ENOVATION CONTROLS®
A HELIOS COMPANY

PowerView® Display
Model PV485

Murphy Standard Operations Manual

00-02-1207
2023-10-31
Section 78

Warranty - A limited warranty on materials and workmanship is given with this Enovation Controls product. A copy of the warranty may be viewed or printed by going to www.enovationcontrols.com/warranty

BEFORE INSTALLING THIS ENOVATION CONTROLS PRODUCT:

- Read and follow all installation instructions.
- Please contact Enovation Controls immediately if you have any questions.

Revision Date	Details
2023-10-31	Updated logo/address block/warranty/copyright
2022-12.22	Support for version 1.88
2021-06-07	Pre-production revision
2021-03-25	New Document

Table of Contents

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Introduction

The PV485 is a rugged CAN-based controller. This manual explains the functions and display screens of the unit and gives details about the PV485 Murphy Standard Configuration.

Engine Parameters

The following are some of the 62 possible engine parameters that can be displayed in standard or metric units as well as in *English, French, German, Spanish, Italian languages.*

• Coolant Level • Fuel Level • Alternator Voltage • Oil Level • System Voltage	• DEF Level • Oil Pressure • Coolant Temperature • Battery Voltage • Oil Temperature

Glossary of Terms and Acronyms

Acronym/Term	Description
CAN	Controller Area Network
DM1	Diagnostic Message 1, Active Diagnostic Trouble Codes
DM2	Diagnostic Message 2, Previously Active Diagnostic Trouble Codes
DM4	Freeze Frame Parameters
DPF	Diesel Particulate Filter
DTC	Diagnostic Trouble Code
ECU	Engine Control Unit
FMI	Failure Mode Identifier
PGN	Parameter Group Number
SPN	Suspect Parameter Number

Button Assignments

Review the icon on the screen directly above each button to determine that button's function. These functions change according to the screen that is displayed. In the above screen, Button 1 will provide the Password screen to enter the Main Menu. In other screens, Button 1 will serve a different function.

Home Screen

When first turning on the controller, you will see the Murphy logo display before the Home screen.

The Home screen displays Engine Hours, Time, RPM/Speed and up to 12 gauges, chosen from 62 available parameters.

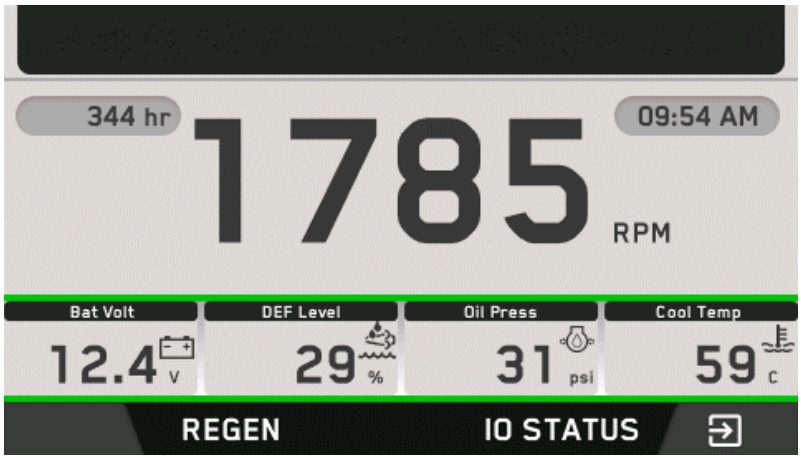
Button Functions

The table below explains the button functions when they appear on the screen.

Button Icon	Description
	Go to menu password screen.
	Throttle or digital gauge value decrease
	Throttle or digital gauge value increase
	Start engine
	Stop engine
	Next / Enter
	Go to fault screen
	Go to preset screen
	Go to I/O status screen
	Go to regeneration screen
	Toggle Pressure Maintain throttle ON/OFF
	Back
	Select previous
	Select next

