical Ratings

The highest rating is given for 115/230 VAC 50/60 Hz.

NOTE!   *Power for pump motor(s) on suction models should always be supplied separately from the Control Electronics and options. Each suction motor operates at 115/230VAC single phase.*

Table 4-5 Electrical Ratings - Control Electronics and Options

Component	Amps	
	115 VAC	**230 VAC**
1 HP Pump Motor (per pump)	14.6	7.3
Control Electronics	4.0	2.0
The following options add to the Control Electronics:		
Payment Option	2.0	1.0
Wayne Connect	2.0	1.0
Healy Vapor Recovery	2.0	1.0

5 STARTUP

5.1 INITIAL CHECKOUT

Before applying power to the dispenser, double-check the wiring to ensure it is correctly routed and terminated. Ensure that all conduits have the washer pushed up against the vapor barrier. Turn on the dispenser control power at the circuit breaker and the submersible pump or suction pump motor circuit breakers. Verify the dispenser powers on and all lights work. The dispenser displays will show some numbers, usually the last sale run during factory test.

The dispenser template, which configures the dispenser, has been loaded in the dispenser and tested at the factory. The dispenser will have the necessary data such as unit prices and blend ratios to allow the dispenser to operate in stand-alone at installation to purge product lines and test operation. At start-up, the procedures in this section should be performed in sequential order to ensure proper operation before the dispenser is switched over to control system operation.

5.2 TURN ON POWER AND CHECK VOLTAGE

1.   Turn on the breaker that supplies power to the dispenser.
2.   Verify that the incoming voltage is within +10% of the rated voltage. If the voltage is not within the acceptable range, take the appropriate corrective measures before using the dispenser.

5.2.1 Dispenser ON/OFF Switch

A power switch to each dispenser is located on the AC Distribution & Motor Control board on Side A of the dispenser. The board is located on the bottom of the left wall of the dispenser if facing side A.

Figure 5-1 Dispenser ON/OFF Switch on A/C Power Distribution Board

5.2.2 iX Pay™ Secure Payment Platform Board Reset Button

A reset button is located on the iX Pay Secure Payment platform board. Refer to the following figure for button location. This may be useful while performing the initial startup of the dispenser.
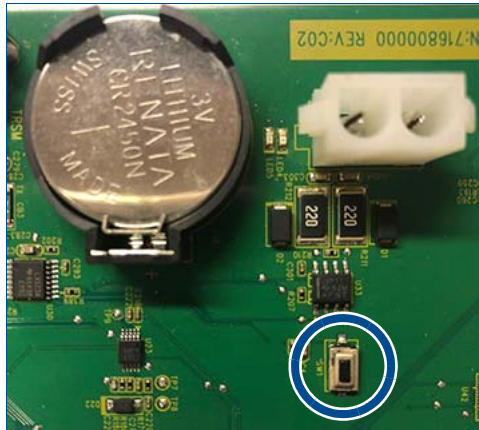
Figure 5-2 iX Pay Platform Board Reset Button (iX Jade board shown)

5.3 CONFIGURATION OF BASIC PARAMETERS USING THE INFRARED REMOTE CONTROL (IRC)

The Infrared Remote Control (IRC) is used to access dispenser Functions/Sub-Functions and Diagnostics (statistics). When held close to the infrared eye located in the Sales Volume Display, the IRC can be used to set Unit Prices, Fueling Point IDs, Blend Ratios, and read Electronic Totalizers.

Figure 5-3   IR Remote Control

Remote Control button descriptions are given in the following table.

Table 5-1 IR Remote Control Button Functions

IRC Keys	When F - - is shown on the Unit Price Display	When F 'xx' is shown on the Unit Price Display	When xx.xx sub-function is shown on the Unit Price Display
NEXT	F00	Next higher function #	Next higher sub-function level.
UP	S - - (statistics mode)	Next higher function #	Next higher sub-function level.
DOWN	S - - (statistics mode)	Next higher function #	Next higher sub-function level.
ENTER	Pressing 3 times will exit configuration mode without saving	Sub-function level (xx.xx)	Back to function level (except after entering new value, it displays the change)
CLEAR	N/A	F - -	Back to function level (except while entering new value can be used to erase last digit typed)
#	N/A	N/A	Must use this key to enter new data
digits [0-9]	After pressing **ENTER**, will take you to the Function level of the digits entered	After pressing **ENTER** will take you to the Function level of the digits entered	When clearing the display with the "#" key first, it will change the value of the sub-function to the digits entered after pressing **ENTER**

When in Statistics Mode (S - - or S "xx" on Unit Price Display), the above commands work the same way.

5.3.1 Set Clock Function

Set the time and date for a dispenser by modifying the following Functions with the Remote Control (IRC):

Dispenser Time and Date

Function **F02**

    Time (HH.MM): Sub-Function .00 (F02.00)

    Date (MM.DD): Sub-Function .01 (F02.01)

    Year (YY.YY):   Sub-Function .02 (F02.02)

To set the date and time for the dispenser, perform the following steps:

Table 5-2 Set Clock Function

Step	IRC Command	Sales Display	Volume Display	Unit Price Display
1	Press either **ENTER**, **1**, or **2**, depending on access level	PASS 1		
2	Type the corresponding password Press **ENTER**	PASS 2		
3	Type the password Press **ENTER**	iGEM software version	Date	F - -
4	Type **2** Press **ENTER**	- - - - -		F 02
5	Press **ENTER**	- - - - -	Time in HH.MM format (If time is correct, skip to Step 8)	F 02
6	Press **#**		Time in HH.MM format	2.00
7	Type the current time in 24-hour format of **HH.MM** Press **ENTER**	- - - - -	Entered time in HH.MM format	2.00
8	Press **NEXT**	- - - - -	Date in MM.DD format (If date is correct, skip to Step 11)	2.01
9	Press **#**		Date in MM.DD format	2.01
10	Type the current date in the format of **MMDD** Press **ENTER**	- - - - -	Entered date in MMDD format	2.01
11	Press **NEXT**	- - - - -	Year in YYYY format (If year is correct, skip to Step 14)	2.02
12	Press **#**		Year in YYYY format	2.02
13	Type the current year in the format of **YYYY** Press **ENTER**	- - - - -	Current year in YYYY format	2.02
14	Press **ENTER**	- - - - -		F 02

5.3.2 Logical Nozzle / Hose Positions

The physical number of hoses on one side of the dispenser is not the same as the number of electronic Logical Nozzles / Hose Positions on that side. A Logical Nozzle / Hose Position defines the attributes of a fueling position, and is used to set unit prices and blend ratios. For example:

- The H(N/L)34-32 model blender has 2 hoses per side and 3 inlets, but 4 grade selects/logical nozzles. Logical nozzles are assigned positions 1 through 7, depending on the dispenser model.

- The H(N/LU)33-31 model non-blender has hose per side and three logical nozzles, which are positions: 1, 2, and 3. For non-blending models, products are shown as X, Y and Z in the table below.

Refer to the Model Designation Chart in Section 1.1 on page 9 for details about model designations. As an example, the model designation **H(W/LU)25-21** is interpreted as follows:

H	(W/LU)	2	5	2	1
H-style	W = Wide LU = Lane Unmirrored	2 grades in	5 grades out	2 hydraulic positions	1 hose per side

Assignments for logical nozzle positions on Helix dispenser models are listed below.

LO = Lowest grade feedstock

HI = Highest grade feedstock

BL = Blend

LO-BL = Lowest blended grade

MID-BL = Medium blended grade

HI-BL = Highest blended grade

S = Special

Helix model # begins with	Dispenser descriptions	N=7	N=6	N=5	N=4	N=3	N=2	N=1
H(N/LU)11-11 S(L/LU)11-11	1 Hose Non-Blender							X
H(N/LU)22-22 S(L/LU) 22-22	2 Hose Non-Blender						Y	X
H(N/LU)23-21	1 Hose Blender	LO		BL		HI		
H(N/LU)24-21	1 Hose Blender	LO	LO-BL	HI-BL	HI			
H(N/LU)25-21	1 Hose Blender	LO	LO-BL	MID-BL	HI-BL	HI		
H(N/LU)33-31	1 Hose Non-Blender					Z	Y	X
H(N/LU)34-32	2 Hose Blender		LO	BL	HI		S	
H(N/LU)35-32 (4+1)	2 Hose Blender		LO	LO-BL	HI-BL	HI		S

Helix model # begins with	Dispenser descriptions	N=7	N=6	N=5	N=4	N=3	N=2	N=1
H(N/LU)35-32 (4+1)	2 Hose Blender		HI	HI-BL	LO-BL	LO		S
H(W/LU)22-22	2 Hose Non-Blender					Y	X	
H(W/LU)23-21	1 Hose Blender	LO		BL		HI		
H(W/LU)24-21	1 Hose Blender	LO	LO-BL	HI-BL	HI			
H(W/LU)25-21	1 Hose Blender	LO	LO-BL	MID-BL	HI-BL	HI		
H(W/LU)33-31	1 Hose Non-Blender					Z	Y	X
H(W/LU)33-33	3 Hose Non-Blender					Z	Y	X
H(W/LU)34-32	2 Hose Blender		LO	BL	HI			S
H(W/LU)34-34	4 Hose Blender	LO		BL		HI		S
H(W/LU)35-32 (4+1)	2 Hose Blender		LO	LO-BL	HI-BL	HI		S
H(W/LU)35-32 (4+1)	2 Hose Blender		HI	HI-BL	LO-BL	LO		S
H(W/LU)35-33 (2+1+1)	3 Hose Double-Dual Blender		BL S + LO (LO BL)	BL S + LO (HI BL)	LO	HI		S
H(W/LU)35-33 (3+1+1)	3 Hose Double-Dual Blender		BL S + LO	LO	BL LO + HI	HI		S
H(W/LU)44-42	2 Hose Non-Blender				W	Z	Y	X
H(W/LU)44-44	4 Hose Non-Blender				W	Z	Y	X
H(W/LU)45-43 (3+1+1)	3 Hose Blender		S2	LO	BL LO + HI	HI		S1
H(W/LU)45-43 (3+1+1)	3 Hose Dual-Blender		BL S2 + LO	LO	BL LO + HI	HI		S1
H(W/LU)45-43 (2+2+1)	3 Hose Dual-Blender		S2	BL S2 + LO	LO	HI		S1
H(W/LU)45-43 (2+2+1)	3 Hose Dual-Blender		BL S2 + LO (LO-BL)	BL S2 + LO (HI-BL)	LO	HI		S1

5.3.3 Setting Unit Prices

The procedure below is used to set the dispenser Unit Prices when operating in Standalone Mode, or when communications with the POS system is disabled.

NOTE!   *When communications with the POS system is enabled, the POS prices will override prices that were manually input at the dispenser.*

Set prices for a dispenser by modifying the following Functions with the Remote Control (IRC):

SIDE A Unit Prices	SIDE B Unit Prices
Function **F03**	Function **F04**
Credit Prices:	**Credit Prices:**
Sub-Function **.0N** (F03.0*N*)	Sub-Function **.0N** (F04.0*N*)
Cash Prices:	**Cash Prices:**
Sub-Function .**1N** (F03.1*N*)	Sub-Function .**1N** (F04.1*N*)

Logical nozzle numbers for each model are shown in

To set prices at the dispenser, perform the following steps.

Table 5-3 Loading Cash and Credit Prices

Step	IRC Command	Sales Display	Volume Display	Unit Price Display	Logical Nozzle #
Load Credit Prices for Side A:					
1	Press ENTER	PASS 1			
2	Type the corresponding **PASSWORD** Press ENTER	PASS 2			
3	Type the **PASSWORD** again Press ENTER	iGEM software version	Date	F - -	
4	Type **3** (**4** for Side B) Press ENTER, ENTER	- - - - - -		F 03	
5	Press # Type numbers ENTER NEXT	- - - - - -	Existing Credit Price --------------------------- New Credit Price	3.01	Noz 1
6	Press # Type numbers ENTER NEXT	- - - - - -	Existing Credit Price --------------------------- New Credit Price	3.02	Noz 2
7	Press # Type numbers ENTER NEXT	- - - - - -	Existing Credit Price --------------------------- New Credit Price	3.03	Noz 3

Table 5-3 Loading Cash and Credit Prices (Continued)

Step	IRC Command	Sales Display	Volume Display	Unit Price Display	Logical Nozzle #
8	Press # Type numbers ENTER NEXT	- - - - - -	Existing Credit Price --------------------------- New Credit Price	3.04	Noz 4
9	Press # Type numbers ENTER NEXT	- - - - - -	Existing Credit Price --------------------------- New Credit Price	3.05	Noz 5
10	Press # Type numbers ENTER NEXT	- - - - - -	Existing Credit Price --------------------------- New Credit Price	3.06	Noz 6
11	Press # Type numbers ENTER NEXT	- - - - - -	Existing Credit Price --------------------------- New Credit Price	3.07	Noz 7
Load Cash Prices for Side A:				
1	Press # Type numbers ENTER NEXT	- - - - - -	Existing Cash Price --------------------------- New Cash Price	3.11	Noz 1
2	Press # Type numbers ENTER NEXT	- - - - - -	Existing Cash Price --------------------------- New Cash Price	3.12	Noz 2
3	Press # Type numbers ENTER NEXT	- - - - - -	Existing Cash Price --------------------------- New Cash Price	3.13	Noz 3
4	Press # Type numbers ENTER NEXT	- - - - - -	Existing Cash Price --------------------------- New Cash Price	3.14	Noz 4
5	Press # Type numbers ENTER NEXT	- - - - - -	Existing Cash Price --------------------------- New Cash Price	3.15	Noz 5
6	Press # Type numbers ENTER NEXT	- - - - - -	Existing Cash Price --------------------------- New Cash Price	3.16	Noz 6

Table 5-3 Loading Cash and Credit Prices (Continued)

Step	IRC Command	Sales Display	Volume Display	Unit Price Display	Logical Nozzle #
7	Press # Type numbers ENTER NEXT	- - - - - -	Existing Cash Price ----------------------------- New Cash Price	3.17	Noz 7
8	ENTER	- - - - - -		F03	
9	Press UP	- - - - - -		**F04**	
Proceed with Loading Credit and Cash Prices for Side B (Function F04), then save changes as follows:					
1	Type **0** ENTER	- - - - - -		F 00	
	ENTER	- - - - - -	1	0.00	
2	Press # Type **3** ENTER	- - - - - -	3	0.00	
3	ENTER	CHanGE	StorED		
4	ENTER	Last Sale Amount	Last Volume Amount	New Price	

5.3.4 Setting Blend Ratios

The procedure below is used to set the dispenser Blend Ratios.

NOTE!   *When enabled, the POS system verifies and confirms that its blend ratio data corresponds to the manually set Blend Ratios.The POS system will not allow fuel to be dispensed if these Blend Ratios do not match.*

In order to set Blend Ratios, you will need to know the Logical Nozzles for the dispenser. The Dispenser Configuration Template defines the dispenser model and assigns Logical Nozzle numbers to the hose positions, as discussed in *Logical Nozzle / Hose Positions* on page 37.

Set Blend Ratios for a dispenser by modifying the following Functions with the Remote Control (IRC):

SIDE A Blend Ratios	SIDE B Blend Ratios

Function **F18**
        Sub-Function **.1N** (F18.1N)
	Function **F18**
	        Sub-Function **.2N** (F18.2N)

To change and save the Blend Ratios, perform the following steps:

Table 5-4 Setting Blend Ratios

Step	IRC Command	Sales Display	Volume Display	Unit Price Display	Logical Nozzle #
Set Blending Ratios for Side A:					
1	Press ENTER	PASS 1			
2	Type the corresponding **PASSWORD** Press ENTER	PASS 2			

Table 5-4 Setting Blend Ratios

Step	IRC Command	Sales Display	Volume Display	Unit Price Display	Logical Nozzle #
3	Type the **PASSWORD** again Press ENTER	iGEM software version	Date	F - -	
4	Type **18** Press ENTER, ENTER	- - - - - -		F 18	
5	Press # Type blend ratio ENTER NEXT	- - - - - -	Current 1 Blend Ratio --------------------------- New Blend Ratio	18.11	Noz 1
6	Press # Type blend ratio ENTER NEXT	- - - - - -	Current 2 Blend Ratio --------------------------- New Blend Ratio	18.12	Noz 2
7	Press # Type blend ratio ENTER NEXT	- - - - - -	Current 3 Blend Ratio --------------------------- New Blend Ratio	18.13	Noz 3
8	Press # Type blend ratio ENTER NEXT	- - - - - -	Current 4 Blend Ratio --------------------------- New Blend Ratio	18.14	Noz 4
9	Press # Type blend ratio ENTER NEXT	- - - - - -	Current 5 Blend Ratio --------------------------- New Blend Ratio	18.15	Noz 5
10	Press # Type blend ratio ENTER NEXT	- - - - - -	Current 6 Blend Ratio --------------------------- New Blend Ratio	18.16	Noz 6
11	Press # Type blend ratio ENTER NEXT	- - - - - -	Current 7 Blend Ratio --------------------------- New Blend Ratio	18.17	Noz 7
12	Press NEXT	- - - - - -			
Set Blending Ratios for Side B:					
1	Press # Type blend ratio ENTER NEXT	- - - - - -	Current 1 Blend Ratio --------------------------- New Blend Ratio	18.21	Noz 1

Table 5-4 Setting Blend Ratios

Step	IRC Command	Sales Display	Volume Display	Unit Price Display	Logical Nozzle #
2	Press # Type blend ratio ENTER NEXT	- - - - - -	Current 2 Blend Ratio --------------------------- New Blend Ratio	18.22	Noz 2
3	Press # Type blend ratio ENTER NEXT	- - - - - -	Current 3 Blend Ratio --------------------------- New Blend Ratio	18.23	Noz 3
4	Press # Type blend ratio ENTER NEXT	- - - - - -	Current 4 Blend Ratio --------------------------- New Blend Ratio	18.24	Noz 4
5	Press # Type blend ratio ENTER NEXT	- - - - - -	Current 5 Blend Ratio --------------------------- New Blend Ratio	18.25	Noz 5
6	Press # Type blend ratio ENTER NEXT	- - - - - -	Current 6 Blend Ratio --------------------------- New Blend Ratio	18.26	Noz 6
7	Press # Type blend ratio ENTER NEXt	- - - - - -	Current 7 Blend Ratio --------------------------- New Blend Ratio	18.27	Noz 7
8	ENTER	- - - - - -		F18	
9	Type **0** ENTER			F 00	
10	ENTER	- - - - - -	1	0.00	
11	Press **#** Type **3** ENTER	- - - - - -	3	0.00	
12	ENTER	CHANGE STORED			
		Last Sale Amount	Last Volume Amount	Current Unit Price	

Using the Helix model H(N/L)23-21 model as an example, the following is a **50%** intermediate blend ratio setting for a single hose blender. Any unused position has to be set to 101, not zero, since zero is reserved for the Lowest Grade Feedstock.

Table 5-5 Example: B12/3 Blend Ratio Setting

Side A		Side B
18.11 = 101		18.21 = 101
18.12 = 101		18.22 = 101
18.13 = 100	**High Product**	**18.23 = 100**
18.14 = 101		18.24 = 101
18.15 = 50	**Blend**	**18.25 = 50**
18.16 = 101		18.26 = 101
18.17 = 0	**Low Product**	**18.27 = 0**

Function.Subfunction syntax:

18.*SN*

S = Dispenser SIDE (1 or 2)

N = Logical Nozzle Number (1-7) as shown in the *Logical Nozzle / Hose Positions* on page 37.

The Volume Display will indicate the value of the Blend Ratio corresponding to the Side (1 or 2) and the Logical Nozzle (N=1-7). If no Blend Ratio is set for a particular Logical Nozzle, the number "101" will be displayed.

Typically, stations sell the low and high grades at zero and 100**%** ratios, and may sell the middle grade at 35**%** or some other intermediate value between 0 and 100. In the example above, the technician would need to change only sub-functions **18.15** and **18.25** to the desired intermediate value.

IMPORTANT! Always get Blend Ratios from the station owner to avoid confusion over which values to use.

To set the Blend Ratio using the example above:

1. When the correct Logical Nozzle is shown on the Unit Price Display, enter the desired value of the Blend Ratio by using **UP** and **DOWN** keys on the Remote Control interface or by typing the # sign followed by the value of the Blend Ratio, followed by **ENTER**.
    For example, to change the value of the Blend Ratio from 50 to 89, press the **UP** button until **89** appears on the price display, then press **ENTER**, or type in **#89**, **ENTER**.
2. Continue until all the Blend Ratios are entered for Side A and Side B.

5.3.5 Setting the Fueling Point ID (FPID)

The dispenser should be configured with a unique FPID, prior to transferring control to the POS Control System. The procedure in the following table is used to set the dispenser Fueling Point (FP) address.

Functions used to set Fueling Point IDs:

SIDE A Fueling Point ID	SIDE B Fueling Point ID
Function **F05**	Function **F06**

To set Fueling Point IDs for a dispenser:

Table 5-6 Setting the FPID

Step	IRC Command	Sales Display	Volume Display	Unit Price Display
Set Fueling Point Address Side A (Serial Filling Mode Only):				
1	ENTER	PASS 1		
2	Type the corresponding **PASS-WORD** Press **ENTER**	PASS 2		
3	Type the **PASSWORD** again Press **ENTER**	iGEM software version	[date]	F - -
4	Type **5** Press **ENTER**	- - - - - -		F 05
5	Press **ENTER**	- - - - - -	Fuel point address for Side A format	F 05
6	Type desired **FPID #** Press **ENTER**	- - - - - -	New fuel point address for Side A	5.00
7	Press **ENTER**	- - - - - -		F 05
Set Fueling Point Address Side B (Serial Filling Mode Only):				
8	Type **6** Press **ENTER**	- - - - - -		F 06
9	Press **ENTER**	- - - - - -	Fuel point address for Side A format	6.00
10	Type desired **FPID #** Press **ENTER**	- - - - - -	New fuel point address for Side A	6.00
11	Press **ENTER**	- - - - - -		F 06
Save Changes:				
12	Type **0** Press **ENTER**	- - - - - -		F 00
13	Press **ENTER**	- - - - - -	1	0.00
14	Press **UP** key to exit (example shown is 3, exit and save) *1 = Do not exit and do not save changes *2 = Exit and do not save changes *3 = Exit and save changes Press **ENTER**	- - - - - -	3	0.00
15	Press **ENTER**	CHAnGE	StorEd	Current Price

5.4 PRIMING SUCTION PUMPS (SUCTION DISPENSERS)

Suction pumps must be primed before their initial operation. It is not advisable to run any type of internal gear pump dry during the priming process. It is also recommended to check and adjust the bypass valve pressure. See Appendix D, *Helix Dispensers with a Compact Pumping Unit (CPU)*, on page 111.

5.5 BLEEDING PRODUCT LINES (REMOTE DISPENSERS)

NOTE!   *To avoid severe damage to the dispenser, all air and air pockets must be bled from the product trunk lines before attempting to dispense product.*

Perform the following steps:

1.   Make sure the power to the appropriate submersible pump is OFF.
2.   To bleed air from a trunk line, remove the pipe plug from the safety impact valve on the dispenser farthest from the storage tank.
3.   Attach a flexible hose to the pipe plug opening in the safety impact valve. If a hose has already been installed on the dispenser, skip to next step.
4.   Energize the appropriate submersible pump and allow the air to bleed out of the trunk line into a test can until product flows into the test can. De-energize the submersible pump and replace the pipe plug. Repeat the procedure for each product and each trunk line.

5.6 AUTHORIZING THE DISPENSER VIA STANDALONE MODE

In order to dispense product, the dispenser must be authorized. A dispenser in Standalone Mode (i.e. not connected to a POS Control System) is ALWAYS authorized, unless the dispenser is equipped with an optional Authorize Keyswitch on the bezel. This momentary contact keyswitch can be used for one-time authorizations.

Dispenser Filling Mode

Function **F01**

     Stand Alone Mode: Sub-Function .02 (F01.02)

To set the Filling Mode to Standalone Operation:

1.   Access the Filling Mode in programming **Function F01**.
2.   Set the sub-function to "**2**" for Standalone Operation.

NOTE!   *When connected to a POS Control System, the system programming determines authorization.*

NOTE!   *The **JP1** jumper (Local Authorize Switch) must be installed on the Sales Display Board in order to put the dispenser in Standalone Mode. Once the dispenser is switched to a POS Control System, the Local Authorize Switch should be removed. See Section 5.16, Security Precautions, on page 52.*

5.7 INITIAL DELIVERY

To dispense product from a newly installed dispenser, make sure unit prices and blend ratios are set (as previously described) and proceed as follows:

1. Turn on the circuit breakers for the dispenser and the submersible pump.
2. If the dispenser is connected to a control system, the dispenser must be authorized.
3. Remove the nozzle from the nozzle boot and select the grade to turn the dispenser on.
4. Make sure the Volume and Total Sale displays reset to zero.
5. Check that when reset is started, the correct submersible pump motor is activated, and at the end of the display reset (approximately three seconds) the solenoid valve(s) opens.

   NOTE!   *Ensure that product lines are properly bled. Refer to Section 5.4 (suction dispensers) or Section 5.5 (remote dispensers) before dispensing any product.*

6. After verifying air is bled properly from each trunk line, *slowly* dispense product through each dispenser until free of air. Dispense enough product through each hose of each dispenser to ensure the dispenser and the lines are free of air before checking the meters.
7. Check all piping and hose connections to make sure there are not any leaks.
8. Turn the dispenser off by inserting the nozzle back into the nozzle boot.
9. Repeat the steps in this section for each dispenser and all hoses.

5.8 METER CALIBRATION - WAYNE IMETER™ OR XFLO® FUEL METERS

Each meter assembly contains two meters. The WIP pulser (or XWIP for Xflo meter) contains two sets of sensors, one set for each meter. On the front of the pulser, there are two Calibration Doors, one for each meter in the assembly. The door closest to the front of the dispenser controls calibration of the front meter and the other door controls calibration of the rear meter.

Please keep the following in mind, when performing the calibration procedure:

- Open only one (1) Calibration Door at a time, as only one (1) meter can be calibrated at a time.
- Verify the Product Grade for each assembly, to ensure the correct Calibration Door is opened during the calibration process. Refer to .

Dispensers have an operation mode setting that establishes the pulser's calibration mode. This is set at the factory in the Dispenser Configuration Template (Read-Only Functions F16). The iMeter and the Xflo meter are calibrated using the same procedure.

Variables in method and environment can account for significant measurement error during meter calibrations, therefore, the procedure below should be followed when calibrating or verifying any meter to ensure proper calibration. The factory verifies that all meters are calibratable prior to shipment.

5.8.1 During the Accuracy Verification and Calibration Procedures

- Use a NIST-traceable Prover, and ensure that it is on a level surface.
- Perform a can wet-down.
- Use consistent drain times (minimum 30 seconds recommended).
- Ensure splashing of fluid is minimized and Nozzle is drained of excess fluid.

5.8.2 Accuracy Verification Procedure - iMeter or Xflo

1. Dispense product into a certified 5 gallon or 20 liter calibration container to wet the container and then empty it back into the tank, allowing it to drain for 10 seconds.

    NOTE!   *When temperature compensation is activated (Canada), the dispenser should be placed into ATC Testing Mode, so that the accuracy can be verified using the gross (uncompensated) volume shown on the display in this mode. See the Weights and Measures Mode appendix in the back of this manual appropriate to your dispenser (Category 2 Only, or Category 2 or 3).*

2. Dispense product into the calibration container until exactly 5 gallons (20 liters) are shown on the dispenser display.

3. Compare the reading on the container's sight glass to the dispenser display. For the "Acceptance" test, the container volume should be within a total of ± 1 cu. in. plus ± 0.5 cu. in. for each gallon dispensed for a 5 or 10 gallon prover.

    NOTE!   *For U.S. weights & measures applications, acceptance tolerance of ± 1 cu. in. plus ± 0.5 cu. in. for each gallon dispensed (into a 5 gallon prover) is required for newly placed in service devices for 30 days. After 30 days, the maintenance tolerance is increased to ± 1 cu. in. plus ± 1 cu. in. for each gallon dispensed (into a 5 gallon prover). Consult Handbook 44 for full information.*

4. If the values are out of range, follow the calibration procedure.

5. Repeat the verification procedure for each hose.

5.8.3 Meter Calibration Procedure - iMeter or Xflo

NOTE!　　　*The WIP and the XWIP are physically the same size, but have different colored cases because they are not interchangeable. The WIP used on the iMeter 2 is green and the XWIP used on the Xflo is blue.*

IMPORTANT!　　　If for any reason the WIP is replaced, **be sure the replacement WIP's tabs snap into place** in the meter slots before tightening the two screws that secure the WIP.

1. Dispense product into a certified 5 gallon or 20 liter calibration container to wet the container and then empty it back into the tank, allowing it to drain for 10 seconds.

2. Identify the calibration door for the meter in need of calibration. Refer to Figure 5-4 for the location of the calibration doors.

   NOTE!　　　*An easy way to identify which meter corresponds to which hose is to start at the discharge outlet casting of the desired hose and trace the discharge line back to the meter. When the calibration door of one meter is opened, it automatically closes the solenoid valve to the other meter so each meter can be calibrated independently.*
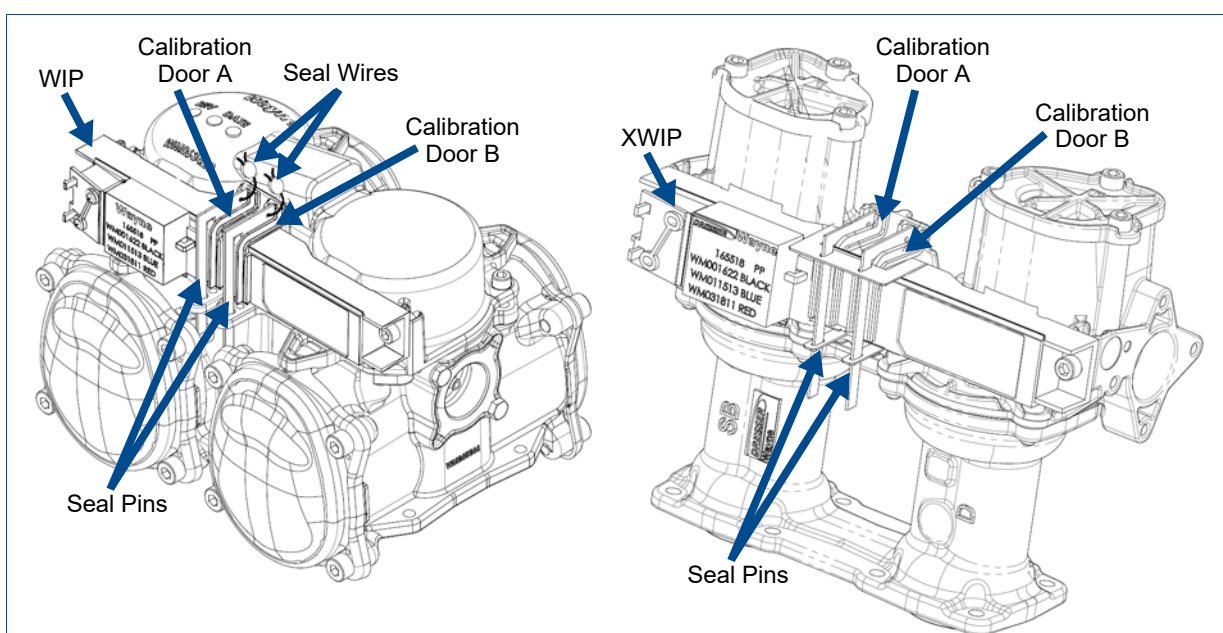

Figure 5-4 iMeter 2 (left) and Xflo (right) fuel meters

3. Remove the seal wire and pin to allow access to the calibration door.

   NOTE!　　　*When temperature compensation is activated (Canada), the dispenser should be placed into ATC Testing Mode, so that the accuracy can be verified using the gross (uncompensated) volume shown on the display in this mode. See the Weights and Measures Mode appendix in the back of this manual appropriate to your dispenser (Category 2 Only, or Category 2 or 3).*

4. Open the calibration door of the meter to be calibrated. Only one door can be opened at a time during the calibration process.

5. Fill the calibration container (5 gallons or 20 liters) to exactly the "0" mark on the sight glass (read the bottom of the meniscus). Disregard any volumes shown on the dispenser display.

6. Close the calibration door. This now redefines the calibration factor in the pulser and return the nozzle to the nozzle boot.

7. Empty the container back into the tank and let it drain for 10 seconds.

8. Verify the accuracy by following the Accuracy Verification procedure.

9. Seal the calibration door.

10. Repeat the calibration procedure for each hose.

5.9 TEST EMERGENCY SHEAR VALVES

Complete the following steps to test the emergency shear valves.

1. Close the shear valve(s) associated with the nozzle position.

2. Activate a transaction on that nozzle position.

3. Open the nozzle into a test can to verify no fuel is flowing. Always be prepared that fuel may flow in case of a failure. Fuel may dribble out for a few seconds but should stop.

4. End the transaction and reset the shear valve to the open position.

5.10 NOZZLE BOOT SWITCH CHECK

In the Helix style nozzle boot, a proximity switch and a magnetic actuator are used for nozzle on/off operation. The proximity switch is attached to the back of the nozzle boot casting. The magnetic actuator is located inside the spring-loaded flipper, which is installed from the top front of the boot casting. When the nozzle is removed, the flipper rotates the magnetic actuator and aligns the actuator with the proximity switch, turning the switch on. There is no adjustment for the switch.

Check the operation of the nozzle switch as follows:

1. Authorize the dispenser and remove the nozzle from the nozzle boot to verify that the switch turns on. An on switch will be indicated by the lighted Push-to-Start buttons and the unit price displays blinking.

2. Insert nozzle slowly into the nozzle boot and check that the switch turns off. The off switch is indicated by the lighted Push-to-Start buttons turning off and the unit price displays stop blinking.

5.11 ANNUNCIATOR OPERATION CHECK

Check that the Annunciator is operating properly on each side of the dispenser. When pressing the keys on the CAT Keypad or the Push-to-Start/Grade Select buttons on the bezel, you should hear the Annunciator beep.

5.12 TEST THE 12-BUTTON PRESET KEYPAD

When a dispenser is equipped with the 12-button preset keypad, shown in Figure 5-5, perform the following steps to verify that the keypad functions correctly.

NOTE!   *It is not necessary to remove the nozzle from the nozzle boot to use the preset keypad.*

1. Touch each of the numbers on the keypad's first row to enter a money preset of $12345.00.

2. Verify the value is shown on the Sales display, then touch the Cancel button to clear the display.

3. Touch each of the numbers on the keypad's second row to enter a money preset of $67890.00.

Figure 5-5 12-button Preset Keypad

4. Verify that the value is shown on the Sales display, then touch the Cancel button to clear the display.

5. Touch the Toggle button then touch any three digit keys to enter a volume preset.

6. Verify that the value is shown on the Volume display, then touch the Cancel button to clear the display.

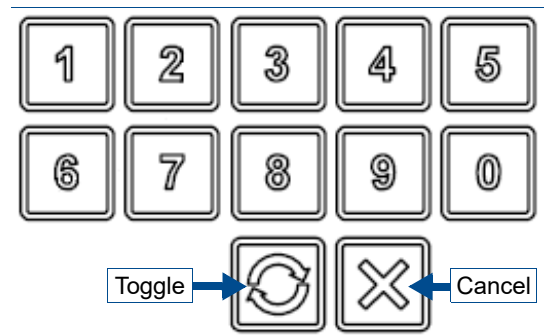7. Repeat the above steps on the other side of the dispenser.

If the keypad does not function as expected, refer to *12-Button Preset Keypad Configuration* on page 98 to verify the keypad configuration.

5.13 PAYMENT PLATFORM CONFIGURATION (OPTIONAL)

Connection details of the iX Pay Secure Payment boards and the SPM keypad are given in the Wayne Helix Service Manual, (P/N WU025076).

For U.S. stations with EPP software, refer to the Wayne iX Pay Secure Payment Initial Startup Configuration for iX R2 or iX Jade Board (P/N W2940079).

For stations with EMV software, refer to the Wayne iX Pay Secure Payment Initial Startup & Configuration iX Pay Secure Payment Platform Software Version EMV 2.8.x (P/N W2940314).

For stations that require the iDPOS software, refer to the Wayne iDPOS Installation & Startup Configuration manual (P/N WU023764).

5.14 WAYNE DISPENSER SECURE ACCESS

For dispensers equipped with the Wayne Dispenser Secure Access security option, arm and disarm using Function F56. Refer to for more information.

5.15 AUDIT REPORTING DISPLAY MODE (WEIGHTS & MEASURES)

NOTE!   *For Weights & Measures Officials and Service Purposes Only*

Weights & Measures Mode contains the following data required by Weights & Measures for each side of the dispenser:

- Blend Ratio Audit Trail
- Volume Metering Unit Change Counter

Weights & Measures Mode is accessed by using the IR Remote Control. Remotes are available at the station.

To use the remote, point at the top-right corner of the Sales Volume Display, keeping it within 12 in. of the display for proper operation.

To access Weights and Measures mode:

1.   Press **ENTER** and then press **CLEAR** twice.

The Sales Display will show **Blend Ratios** with the current Blend Ratios for all blended products.

> ***NOTE!***   *If you do not press another button in 20 seconds, or there is no interaction from the remote, the computer will step through the values.*

2.   Press **NEXT** to view the Blend Ratio Change Counter mode.
3.   Pressing **NEXT** will allow you to toggle through each Blend Ratio Change Counter;
4.   Pressing **NEXT** again will enter into the View Volume Metering Unit Change Counters mode.
5.   The Sales Display will show *n*, where *n* equals the Unit Change Event Number.

The Volume Display contains the metering unit that it was changed to with the following description:

- LitErs = Liters volume unit
- US GAL = U.S. Gallons volume unit
- IP GAL = Imperial Gallons volume unit

6.   Press **CLEAR** and then **ENTER** three (3) times to exit Weights and Measures mode.

5.16 SECURITY PRECAUTIONS

5.16.1 Disable Standalone Mode Operation

Once the dispenser is switched over to the POS Control System, Standalone Operation should be disabled. As an extra security measure, the JP1 jumper that enables Standalone Mode should be removed. The jumper is located on the Sales Display Board as shown in Figure 5-6.

