OPW
FUEL MANAGEMENT SYSTEMS

FL6®

FL6 Fuel Management System

Installation and Operation Manual

 Manual 340233 Rev. F1

OPW Fuel Management Systems -
System and Replacement Parts Warranty Statement

Effective September 1, 2002

System and Replacement Parts Warranty

OPW Fuel Management Systems warrants that all OPW Tank Gauge and Petro Vend Fuel Control systems supplied by OPW Fuel Management Systems to the Original Purchaser will be free from defects in material and/or workmanship under normal use and service for a period of 12 months from the date of installation or 15 months from the date of shipment. Additionally, OPW Fuel Management Systems warrants that all upgrades and replacement parts (new and remanufactured) supplied by OPW Fuel Management Systems will be free from defects in material and workmanship under normal use and service for a period of 90 days from the date of installation or for the remainder of the system's original warranty, whichever is greater, as set forth in the first sentence of this statement. The foregoing warranties will not extend to goods subjected to misuse, neglect, accident, or improper installation or maintenance or which have been altered or repaired by anyone other than OPW Fuel Management Systems or its authorized representative.

The buyer's acceptance of delivery of the goods constitutes acceptance of the foregoing warranties and remedies, and all conditions and limitations thereof.

If a claim is made within the warranted time period that any equipment and/or remanufactured part is defective in material or workmanship under normal use and service, such equipment and/or remanufactured part shall be returned to OPW Fuel Management Systems, freight prepaid. If such equipment or remanufactured part is found by OPW Fuel Management Systems in its sole judgment, to be defective in material or workmanship under normal use and service, OPW Fuel Management Systems, shall, at its sole option, repair or replace such equipment and/or remanufactured part (excluding, in all instances, fuses, ink cartridges, batteries, other consumable items, etc.)

The warranties, as set forth above, are made expressly in lieu of all other warranties, either expressed or implied, including, without limitation, warranties of merchantability and fitness for any particular purpose and of all other obligations or liabilities on OPW Fuel Management Systems part. Further, OPW Fuel Management Systems neither assumes, nor authorizes any other person to assume for it, any other liability in connection with the sale of the systems, or any new/replacement part that has been subject to any damage from any act of nature or any *force majeure*.

The term "Original Purchaser" as used in these warranties shall be deemed to mean the authorized OPW Fuel Management Systems distributor to which the system or any new/replacement part was originally sold. These warranties may be assigned by the original purchaser to any of its customers who purchase any OPW Fuel Management Systems systems or new/replacement parts.

The sole liability of OPW Fuel Management Systems, for any breach of warranty, shall be as set forth above. OPW Fuel Management Systems does not warrant against damage caused by accident, abuse, faulty or improper installation or operation. In no event shall manufacturer's liability on any claim for damages arising out of the manufacture, sale, delivery or use of the goods exceed the original purchase price of the goods. In no event shall OPW Fuel Management Systems be liable for any direct, indirect, incidental or consequential damage or loss of product.

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Introduction

This manual provides everyone -- Installers, Technicians, and Operators with all the FL6 information you need to install, maintain and operate the OPW Fuel Management System's FL6 unit.

Please try to read all sections of this manual prior to installing, servicing, or operating the FL6.

For Technical Support, call your local OPW Fuel Management Systems distributor.

PLEASE NOTE!

Important safety messages are located throughout this manual. Be alert to the possibility of personal injury. Carefully read the messages that are identified by the following notations:

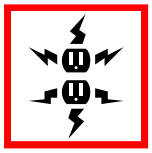
Safety Precautions

No device operating in the hazardous environment of a fueling station can be made COMPLETELY safe, without severely impairing accessibility and operation.

- Careful operation is the best insurance against an accident.
- Completly understanding and following all safety precautions in this manual will prevent potentially serious injuries or property damage.

OPW Fuel Management Systems has made every effort to provide safe equipment. The following precautions should be carefully observed.

Danger



Disconnect the main electrical supply circuit before attempting any service on the equipment.

Properly connect an earth ground to the equipment before applying power.

Because of installation close to FLAMMABLE liquids, it is imperative that all applicable codes (local, NEC (NFPA-70), & NFPA-30A) are strictly adhered to.

System Overview

The FL6 satisfies the demands of fleet operators, yet is easy to install and operate. Before actually installing the FL6, here's an overview of the following:

- Functional Description;
- Physical Description;
- Users

Description

The OPW Fuel Management System's FL6 controls and monitors two hoses with a variety of fuel dispensing equipment. The FL6's accuracy is limited only by the accuracy of the equipment being controlled, (meters and pump pulsers). The unit, via mag-cards or Durakey™ electronic keys, individually controls one or both hoses.

The FL6 ships with up to 100 mag-cards or Durakeys. Many of these keys are "function" keys -- **Report**, **Return**, **Diagnostic**, and others. Used with number cards or keys, they're like a function key on a keyboard.

A Card/Key can access *one or both* fueling points. For example, you could have Cards/Keys 1-10 access hoses #1 and #2 and the remaining Cards/Keys only access hose #1 OR hose #2.

To operate the FL6, all you need are the Card/Keys and the LED display. After you insert the Card/Key, the FL6 determines if it's valid, and for which hose(s) the user is authorized.

If the Card/Key is valid, the FL6 turns ON the BEGIN FUELING and HOSE READY indicators. The HOSE READY indicator signals the user as to which hose(s) is authorized, and not currently in use, for the inserted FL6 card. The user turns on the authorized hose, dispenses product, and turns off the hose.

Dispensed product amounts are stored in FL6 memory and logged to an internal transaction printer. Insert the Report Card/Key will produce a report containing totals for all FL6 users and hose(s).

Installation and most service is easy. There's no need for additional remote control boxes, the FL6 is self-contained. You only need to run power, pulser, and hose control lines to the unit. Wiring is simplified with terminal blocks for high and low voltage circuits.

You can also print a diagnostic report to aid in troubleshooting.

About the FL6 Console

Operating the FL6 (*Figure 1*) is straightforward. Below is a brief description of the components of the system.

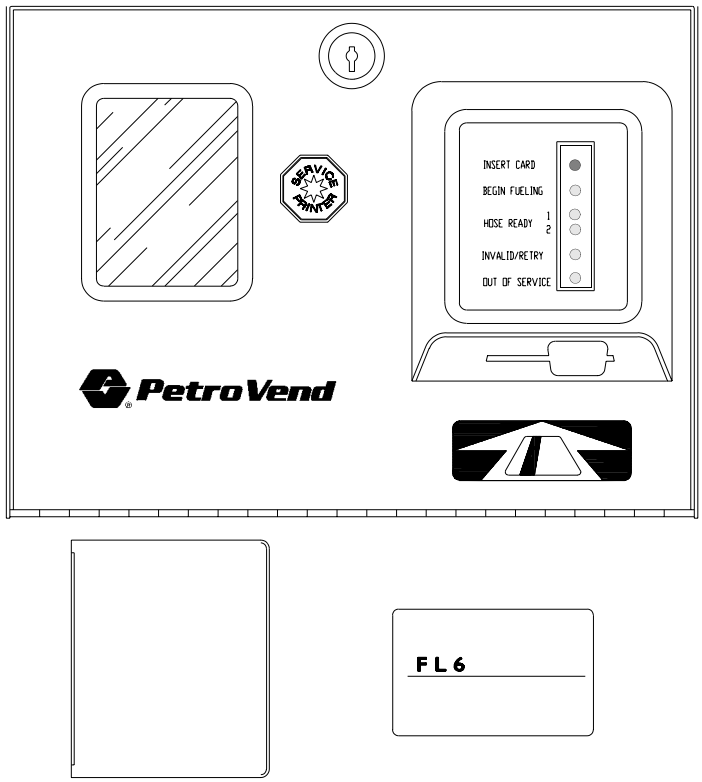


Figure 1: FL6 Front Panel

LED Display

For customers, the LEDs are the FL6's user interface, and go ON and OFF to walk the user through the procedure of dispensing product, from INSERT CARD/KEY to INVALID/RETRY.

For technicians, the LEDs provide administrative, status, and troubleshooting messages. The following indications are shown:

INSERT CARD/KEY lamp

Lights when the FL6 is ready to accept a card. Flashes to indicate an internal error in the FL6.

INVALID/RETRY

Appears when the inserted Card/Key was not read correctly, or the inserted Card/Key was not valid (not authorized for that FL6). This indicator can:

- Go ON for two seconds. The inserted Card/Key was not read correctly or the inserted Card/Key does not contain the proper system number;
- Go ON for five seconds. The inserted Card/Key was invalid (for example the FL6 was expecting a System Card/Key and a user Card/Key was inserted);
- FLASH constantly. The FL6 DIP switches are improperly set;
- ON constantly. Hardware failure. Call your OPW Fuel Management Systems distributor.

BEGIN FUELING

Besides its stated meaning for a customer, in Diagnostic Mode this light shows that a card or key was read correctly.

HOSE READY 1

Besides its stated meaning for a customer, in Diagnostic Mode this light is used to troubleshoot pulser failures at the fuel island.

HOSE READY 2

Besides its stated meaning for a customer, in Diagnostic Mode this light is used to troubleshoot pulser failures at the fuel island.

OUT OF SERVICE

The FL6 is not operational. After a system Card/Key has been inserted, this indicator will appear constantly. No product can be dispensed while this light is ON.

Card/Durakey Reader Opening

This opening gives access to the FL6 card/Durakey reader. When a Card/Key is inserted, it is read and the information transmitted to the FL6 control system for processing.

FL6 Card/Durakey

The FL6 card is like a proprietary mag-striped credit card. When inserted into the FL6, action taken depends on the type of card inserted. Each card has its function printed on the front of the card. There are two types of FL6 cards/key; System cards/key and user cards/key.

You can also use Durakey® electronic keys. The Durakey is a chip embedded in plastic that you can carry on a key ring. It can be re-encoded with new vehicle information thousands of times and cannot be accidentally erased like magnetic cards.

A Durakey encoder is available if you wish to program your own keys.

System Cards/Keys

System Cards/Keys are used to set up and administer the FL6.

These Cards/Keys give complete access to all FL6 functions and data. Keep these keys in a secure location, and allow only authorized people to use them. The system cards/keys are divided into the following two groups:

Control Cards/Keys

These seven cards/keys set up the FL6. Each control Card/Key enables specific setup function:

- ***Activation*** - Enables activation/deactivation of one or both hoses.
- ***Card/Key*** - Enables each user's Card/Key used;
- ***Diagnostic*** - Prints a diagnostic report detailing FL6 status of the FL6, and provides a hose test routine (bypass mode);
- ***Report Card/key*** - Generates a Hose Report: the total non-zero amount of product dispensed by each user card, and the total amount of product dispensed from each hose;
- ***Memory Clear*** - This can only be used after a Report Card/Key has been used to ***Card/key*** produce an FL6 Card/Key and Hose Report. Memory Clear resets FL6 Card/Key totals and hose totals;
- ***Pump Card/key***is used to activate/deactivate a hose. Product cannot be dispensed from a deactivated hose;

- ***Clock Card/key***is used to set the time and date in the FL6.
- ***Enter* Card/key**is used at the end of various configuration and diagnostic procedures to return the system to a normal operating mode.

Number Cards/DURAKEYs

This group of ten cards/keys (numbered 0 through 9) is used to enter numbers when setting specific FL6 parameters such as time/date and Card/Key activation/deactivation.

User Cards/DURAKEYs

The system supervisor will issue and control the user cards/keys. Each user Card/Key can be authorized independently to provide this control.

The FL6 is set up from the factory with ALL user cards/keys active for ALL hoses controlled by the FL6. A user Card/Key can be authorized for either hose 1 or hose 2, or for both hose 1 and hose 2.

- To revoke a user Card/Key authorization, you must deactivate it.
- To reauthorize a user card, activate it and assign a hose(s) to use.

User cards/keys that are not authorized for either hose are considered deactivated.

Internal Printer

The internal thermal printer has supply and take-up spools, a paper feed switch, and a paper-out sensor. When the supply roll is empty or the printer jams or stops working for some reason, the SERVICE PRINTER lamp flashes and an alarm sounds.

Response to Alarm

Upon a printer alarm, you can set the system for pumps to continue to operate normally, or to shut down until after the printer is serviced:

- To operate normally:Install JP2
- To stop pumping:Remove JP2

Jumper JP2 is in the center of the back of the Logic Board (in the front of the console. To get to the jumper:

1. Disconnect power from the console.
2. Unlock and open the front of the console.
3. Remove the four cover screws.

4. Slide the cover foreword and lift to remove.
5. The jumper should be visible on the back of the Logic board.

Note

Although transaction totals continue to accumulate in the system, individual transactions will NOT be available if the printer fails. This is why you must service a printer problem immediately -- to avoid losing the audit trail.

Adjusting Print Density

The FL6 printer is set at the factory for optimal performance and should never need adjustment. However, in extreme temperatures an adjustment may be necessary. In extremely low temperatures the print may become too light to read, at extremely high temperatures the printer may print erratically.

