



**FSM**

**Fuel Supply  
Manager**

**OPERATIONAL &  
INSTALL MANUAL**

**Updated: 29 June 2016**

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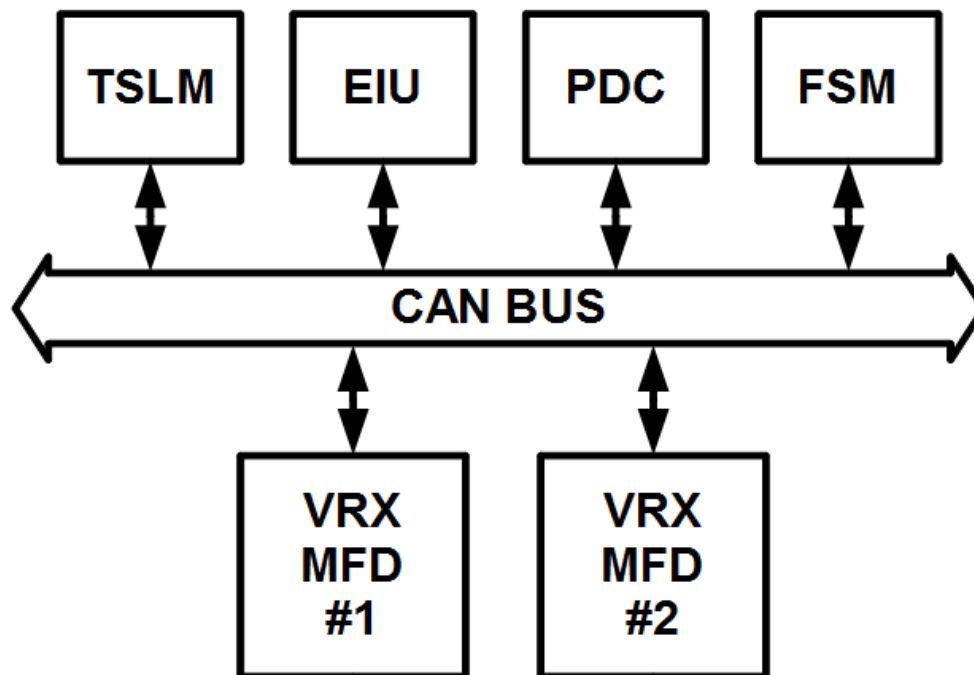
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## Introduction

This manual describes the installation and operation of the Fuel Supply Manager (FSM).

### System Options

The FSM can work standalone or be part of a larger VRX system, in which case this manual must be read in conjunction with the relevant VRX Operational & Installation manual. The diagram below shows how functionality may be further expanded.



The in-flight supply of fuel from several fuel tanks within an airframe to the engine can be managed and overseen with the FSM. It reduces pilot workload. This system closely monitors your fuel supply state of affairs and alerts you about the development of possible problems. You can also engage automatic fuel leveling (AFL) that controls fuel selection with pumps so that fuel in the left and right wing tanks go down evenly as you fly.

The FSM unit has the following capabilities:

- ➔ Senses up to 4 fuel tank levels, 3 fuel pumps, 3 flow-sensors and 1 pressure sensor
- ➔ Tracks flow-sensor totalization quantities for up to 3 individual fuel tanks
- ➔ Selectable Auto Fuel Leveling to balance left and right tanks via electrical fuel pumps
- ➔ Interfaces over CAN bus to integrate with VRX multi-function display(s), etc.
- ➔ Drives various external caution, advisory and warning lights directly
- ➔ Provides RS-232 data for other equipment

Electrical connections are via a single 50-pin standard d-sub connector on the side of the unit.

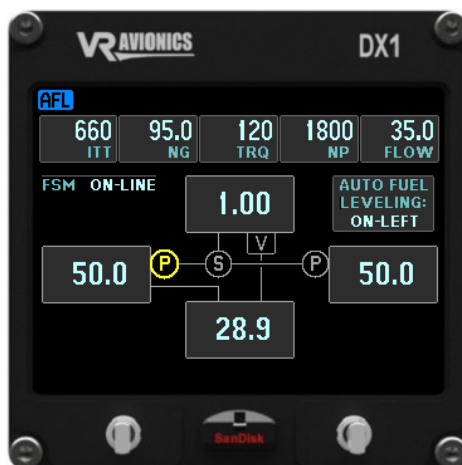
The FSM limits current to each sensor power / excitation line in order to contain possible faults.

The unit can be configured, calibrated and verified either through a Windows based program ([SetView](#)) or through a VRX system multi-function display (MFD).

Calibration (or mapping) of each of the four fuel (tank) levels is done in one operation – filling an empty tank in steps at user fuel increments until full. Afterward you can at any time make minor adjustments to any tank's calibration / mapping table.

### Fuel Layouts

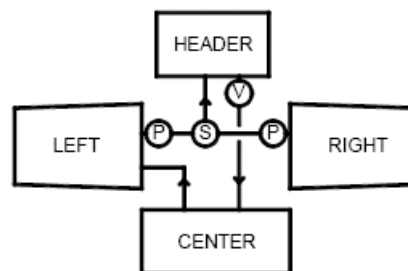
The FSM accommodates different fuel supply designs or layouts, from simple left-right wing layouts to more involved four fuel tank layouts. A VRX multi-function display (MFD) does provide a detailed representation of your fuel layout as shown below.



Next we describe the four standard layouts. New layouts can be added later as requested.

#### Fuel Layout #1

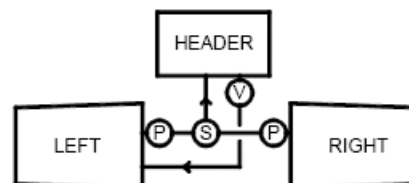
This FSM fuel layout has four fuel tanks in the arrangement shown. The center tank at the bottom feeds the left tank, while both the left and right tanks feed the header tank at the top through respective pumps and a fuel selector. A line from the header to the center tank allows a path for air to escape the header and is controlled by a valve or restrictor.



