

HydrX™ Fuel Conditioning Controller

Setup & Operation Manual



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Introduction

Overview

The Veeder-Root HydrX system has been designed to help maintain diesel underground storage tanks (UST) and their fuel contents in optimal condition by continuously removing water as well as filtering fuel. As the HydrX system is removing water, it is preventing the establishment of an environment that supports the development of bacterial colonies that, left unchecked, will foul fueling system components, such as, check valves, shear valves, filters and nozzles causing equipment down time and loss of business. The bacteria that thrive in these very specific conditions, where they access nutrients from fuel at the fuel water interface, will also create acids in the UST that contribute to corrosion and possible long-term failure of fueling system components, including, submersible turbine pump (STP) columns, shear valves or other ferrous components within the fueling system.

Along with direct water removal, the HydrX system provides a multi-stage filtration system and provides a means for continuous “polishing” of the UST fuel contents. The multi-stage filters provide a combined 25-micron (um) particle filter with a coalescing element that separates any entrained water from the fuel. In addition, a second element provides a fine water separation as well as another 25-micron (um) filtration barrier. This second stage prevents any possibility of returning emulsified fuel and water back to the UST. A novel water intake device (WID) provides direct access to water at the tank bottom at it's farthest reaches. As water is removed from the tank bottom, only clean fuel is returned through the multi-stage filtering. The unique configuration of the WID and filtering provides long life for the filter element as well as providing the cleanest, “driest” fuel that protects the critical flash point and cetane rating of the fuel product necessary for today’s high performance diesel engines.

The HydrX system is comprised of several components that operate together to provide optimal water removal and intelligent pump control while minimizing impact to site operations. Intelligent pump control continuously monitors the HydrX system and determines the best strategy for water removal while managing the STP to minimize run time while providing the required time to remove water and clean fuel in the UST. In addition, the intelligent pump control prioritizes line and tank testing to maintain site compliance. If water is not collected over the course of a daily auto run cycle, the HydrX system will halt processing until a new delivery into the tank occurs. HydrX components include:

- TLS-450 Plus Automatic Tank Gage (ATG)
- HydrX Fuel Conditioner Controller (FCC)
- HydrX Fuel Conditioner (FC)
- Water Intake Device (WID)
- Guide Tube and Guide Tube Riser

The HydrX Fuel Conditioning Controller (FCC) is installed in a non-hazardous location and it operates in combination with a TLS-450PLUS Automatic Tank Gauge (ATG) using existing USM interfaces to Veeder-Root protocol digital devices as well as switched pump control via UIOM relays (see Figure 1).

This setup manual assumes the FCC is installed and wired both to the TLS-450PLUS and the HydrX Fuel Conditioner according to the instructions in the HydrX Installation Manual 577014-446.

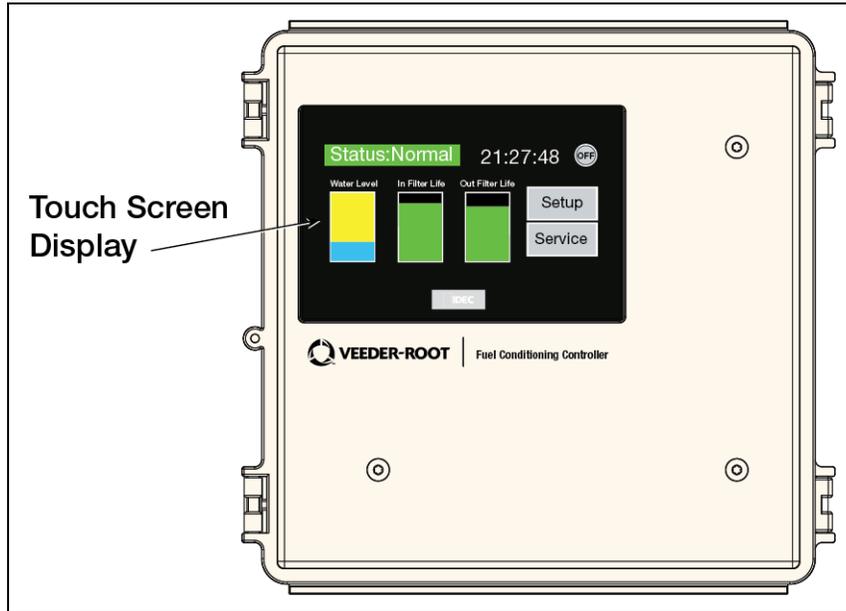


Figure 1. HydrX Fuel Conditioning Controller Front Display

The FCC display has a touch screen which is used to enter HydrX setup parameters, view operating status, manually initiate system tasks, and check system history logs. The FCC display home screen is shown in Figure 2.

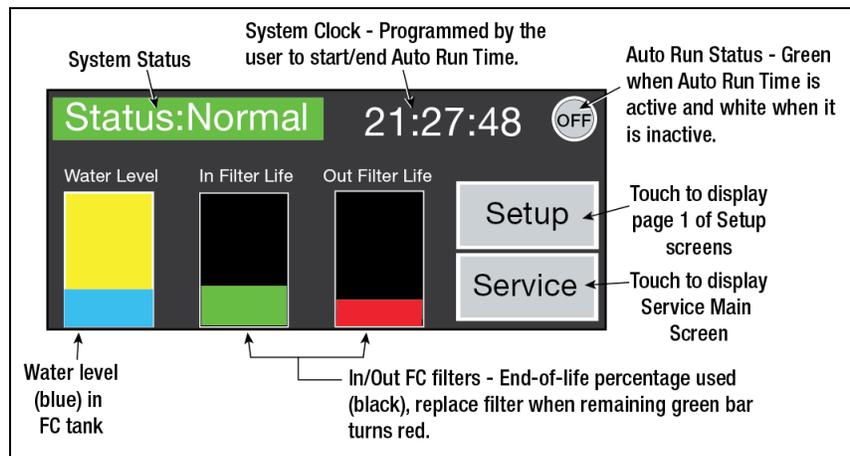


Figure 2. FCC Display Home Screen

FCC Setup

Touch the **Setup** button on the Home screen to begin the FCC setup procedure and display the Auto Run Time screen (see Figure 3).

Auto Run Time Overview

Auto Run Time is a user adjustable setting that tells the FCC which hours the HydrX can run the STP and is typically programmed for quiet hours or overnight shutdowns when sales are slow, or a site is closed for business.

NOTICE The FCC only runs for the duration of the programmed start and end hours if water is being removed or if fuel is being circulated through the Fuel Conditioner.

If water extraction and any required fuel circulation ends before the programmed Auto Run end time, the FCC automatically shuts down the pump and goes into an idle state.

Auto Run Time Setup

1. Touch the **Setup** button on the Home screen to display the Auto Run Time screen (see Figure 3).



Figure 3. Auto Run Time Screen

2. Touch the Start **Hour** field to display the number keypad and enter the hour (24 hour format) you wish to start the HydrX Auto Run Time. To start the FCC auto cycle at midnight, program this value to 00 hour and 00 minute. Start time can be any value between 00 hour 00 minute and 23 hour 59 minute.

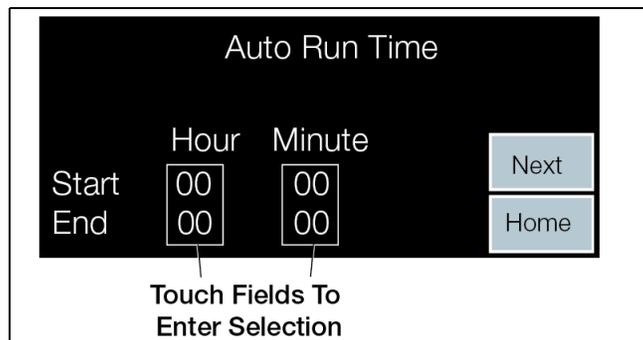


Figure 4. Data Entry

3. To use the keypad, touch a number to enter that value. Touch **CLR** to clear a field's entry, touch **CAN** to cancel a keypad selection, and touch **ENT** to enter a keypad selection into the associated field and close the keypad.

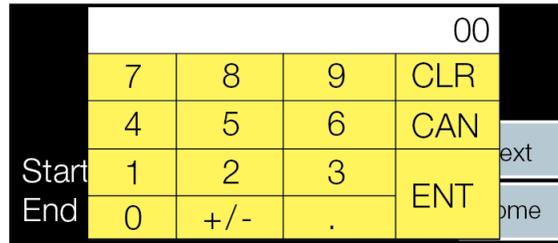


Figure 5. Data Entry Keypad Popup

4. Touch the Start **Minute** field and enter the minutes of the Start Hour, e.g., 00.
5. Touch the End **Hour** field to program the FCC ending hour in 24 hour format.
6. Touch the End **Minute** field and enter the minutes of the FCC ending hour.

Cycle Time Parameters Overview

NOTICE The Cycle Time and Conditioner Processing Cycle parameters described below include typical, recommended or required settings. These parameters should initially be set as outlined below and modified only after observing site operations and the HydrX systems water loading behavior and fuel quality. While highly configurable for any unique site conditions or operating requirements, the values below will provide acceptable performance in most circumstances while balancing STP running hours. Reducing run time, while lowering the utilization of the STP, can reduce water extraction efficiency. Conversely, more water can be removed or more fuel can be polished at the expense of running the STP.