You can adjust the print darkness with the potentiometer labeled R1 at the top of the logic circuit board, next to the pulser field wiring connectors. to do this:

1. Turn FL6 power off.
2. Rotate R1 counter-clockwise until it stops.
3. Rotate R1 clockwise 1/8 of a turn then switch the power back on. The printer will begin printing.
   - If the text is legible you are done.
   - If not, turn off the power, turn R1 another 1/8 turn, turn on the power and check again. Repeat until text is legible.

Caution

Setting the print too dark can result in printer lockups, erratic printouts and/or premature print head failure.

Clearing a “Service Printer” Error

To clear an alarm:

1. Unlock the front door and visually inspect the printer for problems.
2. Replace the paper roll, if necessary.
3. Gently pull the paper from the front of the printer while pressing the paper feed button to free any jammed or misaligned paper.
4. Close and lock the front access door.

5. Insert the ENTER card to silence the alarm and restore operation.

Lock

The FL6 lock secures the internal components of the FL6 from unauthorized access. Keep the key in a safe place.

DIP Switches

The FL6 DIP switches are behind the front cover, and are for entering parameters not enterable via system cards/keys. The following options are set with the DIP switches (listed from top to bottom, 1 - 10)

System Number

Switch 1 - Prevents someone with another FL6 from accessing yours. The system number is unique to this system. All FL6 cards/keys and system cards/keys are encoded with a system number. See *page 36* to set system number.

Pulser 1

Switch 2 - Sets a pulser setting for hose 1 (Weights and Measures requirement). See *page 38* for instructions to set pulser ratios.

Pulser 2

Switch 3 - Sets a pulser setting for hose 2 (Weights and Measures requirement). See *page 38* for instructions to set pulser ratios.

System Number Enable

Switch 4 - Disables system number checking on Control cards/keys, allowing a site supervisor to use one set of control cards/keys for multiple FL6 units. *System number checking cannot be disabled in User cards/keys.* See *page 36* to set system number.

Fuel Limit 1

Switch 5– Limits amount of fuel pumped through hose 1. See *page 40* for help in setting fuel limits.

Fuel Limit 2

Switch 6– Limits amount of fuel pumped through hose 2. See *page 40* for help in setting fuel limits.

Time out - Authorize

Switch 7 – The longest time a user can wait before turning on an authorized hose. See *page 39* to set authorization time out.

Time out - Pulser

Switch 8 –Determines the maximum length of time allowed between pulses from an active hose (Occurs if pulser ceases due to pulser failure or nozzle shut off). See *page 40*.

Pulser 2 Filter

Switch 9 – May be needed to stabilize noisy pulses. Leave ON unless there is a problem with missing pulses.

Pulser 1 Filter

Switch 10 – May be needed to stabilize noisy pulses. Leave **ON** unless there is a problem with missing pulses.

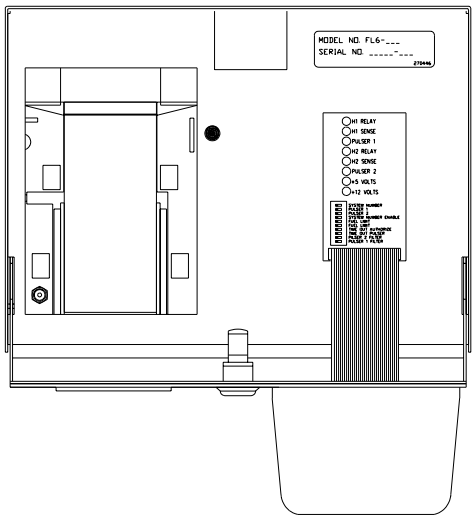


Figure 2: FL6 Diagnostic Lights

Diagnostic Lights

The FL6 has eight LEDs to monitor the condition of your system, without the need for electronic test equipment. See *page 59*.

Bypass

Use Bypass Mode to:

- **Calibrate Meters.** Dispense product and accurately calibrate the meter in the hose cabinet. Transactions are *not recorded* in bypass mode.
- **Test Pulsers**. Lets you dispense product for pulser repair or calibration.

- **Dispense Product During a Hardware Failure.** Pump gas without FL6 control.

Switch Bypass

Two bypass switches (one for each hose) on the power supply circuit board provide complete system bypass. To dispense fuel without using a card, place the switch in BYPASS. Obviously, you should limit access to these switches.

Note

In BYPASS, transactions neither accumulate in the internal totalizers or are recorded by the printer.

Diagnostic Bypass Mode

Use a Diagnostic Card/Key to place the FL6 into the Diagnostic Bypass Mode. Hose pulses are logged and printed. The FL6 maintains the total number of pulses received from the hose while in this mode. Total pulses will be printed at the end (top) of the Diagnostic Report. *To leave this mode, insert the ENTER card.*

Paper Feed

The internal printer has a paper feed button in the lower left corner. Press it once to feed three lines of paper. Hold it down for continuous paper advance.

Users

There are system supervisors and system users.

Supervisors

The person responsible for the FL6, to record authorized use and prevent unauthorized use. Supervisors set or change the fuel control options. They are also responsible for printing reports, maintenance, and troubleshooting/ repair at the first level.

Users

Anyone who uses an FL6 to obtain product -- customers, for example. Users are issued cards/keys by the system supervisor.

Specs & Requirements

The FL6 can operate in a wide range of environmental conditions. *Table 1* is a list of physical, environmental and electrical FL6 specifications.

Specifications

Table 1: FL6 Specifications

Dimensions	12" H x 9" H x 13" D
Operating Temp. Range	-0° F (-18° C) to 120° F (50° C) WITH HEATER: -30° F (-34° C) to 120° F (50° C) This temperature rating includes ambient temperature plus the temperature rise caused by solar heating.
Electrical	*ALL are single-phase dedicated circuit with earth ground.* • **451318-0XX** 120 VAC (+/- 10%) 50/60 Hz 150 W • **415318-1XX** 240 VAC (+/- 10%) 50/60 Hz 150 W • **415318-1XX** 240 VAC (+/- 10%) 50/60 Hz 150 W
Output Relay Rating	• **Motor Duty** - 3/4 HP @ 120 VAC or 240 VAC • **Pilot Duty** - 470 VA @250 VAC • **Pulser Supply** - +12 • VDC @ 25 mA maximum

Pulser Requirements

Table 2: FL6 Pulser Requirements

	Solid State Pulser	Reed Pulser
Supply Voltage	12 VDC (can be supplied by the FL6)	n/a
Maximum Pulse Rate	666 Hz	10 Hz
Duty Cycle	40 - 60%	40 - 60%
Pulser Power Consumption	1.2 W	n/a
Output Load	Sink 25 mA max.	Sink 25 mA max.
Contact Rating	20 VDC min.	20 VDC min.
Bounce Time	n/a	Less than 10 milliseconds
Pulser Ratio	1 - 1000 (in integer steps)	1 - 1000 (in integer steps)

Caution

Some factory-installed pulsers produce voltages other than the voltage supplied by the FL6. Using this type of pulser can damage the FL6 and will void all warranties.

When used as instructed, the FL6 is very immune to pulser noise. If your pulser operates erratically when connected to the FL6, please contact OPW technical support.

Installation

For a proper installation, read and complete each of the following sub-section in the order shown below.

- Site Selection
- Site Preparation
- Physical Installation
- Electrical Installation

Site Selection

Warning

The FL6 is NOT for use in a hazardous location. Also, DO NOT connect the FL6 to equipment that is operating in a hazardous location.

Physical Considerations

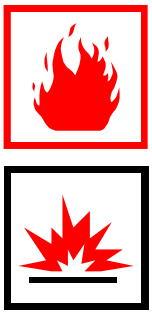
- Provide adequate support on a:
  - 48” Pedestal Mount or...
  - 6” Surface Mount
- Choose a location that’s easy for customers to get to.
- The FL6 must be within 100 feet of the pumps (that’s the maximum pulser wiring length).
- Allow room for the front door to be opened and the top cover removed to provide complete access to the internal components.
- Don’t place the unit in direct sunlight; otherwise, you may not be able to see the LEDs.

Site Preparation

Install the FL6 in accordance with National Electrical Code, NFPA 70, Automotive and Marine Service Station Code, NFPA 30A, and all other National, State, or Local codes and Local authorities having jurisdiction.

Read everything before beginning to prepare your site. There are several installation variations. Select the method best suited for your location.

Warning



Adherence to local, NEC (NFPA), and all other applicable codes is the installer's responsibility. The installer must contact the proper authorities for local code restrictions that may apply.

Conduit Layout

See *Figure 3* on page 19. When calculating the size of the conduits and junction boxes needed, consider the following:

- Low-voltage conduits for pulser wiring;
- High-voltage conduits for FL6 power and hose control.

Caution

Do NOT place high-voltage and low-voltage circuits in the same conduit!

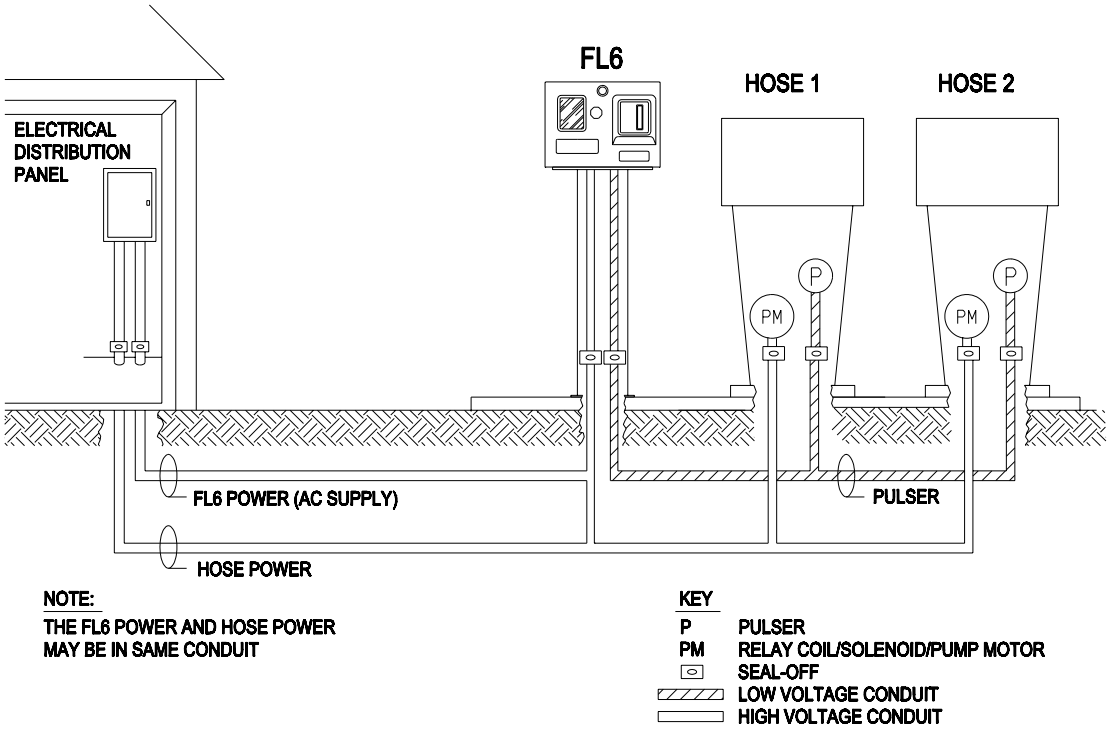


Figure 3: Site Conduit Layout

Warning

NFPA-70 requires external junction boxes to be of sufficient volume to handle the additional wires needed by the FL6 installation. Consult the applicable codes for specific requirements.

Choose a Mounting Method

You can mount the FL6 in one of two ways, on a pedestal, or on a surface.

Pedestal Mounting

In this scenario, the FL6 sits atop a pedestal using the OPW Fuel Management Systems model **401129** 48" Pedestal Kit as shown in *Figure 5*.

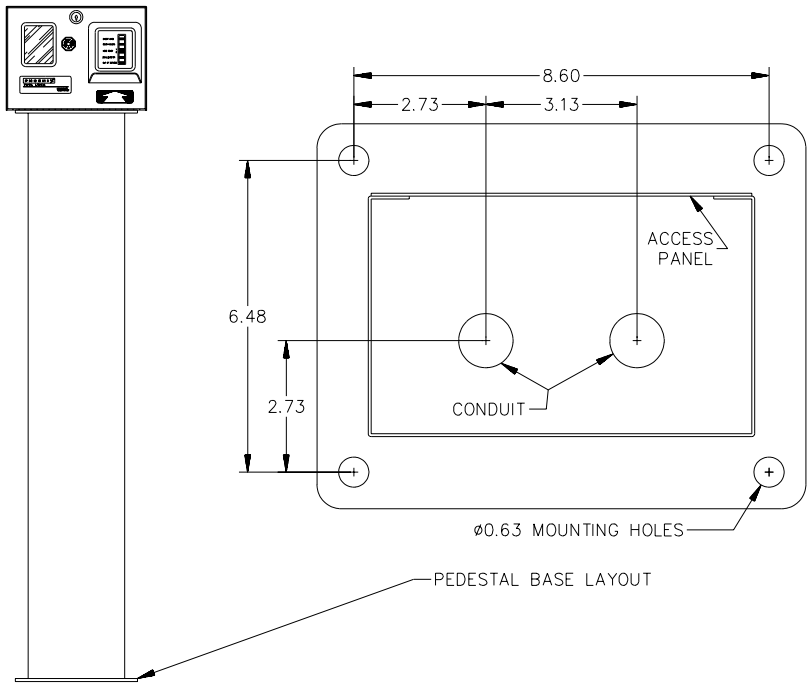


Figure 4: FL6 Pedestal Footprint

Step-by-Step Procedure

1. Position the pedestal so you can open the FL6 front door completely.
2. Use *Figure 4* and anchor bolts at least ½" diameter and long enough to go about 1 ½ "above foundation.
3. Sit the pedestal atop the bolts and secure.