- ➔ Monitors the levels of all fuel tanks via level probes
- ➔ Monitors the fuel pressure and warns if too low
- ➔ Controls left and right fuel pumps for automatic fuel leveling (AFL)
- ➔ Detects the manual or automatic (AFL) activation of all fuel pumps
- ➔ Warns if the header tank level drops too low

#### Fuel Layout #2

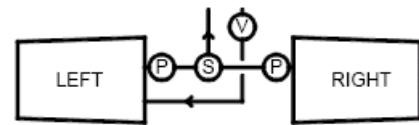
This FSM fuel layout has three fuel tanks in the arrangement shown. Both the left and right fuel tanks feed the header tank at the top through respective pumps and a fuel selector. A line from the header to the left tank allows a path for air to escape the header and is controlled by a valve or restrictor.



- ➔ Monitors the levels of all fuel tanks via level probes
- ➔ Monitors the fuel pressure and warns if too low
- ➔ Controls left and right fuel pumps for automatic fuel leveling (AFL)
- ➔ Detects the manual or automatic (AFL) activation of all fuel pumps
- ➔ Warns if the header tank level drops too low

### Fuel Layout #3

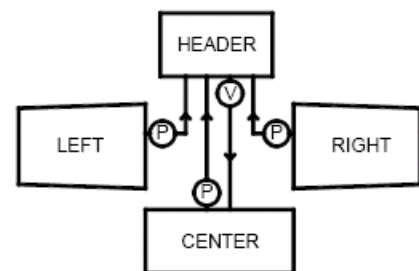
This FSM fuel layout has two fuel tanks in the arrangement shown. Both the left and right fuel tanks feed the engine through respective pumps and a fuel selector. A return line from the engine to the left tank allows motive flow and can be controlled by a valve or restrictor.



- ➔ Monitors the levels of all fuel tanks via level probes
- ➔ Monitors the fuel pressure and warns if too low
- ➔ Controls left and right fuel pumps for automatic fuel leveling (AFL)
- ➔ Detects the manual or automatic (AFL) activation of all fuel pumps
- ➔ Warns if the header tank level drops too low

### Fuel Layout #4

This FSM fuel layout has four fuel tanks, three of which feed fuel directly into a header tank. All feeder tanks have electrical pumps driving fuel to the header. A valve and line from the header to the center tank allows air to escape the header. Two of the feeder tanks constitute the left and right wing tanks, while the engine is fed fuel from the header.



- ➔ Monitors the levels of all fuel tanks via level probes
- ➔ Monitors the fuel pressure and warns if too low
- ➔ Senses the flow rates out of all feeder tanks via flow sensors
- ➔ Tracks totalization quantities (fuel remaining values) for individual feeder tanks
- ➔ Controls left and right fuel pumps for automatic fuel leveling (AFL)
- ➔ Detects the manual or automatic (AFL) activation of all feeder fuel pumps
- ➔ Warns when a pump produces less than expected flow (as when a tank runs dry)
- ➔ Warns if the header tank level drops too low

## Monitoring

### Fuel Pressure

The FSM reads a standard 4-20mA pressure transducer. It only requires 2 wires – signal (power) & ground (return). They are commercial off-the-shelf (COTS) items that can be obtained in different pressure ranges.

### Fuel Flow Rates and Quantities

Fuel flow sensors normally provide a fixed number of pulses per volume of fuel, called the K-factor. These pulse or frequency based flow sensors can be read by the FSM to not only provide the flow rate, but keep track of the total volume (gallons, liters, etc.) of fuel that passed through the sensor. Thus you can get a “Fuel Computer” for each of up to three tanks.

### Fuel Levels

The FSM can measure up to four fuel tank quantities using any combination of frequency or voltage based fuel level probes.

### Fuel Pumps

The FSM can detect activation of up to 3 positively powered fuel pumps working from the same 28V aircraft power bus.

## Operation

### ***Fuel Level Monitoring***

The fuel levels in the tanks that make-up an aircraft's [Fuel Layout](#) is monitored using fuel level probes. There are specific connections for left, right, center and header tanks.

The FSM will turn on the Low Fuel warning (by driving pin 45 low) if the fuel level in the header tank drops below the [Header Quantity Warning Level](#) setting.

A connected VRX MFD will indicate all relevant fuel levels and annunciate the warning.

### ***Fuel Pump Status Monitoring***

The FSM can monitor the fuel pump status of left, right and center pumps (via pins 10, 43 and 27 respectively). Each pump can be either on or off.

A connected VRX MFD will indicate the status of all connected fuel pumps.

### ***Fuel Flow Rate and Quantity Monitoring***

The FSM monitors the fuel flow (rate and quantity) via up to three separate sensors for left, right and center tank lines in addition to the fuel pump statuses mentioned in the previous paragraph. Each sensor can thus be associated with a fuel pump (see previous paragraph) so that there can be flow sensor-pump combinations for left, right and center tanks as in [Fuel Layout #4](#).

The FSM will turn on the Fuel Flow warning for left, right or center tanks (by driving respectively pin 12, 44 or 28 low) if the flow rate drops below the [Pump Fuel Flow Warning Level](#) setting while its associated pump is (powered) on. This warns that a pump is either bad or pumping air (not fuel).

A connected VRX MFD will indicate all fuel flow rates and quantities (totalization values) and annunciate all warnings discussed.

### ***Automatic Fuel Leveling (AFL) Control***

The FSM will control two fuel pumps to realize automatic fuel leveling if AFL-PWR (pin 18) is connected to power and AFL is engaged by the pilot (via [one](#) or [two](#) switches).

A pump can be either associated with the left or the right wing tank. It means that when the left pump is turned on fuel will be drawn from the left wing fuel tank, and when the right pump is turned on fuel will be drawn from the right wing fuel tank.

When AFL is first engaged the FSM will immediately power the fuel pump associated with the fullest tank if [Auto Fuel Leveling Initial Differential Wait Enable](#) is set to No. If this setting is set to Yes then the FSM will wait for the difference in left and right wing tank levels to reach or exceed the [Auto Fuel Leveling Differential](#) setting before activating the pump associated with the fullest tank. The FSM will then persist with this pump until the [Auto Fuel Leveling Differential](#) is again exceeded at which point a switchover is made (to the fullest tank again). This process repeats until both left and right tank levels are zero, ensuring the levels drop evenly as you fly.