Cycle Time Parameters determine how long each operating sequence in the FCC runs. All Cycle Time Parameters are user settable and break down into four discreet settings: Fill Time, Sweep Time, Vacuum Time and Polish Time.

Cycle Time Parameters Screen

1. Touch the **Next** button to display the Cycle Time Parameters screen (see Figure 6).

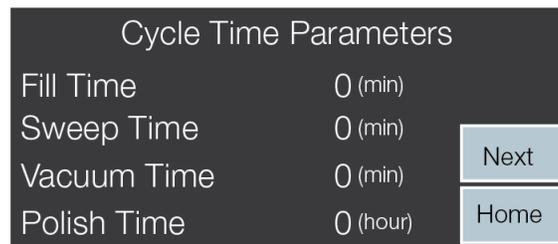


Figure 6. Cycle Time Parameters Screen

2. **Fill Time** - is the amount of time used to fill the fuel conditioner (FC) after a system has been installed or the filters have been serviced. This cycle fills the FC with clean fuel that is fed from the STP through the inlet filter. The inlet filter is a two-stage cartridge type that contains a particle and coalescing element that can separate entrained water. Fill time is typically set to 15 minutes.
3. **Sweep Time** - is used to reverse flow through the WID by using pressure from the STP to push fuel to the bottom of the tank. This pushes any standing water towards the lowest point in the tank for more efficient pick

up as well as clearing any potential clogs that may have built up from vacuuming the tank bottom. This is typically set to 2 minutes.

4. **Vacuum Time** - is the amount of time used to vacuum from the bottom of the UST. This is the primary means for extracting water from the tank. A vacuum cycle is also run at the completion of the fill cycle to remove any trapped air from the fuel conditioner housing. Typically set to 15 minutes.
5. **Polish Time** - is the amount of time that the user allows for circulating fuel through the FC. Polishing simply recycles fuel from the UST at a rate of approximately 6 gallons per minute (gpm) or 360 gallons per hour (gph). Any entrained water and fine water droplets are continuously separated from the fuel in this process as well as any particulate or contamination down to 25 micron (μm) in size. Polish time is typically set to 4 hours, however, this value can be increased or decreased to balance STP run time against a site operator's specific needs for fuel cleanliness.

Conditioner Tank Settings Screen

Conditioner Tank Settings provide information to the FCC needed to control the maximum drain time (spill protection) for the auto drain function as well as holding capacity and height to volume conversion. For a typical 5 gallon capacity fuel conditioner, the following parameters should be used, however, these are modifiable for future FC variations.

1. Touch the **Next** button to display the Conditioner Tank Settings screen (see Figure 7).

Conditioner Tank Settings	
Drain Time	0 (min)
Extended Drain	0 (sec)
Tank Volume	0.00 (gal)
Volume/Inch	0.0000 (gal)

Figure 7. Conditioner Tank Settings Screen

2. **Drain Time** - is the maximum time the STP is allowed to run if the FC measuring probe doesn't reach a 0 gallon, minimum, drain. This prevents the pump from running excessively to help avoid spills or accidental discharges if a drain out is not completed, for any reason. Touch the **Drain Time** field and select the time in minutes to drain the FC tank, This should be set to 10 minutes, maximum, for the 5 gallon FC.
3. **Extended Drain** - is a fine adjustment that lets the drain extend briefly to allow water to clear below the FC measuring probe's lower detection limit of 0.75". Touch the **Extended Drain** field to select an extra amount of time in seconds to continue the draining process. Default is 0 seconds.

NOTICE Unlike the drain time, which shuts down the pump once the water level reaches 0", this setting allows the pump to run the programmed amount of time after the water float has touched bottom on the HydrX Fuel Conditioner (FC) tank. This setting should be limited to 30 seconds, maximum, to prevent any possibility of spilling fuel or ejecting excessive amounts of fuel into the waste water.

4. **Tank Volume** - is the maximum volume of water that the FC tank can hold before indicating that a drain out is required. For the 5 gallon capacity FC, this cannot exceed 5 gallons, however, could be lower if the site operator chooses. Touch the **Tank Volume** field and enter an FC tank max volume, typically set to 5.00 gallons.
5. **Volume/Inch** - is the height to volume conversion used by the FCC for the 5 gallon tank in the Fuel Conditioner. Touch the **Volume/Inch** field and enter the required value of 0.3536 gallons per inch (with 5 gallons in the FC tank, the water height measured in the tank will be 14.14").

Conditioner Processing Cycles Overview

Conditioner Processing Cycles are FCC settings that limit the number of times the FCC runs the STP for water extraction in it's different operating modes as described below.

Conditioner Processing Cycles Screen

1. Touch the **Next** button to display the Conditioner Processing Cycles screen (see Figure 8).

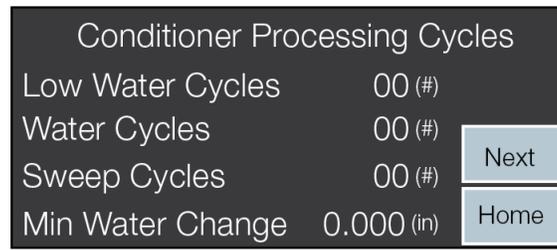


Figure 8. Conditioner Processing Cycles Screen

2. **Low Water Cycles** - limits the number of vacuum cycles used by the FCC to determine that water is not being extracted when the FC measuring probe float is below it's 0.75" minimum detection limit and the float is resting on the FC tank bottom. This is typically set to 4 cycles and typically higher than Water Cycles limit used when the float is off the FC tank bottom. See Water Cycles below.
3. **Water Cycles** - limits the number of vacuum cycles used by the FCC to determine that water is not being extracted when the FC measuring probe float is above it's 0.75" minimum detection limit and the float is off the FC tank bottom. This is typically set to 2 cycles.
4. **Sweep Cycles** - limits the number sweeps intended to move any standing water along the tank bottom to the lowest point. Sweeping improves the overall water collection efficiency of the HydrX FC by encouraging water to move to the end vacuum point that is optimized for water extraction as well as keeping the lines clear from debris buildup in the WID. This is typically set to 2 cycles. A Sweep cycle combines a sweep period, as programmed by the sweep time parameter, with a vacuum period, as programmed by the vacuum time parameter. The combined sweep and vacuum intervals count as a single sweep cycle.
5. **Min Water Change** - provides the minimum height change in the FC measuring probe's water float. If the water float does not meet this minimum change criteria, the FCC logic will determine that water is not being extracted and will move on to the next cycle or mode. This is typically set to 0.05".

NOTICE This does not prevent the FCC from accumulating the water measurement, it only provides a minimum water detection threshold for the operating logic of the controller to limit STP run time if water is not being removed from the UST. The water measurement calculator in the FCC accumulates all the water removed from UST independent of these settings or state of the HydrX operation.

Filter End of Life (EOL) Overview

Filter End of Life (EOL) Settings tell the HydrX FCC the maximum pressure drop (loss) across each filter element as well as when to signal the user that a filter change is required based on percent life remaining. An increasing pressure drop indicates loss of flow through the filter due to element clogging. HydrX filters have high surface area, long life elements. Due to cost and disruption caused by element servicing, filter replacement kits include both inlet and outlet filters which should be replaced at the same time.

Filter EOL (End of Life) Notes:

1. Filters should always be replaced in pairs followed by a Fill Cycle to maximize performance and minimize risk of reduced water removal protection.
2. Inlet and Outlet Life Pressure settings should not exceed 10 PSI. While it is possible to set them lower, this would result in earlier, or more frequent, service calls.
3. To avoid reduced or lost performance caused by loss of flow into the HydrX Fuel Conditioner, the Inlet End of Life recommended setting is 5%. Technically, this can be set to 0%, however, the amount of time between a remaining life of 5% and 0% is not material with respect to the cost of the filter replacement or potential loss of protection.
4. To avoid reduced or lost performance caused by loss of vacuum in the HydrX Fuel Conditioner, the Outlet End of Life recommended setting is 5%. Technically, this can be set to 0%, however, the amount of time between a remaining life of 5% and 0% is not material with respect to the cost of the filter replacement or potential loss of protection.

Filter EOL Settings Screen

1. Touch the **Next** button to display the Filter EOL Settings screen (see Figure 9).

Filter EOL Settings	
Inlet Life Pressure	00.00 (psi)
Outlet Life Pressure	00.00 (psi)
Inlet End of Life	00.00 (%)
Outlet End of Life	00.00 (%)

Next

Home

Figure 9. Filter EOL Settings Screen

2. **Inlet Life Pressure** - is the maximum pressure drop (loss) across the inlet filter element at the end of its working capacity. For the filter types used in the HydrX FC, this is set to 10 psi, maximum.
3. **Outlet Life Pressure** - is the maximum pressure drop (loss) across the outlet filter element at the end of its working capacity. For the filter types used in the HydrX FC, this is 10 psi, maximum.

NOTICE At the start of a new system or after filter replacement, at vacuum pressures lower than -3 psi, the HydrX FC will begin to auto adjust (reduce) the filter life to compensate for the minimum pressure limit of the HydrX vacuum element.

4. **Inlet End of Life** - is the percentage value of remaining filter life that the HydrX will signal the user that the inlet filter must be replaced. This is typically set to 5% to prevent any possibility of contamination or system degradation caused by completely clogged filter elements.
5. **Outlet End of Life** - is the percentage value of remaining filter life that the HydrX will signal the user that the outlet filter must be replaced. This is typically set to 5% to prevent any possibility of contamination or system degradation caused by completely clogged filter elements.