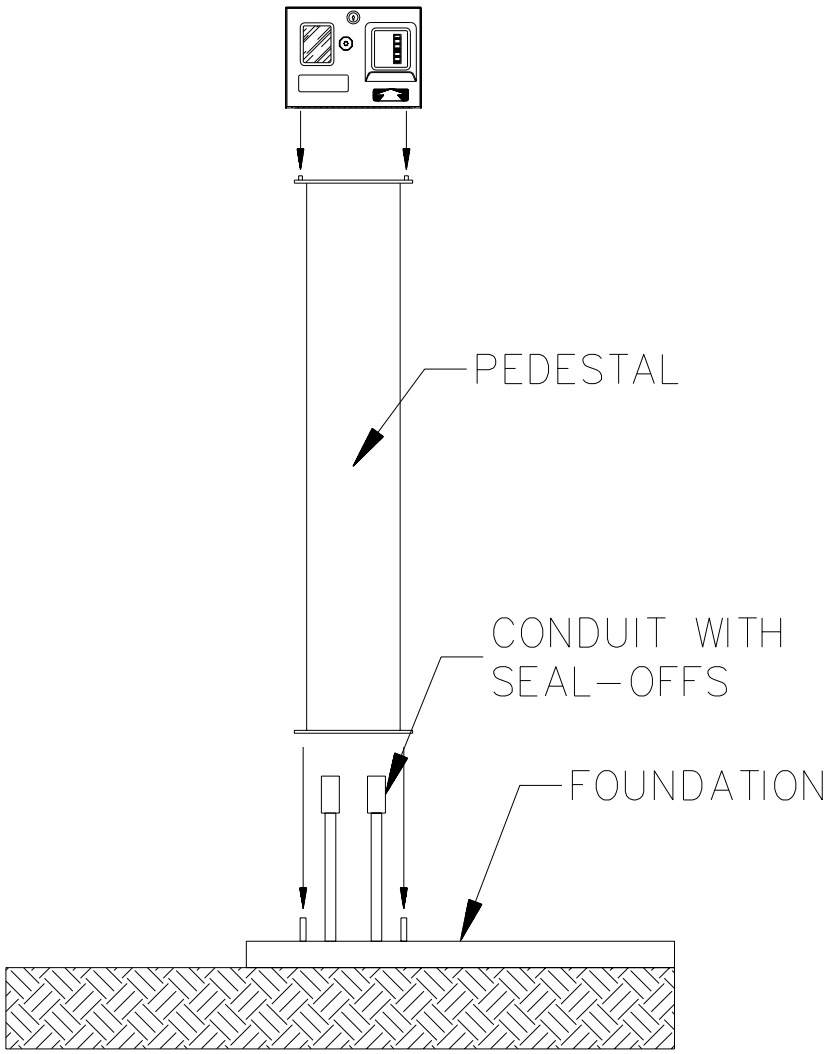


Figure 5: FL6 Pedestal Mounting Scenario

Surface (Six-Inch Pedestal) Mount

You can mount the FL6 to any flat horizontal surface with the model 401128 Six-Inch Pedestal Kit as shown in *Figure 6*.

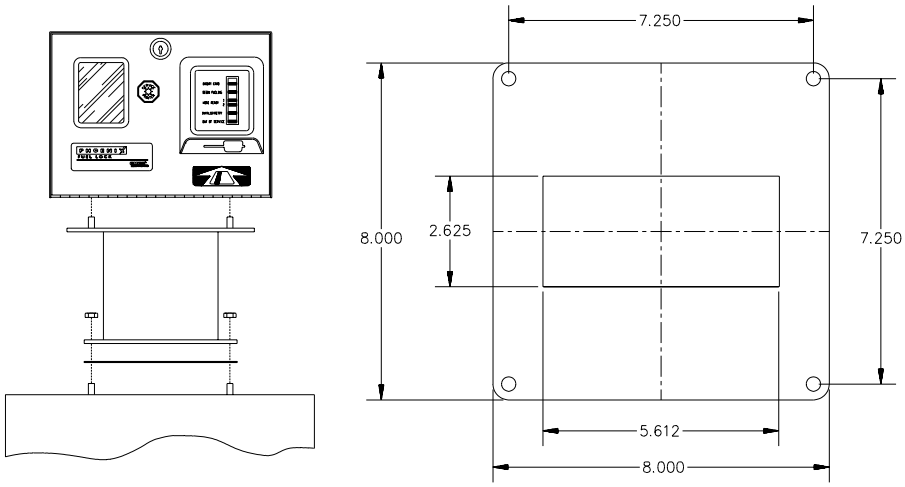


Figure 6: FL6 Head Mounting Dimensions

1. Insure that the mounting surface is level, and solid enough to support the FL6.
2. Position the FL6 so its front door can be opened to provide complete access (approximately 18");
3. Use anchor bolts at least 5/16” diameter and protrude at least 3/4” through the mounting surface. See *Figure 6* for drilling dimensions.
4. Fasten the pedestal to the surface, and the FL6 to the pedestal.

Conduit Termination

Install high and low voltage conduits into the conduit outlets located in the base of the FL6 (*Figure 7* on *page 23*). The plate can be removed for easy access to the pedestal.

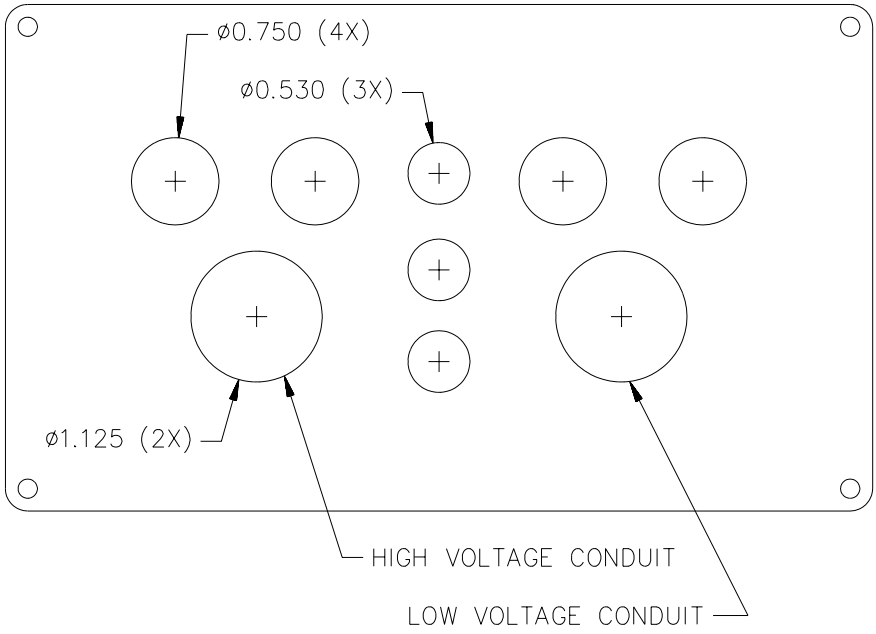


Figure 7: Conduit Entry

Electrical Installation

Before you begin, study ALL wiring diagrams (*Figure 10*, *Figure 11*, *Figure 12*, *Figure 14*) on the next few pages.

- Terminal Strip Access
- FL6 Power (high voltage)
- Hose Control (high voltage)
- Pulser (low voltage)

YOU determine quantity and size of conductors. Conductor sizes listed in this book are the minimum requirements for safe FL6 operation. All conductors must comply with NFPA-70 or applicable regulatory requirements.

Terminal Strip Access

Both high and low voltage wiring attaches to FL6 terminal strips.

Warning

Disconnect the main electrical supply circuit before attempting any service on the equipment!!

Properly connect an earth ground to the equipment before applying power!

OBSERVE ALL applicable codes (local, NEC (NFPA-70), & NFPA-30A)!

1. Unlock and open the FL6 front door.
2. Remove the console cover (four screws).

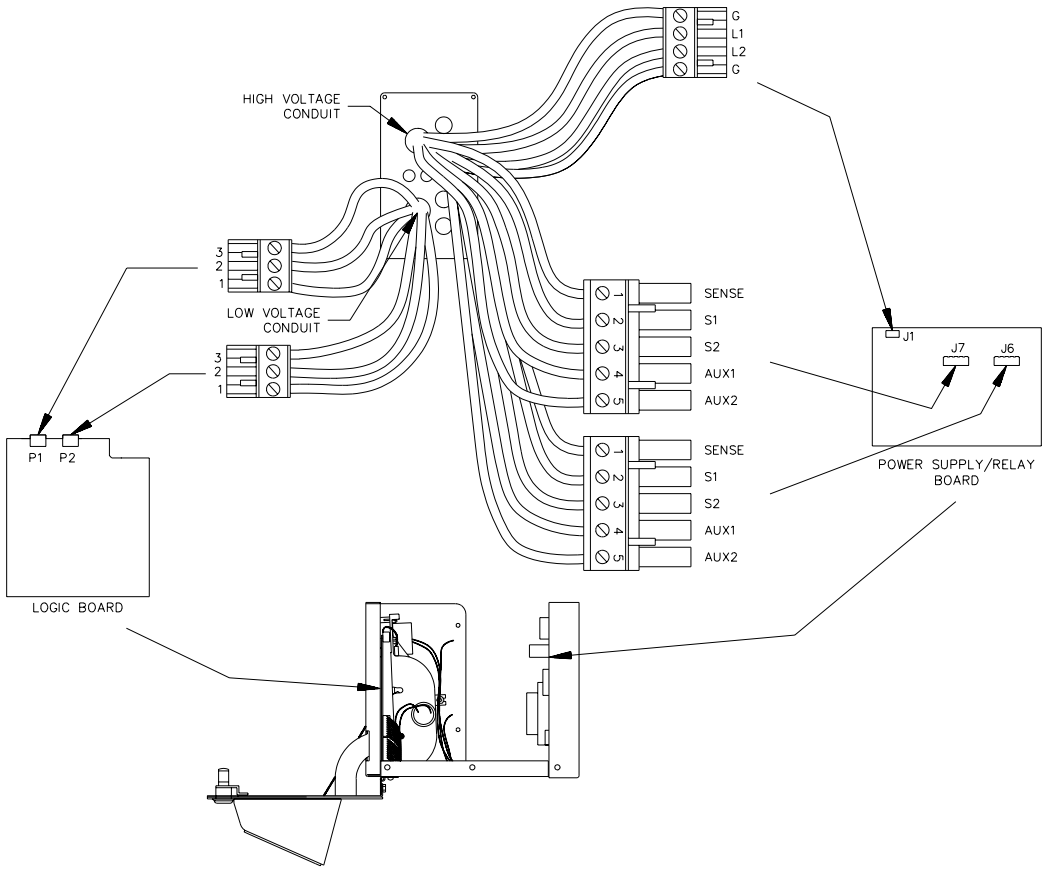


Figure 8: FL6 Signal Wiring

FL6 Power (High-Voltage) Wiring

The FL6 requires a dedicated circuit. This section tells you how to install and connect this circuit to the FL6. See *Figure 9*. Separate electrical circuits are required for each hose connected to the FL6.

Strip 1/4” of insulation from the power supply wiring and connect to the terminal strip on the upper left corner of the power supply board (rear of the FL6 chassis).

Tighten all terminations securely. Make sure no bare wire protrudes from the connector. Leave sufficient wire in the chassis to prevent stress on the connector.