The FSM will use the fuel level values of the left and right tanks (obtained via fuel level probe data) if [Use Levels for Auto Fuel Leveling](#) is set to Yes, otherwise the fuel totalization values for these tanks (obtained via associated fuel flow sensor data) is used.

The FSM will turn on the AFL warning (by driving pin 13 low) if AFL is not engaged (off-line). An AFL warning thus informs the pilot that manual fuel selection is now his responsibility since automatic fuel leveling (AFL) is disengaged.

A connected VRX MFD will annunciate AFL engagement and indicate the currently active pump.

### ***Fuel Pressure Monitoring***

The FSM will turn on the Fuel Pressure warning (by driving pin 11 low) if the measured fuel pressure goes below the [Fuel Pressure Warning Level](#) setting.

A connected VRX MFD can indicate this measured fuel pressure and annunciate its warning.



## Installation

### ***Tools and Equipment***

Tools and equipment required for installation (not included in the purchase) are:

- ✓ Wire cutters
- ✓ Wire strippers
- ✓ Wire (single core, Teflon insulated 20-24 AWG)
- ✓ A VRX multi-function display (MFD) or a laptop computer or PC running Windows. If not equipped with a serial port, a USB port together with a USB-to-serial adapter is needed.
- ✓ A standard RS-232 cable (DB-9 male to DB-9 female) may be needed
- ✓ The following sensors (if you want the particular parameter):
  - ➔ Fuel pressure sensor
  - ➔ Fuel flow sensors
  - ➔ Fuel level (quantity) probes
  - ➔ Fuel pumps (24 volt powered)
- ✓ Connector crimp tool
- ✓ DSUB-50 female connector with crimp pins

Description	Part Numbers		
Crimp contacts	M24308/10-1	M39029/63-368	AMP 205090-1
Crimp tool	M22520/2-01	AFM8 (DMC)	
Crimp tool positioner	M22520/2-08	K13-1 (DMC)	
Insertion tool	MS1969/1-02	DAK 145	
Extraction tool	MS1969/1-02	DAK 145	

## ***Electrical Installation***

The following section describes the wiring requirements for using the FSM. Please follow these instructions explicitly as improper wiring can result in permanent damage to your unit. All electrical power and data lines interface with the FSM via the 50-pin D-Sub connector on the side of the unit.

### **Recommended wiring practices**

NOTE: For all electrical connections, use correct splicing techniques, taking care to properly insulate any exposed wire. A short circuit between any of the wires may cause damage to the FSM and/or other equipment.

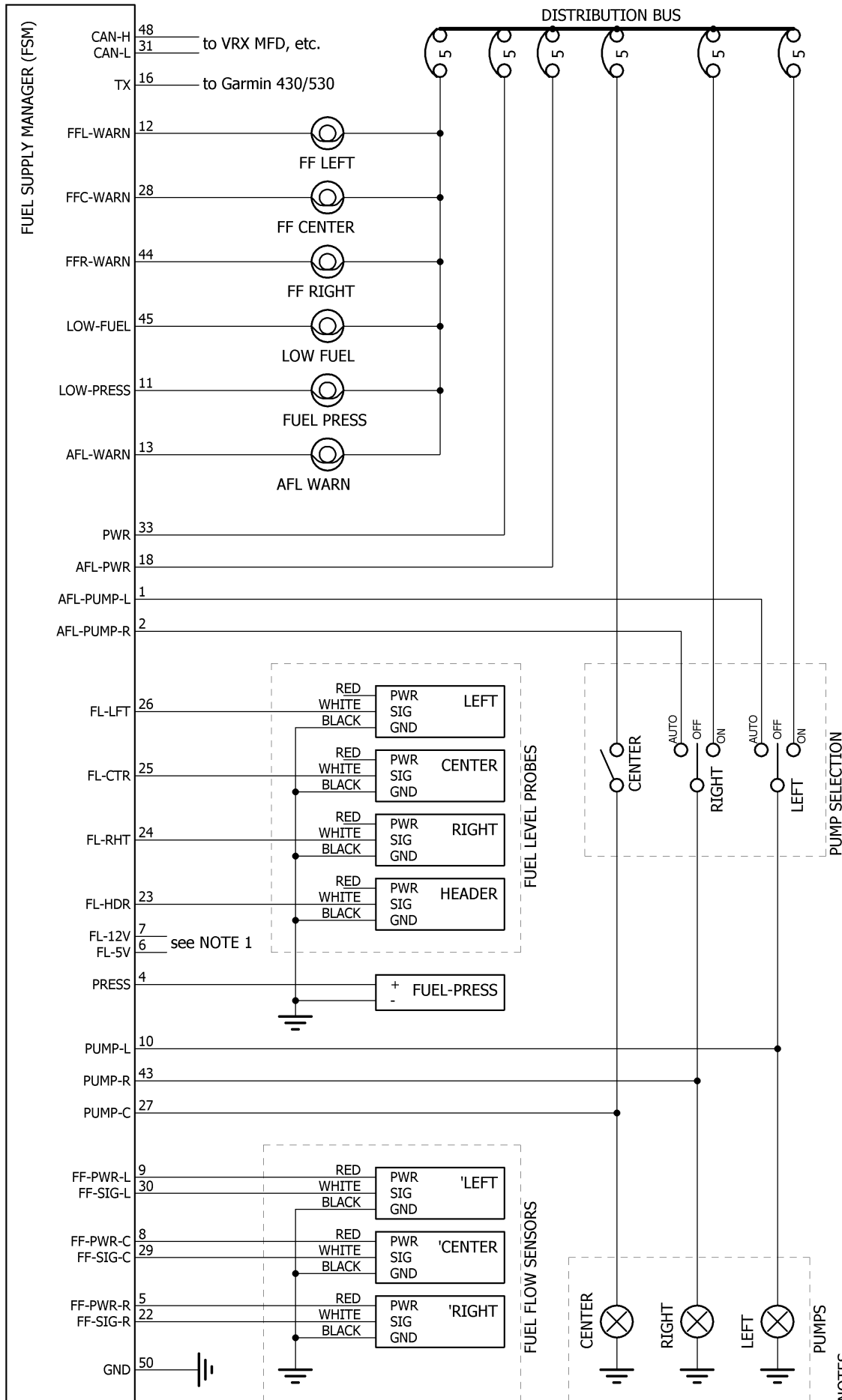
VR Avionics does not normally supply connectors or wire for wiring up your FSM. We recommend that standard aircraft grade wiring and connectors be used during installation. Gauges 20 through 24 AWG wire is sufficient for most lines to the unit. Make sure you protect the power lines with either a circuit breaker or fuse sized appropriate to the wire you select. We recommend you use wire meeting Mil Standard MIL-W-22759/16 (Tefzel insulation) which is available from various suppliers. Another option is to use Teflon insulated wire which is available in various colors.