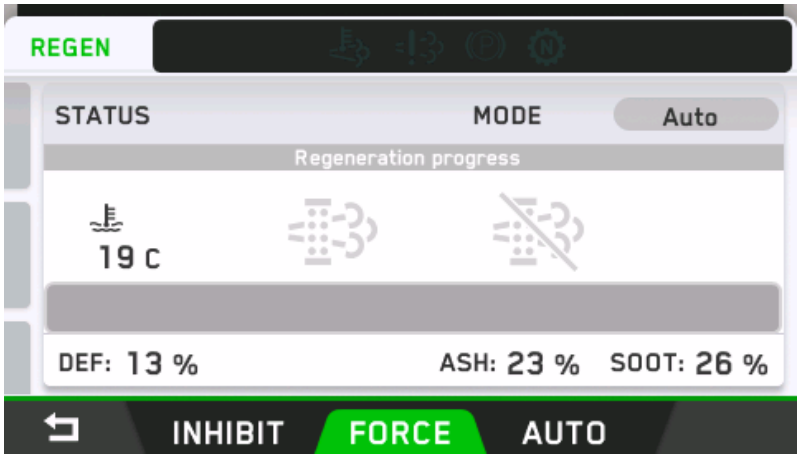
Scrolling 12 Gauges

Pressing button 5 (or Press and hold for 3 seconds if there are active DM1 faults) on the main screen ( as shown in the image below) repeatedly will cycle through all 12 chosen digital gauges.



Regen Screen

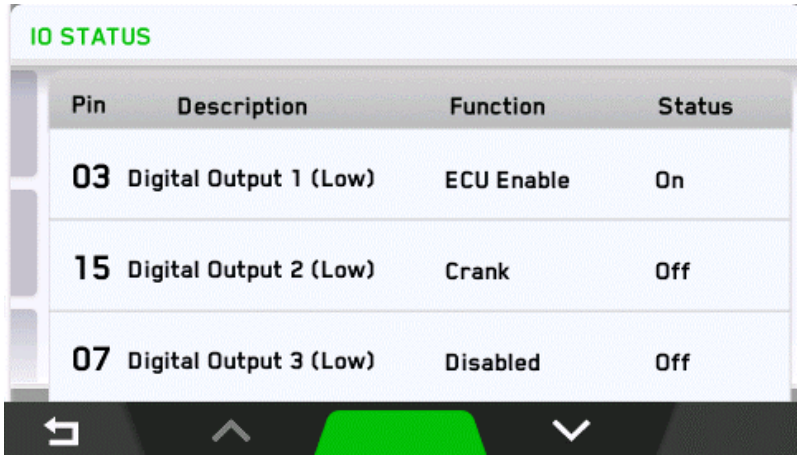
Pressing button 2 while Regen (as shown in the image above) is displayed will open the Regen page, shown below. This provides the user control of engine regeneration and current DPF status.



This same Regeneration page will automatically popup when regeneration is required. A User can press Button 3 (FORCE) to request regeneration or Button 2 (INHIBIT) to prevent/stop regeneration. Press Button 4 (AUTO) to exit Inhibit mode. In order to force a regeneration, each engine's specific regen requirements must be met.

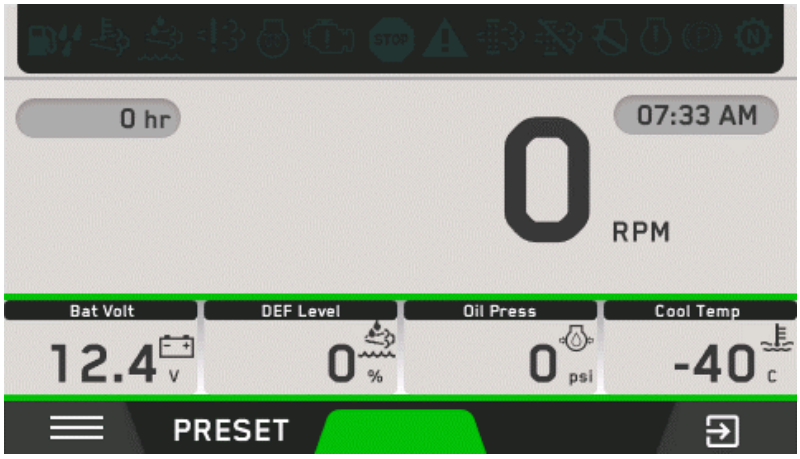
I/O Status Screen

Pressing button 4 when IO Status is displayed will open the I/O status page as shown below. Display connector pins with their corresponding functions and current status will be shown. Use button 2 and 4 to scroll through multiple pages of the IO Status. Once you have navigated to the last available page, the down arrow will turn gray indicating there are no more pages available.