- **Terminal 1** - Chassis ground
- **Terminal 2** - Line voltage L1
- **Terminal 3** - Line voltage L2/Neutral
- **Terminal 4** - Chassis ground

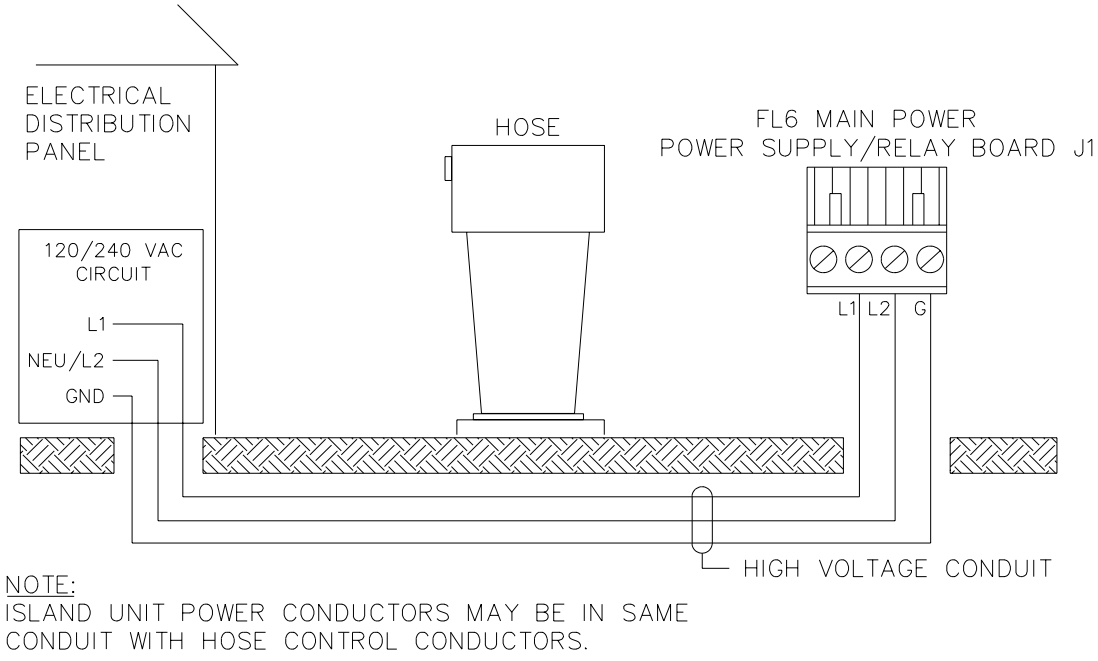


Figure 9: FL6 Power Wiring

Hose Control (High Voltage)

The FL6 has two internal control switches -- one for each hose. When card-authorized, the FL6 closes a switch to allow dispensing of product. This switch is wired in series (via the high-voltage hose control wiring) with the switch in the hose.

1. Select the hose type(s) in your installation and complete the appropriate hose control wiring.
2. See *Table 3*. Make hose control wiring connections at the 5-position connectors in the middle of the power supply board, below the bypass switches. The power supply board is on the rear of the FL6 chassis.
3. Strip approximately ¼ inch of insulation from the wire.
4. Tighten all terminations securely, making sure no bare wire protrudes from the connector. Leave enough wire in the chassis to prevent stress on the connector.

Table 3: Connections at FL6 Power Supply for Hoses

Terminal	Label	Description
1	SENSE	Voltage at pump
2	S1	Relay #1a
3	S2	Relay #1b
4	AUX 1	Relay #2a
5	AUX 1	Relay #2b

This section includes wiring diagrams for the following hose types:

- Single Hose/Single Product Self-contained Suction Pump with Internal Switch (Fill-Rite models: 301, 310, 311, 304, 314, FR701, FR702, FR704; all equipped with -X475 option)
- Single Hose/Single Product Self-contained Suction Pump with External Switch (Fill-Rite models: none)
- Single Hose/Single Product Dispenser without Power Reset (Fill-Rite models: 315S, 305)
- Twin Hose/Single Product Dispenser without Power Reset (Fill-Rite models: 315ST)

The following includes both a site layout and a wiring schematic for each of the hose types listed above. When completing the installation, be sure to check both diagrams to assure proper installation. A twin hose dispenser contains 2 hoses. Each hose is independently controlled by the FL6.

Single Hose/Single Product Self-Contained Suction Pump with Internal Switch (Figure 10)

Fill-Rite Models: 300, 301, 304, 310, 311, 314, FR700, FR701, FR702, FR704; all models equipped with –X375 option.

(Hose 1 connection is shown. For hose 2, connect to FL6 hose 2 terminals.

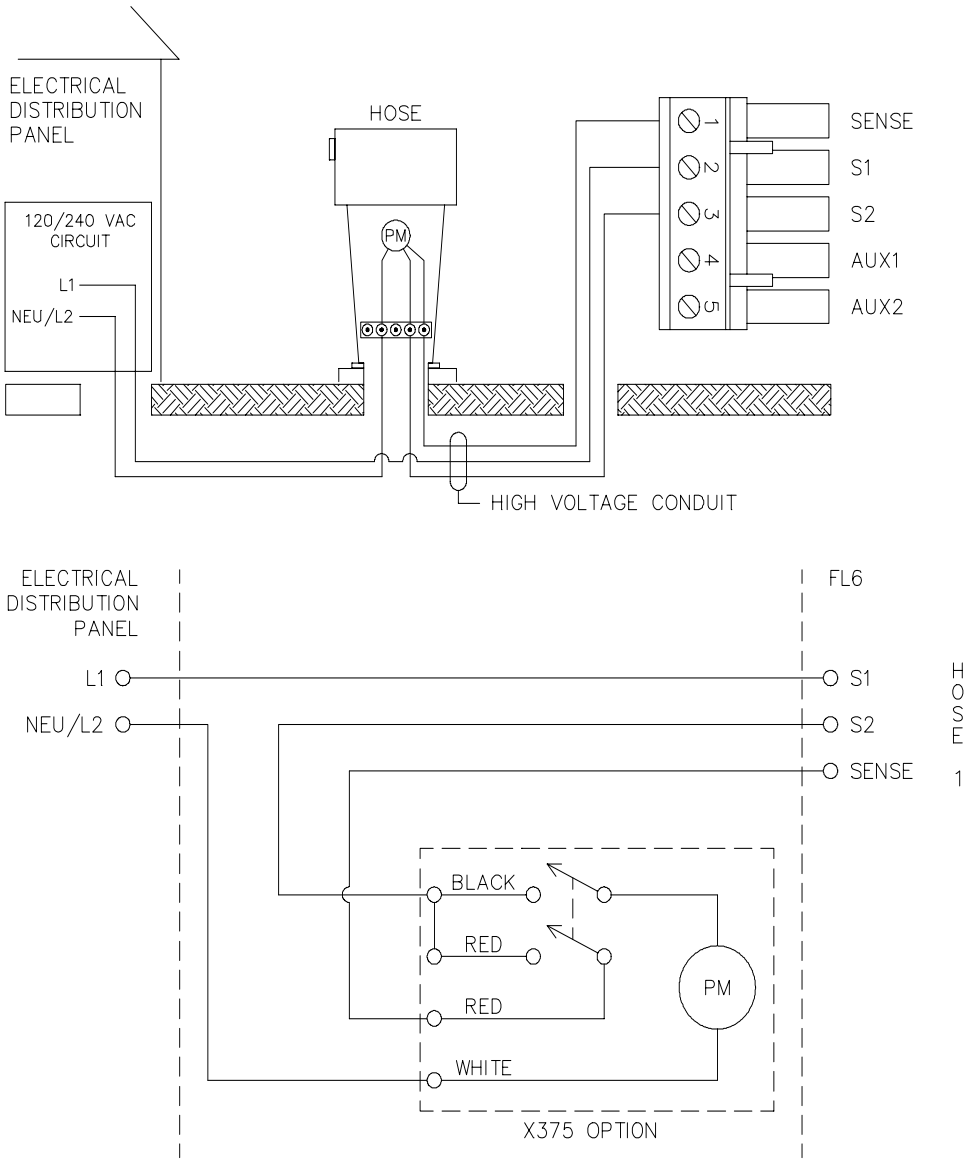


Figure 10: Single Hose/Single Product Self-Contained Suction Pump with Internal Switch

Single Hose/Single Product Self-Contained Suction Pump with Internal Switch (Figure 11)

Fill-Rite Models: 301, 304, 310, 311, 314, FR701, FR702, FR704; all models equipped with -X475 option

Hose 1 connection is shown. For hose 2, connect to FL6 hose 2 terminals.

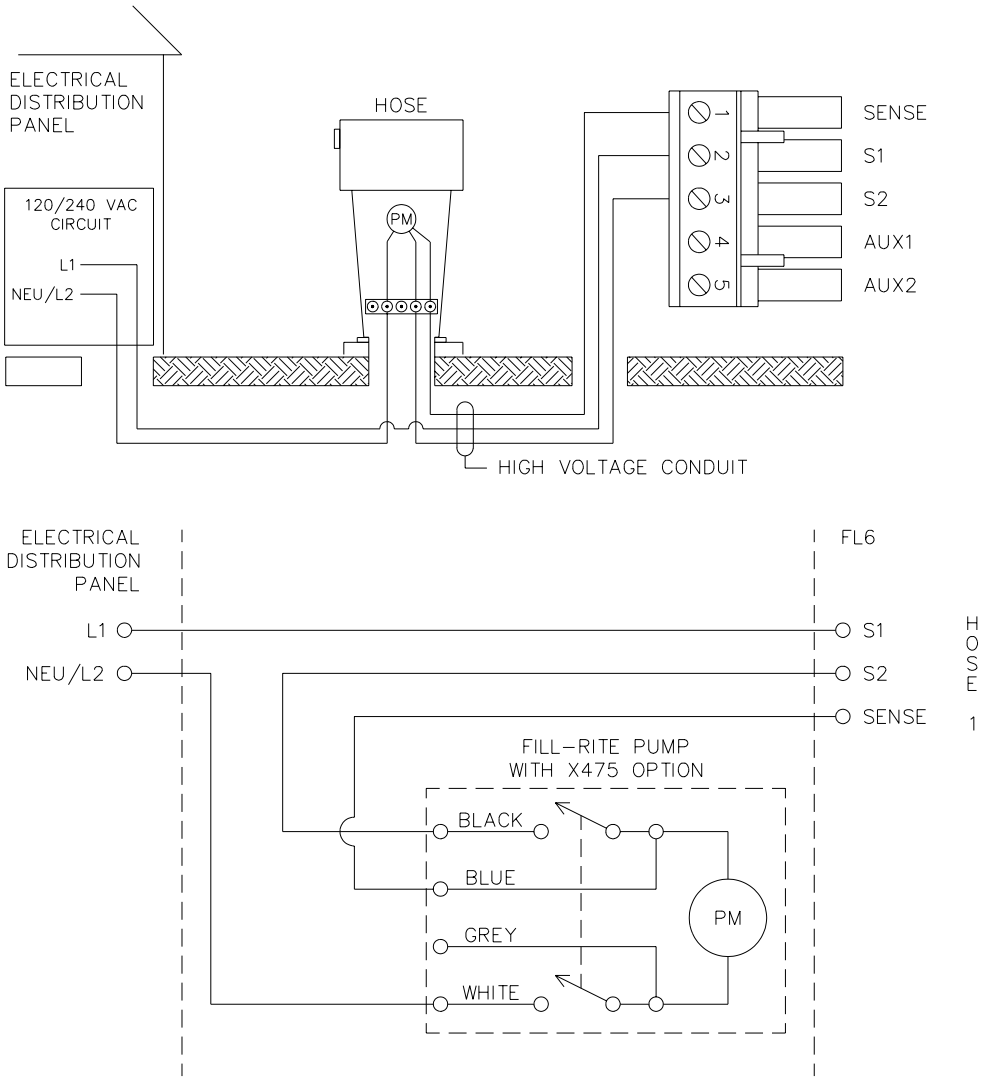


Figure 11: Single Hose/Single Product Self-Contained Suction Pump with Internal Switch

Single Hose/Single Product Self-Contained Suction Pump with External Switch (Figure 12)

Fill-Rite Models: none

Hose 1 connection is shown. For hose 2, connect to FL6 hose 2 terminals.

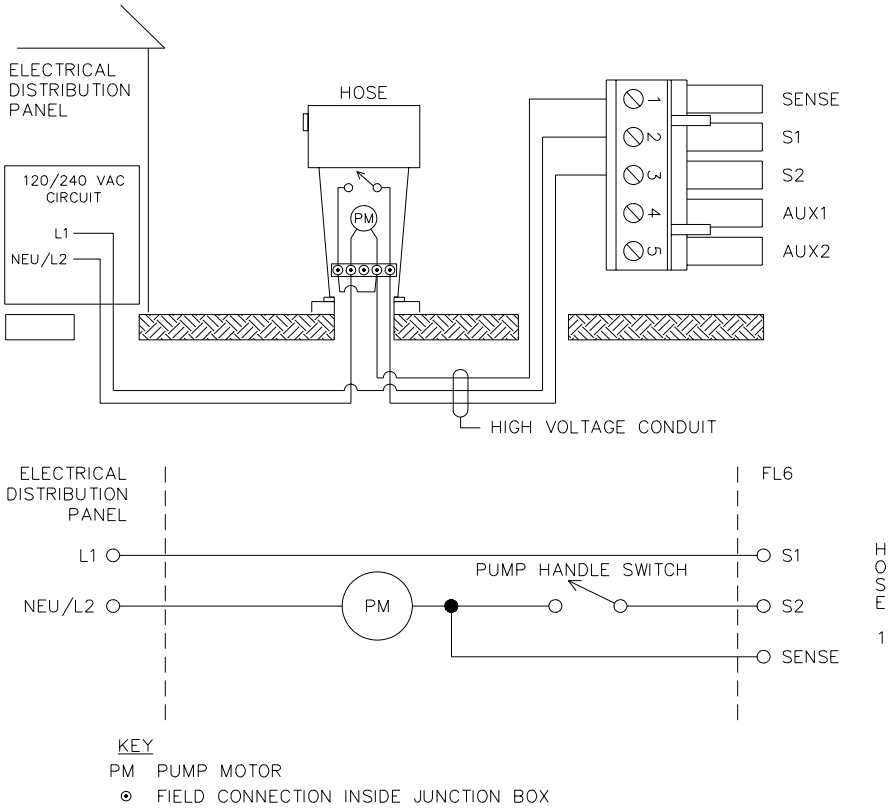


Figure 12: Single Hose/Single Product Self-Contained Suction Pump with External Switch

Note

For 120VAC FL6 systems connected to 240VAC pumps, you MUST install an isolation relay or EMR switch as shown in Figure 13. Otherwise, a continuous “busy” signal will be detected by the FL6.