Connectors: We recommend you use machined pin connectors to mate with the FSM connector. Crimp connections have proven to be the most reliable in aircraft installations. D sub shells to hold the pins are available from various sources. Purchasing quality connectors is a very wise investment.

Installing: Make sure all connections are secure and all wires are routed and strain relieved to ensure the wires will not chafe against any other object in the aircraft.

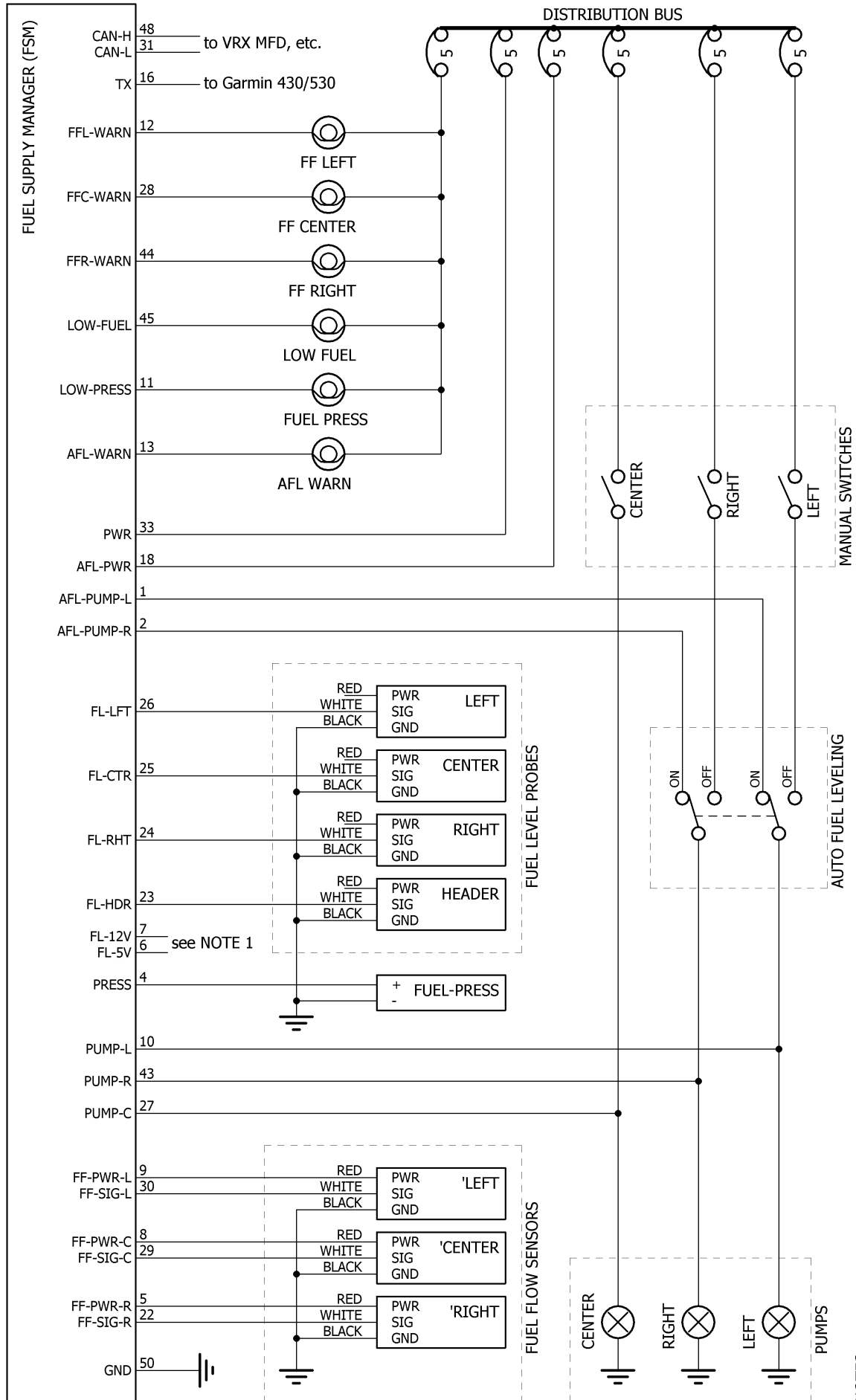
Electrical installation is done either according to [Schematic 1](#) or [Schematic 2](#). Referencing these the following sections are discussed:

- ◆ [Power and Ground](#)
- ◆ [Fuel Level Monitoring](#)
- ◆ [Fuel Flow Monitoring](#)
- ◆ [Fuel Pressure Monitoring](#)
- ◆ [Fuel Pump Monitoring](#)
- ◆ [Auto Fuel Leveling](#)
- ◆ [Warning Lights](#)
- ◆ [CAN Bus Communication](#)



NOTES

- 1) Various fuel level probes are supported - either voltage or analog based with either 5 volt or 12 volt excitation.
- 2) Auto Fuel Leveling (AFL) operation is engaged only when both LEFT and RIGHT switches are selected to AUTO.
- 3) The pilot can revert to manual control of the fuel pumps if the "AFL WARN" annunciation light turns ON.