IMPORTANT!   On dispensers with iGEM software version 83.05 or later, failure to remove the standalone jumper **_prior_** to changing to serial mode will disable the dispenser and show "Closed" on the display. Refer to Section 6.9.1 on page 62 for instructions to recover from this scenario.

1. Disarm the Smart Secure Access (SSA) sensors, if equipped. Refer to Section 6.10.1 on page 64 for instructions if the site is configured to require a OneShot password.

    NOTE!   *When SSA is enabled with Maintenance Mode password option, the sensors are disarmed by entering Maintenance Mode. See Section 6.10.2 on page 65 for more information.*

2. Open the Service Door.

3. Remove the **JP1** jumper on the Sales Display Board.

4. Access the Filling Mode **Function F01** and set sub-function to "**01**" for Serial Mode. Refer to Section 6.9 on page 61 for step-by-step instructions.

5. Close and lock the Service Door.

6. If equipped, re-arm the Smart Secure Access (SSA) system with a OneShot password.

    NOTE!   *When enabled with the Maintenance Mode password option the SSA sensors will automatically re-arm one minute after the service door is closed.*
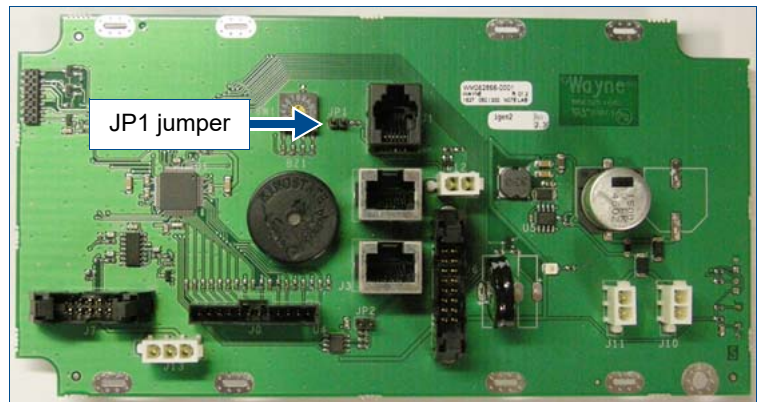
Figure 5-6 Sales Display Board with JP1 Jumper

5.16.2 Change iGEM Passwords

For additional security, the iGEM passwords should be changed from the default settings to prevent unauthorized access to the dispenser. See the Wayne iGEM™ Computer Programming manual (P/N WM048524) as needed. Use function F33 to change the following passwords:

IMPORTANT!   The Weights and Measure password (Function 33.03) MUST NEVER BE CHANGED! Weights and Measures mode does not allow access to any programming. It is a "view-only" mode to provide access to regulatory audit information. If the Weights and Measure password has been changed, reset it to a blank password by going into Function 33.03 then select "#" then "ENTER" then select "#" then "ENTER" again then Save your changes upon exiting programing. Verify that the blank password is in place by entering into the Weights & Measure mode without any password required.

● .00: Service Engineer Password
● .01: Station Manager Password
● .02: Station Operator Password

5.17 BALANCE VAPOR RECOVERY SYSTEM INSTALLATION REQUIREMENTS

5.17.1 Dynamic Back Pressure Testing

At initial installation, balance vapor recovery dispensers should have a dynamic back pressure test performed at each nozzle to ensure there are no blockages in the vapor recovery system. The dispenser should be connected to the underground and the hanging hardware (hoses, nozzles, breakaways, etc.) should be installed.

The following test methods or equivalent methods can be used:

- "ST-27 Gasoline Dispenser Facility Back Pressure." Available from the California Bay Air Management District at https://www.baaqmd.gov.
- "TP201.4 Determination of Dynamic Pressure Performance of Vapor Recovery Systems of Dispensing Facilities." Available from the California Air Resources Board at https://ww2.arb.ca.gov/.

Maximum allowable dynamic back pressure for an individual dispenser nozzle using either test procedure is listed below:

> 60 cu. ft. per hr. < 0.35 in. of water
>
> 80 cu. ft. per hr. < 0.62 in. of water

NOTE!   _Very low numbers for back pressure results may indicate a leak in the system and it should be checked._

5.17.1.1 Back Pressure System Check List

NOTE!   _Check test equipment for up-to-date calibration stickers. Normal use of rotameters and pressure gauges necessitates yearly calibration; calibration is also required if this equipment has been dropped or mishandled._

1. Check test equipment for leaks prior to use. Pressurize with nitrogen supply (plug nozzle end of the fill pipe). Adjust nitrogen until 50% on pressure gauge is reached. Close off supply. A pressure decay must not be more than 0.2 in. of water in five minutes.
2. If facility has a vapor pod (condensate pot), drain prior to testing.
3. Open dry break poppets.
4. Completely drain hoses and nozzles prior to test. A pulsating needle indicates fluid in the lines. Red-rain if necessary.
5. The following information should be included on the field data sheet:
   - Facility address and ID
   - Pump number and grade ID
   - Nozzle make and model
   - Back pressure in inches of water
   - Nitrogen flow rate
6. If back pressure readings are very low (less than .02 @ 20 CFH; 0.18 @ 60 CFH; 0.4 @ 100 CFH):
   a. Check test fixture for tight seal at nozzle entry point.
   b. Check bellows and face seal for tears.
   c. Check vapor piping for leaks.
7. If back pressure readings are high:
   a. Check hoses and nozzle bellows are completely drained.
   b. Check dry break is open. (If only allowed to have one dry break open during the test, try all.)
   c. Check vapor pod.
   d. Check vapor impact valve to be open.
   e. Check piping under dispenser. Should be a minimum of 1 inch diameter piping and fitting.

8.   Check dispenser back pressure, disconnected from the underground and compare to dispenser base line data.

9.   Check hanging hardware separate from dispenser and compare to balance hardware matrix base line data.

10.   Check outlets, hose, and underground, for suspect blockage problems due to fitting bottomed out or casting flashing. Flashing is aluminum edges left over when the casting was made. This should be your last resort to diagnosing high back pressure readings since piping will have to be removed to look inside the casting for flashing. A large amount of flashing would be required to affect readings.

6 OPERATION

6.1 SAFETY PRECAUTIONS

Read Section 2 on page 12 and understand all safety precautions before operating the dispenser.

6.2 BASIC DISPENSER REQUIREMENTS

Unit prices must be set and the dispenser must be authorized for the dispenser to operate. If the dispenser is connected to a control system, each dispenser must have a unique fueling point number set for communication with the system as discussed in Section 4.

If you want to operate a dispenser independently from a control system, perform the following steps to enable Standalone Mode:

1. Move the Authorize switch on the dispenser to the full service position.

    NOTE!   *If the dispenser is not equipped with the Authorize switch, jumper JP1 on the Sales Display board must be installed. This jumper may have been removed at startup.*

2. Access function programming and set the Filling Mode to Stand-alone, as explained in Section 6.8, *Stand-Alone Operation*, on page 60.

6.3 OPERATING THE DISPENSER

1. Authorize the dispenser via the Authorize switch on the dispenser or via the control system.
2. Remove the nozzle from the nozzle boot for either the blended hose or the single product hose. The nozzle boot switch will turn on. The unit price displays of the product(s) not selected will show dashes. If the blending hose is selected, the lighted grade selection buttons for the blending products will blink until a grade selection button is pressed; if the single product hose is selected, the lighted grade selection button for the single product will blink until it is pressed.
3. Push a grade selection button for the desired product to select one of the products from the blending hose, or the one product from the single product hose. The dispenser will reset and prepare for delivery. The sale display will show all eights, then blanks, then the money and volume portion of the display will reset to zero. The unit prices not selected will be blank or show dashes. The grade selection button that was pressed will be steadily lit; the others will be dark. The correct submersible pump(s) will start at the beginning of the reset cycle and the solenoid valve(s) will open approximately three seconds later. Product selection can be changed any time before product flow is sensed by the computer.
4. Dispense product. (Pressing the optional Stop button will stop product flow only. The nozzle boot switch must be cycled and the dispenser must then be reset before that side of the dispenser can continue operation.)
5. Return the nozzle to the nozzle boot. The nozzle boot switch will turn off; the sale will be complete and ready to pay.

NOTE!   *NFPA 30A requires the dispenser to be "manually activated." This requires a separate intentional operation (Push to Start, Cash/Credit selection, or grade selection) after the nozzle is removed from its hang up position.*

6.4 RESTARTING AFTER POWER FAILURE OR SHUTDOWN

After loss of power, the display accurately displays the amount of the sale, in money and volume, for approximately 15 minutes. When power is restored, all sales information returns to the displays. Any sales in progress will be ended; old sales should be paid and the dispenser reauthorized if more product is to be dispensed.

If the dispenser does not operate properly when power is restored (does not deliver product or does not reset), record both the money and volume shown on the display (so sale can be paid) and perform the following:

1.   Ensure all nozzles are properly seated in the nozzle boot.
2.   Authorize the dispenser.
3.   Remove the nozzle from the nozzle boot. The dispenser should operate normally. If the dispenser does not resume normal operation, try cycling power as described in the next section.

6.5 CYCLING POWER TO CLEAR FAULTS

If a fault in the dispenser is detected by the computer, an error message will be displayed in the sale display as described in . Record the displayed error message. It may be possible to restart the dispenser by the following sequence:

1.   Ensure all nozzles are properly seated in the nozzle boot(s).
2.   Turn the control power circuit breaker off for approximately five seconds; the dispenser annunciator will sound. Turn the control power circuit breaker on; the dispenser annunciator will sound again.
3.   Authorize the dispenser.
4.   Remove the nozzle from the nozzle boot. The dispenser should operate normally.

If it is not possible to restart the dispenser using this procedure, or if an error message continues to be displayed, consult appropriate service personnel. Be certain to give the service personnel the amount at which the dispenser stopped and the exact error message given on the sales display.

6.6 ERROR CODES

The iGEM Computer stores the last 50 Error Codes for each side of the dispenser. These can be viewed by accessing Statistical Functions S21 (Side A) and S22 (Side B). The computer stores up to 50 errors per dispenser side, continuing to store errors beyond the 50th by cycling the error buffer, with new errors inserted at the top of the buffer. When this happens, an error is deleted at the bottom of the buffer for every new error that is inserted in the top of the buffer. Only the last 50 errors are stored.

SIDE A Error Codes	Side B Error Codes
Statistic **S21**	Statistic **S22**
Sub-Statistic *.XX* (S21.00 - S21.50)	Sub-Statistic *.XX* (S22.00 - S22.50)

NOTE!   *XX is a value between 01 and 50, with Sub-Statistic .01 being the most recent error/event, and .50 being the oldest.*

Errors are shown on the Sales Volume Display. The display alternates between the two pages of information. Page 1 shows the time, error code, and where the error occurred. Page 2 shows the date and filling count.

Table 6-1 Error Codes shown on Sales Volume Display

Sales Volume Display	Page 1 Error Information	Page 2 Error Information
$:	HH.MM	MM.DD.YY
Gal:	CC.DD.NN	C
	HH = hour	**MM** = month
	MM = minute	**DD** = day
	CC = error code	**YY** = year
	DD = device number	**C** = filling count
	NN = Logical Nozzle Number	

The complete description of the Error Codes is provided in the Helix Service Manual (P/N WU025076).

Computer errors are read by using Maintenance Mode to access the correct Statistics and Sub-Statistics. Perform the following steps using the Remote Control. Bold type denotes Remote Control function; italicized type represents dispenser response.

To access Error Code Sub-Statistics:

1.   Press **ENTER**.
2.   **PASS 1** (enter password)
3.   Press **ENTER**.
4.   **PASS 2** (enter password)
5.   Press **ENTER**. The Unit Price Displays will show F
6.   Press either **UP** or **DOWN** to enter the statistics viewing mode. The Unit Price Display will show S— indicating that a number needs to be selected.
7.   Press **21** to access S21 (error data for Side A which is the Junction Box side)
8.   Press **ENTER**. The Unit Price Display will show 21.01, the first and most recent error data for Side A. The data will be displayed in the 2-page format described earlier, in an alternating sequence, at a 1 second per page rate.
9.   Pressing **NEXT** accesses 21.02 and the display shows information for the second error logged. By pressing **NEXT**, the error buffer can be viewed completely.
10.   To exit, press **CLEAR**, then **UP** or **DOWN**. The Unit Price Display will show S—.
11.   Press **ENTER** three times to exit to the normal display.

6.7 ELECTRONIC TOTALIZER READINGS

6.7.1 Totalizer Readings by Hose (Product) Position

Each fueling point of the dispenser maintains electronic totalizers for both money and volume. Dispensers equipped for Cash/Credit operation also keep separate cash and credit totalizers by grade. Rather than mechanical totalizers, each position has an electro-mechanical totalizer for each feedstock.

See Appendix C, *Hydraulic Configurations - Helix Models 4000 & 5000*, on page 104 for EMT locations.

Electronic totals are stored in statistical functions that are accessed using the IR remote control. The totals for Side 1 are stored in statistical function S01 and those for Side 2 are stored in statistical function S02. The associated sub-functions take the format TN, where T is the type of totals defined below and nozzle position N depends on the dispenser model as defined in Section 5.3.2 on page 37.

> **T** = totals type
>
> 1 = Volume
>
> 2 = Total Money
>
> 3 = Credit
>
> 4 = Cash
>
> 5 = Serial Filing Mode Count
>
> 6 = Stand Alone Mode Filling Count

For example, volume totals by hose position for Side 1 are accessed by examining the contents of statistical function S01.1N while money totals are obtained by accessing S01.2N, where N is the hose position number. For Side 2, the corresponding functions for these variables are S02.1N and S02.2N, respectively.

To read the electronic totalizers, perform the following steps using the IR remote. Bold type denote remote control function; italicized type represents dispenser response:

Accessing the Totalizer Sub-function
1.   Press **ENTER**.
2.   Enter **PASS 1** (enter password)
3.   Enter **PASS 2** (enter password)
4.   Press **ENTER**. The unit price display will show *F--*
5.   Press either **UP** or **DOWN** to enter the statistics viewing mode. The unit price display will show *S--* (indicating a number needs to be selected)
6.   Press **01** to access S01
7.   Press **ENTER**. The unit price display will show *S01* indicating the function has been accessed.
8.   Press **ENTER** to access the sub-functions of S01. The unit price display will show *1.11* and the sales display shows the side 1, volume for nozzle position 1.

Consecutive presses of **NEXT** will advance to the next sub-function, incrementing the value of N by (01). For example, pressing **NEXT** advances the statistical function to S01.12 and the unit price display will show *1.12*. The least significant six (6) digits of the data value appear on the volume display, while higher order non-zero digits of the data value, if present, appear on the money display.

6.7.2 Totalizer Volume Readings by Meter Position

Meter volume totals are stored in statistical functions that are accessed using the remote control. The totals for Side 1 are stored in function S05 and those for Side 2 are stored in function S06. The value of the meter totals are stored in the sub-functions that take the format .M0, where M is the meter number. For example, M=5 for the high feedstock iMeter located on Side 1 of a remote series blender. For Side 2 of the same meter, M=1.

NOTE!   *There is no relationship between meter position and hose position. For example, in [Section 5.3.2](#), positions N=1 and N=5 are not the high feedstock of a remote series blender used in the example above.*

Meter electronic totalizers are read by entering the Maintenance Mode and accessing the correct function and associated sub-functions. Perform the following steps using the remote control. Bold type denote remote control function; italicized type represents dispenser response.

Accessing the Meter Volume Totalizer Sub-function for Side 1

1.   Press **ENTER**.
      PASS 1 (enter password)
2.   Press **ENTER**.
      PASS 2 (enter password)
3.   Press **ENTER**. The unit price display will show *F*
4.   Press either **UP** or **DOWN** arrow to enter the statistics viewing mode. The unit price display will show *S--* (indicating that a number needs to be selected)
5.   Press **05** to access S05
6.   Press **ENTER**. The unit price display will show *S05* (indicating that the statistical function has been accessed)
7.   Press **ENTER** to access the sub-functions of S05. The unit price display will show *5.10* (note here that M=1)

Consecutive pressing of **NEXT** will allow access to the next sub-function, incrementing the value of M by (.1). For example, to access S05.20, press **NEXT**. The unit price display will show 5.20. The value of the meter volume totals is shown in a format such that the least significant six (6) digits of the data value appear on the volume display, while higher order non-zero digits of the data value, if present, appear on the money display. Leading zeros appear as blanks.

Quick Exit

3.   Press the **CLEAR** key until the unit price display window shows S - - .
4.   Press **ENTER** three times. This causes the maintenance mode task to immediately terminate.

6.7.3 Electro-Mechanical Totalizer Operation

Totalizers are optional on Helix dispensers. Electro-Mechanical totalizers are located on the junction box side of the dispenser. There is one totalizer for each meter. The totalizer positions on the bezel relate to the meter position numbers. The physical position of the totalizers, left to right, on the bezel represent meter positions.

The totalizer shows seven digits and reads in whole units (gallons or liters). Fractional amounts that are left over from a previous sale are stored in the dispenser computer. When the next sale of the same product ends, if the fractional amounts from the new sale and previous sale(s) combined are one (1) whole unit or greater, the Electro-Mechanical totalizer is adjusted one whole increment; i.e., if five consecutive sales end with a fractional amount of .2, the Electro-Mechanical totalizer will not account for the fractions until after the fifth sale.

6.8 STAND-ALONE OPERATION

Standalone Mode is used by Field Technicians to by-pass the POS Control System in order to service the dispenser. Standalone Mode is set with the IRC under the F01 Filling Mode Function. For more information about the IRC, see Section 5.3, *Configuration of Basic Parameters Using the Infrared Remote Control (IRC)*, on page 35. Refer to the iGEM Computer Programming Manual (P/N WM048524) for information on available functions.

To Set the Dispenser to Standalone Mode:

NOTE!   *All Nozzles must be hung up before performing the following procedure.*

1.   Perform the following steps with the IRC to change the dispenser mode to standalone operation.

IRC Button	Sales Display	Volume Display	Price Display
Press **ENTER**	*PASS 1*		
Type the corresponding **PASSWORD** Press **ENTER**	*PASS 2*		
Type the **PASSWORD** again Press **ENTER**	*iGEM software version*	*Date*	*F - -*
Press **1** Press **ENTER**	*- - - - - - -*		*F 01*
Press **ENTER**	*- - - - - - -*	*1*	*1.00*
Press **#** Press **2** Press **ENTER**	*- - - - - - - (flashing)*	*2 (flashing)*	*1.00*
Saving the new setting			
Press **ENTER**	*- - - - - - - (flashing)*		*F 01*
Press **0** Press **ENTER**	*- - - - - - -*		*F 00*
Press **ENTER**	*- - - - - - -*	*1*	*0.00*
Press **#** Press **3** Press **ENTER**	*- - - - - - -*	*3*	*0.00*
Press **ENTER**	*CHAnGE*	*StorEd*	

2.   Disarm the Smart Secure Access (SSA) sensors, if equipped. Refer to Section 6.10.1 on page 64 for instructions if the site is configured to require a OneShot password.

>   ***NOTE!***   *When SSA is enabled with Maintenance Mode password option, the sensors are disarmed by entering Maintenance Mode. See Section 6.10.2 on page 65 for more information.*

3.   Open the Service Door.

4.   Install the **JP1** jumper on the Sales Display Board. See Figure 6-1 on page 62.

>   ***NOTE!***   *Perform maintenance or repair as needed while leaving the service door open, then return the dispenser to serial mode by following the instructions in Section 6.9. Perform the following step if the dispenser is to normally operate in standalone mode.*

5.   Close and lock the Service Door. If equipped, re-arm the Smart Secure Access (SSA) system with a OneShot password. See Section 6.10.1 on page 64.

>   ***NOTE!***   *When enabled with the Maintenance Mode password option the SSA sensors will automatically re-arm one minute after the service door is closed. See Section 6.10.2 for more information.*

6.9 SERIAL MODE - POS AUTHORIZES DISPENSER

For a control system to authorize the dispenser the F01 Filling Mode Function needs to be configured using the IRC. For more information about the IRC, see Section 5.3, *Configuration of Basic Parameters Using the Infrared Remote Control (IRC)*, on page 35. Refer to the iGEM Computer Programming Manual (P/N WM048524) for information on available functions.

IMPORTANT!   On dispensers with iGEM software version 83.05 or later, failure to remove the standalone jumper *prior* to changing to serial mode will disable the dispenser and show "Closed" on the display. Refer to Section 6.9.1 on page 62 for instructions to recover from this scenario.

To put the dispenser in Serial Filling Mode:

1. Disarm the Smart Secure Access (SSA) sensors, if equipped. Refer to Section 6.10.1 on page 64 for instructions if the site is configured to require a OneShot password.

   NOTE!   *When SSA is enabled with Maintenance Mode password option, the sensors are disarmed by entering Maintenance Mode. See Section 6.10.2 on page 65 for more information.*

2. Open the Service Door.
3. Remove the **JP1** jumper on the Sales Display Board. See Figure 6-1 on page 62.
4. Perform the following steps with the IRC to change the dispenser mode to serial operation.

IRC Button	Sales Display	Volume Display	Price Display
Press **ENTER**	PASS 1		
Type the corresponding **PASSWORD** / Press **ENTER**	PASS 2		
Type the **PASSWORD** again / Press **ENTER**	iGEM software version	Date	F - -
Press **1** / Press **ENTER**	- - - - - - - (flashing)		F 01
Press **ENTER**	- - - - - - - (flashing)	2 (flashing)	1.00
Press **#** / Press **1** / Press **ENTER**	- - - - - - -	1	1.00
Saving the new setting			
Press **ENTER**	- - - - - - -		F 01
Press **0** / Press **ENTER**	- - - - - - -		F 00
Press **ENTER**	- - - - - - -	1	0.00
Press **#** / Press **3** / Press **ENTER**	- - - - - - -	3	0.00
Press **ENTER**	CHAnGE	StorEd	

5. Close and lock the Service Door. If equipped, re-arm the Smart Secure Access (SSA) system with a OneShot password. See Section 6.10.1 on page 64.

   NOTE!   *When enabled with the Maintenance Mode password option the SSA sensors will automatically re-arm one minute after the service door is closed. See Section 6.10.2 for more information.*

6.9.1 Recovering from Standalone Jumper Fail-safe

On dispensers with iGEM software version 83.05 or later, failure to remove the standalone jumper *prior* to changing the dispenser to serial mode will disable the dispenser and show "Closed" on the display. When this occurs, the error is logged as error #99, logical device #0, device #8. Refer to the iGEM Computer Programming Manual (P/N WM048524) for information about accessing logs and errors.

Perform the following steps to return the dispenser to normal operation.

1. Disarm the Smart Secure Access (SSA) sensors, if equipped. Refer to Section 6.10.1 on page 64 for instructions if the site is configured to require a OneShot password.

    NOTE!   *When SSA is enabled with Maintenance Mode password option, the sensors are disarmed by entering Maintenance Mode. See Section 6.10.2 on page 65 for more information.*

2. Open the Service Door.
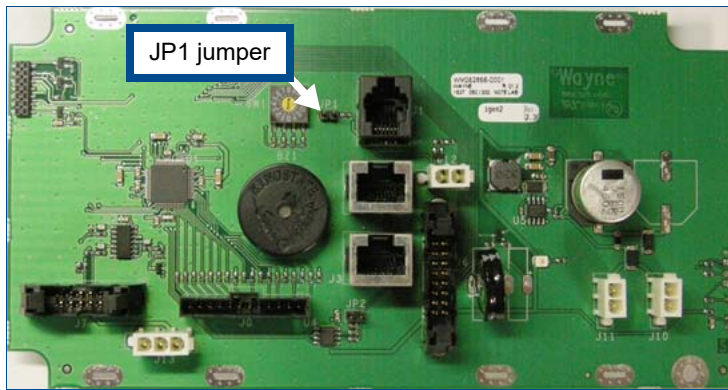3. Remove the **JP1** jumper on the Sales Display Board. See Figure 6-1.

Figure 6-1 Sales Display Board with JP1 Jumper

4. Close and lock the Service Door.
5. Enter and exit Maintenance Mode to clear the fail-safe. Refer to the following instructions.

IRC Button	Sale Display	Volume Display	Price Display
Entering Maintenance Mode			
Press **ENTER**	*PASS 1*		
Type the corresponding **PASSWORD** Press **ENTER**	*PASS 2*		
Type the **PASSWORD** again Press **ENTER**	*iGEM software version*	*Date*	*F - -*
Exiting Maintenance Mode			
Press **0** Press **ENTER**	*- - - - - - -*		*F 00*
Press **ENTER**	*- - - - - - -*	*1*	*0.00*
Press **#** Press **3** Press **ENTER**	*- - - - - - -*	*3*	*0.00*
Press **ENTER**	*CHAnGE*	*StorEd*	

6. If equipped, re-arm the Smart Secure Access (SSA) system with a OneShot password. See Section 6.10.1 on page 64.

    NOTE!   *When enabled with the Maintenance Mode password option the SSA sensors will automatically re-arm one minute after the service door is closed.*

6.10 SMART SECURE ACCESS (SSA)

The required template and Wayne iGEM™ software for dispensers equipped with Smart Secure Access is installed at the factory. Initial startup only requires arming the system using iGEM function F56.00 or F56.01.

Which function to use is predetermined by the customer prior to start-up. Only *one* function can be enabled.

- F56.00 requires a technician to get a OneShot password to arm or disarm the door sensors, or to reset the door sensors after a breach. See Section 6.10.1 on page 64.
- F56.01 allows a technician to arm or disarm the door sensors, or to reset the door sensors after a breach, using only the Maintenance Mode password. See Section 6.10.2 on page 65.

6.10.1 Arming or Disarming Smart Secure Access (SSA) Using a OneShot Password

IMPORTANT!   When Smart Secure Access (SSA) is enabled using Function 56.00, the system MUST be disarmed using the following procedure before opening the bezel doors to prevent a breach.

IRC Button	Sales Display	Volume Display	Price Display
Press **ENTER**	*PASS 1*		
Type the corresponding **PASSWORD** Press **ENTER**	*PASS 2*		
Type the **PASSWORD** again Press **ENTER**	*iGEM software version*	*Date*	*F - -*
Press **56** Press **ENTER**	*- - - - - - -*		*F 56*
Press **0** Press **ENTER**	*5600xx*	*xxxxxx*	*56.00*
The contents of the *Sales* and *Volume* fields show the 12-digit Challenge Code; the first four digits are the function and sub-function. Sign on to DFS Unlock then use the Challenge Code to get the Response Code to enter in the following step; see manual P/N W2940306 for more information about using DFS Unlock. **NOTE!** The prompt times out after two minutes. If the display has returned to the idle state, repeat the above steps to get back to the Challenge Code to enter the Response Code that you have already retrieved.				
Enter Response Code Press **ENTER**	*- - - - - - -*	*0*	*56.00*

To Arm:
  Press **#**
  Press **1**
  Press **ENTER**
	- - - - - - -	*1*	*56.00*

To Disarm:
  Press **#**
  Press **0**
  Press **ENTER**
	- - - - - - -	*0*	*56.00*

Saving the new setting				
Press **ENTER**	*- - - - - - -*		*F 56*
Press **0** Press **ENTER**	*- - - - - - -*		*F 00*
Press **ENTER**	*- - - - - - -*	*1*	*0.00*
Press **#** Press **3** Press **ENTER**	*- - - - - - -*	*3*	*0.00*
Press **ENTER**	*CHAnGE*	*StorEd*	
This has enabled the security switch. After <u>one minute</u> the switch will be armed. Pressing Enter during the one minute period will display "Secure OFF". After one minute, press **ENTER** and the display will show "Secure ON". The procedure is now complete. The bezel should not be opened. **NOTE!** Opening the door anytime after this point will constitute a security breach. At the time a breach occurs, the annunciator will sound a constant alarm tone and the display will show "Closed". To clear the breach, close and secure the doors then access function 56. A new response code will be required.				

6.10.2 Arming or Disarming Smart Secure Access (SSA) Using Maintenance Mode

IRC Button	Sales Display	Volume Display	Price Display
Press **ENTER**	*PASS 1*		
Type the corresponding **PASSWORD** Press **ENTER**	*PASS 2*		
Type the **PASSWORD** again Press **ENTER**	*iGEM software version*	*Date*	*F - -*
Press **56** Press **ENTER**	- - - - - - -		*F 56*
Press **1** Press **ENTER**	- - - - - - -	*0*	*56.01*
To Arm: Press **#** Press **1** Press **ENTER**	- - - - - - -	*1*	*56.01*
To Disarm: Press **#** Press **0** Press **ENTER**	- - - - - - -	*0*	*56.01*
Saving the new setting			
Press **ENTER**	- - - - - - -		*F 56*
Press **0** Press **ENTER**	- - - - - - -		*F 00*
Press **ENTER**	- - - - - - -	*1*	*0.00*
Press **#** Press **3** Press **ENTER**	- - - - - - -	*3*	*0.00*
Press **ENTER**	*CHAnGE*	*StorEd*	
This has enabled the security switch. After <u>one minute</u> the switch will be armed. Pressing Enter during the one minute period will display "Secure OFF". After one minute, press **ENTER** and the display will show "Secure ON". The procedure is now complete. The bezel should not be opened.			
NOTE! Opening the door anytime after this point will constitute a security breach. At the time a breach occurs, the annunciator will sound a constant alarm tone and the display will show "Closed". To clear the breach: open, close and secure the doors then enter Maintenance Mode. The switch will automatically re-arm after one minute and the dispenser will return to the idle operation.			

NOTE! *When Smart Secure Access (SSA) is enabled using Function 56.01, the system can be temporarily disarmed for service by entering Maintenance Mode and then opening the bezel doors. Keep the doors open as long as is needed for service. When finished, close and secure the doors. The switch will automatically re-arm after one minute and the dispenser will return to idle operation.*

7 MAINTENANCE

⚠	**CAUTION!** **EQUIPMENT DAMAGE!**
	To prevent damage to components located in the hydraulic cabinet, dispenser doors should be in place during rainy and/or icy conditions.

7.1 How to Get Service on Your Dispenser

Trouble with the installation of this product should be referred to your DFS ASO. An ASO with a technician number can receive assistance by calling Dover Technical Support (DTS) at:

1-800-926-3737

Customers, Installers, or Distributors who are not an ASO, needing help with the operation or installation of this product, should contact Dover Technical Support (DTS) at:

1-800-289-2963 or support.austin@doverfs.com

IMPORTANT!   Any modification, repair, or service to the dispenser not in accordance with the original design may invalidate compliance with the equipment certifications such as CE Marking, UL, etc. Consult the manufacturer as necessary.

7.2 Preventative Maintenance

Adhere to all safety regulations listed on the inside cover and any other sections where specified when performing preventive maintenance. A correctly-installed dispenser, given proper preventive maintenance, will seldom require emergency service.

Take the following precautions:

- Always make sure ALL power to the dispenser is turned OFF before you open the dispenser cabinet for maintenance. Physically lock, restrain access to, or tag the circuit breakers you turn off when servicing the dispenser. Be sure to trip (close) the emergency valve(s) under the dispenser BEFORE beginning maintenance. Refer to Section 3.10, *Emergency Shutoff Valve*, on page 19 for instructions.
- Do not spray the dispenser with pressurized water. Pressurized water from a power washer or even a garden hose may cause the water to enter the electronic enclosure.
- Hose retractors: Do not abuse the hose by trying to stretch it to reach an automobile. This will cause early failure at the couplings, cable, or clamp. Check the hose retractor periodically for frays or cuts.
- Do not use pipe sealant (pipe dope) on hose / nozzle threads on dispensers equipped with vapor recovery assist systems.

Perform the following checks on a regular basis:

- Check the dispenser for internal and external leaks regularly. Check Nozzle, swivels, hoses, filters, and joints for leaks and wear. Have all leaks or defects repaired immediately.
- Keep the dispenser clean at all times. Use only mild soap and water with a soft cloth. Refer to Section 7.3, *Dispenser Cleaning*, on page 68.

  NOTE!   *Do not spray the dispenser with water! Do not use gasoline or other petroleum-based products to clean the dispenser. Do not use abrasive cleaners on any part of the dispenser.*
- If the doors must be removed during rainy weather, take care to prevent rain from getting inside the dispenser.
- Test the tank for water regularly. Water in petroleum is not only a source of engine trouble, but will also cause damage to the dispenser.
- Check the Nozzle Boot Switch operation to ensure that the flipper up inside the Nozzle Boot, or the up / down side level, depending on model, operates freely.

7.3 DISPENSER CLEANING

Dispenser cleaning should be done frequently and in the manner outlined below. We cannot stress enough that regular care of the dispenser is the most important element of the cleaning procedure. It prevents dirt and liquids from permeating the surface materials and forming stains that can only be removed with more abrasive and aggressive cleaning methods.

NOTE!   *It is important to wipe down the dispenser with a clean cloth and clean water after every cleaning. Periodic waxing of the dispenser surfaces is essential to maintain the original finish and inhibit corrosion. Stainless steel surfaces should be polished with a non-abrasive silicone wax.*

WARNING!
EQUIPMENT DAMAGE!

- **DO NOT** use pressurized water (even from a garden hose) to wash or rinse off a dispenser. Under no circumstance should power washers be used to clean a dispenser. This can force water into the electronic head and cause damage to the electronic components in the dispenser rendering it inoperative.

- **DO NOT** use gasoline or other petroleum based products to clean a dispenser. These products are flammable and can damage paints and plastic parts.

- **DO NOT** use bleach, all-purpose cleaners, or other products that contain chlorine or lye to clean a dispenser. These products are potentially unsafe if mixed with other chemicals, and can damage paints, plastics, and metal parts.

- **Painted Surfaces**

  DFS uses automotive grade paint on all painted surfaces of our dispenser. As such, they can be maintained in the same manner as one would maintain a personal vehicle. The cleaning process level for all Wayne dispensers is based on the amount of dirt or stains on the dispensers. We recommend starting with *Level One* cleaning and moving to the second and third levels only as necessary.

- **Glass and Clear Plastic Surfaces**

  Glass and clear plastic surfaces can be cleaned as outlined in *Level One* cleaning. A household glass cleaner can also be used. It is important that nothing abrasive is used on these surfaces. Please use extra caution during levels two and three cleaning to avoid contact with the display. Should the more aggressive cleaners come in contact with the display, please wash with water immediately.

- **Stainless Steel Surfaces**

  Exposure to contaminants can cause a discoloration of the stainless steel panels. If the discoloration persists after washing as instructed in *Level One* cleaning, the use of an abrasive powder cleaner is very effective in restoring the original shine. Always rub in the same direction of the brush finish on the metal to prevent scratching the stainless steel.

Centers for Disease Control (CDC) Recommendations for Cleaning and Disinfecting of Dispenser Equipment

DFS recognizes the importance of protecting the health and well-being of those who use and service our dispensers from infectious diseases.

- For high-touch areas, such as displays, keypads, card readers, grade select buttons, and nozzles, the CDC recommends both cleaning and disinfecting these surfaces as outlined *Level One* cleaning.

- After cleaning, the elements should be disinfected by gently wiping (DO NOT SPRAY) the hard, non-porous surfaces of the device, paying careful attention to the display, keypad, and other exterior surfaces that might be touched.

  NOTE!   *A list of EPA approved disinfectants is available from* https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2*.*

- The disinfectant should be left on the surface for up to 5 minutes (depending upon the disinfectant). DFS recommends pH balanced surfactant and disinfectant solutions, applied after cleaning.

- Alcohols (typically solutions of 70% alcohol and 30% water) can be very effective when used as a disinfectant, but care should be taken when using these on some plastic surfaces. DFS strongly recommends avoiding the use of bleach or strong alkali based cleaning solutions on the dispenser as these can damage and cause failures to bezels, plastic parts, paints, metals and can be potentially unsafe if mixed with other chemicals.

- Ensure that the manufacturer's instructions for all cleaning products used are followed accurately, and always make sure that there is sufficient ventilation when preparing any toxic solutions.

- Always check the expiration date of any product used. Out-of-date products may not be effective for killing viruses and other infectious agents.

- After disinfecting, ensure that hands and wrists are washed for at least 20 seconds with soap and water, or use hand sanitizer if soap and water are not available.

For questions, please contact your DFS Regional Service Manager.

Dispenser Cleaning Process

DFS recommends using one of the cleaning levels listed below for maintaining dispensers. As with maintaining any painted surface, the climate and surrounding environment will be a factor in how often the dispensers will require cleaning.

There are three levels in the cleaning process. The first level describes the standard cleaning process for dispensers. Levels two and three describe the process for cleaning dispensers that have persistent and stubborn stains. DFS strongly recommends to begin cleaning dispensers using the level one process. If stains are still present, it may be necessary to move to level two or three, depending on the severity of the stains.

- **Level One**

  The first step should be to wash the dispenser using a clean, non-abrasive cloth, warm water, and a mild household cleaner. Dishwashing liquids with degreasing agents work well to remove most of the dirt that accumulates on the dispenser.

  After the above cleaning process, be sure to wipe down the entire dispenser with a clean cloth and clean water. Cleaning residue left on the dispenser will actually attract dirt and lead to a graying effect.

  NOTE!   *As part of Level 1 cleaning, refer to* [Centers for Disease Control (CDC) Recommendations for Cleaning and Disinfecting of Dispenser Equipment](#)*.*

- **Level Two**

  The second step, aimed at removing persistent stains, is to use more aggressive, non-abrasive household cleaners or non-abrasive industrial cleaners.

  After cleaning, be sure to wipe down the entire dispenser with a clean cloth and clean water.

- **Level Three**

  The third step, only for the most stubborn stains, is to use mildly abrasive cleaners. After cleaning, be sure to wipe down the entire dispenser with a clean cloth and clean water.

Periodic waxing of the dispenser surfaces is essential to maintain the original finish and inhibit corrosion. Painted surfaces should be waxed with an automotive wax or polish.

7.4 METER MAINTENANCE

All meters in the dispensers are determined to be calibratable when shipped from the factory.

It is recommended that Wayne fuel meters be periodically checked for acceptable accuracy based on NCWM[1] Handbook 44 under the General Code, G-UR.4, Maintenance Requirements and Liquid Measuring Device Code, Section 3.30. If adjustments need to be made, one would follow the procedure in the service manuals for the respective equipment. All adjustments shall be made in accordance with G-UR.4 Maintenance Requirements of Handbook 44.

Refer to the Meter Calibration Procedure appropriate to your dispenser in Section 5.8, *Meter Calibration - Wayne iMeter™ or Xflo® Fuel Meters*, on page 48.