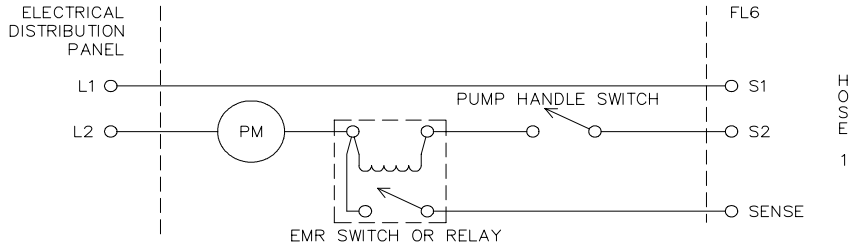


Figure 13: Isolation Relay Wiring

Single Hose/Single Product Dispenser without Power Reset (Figure 14)

Fill-Rite Models: 315S, 305

Hose 1 connection is shown. For hose 2, connect to FL6 hose 2 terminals.

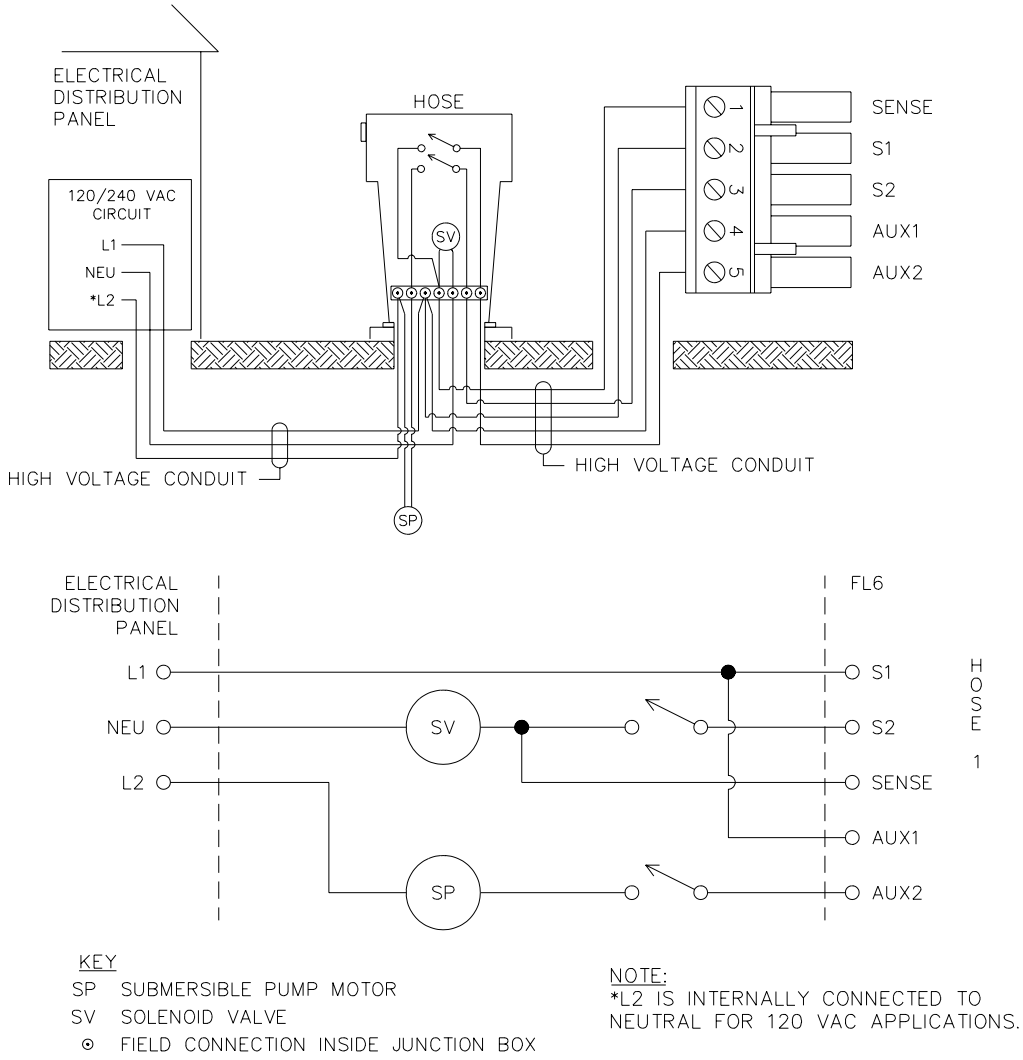


Figure 14: Single Hose/Single Product Dispenser without Power Reset

Twin Hose/Single Product Dispenser without Power Reset (Figure 15)

Fill-Rite models: 315ST

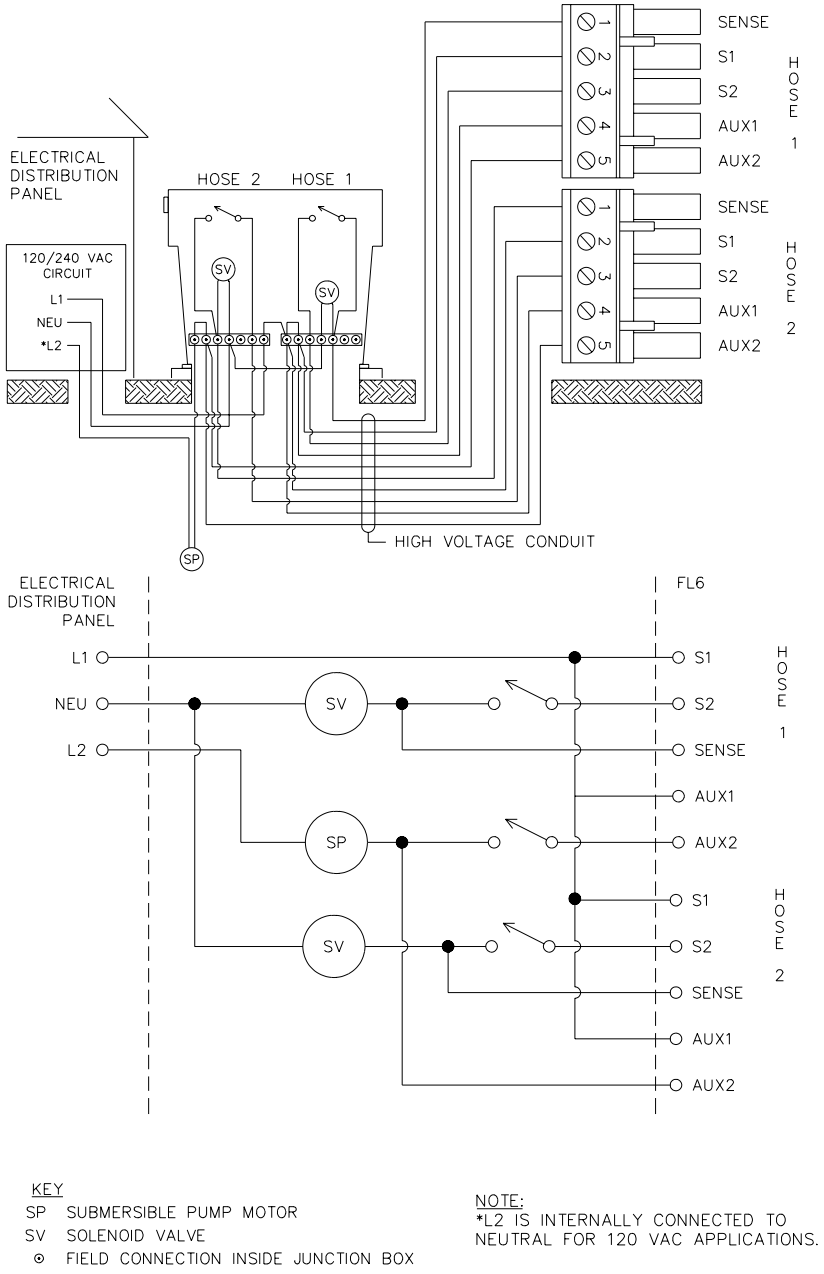


Figure 15: Twin Hose/Single Product Dispenser without Power Reset

Pulser (Low-Voltage) Wiring

See *Figure 16* for an overview and *Figure 17* on *page 34* for wiring specific pulser models.

The pulser lives inside a fuel pump, and sends an electronic pulse each time a specific amount of product is dispensed. The pulses determine the amount of product dispensed during a normal transaction.

Each hose must have a pulser dedicated to that particular hose.

Strip about 1/4” of insulation from the pulser wiring and attach to the two connectors on the top of the logic board (on the front of the FL6 chassis). Tighten all terminations securely, making sure no bare wire protrudes from the connector.

Caution

Leave enough wire in the chassis to prevent stress on the connector.

1 +12 Volts DC pulser supply

2 Pulser Input

3 Ground

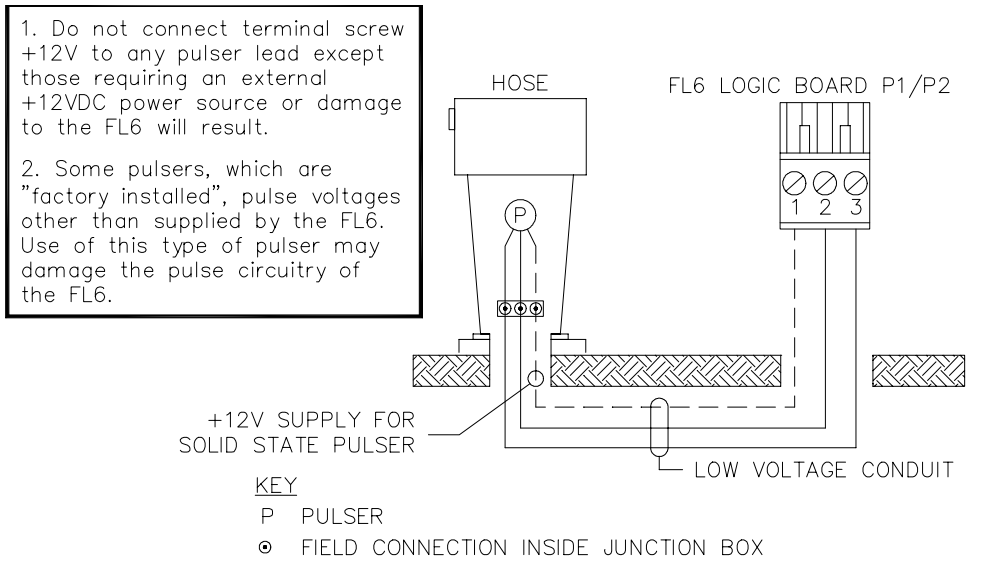


Figure 16: Typical Pulser Connections

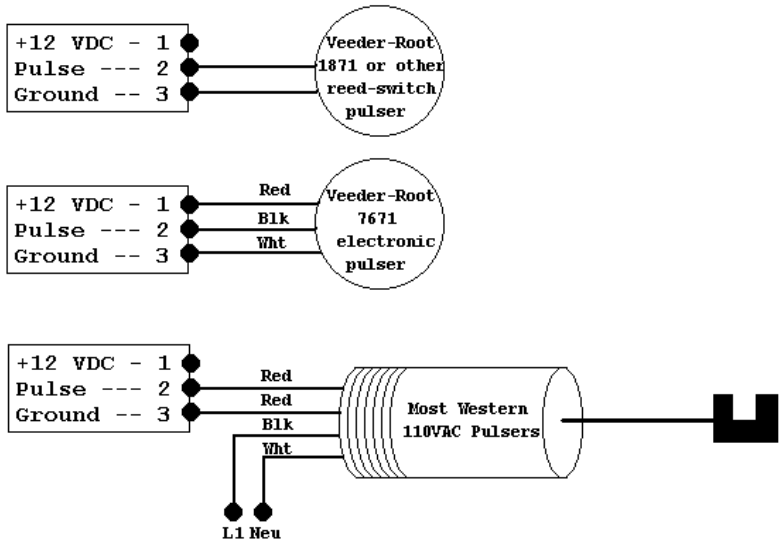


Figure 17: Pulser Connections by Make and Model

Setup

The FL6 ships from OPW Fuel Management Systems with much of the setup already completed. All you have to do is install it, and turn it on -- all the cards/keys are authorized to dispense product.

You need to do some customized setup for your individual site requirements -- time, date, system #, unit #, and pulser ratios.

1. First, turn the FL6 OFF at the distribution panel or the power supply board if the chassis is open.
2. Wait ten seconds, then reapply power.

- *The printer print a Diagnostic Report, a list of all current parameters/ options of the FL6 (except Card/Key authorizations). Keep this list -- it lets you return everything to factory defaults.*

If the Invalid/Retry indicator appears for five seconds after entering a card, the system is busy.