- NOTES**
- 1) Various fuel level probes are supported - either voltage or analog based with either 5 volt or 12 volt excitation.
  - 2) The pilot can revert to manual control of the fuel pumps if the "AFL WARN" annunciation light turns ON.

## Power and Ground

Aircraft power (28 volt) must be connected to PWR (pin 33). An 1 amp circuit-breaker or fuse from the distribution bus is sufficient. This supplies the monitoring needs of the FSM. The unit must be grounded via pin 50 at a common grounding point.

## Fuel Level Monitoring

The FSM monitors fuel levels using any combination of frequency based or analog voltage based sensors / probes.

For excitation of these sensors there is a dedicated 5 volt output (pin 6) and a dedicated 12 volt output (pin 7) from the FSM. Connect sensor power (usually red) to one of these excitation outputs according to their requirement. Signal wires from each sensor (usually white) must be wired to its associated location – left (pin 26), right (pin 24), center (pin 25) and header (pin 23). Sensor ground wires (usually black) must be connected to the same common grounding point used to ground the FSM unit itself (pin 50). We recommend using one 3 wire multi-core cable with shielding to each fuel level sensor. 22 or 24 gauge wires inside each cable are sufficient.

When using frequency based sensors from Electronics International you do not require the divide-by-4-circuit some of their measuring units require between the probe and the measuring unit. Our FSM can measure probe frequencies up to 60 KHz. Below are some fuel level probe examples:

Manufacturer	Probe Type	Part Number
Electronics International	5 volt powered frequency output	P-300C
Westach	12 volt powered voltage output	395-5SB-5

## Fuel Flow Monitoring

The FSM reads an open collector pulse based fuel flow sensor, which is an industry standard. The FSM also provides the sensor with power (12V excitation). Fuel flow hookup is as shown below. Any open collector pulse based fuel flow sensor will work such as the FT-60, FT-90 or FT-180 from Electronics International.

Connect each sensor power (usually red) to left (pin 9), right (pin 5) or center (pin 8) appropriately. Signal wires from each sensor (usually white) must also be wired to its associated location – left (pin 30), right (pin 22) and center (pin 29). Sensor ground wires (usually black) must be connected to the same common grounding point used to ground the FSM unit itself (pin 50). We recommend using one 3 wire multi-core cable with shielding to each sensor. 22 or 24 gauge wires inside each cable are sufficient.

Please note to set all the relevant [Fuel Flow Sensor K-factor](#) configuration properties to the k-factor value that comes with each fuel flow sensor.

## Fuel Pressure Monitoring

The FSM can monitor fuel pressure via a 4-20mA transducer. A wide range of 4-20mA pressure transducers (with various port sizes, pressure ranges, etc.) are available commercially off-the-shelf. The positive wire (usually red or white) of the sensor must go to PRESS (pin 4) while the negative wire (usually black) can go to either the common grounding point or to the fuel pressure input of a VRX MFD. In the latter case both the FSM and the MFD use the same sensor to monitor fuel pressure to provide redundancy.

The [Fuel Pressure Sensor Type](#) setting must match the sensor. Below we list a few examples:

Manufacturer	Part Number	Typical Sensor	
		Press. Range	Type Setting
MSI	M5151-000005-050PG	0 - 50 psi	500
Honeywell	MLH100PGL01B	0 - 100 psi	1000
SSI Tech	P51-50-G-A-I36-20MA-000-000	0 - 50 psi	500

### Fuel Pump Monitoring

If your fuel system have electrical transfer / supply pumps such as that required for auto fuel leveling (AFL) then you can connect them to dedicated pump inputs for left (pin 10), right (pin 43) and center (pin 27). This allows the FSM to monitor their status whether they are manually switched by the pilot or automatically controlled by the FSM. In the latter case these left and right inputs must match the associated left and right wing tanks, so that when one is activated its associated wing's tank will drop as fuel is used. See also next paragraph.

### Auto Fuel Leveling

For auto fuel leveling (AFL) the power enabling the FSM to drive the left and right fuel pumps must be supplied with a wire to AFL-PWR (pin 18). A circuit-breaker or fuse able to power one fuel pump is sufficient since only one pump will be active at a time during AFL operation.

Both AFL-PUMP-L (pin 1) and AFL-PUMP-R (pin 2) must be wired by way of (auto /manual /off) selection switches to the relevant fuel pump positive inputs (usually red). Selection switching can be done either by way of [Schematic #1](#) or [Schematic #2](#). Both of these allow for manual and auto fuel selection / leveling.

### Warning Lights

If direct driving of certain warning lights are required you may wire the ones you must use. VRX multi-function display(s) (MFD's) also annunciates these warnings if connected via [CAN Bus Communication](#).

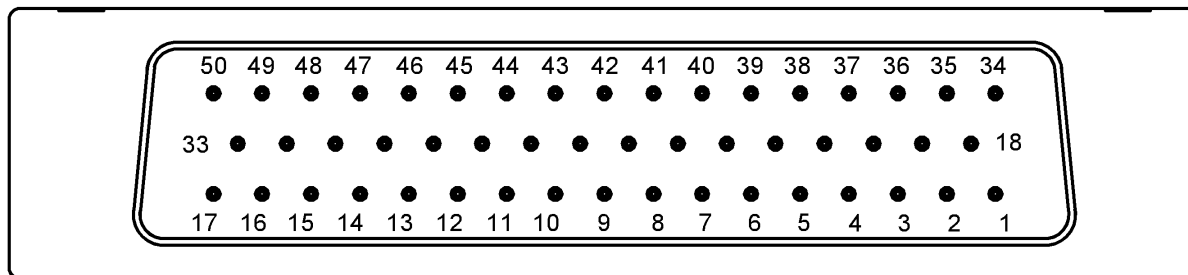
Warning light outputs for FFL-WARN (pin 12), FFR-WARN (pin 44), FFC-WARN (pin 28), LOW-FUEL (pin 45), LOW-PRESS (pin 11), and AFL-WARN (pin 13) are available. Their operation is described in the [Operation chapter](#).