7.5 HOSE AND HOSE RETRACTOR

IMPORTANT!   Never re-install a broken break-away valve. This can result in serious damage to equipment, vehicles, and possible serious bodily injury.

Hose assemblies should be UL-Listed and installed in accordance with the manufacturer's instructions. To ensure a proper joint, wash all cutting oil off of the threads and use a UL classified gasoline resistant pipe joint sealing compound. Place the compound on male threads only; be careful not to get any excess compound inside fittings. Install the fixed end of the hose to the dispenser outlet; secure according to the instructions of the sealing compound and hose manufacturers. Install the swivel end of the hose or other swivels to the nozzle according to the manufacturer's instructions.

IMPORTANT!   Do not use the sealant on balanced or inverted hoses used with vapor recovery.

NFPA code requires that a Listed emergency breakaway device designed to retain liquid on both sides of the break-away point, must be installed on each hose dispensing Class 1 liquids. These devices must be installed and maintained per the manufacturer's instructions. Refer to the state and local code requirements that apply to your installation.

On vapor recovery dispensers all hoses, nozzles, and breakaways must be CARB certified. DFS recommends using the VR nozzle by VST (manufacturer's part number VST-EVR-NB) and associated hanging hardware.

NOTE!   *On dispensers equipped with the Hose Retractor option, the hose clamp must be mounted above the breakaway device to avoid damage to the dispenser in the event of a drive-off.*

Refer to the following table for combined hose, breakaway, and whip/pigtail maximum lengths.

Hose Type	Length
Non-vapor - 3/4 in (.019 m)	10 ft (3.05 m)
Non-vapor - 5/8 in (.016 m)	14 ft (4.27 m)

⚠️	**WARNING!** **HAZARDOUS CONDITION!**
	Use only Listed hoses and nozzles. Continuity must be present between the dispenser outlet and nozzle spout to prevent static discharge while fueling. Continuity must be checked for each outlet/hose assembly to ensure that the nozzle is grounded. Failure to do so may result in a hazardous condition that could cause serious injury.

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1. National Conference on Weights and Measures

7.6 FILTER / STRAINER - REMOTE

The filter should be changed and the strainer should be cleaned on a regular basis. A dirty filter and strainer may cause the dispenser to deliver fuel slowly. In some cases this may appear to be a more serious service-related problem when simply changing the filter and cleaning the strainer is that is required.

NOTE!   *To prevent fuel spillage when changing filters on Helix dispensers, always place a suitable container under the fuel funnel and use absorbent pads under and around the container.*

NOTE!   *As a safety reminder, always take the necessary precautions to prevent spilling fuel under and around the dispenser.*

NOTE!   *If you have any questions, please contact Dover Technical Support (DTS) at 1-800-926-3737.*

NOTICE! Turn power OFF!
Before removing the filter and strainer, turn the power to the dispenser and submersible pump(s) OFF and close the emergency shut-off valves on the dispenser being serviced. Failure to do so may result in a hazardous condition that can result in serious injury.

The fuel filter is removed the same way an oil filter is removed from a car engine. The new funnel catches fuel that is spilled and will properly drain it into a container. Place a container under the funnel spout when changing the filter.

The strainer is located inside the casting and held in place by the filter. Place a suitable container below the filter/strainer casting to catch product and sediment. Remove the filter and gently pull the strainer out of the filter/strainer casting. Clean strainer screen of any debris. Re-install strainer and a new filter.

To install the new filter, first apply a thin coat of oil to the gasket and hand turn until the gasket contacts the base. Then tighten one half turn. Open the emergency shear valve, turn the submersible circuit breaker ON, and check for leaks.

In new installations it may be necessary to change the filter frequently in the first few days of operation in order to ensure proper operation.

If the underground installation is new it may be necessary to clean the strainer screen two or three times the first few days of operation to remove debris and pipe dope. After this, occasional cleaning of the strainer is all that should be required. The fuel filter should be changed whenever the strainer is cleaned.

NOTE!   *Replacement fuel filter should be UL-recognized. The recommended gasoline and ethanol fuel filters are rated at 10 micron.*

Figure 7-1 Remote Filter

NOTE!   *On E85 dispenser models, use strainer cartridges marked "E85" manufactured by Central Illinois Mfg.*

7.7 FILTER / STRAINER - SUCTION

The filter should be changed and the strainer cleaned on a regular basis. A dirty filter and strainer may cause the dispenser to deliver fuel slowly. In some cases, this may appear to be a more serious service related problem, when simply changing the filter and cleaning the strainer is all that is required.

The fuel filter is removed the same way an oil filter is removed from a car engine. As shown below, the new fuel funnel catches any fuel that is spilled and will properly drain it into a container. Place a container under the funnel spout when changing the filter.

To install the new filter, first apply a film of oil to the gasket and hand turn until the gasket contacts the base. Then tighten one half turn. Open the emergency shear valve, turn the submersible circuit breaker ON and check for leaks.

In new installations it may be necessary to change the filter frequently in the first few days of operation in order to ensure proper operation.

The strainer is located inside the casting and held in place by the filter. Place a suitable container below filter/strainer casting to catch product and sediment. Remove the filter and gently pull the strainer out of the filter/strainer casting. Clean strainer screen of any debris. Reinstall strainer and a new filter.

If the underground installation is new, it may be necessary to clean the strainer screen two or three times the first few days of operation to remove debris and pipe dope. After this, occasional cleaning of the strainer is all that should be required. The fuel filter should be changed whenever the strainer is cleaned.

NOTE!   *Replacement fuel filters should be UL-recognized. The recommended gasoline and ethanol fuel filters are rated at 10 micron.*

Figure 7-2 Suction Filter/Strainer Casting

NOTE!   *On E85 dispenser models, use strainer cartridges marked "E85" manufactured by Central Illinois Mfg.*

⚠️	**WARNING!** **Electric Shock Hazard!**
⚡	Before removing the filter and strainer turn the power OFF to the dispenser. Failure to do so may result in a hazardous condition that can result in serious injury.

Loosen the four screws and rotate the cover. Remove the cover and the attached filter. Replace the filter and reinstall the cover.

7.8 PRINTER MAINTENANCE - DW-14 RS-232 PRINTER

7.8.1 Printer Paper Specification

The printer uses thermal printer paper with the following specifications:

Basic Weight	58.0 ± 5.0 (g/sq meter)
Caliper	0.0023 - 0.0028 in. 0.058 - 0.071 mm
Elmendorf Tear	Main direction - 20 mg (min.) Cross direction - 20 mg (min)
Smoothness	Berk seconds 250 - 550
Base Paper	Kansaki P-300 Koehler KT55F18
Paper Roll Configuration	
Inside Core Diameter	0.68 - 0.79 in. 1.727 - 2.006 cm
Core Annular Thickness	2.32 - 2.36 in. 5.89 - 5.994 cm
Paper and Core Width	2.32 - 2.36 in. 5.89 - 5.994 cm
Finished Roll Diameter	3.80 - 4.00 in. 9.652 - 10.16 cm

7.8.2 Thermal Characteristics

Paper shall not display a visual change in the background color during use and/or storage under cyclic conditions of temperature ranging between 5°C to 52°C with variable humidity ranging between 0% and 90%.

7.8.3 Thermal Response Range

Initiation	75°C (167°F)
Functional	85°C (185°F)
Developed Image	Black

7.8.4 Residual Particles

The annular are represented by the sheared edges of the paper, both sides shall not have more than one particle per square inch nor more than five particles in total per annular surface area. The test for particles shall consist of impressing the adhesive side of a one inch square, or equivalent, strip of black adhesive tape against the surface; removing the strip of tape and examining the adhesive surface for adhering particles.
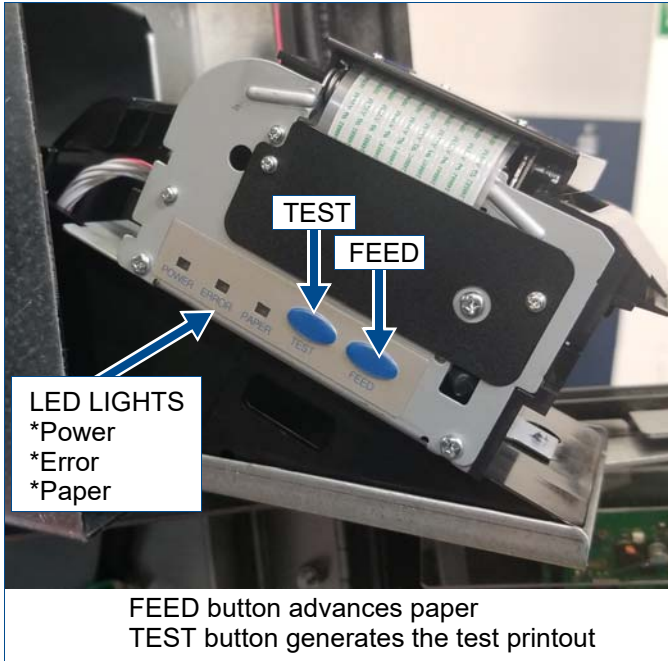
7.8.5 Symptoms and LED Indicators

FEED button advances paper
TEST button generates the test printout

Figure 7-4 DW-14 low profile printer

NOTE!   *The printout shows the printer software switches. There are no manual DIP switches on this printer.*

Table 7-1 Printer Symptoms and LED Indicators

Symptom	POWER LED Green	ERROR LED Red	PAPER LED Orange
Normal Operation	On	Off	Off
Paper at End	On	Off	On
Paper Near End	On	Off	Blinking Fast
Printhead Open	On	On	Off
Paper Loading Jam	On	Off	Blinking
Paper Exit/Chute Jam	On	Blinking	Off
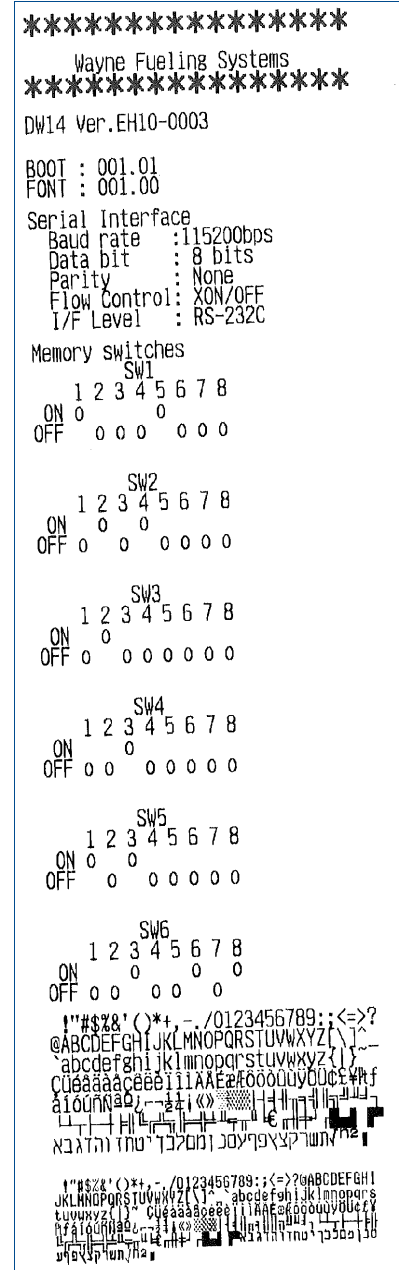
Figure 7-3 DW-14 Printer Test Receipt

7.8.6 Loading Printer Paper

1.   Unlock and open printer door. Slide printer assembly out of the dispenser.

Unlock door   Pull printer out

2.   Remove the old core and place the new roll of paper into the tray so that the paper feeds from the top of the roll into the printer.
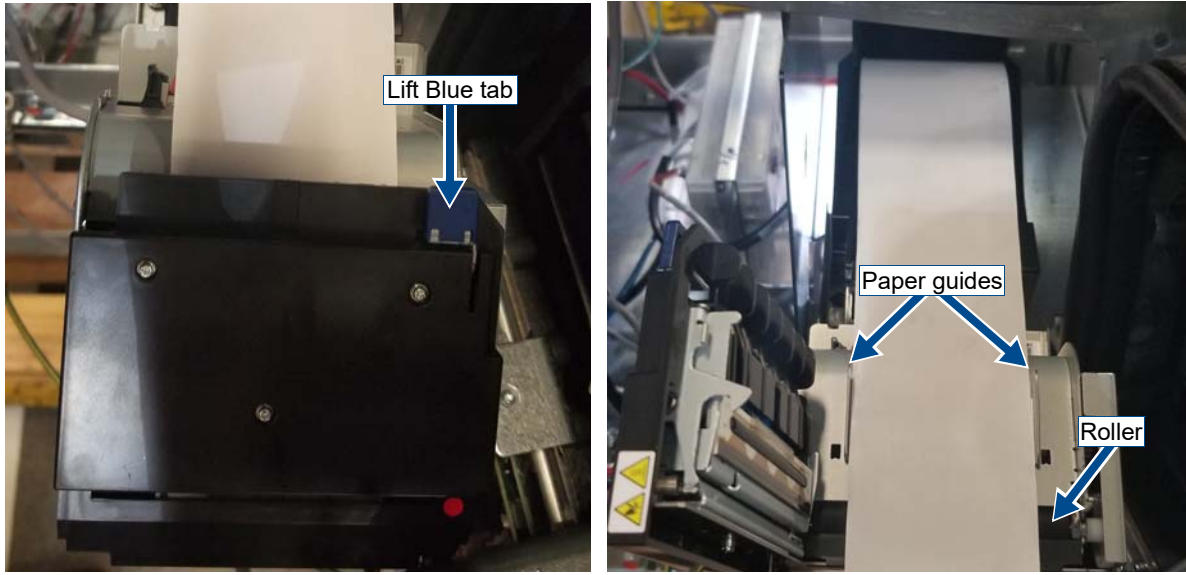

Remove old core

Install new roll
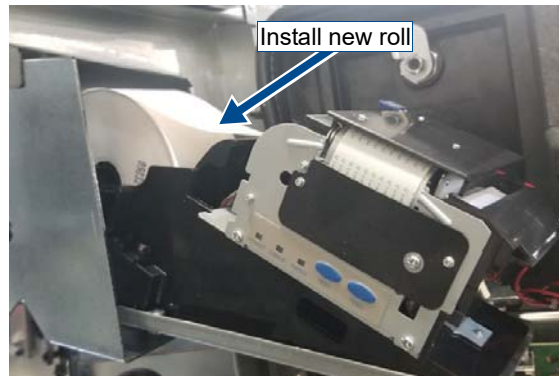
Remove old paper core   Insert new paper

3.   Lift the Blue tab to open the Printhead and remove any left over paper from the previous roll. Pull the new paper to just past the roller, being sure to place it between the paper guides.

4.   Close the Printhead. The printer should advance the paper and generate a test receipt.

5.   Remove the test receipt, push the printer assembly back into the dispenser, then close and lock the printer door.

7.8.7 Clearing Paper Jams

1. Unlock and open printer door. Clear any paper from the paper chute then slide the printer assembly out of the dispenser.
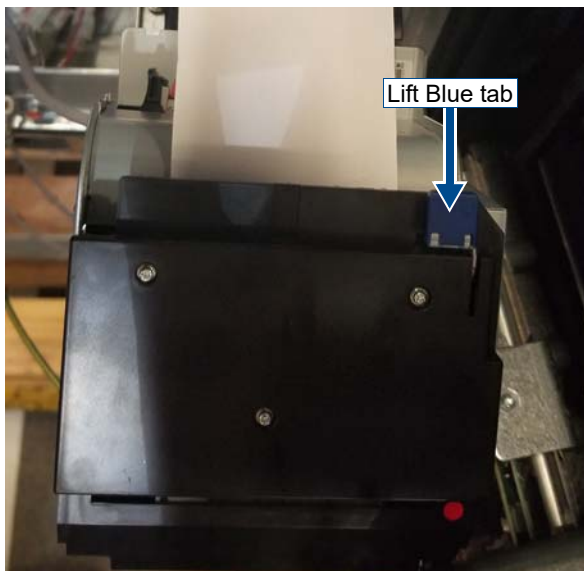

Unlock door   Pull printer out

2. Lift the Blue tab to open the Printhead and remove any paper left under the Printhead. Pull the paper from the roll to just past the roller, being sure to place it between the paper guides.
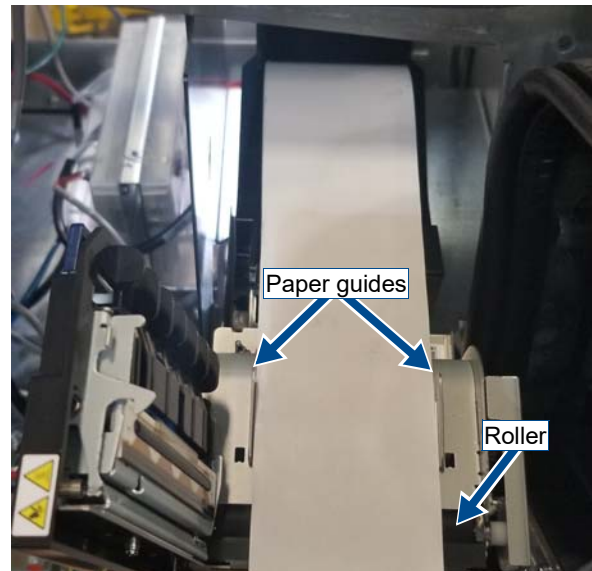
3. Close the Printhead. The printer should advance the paper and generate a test receipt.
4. Remove the test receipt, push the printer assembly back into the dispenser, then close and lock the printer door.

7.9 BALANCE VAPOR RECOVERY MAINTENANCE

All hoses, nozzles, breakaways, etc., must be CARB certified for use on Wayne vapor recovery dispensers.

Tears or rips in the balance nozzle vapor bellows will cause the vapor system to be in non-compliance. Replace or repair the nozzles as necessary.

The bellows face-plate (where nozzle seals on vehicle fuel tank) must make a good seal when inserted into the fuel tank. Damaged or warped faces are not acceptable and will cause the system to be in non-compliance. Replace or repair as necessary.

Wire clamps at top of the bellows may have critical placement to requirement to maintain compliance. If clamp is loose or broken, it must be replaced or repaired according to the nozzle manufacturer instructions.
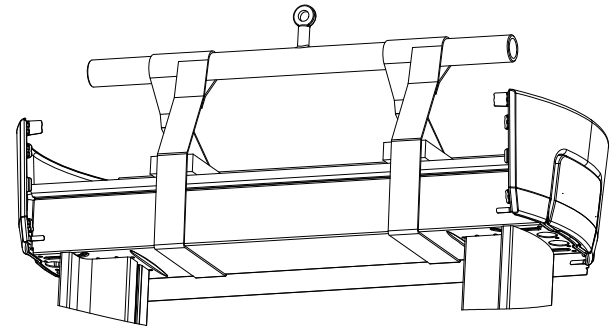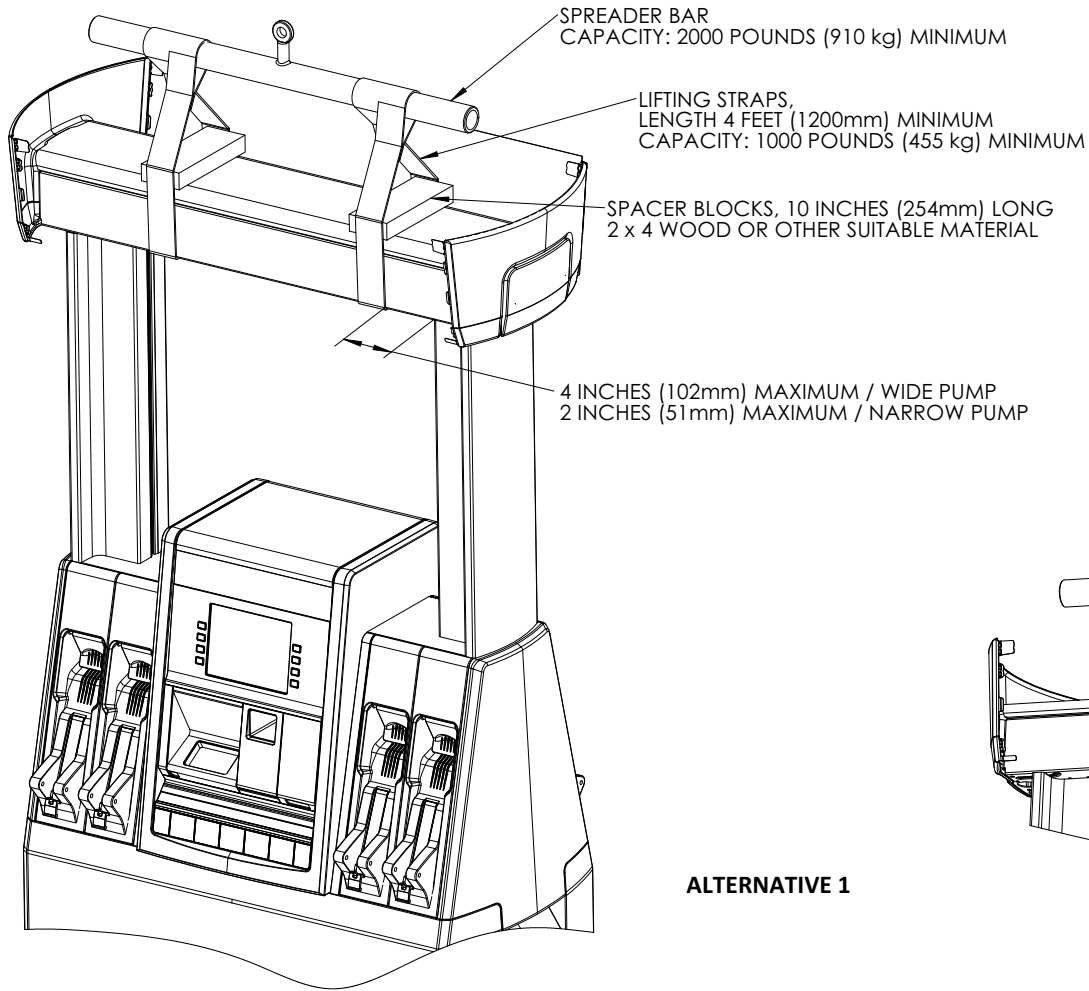
To ensure on-going compliance of the balance system, once per year checks of the pressure drop and tightness of the system are recommended. These test are discussed in Section 5.17, *Balance Vapor Recovery System Installation Requirements*, on page 53.

DFS recommends the following CARB-approved nozzles for dispensers with Balance Vapor Recovery.

● Vapor Systems Technologies (VST) - VST-EVR-NB

APPENDIX A INSTALLATION DRAWINGS

WM046631 - Helix Lifting Instruction, Sheet 1

SPREADER BAR
CAPACITY: 2000 POUNDS (910 kg) MINIMUM

LIFTING STRAPS,
LENGTH 4 FEET (1200mm) MINIMUM
CAPACITY: 1000 POUNDS (455 kg) MINIMUM

SPACER BLOCKS, 10 INCHES (254mm) LONG
2 x 4 WOOD OR OTHER SUITABLE MATERIAL

4 INCHES (102mm) MAXIMUM / WIDE PUMP
2 INCHES (51mm) MAXIMUM / NARROW PUMP

ALTERNATIVE 1

WM046631 - Helix Lifting Instruction, Sheet 2

RUBBER OR SIMILAR MATERIAL
(BETWEEN FORK AND TOP BOX)
TO PROTECT THE PAINTED SURFACE
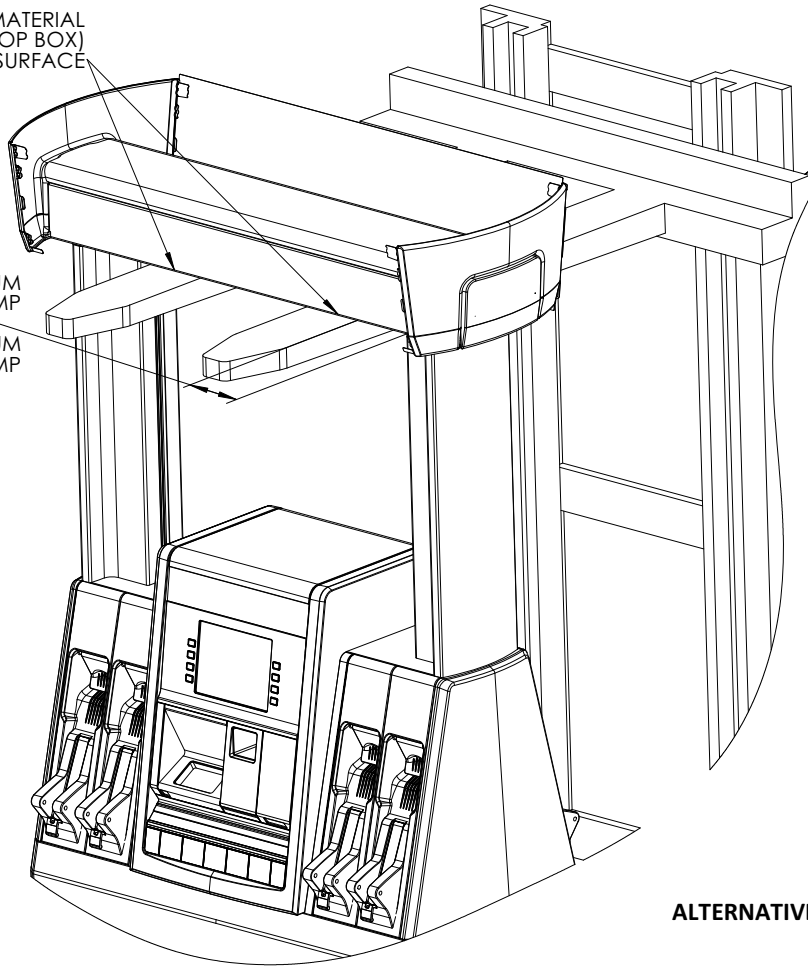
FORK LIFT
CAPACITY: 2000 POUNDS (910 kg) MINIMUM

4 INCHES (102mm) MAXIMUM
WIDE PUMP

2 INCHES (51mm) MAXIMUM
NARROW PUMP

NOTE:
SPACE BETWEEN FORK
AND TOP VALANCE
DURING LIFTING
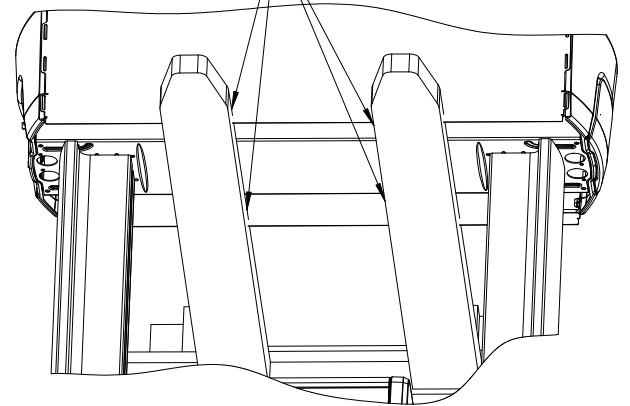
ALTERNATIVE 2

WM046631 - Helix Lifting Instruction, Sheet 3

INSTRUCTION:

PLACE STEEL BARS UNDERNEATH
THE PUMP BY MANUALLY TILTING
THE PUMP SLIGHTLY.
SLIDE IT TO THE PLATFORM.

STEELBARS

PALLET

PLATFORM
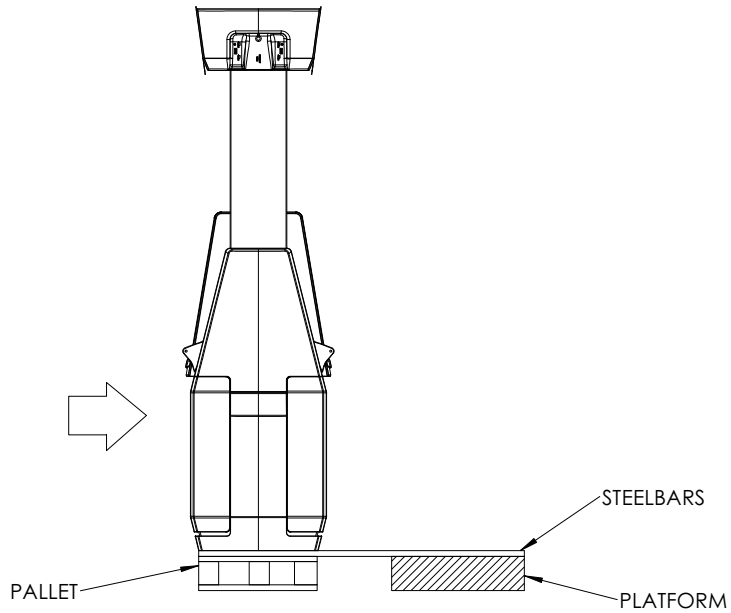
ALTERNATIVE 3

UNLESS NOTED OTHERWISE, DIMENSIONS ARE IN mm

Instruction: Filter Orientation

THE FIRST TWO FILTERS SHOULD BE FACED
TOWARDS THE B-SIDE AND THE THIRD ONE
FACING A-SIDE IN THE NARROW, HELIX 4000

THIS FILTER SHOULD BE ASSEMBLED OPPOSITE TO
THE OTHER TWO FILTERS, AS SHOWN FACING B-SIDE

THE FIRST THREE FILTER SHOULD BE FACED TOWARDS THE
A-SIDE AND THE OTHER FILTER SHOULD BE ASSEMBLED
AS FACING B-SIDE IN THE WIDE, HELIX 5000

NARROW

WIDE

THE DISTANCE BETWEEN
TWO OPPOSITE FACING FILTERS ARE APPR. 27 mm

THE DISTANCE BETWEEN
TWO OPPOSITE FACING FILTERS ARE APPR. 27 mm

240 (2x)

SECTION A-A

SECTION B-B

Appendix A Installation Drawings

WU007415 - Installation Drawing, Helix 4000, Remote, Sheet 1

DESCRIPTION OF CHANGE
ADDED TWO SHEETS FOR CLARITY; ADD LOCATION OF BALANCED VAPOR RETURN; ADD DIMENSIONS BETWEEN COLUMNS AND BETWEEN HEAD AND VALANCE; ADD NOTES; REMOVE 2000 FROM TITLE AND NOTES
NEW SHEET ADDED WITH DIMENSIONS FOR TOP BOX. ETHANOL ADDED FOR WIDE

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL PIPING AND ELECTRICAL INSTALLATIONS MUST CONFORM TO ALL APPLICABLE REGULATIONS INCLUDING NFPA30, FLAMMABLE & COMBUSTIBLE LIQUIDS CODE; NFPA30A, AUTOMOTIVE & MARINE SERVICE STATION CODE; NFPA70, NATIONAL ELECTRICAL CODE. DO NOT " DAISY CHAIN" THE DISPENSER POWER CIRCUIT TO ANY OTHER EQUIPMENT.
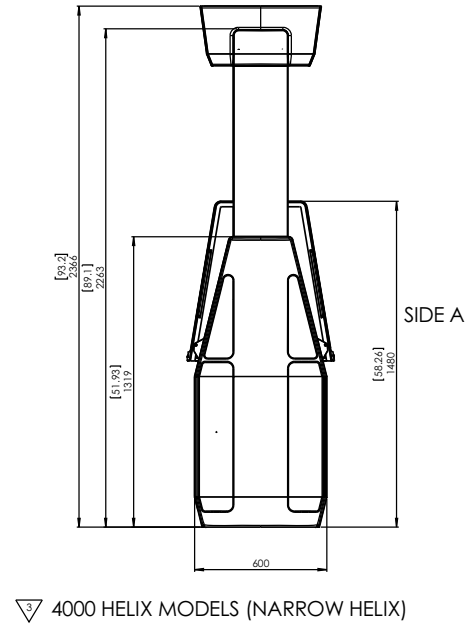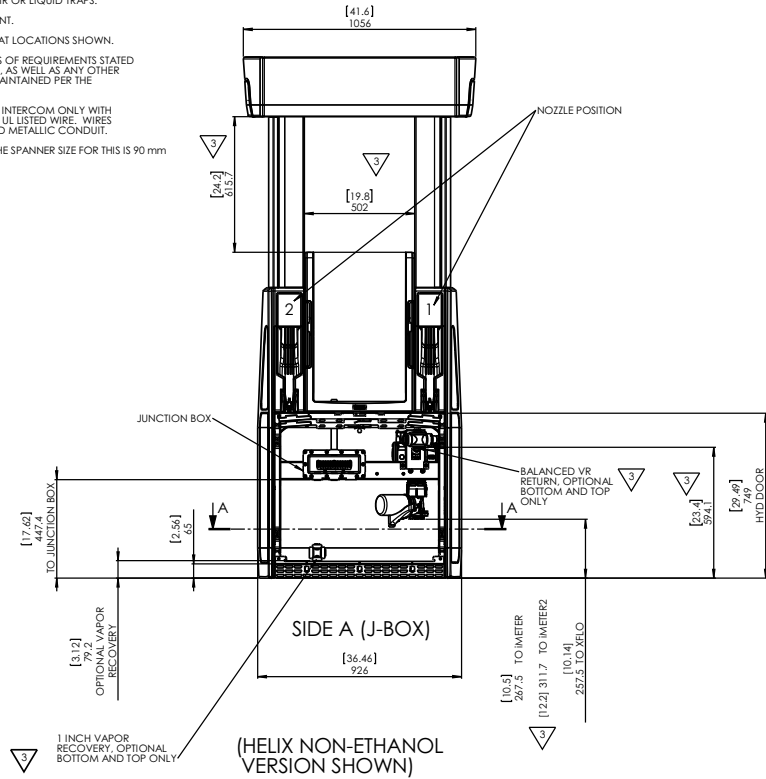
2. PIPING FROM TANK TO DISPENSER SHOULD SLOPE UPWARDS TO AVIOD AIR OR LIQUID TRAPS.

3. USE UNIVERSAL POINTS AT DISPENSER TO ALLOW FOR GROUND MOVEMENT.

4. FIRMLY MOUNT THE DISPENSER TO THE ISLAND USING THE ANCHOR BOLT AT LOCATIONS SHOWN.

5. EMERGENCY SHUTOFF VALVES AND BREAKAWAY DEVICES ARE EXAMPLES OF REQUIREMENTS STATED IN THE NFPA30A AUTOMOTIVE & MARINE SERVICE STATION CODE. THESE, AS WELL AS ANY OTHER SAFETY DEVICES REQUIRED BY NFPA30 & 30A, MUST BE INSTALLED AND MAINTAINED PER THE MANUFACTURER'S INSTRUCTIONS.

6. CONNECT OPTIONAL INTERCOM CIRCUIT TO A LISTED CLASS 2 POWERED INTERCOM ONLY WITH 18 GAUGE MINIMUM, AT LEAST 90 DEGREE C, 600 V GAS & OIL RESISTANT UL LISTED WIRE. WIRES BACK TO INTERCOM POWER MUST BE RUN IN SEPARATE DEDICATED LISTED METALLIC CONDUIT.

7. THE COUPLING SHOULD BE TIGHTENED WITH A TORQUE OF 120 Nm AND THE SPANNER SIZE FOR THIS IS 90 mm

8. REMOVED

NOZZLE POSITION

JUNCTION BOX

BALANCED VR RETURN, OPTIONAL BOTTOM AND TOP ONLY

SIDE A (J-BOX)

(HELIX NON-ETHANOL VERSION SHOWN)

1 INCH VAPOR RECOVERY, OPTIONAL BOTTOM AND TOP ONLY

OPTIONAL VAPOR RECOVERY

SIDE A

4000 HELIX MODELS (NARROW HELIX)

UNLESS NOTED OTHERWISE, DIMENSIONS ARE IN mm

MATERIAL			DEBURR AND BREAK SHARP EDGES	SCALE 1:10	DO NOT SCALE DRAWING		Related Drawing
THICKNESS						DOVER FUELING SOLUTIONS	
SURFACE TREATMENT							
SURFACE FINISH			TITLE INSTALLATION INSTRUCTION HELIX 4000 AND 5000, UL, REMOTE				DRAWING NO. WU007415
GENERAL TOLERANCE							
REPLACED BY						SHEET 1 OF 5	A1

APPROVED BY		03.12	WU019777-0001
DRAWN BY Jenny Jakobsen	REV	DATE	ECN NO.

SW FORM REF: WB000245 Revision 01.6

WU007415 - Installation Drawing, Helix 4000, Remote, Sheet 2

DESCRIPTION OF CHANGE
ADDED TWO SHEETS FOR CLARITY; ADD LOCATION OF BALANCED VAPOR RETURN; ADD DIMENSIONS BETWEEN COLUMNS AND BETWEEN HEAD AND VALANCE; ADD NOTES; REMOVE 2000 FROM TITLE AND NOTES
NEW SHEET ADDED WITH DIMENSIONS FOR TOP BOX. ETHANOL ADDED FOR WIDE

[32.7]
831

[30.16]
766
INSIDE FRAME

[0.7]
4X Ø18
FOR 3/8" ANCHOR BOLTS
USE 1-1/2" DIA x 1/8" THICK FENDER
WASHER ON TOP SIDE OF FRAME

[0.75]
19

[9.45]
240

[9.45]
240

[2.64]
66.9

[9.25]
235

[17.32]
440
INSIDE FRAME

[20]
507

[9.25]
235

[7.85]
199.5

[31.3]
794.2

[7.8]
197.8

[7.6]
193
VAPOR

[3]
2X 76.2

1-1/2" NPT INLET

3X CONDUIT LOCATION

BALANCED VR RETURN

[4.53]
115

[7.58]
192.6   OPTIONAL
VAPOR RECOVERY

[10.43]
265

[10.43]
265

SIDE A (J-BOX)

SECTION A-A
SCALE 1 : 5

	Helix with Single Valves			Helix with Dual Valves		
Relay Select	X	Y	Z	X	Y	Z
Meter Position	1	2	3	1	2	3
Product	Lo	Hi	Special	Hi	Lo	Special

HELIX 4000 (NARROW) METER POSITIONS

3	2	1

SIDE A (J-BOX)

UNLESS NOTED OTHERWISE, DIMENSIONS ARE IN mm

| MATERIAL | | DEBURR AND BREAK SHARP EDGES | SCALE 1:10 | DO NOT SCALE DRAWING | | DOVER FUELING SOLUTIONS | Related Drawing |

THICKNESS

SURFACE TREATMENT

SURFACE FINISH

GENERAL TOLERANCE

REPLACED BY

APPROVED BY   03.12   WU019777-0001

DRAWN BY   REV   DATE   ECN NO.
Jenny Jakobsen

TITLE
INSTALLATION INSTRUCTION
HELIX 4000 AND 5000, UL, REMOTE

DRAWING NO.
WU007415

SHEET 2 OF 5   A1

SW   FORM REF: W8000245 Revision 01.6
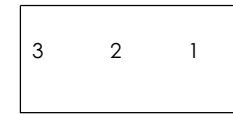
WU007415 - Installation Drawing, Helix 5000, Remote, Sheet 3

DESCRIPTION OF CHANGE
ADDED TWO SHEETS FOR CLARITY; ADD LOCATION OF BALANCED VAPOR RETURN; ADD DIMENSIONS BETWEEN COLUMNS AND BETWEEN HEAD AND VALANCE; ADD NOTES; REMOVE 2000 FROM TITLE AND NOTES
NEW SHEET ADDED WITH DIMENSIONS FOR TOP BOX. ETHANOL ADDED FOR WIDE

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL PIPING AND ELECTRICAL INSTALLATIONS MUST CONFORM TO ALL APPLICABLE
    REGULATIONS INCLUDING NFPA30, FLAMMABLE & COMBUSTIBLE LIQUIDS CODE;
    NFPA30A, AUTOMOTIVE & MARINE SERVICE STATION CODE;
    NFPA70, NATIONAL ELECTRICAL CODE. DO NOT " DAISY CHAIN" THE DISPENSER
    POWER CIRCUIT TO ANY OTHER EQUIPMENT.