All setup procedures require access to the internal DIP switches. Obtain the FL6 key and open the front door before proceeding.

System Reset

Caution

This action clears all user and hose totals from the FL6 memory and returns setup values to factory default settings. You must then complete ALL the following procedures to customize your system if the default values are not correct.

To perform a System Reset, do the following.

1. Turn **OFF** the FL6 power at the electrical distribution panel, (or at the internal power supply switch, located on the power supply board).
2. Open the FL6 front door.
3. Record the position of all DIP switches.
4. Set DIP switches 1-8 to the **ON** position (right).
5. Turn **ON** the FL6 power.
6. Check the FL6 display. The INVALID/RETRY indicator should begin to flash.
7. Turn **OFF** the FL6 power.

8. Set DIP switches 1-8 to the **OFF** position.
9. Turn **ON** the FL6 power at the electrical distribution panel, or use power switch.

- *All FL6 memory has been erased. A report prints showing defaults.*

10. Restore the DIP switches to their original positions.

System Number (default is the supplied system/user cards/keys)

Every key or card has a System Number on it, corresponding to the System Number of the FL6. This number prevents other Card/Key sets from gaining access to your system. Every Card/Key is checked for this number before authorization is given to dispense product.

You can change the system number using any Card/Key.

Changing the System Number

Required Cards/Keys - Number 0-9 with the desired system number code

1. Set the DIP switch **1** to **ON**
2. Verify the **OUT OF SERVICE** and **INSERT CARD KEY** indicators are lit, indicating the FL6 is ready for the system number to be entered. If not lit, turn the switch off then on again;
3. Insert the number card, from the desired system number folder, corresponding to the desired unit number.

- The System number is set to the system number on this card;
- The Unit number is set to the Card/Key number of this card;

4. Confirm the **BEGIN FUELING** indicator comes on for one second after each Card/Key insertion.

- If the **INVALID/RETRY** indicator comes on, the Card/Key has not been properly read;

5. Set DIP switch **1** to **OFF**. The printer will print the system number, unit number, and Card/Key type as follows:

```
Current Time/Date:
07:4610/08/98

System Number=12345
Unit Number=1
Type of Card=0

The System Number was set to 12345 (S# = 12345)

The Unit was set to 1 (Unit # = 1)

The Card/Key Type was set to FL6 user Card/Key
(# Type = 0) at 7:46am on 12/08/95 (07:46     12/08/95).
```

- **If the system number is incorrect** -- make sure the correct system Card/Key was used.
- **If the unit number is incorrect**, repeat needed steps in this procedure.
- **If the Card/Key type is incorrect** verify that the correct Card/Key type was inserted.

```
0  FL6 User Card/Key
```

You may need to disable system number checking for System cards/keys, if the System cards/keys are not from the same set. For example, if you have a FL5A Card/Key to change system number but not the FL5A System cards/keys to do supervisory tasks.

- **System Number Checking**...Disable/enable for *SYSTEM* cards/keys only:

DIP SWITCH 4- System Number Checking
ON Disabled
OFF Enabled

Unit Number (default is **0**)

The unit number is a number set by the system supervisor to identify a specific FL6 at a site location where more than one FL6 exists. This single digit number is printed on the FL6 report to make identification easy.

Setting the Unit number - See procedure for Setting System Number (page 36).

Hose Pulser Ratio(Default is **10**)

Each hose connected to the FL6 contains a pulser. The pulser is an electronic device which sends an electrical pulse to the FL6 each time a specific unit of product is dispensed.

A particular pulser may send a pulse for each 0.1 gallons where another may send pulses for each 0.01 gallons. The pulses are then converted into a whole volume unit (i.e., gallon, liter, etc.) so that you can easily determine how much product was dispensed.

The number of pulses sent per volume unit is the Pulser Ratio. This ratio (see *Table 4*) is EXTREMELY important for the FL6 to determine how much product is dispensed.

Table 4: Pulser Concept

PULSER	SENDS A PULSE EVERY...	PULSE RATIO
A	Volume unit	1:1
B	1/10 Volume Unit	10:1
C	1/100 Volume Unit	100:1

Setting a Pulser Ratio

ALL user Card/Key totals must be 0.0 (cleared) before the FL6 allows you to change the pulse ratio. See *page 46* for instructions on clearing memory.

Required Cards/Keys -- Number cards/keys 0-9**;**

1. Set the DIP switch for the hose, which you wish to change the pulse ratio for, to **ON**;
   - Hose 1 - Switch **2**
   - Hose 2 - Switch **3**

Note

You can only set one hose pulse ratio at a time. If you need to set both hose 1 and hose 2 pulse ratios, set hose 1 first, then hose 2.

The FL6 flash the INVALID/RETRY indicator if all user Card/Key totals are not set to **0.0**. You must turn **OFF** the DIP switch and clear the user Card/Key totals.

2. Check the FL6 display. The OUT OF SERVICE and INSERT Card/Key indicator should appear. This would indicate the FL6 is ready for the pulse ratio to be entered.

3. Try changing the DIP switch again if the OUT OF SERVICE indicator does not appear.
4. Insert the number cards/keys corresponding to the pulse ratio.

   10 Insert number Card/Key 1, then Card/Key 0

   100 Insert number Card/Key 1, then Card/Key 0, then Card/Key 0

Note

The FL6 shows the correct read of a Card/Key by turning ON the BEGIN FUELING indicator for one second after each insertion.

5. Set the DIP switch to the **OFF** position.
6. The following will print:

```
Current Time/Date
07:46 10/08/98
Pulse Ratio 1  = 10

Hose 1 pulse ratio was set to 10 at 7:46am on 10/08/98.
```

Authorization Timeout (ATO) (Default **30** seconds)

The ATO is the longest time a user can wait before turning ON an authorized hose. Set for either 30 or 60 seconds.

ATO begins the instant a Card/Key is recognized. If the user waits the entire ATO period, they must reinsert the card. The FL6 logs the timed out transaction on the printer and assigns a termination code indicating an ATO.

The ATO cannot be set independently for each hose. .

ATO to...	30 SECONDS	60 SECONDS
DIP SW 7 is	OFF	ON

The printer prints the following if SW 7 is ON

```
Current Time/Date
07:4610/08/03
Timeout Auth.  = 60

The Authorization Timeout was set to 60 at 7:46am on Octo-
ber 8th, 2003.
```

Missing Pulse Timeout (MPTO) (Default **30** seconds)

The MPTO is the maximum time allowed between received fueling pulses. Choose 30 seconds or 180 seconds.

MPTO begins when the hose is turned ON and resets after each pulse is received. Should the pulses stop, due to pulser failure or nozzle shut off, the time-out continue until 30 or 180 seconds has passed.

When the MPTO is up, the FL6 ends the transaction, and logs it on the printer with the proper termination code. The MPTO setting is for both hoses.

For MPTO of...	30 SECONDS	180 SECONDS
DIP SW 8 is	OFF	ON

The printer prints the following if SW8 is **ON**:

```
Current Time/Date
07:4610/08/03
Missing Pulse TO= 180

The Missing Pulse Timeout was set to 180 at 7:47am on
October 8th, 2003).
```

Fuel Limit (Default **disabled**)

The FL6 complies with the Uniform Fire Code by allowing software control of the maximum fuel dispensed in a single transaction. The limit can be set for each hose.

Required Cards/Keys -- Number cards/keys 0-9

1. Set the DIP switch for the hose, which you wish to change the fuel limit for, to **ON**;

   Hose 1 Switch **5**

   Hose 2 Switch **6**

Note

You can only set one hose fuel limit at a time. If you need to set both hose 1 and hose 2 fuel limits, set hose 1 first, then hose 2.

2. Check the FL6 display. The **OUT OF SERVICE** and **INSERT** Card/Key indicator should appear. This would indicate the FL6 is ready for the fuel limit to be entered.

- Try changing the DIP switch again if the OUT OF SERVICE indicator does not appear.

3. Use *Table 5* and insert the number cards/keys corresponding to the desired fuel limit:

Table 5: Fuel Limit Card Entry

Fuel Limit	Entry
25	Insert Number Card/Key 2, then 5
100	Insert Number Card/Key 1, then 0, then 0 again.

4. Insert **ENTER** Card
5. Set the DIP switch to the **OFF** position.

The following prints:

```
Current Time/Date
07:4610/08/98
Hose1 Fuel Limit  = 25

Hose 1 fuel limit was set to 25 at 7:46am on 10/08/98.
```

Verifying the Setup

1. Insert a user Card/Key and dispense product from hose 1;

- *The printer prints the transaction information after the hose handle is turned off.*

2. Verify the printed transaction is correct. If not, make the appropriate changes in the FL6 setup. See *Service* on page 53.
3. If you have a two-hose FL6, repeat these steps for hose two.
4. Perform a Card/Key and Hose Report.
5. Verify the totals are correct for the product dispensed.

Operation

"Operation" consists of Administration, Refilling, and Report Generation.

Administration

The following procedures are functions that may be done from time-to-time or on a routine basis by the system supervisor.

Set Time/Date (default **Eastern** when shipped)

The FL6 contains an internal clock that keeps track of the current time/date. The time and date are printed on each FL6 report as well as the transaction audit trail. The time is based on a 24-hour format (i.e., 10:30pm is represented as 22:30). The date can be in one of two modes: European format or US. The date, **January 15** can be represented as:

US	01/15/03 (Month/Day/Year)
Europe	15.01.03 (Day.Month.Year)

Setting the Time/Date

Required Cards/Keys -- Clock, 0-9, Enter

1. Insert the Clock Card/Key into the FL6 Card/Key opening. The OUT OF SERVICE and INSERT CARD/KEY indicators will appear;
2. Insert the two number cards/keys corresponding to the hour of the day (8 AM is "08" and 6 PM is "18", for example)
3. Insert the two number cards/keys corresponding to the minutes of the day

Hour 23	Insert number Card/Key **2**, then number Card/Key **3**
Minute 58	Insert number Card/Key **5**, then number Card/Key **8**

4. Insert the **Enter** Card/Key;
5. Insert the two number cards/keys for the day of the month;
6. Insert the two number cards/keys for the month of the year;
7. Insert the two number cards/keys corresponding to the year;

   EXAMPLE... June 23, 2003

Day 23	Insert number Card/Key **2**, then number Card/Key **3**

Month 06 Insert number Card/Key **0**, then number Card/Key **6**

Year03 Insert number Card/Key **0**, then number Card/Key **3**

8. Insert the **Enter** Card/Key;
9. Enter the Card/Key to set the date format:

U.S. Insert number Card/Key **0**

Europe Insert number Card/Key **1**

10. Insert the **Enter** Card/Key.

The printer will print the set time and date of the FL6.

Activate/Deactivate User Card (*default is **All** cards/keys **active**)*

Deactivating a User Card

Required Cards/Keys: Activation, Numbers 0-9, Enter

1. Insert the **Activation** Card/Key into the FL6 reader. The **OUT OF SERVICE** and **INSERT CARD/KEY** indicators will appear;
2. Insert the number card(s) representing the user Card/Key to be deactivated

- EXAMPLE: For user Card/Key **16**, enter/remove number Card/Key 1, followed by number Card/Key 6

3. Insert the **Enter** Card/Key to enter the Card/Key number into the FL6;
4. Insert the **Enter** Card/Key again. This enters “no hoses”, which deactivates the card;
5. Wait for the print out;
6. Repeat 2-5 for each user Card/Key to be deactivated.

The printer will print for each Card/Key deactivated, then **OUT OF SERVICE** goes out.

Activating a User Card

Required Cards/Keys: Activation, Numbers 0-9, and Enter

1. Insert the **Activation** Card/Key into the FL6 reader. The **Out of Service** and **INSERT** Card/Key indicators will appear.

If the INVALID/RETRY indicator appears for five seconds, the system is busy refilling;

2. Insert the number card(s) representing the user Card/Key to be activated.

- EXAMPLE: For user Card/Key **16**, enter/remove number Card/Key 1, followed by number Card/Key 6

3. Insert the **Enter** Card/Key. This will enter the user Card/Key number into the FL6;
4. Insert the number card(s) for the hoses to be assigned to this user card - 1, 2, or both
5. Insert the **Enter** Card/Key.
6. Wait for the print out;
7. Repeat steps 2 through 6 for each user Card/Key you wish to activate;
8. Insert the **Enter** Card/Key.

```
Current Time/Date
07:4610/08/03
Card Number=16
Hose2=OFF
Hose1=ON
```

The printer will print for each Card/Key activated, then OUT OF SERVICE WILL DISAPPEAR

Deactivate/Activate Hose *(default is **Hose 1 & 2 active**)*

The deactivate hose function turns off both hoses so no one will be able to dispense product from either hose. This might be done for servicing or maintenance purposes. This could be one dispenser with two hoses or two separate pumping units with a single hose each. The activate hose function turns a hose on to all users who are authorized.

Required Cards/keys -- Pump, Number 1 and/or 2, Enter

Note

To deactivate a single hose, first deactivate both hoses (explained below) then activate the one you want active.