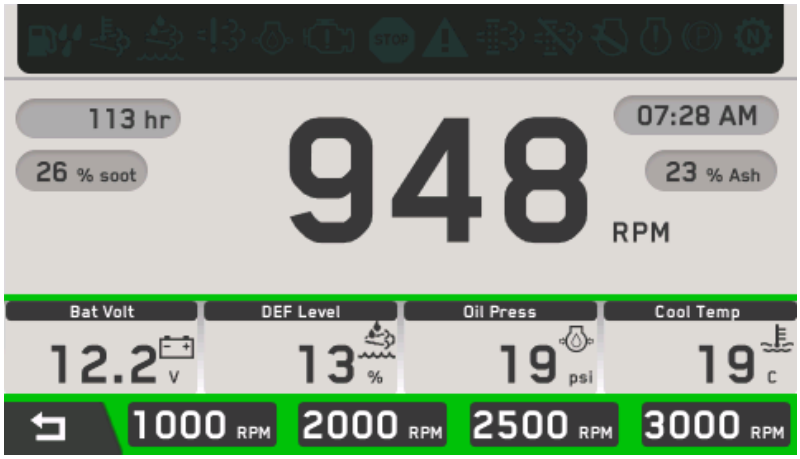


Preset Screen

If Throttle Type is set in the Throttle menu to Preset, the context of main screen button #2 will change to “PRESET” as shown in the next image.



Once you press the PRESET button, the preset speed options will appear as shown in the following image. The preset speed allows the user to quickly control engine speed to a pre-configured target speed. The type of the target speed illustrated below will depend on the Target RPM Type setting in the menu. Available options are RPM or Percentage.



or

Press the corresponding speed button to request the indicated speed, and the back button to leave the page.

Alert Icons

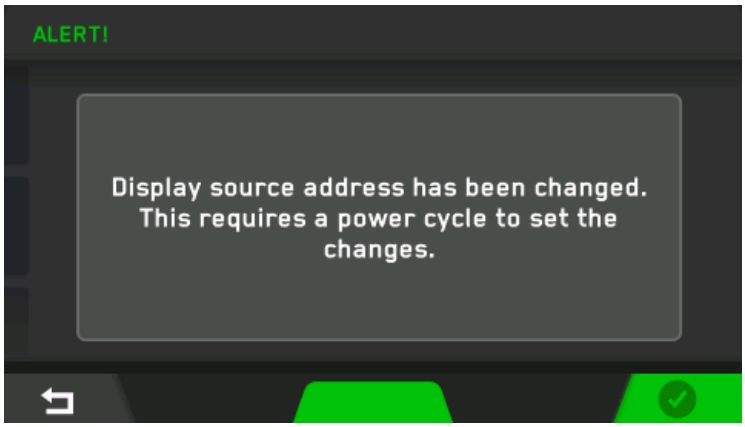
The Alert Icons at the top of the main page will light up when communicating to the operator. Pay close attention to any Status Icon and its color that may appear.

Status Icon	Description
	Water in Fuel
	Engine Exhaust High Temperature Lamp
	Diesel Exhaust Fluid (DEF) Level
	Emission failure
	Engine Oil Pressure
	Preheat – Wait to Start
	Check Engine / malfunction
	Warning
	Diesel Particulate Filter Lamp
	DPF Regeneration set to Inhibit – Displays when the machine or the operator has inhibited regeneration
	Maintenance / Service Required

Status Icon	Description
	Check Engine / Protect
	Parking Brake Engaged
	Transmission Neutral
	Stop engine.
	Air filter
	Fuel filter
	Coolant level
	Coolant temperature
	Inducement warning (FPT only)

Popup Message Screen

When a popup message is shown, the user must acknowledge it by pressing button 1 to cancel or button 5 to accept, then the popup message will clear. Please pay attention to the indicated messages.