2. PIPING FROM TANK TO DISPENSER SHOULD SLOPE UPWARDS TO AVIOD AIR OR LIQUID TRAPS.

3. USE UNIVERSAL POINTS AT DISPENSER TO ALLOW FOR GROUND MOVEMENT.

4. FIRMLY MOUNT THE DISPENSER TO THE ISLAND USING THE ANCHOR BOLT AT LOCATIONS SHOWN.

5. EMERGENCY SHUTOFF VALVES AND BREAKAWAY DEVICES ARE EXAMPLES OF REQUIREMENTS STATED
    IN THE NFPA30A AUTOMOTIVE & MARINE SERVICE STATION CODE. THESE, AS WELL AS ANY OTHER
    SAFETY DEVICES REQUIRED BY NFPA30 & 30A, MUST BE INSTALLED AND MAINTAINED PER THE
    MANUFACTURER'S INSTRUCTIONS.

6. CONNECT OPTIONAL INTERCOM CIRCUIT TO A LISTED CLASS 2 POWERED INTERCOM ONLY WITH
    18 GAUGE MINIMUM, AT LEAST 90 DEGREE C, 600 V GAS & OIL RESISTANT UL LISTED WIRE. WIRES
    BACK TO INTERCOM POWER MUST BE RUN IN SEPARATE DEDICATED LISTED METALLIC CONDUIT.

7. THE COUPLING SHOULD BE TIGHTENED WITH A TORQUE OF 120 Nm AND THE SPANNER SIZE FOR THIS IS 90 mm

JUNCTION BOX

BALANCED VR
RETURN, OPTIONAL
BOTTOM AND TOP
ONLY

HYDRAULIC DOOR

[52.3]
1328

[30.4]
772

[24.2]
615.7

[93.2]
2366

[89.1]
2263

[51.93]
1319

[58.27]
1480

SIDE A (J-BOX)

5000 HELIX MODELS (WIDE HELIX)

[17.62]
447.4
TO JUNCTION BOX

[3.12]
79.2
OPTIONAL VAPOR
RECOVERY

[14.7]
372.7 TO ETHANOL

[23.4]
594.7

[29.5]
749

SIDE A (J-BOX)

[47.09]
1196

[10.5]
267.9 TO METER

[12.2] 311.7 TO METER2

[10.14]
257.5 TO XFLO

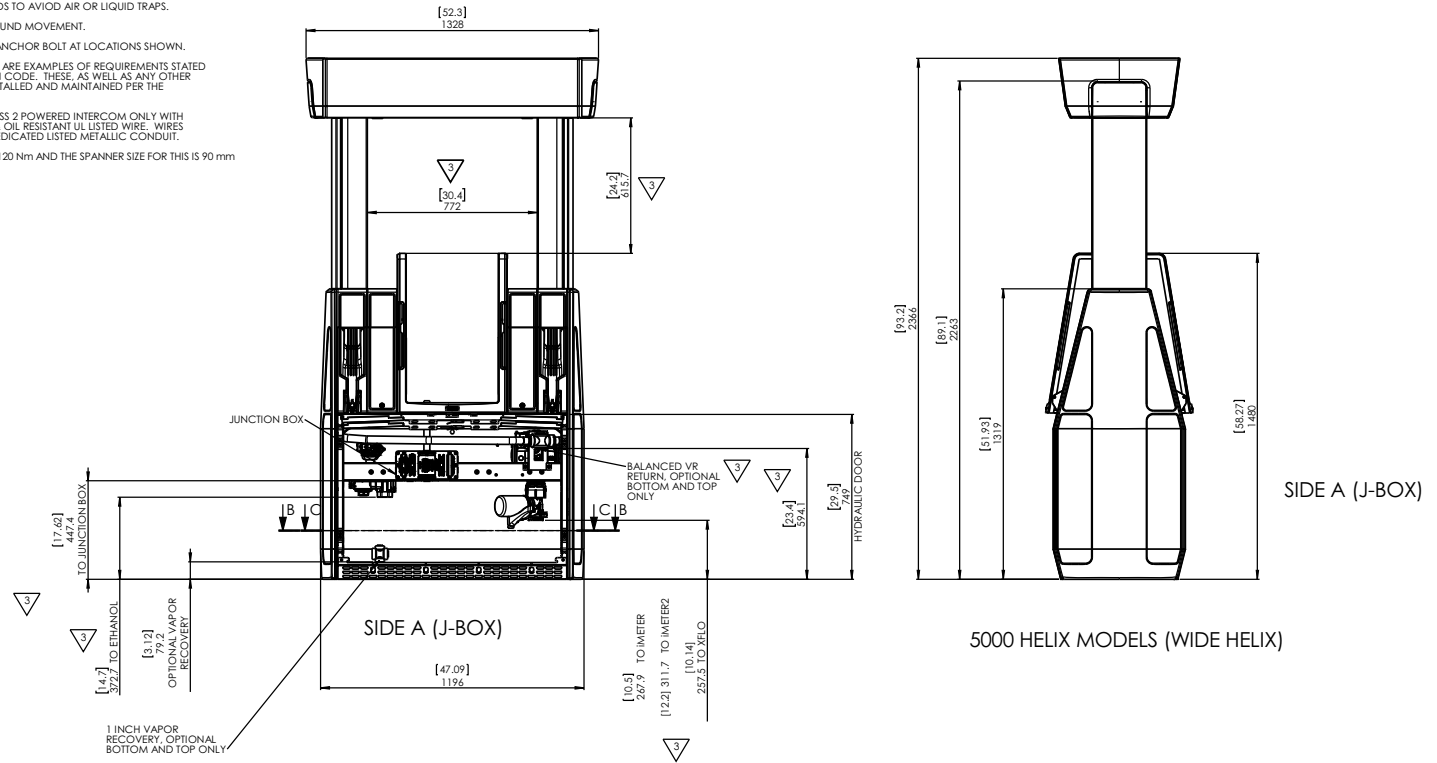1 INCH VAPOR
RECOVERY, OPTIONAL
BOTTOM AND TOP ONLY

UNLESS NOTED OTHERWISE, DIMENSIONS ARE IN mm

MATERIAL		DEBURR AND BREAK SHARP EDGES	SCALE 1:10	DO NOT SCALE DRAWING		Related Drawing
THICKNESS					DOVER FUELING SOLUTIONS	
SURFACE TREATMENT						
SURFACE FINISH				TITLE INSTALLATION INSTRUCTION		DRAWING NO. WU007415
GENERAL TOLERANCE				HELIX 4000 AND 5000, UL, REMOTE		
REPLACED BY						SHEET 3 OF 5

APPROVED BY		03.12	WU019777-0001
DRAWN BY Jenny Jakobsen	REV	DATE	ECN NO.

SW   FORM REF: W8000245 Revision 01.6

WU007415 - Installation Drawing, Helix 5000, Remote, Sheet 4

DESCRIPTION OF CHANGE
ADDED TWO SHEETS FOR CLARITY; ADD LOCATION OF BALANCED VAPOR RETURN; ADD DIMENSIONS BETWEEN COLUMNS AND BETWEEN HEAD AND VALANCE; ADD NOTES; REMOVE 2000 FROM TITLE AND NOTES
NEW SHEET ADDED WITH DIMENSIONS FOR TOP BOX. ETHANOL ADDED FOR WIDE

SIDE A (J-BOX)

WIDE METER POSITIONS

| 4 | 3 | 2 | 1 |
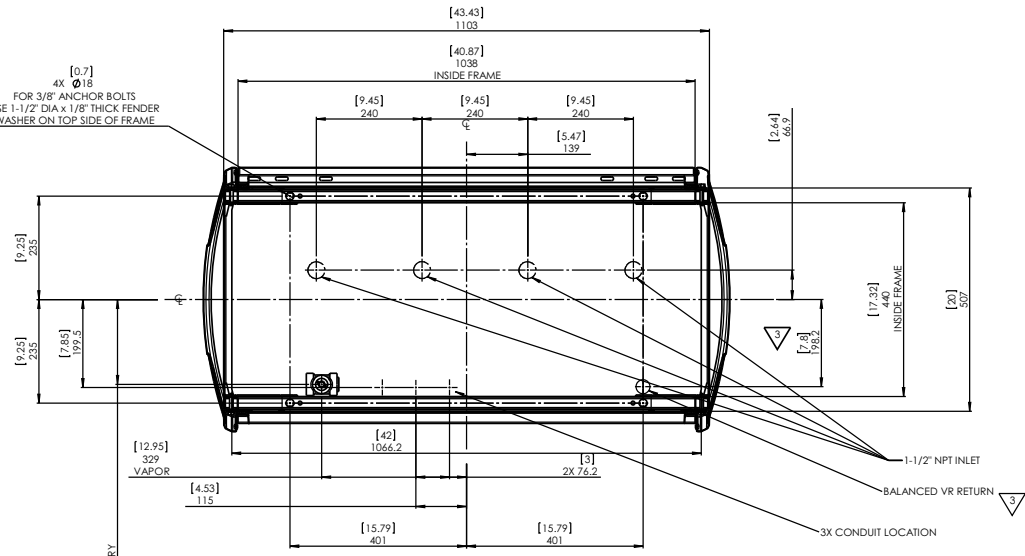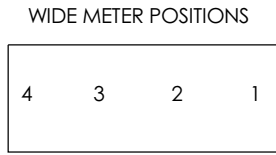
SIDE A (J-BOX)

E85 SIDE A (J-BOX)

	Helix with Single Valves				Helix with Dual Valves			
Relay Select	X	Y	Z	AA	X	Y	Z	AA
Meter Position	1	2	3	4	1	2	3	4
Product	Lo	Hi	Special	Special	Hi	Lo	Special	Special

UNLESS NOTED OTHERWISE, DIMENSIONS ARE IN mm

MATERIAL		DEBURR AND BREAK SHARP EDGES	SCALE 1:10	DO NOT SCALE DRAWING		DOVER FUELING SOLUTIONS	Related Drawing
THICKNESS							
SURFACE TREATMENT			TITLE				DRAWING NO.
SURFACE FINISH			INSTALLATION INSTRUCTION				WU007415
GENERAL TOLERANCE			HELIX 4000 AND 5000, UL, REMOTE				SHEET 4 OF 5
REPLACED BY							A1

APPROVED BY — 08.12 — WU019777-0001
DRAWN BY Jerry Jakobsen — REV — DATE — ECN NO.

SW FORM REF: W8000245 Revision 01.6

WU007415 - Installation Drawing, Helix 4000 and 5000, Remote, Sheet 5

DESCRIPTION OF CHANGE
ADDED TWO SHEETS FOR CLARITY; ADD LOCATION OF BALANCED VAPOR RETURN; ADD DIMENSIONS BETWEEN COLUMNS AND BETWEEN HEAD AND VALANCE; ADD NOTES; REMOVE 2000 FROM TITLE AND NOTES
NEW SHEET ADDED WITH DIMENSIONS FOR TOP BOX. ETHANOL ADDED FOR WIDE

DIMENSIONS FOR TOP BOX

4000 HELIX MODELS (NARROW HELIX)

5000 HELIX MODELS (WIDE HELIX)

UNLESS NOTED OTHERWISE, DIMENSIONS ARE IN mm

MATERIAL		DEBURR AND BREAK SHARP EDGES	SCALE 1:10	DO NOT SCALE DRAWING		Related Drawing
THICKNESS						
SURFACE TREATMENT						
SURFACE FINISH		TITLE INSTALLATION INSTRUCTION HELIX 4000 AND 5000, UL, REMOTE			DRAWING NO. WU007415	
GENERAL TOLERANCE						
REPLACED BY					SHEET 5 OF 5	A1

| APPROVED BY | | 03.12 | | WU019777-0001 |
| DRAWN BY Jenny Jakobsen | | REV | DATE | ECN NO. |

SW   FORM REF: WB000245 Revision 01.6

WU18653 - Installation Wiring Diagram - Remote

Not all configurations are UL Listed. Only those dispensers that bear a UL mark are Certified.

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL EQUIPMENT TO BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NFPA 70) AND THE AUTOMOTIVE AND MARINE SERVICE STATION CODE (NFPA 30A). NOTE: DATA AND RELAY SELECT WIRES ARE CONSIDERED CLASS 1 CIRCUITS.

2. FOR SUPPLY CONNECTIONS, USE WIRES RATED AT LEAST 90°C (194°F), 600V, GAS & OIL RESISTANT.

3. DISPENSER CONTROL POWER:

    A. VOLTAGE: 110/120 VAC 50/60 Hz
       AMPERAGE: 8.0 AMPS MAX

    B. VOLTAGE: 220/240 VAC 50/60 Hz
       AMPERAGE: 4.0 AMPS

4. REMOTE DISPENSERS REQUIRE A RELAY TO INTERFACE TO THE SUBMERSIBLE PUMP MOTOR. A LISTED MAGNETIC MOTOR CONTROLLER ASSY IS RECOMMENDED.

5. IN MULTIPLE DISPENSER INSTALLATIONS, ALL DISPENSERS OPERATING THE SAME SUBMERSIBLE PUMP CONTROL RELAY MUST BE CONNECTED TO THE SAME MAIN POWER CIRCUIT BREAKER. THIS MAY REQUIRE MULTIPLE PUMP CONTROL RELAYS FOR A SUBMERSIBLE PUMP.

6. THE ELECTRICAL INTERCONNECTIONS SHOWN ON THIS DRAWING ARE TYPICAL WHEN ADDITIONAL LIKE DISPENSERS ARE INSTALLED AT A SITE. SEE APPROPRIATE MODEL NO. INSTALLATION WIRING DIAGRAM WHEN OTHER MODELS ARE BEING INSTALLED.

7. FOR FULL DETAILS OF WAYNE CONTROL SYSTEMS INTERCONNECTIONS SEE THE MANUAL PROVIDED WITH THE WAYNE PUMP CONTROL SYSTEM OR WAYNE CARD PROCESSING SYSTEM.

8. LIGHTED VALANCE READY DISPENSERS ONLY. LIGHTED VALANCES ATTACHED TO THE DISPENSER SHOULD BE "LISTED BY REPORT" IN ACCORDANCE WITH NFPA 30A, CLAUSE 6.3.2.1. FOLLOW INSTRUCTIONS PROVIDED BY VALANCE MANUFACTURER AND SECURE ALL OPEN WIRING AWAY FROM SHARP EDGES, INCLUDING SHEET METAL.

9. OPTIONAL SPEAKER INSTALLATION WIRING IS LOCATED IN JUNCTION BOX. CONNECT INTERCOM CIRCUIT TO A LISTED CLASS 2 POWERED INTERCOM, AS PER NEC(NFPA70, PARAGRAPH 725.136 (D)(2)(6), ONLY WITH 18 GAUGE MINIMUM, AT LEAST 90°C,600 V GAS & OIL RESISTANT UL LISTED WIRE. WIRES BACK TO INTERCOM POWER MUST BE RUN IN SEPARATE DEDICATED UL LISTED METALLIC CONDUIT.

WIRE COLOR

BLACK	BK
BLUE	BE
BROWN	BN
GRAY	GY
GREEN	GN
ORANGE	OE
PINK	PK
VIOLET	VT
WHITE	WE
YELLOW	YW

EXAMPLE

WE/RD	WHITE WITH RED STRIPE

TO LIGHTED VALANCE POWER SUPPLY, OPTIONAL. SEE NOTE 8.

TO DATA DISTRIBUTION CABINET FOR CONNECTION TO A WAYNE PUMP CONTROL SYSTEM, OPTIONAL. SEE NOTE 7.

TO SITE CONTROLLER CABINET FOR CONNECTION TO A WAYNE CARD PROCESSING SYSTEM, OPTIONAL. SEE NOTE 7.

TO SUBMERSIBLE PUMP CONTROL RELAY COILS. SEE NOTES 4 AND 5.

UNLESS NOTED OTHERWISE, DIMENSIONS ARE IN mm

APPROVED						
Rory Rinkevich	01	2019-01-30	First Rev.			
DRAWN	REV	DATE	ECN NO.			
Lennie Reeh						

MATERIAL		DEBURR AND BREAK SHARP EDGES	SCALE 1:4	DO NOT SCALE DRAWING		Related Drawing
THICKNESS					**DOVER** FUELING SOLUTIONS	
SURFACE TREATMENT						
SURFACE FINISH		TITLE				DRAWING NO.
GENERAL TOLERANCE		INSTALLATION WIRING DIAGRAM				WU018653
REPLACED BY		HELIX METAL HEAD, REMOTE DISPENSER				SHEET 1 OF 1 A3

SW   FORM REF: WB000247 Revision 01.6

Junction Box Terminal Strip Wiring - Remote

Terminal	Color	Connection	Product Designation Single Valve	Product Designation Multi Valve
1	Black	AC Hot		
2				
3	White/Red	Relay Select	LO (X)	HI (X)
4	White/Brown	Relay Select	HI (Y)	LO (Y)
5	White/Black	Relay Select	Special (Z)	Special (Z)
6	White/Blue	Relay Select	Special (AA)	Special (AA)
7	White	Neutral		
8				
9	Brown	CAT TX / RX +		
10	Violet	CAT TX / RX -		
11	Yellow	Current Loop 1 +		
12	Violet	Current Loop 2 -		
NC	Orange	Wayne TRAC TX / RX +		
NC	Blue	Wayne TRAC TX / RX -		
option NC	Blue	Intercom Speaker +		
option NC	White	Intercom Speaker -		
option NC	Blue	Call Button +		
option NC	Blue	Call Button -		

WU011861 - Installation Drawing, Helix 4000, Suction, Sheet 1

DESCRIPTION OF CHANGE
ADDED TWO SHEETS FOR CLARITY; ADD LOCATION OF BALANCED VAPOR RETURN; ADD DIMENSIONS BETWEEN COLUMNS AND BETWEEN HEAD AND VALANCE; ADD NOTES; REMOVE 2000 FROM TITLE AND NOTES
NEW SHEET WITH DIMENSIONS FOR TOP BOX ADDED

NOTES: UNLESS OTHERWISE SPECIFIED

1.   ALL PIPING AND ELECTRICAL INSTALLATIONS MUST CONFORM TO ALL APPLICABLE
     REGULATIONS INCLUDING NFPA30, FLAMMABLE & COMBUSTIBLE LIQUIDS CODE;
     NFPA30A, AUTOMOTIVE & MARINE SERVICE STATION CODE;
     NFPA70, NATIONAL ELECTRICAL CODE. DO NOT " DAISY CHAIN" THE DISPENSER
     POWER CIRCUIT TO ANY OTHER EQUIPMENT.

2.   PIPING FROM TANK TO DISPENSER SHOULD SLOPE UPWARDS TO AVIOD AIR OR LIQUID TRAPS.

3.   USE UNIVERSAL JOINTS AT DISPENSER TO ALLOW FOR GROUND MOVEMENT.

4.   FIRMLY MOUNT THE DISPENSER TO THE ISLAND USING THE ANCHOR BOLT AT LOCATIONS SHOWN.

5.   EMERGENCY SHUTOFF VALVES AND BREAKAWAY DEVICES ARE EXAMPLES OF REQUIREMENTS STATED
     IN THE NFPA30A AUTOMOTIVE & MARINE SERVICE STATION CODE. THESE, AS WELL AS ANY OTHER
     SAFETY DEVICES REQUIRED BY NFPA30 & 30A, MUST BE INSTALLED AND MAINTAINED PER THE
     MANUFACTURER'S INSTRUCTIONS.

6.   CONNECT OPTIONAL INTERCOM CIRCUIT TO A LISTED CLASS 2 POWERED INTERCOM ONLY WITH
     18 GAUGE MINIMUM, AT LEAST 90 DEGREE C, 600 V GAS & OIL RESISTANT UL LISTED WIRE. WIRES
     BACK TO INTERCOM POWER MUST BE RUN IN SEPARATE DEDICATED LISTED METALLIC CONDUIT.

7.   THE COUPLING SHOULD BE TIGHTENED WITH A TORQUE OF 120 Nm AND THE SPANNER SIZE FOR THIS IS 90 mm

8.   REMOVED

NOZZLE POSITION

JUNCTION BOX

SIDE A

BALANCED VR
RETURN, OPTIONAL
BOTTOM AND TOP
ONLY

SIDE A

4000 HELIX MODELS (NARROW HELIX)

UNLESS NOTED OTHERWISE, DIMENSIONS ARE IN mm

MATERIAL		DEBURR AND BREAK SHARP EDGES	SCALE 1:10	DO NOT SCALE DRAWING		**DOVER** FUELING SOLUTIONS	Related Drawing
THICKNESS						
SURFACE TREATMENT			TITLE		DRAWING NO.
SURFACE FINISH			INSTALLATION INSTRUCTION		WU011861
GENERAL TOLERANCE			HELIX 4000 AND 5000, UL, SUCTION		SHEET 1 OF 5
REPLACED BY					A1

| APPROVED BY | 02.8 | | WU019777-0001 |
| DRAWN BY Jenny Jakobsen | REV | DATE | ECN NO. |

SW   FORM REF: WB000245 Revision 01.6

WU011861 - Installation Drawing, Helix 4000, Suction, Sheet 2

DESCRIPTION OF CHANGE
ADDED TWO SHEETS FOR CLARITY; ADD LOCATION OF BALANCED VAPOR RETURN; ADD DIMENSIONS BETWEEN COLUMNS AND BETWEEN HEAD AND VALANCE; ADD NOTES; REMOVE 2000 FROM TITLE AND NOTES
NEW SHEET WITH DIMENSIONS FOR TOP BOX ADDED

[0.7]
4X   Ø18
FOR 3/8" ANCHOR BOLTS
USE 1-1/2" DIA x 1/8" THICK FENDER
WASHER ON TOP SIDE OF FRAME

[32.7]
830

[30.2]
766
INSIDE FRAME

[0.6]
14.6

[5.6]
141.6

[9.25]
235

[9.25]
235

[7.9]
199.5

[17.3]
440
INSIDE FRAME

[20]
507

[7.8]
197.8

1-1/2" NPT INLET

BALANCED VR RETURN

2X CONDUIT LOCATION

[6.5]
165.2

[3]
2X 76.2

[4.53]
115

USE THIS POSITION
WITH TWO HYD TREE

[10.43]
265

[10.43]
265

[31.3]
794.2

SECTION A-A
SCALE 1 : 5

NARROW METER POSITIONS

2   1

SIDE A (J-BOX)

UNLESS NOTED OTHERWISE, DIMENSIONS ARE IN mm

| MATERIAL | | DEBURR AND BREAK SHARP EDGES | SCALE 1:10 | DO NOT SCALE DRAWING | | Related Drawing |
| THICKNESS | | | | | DOVER FUELING SOLUTIONS | |

APPROVED BY   02.8   WU019777-0001

DRAWN BY   REV   DATE   ECN NO.
Jenny Jakobsen

SURFACE TREATMENT
SURFACE FINISH
GENERAL TOLERANCE
REPLACED BY

TITLE
INSTALLATION INSTRUCTION
HELIX 4000 AND 5000, UL, SUCTION

DRAWING NO.
WU011861

SHEET 2 OF 5   A1

SW   FORM REF: WB000245 Revision 01.6

WU011861 - Installation Drawing, Helix 5000, Suction, Sheet 3

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

DESCRIPTION OF CHANGE
ADDED TWO SHEETS FOR CLARITY; ADD LOCATION OF BALANCED VAPOR RETURN; ADD DIMENSIONS BETWEEN COLUMNS AND BETWEEN HEAD AND VALANCE; ADD NOTES; REMOVE 2000 FROM TITLE AND NOTES
NEW SHEET WITH DIMENSIONS FOR TOP BOX ADDED

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL PIPING AND ELECTRICAL INSTALLATIONS MUST CONFORM TO ALL APPLICABLE REGULATIONS INCLUDING NFPA30, FLAMMABLE & COMBUSTIBLE LIQUIDS CODE; NFPA30A, AUTOMOTIVE & MARINE SERVICE STATION CODE; NFPA70, NATIONAL ELECTRICAL CODE. DO NOT " DAISY CHAIN" THE DISPENSER POWER CIRCUIT TO ANY OTHER EQUIPMENT.

2. PIPING FROM TANK TO DISPENSER SHOULD SLOPE UPWARDS TO AVIOD AIR OR LIQUID TRAPS.

3. USE UNIVERSAL JOINTS AT DISPENSER TO ALLOW FOR GROUND MOVEMENT.

4. FIRMLY MOUNT THE DISPENSER TO THE ISLAND USING THE ANCHOR BOLT AT LOCATIONS SHOWN.

5. EMERGENCY SHUTOFF VALVES AND BREAKAWAY DEVICES ARE EXAMPLES OF REQUIREMENTS STATED IN THE NFPA30A AUTOMOTIVE & MARINE SERVICE STATION CODE. THESE, AS WELL AS ANY OTHER SAFETY DEVICES REQUIRED BY NFPA30 & 30A, MUST BE INSTALLED AND MAINTAINED PER THE MANUFACTURER'S INSTRUCTIONS.

6. CONNECT OPTIONAL INTERCOM CIRCUIT TO A LISTED CLASS 2 POWERED INTERCOM ONLY WITH 18 GAUGE MINIMUM, AT LEAST 90 DEGREE C, 600 V GAS & OIL RESISTANT UL LISTED WIRE. WIRES BACK TO INTERCOM POWER MUST BE RUN IN SEPARATE DEDICATED LISTED METALLIC CONDUIT.

7. THE COUPLING SHOULD BE TIGHTENED WITH A TORQUE OF 120 Nm AND THE SPANNER SIZE FOR THIS IS 90 mm

[52.3]
1328

[30.4]
772

[24.2]
615.7

JUNCTION BOX

[18.65]
473.6
TO JUNCTION BOX

IE B   B IE

[93.2]
2366

[51.93]
1319

[23.4]
594.1

[29.5]
749
HYD DOOR

[4.8]
120.8

[47.09]
1196

SIDE A

BALANCED VR RETURN, OPTIONAL BOTTOM AND TOP ONLY

[89.1]
2263

[58.27]
1480

SIDE A

SECTION E-E

5000 HELIX MODELS (WIDE HELIX)

UNLESS NOTED OTHERWISE, DIMENSIONS ARE IN mm

| MATERIAL | | DEBURR AND BREAK SHARP EDGES | SCALE 1:10 | DO NOT SCALE DRAWING | | DOVER FUELING SOLUTIONS | Related Drawing |

THICKNESS
SURFACE TREATMENT
SURFACE FINISH
GENERAL TOLERANCE
REPLACED BY

APPROVED BY   02.8   WU019777-0001

DRAWN BY   REV   DATE   ECN NO.
Jerry Jakobsen

TITLE
INSTALLATION INSTRUCTION
HELIX 4000 AND 5000, UL, SUCTION

DRAWING NO.
WU011861
SHEET 3 OF 5   A1

SW   FORM REF: WB000245 Revision 01.6

WU011861 - Installation Drawing, Helix 5000, Suction, Sheet 4

DESCRIPTION OF CHANGE
ADDED TWO SHEETS FOR CLARITY; ADD LOCATION OF BALANCED VAPOR RETURN; ADD DIMENSIONS BETWEEN COLUMNS AND BETWEEN HEAD AND VALANCE; ADD NOTES; REMOVE 2000 FROM TITLE AND NOTES
NEW SHEET WITH DIMENSIONS FOR TOP BOX ADDED

SECTION B-B
SCALE 1 : 5

WIDE METER POSITIONS

| 3 | 2 | 1 |

SIDE A (J-BOX)

UNLESS NOTED OTHERWISE, DIMENSIONS ARE IN mm

MATERIAL
THICKNESS
SURFACE TREATMENT
SURFACE FINISH
GENERAL TOLERANCE
REPLACED BY

DEBURR AND BREAK SHARP EDGES
SCALE 1:10
DO NOT SCALE DRAWING

Related Drawing

TITLE
INSTALLATION INSTRUCTION
HELIX 4000 AND 5000, UL, SUCTION

DRAWING NO.
WU011861
SHEET 4 OF 5   A1

APPROVED BY
DRAWN BY Jenny Jakobsen
REV 02.8
DATE
ECN NO. WU019777-0001

SW   FORM REF: WB000245 Revision 01.6

WU011861 - Installation Drawing, Helix 4000 and 5000, Suction, Sheet 5

DESCRIPTION OF CHANGE
ADDED TWO SHEETS FOR CLARITY; ADD LOCATION OF BALANCED VAPOR RETURN; ADD DIMENSIONS BETWEEN COLUMNS AND BETWEEN HEAD AND VALANCE; ADD NOTES; REMOVE 2000 FROM TITLE AND NOTES
NEW SHEET WITH DIMENSIONS FOR TOP BOX ADDED

DIMENSIONS FOR TOP BOX

4000 HELIX MODELS (NARROW HELIX)

5000 HELIX MODELS (WIDE HELIX)

UNLESS NOTED OTHERWISE, DIMENSIONS ARE IN mm

TITLE
INSTALLATION INSTRUCTION
HELIX 4000 AND 5000, UL, SUCTION

DRAWING NO. WU011861
SHEET 5 OF 5

WU018654 - Installation Wiring Diagram - Suction

Not all configurations are UL Listed. Only those dispensers that bear a UL mark are Certified.

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL EQUIPMENT TO BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NFPA 70) AND THE AUTOMOTIVE AND MARINE SERVICE STATION CODE (NFPA 30A). NOTE: DATA AND RELAY SELECT WIRES ARE CONSIDERED CLASS 1 CIRCUITS.

2. FOR SUPPLY CONNECTIONS, USE WIRES RATED AT LEAST 90°C (194°F), 600V, GAS & OIL RESISTANT.

3. DISPENSER CONTROL POWER:

   A. VOLTAGE: 110/120 VAC 50/60 Hz
       AMPERAGE: 8.0 AMPS MAX

   B. VOLTAGE: 220/240 VAC 50/60 Hz
       AMPERAGE: 4.0 AMPS

4. THE ELECTRICAL INTERCONNECTIONS SHOWN ON THIS DRAWING ARE TYPICAL WHEN ADDITIONAL LIKE DISPENSERS ARE INSTALLED AT A SITE. SEE APPROPRIATE MODEL NO. INSTALLATION WIRING DIAGRAM WHEN OTHER MODELS ARE BEING INSTALLED.

5. FOR FULL DETAILS OF WAYNE CONTROL SYSTEMS INTERCONNECTIONS SEE THE MANUAL PROVIDED WITH THE WAYNE PUMP CONTROL SYSTEM OR WAYNE CARD PROCESSING SYSTEM.

6. LIGHTED VALANCE READY DISPENSERS ONLY. LIGHTED VALANCES ATTACHED TO THE DISPENSER SHOULD BE "LISTED BY REPORT" IN ACCORDANCE WITH NFPA 30A, CLAUSE 6.3.2.1. FOLLOW INSTRUCTIONS PROVIDED BY VALANCE MANUFACTURER AND SECURE ALL OPEN WIRING AWAY FROM SHARP EDGES, INCLUDING SHEET METAL.

7. OPTIONAL SPEAKER INSTALLATION WIRING IS LOCATED IN JUNCTION BOX. CONNECT INTERCOM CIRCUIT TO A LISTED CLASS 2 POWERED INTERCOM, AS PER NEC(NFPA70, PARAGRAPH 725.136 (D)(2)(6), ONLY WITH 18 GAUGE MINIMUM, AT LEAST 90°C,600 V GAS & OIL RESISTANT UL LISTED WIRE. WIRES BACK TO INTERCOM POWER MUST BE RUN IN SEPARATE DEDICATED LISTED METALLIC CONDUIT.

NEUTRAL TO LIGHTED VALANCE POWER SUPPLY, OPTIONAL.
HOT   SEE NOTE 6.

NOTE! See item 12 on page 112 regarding Aboveground Storage Tank (AST) requirements.

TANK 1
TANK 2   TO ABOVE GROUND TANK VALVES
TANK 3
NEUTRAL

DATA -   TO DATA DISTRIBUTION CABINET FOR CONNECTION TO A WAYNE PUMP
DATA +   CONTROL SYSTEM, OPTIONAL. SEE NOTE 5.

DATA -   TO SITE CONTROLLER CABINET FOR CONNECTION TO A WAYNE CARD
DATA +   PROCESSING SYSTEM, OPTIONAL. SEE NOTE 5.

NOTE! See Table 4-1 on page 30 regarding wiring requirements for suction pumps.

WIRE COLOR	
BLACK	BK
BLUE	BE
BROWN	BN
GRAY	GY
GREEN	GN
ORANGE	OE
PINK	PK
VIOLET	VT
WHITE	WE
YELLOW	YW
EXAMPLE	
WE/RD	WHITE WITH RED STRIPE

UNLESS NOTED OTHERWISE, DIMENSIONS ARE IN mm

APPROVED Rory Rinkevich	01	2019-01-30	First Rev.
DRAWN Lennie Reeh	REV	DATE	ECN NO.

MATERIAL		DEBURR AND BREAK SHARP EDGES	SCALE 1:4	DO NOT SCALE DRAWING		**DOVER** FUELING SOLUTIONS	Related Drawing
THICKNESS							
SURFACE TREATMENT							DRAWING NO.
SURFACE FINISH		TITLE					WU018654
GENERAL TOLERANCE		INSTALLATION WIRING DIAGRAM					
REPLACED BY		HELIX METAL HEAD, SUCTION					SHEET 1 OF 1

SW   FORM REF: WB000247 Revision 01.6

Junction Box Terminal Strip Wiring - Suction

Terminal	Color	Connection	Product Designation
1	Black	AC HOT	Main Conduit
2	Red	PUMP 1- HOT	Side Conduit
3	Brown	PUMP 2- HOT	
4	Black	PUMP 3- HOT	
5	White	NEUTRAL	Main Conduit
6	White/Red	PUMP 1- NEUTRAL	Side Conduit
7	White/Brown	PUMP 2- NEUTRAL	
8	White/Black	PUMP 3- NEUTRAL	
9	Brown	CAT TX / RX +	
10	Violet	CAT TX / RX -	
11	Yellow	Current Loop 1 +	
12	Violet	Current Loop 2 -	
	Green/Yellow	Ground	Main Conduit
3X	Green/Yellow	Ground	Side Conduit
option NC	Orange	Wayne TRAC TX / RX +	Main Conduit
option NC	Blue	Wayne TRAC TX / RX -	
option NC	Black	Lighted Valance (Optional) HOT	
option NC	White	Lighted Valance (Optional) NEUTRAL	
option NC	Blue	Intercom Speaker +	
option NC	White	Intercom Speaker -	
option NC	Blue	Call Button +	
option NC	Blue	Call Button -	

12-Button Preset Keypad Configuration

Helix dispensers may be equipped with the 12-button preset keypad, shown in Figure A-1,which allows entering a fuel volume or money amount at which the dispenser will automatically stop the flow of fuel.

This keypad communicates with the dispenser via the CAN bus, and is configured using a CAN bus termination jumper and two 16-position rotary switches as shown in Figure A-2.
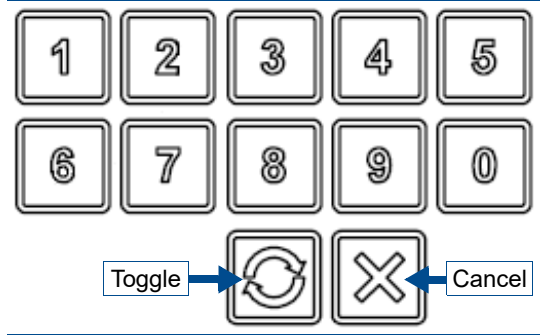
Figure A-1 12-button Preset Keypad
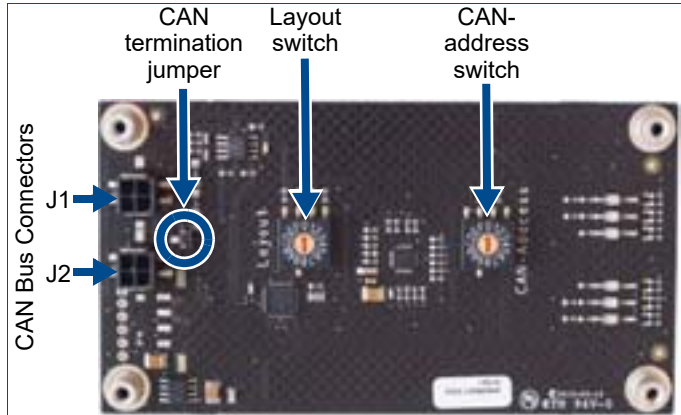
Figure A-2 P/N WU023122-0001

The positions on the rotary switches, shown in Figure A-3, may be labeled either as 1-16 (left) or 0-F (right). There is no guarantee of which variant will be available at the time of manufacture, therefore the switch positions for both variants are provided below.