To deactivate both hoses:

1. Insert the **Pump** Card/Key into the FL6 reader. The **OUT OF SERVICE** and **INSERT CARD/KEY** lights go ON.
2. Insert the **Enter** Card/Key.

The printer shows both hoses deactivated as follows, then OUT OF SERVICE will disappear.

```
Current Time/Date
07:4610/08/98
Pulse Ratio 1=0
Pulse Ratio 2=0

Hose 1 & 2 was deactivated at 7:40am on 10/08/98
```

Activating a Hose or Both Hoses

Required Cards/keys -- Pump, Number 1 *and/or* 2, Enter

1. Insert the **Pump** Card/Key into the FL6 reader. The OUT OF SERVICE and INSERT CARD/KEY indicators will appear;
2. Insert the number card(s) representing the hose(s) to be activated (1, 2, or both);
3. Insert the **Enter** Card/Key.

The printer will show the hose activation as follows, then OUT OF SERVICE will disappear.

```
Current Time/Date
07:4610/08/98
Pulse Ratio 1=10
Pulse Ratio 2=10

Hose 1 and Hose 2 were activated with a pulse ratio of 10
at 7:37am on 102/08/98.
```

Memory Clear (*default **Cleared)***

The memory clear function erases specific transaction totals from the FL6 memory. There are five memory clear functions:

- Clear All Card/Key and Hose Totals;
- Clear All Card/Key Totals;
- Clear Individual User Card/Key Totals;
- Clear Hose 1 Totals;
- Clear Hose 2 Totals.

Note

Before you do any memory clear procedure, print a Card/Key and Hose Total Report.

Clear All Card/Durakey and Hose Totals

This procedure clears amount totals for product dispensed by ALL user cards/keys, as well as amount totals for product dispensed from both hoses.

Required Cards/keys -- Memory Clear, 9, *and* Enter

1. Insert and remove the **Memory Clear** card. The OUT OF SERVICE and INSERT CARD/KEY indicators go ON.
2. Insert and remove the number **9 Card/Key** three times.

Note

Whenever a card is inserted in the FL6, the BEGIN FUELING indicator appears for one second. This tell you that the Card/Key was read correctly. If you do not see the BEGIN FUELING indicator, reinsert the Card/Key.

3. Insert the **Enter** Card/Key.

All user Card/Key totals and hose totals are cleared, the printer prints the following, then OUT OF SERVICE goes out.

```
FL6 = Pump1 = Pump 2 = 0000

Printout indicates ALL user Card/Key and both hose totals
were set to 0000 (cleared).
```

Clear All User Card/Key Totals

This procedure clears amount totals for product dispensed by ALL user cards/keys.

Note

This procedure does not clear hose totals.

Required Cards/keys: Memory Clear, 8, Enter

1. Insert and remove the **Memory Clear** card. The OUT OF SERVICE and INSERT CARD/KEY indicators will appear.
2. Insert and remove the number **8 Card/Key** three times.
3. Insert the **Enter** Card/Key.

All user Card/Key totals are cleared, the printer will print the following, then OUT OF SERVICE will disappear.

```
FL6 = 0000

Printout indicates ALL user Card/Key totals were set to
0000 (cleared).
```

Clear Individual User Card/Key Totals

This procedure clears ALL totals for an individual user card:

Required Cards/keys -- Memory Clear, 0-9, Enter

1. Insert and remove the **Memory Clear** card. The OUT OF SERVICE and INSERT CARD/KEY indicators will appear;
2. Insert and remove the number card(s) representing the user Card/Key total to be cleared (see note in the middle of *page 47*).
3. Insert the **Enter** Card/Key.

The user Card/Key totals are cleared, the printer will print the following, then OUT OF SERVICE will disappear.

```
Card Number 34  = 0000

Printout indicates user Card/Key Number 34 totals were set
to 0000 (cleared).
```

Clear Hose 1 Totals

This procedure clears ALL totals for hose 1 only.

Required Cards/keys -- Memory Clear, 6, Enter

1. Insert and remove the **Memory Clear** card. The OUT OF SERVICE and INSERT CARD/KEY indicators will appear;
2. Insert and remove the number **6** Card/Key three times (see note in middle of *page 47*).
3. Insert the **Enter** Card/Key.

The hose 1 totals are cleared, the printer will print the following, then OUT OF SERVICE will disappear.

```
Printout indicates the hose 1 totals were set to 0000
(cleared).
```

Clear Hose 2 Totals

This procedure clears ALL totals for hose 2 only.

Required Cards/keys -- Memory Clear, 7, Enter

1. Insert and remove the **Memory Clear** card. The OUT OF SERVICE and INSERT CARD/KEY indicators will appear.
2. Insert and remove the number **7** Card/Key three times (see note in the middle of *page 47*).
3. Insert the **Enter** Card/Key.

The hose 2 totals are cleared, the printer print the following, then OUT OF SERVICE will disappear.

```
Pump 2  = 0000

Printout indicates the hose 2 totals were set to 0000
(cleared).
```

Enter/Exit Diagnostic Mode

Use the **Diagnostic** Card/Key to place FL6 into diagnostic mode. Simply insert and remove the Diagnostic card. A Diagnostic Report prints. The system first turns ON the OUT OF SERVICE indicator. The Hose Ready 1 & Hose Ready 2 indicators will appear after printing has completed.

To exit the diagnostic mode, insert the **Enter** Card/Key.

PRINT Card/Key and Hose Total Report

Included in the Card/Key and Hose Total Report:

Report Time The time at which the report was generated

Report Date The date in which the report was generated

Unit Number The FL6 unit number from which the report was generated

User Card User's Card/Key to which the printed totals belong

Card Totals Totals for each hose for the respective Card/Key number

CardActivation Activation status of the user card, "**-**" for deactivated, or '+' for activated.

Status The Card/Key and Hose Total Report provides the only means available to produce a report listing activation status for all user cards/keys:

- '**--**'The User Card/Key is *deactivated* for both Hose 1 and Hose 2;
- '**+-**'The User Card/Key is *activated* for Hose 1, *deactivated* for Hose 2;
- '**-+**'The User Card/Key is *deactivated* for Hose 1, *activated* for Hose 2;
- '++'The User Card/Key is *activated* for both Hose 1 and Hose 2;

Hose 1 or 2 Total

This is printed at the bottom of the report represents the total amount of product dispensed from hose 1 by ALL cards/keys;

Creating a Card/Key-Hose Total Report

Required Card/Key -- Report

Insert the **Report** Card/Key into the FL6. The OUT OF SERVICE indicator goes ON, then OFF when printing is complete.

The Card/Key and Hose Total Report will only print the Card/Key totals for user cards/keys with a non-zero amount (i.e., user cards/keys with '0.0' amount dispensed from both hoses since the last clear operation will not be listed on the report.)

Note

Reports print on thermal paper. Over time, thermal paper fades. Therefore, make a photocopy of any reports that you want to keep for a long time.

Sample Card/Key - Hose Total Report

```
Current Time/Date
07:46  10/08/03

Unit Number=3
All Active Cards With 0
Records Will Not Print

Card+/-Pump 1Pump 2
1  ++ 132.0088.20
2  ++ 13.4016.90
3  -+ 0.0019.90
4  ++ 40.7010.30
7  -+ 0.0035.00
9  -- 12.2010.30
10 ++ 30.005.00
15 ++  17.0020.40

Pump 1=253.00
Pump 2= 175.80
```

Sample Report Explanation

The report was generated at 07:46am on October 8th, 2003, on FL6 number 3 (Unit # = 3).

The report header defining the fields printed on the report.

- **Card**-User Card/Key number
- **+/--**User Card/Key activation status
- **Pump1**-Hose 1 total for associated user card
- **Pump2**-Hose 2 total for associated user card
- **User Card/Key 1 is *activated* for both hose 1 and 2** (++). The amount of product dispensed for Card/Key 1from hose 1 is 132.00 and the amount dispensed from hose 2 is 88.20.
- **User Card/Key 3 is *deactivated* for hose 1, *activated* for hose 2 (-+)**. The amount of product dispensed for Card/Key 3 from hose 1 is 0.00 and the total amount dispensed from hose 2 is 19.90.
- **User Card/Key 9 is *deactivated* for both hose 1 and hose 2 (--)**. The amount of product dispensed for Card/Key 9 from hose 1 is 12.20 and the amount dispensed prior to deactivation from hose 2 is 10.30.

Notice that Card/Key 5,6, and 8 (and any over 15) do not appear on the report. The report prints only those Card/Keys with dispensed product.

The end of the report always prints the total amount of product dispensed from each hose. The sample report shows the total amount of product dispensed from hose 1 is 253.00 and from hose 2 is 175.80.

Other Details

AUDIT TRAIL Immediately after a transaction is completed, the printer prints a log of the transaction information. Should the FL6 fail, the system supervisor can still account for the entire product dispensed.

Transaction Datedate transaction was completed;

Transaction Timetime transaction was completed;

User Card/Key Numberuser Card/Key used for the transaction;

Hose Numberhose from which product was dispensed;

Card Totalreflects the Card/Key total at the time the transaction was completed, including the amount of product dispensed for that transaction.

Termination Codeis printed for every transaction, and can be...

- Normal transaction termination.
- Initial Time-out period was exceeded.

- Missing Pulse Time-out period was exceeded.
- Power was lost before the transaction was printed.

CARD TOTAL This report is a printout of the totals for each Card/Key with a nonzero amount. Also included in this report is the status of the card's hose authorization and the total amount dispensed from each hose;

SYSTEM The printer logs any changes made to the system's current setup

STATUS (e.g., time, date, Card/Key hose authorization, etc.);

DIAGNOSTIC Details the status of the FL6 setup and operation.

Service

A diagnostic sub-system is built into the FL6 to assist system administrators in diagnosing and correcting field-repairable faults (installation flaws, setup, operational, and printer faults). These are “first-level” repairs.

Caution

A component-level problem with the logic or relay board is not a first level repair and must be referred to factory service.

Diagnostics

FL6 faults appear on the LED display. Except for printer transactions and the printed diagnostic report, the LEDs are the only operator interface.

System administrators must develop a maintenance routine for the FL6. Typically, a flashing display means the FL6 needs some form of attention. For operational problems or incorrectly reported data, use the diagnostic mode to help resolve the situation.

Diagnostic Mode

Use the Diagnostic card to enter diagnostic mode. The LED and the printer report results. When the printer completes a Diagnostic Report, the FL6 enters a bypass mode -- this allows the technician to verify pulses from the hoses are being received and processed by the FL6.

1. Insert the **Diagnostic** Card/Key into the FL6. The OUT OF SERVICE indicator will appear and the report will begin printing.
2. View the report and verify everything is OK.
3. HOSE READY 1 goes ON when printing is done. Record the mechanical totalizer for hose 1, then dispense some product from hose 1. The HOSE READY 1 indicator will flash as pulses are received;
4. Turn off hose 1, record the hose 1 mechanical totalizer reading, and determine the amount of product dispensed (*finish* - *start*). For two hose models, repeat steps 3 and 4 for hose 2.
5. Insert the **Enter** Card/Key. The FL6 prints pulses received during the diagnostic mode for each hose tested;
6. Remove the Diagnostic Report from the printer, if desired.

The pulses from hose 1 (P1) divided by the hose 1 pulse ratio (PR1) should equal the result from the hose 1 mechanical totalizer. If not, check the pulse ratio (PR1) -- reset if necessary. Repeat for hose 2.

Diagnostic Report

The following is a sample Diagnostic Report and a description to assist in interpreting the Diagnostic Report for your system.

```
Software Date = 10/30 2003
Software Ver= 1.10
Model Name= FL6


Current Time/Date
20:26 10/10/03


Total Power Down = 32
Power Down Time/Date
20:25 10/10/03


Motor Takeup = 1750
Memory Error = 0
Watchdog Timeout = 0
Clock Failure = 0
IRQ Interrupts = 0
Illegal Oper. = 0
Pump Index 1 = 0
Pump Index 2 = 0


System Number = 00000
Unit Number = 0
Type of Card = 0
Check System No. = Y
Pulse Ratio 1 = 10
Pulse Ratio 2 = 10
Timeout Auth. = 30
Missing Pulse TO = 30
Hose1 Fuel Limit = x.xx
Hose2 Fuel Limit = x.xx
```

The report prints from the bottom to the top. All values listed from S# through L2 are default parameters/options.

P1 (17) and P2 (18) fields are not printed until the FL6 is taken out of the Diagnostic Mode by inserting the Enter Card/Key.

Diagnostic Report Breakdown

See previous page for sample report.