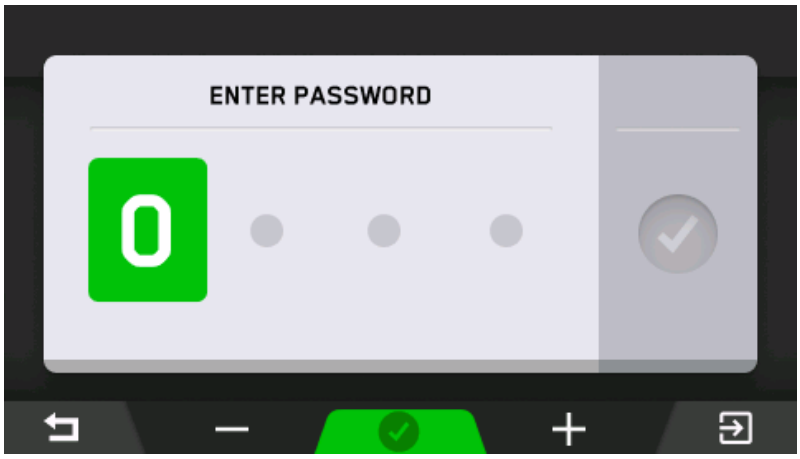
Main Menu

Press  (Button 1) then enter the appropriate password to gain access to the Main Menu.

There are three levels of security for the PV485:

- Low (factory password of 1111)
- Median (factory password of 5311)
- OEM (factory password of 3482)

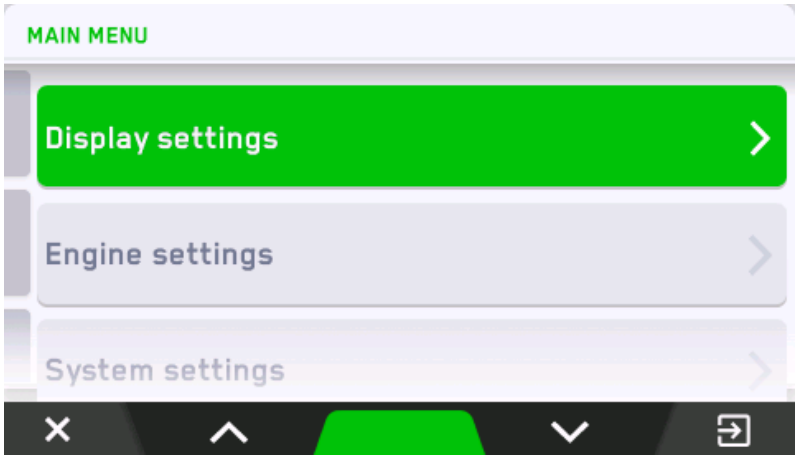
These password selections may be changed within the menu.



Enter Password

Step	Action
1	Adjust the highlighted number with the – (Button 2) and + (Button 4).
2	Press Button 5 to move to the next number.
3	Repeat steps 1 and 2 to assign all four numbers of the password, then press Button 3 to confirm.
4	Exit the Menu by pressing Button 1.

When the password has been accepted, the Main Menu screen will appear:



Pressing buttons 2 and 4 will scroll through these Main menu items, which will be described in the following sections:

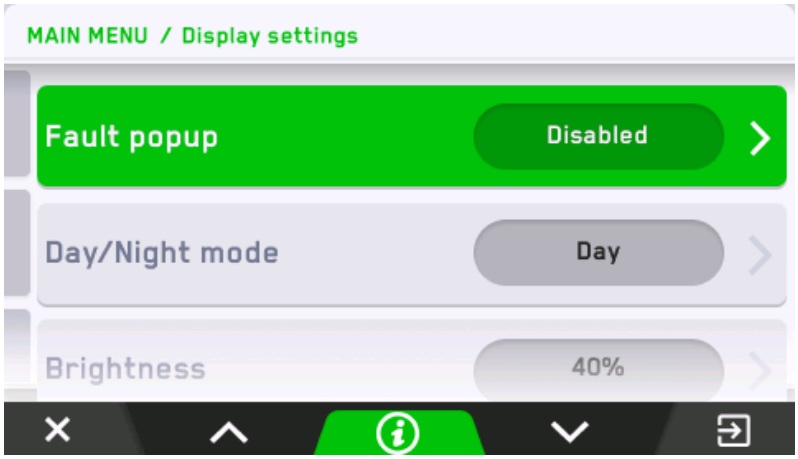
- Display Settings
- Engine Settings
- System Settings
- Advanced Settings
- I/O Settings
- Throttle Settings
- Communication Setup
- Diagnostics
- Customize Display Interface
- Main Screen Gauge Setup
- Engine special functions (only available to specific engines)

Pressing Button 5 will enter the selected menu area.