### CAN Bus Communication

The FSM can be connected to a VRX system that may have one or more VRX multi-function displays (MFD's) with which to exchange information. This happens via a common CAN bus network. The relevant VRX Operational and Installation manual provide the information on how to wire the CAN bus to a FSM.

The VRX MFD will facilitate many things including fuel level calibration (mapping) and adjustment of FSM configuration settings.

**Pin Assignments**



PIN	DESC	PIN	DESC	PIN	DESC
1	AFL-PUMP-L	18	AFL-PWR	34	
2	AFL-PUMP-R	19		35	
3		20		36	
4	FUELP+	21		37	
5	FF-PWR-R	22	FF-SIG-R	38	
6	FL-5V	23	FL-HEADER	39	
7	FL-12V	24	FL-RIGHT	40	
8	FF-PWR-C	25	FL-CENTER	41	
9	FF-PWR-L	26	FL-LEFT	42	
10	PUMP-L	27	PUMP-C	43	PUMP-R
11	LOW PRESS	28	FFC-WARN	44	FFR-WARN
12	FFL-WARN	29	FF-SIG-C	45	LOW FUEL
13	AFL-WARN	30	FF-SIG-L	46	
14		31	CAN-L	47	
15	CAN-T	32	CAN-L	48	CAN-H
16	TX232	33	PWR	49	CAN-H
17	RX232			50	GND

## Configuration

### *Introduction*

This chapter describes the configuration settings of the FSM, which can be accessed in one of two ways, either:

- 1) through a Windows computer running our SetView software, or
- 2) through a VRX multi-function display.

See the [SetView Software](#) chapter later in this manual about how to do it through your Windows computer / laptop.

The relevant **VRX Operational & Installation manual** (which can be downloaded from our website) describes how to do it through the VRX multi-function display.

### **Configuration Settings**

In this section we describe the various configuration properties of the FSM. See [Adjusting the Configuration](#) about how to alter any of these settings.

#### **Fuel Pressure Warning Level**

This sets the level where the Fuel Pressure warning is triggered. One count equates to 0.1 psi. See also [Fuel Pressure Monitoring](#).

#### **Header Quantity Warning Level**

This sets the level where the Low Fuel warning is triggered. One count equates to 0.1 volume unit. See also [Fuel Level Monitoring](#).

#### **Pump Fuel Flow Warning Level**

This sets the level where the Fuel Flow left, right and center warnings are triggered. One count equates to 0.1 volume-per-hour unit. See also [Fuel Flow Rate and Quantity Monitoring](#).

#### **Fuel Flow Filter (1-16)**

This setting adjusts the response of the fuel flow reading - from 1 to 16. The higher the number the more filtering is applied but the slower the response.

#### **Auto Fuel Leveling Initial Differential Wait Enable**

See [Automatic Fuel Leveling \(AFL\) Control](#) discussion. This is a Yes or No setting.

#### **Header Quantity Filter Enable**

This Yes or No setting selects whether filtering must be added for the Header tank fuel level probe signal.

#### **Use Levels for Auto Fuel Leveling**

See [Automatic Fuel Leveling \(AFL\) Control](#) discussion. This is a Yes or No setting.

#### **Auto Fuel Leveling Differential**

See [Automatic Fuel Leveling \(AFL\) Control](#) discussion. One count equates to 0.1 volume unit.

#### **Fuel Pressure Sensor Type**

This setting selects the sensor type (or rating) used for the fuel pressure sensing. For example, set to 500 if using a 0 – 50 psi sensor.



### Fuel Pressure Sensor Calibration

This setting is unique to a particular FSM. It calibrates the 4-20mA torque sensing input. Before changing it make sure the Fuel Pressure Sensor Type is set correctly. Also good practice is to always remember what this setting was before.

### Fuel Flow Sensor K-factor – LEFT

This setting adjusts the k-factor of the left fuel flow sensor. The k-factor is the number of pulses your sensor sends out for every one volume unit (gallons, liters, etc.) that flows through it.

### Fuel Flow Sensor K-factor – CENTER

This setting adjusts the k-factor of the center fuel flow sensor. The k-factor is the number of pulses your sensor sends out for every one volume unit (gallons, liters, etc.) that flows through it.

### Fuel Flow Sensor K-factor – RIGHT

This setting adjusts the k-factor of the right fuel flow sensor. The k-factor is the number of pulses your sensor sends out for every one volume unit (gallons, liters, etc.) that flows through it.

### Fuel Full Value – LEFT

This is the Fuel Computer **full tank** value for this fuel tank if used.

### Fuel Full Value – CENTER

This is the Fuel Computer **full tank** value for this fuel tank if used.

### Fuel Full Value – RIGHT

This is the Fuel Computer **full tank** value for this fuel tank if used.

### **\*\*LEFT,CENTER,RIGHT,HEADER\*\* Fuel Tank Quantity (0=Not-Used, 1=Freq, 2=Volt)**

The table below shows the fuel level probe types supported and their available settings:

Fuel Tank Quantity setting	Description
0	Not used
1	Frequency probe
2	Voltage probe (0 – 5 volt)

### Fuel Level x Calibration Offset, Interval and last interval

These three configuration settings define the 20 fuel levels (US gallons, liters, etc.) that are represented by the 20 calibration points allocated for each tank. They are automatically filled in by SetView or the VRX MFD when you perform fuel tank calibration.