ATG Device Mapping Overview

ATG Device Mapping Tells the HydrX FCC about the physical locations of the devices within the TLS ATG. As probes, sensors and the Fuel Conditioner, they are assigned physical locations, like probe 1, probe 2, LPR 1, LPR 2, Fuel Conditioner 1, etc. This section defines where to locate the devices used by the FCC when communicating with the TLS and inquiring device data.

ATG Device Mapping Screen

1. Touch the **Next** button to display the ATG Device Mapping screen (see Figure 10).

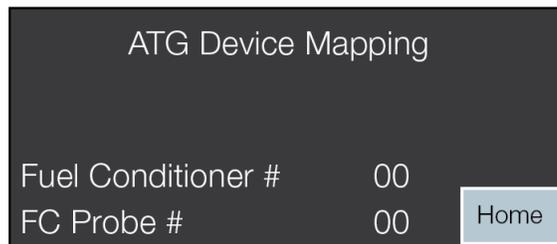


Figure 10. ATG Device Mapping Screen

2. **Fuel Conditioner #** - For currently supported single HydrX Fuel Conditioner configurations, this should be programmed to 1.
3. **FC Probe #** - is the probe located in the fuel conditioner housing and is the same number as programmed into the TLS when configuring the FC devices and settings. If the fuel conditioner probe is mapped into the TLS as the eighth probe and then assigned to the FC during setup, this value would be programmed as 8.

NOTICE Reference “**TLS-450PLUS Setup**” for detailed programming instructions.

4. Touch the **Home** button to return to the Home screen (see Figure 2).

Service

The HydrX FCC includes service mode screens that support maintenance, operations and diagnostics for performance monitoring or servicing the system. Principle service controls and indicators are described in this section.

FCC Service Home Screen

Touch the Service button on the FCC Home Screen to display the Service main screen (see Figure 11).

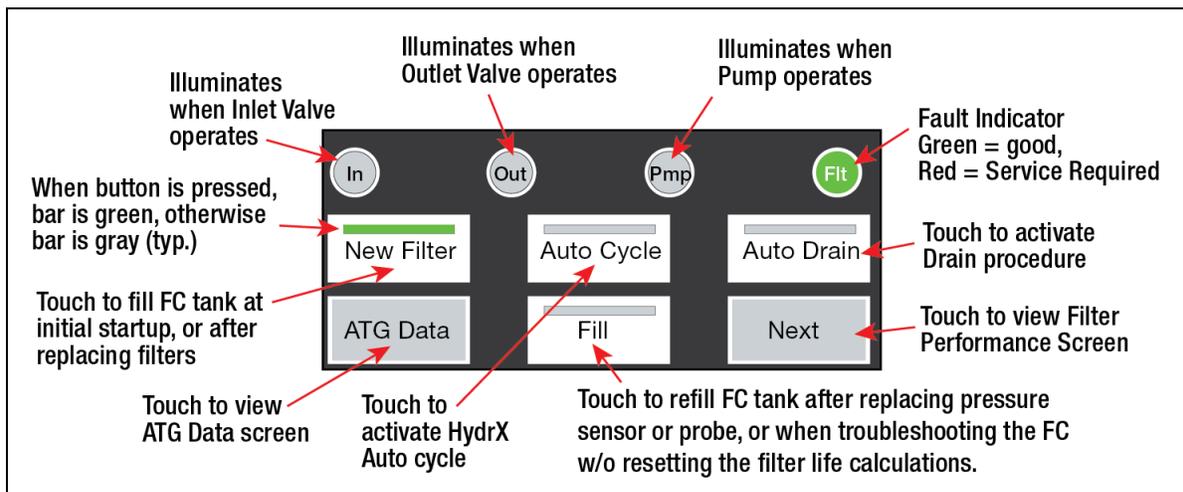


Figure 11. FCC Service Home Screen

New Filter Button

When a system is first started, after installation and connection to the STP, or after the filters are replaced, touching the **New Filter** button refills the Fuel Conditioner (FC) tank with fuel. A fill cycle includes the time programmed as Fill Time followed by a vacuum interval, programmed as Vacuum Time to completely fill and de-aerate the tank. During the fill cycle, the inlet and outlet filter pressure losses are independently measured and stored as reference values that are used to calculate filter life. Inlet filter pressure is measured during the pressurized interval, essentially at pump pressure. Outlet filter pressure is measured during the vacuum interval under a vacuum created by an integral venturi element in the HydrX Fuel Conditioner (FC) manifold. As the filters accumulate debris and clog, the pressure changes from this reference value, the pressure difference indicating remaining filter life.

Fill Cycle Notes:

1. A complete fill cycle consists of a pressurized fill interval, time determined by programmed fill time, plus a vacuum interval, time determined by programmed vacuum time. **Assuming a typical 15 minute fill time plus typical 15 minute vacuum time, total fill interval is 30 minutes.**
2. **Only run a fill cycle during initial system startup or after filter replacement.** Reference pressure measurements are made on the inlet and outlet filter that provide the basis for calculating filter life. **Running fill cycles on used filters, will create significant life calculation errors and degraded system performance.**

Auto Cycle Button

By pressing the auto cycle button on the front panel of the FCC, if an auto cycle is not already in progress, the HydrX FCC will run an auto cycle.

Auto Cycle Notes

1. Except for new system startup, an auto cycle is run when the following conditions are met:
 - a. Water has been collected in the previous day. And,
 - b. The FCC is within the auto start and auto end times. Or,
 - c. A delivery has occurred. And,
 - d. The FCC is within the auto start and auto end times. Or,
 - e. An auto cycle can also be manually started and will run provided conditions A or C are true.
2. An auto cycle is always run after initial system startup without regard to any prior water removal.
3. Any auto cycle interval is held pending due to any of the following conditions:
 - a. A line test is in progress
 - b. A tank leak test is in progress
 - c. A delivery is in progress and the HydrX is running a delivery polish cycle
4. An auto cycle will not run due to any of the following conditions:
 - a. The HydrX Fuel Conditioner (FC) requires a water drain service
 - b. The HydrX Fuel Conditioner (FC) requires a filter service
 - c. A line test shutdown on the line assigned to the fuel conditioner
 - d. A tank test shutdown on the tank assigned to the fuel conditioner
 - e. A line LPR fault on the line assigned to the fuel conditioner
 - f. A tank probe fault on the tank assigned to the fuel conditioner
 - g. A communication failure between the FCC and ATG
 - h. Failure of any FC sensor (either probe or pressure sensor)
5. Auto cycle always starts with vacuum cycles, followed by sweep cycles, followed by polish cycles. The rules for vacuum and sweep cycles are defined in notes 5 - 7 below.
6. The Low Water Cycles setting is the number of consecutive vacuum cycles without water removal when the HydrX Fuel Conditioner (FC) float is on the bottom of the FC tank.
7. The Water Cycles setting is the number of consecutive vacuum cycles without water removal when the HydrX Fuel Conditioner (FC) float is not on the bottom of the FC tank.
8. The Sweep Cycles setting is the number of consecutive combined sweep and vacuum cycles without water removal after the FCC has completed vacuum only cycles.
9. For the cycle types defined by notes 5 – 7, the counter value decrements when water is not extracted. If water is extracted, the counter does not decrement or is reset to its programmed setting until the consecutive number of cycles are run without water removal.

Auto Drain

This function automatically operates the STP to eject water from the FC housing via a Veeder-Root 330020-880 Water Drain Kit, or similar. After coupling the kit to the FC, the user touches the FCC **Auto Drain** button (see Figure 11) to initiate the FC tank drain sequence. The 330020-880 kit includes a nozzle to control the flow out of the FC. The FCC continuously monitors the water level in the FC housing and, once the water float reaches the FC tank bottom, or the programmed Drain Time has expired, automatically shuts down the STP.

Filter Performance Screen

The Filter Performance screen displays the read-only FC inlet and outlet valve status (see Figure 12). 'P0' is the pressure measured by the HydrX FCC when a filter is new or has been replaced. 'P' is the current pressure as measured by the HydrX FCC that indicates if the filter is clogging which diminishes filter life. '%' is the percent of remaining filter life. This screen displays all relevant filter information, including:

- Inlet and Outlet filter reference pressures, P0. This is the pressure measured through the filter at initial system startup or after filter replacement and represents the filter pressure at 100% capacity or life.
- Inlet and Outlet filter current operating pressure, or P. The reference pressure, P0, for each filter minus the current operating pressure is the pressure drop that coinciding with the programmed filter parameters, Inlet Life Pressure and Outlet Life Pressure, respectively.
- Inlet and Outlet filter percent remaining life (%). This value is the calculated remaining life on each filter and is calculated as:

$$\% = (P_0 - P) / (\text{Programmed Life Pressure}) \times 100$$

NOTICE A replace filter service signal is sent to the TLS once the percent remaining life is less than or equal to the programmed Inlet or Outlet End of Life setting. For example, if the FCC is programmed to signal at 5% life remaining, when the inlet or outlet filter calculation result is 5%, or less, the filter replacement signal is set.