CAN-Address Switch

Dispenser Side	Switch Variant	
	1-16	0-F
Side A	1	0
Side B	2	1
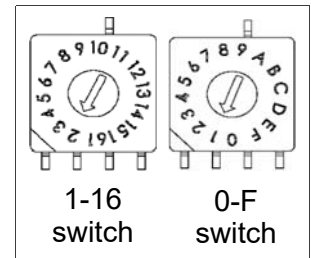
**Figure A-3
16-Position Rotary
Switch Variants**

Layout Switch

Keypad Layout	Switch Variant		iGEM Button Numbering				
	1-16	0-F					
12-Button Preset 5x3	1	0	1	9	2	10	3
			11	4	12	5	13
			17	■	6	14	21

CAN Bus Termination

See Figure A-2 for the location of the CAN bus termination jumper, then refer to Appendix E, *Dispenser CAN Bus Configuration / DIP Switch Settings*, on page 113.

APPENDIX B SITE INTERCONNECTION DIAGRAMS

Backroom Installation

NOTES:

1 MULTIPLE RELAY CABINETS ARE NEEDED IN SOME INSTALLATIONS. SEE ALSO PUMP RELAY INSTALLATION WIRING DIAGRAM.

2 THE SECOND DATA DISTRIBUTION CABINET IS NEEDED ONLY IN INSTALLATIONS REQUIRING MORE THAN 16 CONNECTION PAIRS TO THE PUMP SERIAL DATA CHANNELS. TO DETERMINE THE NUMBER OF CONNECTION PAIRS NECESSARY IN AN INSTALLATION:

    a. ENTER THE SITE QUANTITY OF EACH TYPE DISPENSER IN THE DD PAIR CALCULATION TABLE TO THE RIGHT.
    b. MULTIPLY EACH QUANTITY BY THE PAIRS/UNIT QUANTITY TO GET THE TOTAL.
    c. ADD THE TOTALS FROM STEP 2b. IF THE GRAND TOTAL EXCEEDS 16, A SECOND DATA DISTRIBUTION CABINET IS REQUIRED.

3 INTERCONNECT PANEL FOR PERIPHERAL EQUIPMENT: SEE APPLICABLE INSTALLATION INSTRUCTIONS FOR CABLING REQUIREMENTS.

DATA DISTRIBUTION (DD) PAIR CALCULATION			
EQUIPMENT DESCRIPTION	SITE QTY.	PAIRS/UNIT	TOTAL
DD-PREFIX DISPENSER		1	
NON-DD PREFIX DISPENSER WITHOUT DCPT		2	
NON-DD PREFIX DISPENSER WITH DCPT		1	

Data Distribution Cabinet to Dispensers

DJR-FH-109-I

POWER PANEL

SYSTEM CONTROL POWER

HOT

NEUTRAL

1 HOT
2 NEUTRAL
3 GROUND

SITE CONTROLLER CABINET

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

TB2

DATA DISTRIBUTION CABINET #1

TB1

DATA LINK A

3

4   DATA LINK B

TB2

TB3

TB4

SEE NOTE 2

TB5   1 2 3 4 5 6

TB6   1 2 3 4 5 6

OPTIONAL DATA DISTRIBUTION CABINET #2

TB1

DATA LINK A

DATA LINK B

TB2

TB5   1 2 3 4 5 6

TB6   1 2 3 4 5 6

TO DISPENSER JUNCTION BOXES

1

NOTES:

1 SEE DISPENSER INSTALLATION WIRING DIAGRAM FOR WIRING CONNECTIONS.

2 IF TWO DISTRIBUTION CABINETS ARE REQUIRED, REMOVE JUMPERS BETWEEN TERMINALS # 4 AND # 5 ON TB5 AND TB6 IN THE DATA DISTRIBUTION CABINETS AND CONNECT AS SHOWN.

3 EACH DATALINK PAIR SHOULD BE CONNECTED TO SEPARATE +, - TERMINALS.

4 DATALINK CONNECTIONS SHOULD BE DISTRIBUTED BETWEEN DATALINK A AND DATALINK B, WITH APPROXIMATELY 1/2 OF TOTAL DISPENSERS CONNECTED TO DATALINK A AND THE REMAINING DISPENSERS CONNECTED TO DATALINK B. NO MORE THAN 12 PAIRS SHOULD BE CONNECTED TO EITHER DATALINK A OR DATALINK B.

Pump Relay Installation Wiring Diagram

DJR-FH-123-C

WAYNE PUMP RELAY CABINET

SUBMERSIBLE PUMP CONTROL RELAY #4 — #4 — L2 OUT / L1 OUT / L2 IN / L1 IN
SUBMERSIBLE PUMP CONTROL RELAY #3 — #3 — L2 OUT / L1 OUT / L2 IN / L1 IN
SUBMERSIBLE PUMPCONTROL RELAY #2 — #2 — L2 OUT / L1 OUT / L2 IN / L1 IN
SUBMERSIBLE PUMP CONTROL RELAY #1 — #1 — L2 OUT / L1 OUT / L2 IN / L1 IN

#5 — L2 OUT / L1 OUT / L2 IN / L1 IN — SUBMERSIBLE PUMP CONTROL RELAY #5
#6 — L2 OUT / L1 OUT / L2 IN / L1 IN — SUBMERSIBLE PUMP CONTROL RELAY #6
#7 — L2 OUT / L1 OUT / L2 IN / L1 IN — SUBMERSIBLE PUMP CONTROL RELAY #7
#8 — L2 OUT / L1 OUT / L2 IN / L1 IN — SUBMERSIBLE PUMP CONTROL RELAY #8

1 2 3 4 5 6   1 2 3 4 5 6

SUBMERSIBLE PUMP #1 POWER 240VAC, 1HP MAX.

RELAY 1 SELECT
RELAY 2 SELECT
RELAY 3 SELECT
RELAY 4 SELECT
NEUTRAL FOR RELAYS 1-4

TO SUBMERSIBLE PUMP #1

RELAY 5 SELECT
RELAY 6 SELECT
RELAY 7 SELECT
RELAY 8 SELECT
NEUTRAL FOR RELAYS 5-8

NOTES:

1. RELAYS #5 AND #6 ARE PROVIDED ONLY IN 6 AND 8 RELAY CABINETS. RELAYS #7 AND #8 ARE PROVIDED IN AN 8 RELAY CABINET.

2. SEE DISPENSER INSTALLATION WIRING DIAGRAM FOR WIRING CONNECTIONS.

Dispenser Card Processing (CATs)

DJR-FH-101-E

SITE CONTROLLER CABINET

NOTES:

[1] THE CONNECTIONS SHOWN FOR DISPENSERS 1, 5, AND 9 ARE CONNECTED TO CHANNEL A. DISPENSERS 2, 6, AND 10 ARE CONNECTED TO CHANNEL B, AND SO ON PER THE FOLLOWING TABLE:

DISPENSER NUMBER	CARD PROCESSING DATA CHANNEL
1	A
2	B
3	C
4	D
5	A
6	B
7	C
8	D
9	A
10	B
11	C
12	D

A MAXIMUM OF 6 VISTA CARD TERMINALS MAY BE CONNECTED TO EACH CHANNEL. A DUAL SIDED INSTALLATION, INTEGRATED IN THE DISPENSER, CONSTITUTES TWO VISTA CARD TERMINALS.

CHANNEL A +
CHANNEL A -
CHANNEL B +
CHANNEL B -
CHANNEL C +
CHANNEL C -
CHANNEL D +
CHANNEL D -

TB2   TB3   TB4   TB5

SEE NOTE [1]

SEE NOTE [1]

EXISTING DISPENSER WIRING TERMINAL STRIP

CARD TERMINAL - (W-GY) 2   CHANNEL A -
CARD TERMINAL + (BN) 2   CHANNEL A +

DISPENSER #1 JUNCTION BOX

WIRE CONNECTOR (TYP)

EXISTING DISPENSER WIRING TERMINAL STRIP

CARD TERMINAL - (W-GY) 2   CHANNEL A -
CARD TERMINAL + (BN) 2   CHANNEL A +

DISPENSER #5 JUNCTION BOX

EXISTING DISPENSER WIRING TERMINAL STRIP

CARD TERMINAL - (W-GY) 2   CHANNEL A -
CARD TERMINAL + (BN) 2   CHANNEL A +

DISPENSER #9 JUNCTION BOX

APPENDIX C HYDRAULIC CONFIGURATIONS - HELIX MODELS 4000 & 5000

Below are graphical layouts of the available hydraulic configurations for the different Helix dispenser models. The graphics can be interpreted as follows, using the H(W/L)44-44 model as an example.
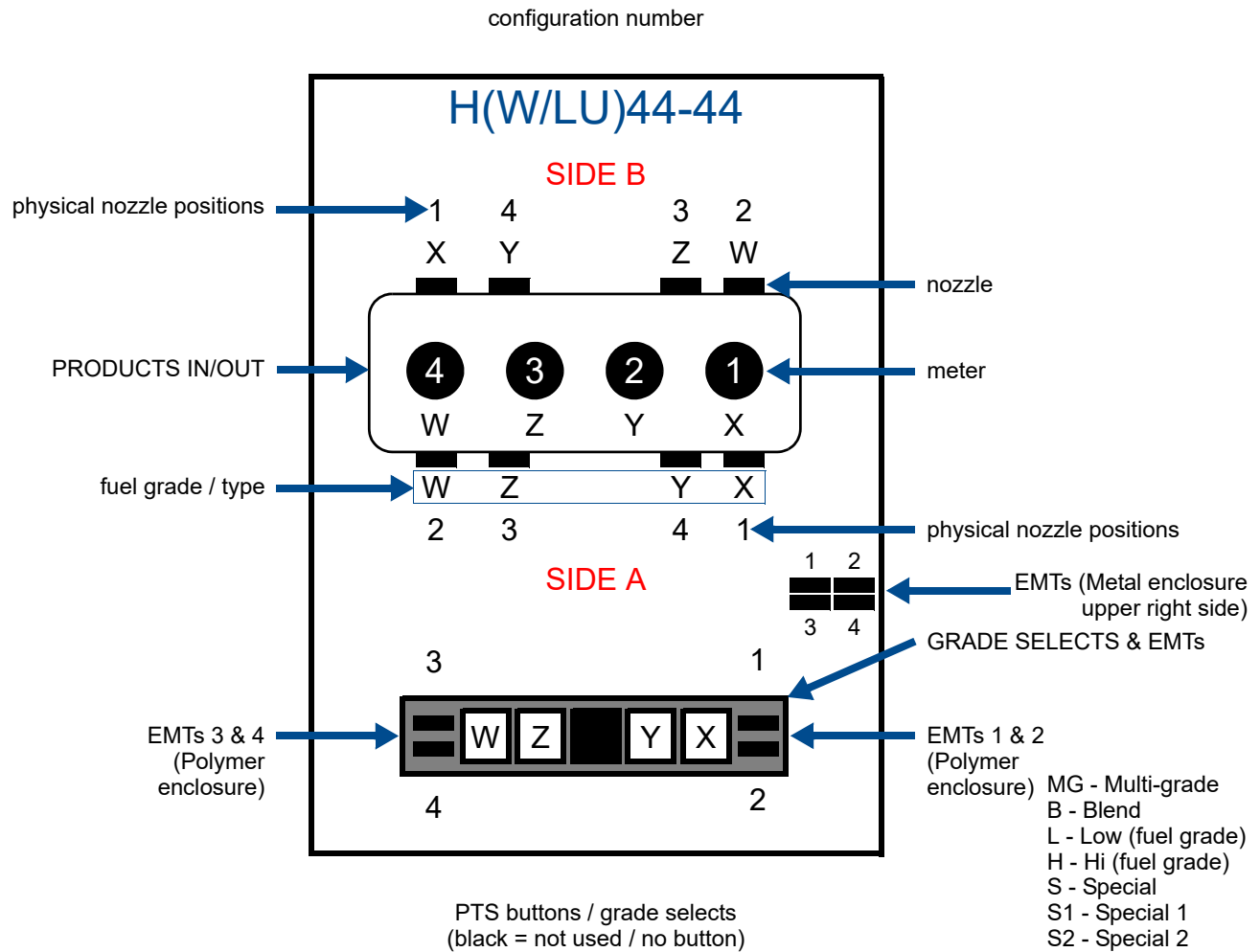
11-11: SINGLE PRODUCT
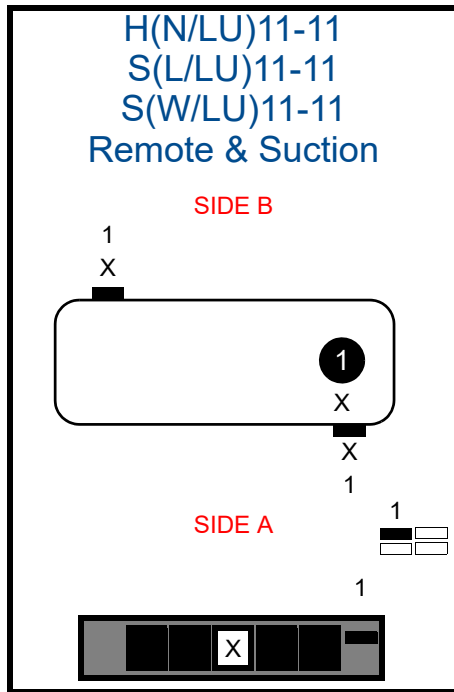
Single-Sided:
H(N/LU)11-110
S(L/LU)11-110

22-22: 2-PRODUCT NON-BLENDER
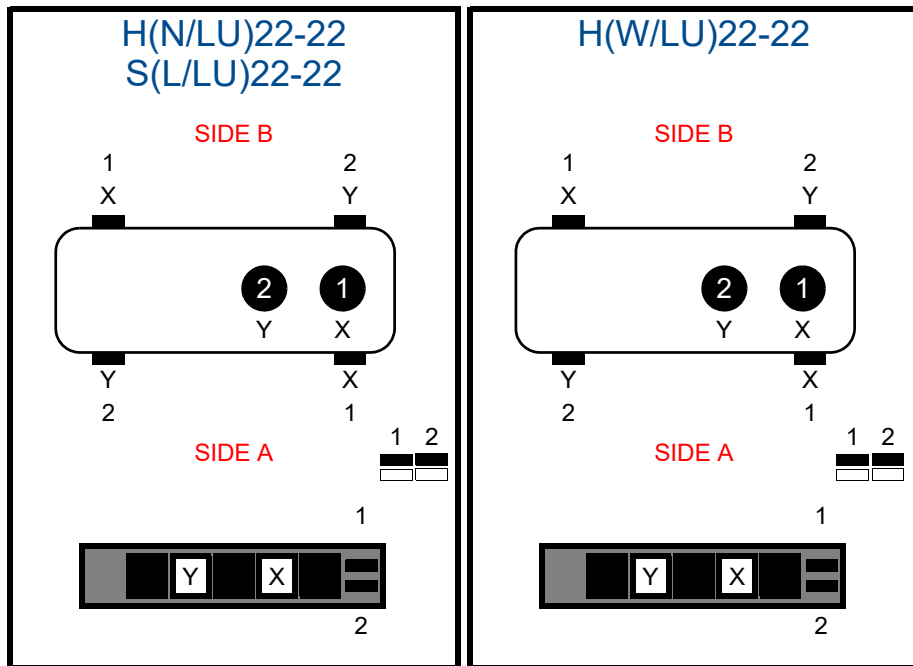
Single-Sided:
H(N/LU)22-22
S(L/LU)22-220
Vista Equivalent: 389

Single-Sided:
H(W/LU)22-220
Vista Equivalent: 399

33-3X: 3 PRODUCT NON-BLENDER (MULTI- & UNI-HOSE)

H(W/LU)33-33

SIDE B

| 1 | 4 | | 2 |
| X | Y | | Z |

3 **2** **1**
Z   Y   X

Z   Y   X
2   4   1

1	2
3	

SIDE A

3   1
[Z Y X]
                           2
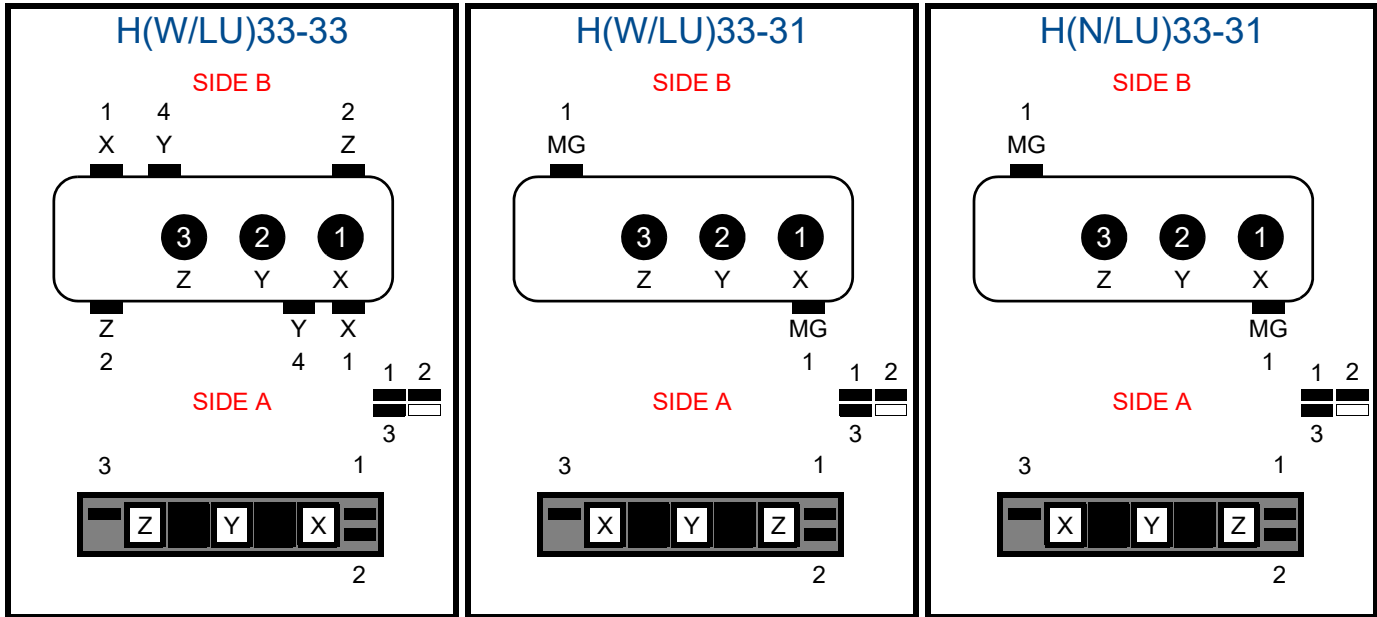
Single-Sided:
H(W/LU)33-330
Vista Equivalent: 390

H(W/LU)33-31

SIDE B

1
MG

3 **2** **1**
Z   Y   X

MG
1

1	2
3	

SIDE A

3   1
[X Y Z]
                           2

Single-Sided:
H(W/LU)33-310
Vista Equivalent: 390/U

H(N/LU)33-31

SIDE B

1
MG

3 **2** **1**
Z   Y   X

MG
1

1	2
3	

SIDE A

3   1
[X Y Z]
                           2

Single-Sided:
H(N/LU)33-310
Vista Equivalent: 390/U Narrow

44-4X: 4-PRODUCT NON-BLENDER (MULTI- & UNI-HOSE)

H(W/LU)44-44

SIDE B

| 1 | 4 | | 3 | 2 |
| X | Y | | Z | W |

4 **3** **2** **1**
W   Z   Y   X

W   Z   Y   X
2   3   4   1

1	2
3	4

SIDE A

3   1
[W Z Y X]
4   2
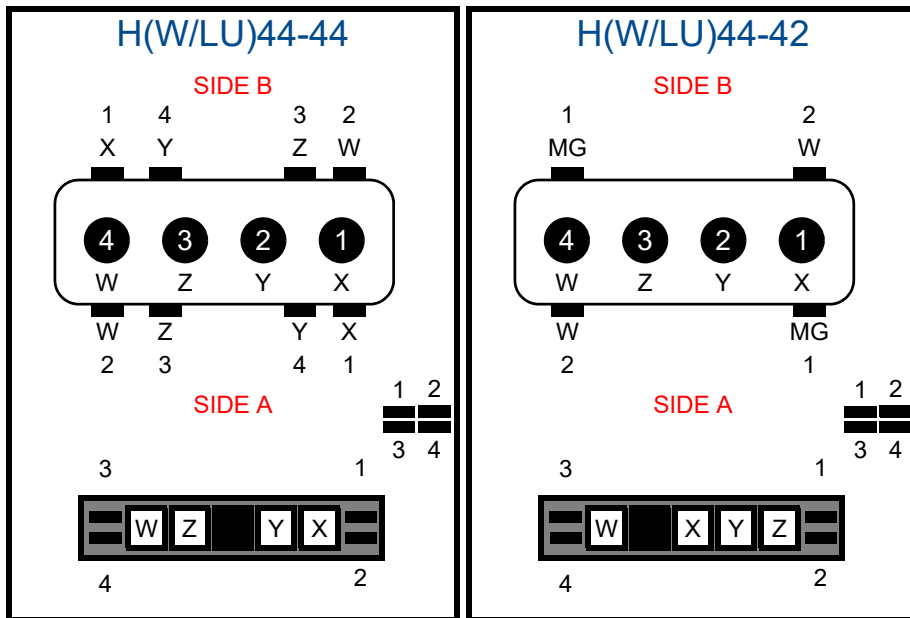
Single-Sided:
H(W/LU)44-440
Vista Equivalent: 490

H(W/LU)44-42

SIDE B

1   2
MG   W

4 **3** **2** **1**
W   Z   Y   X

W   MG
2   1

1	2
3	4

SIDE A

3   1
[W X Y Z]
4   2

Single-Sided:
H(W/LU)44-420
Vista Equivalent: 490/U

2X-21: 2-PRODUCT NARROW BLENDER (3-5 GRADES)

H(N/LU)23-21

SIDE B

1
B

2   1
H   L

B
1

SIDE A

1   2

1

L B1 H

2
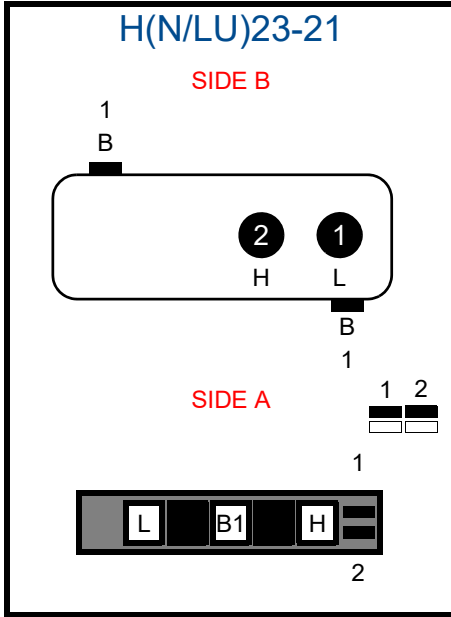
Single-Sided:
H(N/LU)23-210
Vista Equivalent: 580

H(N/LU)24-21

SIDE B

1
B

2   1
H   L

B
1

SIDE A

1   2

1

L B1 B2 H

2
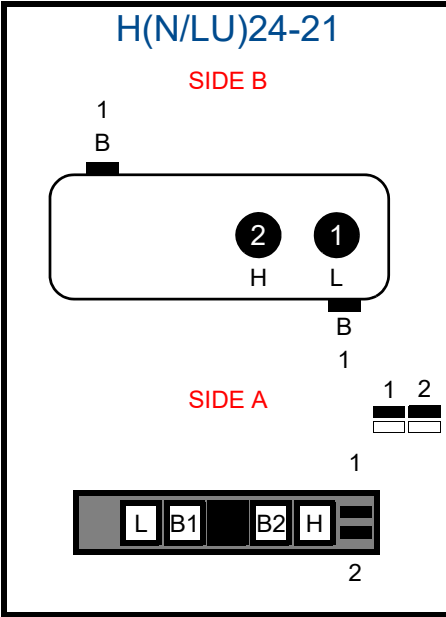
Single-Sided:
H(N/LU)24-210
Vista Equivalent: 585

H(N/LU)25-21

SIDE B

1
B

2   1
H   L

B
1

SIDE A

1   2

1

L B1 B2 B3 H

2
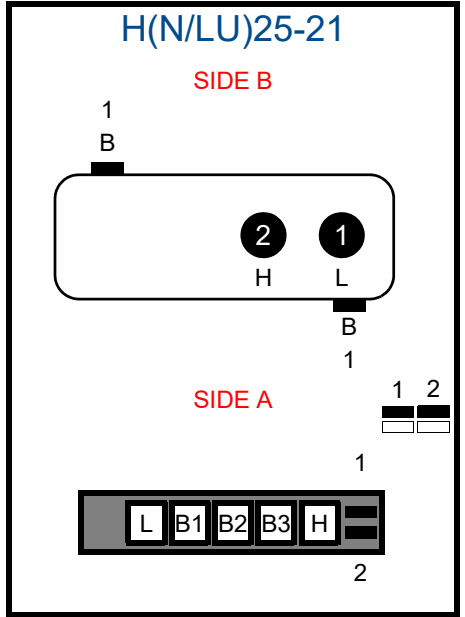
Single-Sided:
H(N/LU)25-210
Vista Equivalent: 585

2X-21: 2-PRODUCT WIDE BLENDER (3-5 GRADES)

H(W/LU)23-21

SIDE B

1
B

2   1
H   L

B
1

SIDE A

1   2

1

L B1 H

2
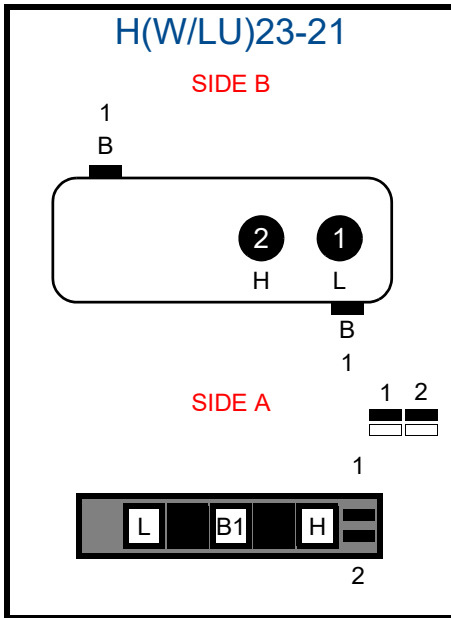
Single-Sided:
H(W/LU)23-210
Vista Equivalent: 590/U

H(W/LU)24-21

SIDE B

1
B

2   1
H   L

B
1

SIDE A

1   2

1

L B1 B2 H

2
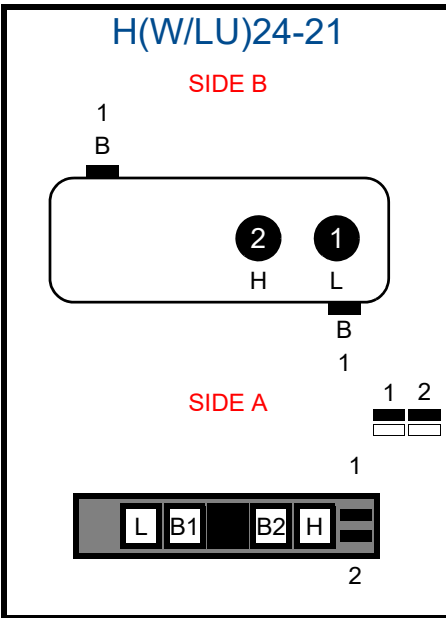
Single-Sided:
H(W/LU)24-210
Vista Equivalent: 595/U

H(W/LU)25-21

SIDE B

1
B

2   1
H   L

B
1

SIDE A

1   2

1

L B1 B2 B3 H

2
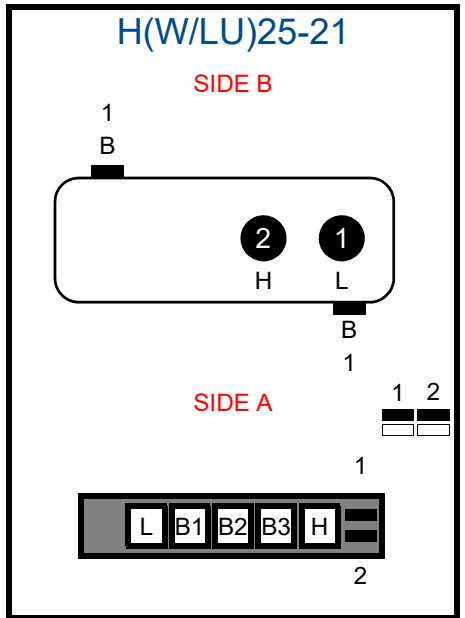
Single-Sided:
H(W/LU)25-210
Vista Equivalent: 595/U

34-3X: 3 + 1 BLENDER (NARROW AND WIDE)

H(N/LU)34-32

SIDE B

1
B

2
S

3 S
2 H
1 L

S
2

B
1

1 2
3

SIDE A

3

1

S L B H

2
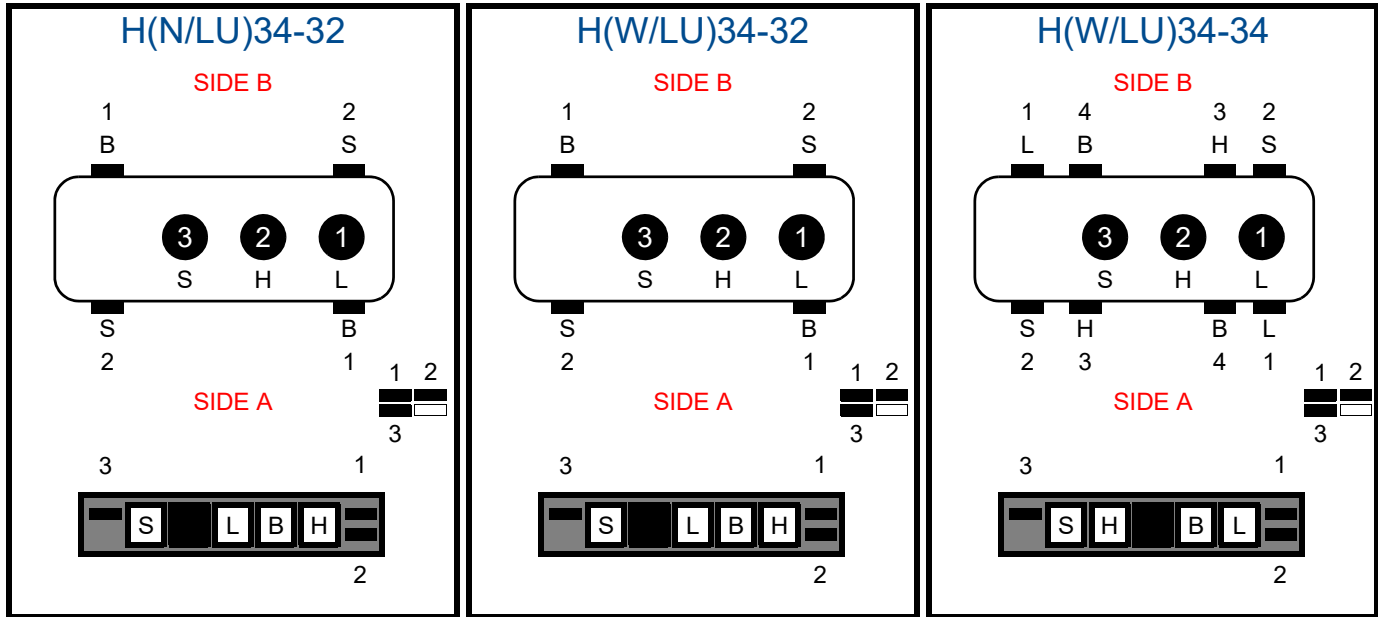
Single-Sided:
H(N/LU)34-320
Vista Equivalent: 595 Narrow

H(W/LU)34-32

SIDE B

1
B

2
S

3 S
2 H
1 L

S
2

B
1

1 2
3

SIDE A

3

1

S L B H

2

Single-Sided:
H(W/LU)34-320
Vista Equivalent: 595

H(W/LU)34-34

SIDE B

1
L

4
B

3
H

2
S

3 S
2 H
1 L

S
2

H
3

B
4

L
1

1 2
3

SIDE A

3

1

S H B L

2

Single-Sided:
H(W/LU)34-340
Vista Equivalent: 591

35-32: 4 + 1 BLENDER (NARROW)

H(N/LU)35-32

SIDE B

1
B

2
S

3 S
2 H
1 L

S
2

B
1

1 2
3

SIDE A

3

1

S L B1 B2 H

2

Single-Sided: N/A
Vista Equivalent: 595

H(N/LU)35-32

SIDE B

1
B

2
S

3 S
2 H
1 L

S
2

B
1

1 2
3

SIDE A

3

1

S H B2 B1 L

2
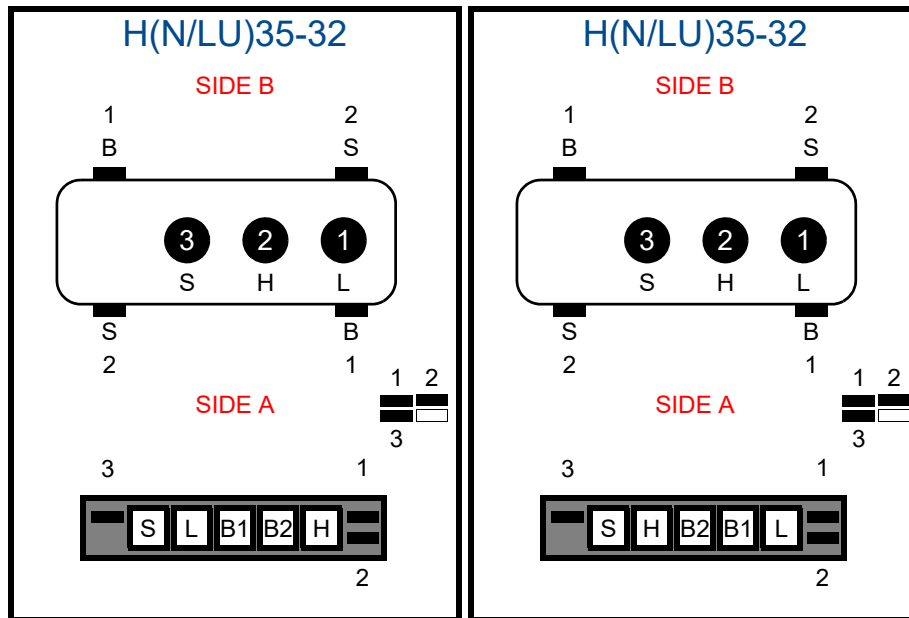
Single-Sided: N/A
Vista Equivalent: 595

35-32: 4 + 1 BLENDER (WIDE)
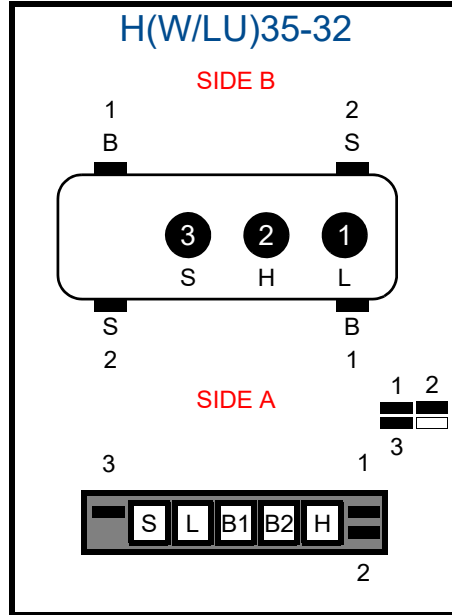
H(W/LU)35-32

SIDE B

1
B

2
S

③ ② ①

S   H   L

S
2

B
1

1 2
3

SIDE A

3   1

| S | L | B1 | B2 | H |

2

Single-Sided:
H(W/LU)35-320
Vista Equivalent: 595

H(W/LU)35-32

SIDE B

1
B

2
S

③ ② ①

S   H   L

S
2

B
1

1 2
3

SIDE A

3   1

| S | H | B2 | B1 | L |

2
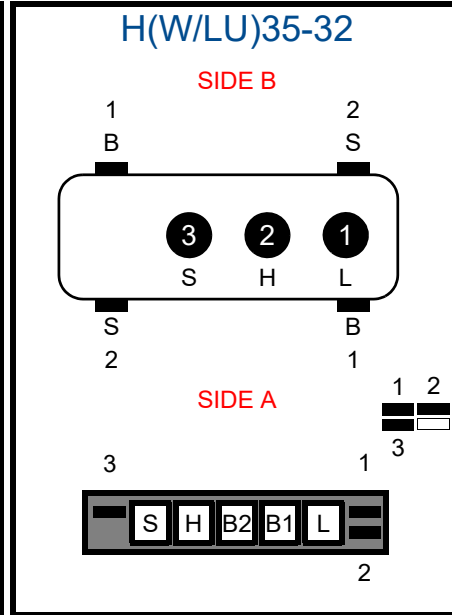
Single-Sided:
H(W/LU)35-320
Vista Equivalent: 595

35-33: MULTI-VALVE BLENDERS
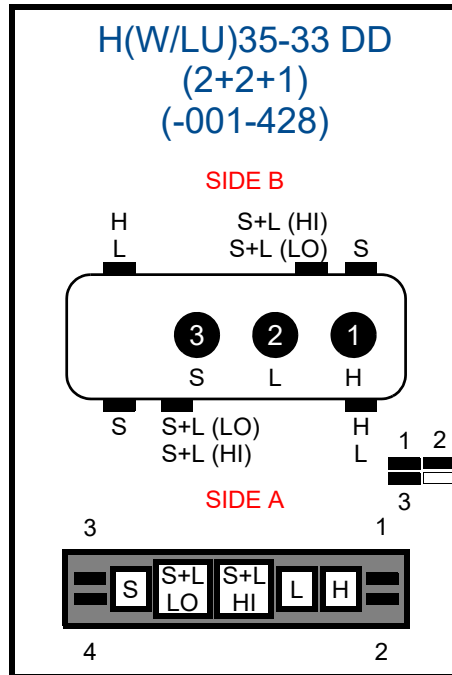
H(W/LU)35-33 DD
(2+2+1)
(-001-428)

SIDE B

H
L

S+L (HI)
S+L (LO)

S

③ ② ①

S   L   H

S
S+L (LO)
S+L (HI)

H
L

1 2
3

SIDE A

3   1

| S | S+L LO | S+L HI | L | H |

4   2

Single-Sided: N/A
H(W/LU)35-330
Vista Equivalent: N/A

H(W/LU)35-33 DD
(3+1+1)
(-001-429)