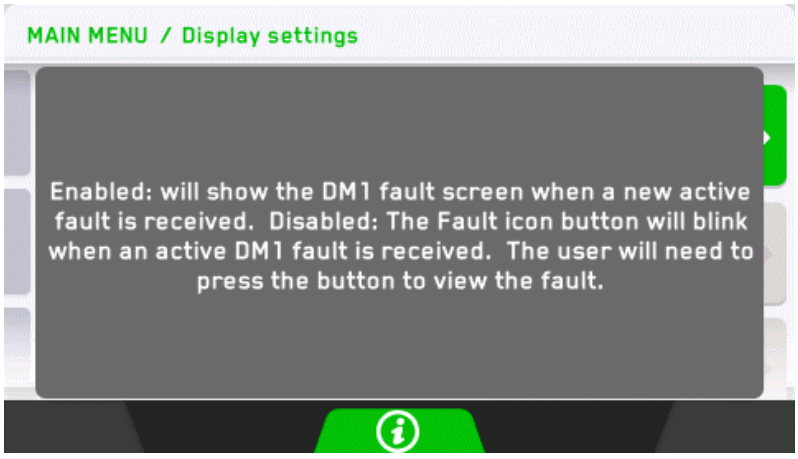
Display Settings

The Display Settings menu houses the controls for the appearance of the display:

- Fault Popup
- Day/Night Mode
- Brightness
- Language
- Units
- Clock
- View Service Reminder



Note that each menu item's current setting is indicated to the right of the corresponding item. If a Screen Tip is available for the selected menu item, the information symbol will be available on the navigation bar. Pressing Button 3 to view the available Screen Tip for the highlighted Fault popup above will appear as shown below:



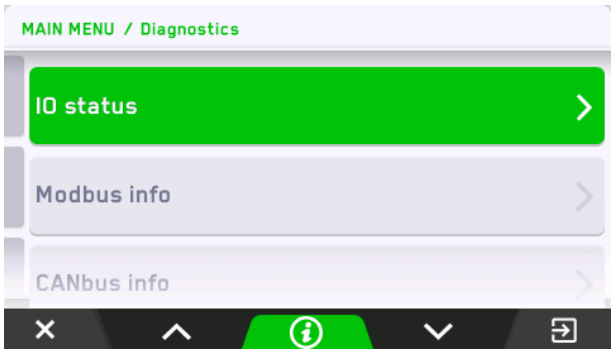
Pressing button 3 again will clear the Tip screen.

Fault Popup

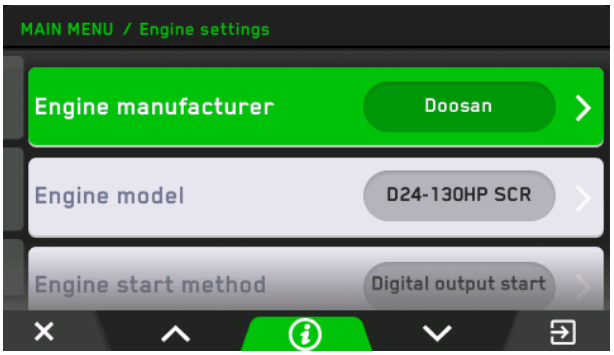
This selection allows the enabling or disabling of displaying the faults screen pop up. If disabled, a warning icon will appear on the navigation bar above button 1 or 5 when an active fault is received. The user must press the corresponding button to view the fault.

Day / Night Mode

To optimize visibility in Day/Night conditions, the display theme colors will change based on the selected option mode.



Day Mode



Night Mode

Brightness

This selection controls how dim or bright the screen appears.