Filter Performance			
	Inlet	Outlet	
PO	0.00 (psi)	0.00 (psi)	Home
P	0.00 (psi)	0.00 (psi)	
%	0.0 (%)	0.0 (%)	Next

Figure 12. Filter Performance Screen

1. Touch the **Home** button to return to the FCC Home screen (see Figure 2).
2. Touch the **Next** button to display the next service screen.

Water Collection Screen

The HydrX FCC accumulates a set of water collection statistics to help users understand the conditions when water is entering or collecting in their UST. Statistics are arranged in the following groups:

- Current and Last Hour accumulation, Current and Last Day accumulation (see Figure 13).

Water Collection			
	Current	Last	
Hour	0.0 (gal)	0.0 (gal)	Home
Day	0.0 (gal)	0.0 (gal)	
			Next

Figure 13. Water Collection (Hour/Day) Screen

- Current and Last Month accumulation, Current and Last Year accumulation (see Figure 14).



Figure 14. Water Collection (Month/Year) Screen

Monitoring patterns in these distributions can help users identify if water is collected in gradual condensing type conditions, dropped with deliveries, i.e., correlating daily accumulations to ATG deliveries or ingress after wet weather periods in either daily or monthly accumulations.

Touch the **Clear** button to reset the accumulations to zero.

Service Counter Screen

The FCC includes non-resettable service counters that count water drain outs and filter changes (see Figure 15).

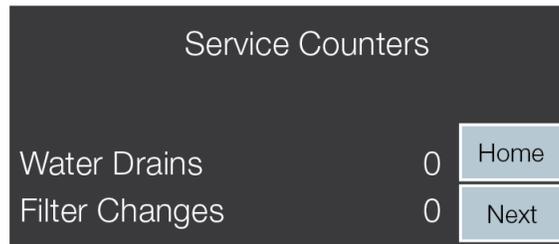


Figure 15. Service Counters Screen

Operational Mode History Screen

The FCC maintains a running history of both the number of times and the amount of time the system has been in each of its operational modes (see Figure 16). Time and counter values are reset at the start of an Auto Cycle.

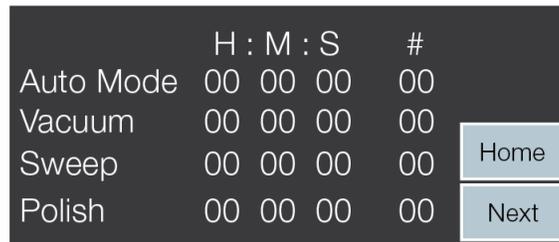


Figure 16. Mode Cycle History Screen

FC Comm Diagnostic Screen

The FCC displays read-only communications diagnostic counters of serial communications between the FCC and ATG Fuel Conditioner (FC) functions (see Figure 17).

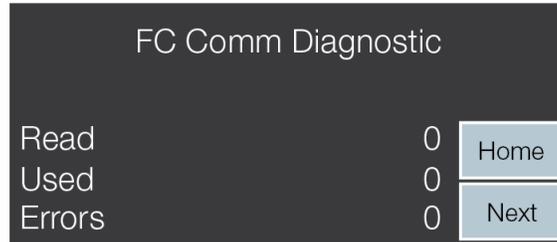


Figure 17. FC Pressure Sensor Diagnostic Screen

FC Probe Comm Diagnostic Screen

The FCC displays read-only diagnostics counters of serial communication with the FC Mag Probe (see Figure 18). These counters only function during Auto Drain.

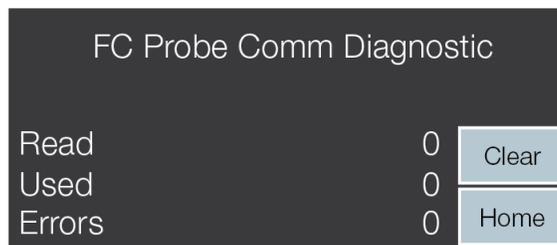


Figure 18. FC Probe Diagnostic Screen

Touch the **Clear** button to reset the counters to zero in both FC comm diagnostic screens.

ATG Sensor Data

Touch the **ATG Data** button to display read-only HydrX parameters from the Fuel Conditioner Mag Probe and pressure sensor readings that are sent from the TLS-450PLUS (see Figure 19). Touch the **Home** button to return to the FCC Home screen (see Figure 2).

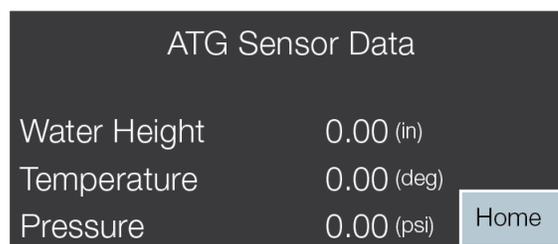


Figure 19. ATG Sensor Data Screen

FCC Software Upgrade

WARNING



To avoid electric shock do not touch any wiring terminals inside the FCC while performing this procedure.

1. If you have a FCC upgrade thumb drive with the software upgrade already on it, go to Step 3.
2. If you have downloaded the FCC software onto a PC, insert a thumb drive into your PC and copy the HGDATA01 directory from your PC location to the root directory of the thumb drive (typically drive labeled D:).

NOTICE

The USB is formatted as FAT32, so, your PC operating system must support the FAT32 file system to copy this file. Newer versions of MAC OS support this, but you should make certain if you are copying from a MAC. Specify that it is OK to overwrite the contents.

3. Open the door of the FCC and with the power to the FCC On, plug the upgrade thumb drive into the FCC USB2 port on the rear of the FCC Display (see Figure 20).

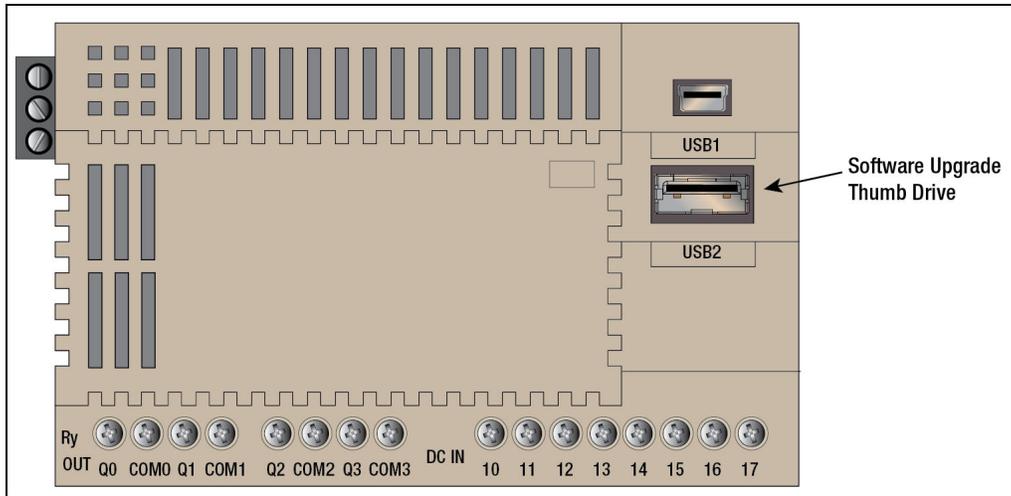


Figure 20. FCC USB Ports

4. When the Confirmation screen displays, touch the **Download Proj.** button to install the software upgrade (see Figure 21).

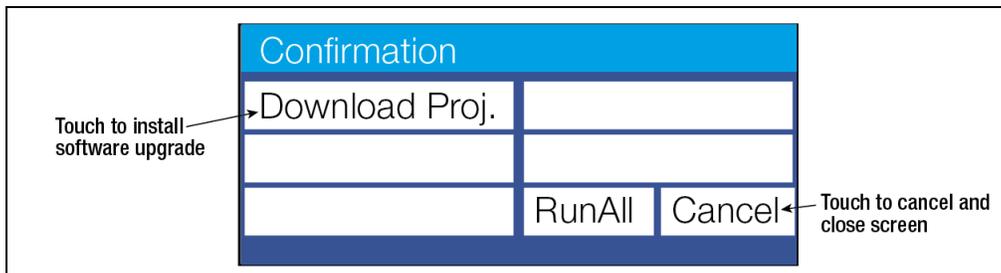


Figure 21. FCC Software Upgrade Screen

5. The FCC will go through a series of steps loading the project contents into its memory. Wait for the Confirmation screen to return then touch **Cancel** to return to the Home screen (see Figure 2).
6. The new code and user interfaces are loaded on your FCC. Remove the thumb drive and close and secure the FCC cover.

FCC Clock Setup

To set the FCC internal clock on initial startup follow the steps below.

1. Touch the upper left corner of the FCC display status bar and press it until the Maintenance screen appears (see Figure 22).