SIDE B

H
L
B

S+L   S

③ ② ①

S   L   H

S
S+L

H
L
B

1 2
3

SIDE A

3   1

| S | S+L | L | B | H |

4   2
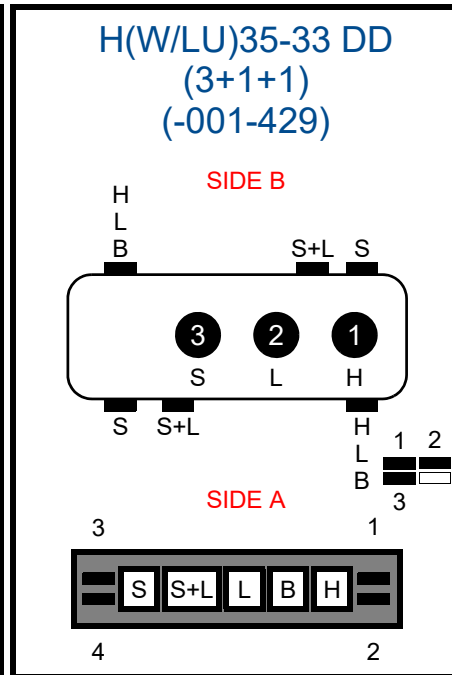
Single-Sided: N/A
H(W/LU)35-330
Vista Equivalent: N/A

45-43: SINGLE- AND MULTI-VALVE BLENDERS
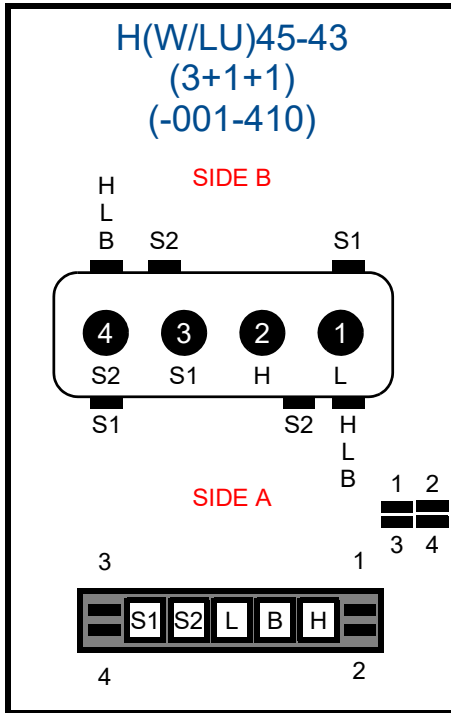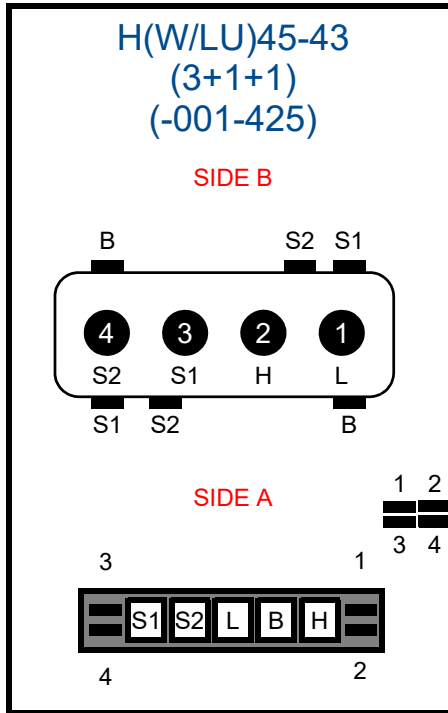
H(W/LU)45-43 (3+1+1) (-001-410)

SIDE B

H L B   S2   S1

④   ③   ②   ①
S2   S1   H   L

S1   S2   H L B

SIDE A   1 2
                      3 4

3   1

S1 S2 L B H

4   2

Single-Sided:
H(W/LU)45-430
Vista Equivalent: N/A

H(W/LU)45-43 (3+1+1) (-001-425)

SIDE B

B   S2 S1

④   ③   ②   ①
S2   S1   H   L

S1   S2   B

SIDE A   1 2
                      3 4

3   1

S1 S2 L B H

4   2

Single-Sided:
H(W/LU)45-430
Vista Equivalent: N/A

H(W/LU)45-43 (3+1+1) (-001-452)

SIDE B

H L B
S2   B   S1

④   ③   ②   ①
S2   S1   H   L

S1   H L B   S2

SIDE A   1 2
                      3 4

3   1

S1 L B H S2

4   2

Single-Sided:
H(W/LU)45-430
Vista Equivalent: N/A

H(W/LU)45-43 D (3+1+1) (-001-427) & (-003-109)

SIDE B

B   S2+L S1

④   ③   ②   ①
S2   S1   H   L

S1   S2+L   B

                      1 2
SIDE A   3 4

3   1

S1 | S2 B | L B H

4   2

Single-Sided:
H(W/LU)45-430
Vista Equivalent: N/A

H(W/LU)45-43 D (2+2+1) (-001-426)

SIDE B

H L   S2+L
             S2 S1

④   ③   ②   ①
S2   S1   H   L

S1   S2   H L
      S2+L

SIDE A   1 2
                      3 4

3   1

S1 S2 | S2 BL | L H

4   2

Single-Sided:
H(W/LU)45-430
Vista Equivalent: N/A

H(W/LU)45-43 D (2+2+1) (-003-108)

SIDE B

H L   S2+L (HI)
             S2+L (LO) S1

④   ③   ②   ①
S2   S1   H   L

S1   S2+L (LO)   H L
      S2+L (HI)

SIDE A   1 2
                      3 4

3   1

S1 | S2+L LO | S2+L HI | L H

4   2
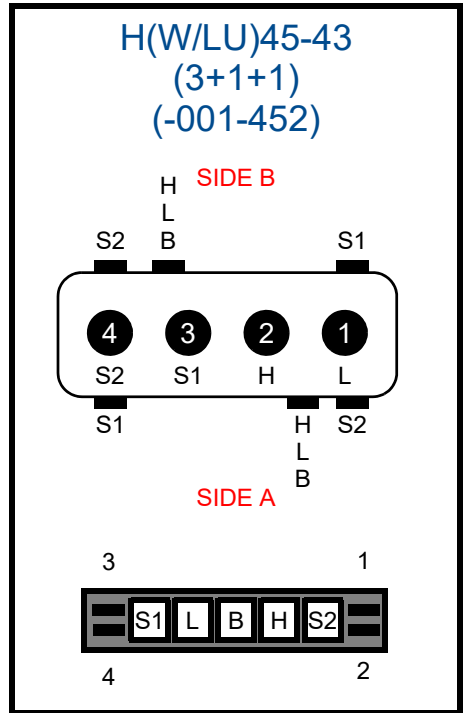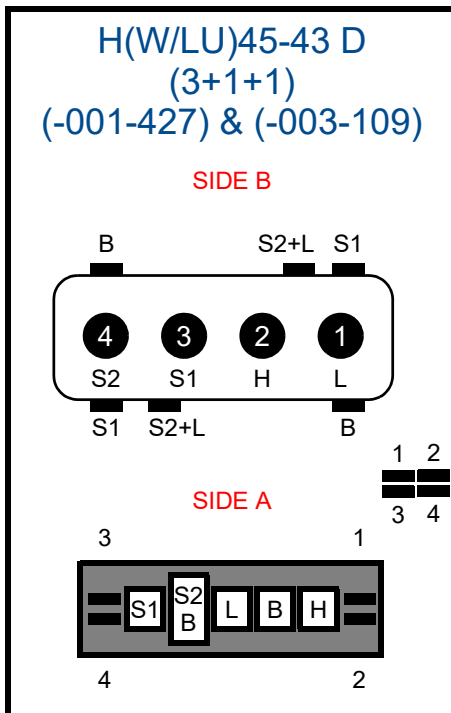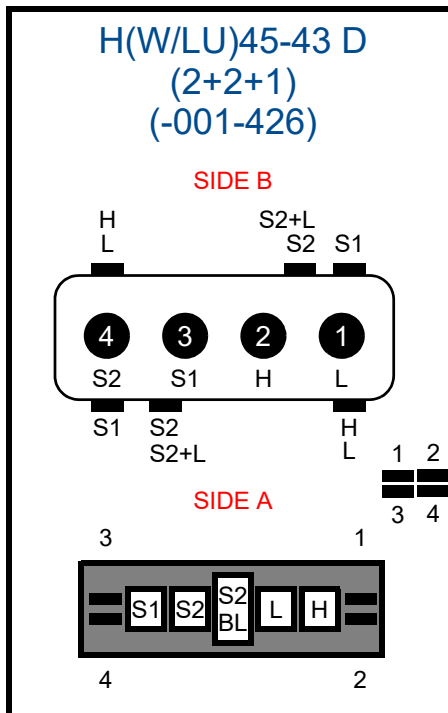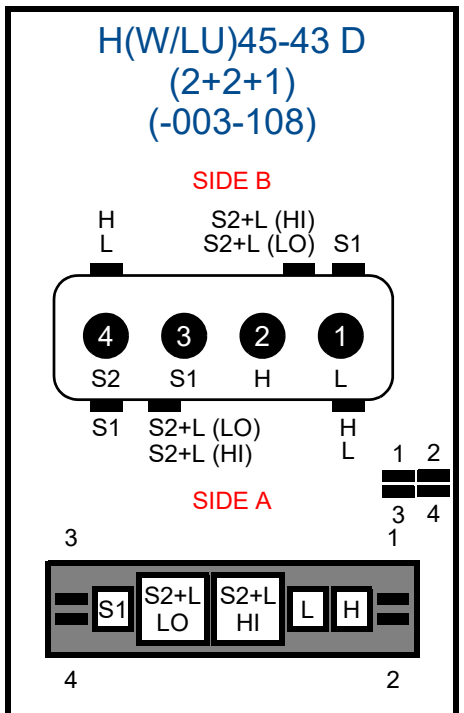
Single-Sided:
H(W/LU)45-430
Vista Equivalent: N/A

APPENDIX D HELIX DISPENSERS WITH A COMPACT PUMPING UNIT (CPU)

1. Supply piping should be selected and installed in accordance with local, state, and federal regulations. The piping manufacturer's instructions should be followed for the proper trenching, connection, sealing, corrosion prevention, pressure relief, and leak detection and containment.

2. Supply lines should extend a minimum of 18" (46 cm) straight down from the dispenser (more in hot climates and high altitudes to prevent product vaporization) and then slope downward to the tank at approximately ¼" per foot (1 cm drop per 48 cm run). Be sure there are no traps and minimize the number of bends and elbows. If the distance from the dispenser to the tank is 60 feet (18.2m) or less, 1-1/2 inch (3.8 cm) schedule 40 pipe may be used. For distances greater than 60 feet (8.2 m), 2-inch (5.1 cm) schedule 40 pipe is recommended to minimize friction. Runs of pipe should also be no closer than 18" from the road surface to minimize effects of heat buildup on product lines in reducing the potential for fuel vaporization.

3. To maximize flow and minimize product vaporization (gasoline), position the suction pump dispenser and the tank as close together as possible, minimize the number of turns in the supply piping, and minimize the vertical lift. The vertical lift is limited by the properties of the product being dispensed [dynamic lift: gasoline – approximately 11feet (3.1 m); diesel – approximately 13 feet (4 m). The maximum lift will vary depending upon product temperature, fuel properties and installation conditions. Static lift is defined as the distance from the liquid surface to the center line of the pump. It is recommended to limit static lift to not greater than 10 feet.

4. It is recommended that the vent line from the air separator be piped back to the storage tank. The return line should be at least ½" (1.3 cm).

5. Since Helix suction dispensers are factory-equipped with a check valve, spring-loaded valves and union check valves are not to be used.

6. DFS recommends only one suction pump be connected to a single suction line. If connecting multiple pumps to the same suction line is unavoidable, it is very important that a swing check valve be used in each suction line branch and that each valve be placed in the line as close as possible to the connection leading to the main suction line coming from the tank. This is necessary to prevent a pump from emptying the line leading to another pump instead of pulling the product out of the tank.

7. CPUs on Helix dispensers come factory fit with a check valve in the filter pot (see Figure D-1 below). No additional check valves are necessary.

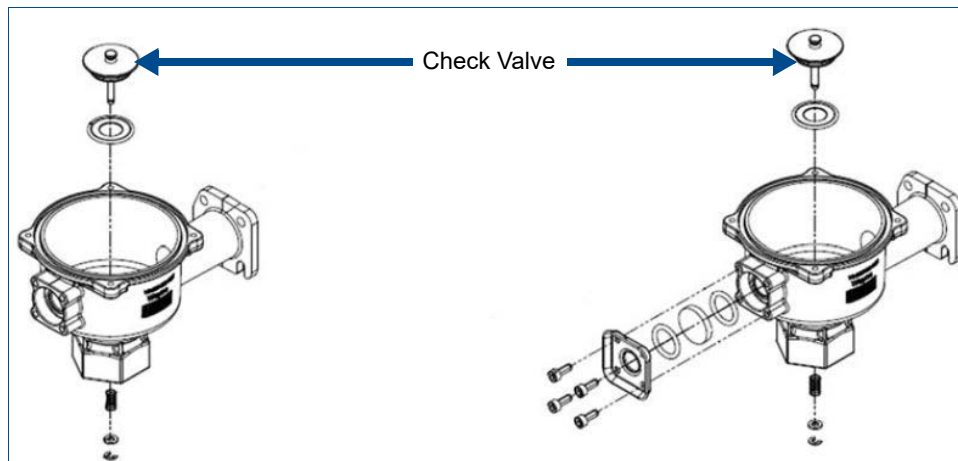**Figure D-1 CPU Check Valves**

8. Suction pumps must be primed before their initial operation. It is not advisable to run any type of internal gear pump dry during the priming process.

9. For priming, insert a small quantity of light-grade oil (1/2 pint or ¼ liter) through the priming plug in the pumping unit before staring the pump for the first time. For the location of the priming plug (see Figure D-2 below).

10. The bypass valve pressure in the CPU should be checked and adjusted if necessary. If there is not enough pressure, the pump will deliver product slowly. If the pressure is too high, delivery of the product will not increase, but increased noise and wear will result (pump cavitation), and an unnecessary load will be placed on the motor.

11. Check/Adjust the pump bypass pressure:
    ○   Before checking the bypass pressure, clean the pump strainer assembly.
    ○   To check the bypass pressure, remove the priming plug and install a pressure gauge in the priming port or upper port, see Figure D-2.
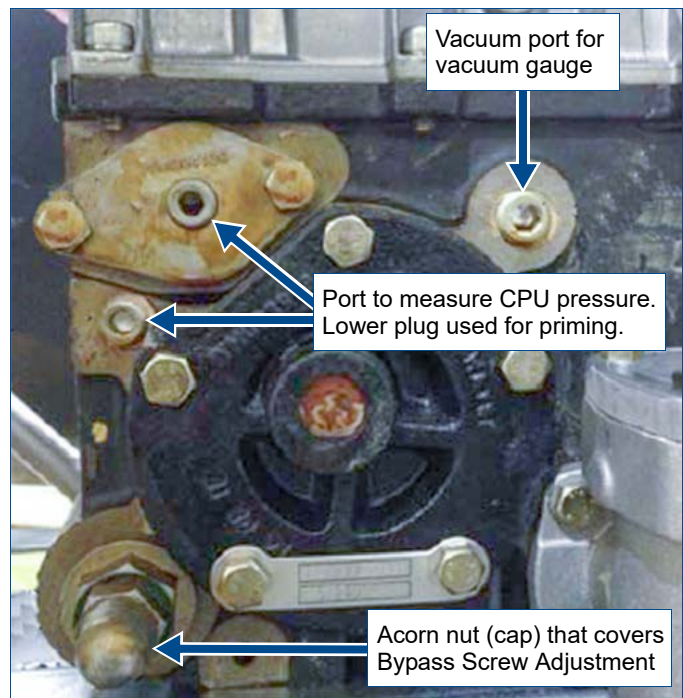
        Turn the pump on so that the motor and pumping unit are running, but leave the nozzle closed. Verify that the pressure is in the 29-30 psi range (factory setting).

Figure D-2 CPU Ports

NOTE!   *The bypass pressure many be raised to increase the flow, or lowered to decrease the flow and load on the motor. When changing the bypass pressure, always verify that the amperage draw does not exceed the amp rating on the motor.*

    ○   If the bypass pressure needs adjustment, remove the acorn nut (cap) that covers the adjustment screw and lock nut. Loosen the lock nut and turn the adjustment screw clockwise to increase the pressure and counterclockwise to lower the pressure. Once the correct pressure is reached, tighten down the lock nut and replace the acorn nut.
    ○   With the nozzle open and dispensing fuel, verify that the amps are less than the motor amp rating. If the amps exceed the motor rating, the bypass must be lowered until the amps are below the rating.

12. If the suction pump is used with an aboveground storage tank (AST) (mounted below the product level in the tank), the installer must provide the necessary safety valves according to local, state, and federal codes. These valves include, but may not be limited to, an emergency block valve in the piping immediately after it exits the tank followed by an electrically operated solenoid valve for anti-siphon. A vacuum-actuated valve (pressure regulator valve) with shear section, or equivalent valve, must be installed beneath the pump. All valves must be equipped with a pressure relief mechanism. Pressure in the pump cannot exceed 50 psi.

13. Check that the suction pump pulley and the motor pulley are in straight alignment. Lay a straight edge ruler against both outer pulley sheaves, where the pump pulley is the reference surface. The motor pulley must be within 1/8" (32 mm) of straight alignment with the pump pulley.

14. If the motor pulley requires adjustment, loosen the set screw on the inside of the pulley which holds the key against the motor shaft. Align the pulley and retighten the set screw.

APPENDIX E DISPENSER CAN BUS CONFIGURATION / DIP SWITCH SETTINGS

This section outlines the correct CAN bus termination configuration for some DFS dispenser component controller boards. CAN Bus implementations require installation of a termination resistor (~120ohm) between the CAN High and CAN Low signals at two locations for reliable communication. The two terminations should be at locations farthest apart in the CAN Bus wiring/signal path for best performance. Electronic control boards connecting to the CAN Bus should have a method (DIP switch, jumper, etc.) to enable a termination resistor on that board. This section specifies which control boards inside a dispenser should have the termination resistor enabled or disabled.

For more detailed information regarding CAN Bus settings, refer to the *CAN Bus Switch Settings Guide* (P/N WU018306).

E.1 DISPENSER REQUIREMENTS

The dispenser must contain at least one of the following dispenser options and/or controller boards:

- iX Board (Jade, Red, or Blue)
- SSA Controller
- iGEM
- CAN to TTL
- Preset Keypad

E.2 TERMINATION PRIORITY

Table E-1 shows the priority order for which components should enable termination 1 and 2 for the dispenser CAN Bus.

Components for each Termination (1 or 2) are listed in priority order. The highest priority component installed in the dispenser for each termination should be configured to have termination installed/active. All other components installed should NOT be terminated.

Table E-1 iGEM Termination Priority

TERMINATION 1	TERMINATION 2
iGEM iGEM will come with CAN Bus termination already ON. There is no need to manually terminate.	iX Board Side B
	ANT Board Side B
	iX Board Side A
	ANT Board Side A
	SSA Controller
	CAN to TTL
	Preset Keypad

E.3 DISPENSER CONFIGURATIONS

The tables below show the possible configurations and components with CAN Bus that could be installed in a dispenser. Each configuration indicates which component should be the termination. Other components should NOT have a termination. The components termination is determined by the termination priority list as specified in the section above.

Interpreting the CAN Bus Configuration Tables

The *Dispenser Components* columns list the boards (and combinations thereof) with CAN Bus that will most commonly be found on Wayne dispensers. The *CAN Bus Termination Settings* columns specify how the CAN Bus switch(es) should be set for those boards present on the dispenser.

Example 1 (see Table E-2, Row 5)

The *Dispenser Components* columns show us that the dispenser contains one iGEM board, one iX Board (on Side A), and one Smart Secure Access (SSA) controller board. For this configuration, the *CAN BUS Termination Settings Columns* tell us to:

○   Set Side A iX Board J2 DIP 1 to ON

○   Set Side A iX Board J2 DIP 2 to ON

○   Set SSA Controller Board #1 DIP 1 to OFF

Table E-2 Helix Dispenser CAN Bus Configuration Matrix - Standard Dispensers
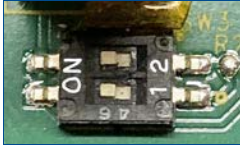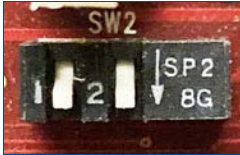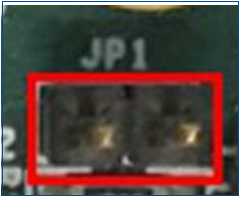
Standard Dispenser	Dispenser Components								CAN BUS Termination Settings										
	IGEM1/IGEM2	iX Board Side A	iX Board Side B	ANT Board Side A	ANT Board Side B	SSA Controller	Preset Keypad Side A	Preset Keypad Side B	iX Board Side A J2 DIP1	iX Board Side A J2 DIP2	iX Board Side B J2 DIP1	iX Board Side B J2 DIP2	ANT Board Side A Pins 1&2	ANT Board Side A Pins 2&3	ANT Board Side B Pins 1&2	ANT Board Side B Pins 2&3	SSA Controller DIP1	Preset Keypad Side A	Preset Keypad Side B
1	Yes																		
2	Yes						Yes											On	
3	Yes						Yes	Yes										Off	On
4	Yes					Yes											On		
5	Yes					Yes	Yes										On	Off	
6	Yes					Yes	Yes	Yes									On	Off	Off
7	Yes	Yes							On	On									
8	Yes	Yes					Yes		On	On								Off	
9	Yes	Yes				Yes			On	On							Off		
10	Yes	Yes				Yes	Yes		On	On							Off	Off	
11	Yes	Yes	Yes						Off	Off	On	On							
12	Yes	Yes	Yes				Yes	Yes	Off	Off	On	On						Off	Off
13	Yes	Yes	Yes			Yes			Off	Off	On	On					Off		
14	Yes	Yes	Yes			Yes	Yes	Yes	Off	Off	On	On					Off	Off	Off
15	Yes			Yes									Off	On					
16	Yes			Yes		Yes							Off	On			Off		
17	Yes			Yes	Yes								On	Off	Off	On	Off		
18	Yes			Yes	Yes	Yes							On	Off	Off	On	Off		

Table E-3 Helix Dispenser CAN Bus Configuration Matrix - Canada Standard Dispensers

Canada Standard Dispenser	Dispenser Components									CAN BUS Termination Settings											
	IGEM1/IGEM2	iX Board Side A	iX Board Side B	ANT Board Side A	ANT Board Side B	SSA Controller	CAN to TTL	Preset Keypad Side A	Preset Keypad Side B	iX Board Side A J2 DIP1	iX Board Side A J2 DIP2	iX Board Side B J2 DIP1	iX Board Side B J2 DIP2	ANT Board Side A Pins 1&2	ANT Board Side A Pins 2&3	ANT Board Side B Pins 1&2	ANT Board Side B Pins 2&3	SSA Controller DIP1	CAN to TTL	Preset Keypad Side A	Preset Keypad Side B
1	Yes						Yes												On		
2	Yes						Yes	Yes											Off	On	
3	Yes						Yes	Yes	Yes										Off	Off	On
4	Yes					Yes	Yes											On	Off		
5	Yes					Yes	Yes	Yes										On	Off	Off	
6	Yes					Yes	Yes	Yes	Yes									On	Off	Off	Off
7	Yes	Yes					Yes			On	On								Off		
8	Yes	Yes					Yes	Yes		On	On								Off	Off	
9	Yes	Yes				Yes	Yes			On	On							Off	Off		
10	Yes	Yes				Yes	Yes	Yes		On	On							Off	Off	Off	
11	Yes	Yes	Yes				Yes			Off	Off	On	On						Off		
12	Yes	Yes	Yes				Yes	Yes	Yes	Off	Off	On	On						Off	Off	Off
13	Yes	Yes	Yes			Yes	Yes			Off	Off	On	On					Off	Off		
14	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Off	Off	On	On					Off	Off	Off	Off
15	Yes			Yes			Yes							Off	On				Off		
16	Yes			Yes		Yes	Yes							Off	On			Off	Off		
17	Yes			Yes	Yes		Yes							On	Off	Off	On	Off	Off		
18	Yes			Yes	Yes	Yes	Yes							On	Off	Off	On	Off	Off		

E.4 CAN Bus Switch & Jumpers (example settings)

This table provides images of the CAN Bus switches and jumpers with example settings. Settings shown in the images do not necessarily represent what the settings will actually be. This will depend upon dispenser configuration. Refer to the applicable tables in the previous section for switch settings based upon options present on the dispenser.

BOARD	SWITCH/ JUMPER	IMAGE
iX Jade	**SW3** DIP 1&2 = ON	
iX Red	**SW2** DIP 1&2 = ON	
iX Blue	**J39** OFF (not terminated)	
iX Blue	**J39** ON (terminated)	
ANT	**Pins 1&2** ON (not terminated, shown, default) **Pins 2&3** ON (terminated)	

BOARD	SWITCH/ JUMPER	IMAGE
SSA	**SW2** DIP 1-4 = OFF	
SSA	**SW2** DIP 1 = ON DIP 2-4 = OFF	
CAN to TTL	**JP1** OFF (not terminated)	

APPENDIX F GEN 1 VALANCE INSTALLATION

1.   Remove two 10mm hex head screws on the end of the top cover. Repeat for opposite end.
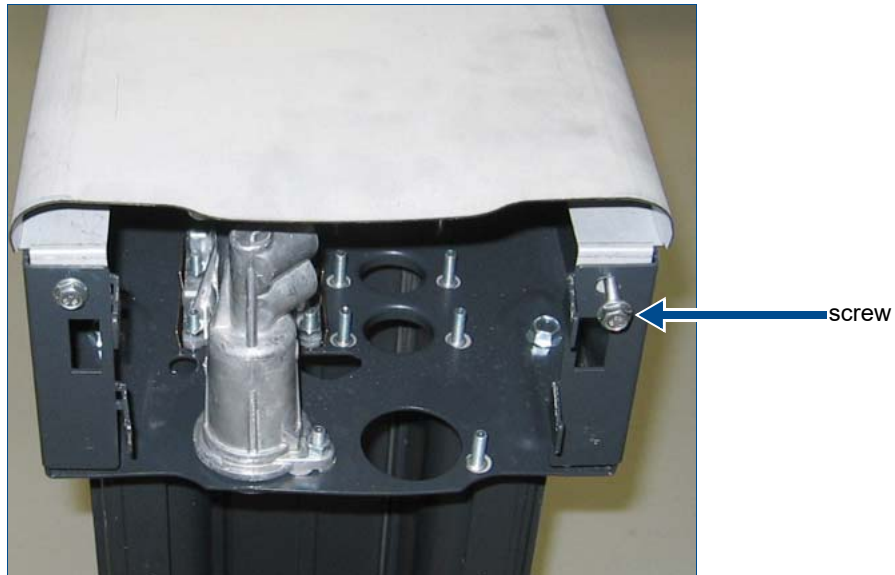
2.   Attach one valance end cap, pushing it back completely and secure it with the two screws.

3.   Attach the other valance end cap, but let it rest on the outer hooks. Do not secure this end. See figure at right.

4.   Attach side valance to fixed end valance, then loosely attach to the other end valance. See figure below.

5.   Attach other side valance to fixed end valance, then loosely attach to the other end valance.

6.   Secure the two side valances to the loose end valance, then secure the end valance with the two screws.

7.   Attach (snap in) the end cover on both ends of the valance.

APPENDIX G GEN 2 VALANCE INSTALLATION

This section provides instructions for installing the Gen 2 valance on Wayne Helix™ fuel dispensers.

Table G-1 Required parts for valance installation

Item	Part Number	Description	Qty.
1	WU026145-F050	Support Bracket	2
2	WU026142-W001 WU026144-W001	Top Panel, Narrow Top Panel, Wide	2
3	WU026140-W001	End Panel	2
4	000-918513-	Self-Tapping Screw	16
5[a]	WU026268-F050 WU026269-F050	Top Box Cover, Wide, Valance Top Box Cover, Narrow, Valance	1

a. Top box cover (not included) required for retrofit installations or service replacements only; new dispensers ordered with valance already include a compatible top box cover.
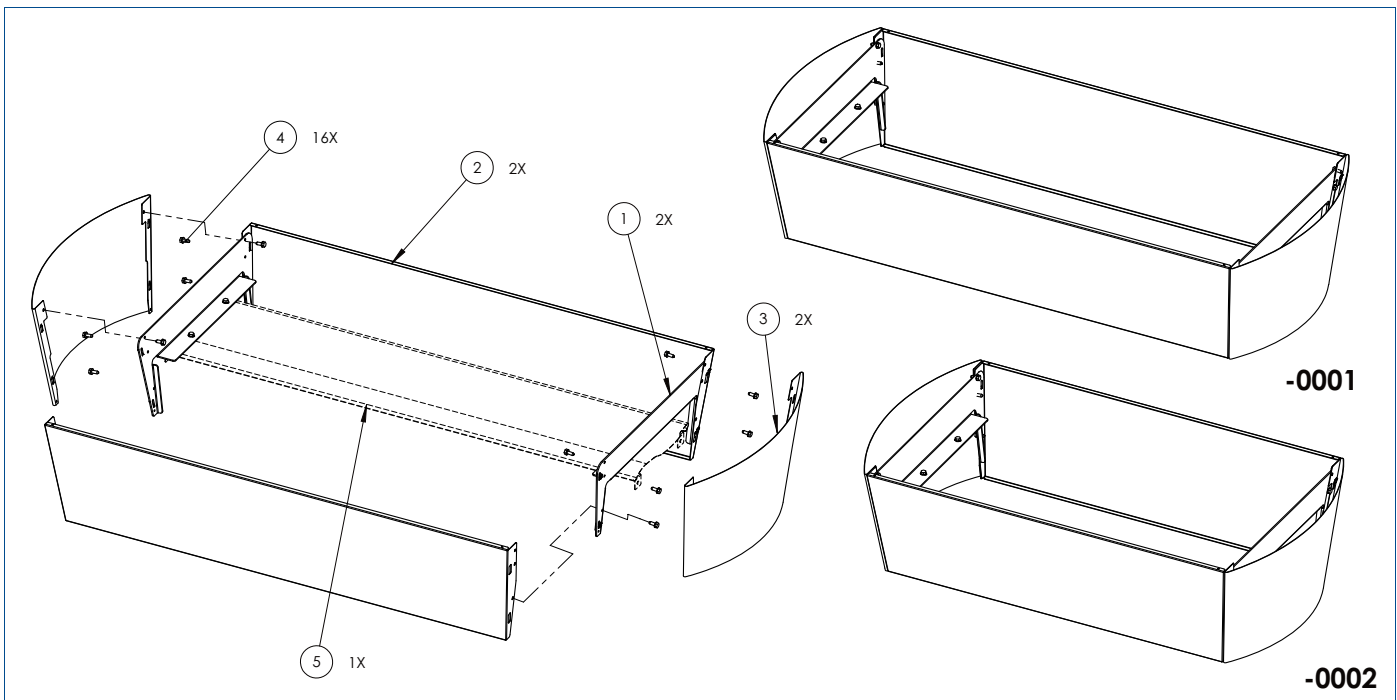
Figure G-1 Valance assembly diagram

	NOTICE!
	The valance is constructed from sheet metal parts that may have sharp edges. Wear work gloves when handling to avoid injury. It is also recommended to lay parts on pads or cardboard to avoid scratches or other cosmetic damage during assembly.

Perform the following steps to assemble the valance.

1. Lay a top panel (item 2) face-down on a flat, non-scratching surface.

2. Align and insert the retaining tabs on a support bracket (item 1) with the slots on the top panel.

Figure G-2 Align support bracket tabs with top panel

3. From the inside of the panel, insert the retaining tabs into the slots, then push the bracket towards the top of the panel to seat the tabs in the slots. See Figure G-3.
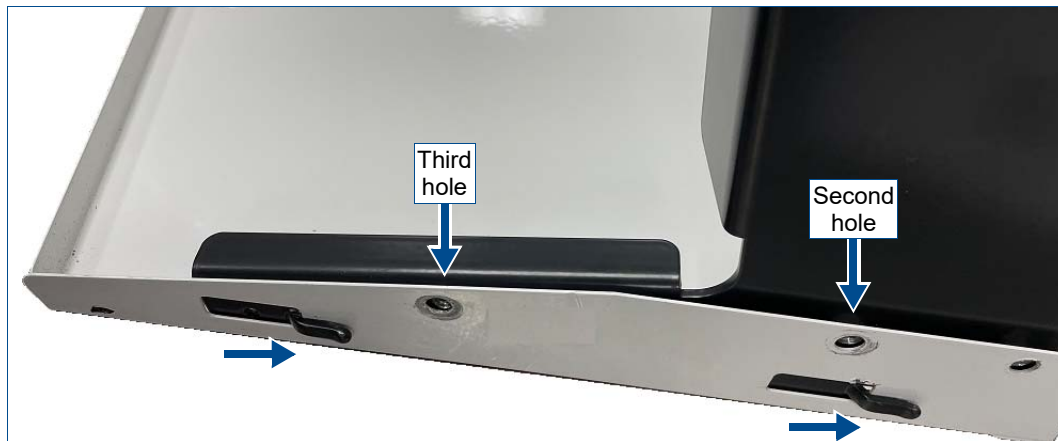
Figure G-3 Seat support bracket tabs in top panel

4. From the outside of the panel, install two screws (item 4) in the second and third holes from the top to secure the panel to the bracket. See Figure G-3.

5. Repeat step 2 through step 4 to attach the second support bracket (item 1) to the other end of the top panel. See Figure G-4.

Figure G-4 Support brackets attached to first top panel

6.   Lay the second top panel (item 2) across the support brackets and attach each end in the same manner as the first top panel. See Figure G-5.

Figure G-5 Second top panel attached to support brackets

7.   Rotate the valance down so it lays flat on the surface with the bracket crossbars at the top.

8.   Align the slots on one side of an end panel (item 3) with the retaining tabs on the support bracket, then push the end panel onto the tabs and down to seat the tabs in the slots. See Figure G-6 left.

> *NOTE!*   *It is recommended that the end of the valance hang over the edge of an elevated work surface to provide easier access while attaching the end panel. You may also need a rubber mallet or other soft hammer to gently tap the end panel into alignment. From the inside of the valance, install a screw in the top hole — but do not tighten it — to prevent the end panel from sliding off of the retaining tabs while attaching the other side.*

Figure G-6 Connect end panel to support bracket

9.   On the other side of the end panel, align the top slot with its retaining tab and push it onto its tab, then align the bottom slot and push it onto its tab.

10.   Push the end panel down to seat the tabs in the slots. See Figure G-6 right.

11. From the inside of the valance, install a screw (item 4) in the top hole and tighten, then tighten the screw installed in step 8 to secure the end panel to the bracket. See Figure G-7.

Figure G-7 End panel screw

12. Repeat step 8 through step 11 to install the second end panel on the other end of the valence.

13. Remove the four (4) plugs from the top box cover at the top of the dispenser columns. See Figure G-8.

   NOTE!   *If the holes and plugs are not present, you must remove the top box cover and replace it with WM044166-0005 for Wide dispensers, or WM044166-0006 for Narrow dispensers.*

14. Lift the assembled valance and place on the top box cover. Align the screw holes on the support brackets with the holes on the top box cover. See Figure G-8.

15. Install four (4) screws (item 4) to secure the valance to the dispenser. See Figure G-8.

Figure G-8 Valance installation on dispenser

APPENDIX H WEIGHTS AND MEASURES MODE - CATEGORY 2 ONLY

The following Appendix covers dispensers that are only available as category 2 devices and have iGEM software version 79 or lower. For software versions 80 and above see

H.1 GENERAL INFORMATION

NOTE!   *The following information shows the settings for units with price displays. Units without price displays will look slightly different as the information toggles using the single volume display.*

- Weights & Measures mode provides an audit trail of metrologically significant information that is handled through a W&M Category 2 sealing method. This function is mainly for use by Weights and Measures officials to view the events recorded in the audit trail related to the Category 2 seal.

- Weights & Measures mode is accessed using the handheld Infrared Remote Control (IRC). To use the IRC, point it at the volume display within a distance of 12 to 18 inches. While most of the Weights & Measures mode information is not side specific, for information that is side specific, you will need to enter the W&M mode pointing the remote towards the display for the relevant side. For twin models with island-oriented nozzles that have two displays on each side, you may need to sign on again into Weights & Measures mode to see values for the meter totals for that side. Since the displays for each "side" of the dispenser show on both the front and back of the dispenser on these models, the software cannot determine the side of the dispenser by just the location of the remote.

- The Weights & Measures mode is comprised of multiple level menus. The upper level menu allows you to scan through the various choices that are available. When you reach a category where you want more information, you can choose that menu to view the additional information. You do not need a security code to access or obtain information through the Weights & Measures mode. The cabinet does not need to be opened to access this mode.
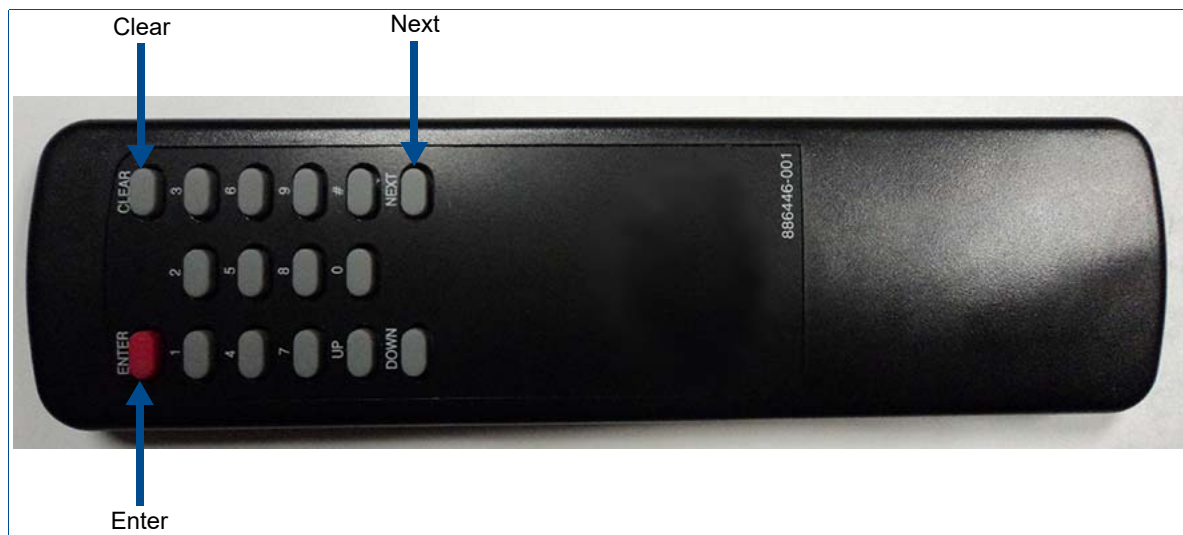
Figure H-1   Infrared (IR) Remote Control PN WM002290

H.2 UPPER LEVEL MENU

The upper level menu allows you to scan through the primary categories for the Weights & Measures mode. Enter this menu by pointing the IRC at the volume display and pressing the "Clear" button. You can continue to press the "Clear" button until the dispenser leaves the Weights & Measures mode or press "Enter" at any time to enter the sub-menu of any of the primary categories. The graphic below shows the primary categories. Each of these is fully explained in the following pages. The "Last Transaction" refers to the most recent transaction that was run on the dispenser.