Fuel Level x Calib point	Formula	Example: Offset:20, Interval:25, last interval:10
1	Offset	2.0 (gallons)
2	Offset + (1 x Interval)	4.5 (gallons)
3	Offset + (2 x Interval)	7.0 (gallons)
4	Offset + (3 x Interval)	9.5 (gallons)
5	Offset + (4 x Interval)	12.0 (gallons)
6	Offset + (5 x Interval)	14.5 (gallons)
7	Offset + (6 x Interval)	17.0 (gallons)
8	Offset + (7 x Interval)	19.5 (gallons)

Fuel Level x Calib point	Formula	Example: Offset:20, Interval:25, last interval:10
9	Offset + (8 x Interval)	22.0 (gallons)
10	Offset + (9 x Interval)	24.5 (gallons)
11	Offset + (10 x Interval)	27.0 (gallons)
12	Offset + (11 x Interval)	29.5 (gallons)
13	Offset + (12 x Interval)	32.0 (gallons)
14	Offset + (13 x Interval)	34.5 (gallons)
15	Offset + (14 x Interval)	37.0 (gallons)
16	Offset + (15 x Interval)	39.5 (gallons)
17	Offset + (16 x Interval)	42.0 (gallons)
18	Offset + (17 x Interval)	44.5 (gallons)
19	Offset + (18 x Interval)	47.0 (gallons)
20	Offset + (18 x Interval) + Last Interval	48.0 (gallons) – full tank

### Fuel Level x Calibration Points

These are the sensor values (representing frequency or voltage) at each of the 20 (gallon) points in the previous paragraph. This constitute the calibration table for each fuel tank, which provides more accurate fuel level readings for fuel tanks of various shapes.

These 20 calibration points are automatically calculated and filled-in by SetView or your VRX MFD when you perform a fuel tank calibration operation. Thereafter you can make minor adjustments here should you wish to.

### Fuel Layout / Configuration

This setting (number from 1 to 4) corresponds to the [fuel layout you have chosen](#). For example set to 1 if fuel layout #1 is chosen.

## SetView Software

### *Introduction*

The SetView software connects to the FSM and allows you to do the following:

- ➔ Update firmware
- ➔ View and record parameters
- ➔ View and adjust configuration / settings
- ➔ Share configuration and recordings via email
- ➔ Calibrate / map fuel tank levels

### *System Requirements*

- ➔ Operating System: Windows 7 or higher
- ➔ One available serial port. If no serial port is available, a USB port together with a USB-to-Serial Converter can be used.

### *SetView download and Installation*

Find the latest version of SetView on our website ([www.vravionics.com](http://www.vravionics.com)) and install it onto your Windows computer or laptop:

- ➔ Click on the **SetView Software** link found at ([www.vravionics.com/downloads.html](http://www.vravionics.com/downloads.html))
- ➔ Click on **Install** and run the setup.exe until all is successfully installed.

Bundled with the latest software are the latest firmware for all VR units in your system (EIU, TSLM, PDC, FSM, etc.). This new firmware may provide new features or have corrected old problems.

### *Using SetView*

Through its dedicated 9 pin maintenance connector the FSM can link with your computer / laptop connecting either directly to your computer's serial port or via a USB-to-Serial converter.

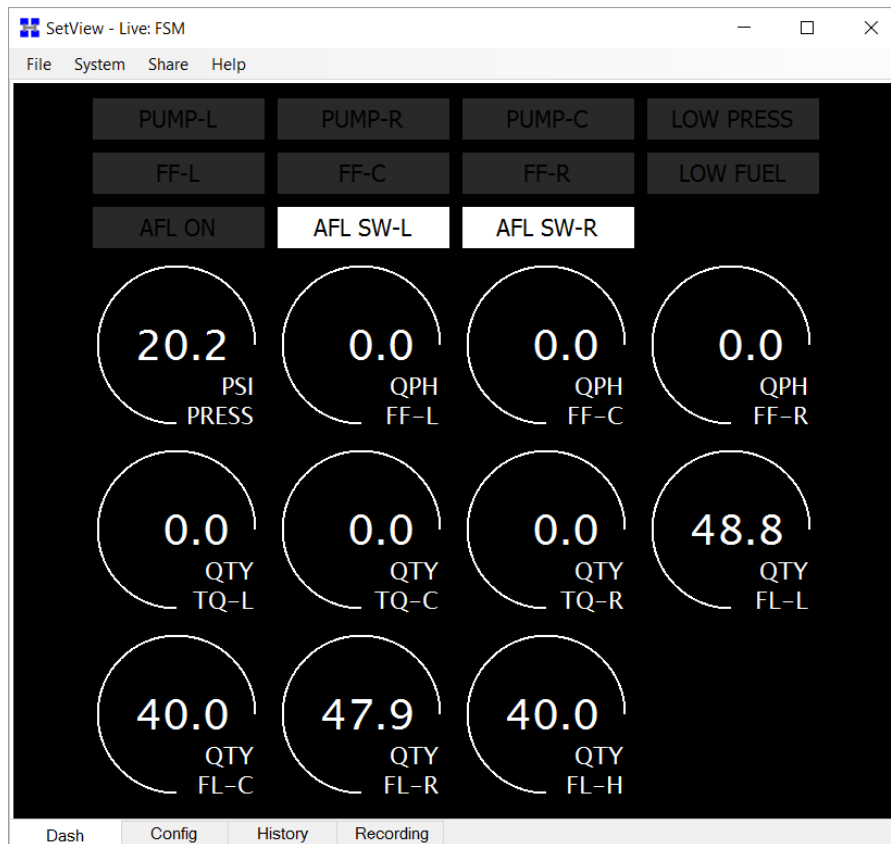
- ➔ Plug in your USB-to-Serial converter (if you are using one) in your Laptop. If this is the first time it have been plugged into a specific USB port, wait for Windows to recognize it and successfully install its driver.
- ➔ Connect the USB-to-Serial converter serial port to the 9 pin maintenance connector.
- ➔ Run the SetView Software.
- ➔ Select from the main menu System > Serial Port. Confirm you have a COM port selected and that it is the right one.
- ➔ Power the FSM module (by switching on the aircraft's master switch).

Reasons for failing to establish communication could be:

- ➔ Power was not applied to the FSM, or
- ➔ The serial cable between the unit and the laptop is not connected properly, or
- ➔ The correct serial port was not selected, or
- ➔ The USB-to-Serial converter driver was not properly installed. If you have bought a new USB-to-Serial converter, you first need to get it to work with Windows on your computer. Plug only the USB-to-Serial converter into the laptop / PC, let Windows recognize it and install the relevant driver first. Only when this is complete and Windows tells you that the device is ready to be used, should you plug it into the FSM, start the SetView software and switch the power on.