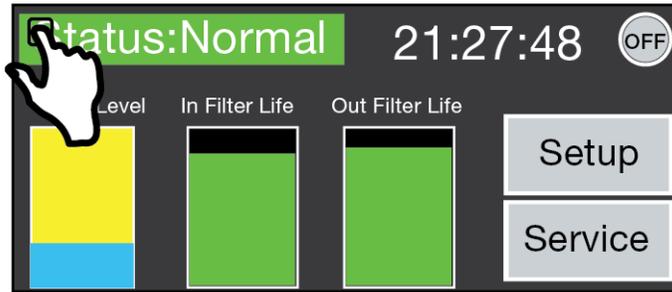


Figure 22. Accessing Maintenance Screen

2. When the Maintenance screen appears touch the System Mode button to open the System Mode top page.

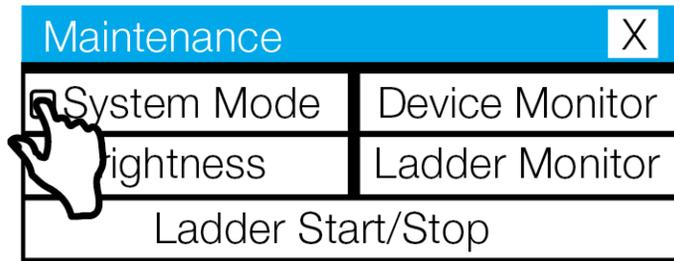


Figure 23. Maintenance Screen

3. On the System Mode Top Page, touch the Main Menu button (see Figure 24).

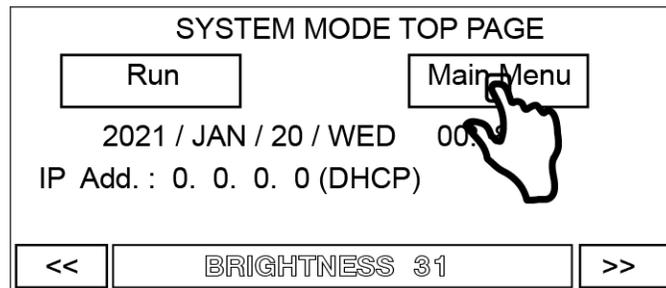


Figure 24. System Mode Top Page

- On the Main Menu page touch the Clock Setting button open the Clock Set page (see Figure 25)

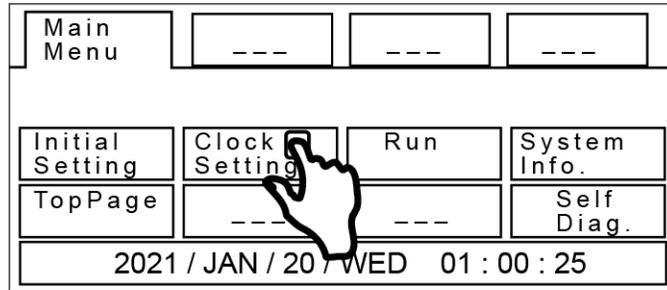


Figure 25. Main Menu Page

- On the Clock Set page, observe the button functions in Figure 26 to reset the date and time. Touch the number buttons to enter date/time.

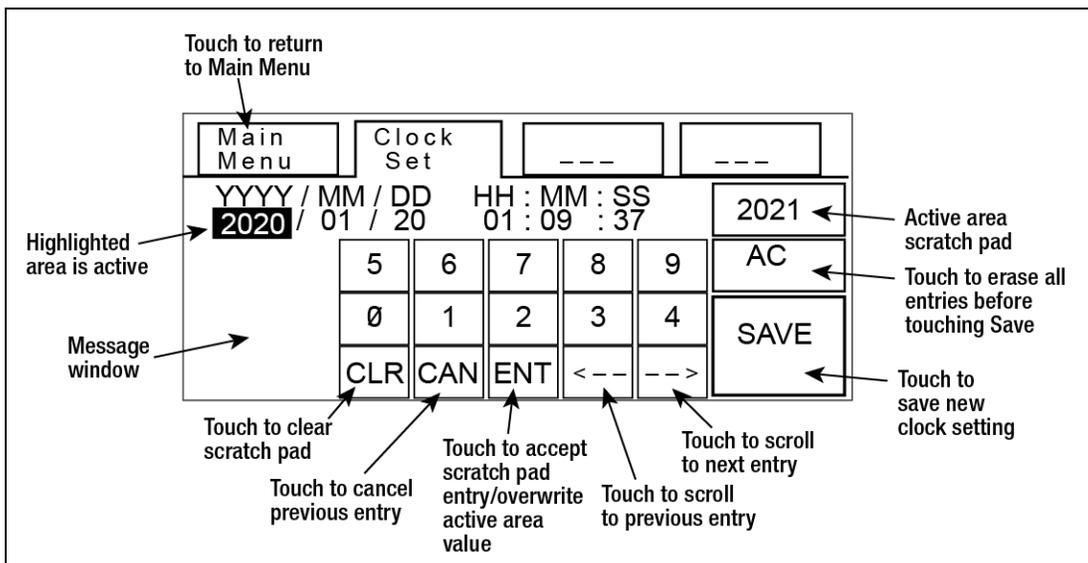


Figure 26. Clock Set Page

- After saving the date and time, touch the Main Menu button to return to the Main Menu page, then touch the Run button on that page return to the FCC Home Page.

TLS-450PLUS Setup

Install HydrX Fuel Conditioning System Software

The TLS-450PLUS ATG must have Version 9R or later system software and have the HydrX System 'In-Sump Fuel Conditioner' software feature installed. If necessary, install the In-Sump Fuel Conditioner software feature as described below.

1. Plug a USB Adapter - Feature Upgrade iButton with the In-Sump Fuel Conditioner software installed, into one of the two TLS-450PLUS USB ports located under the console comm bay (see Figure 27).

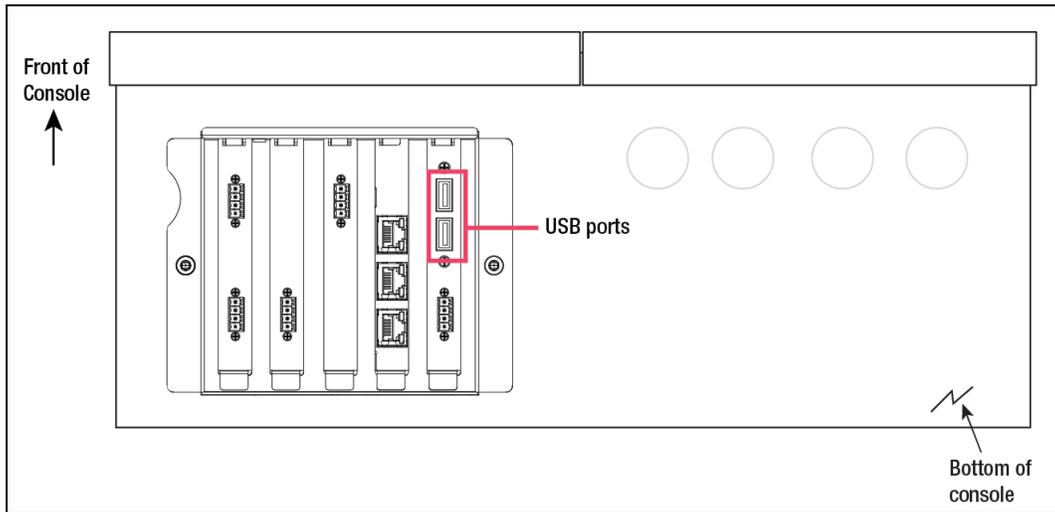


Figure 27. TLS-450PLUS USB Ports

2. Touch **Menu>Software Maintenance>Upgrade Features** to display the Upgrade Features screen (see Figure 28).

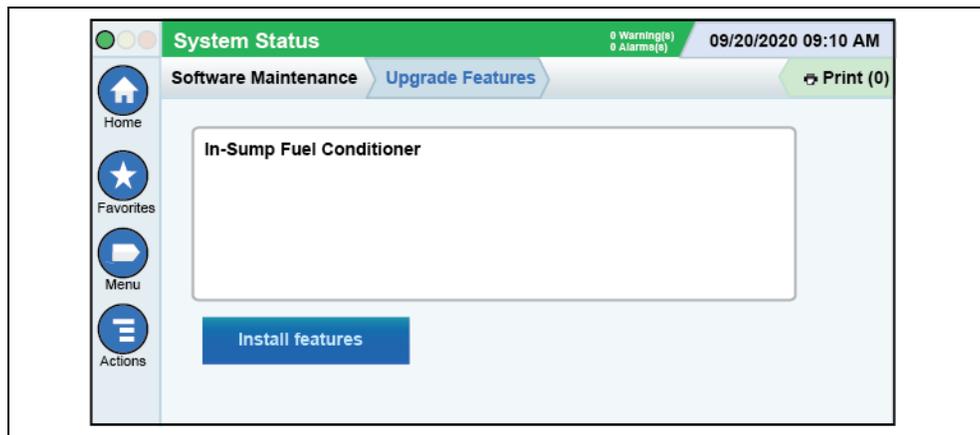


Figure 28. TLS-450PLUS Upgrade Features Screen

3. Touch the **Install Features** button to start the installation process. During the activation process, several dialog boxes will be displayed to inform you of key events.

NOTICE **IMPORTANT!** During feature activation, which only takes a few minutes, there must be no dispensing.

4. During the installation, the current status of the feature will be indicated by the following messages:
 - Ready to Activate
 - Activation in Progress
5. Following activation, the console converts the setup databases. Once the new feature is installed, setup relevant to the new feature will be required.

FC Mag Probe Setup

1. Touch **Setup>Devices** to enter Device setup. If the Probe setup screen is not visible, open the Setup Devices Index and touch the **Probe** button to open the Probe setup screen.