Last Transaction

52.20
18.650
2.799

Press "Clear"

Unit of Measure Menu

2.01
US GAL
Unit

Press "Clear" OR "Next" OR 20 Sec Timeout

Press "Enter" → **Unit of Measure Log Details**

Pulse Output Config Menu

6   100
2
POut

Press "Clear" OR "Next" OR 20 Sec Timeout

Press "Enter" → **Pulse Output Config Log Details**

ATC Configuration Menu

2
tC On
Atc

Press "Clear" OR "Next" OR 20 Sec Timeout

Press "Enter" → **ATC Config Log Details**

Product Pressurization Menu

2
1-On
PPL

Press "Clear" OR "Next" OR 20 Sec Timeout

Press "Enter" → **Product Pressurization Log Details**

Program Change Menu

2
71.00
PC

Press "Clear" OR "Next" OR 20 Sec Timeout

Press "Enter" → **Program Change Log Details**

Totalizer Meter Readings

135
289.104
b tS

Press "Clear" OR "Next" OR "Enter" OR 10 Sec Timeout

Metrological Settings Menu

- - - - - -
F 16

Press "Clear"

Press "Enter" OR "Next" → **Program Change Log Details**

Last Transaction

52.20
18.650
2.799

H.3 UNIT OF MEASURE MENU

The Unit of Measure (UOM) menu shows the existing UOM (US Gallons or Liters), the existing meter type (see chart below), and the number of events recorded at the top level menu. You can look at the detail of each event which shows the UOM for each event along with the date and time that change took place. The log stores the most recent 10 events. The sub-menu will show "nonE" for the remaining events once no other changes were recorded. You can press "Clear" at any time to move to the next upper menu item.

Meter Type	Description
01	iMeter w/ WIP
02	LC Meter
04	xFlo Meter
05	LC & iMeter Combo
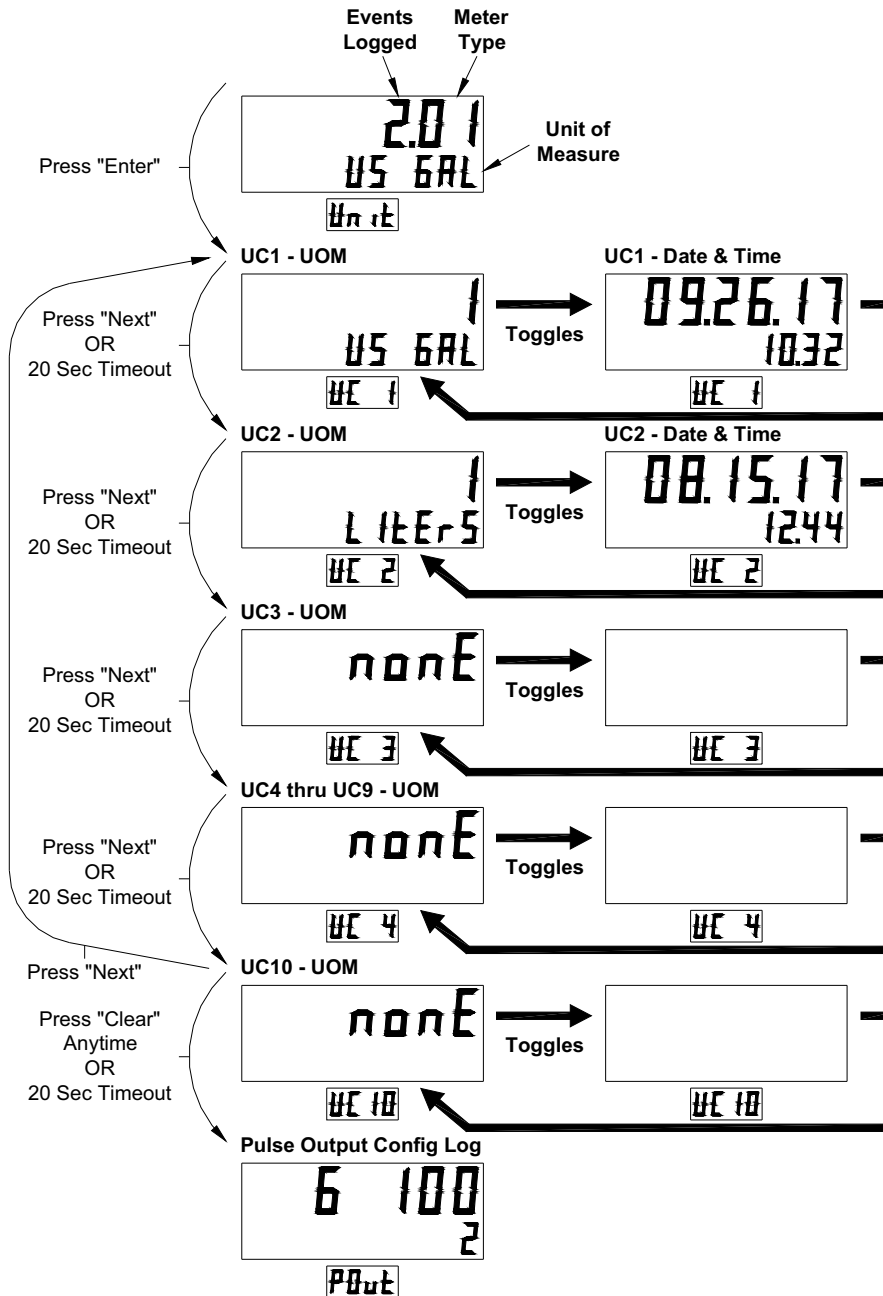
H.4 PULSE OUTPUT MENU

The Pulse Output menu shows the pulse output type (gallons or liters), the pulse rate per unit (or "0" if pulse output is off), and the number of events recorded at the top level. You can look at the detail of each event which shows the UOM along with the date and time that it took place. The log stores the most recent 10 events. The sub-menu will show "nonE" for the remaining positions once no other events were recorded. You can press "Clear" at any time to move to the next upper menu item.

UOM	Description
G	Gallons
L	Liters

Rate	Description
0	Pulse Output Off
10	10 pulses per unit
100	100 pulses per unit
250	250 pulses per unit
500	500 pulses per unit
1000	1000 pulses per unit
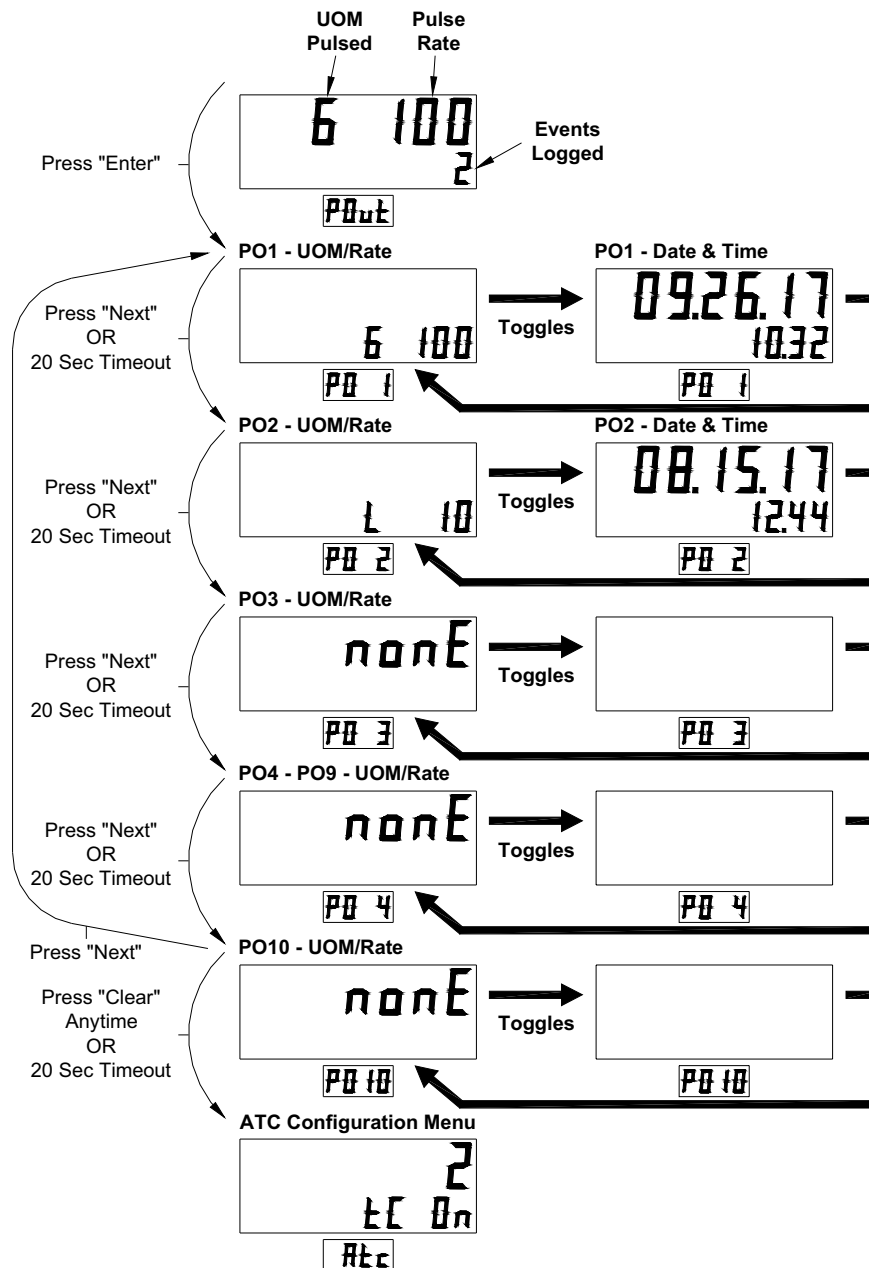
H.5 AUTOMATIC TEMPERATURE COMPENSATION (ATC) MENU

The ATC menu shows the ATC status and the number of events recorded at the top level. The ATC feature is used only in the Canadian market. Specific hardware is required for it to be active. You can look at the detail of each event which shows the ATC status along with the date and time that it took place. The log stores the most recent 10 events. The sub-menu will show "nonE" for the remaining positions once no other events were recorded. For each of the 10 recorded events, you can see additional details which shows probe assignments and the fuel assignment for each meter (1-8), for that event by pressing "Enter" again. You can press "Clear" at any time to move to the next upper menu item.

Probe	Description
P0	Not Assigned
P1	Probe 1
P2	Probe 2
P3	Probe 3
P4	Probe 4
P5	Probe 5
P6	Probe 6
P7	Probe 7
P8	Probe 8

Fuel	Description
0	Gasoline
1	Diesel
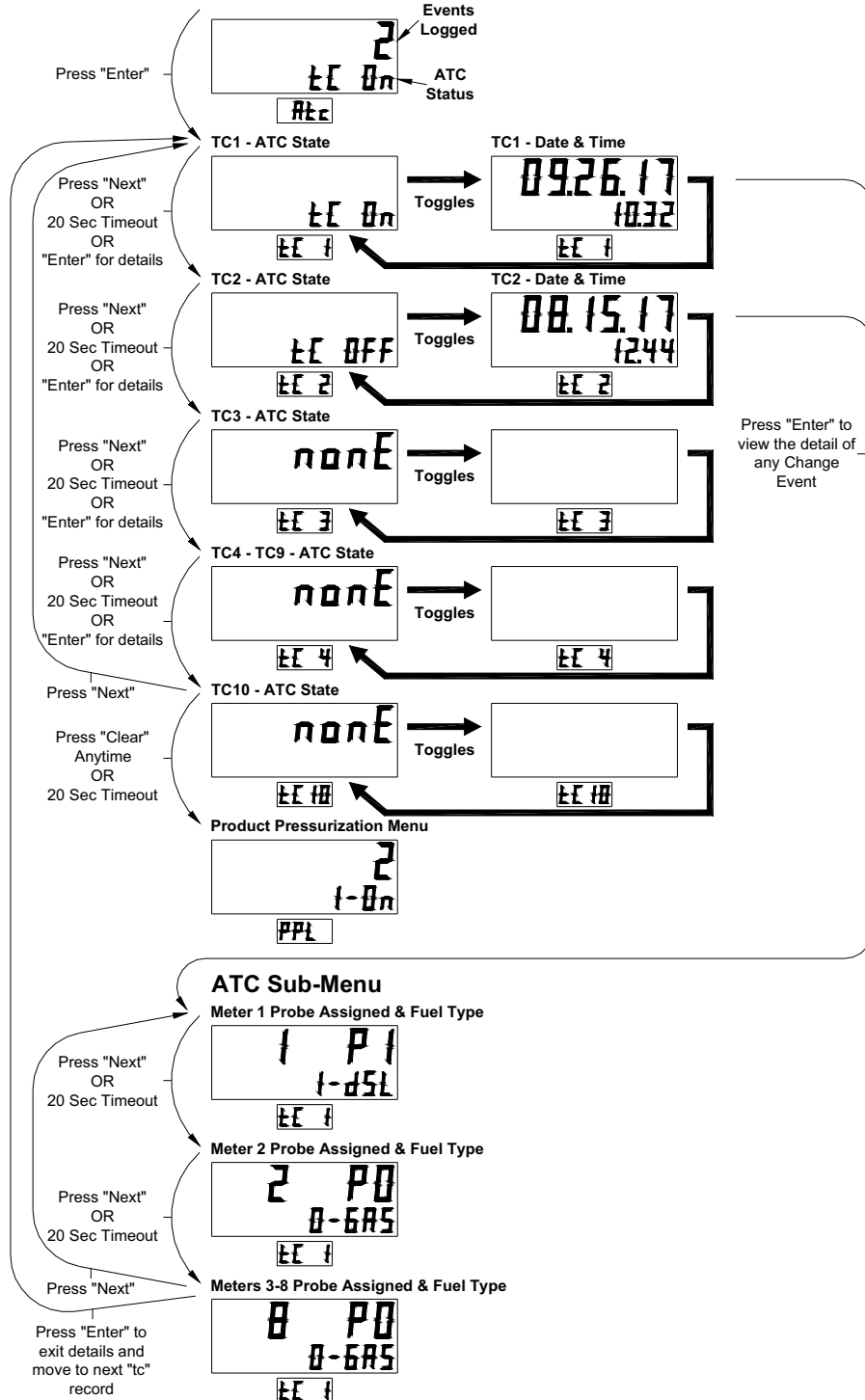
H.6 PRODUCT PRESSURIZATION MENU

The Product Pressurization menu shows the Product Pressurization status and the number of events recorded at the top level. The Product Pressurization feature is used to make sure the hose is charged (at the very beginning of a transaction) after sitting for more than 1 hour. You can press "Enter" to look at the detail of each event which shows the product pressurization status along with the date and time that it took place. The log stores the most recent 10 events. The sub-menu will show "nonE" for the remaining positions once no other events were recorded. You can press "Clear" at any time to move to the next upper menu item.
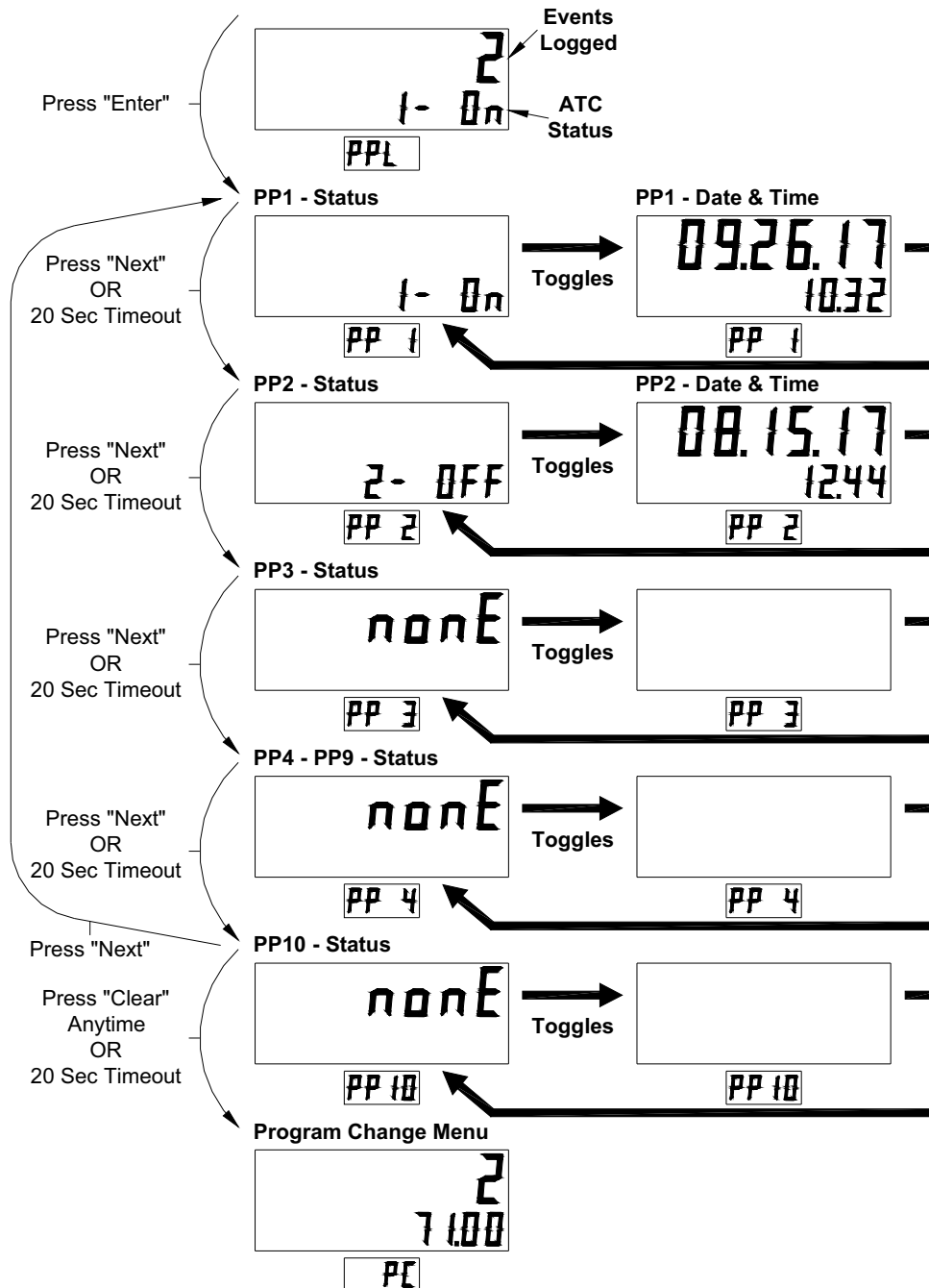
H.7 PROGRAM CHANGE MENU

The Program Change menu shows the present version of software installed and the number of events recorded at the top level. You can press "Enter' to look at the detail of each event which shows the source of the software download along with the date and time that it took place. The log stores the most recent 10 events. The sub-menu will show "nonE" for the remaining positions once no other events were recorded. You can press "Clear" at any time to move to the next upper menu item.

Source	Description
4	Servterm
5	iX via CAN
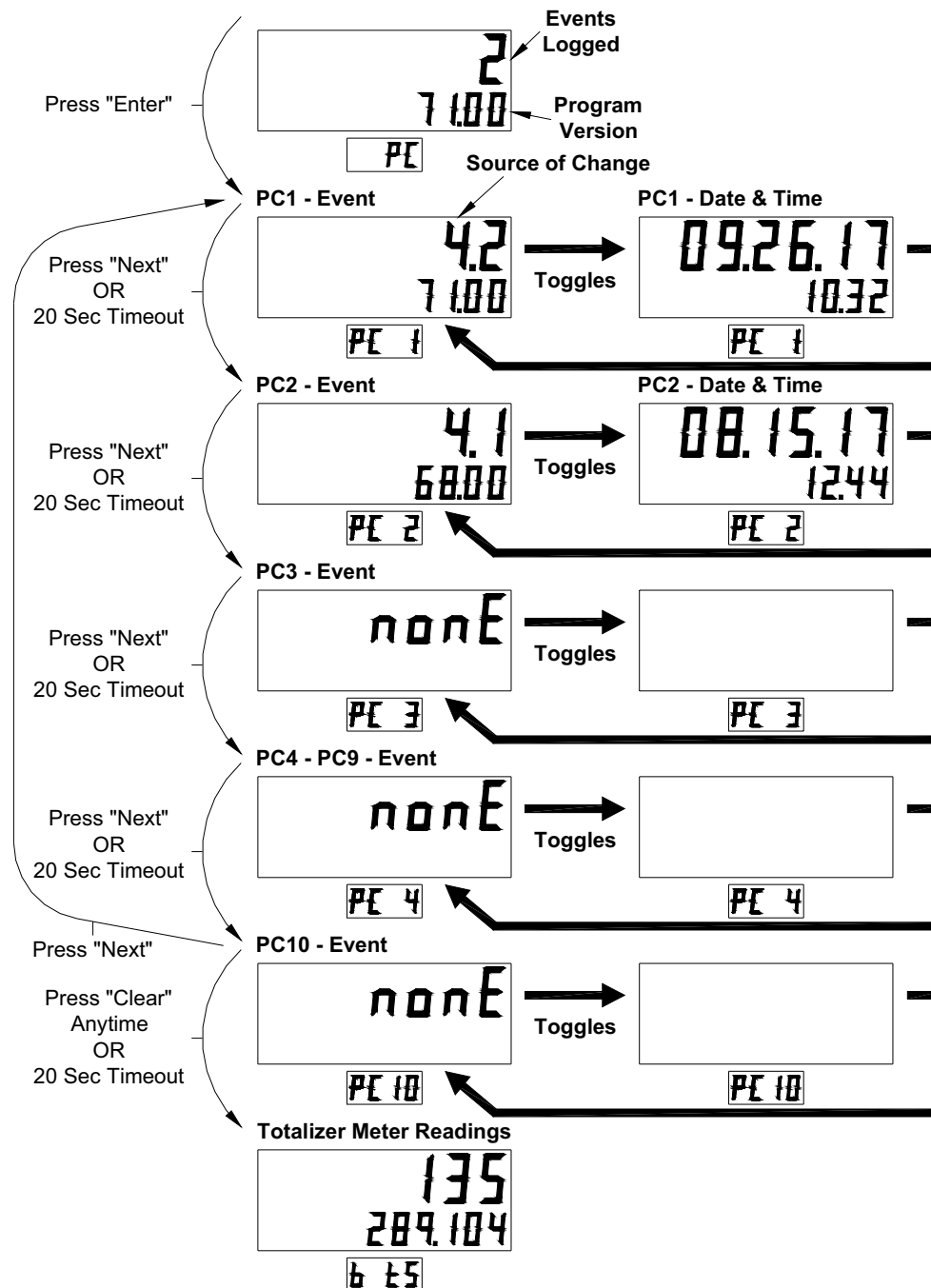
H.8 METER TOTALS

The Meter Totals menu shows the volume totalizer for the side that was used when the Weights and Measures mode was activated. For twin models with island-oriented nozzles that have two displays on each side, you may need to go through the Weights and Measures mode access sequence for each side to see the totals for both sides. The Status/PPU display shows the side being accessed (a or b) and the associated totalizer assignment (tx). You can press "Clear" at any time to move to the next upper menu item.
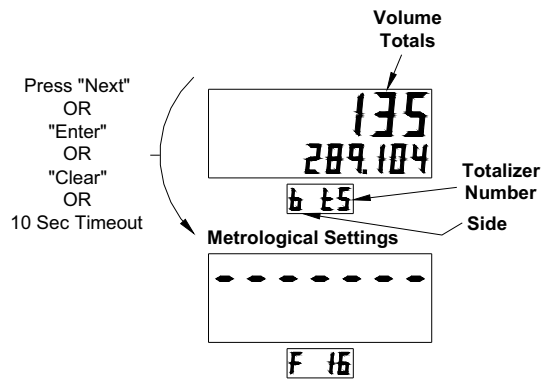
H.9 METROLOGICAL SETTINGS MENU

The Metrological Settings menu covers various dispenser configuration settings in the dispenser that may have an impact on the dispenser operation. Once at the first setting of F16, you can press "Enter" to scan through the F16 settings or "Next" to move to the next configuration parameter setting. You can press "Clear" at any time to exit the Weights and Measures mode.
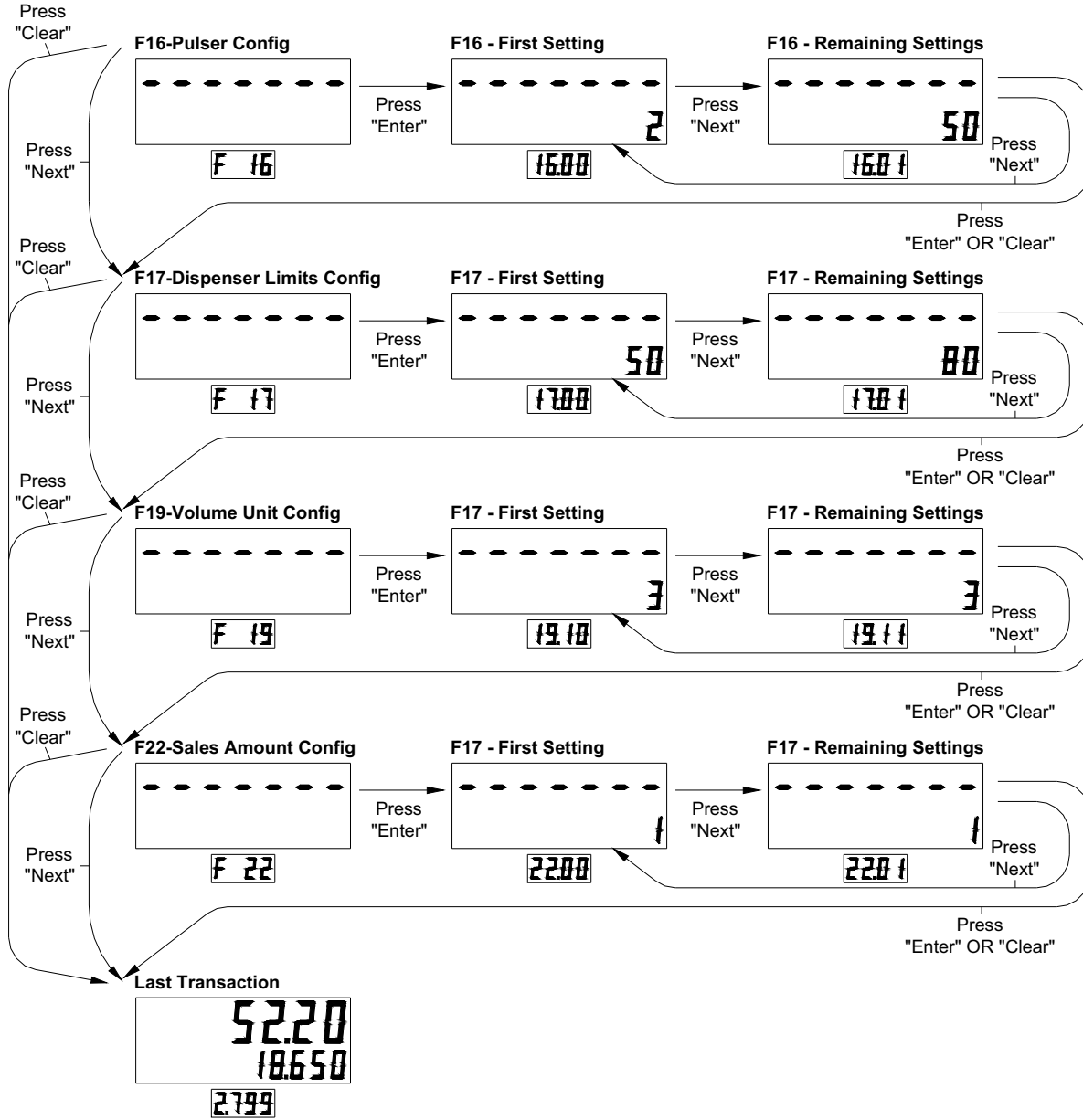
NOTE!   See [Section H.10](#) on page 133 for these configuration parameter definitions.

H.10 METROLOGICAL CONFIGURATION PARAMETER DEFINITIONS

Function	Description	Sub-Function	Description
F16	Meter Configuration	.00	Measurement mode
			1=Liters
			2=Gallons
			3=Imperial gallons
		.01	Pulser reverse pulse hysteresis, 1-64
		.03	Reverse pulse limit (after hysteresis) on an idle/unused pulser, 1-255
		.04	Meter type
			1=WIP
			2=PPM w/ LC meter
			3=PPM w/ E85 meter
			4=Xflow, 5=LC & iMeter combo
F17	Dispenser Limits Configuration	.00	Max. # of pulse errors on an in-use pulser (in a transaction), 1-99
		.01	Max. # of pulse errors on an idle/unused pulser, 1-99
		.02	Max. # of display errors/filling, 0-99, 0=disabled
		.03	Stop for "no flow" time limit, 0-1000 seconds
		.04	Max. # of consecutive no flow events w/o error, 0-10, 0 = disabled
		.05	Max. # of flow lost events w/o error, 0-10, 0 = disabled
		.06	Max. # of unfinished fillings, 0-10, 0 = disabled
		.07	Max. $ filling amount/filling, 1-6 digits
		.08	Max. volume amount/filling, 1-6 digits
		.09	Stop for "flow lost" time limit, 0-1000 seconds
F19	Volume Unit Specific Configuration	.10	Suppressed volume @ start of filling, 1-9 cl.
		.11	Max. volume for selection of new product, 1-9 cl.
		.12	Suppress overflow of preset limit, 0-99 cl.
		.13	Preset/prepay slow down volume delta, 5-399 cl.
		.14	Forward pulse limit on idle/unused EIP, 1-99 cl.
		.15	Liters pulse output resolution
			0=Disabled
			1=1 pulse per unit
			2=10 pulses per unit
			3=100 pulses per unit
			4=250 pulses per unit
		.16	Calibration Test Container Volume - Liters (UHC only)
			20 - 1000 Liters
		.20	Suppressed volume @ start of filling, 1-99 (units of 0.001 gals.)
		.21	Max. volume for selection of new product, 1-99 (units of 0.001 gals.)
		.22	Suppress overflow of preset limit, 0-99 (units of 0.001 gals.)
		.23	Preset/prepay slow down volume delta, 2-999 (units of 0.001 gals.)

Function	Description	Sub-Function	Description
F19	Volume Unit Specific Configuration, continued	.24	Forward pulse limit on idle/unused pulser, 1-999 (units of 0.001 gals.)
		.25	Gallons pulse output resolution
			0=Disabled
			1=1 pulse per unit
			2=10 pulses per unit
			3=100 pulses per unit
			4=250 pulses per unit
			5=500 pulses per unit
			6=1000 pulses per unit
		.26	Calibration Test Container Volume - Gallons (UHC only)
			5 - 250 Gallons
F22	Sales Amount Calculation	.00	Denomination ratio between money display and unit price display
			1=1/1
			2=10/1
			3=100/1
			4=1/10
			5=1/100
			6=1/1000
		.01	Count by ones or fives in leas significant digit of money display
			1=Ones
			2=Fives
		.02	Volume digits to the right of the decimal point used in the amount calculation, 0-5
			5=use volume decimal point as defined in F14.03
		.03	Money preset configuration
		.04	Default price mode
			1=Credit
			2=Cash

H.11 AUTOMATIC TEMPERATURE COMPENSATION (ATC) TESTING

Dispensers equipped with ATC (used in Canada) convert the gross delivery of fuel to a temperature compensated value according to the temperature and type of fuel being dispensed. A switch is provided in the hydraulic portion of the dispenser cabinet to allow for calibration and testing of the dispenser. Perform the ATC test and/or meter calibration as follows:

Step	$ Total Display	Volume Display	PPU/Status Display
Turn on the Temp. Comp. toggle switch located on the horizontal support rail in the hydraulic cabinet.	Display will show ATC compensated volume.	Display will show uncompensated (gross) volume.	Display will show probe temperature.
Remove nozzle from nozzle boot and select grade.	During the reset cycle, the iGEM software version will briefly appear.	During the reset cycle, the temp. comp. software version will briefly appear.	During the reset cycle, display shows the Volume Correction Factor (VCF) Fuel Type (Gas or Diesel).
Dispense fuel.	Compensated (net) volume appears.	Uncompensated (gross) volume appears.	Probe temperature is shown on PPU display #1, and Flow Rate is shown on PPU display #2.
Turn off the Temp. Comp. switch in the hydraulic cabinet.	$ Total appears.	Compensated (net) volume appears.	PPU appears.

NOTE!   *To verify the accuracy of the temperature probes, insert a Weights and Measures probe in the NPT test port next to the ATC temperature probe. Follow the steps above to see the temperature probe reading and verify it against the Weights and Measures probe.*

APPENDIX I WEIGHTS AND MEASURES MODE - CATEGORY 2 OR 3

The following Appendix covers dispensers that are available as Category 2 or 3 devices and have iGEM software version 80 or higher. For the unit to be able to operate as a Category 3 device allowing remote downloads, the dispenser must have an operating internal printer. See [Appendix H](#) on page 124 for iGEM software versions 79 and lower.

I.1 CATEGORY 2 AND 3 IDENTIFICATION

- **Category 2:** Units that are running in a Category 2 mode must have changes made to the metrologically significant parameters locally. These changes can be made with the Infrared Remote Control (IRC) or through the servTerm application run on a local PC. Remote downloads are not permitted.

- **Category 3:** Units that are running in a Category 3 mode can have changes made to the metrologically significant parameters locally or remotely. These changes can be made with the Infrared Remote Control (IRC), through the servTerm application run on a local PC, or remotely through the Payment Terminal. For a dispenser to be run in the Category 3 mode, there must be a Payment Terminal installed in the dispenser that is equipped with a printer.

I.2 GENERAL INFORMATION

- Weights and Measures mode is accessed using the handheld Infrared remote control (IRC). To use the IRC, point it at the volume display within a distance of 12 to 18 inches.

- The Weights and Measures mode is comprised of multiple level menus. The upper level menu allows you to scan through the various choices that are available. When you reach a category where you want more information, you can choose that menu to view the additional information. You do not need a security code to access or obtain information through the Weights and Measures mode. The cabinet does not need to be opened to access this mode.

- If the dispenser is operating in a Category 3 mode, pressing "4" on the remote keypad will cause the existing menu to print on the Payment Terminal printer.
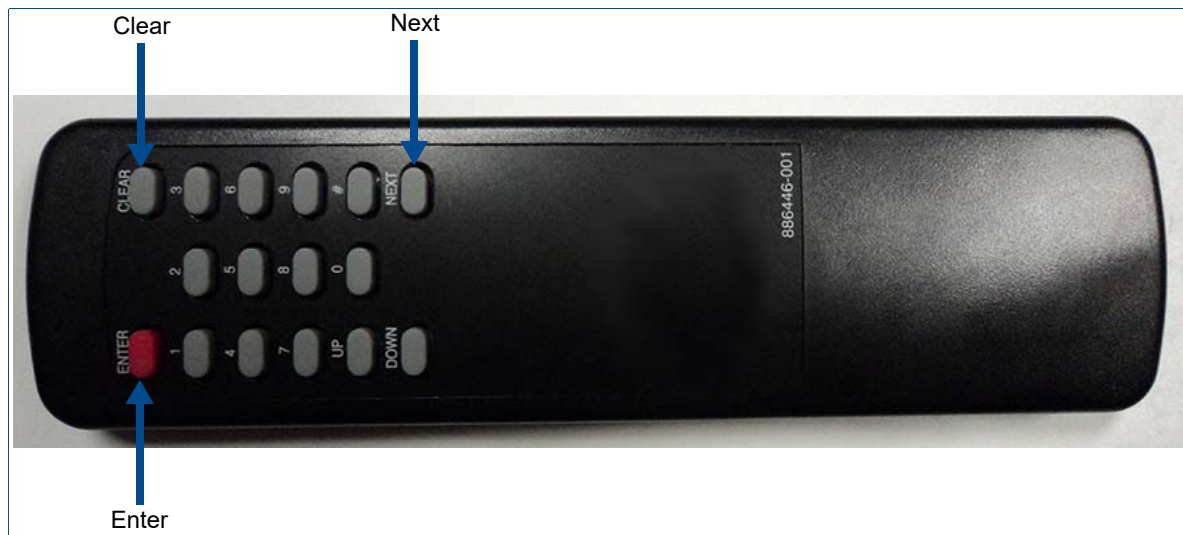
Figure I-1   Infrared (IR) Remote Control PN WM002290

I.3 UPPER LEVEL MENU

The upper level menu allows you to scan through the primary categories for the Weights and Measures mode. Enter this menu by pointing the IRC at the volume display and pressing the "Clear" button. After pressing the "Clear" button dashes will appear on the display. Wait 5 seconds before pressing any other buttons. You can continue to press the "Clear" button until the dispenser leaves the Weights and Measures mode or press the appropriate key as detailed below to view information. The graphic below shows the primary categories. Each of these is fully explained in the following pages. The "Last Transaction" refers to the most recent transaction that was run on the dispenser.

Last Transaction

Press "Clear"

52.20
18650

W&M Mode Entry Screen

Do Not Press Any Buttons, Will Automatically Advance in 5 Secs.