- This FL6 has **firmware** revision of 1.10 created on 10/30/98. This information is needed when contacting your OPW Fuel Management Systems distributor.
- **Time/Date** -- when the Diagnostic Report was generated. In the sample it's September 8th, 2003 at 7:21am (07:21 09/08/03). To set the time or date, see *page 43*.
- **Total Power Downs** -- this FL6 has been shut off 32 times since it was cleared with Setup. The last time it was powered down was October 10th at 8:25 PM. The time/date should agree with the time/date(s) that you know power to the FL6 was lost or turned OFF.
- **Motor Take-up** -- This unit-less number is the amount of tension put on the paper in the printer take-up reel. To adjust, see *page 56*.
- **Memory Error, Watchdog Timeout, Clock Failure, IRQ Interrupts, Illegal Oper, Pump Index 1,2** -- Internal FL6 operational indicators for diagnosing FL6 hardware. Normally, all are zero. If any are nonzero, restart the diagnostic mode. If non-zeros persist, contact your OPW Fuel Management Systems distributor.
- **System Number** -- Default is 00000. The system number is always five digits. To set, see *page 36*.
- **Unit Number** -- Valid unit numbers are 0 through 9. To set, see *page 37*.
- **Type of Card** -- The only valid number is "0", which means this unit uses the FL6 cards/keys.
- **Check System No**. -- The System Number WILL be checked on all Cards/Keys in this set. To disable enter N. See *page 36*.
- **Pulse Ratio 1,2** -- Hose 1 and 2 have pulse ratios of 10:1. To set pulse ratios, see *page 38*.
- **Timeout Auth** -- The time allowed to begin fueling after pump has been authorized is 30 seconds. To set this time see *page 39*.
- **Missing Pulse TO** -- The time allowed between pulses defaults at 30 seconds. To set the Missing Pulse Time-out, see *page 40*.
- **Hose 1, 2 Fuel Limit** -- The quantity limit for both pumps is 50 units. Default is disabled (no limit). To set, see *page 40*.

Printer Spool Tension Adjustment

You can adjust the tension of the paper roll if the paper is too loose or too tight. Normally, you don't need to change from the default setting of 1750.

If the paper becomes loose, check to make sure the roll is properly locked into place. If it's too tight, paper may drag through the printer during printing, distorting text. Make adjustments as follows:

1. Print a diagnostic report (see *page 54*).
2. Read the Motor Take-up value from the report, then use *Table 6* to choose a new tension value (Cards/Keys 0-4 to reduce tension, Cards/Keys 6-9 to increase).
3. Insert the number card for the desired tension.

Table 6: Printer Motor Tension Settings

Card Number	Motor Take-up Setting
0	1500
1	1550
2	1600
3	1650
4	1700
5	1750
6	1800
7	1850
8	1900
9	1950

Troubleshooting with the LEDs

LED Display	Mode	Explanation
INSERT CARD	On	System is ready for Card/Key insertion.
	Flashing	Internal system error; perform a Diagnostic Report.
Begin Fueling	On	System is waiting for hose selection.
	On for 1 sec.	User Card/Key is not activated for that hose.
		System Card/Key inserted and correctly read. (correct operation)
HOSE READY 1	On	Hose 1 is ready to dispense product.
	Flash	System is in diagnostic mode and a pulse was received from hose 1 (hose in use).
HOSE READY 2	On	Hose 2 is ready to dispense product.
	Flash	System is in diagnostic mode and a pulse was received from hose 2 (hose in use).
Invalid/RETRY	On for 2 sec.	a) Entered Card/Key was not read correctly; insert Card/Key again. b) Entered Card/Key does not belong to the FL6 unit or the system number is incorrect. Check card(s) or reset system number.
	On for 5 sec.	A system Card/Key was inserted while a hose was active, or a user Card/Key was inserted while the FL6 was in a setup mode.
	On	Failed hardware. Perform a Diagnostic Report, if possible, and/or contact your OPW Fuel Management Systems distributor.
	Flashing	a) One or more of the first three DIP switches was ON when the FL6 was powered up. Turn OFF the FL6, set DIP switches 1, 2, & 3 to OFF, then turn the FL6 power ON. b) The pulse ratio DIP switch has been changed without clearing ALL user Card/Key totals. Either clear the user Card/Key totals or return the DIP switch to the original position.
Out of Service	On	a) Hardware failure b) The FL6 is in setup mode (sw 1, 2, or 3 ON) or a system Card/Key has been inserted. Insert the Enter Card/Key to exit setup mode or complete the system Card/Key operation.
SERVICE PRINTER INDICATOR	Flashing	A printer problem has occurred. Check for low paper or a paper jam. Press the Paper Feed one time and then insert the ENTER Card/Key after resolving the printer problem.

Troubleshooting via a Diagnostic Report

To print a report, see *page 49*.

Table 7: Diagnostics Using the Printed Report

Problem	Solution
Report Time/Date does not agree with current time/date.	Reset the system Time/Date. See *page 43*.
Excessive number of Power Downs.	Every time AC power goes off, this counter increments. Unexplained power-downs could be caused by a faulty circuit between the FL6 and the electrical panel. Contact your electrician if you have doubts.
Product quantity dispensed (as shown on an FL6 printout) is not the same as the actual amount dispensed.	Hose pulse ratio set incorrectly. Determine proper pulse ratio and reset the FL6 setting. See *page 38*.
Product can be dispensed without a Card/Key. .	System may be in BYPASS mode. See *page 12*.
SERVICE PRINTER indicator is flashing and system is OUT OF SERVICE.	See *Clearing a Printer Error* on page 59.

Note

Termination Codes (listed on a report as "T/C = #"), used with other information, can be very helpful in solving a problem.

Termination Message	Description
NORMAL	Transaction ended uneventfully
INITIAL TIMEOUT EXCEEDED	See *page 39* to change ATO (Authorization Timeout)
EXCEEDED FUEL LIMIT	See *page 40* to change fuel limit.
TIMEOUT PULSER	See *page 40* to change time limit between pulses.
PWR LOST - TRANSACTION END	Pump or station power lost during pumping.

If a problem cannot be resolved, write down all information obtained, print the Diagnostic Report and call your OPW Fuel Management Systems distributor.

Troubleshooting Using the LEDs

The FL6 diagnostic LEDs diagnose most common problems without special tools or equipment. View the LEDs simply by opening the front door.

Indicator	What it Means
H1 RELAY	Lights when Pump 1 has been authorized by the FL6.
H1 SENSE	Lights when user activates Pump 1.
PULSER 1	Flashes while Pump 1 is dispensing fuel.
H2 RELAY	Lights when Pump 2 has been authorized by the FL6.
H2 SENSE	Lights when user activates Pump 2.
PULSER 2	Flashes while Pump 2 is dispensing fuel.
+5 VOLTS	The FL6 5 volt supply is operational. ON whenever system is ON.
+12 VOLTS	The FL6 12 volt supply is operational. ON whenever system is ON.

Clearing a Printer Error

To clear a flashing PRINT FAIL indication:

1. Open the FL6 front door.
2. Check the printer paper supply roll. If the supply roll is out of paper, or the red stripe on the edge of the supply roll is showing, go to *Adding Printer Paper* on page 61.
3. Pull gently on the paper coming out of the front of the printer. If the paper does pull easily, skip to Step 7.
4. Tear off the paper from the front of the printer.
5. Remove the supply roll and pull the paper backwards through the printer. If the paper cannot be removed easily, do not continue. Contact your OPW Fuel Management Systems distributor;
6. Cut off any rough paper end and reinstall the paper, go to *Adding Printer Paper* on page 61.
7. If paper is easily pulled, the problem is not a paper jam. Check the printer for any signs of foreign material in the printer mechanism. Remove the foreign material, and reinstall the paper. Contact your distributor if you can't find anything stuck in the printer.
8. Press the **Paper Feed** button.
9. Insert the Enter Card/Key. If this does not clear the printer error (the SERVICE PRINTER indicator goes OFF), contact your distributor.

Maintenance

The FL6 has been designed to be as maintenance free as possible. However, there are some items that will need your attention from time to time.

Adding Printer Paper

The FL6 printer uses thermal transfer paper. The paper can only be purchased from an authorized OPW Fuel Management Systems distributor. To order the paper, contact your distributor and order part 5A114.

Check the paper supply roll regularly. This is the only permanent record of transactions.

Note

The FL6 does not have to be out of paper before you can replace the supply roll. You should replace the roll when you see red on the edge of a report.

1. Open the FL6 front door. If completely out of paper, skip to step 8.
2. Depress the Paper Feed button until all printing is clearly visible.
3. Remove the take-up spool (at the bottom of the printer mechanism).
4. Grasp the paper towards the top of the printer (where the paper exits the printer) and with a quick motion pull the paper up and across (at a slight angle) to the printer tear bar.
5. The take-up spool is designed to split into two halves (*Figure 18*) for easy removal of the printer paper. Grasp each end of the take-up spool and pull the spool apart.

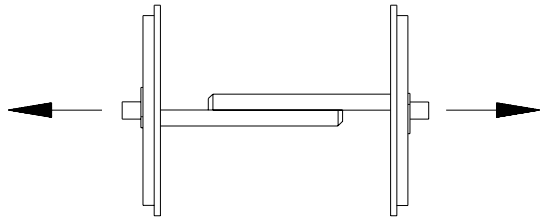


Figure 18: Separating the Take-Up Spool

6. Remove the paper supply from the printer housing.
7. Pull out any remaining paper from the printer.
8. Remove the old paper roll from the supply spindle.

9. Inspect the new paper roll to assure that the edges are smooth, straight, and the roll is not “telescoped”. If it is, discard the paper roll and obtain a new one.
10. Insert the supply spindle into the new paper roll.
11. See *Figure 19*. Insert the new roll into the printer housing with the paper coming off the back and bottom of the roll. (See .)

Note

Thermal paper has only one temperature-sensitive side. If the paper is installed backwards, nothing will appear on the paper during printing..

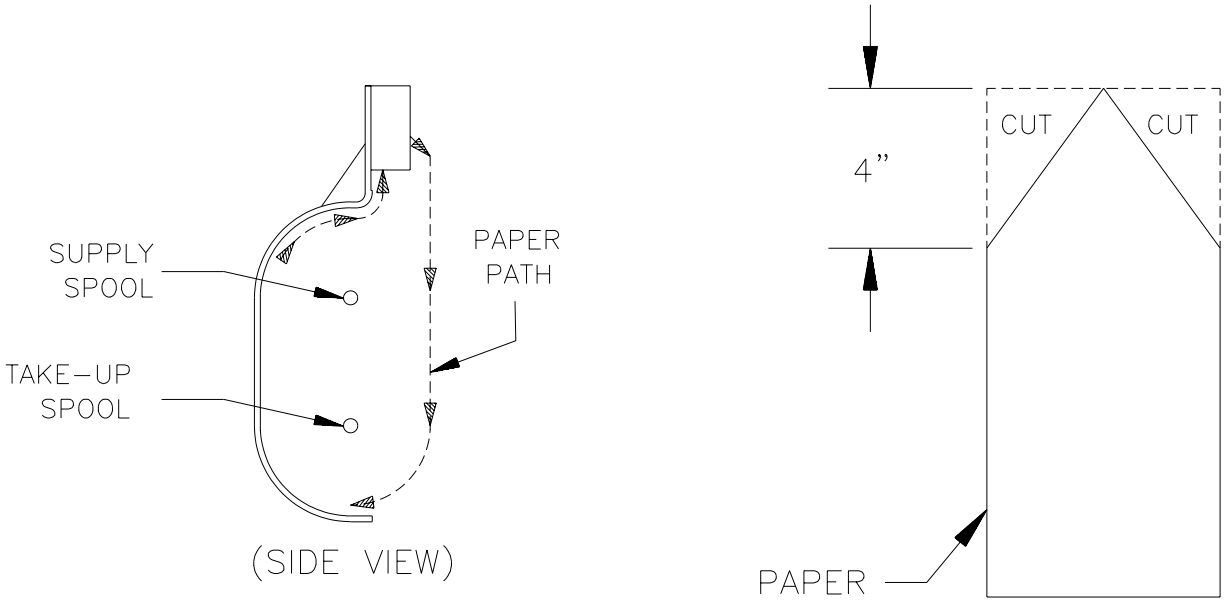


Figure 19: Feeding the Paper Through the Printer

12. See *Figure 19*. Cut the end of the paper to a point about four inches long and insert the edge of the paper into the back printer slot;
13. Hold down the **Paper Feed** button while gently feeding the paper into the printer until the printer takes hold of the paper.
14. Continue holding **Paper Feed** until about an inch of paper extends out the front of the printer, then release the button.
15. Grasp the end of the paper and pull about a foot more paper through the printer.
16. Insert the end of the paper between the two halves of the take-up spool and then press the two halves back together.

17. Insure there are no twists in the paper, then insert the take-up spool back into the printer housing;
18. Hold the **Paper Feed** button for five seconds.
19. Remove any slack in the paper by turning the take-up spool manually. The paper should feed the take-up spool from the front as shown;

Note

*If the SERVICE PRINTER light does not go OFF by itself, insert the **Enter** card.*

Card Reader Cleaning

Use a card reader cleaning card at least weekly. The card safely removes contaminants from the magnetic head inside the reader. Ten-packs of cleaning cards may be purchased from your distributor.

To clean the FL6 card reader with a cleaning card, complete the following procedure:

Note

DO NOT open a pouch until ready to insert the cleaning card into the reader. The cleaning fluid dries quickly.

1. Open the cleaning card's pouch and remove the card.
2. With the soft side UP, insert the cleaning card into the reader.
3. Remove the cleaning card, then wait a few seconds for the card to dry.
4. Re-insert the (now-dry) cleaning card to dry the head.
5. Remove and discard cleaning card.

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Notes:

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