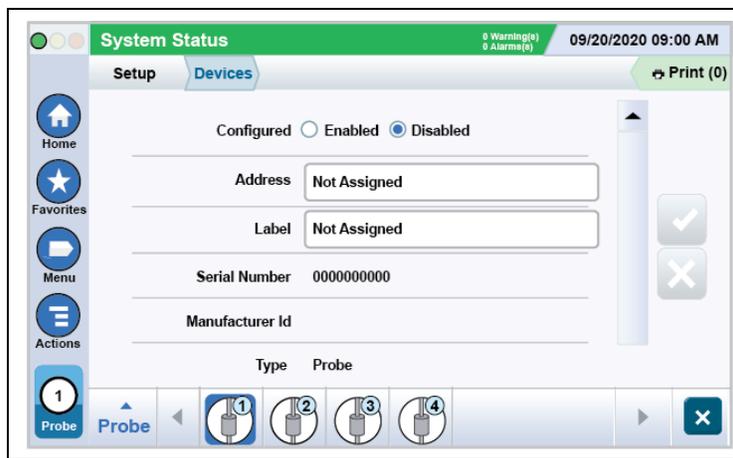


Figure 29. Accessing TLS-450PLUS Probe Setup Screen

2. Touch the **Enabled** radio button to configure this probe.
3. Touch the **Address** field and select the address of the probe connected to the FC, e.g., B1:S1:1.
4. Touch **Label** field and enter a description of this mag probe (up to 20 alphanumeric characters) that will appear on the console screens and in reports, e.g., FC 1 Mag Probe.
5. **Serial Number** - is a read only value.
6. **Type** - is a read only value.
7. **Float Type** - is a read only value.

FC Pressure Sensor Setup

1. Open the Setup Devices Index and touch the **Line Pressure Sensor** button to open the Line Pressure Sensor setup screen.



Figure 30. Accessing TLS-450PLUS Line Pressure Sensor Setup Screen

2. Touch the **Enabled** radio button to configure this pressure sensor.
3. Touch the **Address** field and select the address of the pressure sensor connected to the FC, e.g., B1:S1:2.
4. Touch **Label** field and enter a description of this sensor (up to 20 alphanumeric characters) that will appear on the console screens and in reports, e.g., FC 1 Pressure Sensor.
5. **Serial Number** is a read only value.

External Input Setups

FCC SWITCH CONTACT SETUP

1. Go to the **Menu>Setup>Devices** screen, open the Setup Devices Index and touch the **External Input** button to open the External Input setup screen (Figure 31).

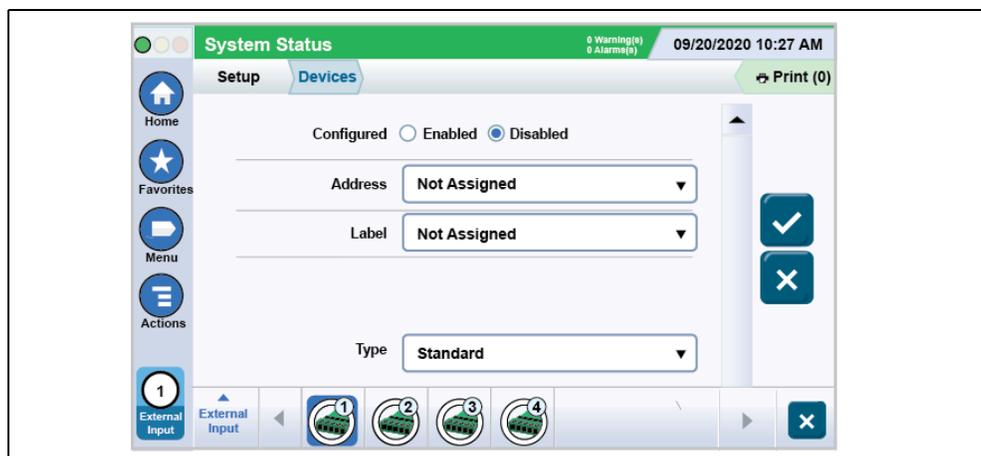


Figure 31. TLS-450PLUS External Input Setup Screen For FCC Switch Contact

2. Select the External Input you want to configure for the FCC switch contact.
3. Touch the **Enabled** radio button to configure this External Input.
4. Touch the **Address** field and select the address of the relay connected to the FCC terminals 11/12 in wiring diagrams.

NOTICE Relays connected to the I/O module will display the following possible address codes in the Address Field: **B1:Sx:X**, where **Sx** is the slot in which the I/O module is installed (from 1 to 4) and **X** is the connector input to which the device is attached (from 1 to 4).

5. Touch **Label** field and enter a description of this relay (up to 20 alphanumeric characters) that will appear on the console screens and in reports, e.g., 'HydrX Service'.
6. Touch the **Type** field and select 'Standard' (On/Off state is determined by assigned alarms or warnings).
7. Touch the **Orientation** field and select 'Normally Closed'.
8. Touch the check key to accept the selections.

DIESEL PUMP SWITCH HOOK SETUP

1. On the External Input screen (Figure 31), select the External Input you want to configure for the diesel pump switch hook.
2. Touch the **Enabled** radio button for the External Input you want to configure.
3. Next, select the address for the High Voltage External Input that the Diesel Switch Hook is connected to on the IOM Module (labeled PUMP/PUMP RETURN [NEUTRAL] in wiring diagrams).

NOTICE Relays connected to the IOM Module will display the following possible address codes in the Address Field: **B1:Sx:X**, where **Sx** is the slot in which the IOM Module is installed (from 1 to 4) and **X** is the connector input to which the switch hook is attached (from 10 to 14).

4. Touch the **Label** field and enter a description of the relay that will appear on the console screens and in reports, e.g. Diesel Switch Hook Input
5. Touch the **Type** field and select '**Pump Sense**'
6. Touch the **Orientation** field and select '**Normally Open**'
7. Touch the check key to accept the selections.

Relay Setup (Output Relay that will engage the STP)

1. Go to the **Menu>Setup>Devices** screen, open the Setup Devices Index and touch the **Relay** button to open the Relay setup screen.

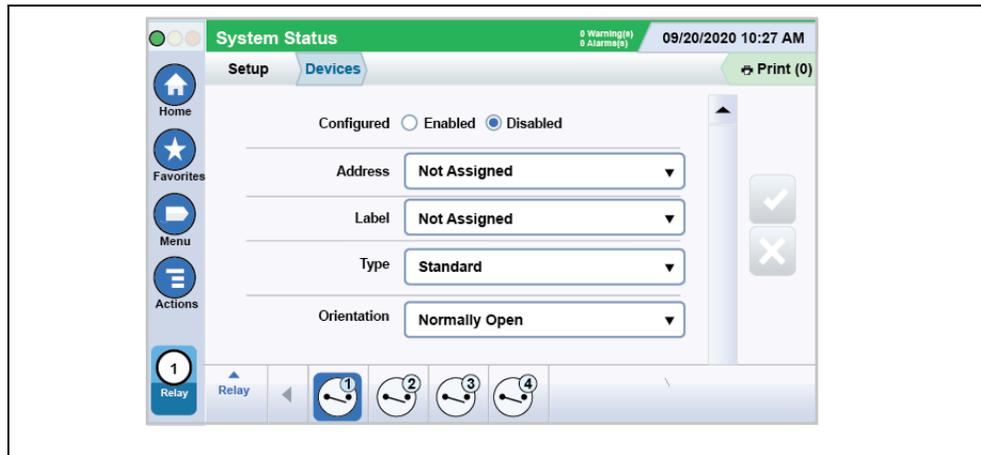


Figure 32. Relay Setup Screen

2. Select the Relay you want to configure on the lower horizontal section of the screen
3. Touch the **Enabled** radio button to enable the Relay you want to configure.
4. Next, select the **Address** for the High Voltage Relay Output that is wired to the Diesel Relay or pump controller that will engage or turn on the Diesel STP (labeled LINE/PUMP OUTPUT in wiring diagrams).

NOTICE Relays connected to the IOM Module will display the following possible address codes in the Address Field: **B1:Sx:X**, where **Sx** is the slot in which the IOM Module is installed (from 1 to 4) and **X** is the connector Output which is wired to the Diesel Relay (from 5 to 9)

5. Touch the **Label** field and enter a description of the relay that will appear on the console screens and in reports, e.g. Diesel Pump Relay
6. Touch the **Type** field and select '**Pump Control Output**'.
7. Touch the **Orientation** field and select '**Normally Open**'.
8. Accept the rest of the screen defaults and touch the check key to accept the selections.

Pumps and Lines Setup

Pump Setup

1. Go to **Menu>Setup>Pump and Lines**, open the Setup Devices Index and touch the **Pumps** button to open Pump setup screen.