Language

This selection selects the displayed language. Available languages include in *English, French, German, Spanish, Italian.*

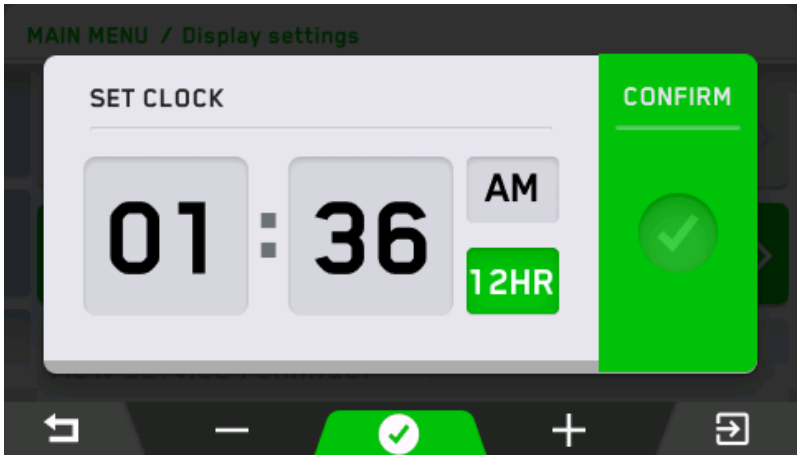
Units

This selection controls how measurements are displayed.

Measurement	Available Selections
Pressure	Kpa, Bar or PSI
Temperature	°F or °C
Speed	MPH, KPH or M/S
Distance	Feet, Meters, Mi or Km
Flow	L/s, L/min, gal/min (US) or gal/min (UK)
Volume	L, gal (US) or gal (UK)

Clock

This selection allows a user to set the clock and choose a 12- or 24-hour display. Once the clock is set, cycle power on the display to update the clock.



Step	Action
1	Select Display Settings, then Clock from the Main Menu.
2	The next screen highlights the hour. Adjust this using Buttons 2 and/or 4.
3	To move to the next field, press Button 5.
4	Adjust the minutes. Press Button 5.
5	Select between AM or PM. Press Button 5.
6	(Optional Step) Change between 12HR and 24HR using Buttons 2 or 4.
7	Pressing Button 3 will display popup messages to confirm or cancel the new clock settings.
8	Exit the Menu by pressing Button 1.

View Service Reminder

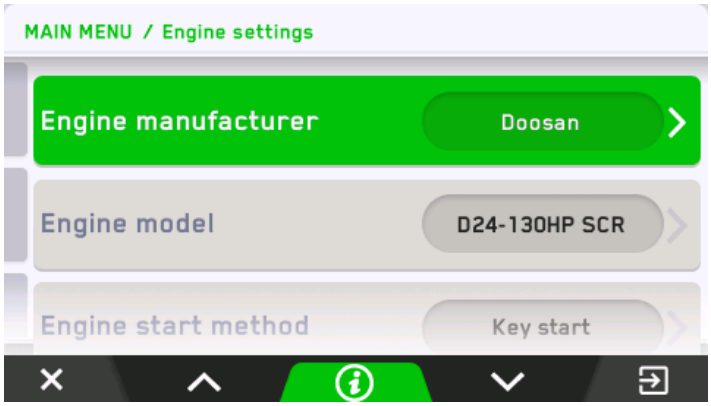
This selection displays the remaining hours left until service is needed for the Air filter, Battery life, Belt life, Fuel filter, Oil filter, Oil life and Overhaul. Change or reset the service hours via the System Settings menu.

Engine Settings

The Engine Settings menu houses the settings for the Engine:

- Engine Manufacturer
- Engine Model (optional depends on Engine Manufacture)

- Engine Start Method
- Show Ash Gauge
- Show Soot Gauge
- Show Regen Progress
- Emission Settings



Engine Manufacturer

This selection allows the operator to select the engine manufacturer of the engine which currently includes: Caterpillar, Cummins, Deutz, JCB", Volvo, Perkins, HATZ, Yanmar, Kubota, Doosan, Kohler, John Deere, FPT, Isuzu, PSI, Ford, GM and Scania. By default, the engine manufacturer is set to Other. When an engine manufacturer is selected the display software will automatically adjust the required settings to ensure the engine is controlled per the manufacturer's requirements.

Engine Model

This optional selection allows the user to select the model of the engine. As with engine manufacturer, unique settings are applied once a different engine model is selected to ensure control settings meet the manufacturer's requirements.

Engine Start Method

This selection allows the operator to select the method that will start the engine:

Engine Start Method	Description
CAN Start	If selected, the engine can be started using a CAN message. The specific CAN messages need to be programmed.
Digital Output Start	This method uses digital output to control an external relay for crank.
Disabled	Crank is controlled by an external device such as a key.