## Viewing and recording parameters

After running the SetView software, selecting the correct serial port and applying power to the system, the SetView software should start showing parameters.



To **make a recording** select from the main menu System > Record Parameter Stream. To stop recording thereafter select System > Stop Recording Parameter Stream. The recording will then be saved to a file and shown in graph format for you to view.

## Synchronizing with the system

By synchronizing (menu > system > synchronize) SetView will first check the firmware version of the FSM and any other VR units in your system (connected via CAN bus). If there is a new version SetView will in each case ask you if you want to update. Only if you select Yes it will update the particular unit to the new version.

A synchronize will also make SetView read the FSM's configuration as well as those for the other VR units in your system. The bundled configuration settings will be saved to file and can be viewed by simply clicking on the **Config** tab at the bottom of SetView.

## Sharing files via email

If you have made a recording and/or done a synchronize which will read the FSM configuration, you can easily share these files with others via email (menu > Share). If troubleshooting and you require support from VR Avionics, you may email your recording and configuration to us so we can better be able to assist you.

### Adjusting the Configuration

To make adjustments to the configuration (such as setting the [Auto Fuel Leveling Differential](#)), select from the main menu **System > Adjust Configuration...** The system will take a second or two to first read the configuration settings before allowing you to adjust them as shown below.

Model	Serial #	Configuration Property	Setting	Access
FSM	1001	Fuel Pressure Warning Level	10.0	Adjustable
FSM	1001	Header Quantity Warning Level	10.0	Adjustable
FSM	1001	Pump Fuel Flow Warning Level	10.0	Adjustable
FSM	1001	Fuel Flow Filter (1-16)	8	Adjustable
FSM	1001	Auto Fuel Leveling Initial Differential Wait Enable	0	Adjustable
FSM	1001	Header Quantity Filter Enable	0	Adjustable
FSM	1001	Use Levels for Auto Fuel Leveling	1	Adjustable
FSM	1001	Auto Fuel Leveling Differential	2.0	Adjustable
FSM	1001	Fuel Pressure Sensor Type	50.0	Adjustable
FSM	1001	Fuel Pressure Sensor Calibration	4760	Adjustable
FSM	1001	Fuel Flow Sensor K-Factor - LEFT	66000	Adjustable
FSM	1001	Fuel Flow Sensor K-Factor - CENTER	68000	Adjustable
FSM	1001	Fuel Flow Sensor K-Factor - RIGHT	66000	Adjustable
FSM	1001	Fuel Full Value - LEFT	48.0	Adjustable
FSM	1001	Fuel Full Value - CENTER	28.0	Adjustable
FSM	1001	Fuel Full Value - RIGHT	48.0	Adjustable

To modify any specific configuration item, scroll to the item and hit <SPACE BAR> or double-click on it. A dialog box will appear where you can assign a new value to that configuration property...

Auto Fuel Leveling Differential

2.0

Update

Cancel

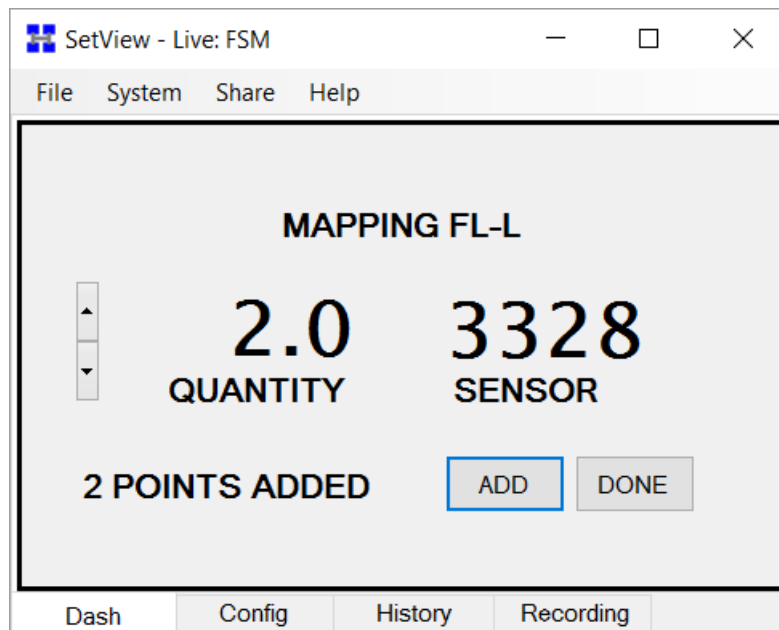
When done click the Update button to change the configuration item setting.

## Calibrating Fuel Tank Levels

We describe how to calibrate the FSM fuel levels using the SetView software. Calibration may also be done via a VRX MFD and is described in the relevant VRX Operational and Install Manual.

To calibrate (or map) a fuel tank using SetView you must first set its sensor type. You do this by adjusting the [Fuel Tank Quantity \(0=Not-Used, 1=Freq, 2=Volt\)](#) configuration setting.

Then select from the main menu **System > Diagnostic Function > MAP FL-L** (or FL-C, FL-R, FL-H depending on the fuel tank you want to map). The screen below shows mapping for FL-L (left).



Also on the screen are three values. On the left is the QUANTITY value, on the right the SENSOR value / reading, and below in the middle the total POINTS ADDED value.

1. Starting with an empty tank fill it to the lowest amount you want displayed. This can be an empty tank if you wish. Use the UP and DOWN arrows on the left to set the QUANTITY value to the amount you have poured in.
2. Press the ADD button when the SENSOR reading has stabilized to add this point. You'll see the POINTS ADDED increment to indicate that the point was added to the internal mapping table.
3. Repeat by pouring another amount of fuel into the tank, setting the QUANTITY value, and then adding that point to the internal mapping table. Note that there is 50 points available in the table so make sure you don't make the fuel increments too small and exhaust the 50 spots before you reach a full tank.
4. When the fuel tank reaches it's full value, enter and ADD this last point to the table, then select the DONE button.
5. You'll be prompted on whether you want to proceed and write the calibration table, YES or NO. Select YES to complete the process or NO to cancel out back to the main menu.