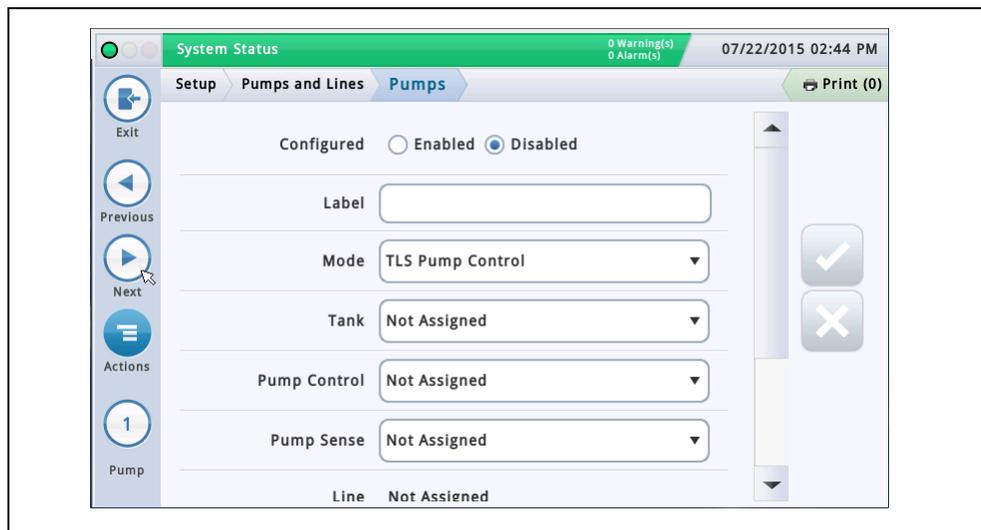


Figure 33. Pumps Setup Screen

2. Touch the lower left hand corner where it shows **Pump 1** and select the Pump along the bottom horizontal section of the screen for the Pump you want to configure.
3. Touch the **Enabled** radio button to enable the Pump you want to configure.
4. Touch the **Label** field to identify the Pump you are going to configure e.g. Diesel Pump.
5. Touch the **Mode** field and select 'TLS Pump Control'.
6. Touch the **Tank** field and select the tank with this Diesel Pump.
7. Touch the **Pump Control** field and select the Relay that was previously configured in **Devices>Relay** for the Diesel Pump.
8. Touch the **Pump Sense** field and select the External Input that was previously configured in **Devices>External Input** for the Diesel Switch Input.
9. Accept the rest of the screen defaults and touch the check key to accept the selections.

Line Setup

NOTICE The Lines setup may differ depending if the site is running DPLLD or not. Both sets of instructions will be shown below:

1. Go to **Menu>Setup>Pump and Lines**, open the Setup Devices Index and touch the **Line** button to open the Line setup screen.

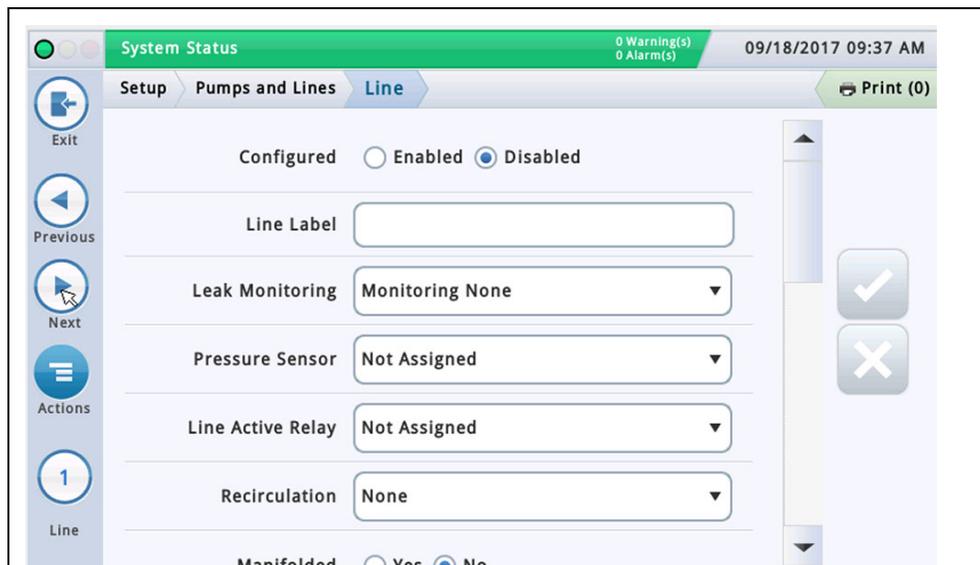


Figure 34. Line Setup Screen

2. Touch the lower left hand corner where it shows **Line 1** and select the Line along the bottom horizontal section of the screen for the Line you want to configure.
3. Touch the **Enabled** radio button for the Line that you want to configure.
4. Touch the **Line Label** field to identify the Line you are going to configure e.g. Diesel Line
5. Touch the **Leak Monitoring** field and select (Monitoring PLLD) if the site is using DPLLD, or, select (Monitoring None) if the site has No DPLLD
6. Touch the **Pressure Sensor** field and select the (LPR Sensor) if the site is using DPLLD, or, select (Not Assigned) if the site has No DPLLD.
7. Leave the Recirculation field at None unless this option is installed.
8. The **Line Active Relay**, **Manifolded**, **Dispense Mode**, **Active Switchover**, **Switchover Volume Threshold** and **Switchover Height Threshold** fields can be programmed for a site with DPLLD depending on the DPLLD application at the site. If no DPLLD, these screens can be left at their default values.
9. In this page of Line setup screens (see Figure 35), all configured Pumps will display in the left hand column for all pumps that were configured for each product. Identify the Pump that was configure in the previous Pumps menu for the Diesel Product and touch the Right Hand arrow next to the Diesel Pump to move the Diesel Pump to the right hand Selected Pumps column.
10. Touch the check key to accept the selections.

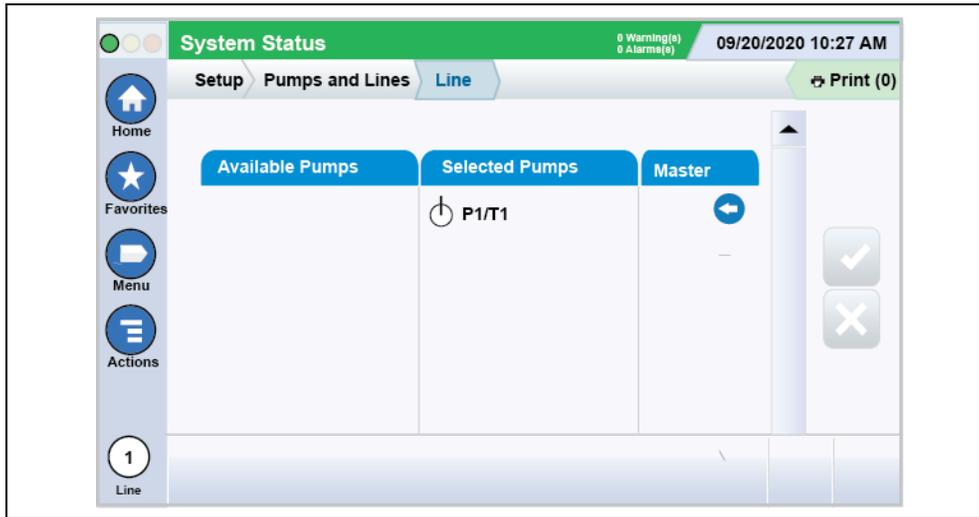


Figure 35. Line Setup Screen - Last Page

Custom Alarms Setup

1. Touch **Setup>Custom Alarms>Devices** to display the Custom Alarms Setup screen to create a custom alarm label that will identify the external input assigned to the Fuel Conditioner.

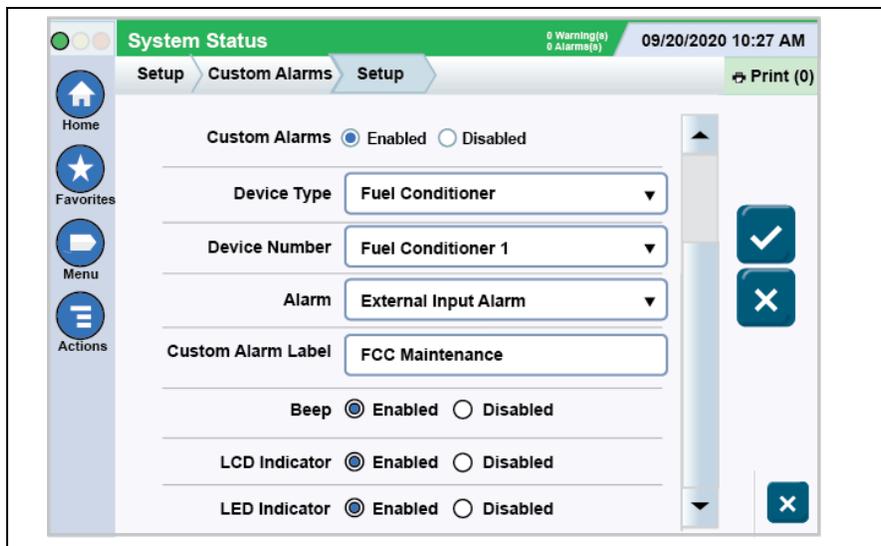


Figure 36. Custom Alarms Setup Screen Example

2. Touch the **Device Number** field and select the specific device, e.g., 'External Input X : HydrX Service'.
3. Touch the **Alarm** field and select '**External Input Alarm**'.
4. Touch the **Custom Alarm Label** and enter a label for this alarm, e.g., 'FCC Maintenance'.
5. Accept the rest of the screen defaults and touch the check key to accept the selections.