Show Ash Gauge

This selection determines whether the Optional Ash Gauge will be shown or hidden on the home screen.

Show Soot Gauge

This selection determines whether the Optional Soot Gauge will be shown or hidden on the home screen.

Show Regen Progress

This selection determines whether the progress during a Regeneration will be shown or hidden on the Regen screen.

Emission Settings

The following items are available under the Emission Settings menu:

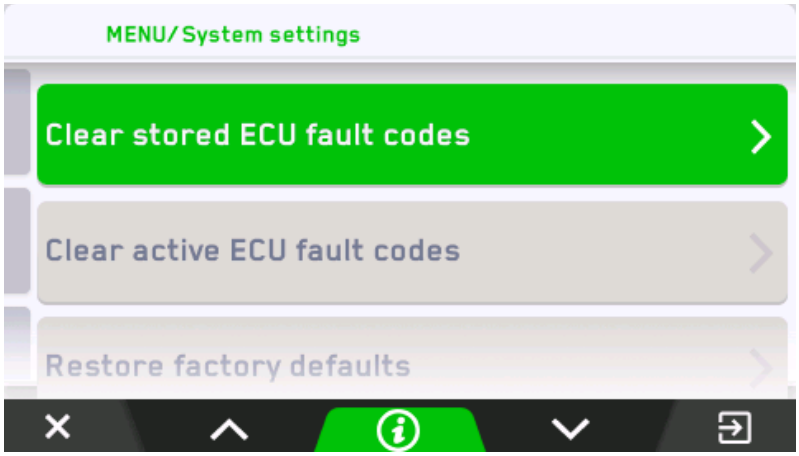
Menu Item	Description
Emission Tier	(Stage V, Tier 4, Other)
Ash Load Warning	**Auto:** Warning will be controlled by the engine ECU. For example, DM1
	Set by Display: User can set the warning trigger level.
Soot Load Warning	**Auto:** Warning will be controlled by the engine ECU. For example, DM1.
	Set by Display: User can set the warning trigger level.
Display TX park (SPN70)	**Disabled:** Parking brake (spn 70) CAN message will not transmitted by the display.
	Enabled: Parking brake (spn 70) CAN message will transmitted by the display.
Display TX neutral (SPN604)	**Disabled:** Neutral switch (spn 604) CAN message will not transmitted by the display.
	Enabled: Neutral switch (spn 604) CAN message will transmitted by the display.

System Settings

The System Settings menu houses the settings for the System:

- Clear Stored ECU Fault Codes
- Clear Active ECU Fault Codes
- Restore Factory Defaults
- System Information
- Set Service Reminder

- Export Settings
- Fault shutdown control



Clear Stored ECU Fault Codes

This selection allows the operator to clear stored faults from the engine ECU. This setting should only be used by a qualified engine technician. All engine manufacturers and models may not support this feature.

Clear Active ECU Fault Codes

This selection allows the operator to clear all active faults from the engine ECU. This setting should only be used by a qualified engine technician. All engine manufacturers and models may not support this feature.

Restore Factory Defaults

This selection allows the display parameters to be reset back to the Factory settings.

System Information

This selection displays the Engine Manufacturer, Software, Bootloader, Configuration, Unique ID, Part and Serial numbers.

Set Service Reminder

This selection provides the ability to set and reset service reminders for the Air Filter, Battery Life, Belt Life, Fuel Filter, Oil Filter, Oil Life and Overhaul. Set the service hours to 0 if you do not wish to use the selected service reminder.

Export Settings

This selection allows exporting of established settings from the menu within the display. This feature is useful when the saved settings will be used on multiple displays. First ensure all settings are set then export to a USB using the programming kit (78700590), the programming harness (78090077) or your own harness. The exported file can then be imported to another display.

At power up, the display automatically checks for an import settings file from an inserted USB drive. Once detected, a popup messages will ask if you wish to import the settings. If confirmed the display is updated with the available settings. It is important to note that the import settings file must be created by using export settings from the display.