Legally Relevant Menu

Press "Clear" OR "Next" OR 20 Sec Timeout

1428
Lr   C3

Press "Enter" → **Legally Relevant Log Details**

Blend Ratios

Press "Clear" OR "Next" OR "Enter" OR 20 Sec Timeout

bLEnd
Lr rAtioS

The current blend ratios are shown in the PPU displays (Will not show this menu if this is not a blender)

Program Change Menu

Press "Clear" OR "Next" OR 20 Sec Timeout

2
PC   8208

Press "Enter" → **Program Change Log Details**

Meter Totals Menu

Press "Clear" OR "Enter"

185
A tl 603742

Press "Next" OR 20 Sec Timeout → **Meter Totals Details**

Function Settings Menu

Press "Clear"

F 16

Press "Enter" → **Function Settings Details for this Function**

Press "Next" → **Move to Next Function**

Last Transaction

52.20
18650

I.4 LEGALLY RELEVANT EVENTS

I.4.1 Legally Relevant Menu

The Legally Relevant menu provides access to the most recent 1000 events for parameter changes that are considered to be Legally Relevant (metrologically speaking). The Event Number assigns a number for the change. It goes to "65,536" before resetting to "1". Each event shows the parameter that was changed, the new value that was loaded, and the date/time when it took place. If the dispenser is set up as a Category 3 device, you can press "4" on the remote at any time to print this log to the local printer. All 1000 records will print. Events that will be recorded along with their definitions are shown later in . You can press "Clear" at any time to move to the next upper menu item.
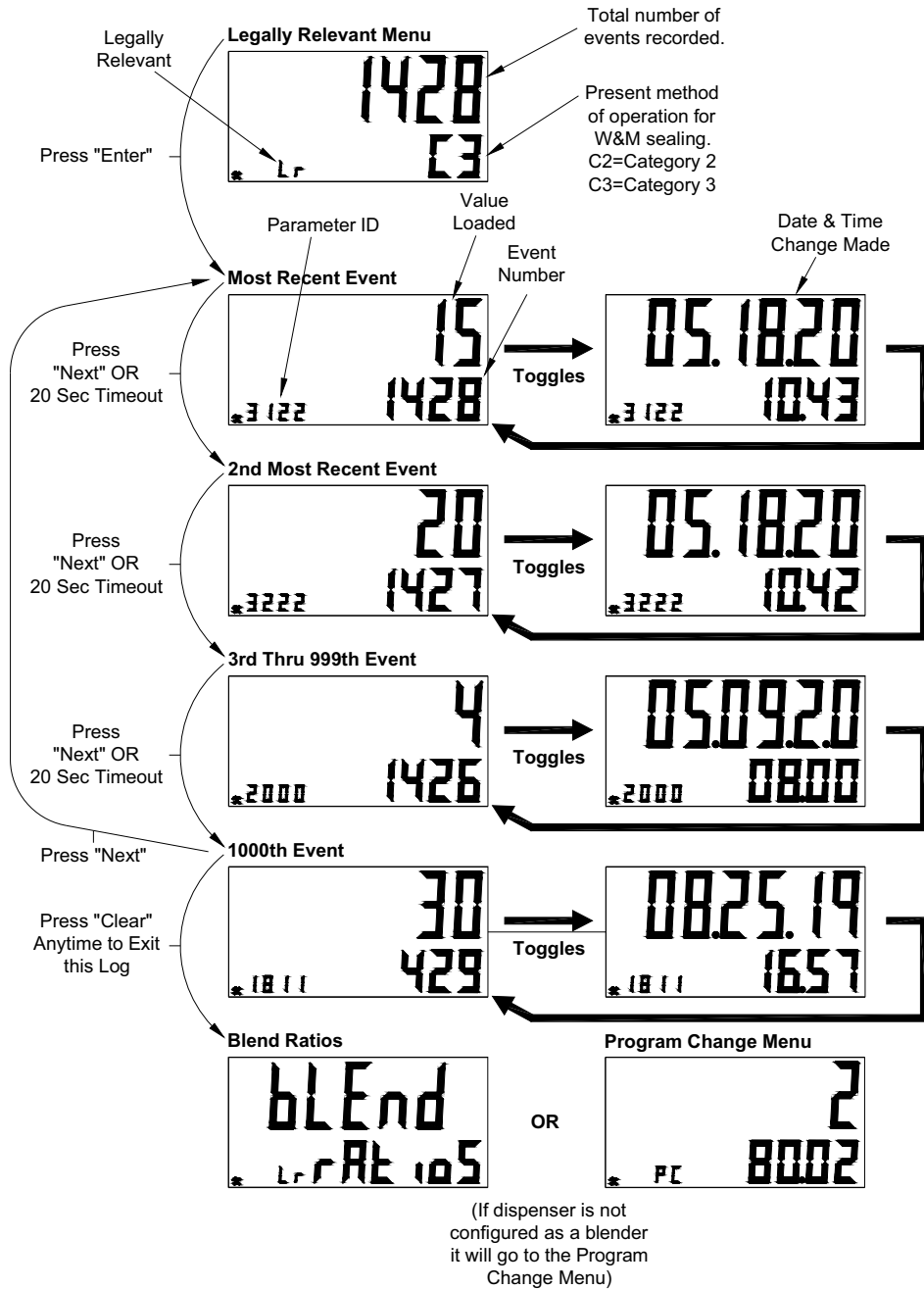
I.4.2 Printout for Legally Relevant Events (Category 3 Only)

When the dispenser is operated as a Category 3 device, the Legally Relevant event log can be printed to the printer (when in this menu) by pressing "4" on the Infrared Remote. A record number "R" shows the number for the record within this log (1 - 1000). An event number "E" shows the number for the event (1 - 65,536). The date/time that the event took place is shown. the parameter that was changed is also shown along with the new value that was loaded.

"Rx" Record Number — Log Identification

Legally Relevant Change Log
R 1 E 1428
05/18/2020 10:43
F31.22 = 15
R 2 E 1427
02/05/2020 8:35
0077.00
R 2 E 1427
02/05/2020 8:35
0077.00

"Ex" Event Number

Date & Time of Event

Parameter Changed

New Value Loaded
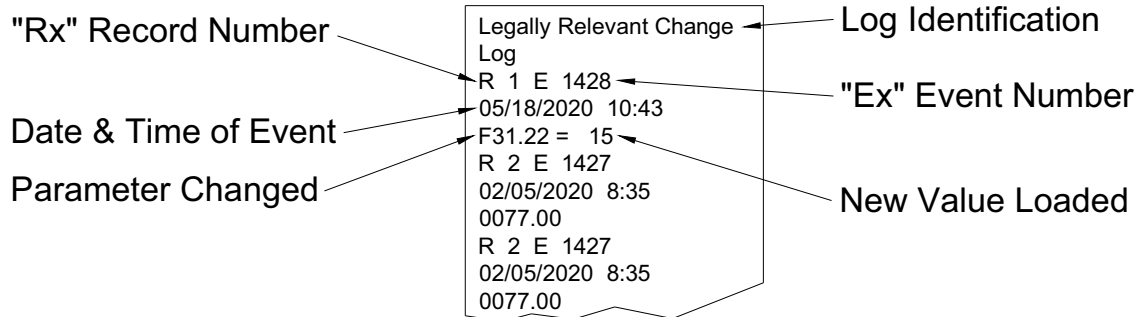
I.5 BLEND RATIO SETTINGS

If the dispenser is configured as a Blender, the blend settings for each Push-to-Start (PTS) position will appear in the corresponding PPU displays. The value shown is the percentage of blend selected for the primary meter for that PTS position. This corresponds with the table for blend ratios as defined in Function F18 along with the nozzle and meter assignments for that particular PTS button. If the dispenser is not configured as a blender, this screen will not appear. Press "Enter", "Clear" or "Next" to move to the "Program Change Menu".

I.6 PROGRAM CHANGE

I.6.1 Program Change Menu

The Program Change menu provides access to view the most recent 10 program changes. Those changes are numbered in the Program Change number as 1 - 10. The Change Source indicates if the change was done locally "4" or remotely "7". The Event Number assigns a number for the change. It goes to "65,536" before resetting to "1". Each event shows the software version loaded as well as the date and time when the change took place. If the dispenser is set up as a Category 3 device, you can press "4" on the remote at any time to print this log to the local printer. The 10 most recent changes will print. You can press "Clear" at any time to move to the next upper menu item.
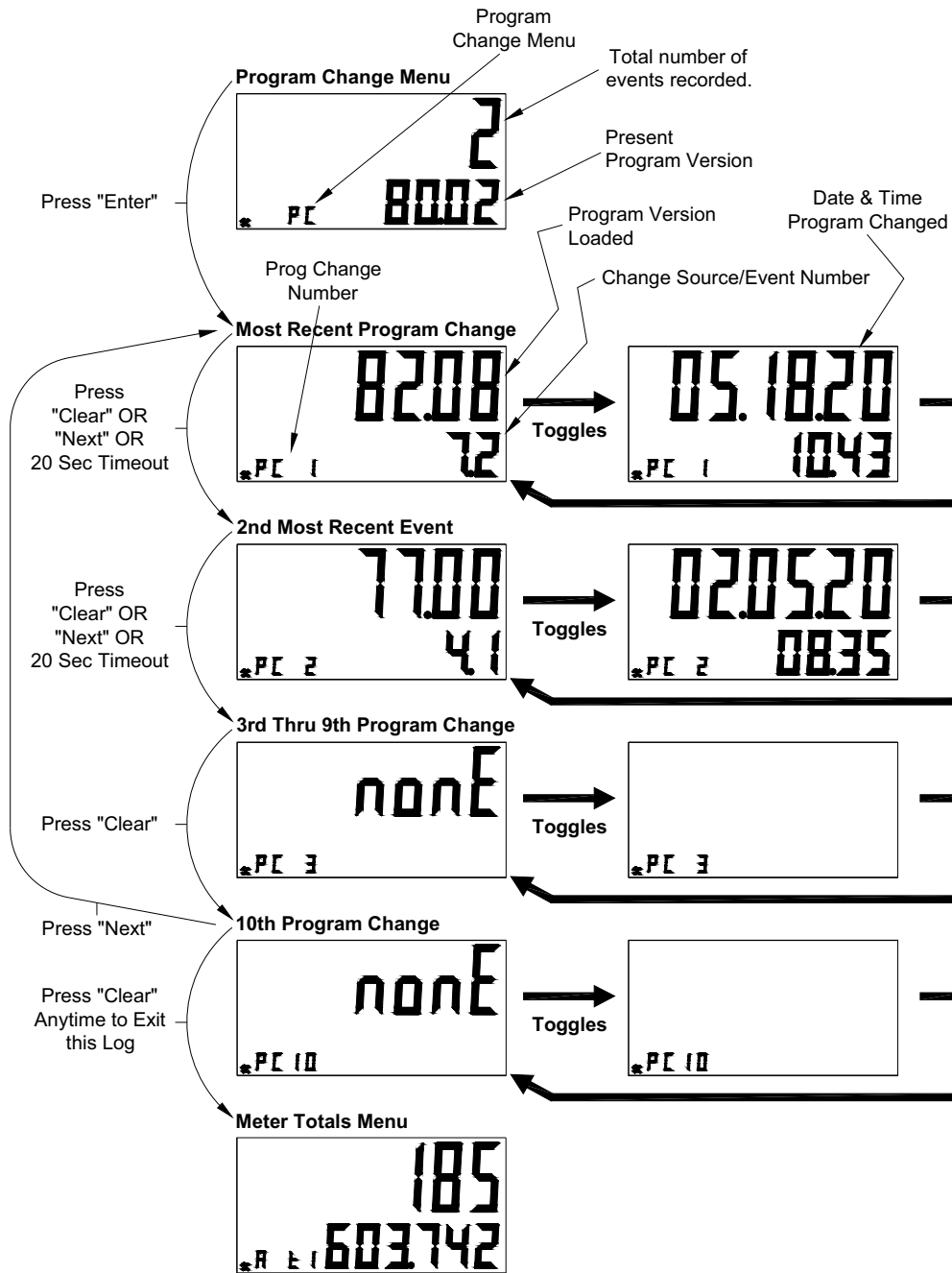
I.6.2 Printout for Program Change Events (Category 3 Only)

When the dispenser is operated as a Category 3 device, the Program Change event log can be printed to the printer (when in this menu) by pressing "4" on the Infrared Remote. A record number "R" shows the number for the record within this log (1 - 10). An event number "E" shows the number for the event (1 - 65,536). The date/time that the program change took place is shown. The program that was loaded is shown. The source "S" of the changes is also shown (4=Local, 7=Remote).

"Rx" Record Number — Log Identification

```
F00.00  =   00000
Prog Rev Change Log
R  1  E  2
05/18/2020  10:43
0080.02
S  7
R  2  E  1
02/05/2020  8:35
0077.00
S  4
R  3  E  0
00/00/0000  0:00
000.00
S  0
R  4  E  0
00/00/0000  0:00
000.00
S  0
```

"Ex" Event Number

Date & Time of Event

"Sx" Download Type — Software Version
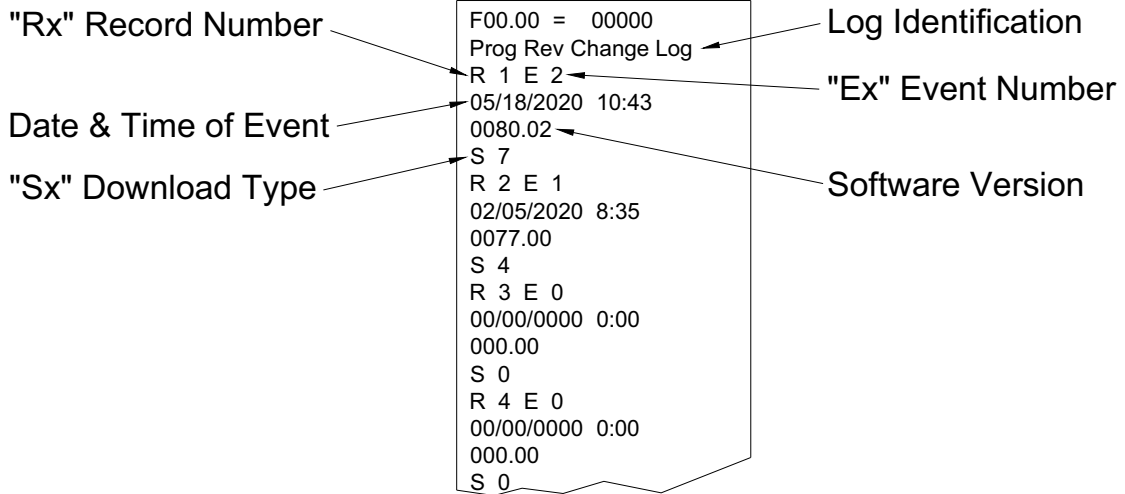
I.7 METER TOTALIZERS

The Meter Totalizer menu provides access to view the totals for each meter in the dispenser by meter number. Meters are shown by Side (A or B). To view the totals for Side A the Weights and Measures mode must be activated on that side and vice versa for Side B. Press "Enter" or "Clear" at any time to skip to the Function Settings menu.

Meter
Number

Meter Totals (First meter total)

Dispenser Side
(A or B)

Meter totalizer reading. Least
significant digit is shown in bottom
row with most significant rolling into
top display as the totalizer increases.
(185,603.742 Gallons shown)

| 185 |
| A t1 603742 |

Second Meter Total

Press
"Next" OR
20 Sec Timeout

Meters with no totals will
not show in this menu

| 14 |
| A t2 352812 |

Third Meter Total

Press
"Next" OR
20 Sec Timeout

| 203 |
| A t3 461005 |

Fourth Meter Total

Press
"Next" OR
20 Sec Timeout

| 72 |
| A t4 746783 |

Press
"Enter" OR
"Clear"

Function Settings Menu

| ◆ ◆ ◆ ◆ ◆ ◆ |
| F 16 |

I.8 FUNCTION SETTINGS MENU

The Function Settings menu covers several configuration settings in the dispenser to show the existing settings. Once at the first setting of F16, you can press "Enter" to scan through the F16 settings or "Next" to move to the next configuration parameter setting. For definitions of these parameters see Section I.9 on page 144. You can press "Clear" at any time to exit Weights and Measures mode.
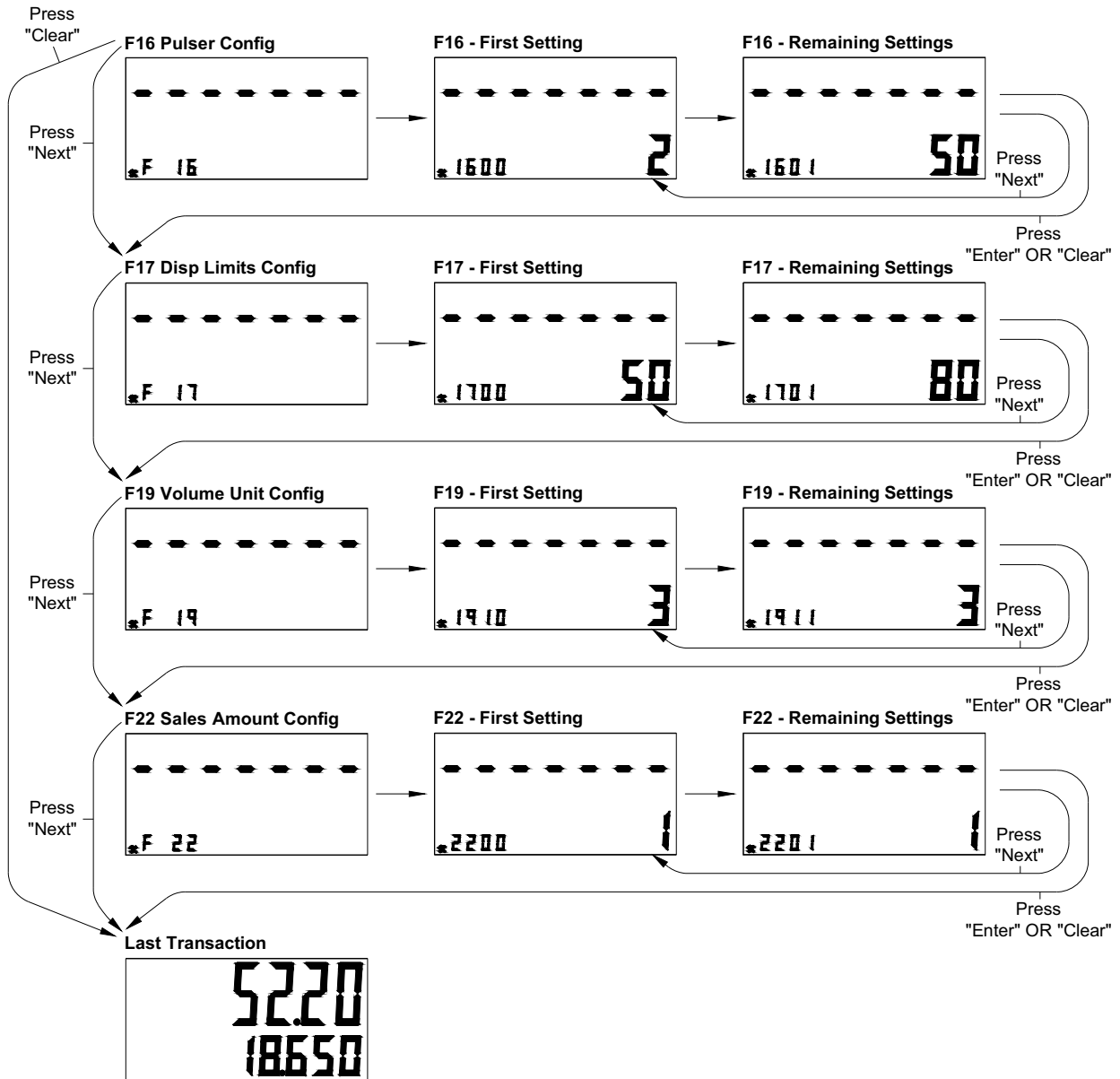
I.9 CONFIGURATION PARAMETER DEFINITIONS

This table shows the configuration setting that are recorded in the event logger when a change is made.

Function	Description	Sub-Function	Description
F02	Clock Config	.00	Time in the format HH.MM
		.01	Date in the format MM.DD
		.02	Year in the format YYYY
F07	Dispenser Configuration	.02	Max. blend error allowed, 1-5 (units of %)
		.03	First check set for blending if liters, 2-200 (units of 1/10 Liters)
		.04	First check set for blending if gallons, 5-50 (units of 1/10 gallons)
F14	Dispenser Display Configuration (Controls both sides)	.02	Money display digits to right of decimal point, 0-4
		.03	Volume display digits to right of decimal point, 0-4
		.04	Unit Price display digits to right of decimal point, 0-4
		.07	total & totalizers $ Amount display digits right of decimal point, 0-4
		.08	Total & totalizers Volume display digits right of decimal point, 0-4

F16	Meter Configuration	.00	Measurement mode
			   1=Liters
			   2=Gallons
			   3=Imperial gallons

		.01	Pulser reverse pulse hysteresis, 1-64
		.03	Reverse pulse limit (after hysteresis) on an idle/unused pulser, 1-255

		.04	Meter type
			   1=WIP
			   2=PPM w/ LC meter
			   3=PPM w/ E85 meter
			   4=Xflow, 5=LC & iMeter combo

F17	Dispenser Limits Configuration	.00	Max. # of pulse errors on an in-use pulser (in a transaction), 1-99
		.01	Max. # of pulse errors on an idle/unused pulser, 1-99
		.02	Max. # of display errors/filling, 0-99, 0=disabled
F18	Blend Ratios S=Side (1=A, 2=B) N=Logical Nozzle	.SN	Blend percentage of the primary blend meter (0 - 101, 101=Disabled).
F19	Volume Unit Specific Configuration	.10	Suppressed volume @ start of filling, 1-9 cl.
		.11	Max. volume for selection of new product, 1-9 cl.
		.12	Suppress overflow of preset limit, 0-99 cl.
		.13	Preset/prepay slow down volume delta, 5-399 cl.
		.14	Forward pulse limit on idle/unused EIP, 1-99 cl.

Function	Description	Sub-Function	Description
F19	Volume Unit Specific Configuration (continued)	.15	Liters pulse output resolution
			0=Disabled
			1=1 pulse per unit
			2=10 pulses per unit
			3=100 pulses per unit
			4=250 pulses per unit
		.16	Calibration Test Container Volume - Liters (UHC only)
			20 - 1000 Liters
		.20	Suppressed volume @ start of filling, 1-99 (units of 0.001 gals.)
		.21	Max. volume for selection of new product, 1-99 (units of 0.001 gals.)
		.22	Suppress overflow of preset limit, 0-99 (units of 0.001 gals.)
		.23	Preset/prepay slow down volume delta, 2-999 (units of 0.001 gals.)
		.24	Forward pulse limit on idle/unused pulser, 1-999 (units of 0.001 gals.)
		.25	Gallons pulse output resolution
			0=Disabled
			1=1 pulse per unit
			2=10 pulses per unit
			3=100 pulses per unit
			4=250 pulses per unit
			5=500 pulses per unit
			6=1000 pulses per unit
		.26	Calibration Test Container Volume - Gallons (UHC only)
			5 - 250 Gallons
F20	Dispenser Serial Link Protocol	.00	1=Std DART, 2=Full DART, 3=LON, 4=US Current Loop, 7=CAN, 10=LON Standalone, 11=US Legacy DART
F21	Misc Configuration Part 1	.00	Pump Motor ON Config:
			1=ON at end of display test
			2=ON at start of display test
			3=ON at product selection
			4=ON at nozzle lift
		.01	Lock on filling mode configuration
			1=Access to filling mode configuration restricted
			2=Access allowed
		.02	Standalone indication enabled (show 4 digits right of decimal place)
			1=Yes
			2=No
		.03	Blank or dash unselected unit price displays on product selection
			1=Blank
			2=Dash

Function	Description	Sub-Function	Description
F21	Misc Configuration Part 1 (continued)	.04	Product change allowed after fueling started
			1=Nozzle change allowed, fueling point remains authorized
			2=Nozzle change not allowed, fueling point auth canceled
			3=Product change not allowed w/o replacing nozzle, remains authorized
			4=Product change not allowed w/o replacing nozzle, auth canceled
		.05	Electro-mechanical totalizer configuration
			1=Each side has its own totalizer per meter
			2=One totalizer per meter shared by both sides
		.06	Flowrate Display
			0=Display normal sale amount
			1=Display primary product flowrate
			2=Display secondary product flowrate
			3=Display total flowrate
			4=Display Wayne Vac diagnostics
		.07	Product Pressurization Function
			1=Enabled
			2=Disabled
		.08	Arming Key Authorization
			0=Disabled
			1=Arming required in both cash & credit modes
			2=Arming required in cash mode only
			3=Arming required in credit mode only
		.09	Maintenance Mode access thru remote w/o pressing CRC button on iGEM
			0=Entry possible at all levels
			1=Entry with buttons 1, 2, 5 and CLEAR w/o CRC
			2=Entry with buttons 5 and CLEAR w/o CRC
			4=Entry with button 5 without CRC
			5=No entry w/o pressing CRC first
			6=Entry with button 1 w/o CRC
			8=Entry with button CLEAR w/o CRC
F22	Sales Amount Calculation	.00	Denomination ratio between money display and unit price display
			1=1/1
			2=10/1
			3=100/1
			4=1/10
			5=1/100
			6=1/1000
		.01	Count by ones or fives in leas significant digit of money display
			1=Ones
			2=Fives

Function	Description	Sub-Function	Description
F22	Sales Amount Calculation (continued)	.02	Volume digits to the right of the decimal point used in the amount calculation, 0-5
			5=use volume decimal point as defined in F14.03
		.03	Money preset configuration
		.04	Default price mode
			1=Credit
			2=Cash
F29	Side A Liter Flow Rate Config: N=Logical Nozzle	.0N	Max slow flow rate3-50 (units of 1/10 Liters/Min.)
		.1N	Min slow flow rate, 0-50 (units of 1/10 Liters/Min.) 0=No minimum
		.2N	Max fast flow rate, 10-180 (units of Liters/Min.)
		.3N	Min fast flow rate, 0-180 (units of Liters/Min.) 0=No minimum
F30	Side B Liter Flow Rate Config: N=Logical Nozzle	.0N	Max slow flow rate3-50 (units of 1/10 Liters/Min.)
		.1N	Min slow flow rate, 0-50 (units of 1/10 Liters/Min.) 0=No minimum
		.2N	Max fast flow rate, 10-180 (units of Liters/Min.)
		.3N	Min fast flow rate, 0-180 (units of Liters/Min.) 0=No minimum
F31	Side A Gals Flow Rate Config: N=Logical Nozzle	.0N	Max slow flow rate, 1-10 (units of 1/10 Gallons/Min.)
		.1N	Max. fast flow rate, 3-48 (units of Gallons/Min.)
F32	Side B Gals Flow Rate Config: N=Logical Nozzle	.0N	Max slow flow rate, 1-10 (units of 1/10 Gallons/Min.)
		.1N	Max. fast flow rate, 3-48 (units of Gallons/Min.)
F33	Password Change	.00	Service engineer password, 6 numeric characters max.
		.01	Station manager password, 6 numeric characters max.
		.02	Station operator password, 6 numeric characters max.
		.03	Weights and Measures password, 6 numeric characters max.
F39	Error Severity Level Configuration XX=Selected Error Number	.XX	0=Only log error in log.
			1=Terminate sale only.
			2=Semi-fatal. Only affected side of the dispenser is closed.
			3=Fully fatal. Total dispenser closed. Maint mode access/cycle power to reset.
			4=Catastrophic. Both sides of dispenser closed. Cycle power to reset.
			5=Error completely disabled.
F42	Misc Config Part 2	.00	Totals display mode
			0=Display totalizers per meter
			1=display totalizers per logical nozzle
			2=display totals per meter
			3=Display total per logical nozzle
			4=Display WIP totalizers

Function	Description	Sub-Function	Description
F43	Meter Channel Configuration M=Meter channel 1=Meters 1 & 5 2=Meters 2 & 6 3=Meters 3 & 7 4=Meters 4 & 8	.0M	Meter Type
			0=No meter attached
			1=iMeter
			2=PPM w/ LC meter
			3=PPM with E85 meter
			4=Xflow meter
		.1M	Reverse pulse hysteresis, 1-64
		.2M	Max number of pulser errors/reverse pulses on an "in use" WIP in a trans, 1-99
		.3M	Reverse pulse limit (after hysteresis) on an idle/unused WIP, 1-255
		.4M	Liters, Suppress overflow of preset limit, 1-99 cl.
		.5M	Liters, Preset/prepay slow down volume delta, 5-399 cl.
		.6M	Liters, Forward pulse limit on an idle/unused WIP, 1-99 cl.
		.7M	Gallons, Suppress overflow of preset limit, 0-99 (1/1000 gallons)
		.8M	Gallons, Preset/prepay slow down volume delta, 2-999 (1/1000 gallons)
		.9M	Gallons, Forward pulse limit on an idle/unused WIP, 1-999 (1/1000 gallons)
F50	ATC Configuration N=Meter number (1-8)	.0N	Temperature probe assignment
		.1N	Product type assignment
F68	Additive Configuration N=Logical Nozzle (1-7)	.0N	Number of turns per liter by logical nozzle (X=logical nozzle)
		.08	Additive calibration options
			0=No calibration
			1=Additive calibration side 1 only
			2=Additive calibration side 2 only
			3=Additive calibration of both sides
			4=No additive. This allows Weights and Measures official to measure diesel only.
F71	Alternate Display Configuration	.00	Alternate display
			0=No alternate display
			1=Anthem display
		.01	Country code
			0=US
			1=International
		.02	CAN FDDP display
			0=Disabled
			1=Enabled
F98	Software Download	.04	Local Software download through local serial port
		.07	Remote Software download from remote location

I.10 AUTOMATIC TEMPERATURE COMPENSATION (ATC) TESTING

Dispensers equipped with ATC (used in Canada) convert the gross delivery of fuel to a temperature compensated value according to the temperature and type of fuel being dispensed. A switch is provided in the hydraulic portion of the dispenser cabinet to allow for calibration and testing of the dispenser. Perform the ATC test and/or meter calibration as follows:

Step	$ Total Display	Volume Display	PPU/Status Display
Turn on the Temp. Comp. toggle switch located on the horizontal support rail in the hydraulic cabinet.	Display will show ATC compensated volume.	Display will show uncompensated (gross) volume.	Display will show probe temperature.
Remove nozzle from nozzle boot and select grade.	During the reset cycle, the iGEM software version will briefly appear.	During the reset cycle, the temp. comp. software version will briefly appear.	During the reset cycle, display shows the Volume Correction Factor (VCF) Fuel Type (Gas or Diesel).
Dispense fuel.	Compensated (net) volume appears.	Uncompensated (gross) volume appears.	Probe temperature is shown on PPU display #1, and Flow Rate is shown on PPU display #2.
Turn off the Temp. Comp. switch in the hydraulic cabinet.	$ Total appears.	Compensated (net) volume appears.	PPU appears.

NOTE!   *To verify the accuracy of the temperature probes, insert a Weights and Measures probe in the NPT test port next to the ATC temperature probe. Follow the steps above to see the temperature probe reading and verify it against the Weights and Measures probe.*

APPENDIX J GLOSSARY OF TERMS AND ACRONYMS

TERM	DEFINITION
additive	a product added to the gasoline to enhance performance
ALU	aluminum
ambient	the surrounding area or environment (as in ambient temperature)
annunciator	beeper, buzzer
ANTX board	Anthem secure payment board in the dispenser
ATC	automatic temperature compensation
bezel	the outer rim at the upper part of the dispenser
bleeding	clearing the fuel lines of air (also, purging)
blend ratios	the amount or quantity of each of the two fuels added together to obtain the third fuel
blender	mixes two fuels together to obtain a third; a blending dispenser
board	PCB printed circuit board; one of the electronic boards in the dispenser
bootstrap	(as in computers, loading software)
breakaway	device between the hose and dispenser that breaks if the hose is accidentally pulled by the car
breakaway valve	see emergency valve
C&PR valve	Check and Pressure Relief Valve
CAT	Customer-Activated Terminal
circuit breaker	a type electrical device
conduit	enclosure used for routing electrical wires
coupling	small section of pipe used to connect two pipes together
C-style	the frame of a dispenser in the shape of the English letter C
current loop	a communication circuit used by the dispenser and POS system
double bump tube	a tube having two raised areas on the ends
drip pan	a pan used to drain or catch the fuel to keep it from spilling onto the ground
EH	Electronic Head - electronics cabinet
EHPM	electronic head and payment terminal

TERM	DEFINITION
electro-mechanical	mechanical device controlled by electricity (as in electro-mechanical totalizer)
emergency valve	this valve is designed to close the fuel supply line if a vehicle crashes into the dispenser or if there is fire in the dispenser; also known as shear valve, crash valve and breakaway valve
EMT	electro-mechanical totalizers
ESD	Electro-Static Discharge
filter	device that captures small unwanted particles in the gasoline or diesel fuel
FPID	Fueling Point Identification Address - a number assigned to a dispenser so that it can be identified on a communications network
fuel funnel	used to drain fuel into a pan or container in order to prevent spilling
gross volume	the amount or volume of fuel before temperature compensation
Healy	name of a vapor recovery system
high capacity	dispenser is designed for a higher fuel flow rate and therefore delivers a higher volume of fuel as compared to a standard capacity dispenser
hose	flexible tubing that connects the nozzle to the dispenser and where gasoline, petrol, or other product flows through
H-style	the frame of a dispenser in the shape of the English letter H
hybrid	more than one source: (Wayne - Hybrid card reader that reads both magnetic strip cards and cards that contain a micro-chip that has the card number
inlet	location at a meter, valve, or casting where the fuel enters
Intrinsic Safe Barrier (ISB)	barrier inside the dispenser - the area below the barrier is free from hazardous electrical sparks
island oriented	when the nozzle is located on the left or right sides of the dispenser, as opposed to the front or back sides.
jitter	unwanted electrical pulses or interference (as in jitter pulses)
jumper	small wire or connector used to join together to pins in a connector or on a circuit board
junction box	a metal box located near the bottom of the dispenser

TERM	DEFINITION
lane oriented	when the nozzle is location on the front or back sides of the dispenser as opposed to the left or right sides
LEE	lower electronic enclosure
low hose	the fuel hose is connected near the middle of the dispenser, as opposed to high at the top
LT	Low Temperature
LTS	lift-to-start (to activate dispenser)
meter	dispenser component that measures the amount of fuel dispensed.
net volume	the amount or volume of fuel after temperature compensation
nozzle	device at the end of the hose that is inserted into the vehicle (or container) when dispensing product
nozzle boot	the holder (on the dispenser) of the nozzle when it is not in use
outlet	location at a meter, valve, or casting where the fuel exits
outlet casting	a metal or aluminum type mold where the hose is connected to the dispenser
P/N	Part Number
payment terminal (PT)	as in payment terminal on the dispenser where a payment is made by credit card
PCB	Printed Circuit Board
pedestal	platform or base that the dispenser sits on (also referred to as 'island' in some areas)
pipe dope	sealant used on the threads of a pipe; pipe sealant
POS	Point of Sale
prime	to pour fuel into the pump to clear out the air in order to start the pump properly
product tube	fuel tube; the tube that contains the fuel or that fuel moves through
PTS	Push-to-Start (to activate dispenser)
pulser	device that generates signals
purge	clearing the fuel lines of air
relay	an electrical component used in the dispenser
remote (pump)	the pump for the dispenser is located in the underground tank; not inside the dispenser
residual	something left over or remaining (as in residue)

TERM	DEFINITION
retainer clip (pin)	clip or pin used to secure or hold a tube in place
retractor	pulls hose back into place after use
sales/volume display	shows the total sale amount and the volume dispensed
satellite (dispenser)	a small dispenser connected to and controlled by another dispenser that is referred to the master
secondary display	a backup display that shows the last sale in the event of power failure
servTerm	a software application also known as the Service Terminal program
shear valve	see emergency valve
Sight glass	a glass cylinder used for visually measuring volume of fuel
Small-style	a short (small) type of dispenser
softkey	as in buttons or keys on a keypad
solenoid valve	electro-mechanically operated valve
SPM	Secure Payment Module
SSA	Smart Secure Access
stand-alone mode	dispenser is not connected to or communicating with the POS
Std	standard
strainer	device that captures small unwanted particles in the gasoline or diesel fuel
submersible	pump that is located in the underground tank
suction (pump)	the pump for the dispenser is located inside the dispenser
SVMX board	previous name for ANTX board
torque	rotating force applied to tighten; amount of force used to tighten a screw or pipe
Torx™	a brand name of a type of screw
TOT	totalizer
totalizer	device on the dispenser that counts and displays the total volume units
UI	User Interface
universal joint	a type of coupling
UPD	Unit Price Display - shows the fuel price per gallon or per litre

TERM	DEFINITION
UPS	Un-interruptible Power Supply
vacuum	air has been removed (as in a vacuum line)
valance	cosmetic panels around the top of the dispenser
vapor recovery	system that claims fuel vapors, minimizing exposure to the customer and environment
visible totalizers	volume totals (optional) displayed on some secondary displays; previously shown by EMTs
WIP	Wayne Intelligent Pulser - device converts magnetic field from meter and sends digital pulses to computer. Used on iMeter.
Xflo	a type of meter manufactured by Wayne
XWIP	WIP used on Xflo meter

INSTALLATION & OPERATION

Wayne Helix™ 4000 and 5000 Fuel Dispensers
Standard, Enhanced Capacity and Super-High Capacity Models

This product complies with Part 15 of the FCC rules and regulations. Operation is subject to the following two conditions:
(1) This product may not cause harmful interference, and
(2) this product must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device as set forth in Part 15 of the FCC Rules. Those 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 it is not installed and used in accordance with the instruction manual, it may casue harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

Any modifications made to this product not approved by Dover Fueling Solutions could void your authority to operate this equipment.

Warranty

Any alterations, additions, or unauthorized work, performed on the equipment without the manufacturer's express written consent shall void any existing product warranty. Please see product warranty information for additional details. Use only genuine parts.

INSTALLATION & OPERATION

Wayne Helix™ 4000 and 5000 Fuel Dispensers
Standard, Enhanced Capacity and Super-High Capacity Models

WU017834

Wayne FUELING SYSTEMS | **DOVER** FUELING SOLUTIONS