Fuel Conditioner Setup

1. Touch **Menu>Setup>Fuel Conditioner** to display the Fuel Conditioner Setup screen (see Figure 37)

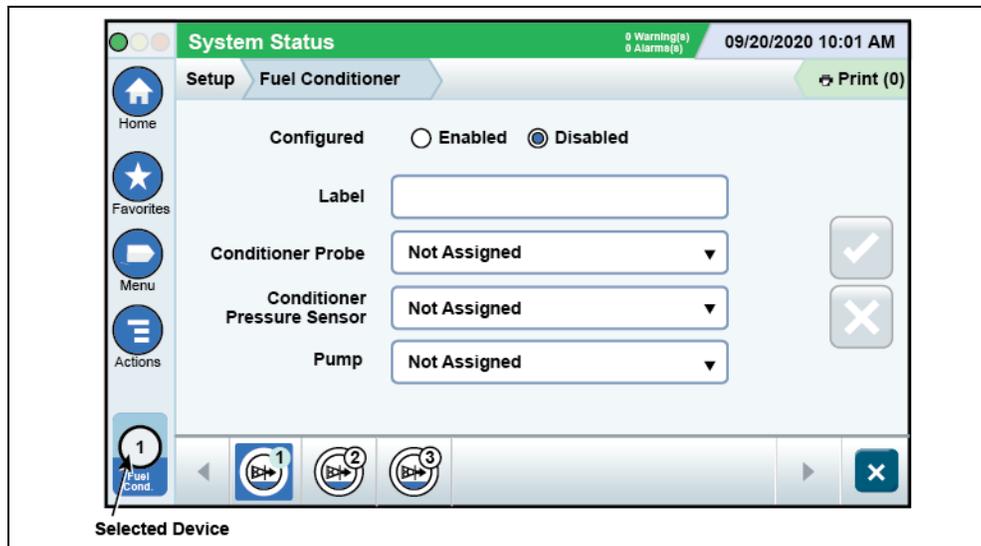


Figure 37. TLS-450PLUS Fuel Conditioner Setup Screen

2. Touch the **Enabled** radio button to configure this Fuel Conditioner.
3. Touch the **Label** field to enter a name for this device, e.g. 'HydrX 1'.
4. Touch the **Conditioner Probe** field to assign the mag probe in this Fuel Conditioner.
5. Touch the **Conditioner Pressure Sensor** field to assign the pressure sensor in this Fuel Conditioner.
6. Touch the **Pump** field to assign the diesel pump connected to this Fuel Conditioner.
7. Touch the check key to accept the selections.

Operation

Operation and service of the HydrX system is controlled from the FCC front panel following the instructions discussed in this manual. The TLS-450PLUS HydrX overview screen allows the user to view the current status of the HydrX system only.

To view the current status of the HydrX Fuel Conditioning System, touch **Menu>Overview>Fuel Conditioner** (see Figure 38).

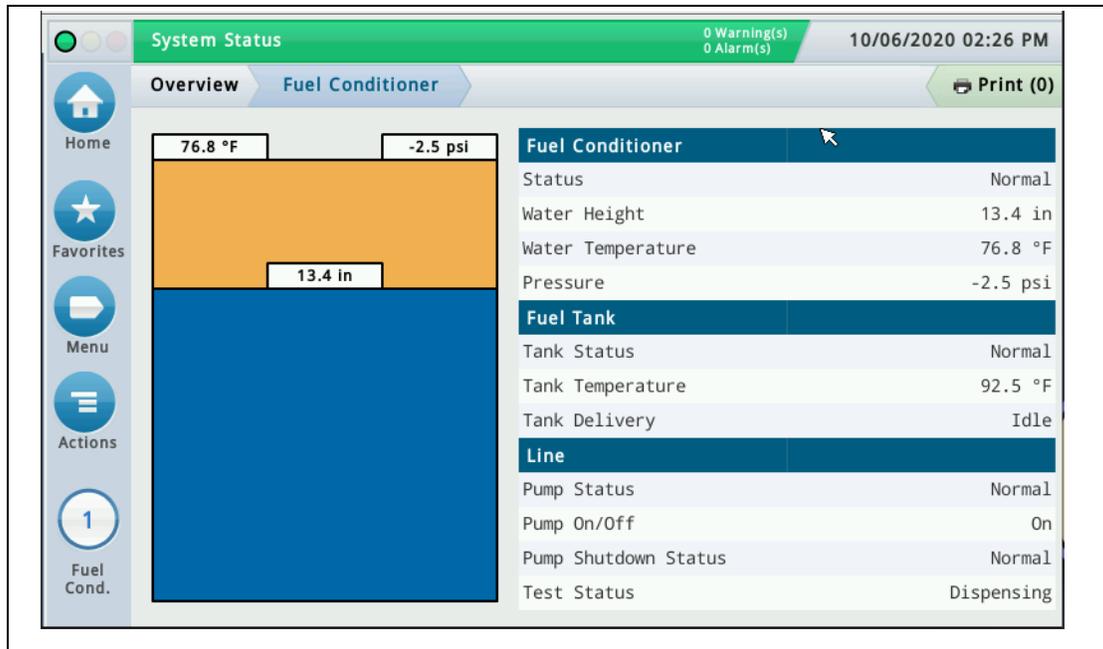


Figure 38. TLS-450PLUS HydrX Overview Screen

HydrX System Maintenance Alerts

FCC Display Message	TLS-450PLUS Status Message	Cause	Action
Status: Drain	User programmed custom alarm, i.e., "HydrX Service"	HydrX water collection tank full	Drain tank (Refer to Manual 577014-474)
Status: Filter	User programmed custom alarm, i.e., "HydrX Service"	HydrX filter at end of life (EOL)	Replace filters (Refer to Manual 577014-473)
Status: Comm	User programmed custom alarm, i.e., "HydrX Service"	Persistent communications errors between HydrX FCC and TLS	Check ATG serial settings Check serial cable connection

FCC Display Message	TLS-450PLUS Status Message	Cause	Action
Status: Pressure Fault	User programmed custom alarm, i.e., "HydrX Service"	Insufficient STP pressure	Check drain valve seated
			Check filters
			Check STP pressure at HydrX adapter port
Status: Vacuum Fault	User programmed custom alarm, i.e., "HydrX Service"	Insufficient STP vacuum	Check drain valve seated
			Check filter cover o-rings
			Check STP pressure at HydrX adapter port
	Probe Out	FC Mag probe inoperative	Replace mag probe (Refer to Manual 577014-469)
	Comm Alarm	FC Pressure sensor inoperative	Replace pressure sensor (Refer to Manual 577014-470)

HydrX System Specifications and Default Settings

Specifications

Attribute	Rating	Unit	Comment
Filtration			
Multi-Stage Filtration			
Inlet Type:	Particle plus Coalescing media		
Outlet Type:	Fine water separation		
Filtration:	25 micron (all elements)	mm	
End of life (EOL) Inlet filter pressure drop:	10	psi	
End of life (EOL) Outlet filter pressure drop:	10	psi	
Water Holding Capacity			
FC Tank:	5	gal	
Electrical			
Two Class 1 Valves:	Rated 120 Vac, 60 Hz, 7.3 W UL listed CLASS 1, DIV. 1 GROUP D Hazardous Locations Reference UL File E37780		Switched AC power provided by HydrX Fuel Conditioning Controller, rated 120 Vac, 5 A
Two Intrinsically Safe Circuits:	Rated 12.6 Vdc, 0.196 A, 0.62 W UL listed CLASS 1, DIV. 1 GROUP D Hazardous Locations Reference UL File MH11766		Intrinsically safe DC power provided for HydrX Fuel Conditioner Probe and Pressure Sensor by TLS-450PLUS ATG
Performance			
Flow Rate - Pressurized:	6	gpm	Nominal rating, varies with pump pressure and filter life
Flow Rate - Vacuum:	0.6	gpm	Nominal rating, varies with pump pressure and filter life
Maximum Rated Operating Pressure:	50	psi	Proof pressure rated 5X, 250 psi maximum
Environmental			
Operating Temperature - Maximum:	122	°F	
Operating Temperature - Minimum:	-40	°F	
Storage Temperature - Maximum:	-40	°F	
Storage Temperature - Minimum:	156	°F	
Humidity:	100	% RH	Including condensing and immersion

Recommended HydrX Fuel Conditioning Controller Settings

Category	Setting	Unit	Comment
Auto Run Time			
Start	00:00	HH:MM	24 hour format
End	08:00	HH:MM	24 hour format
Cycle Time Parameters			
Fill Time	15	Minutes	
Vacuum time	15	Minutes	
Sweep Time	2	Minutes	
Polish Time	4	Hours	
Conditioner Tank Settings			
Drain time	10	Minutes	
Extended Drain	0	Seconds	
Tank Volume	5.00	Gallons	
Volume/Inch	0.3536	Gallons/Inch	
Conditioner Processing Cycles			
Low Water Cycles	50	Cycles	Number of contiguous cycles where detected water change is less than Minimum Water Change setting and FC float is at bottom of FC tank.
Water Cycles	2	Cycles	Number of contiguous cycles where detected water change is less than Minimum Water Change setting and FC float is not at bottom of FC tank.
Sweep Cycles	2	cycles	Number of contiguous cycles where detected water change is less than Minimum Water Change setting after alternating sweep and vacuum cycles.
Minimum Water Change	0.050	Inches	Minimum change in float height used to evaluate if water is being extracted from UST.
ATG Device Mapping			
Fuel Conditioner	1		
FC Probe	?		User specified by TLS settings
ATG Probe	?		User specified by TLS settings



For technical support, sales or
other assistance, please visit:
www.veeder.com

A blue square containing a white wireframe globe icon centered in the upper half, and contact information text in the lower half.