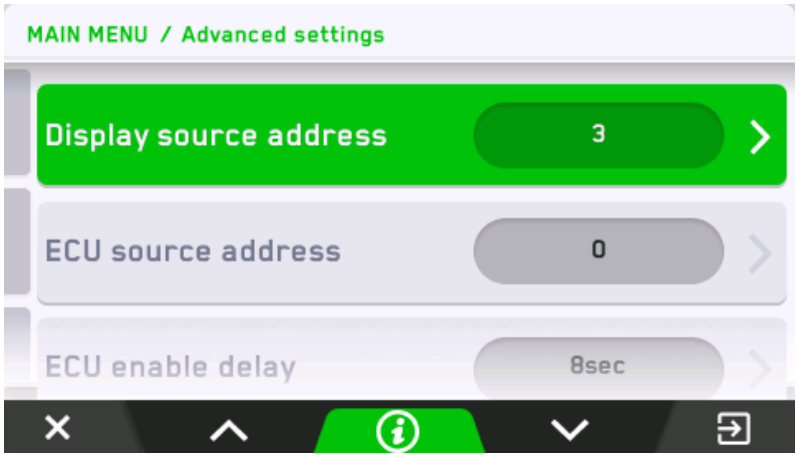
Fault Shutdown Control

This selection provides the shutdown option when active stop or malfunction fault received by the display.

Advanced Settings

The Advanced Settings menu houses additional settings for the System:

- Display Source Address
- ECU Source Address
- ECU Enable Delay
- TSC1 Setup
- Shutdown and Warning
- Median Menu Access Control
- Low Menu Access Control
- Change Passwords (OEM, Median and Low)



Display Source Address

Allows the operator to set the address claim of the display when used on the CANbus. This address is relative to the address from which the ECU requires the TSC1 to be broadcast. Consult your engine manufacturer or dealer to obtain the correct source address the display should utilize to communicate correctly with the engine ECU. Factory set to 3 and changed per Engine Manufacturer setting.

ECU Source Address

Allows the operator to set the source address to which the ECU will be connected. Normally set to 0, 1 or 2 per SAE J1939 specifications. Factory set to 0.

ECU Enable Delay

Allows the operator to set a delay time (in seconds) before the ECU enable is active. To use this feature the ECU enable power must be controlled by the display output with an external relay. Applying a delay to the ECU enable power allows the operator the ability to adjust the time required for the ECU to establish communication with the display/controller after power up.

TSC1 Setup

This selection will allow the operator to configure the following settings for Torque Speed Control (TSC) 1:

Menu Item	Choices/Description
TSC1 Enable	**Enabled:** display will transmit TSC1 messages.
	Disabled: display will not transmit TSC1 messages.
TSC1 Independence	**Enabled:** allows the user to set a separate source address for TSC1 throttling from the display's claim address. This should only be done if the service technician knows this to be true.
	Disabled: TSC1 throttling from the display's claim address.
TSC1 Source Address	(**numeric value**) allows setting TSC1 throttle to be sent from a source address separate than the display claim address. (Only appears when TSC1 Independence is set to Enabled)

Continued

Menu Item	Choices/Description
Calculate TSC1 Checksum	**Enabled:** The display will add the checksum to the transmitted TSC1 message. This requirement is common with Stage V engines.
	Disabled: The display will not calculate checksum and the value will be 0xF.
Calculate TSC1 Count	**Enabled:** The display will add the Count calculation to the transmitted TSC1 message. This requirement is common with Stage V engines.
	Disabled: The display will not calculate Count and the value will be 0xF.
SPN 3349 Transmission Rate	(10, 20, 50, 100, 250, 500, 750, 1000 ms) This parameter indicates the transmission rate at which the display will transmit the TSC1 message.
SPN 3350 Control Purpose	(Acc Pedal Op, Cruise Control, PTO Governor, Road Speed Gov, Engine Protection, Temp Power Control) This parameter indicates which control mode the sending device is using to generate the TSC1 command.
SPN 518 Requested Torque	(numeric value) This parameter provides control/limit of the output torque.
SPN 695 Override Mode	(Override Disabled, Speed Control, Torque Control, Speed/Torque Limit Control) The override control mode defines which sort of command is used.:
SPN 696 Control Conditions	(Transient, Stability, Vehicle Driveline, PTO Driveline) This parameter provides the governor characteristics that are desired during speed control.
SPN 897 Control Priority	(Highest, High, Medium, Low) This field is used as an input to the engine or retarder to determine the priority of the Override Control Mode received in the Torque/Speed Control message.

Shutdown and Warning

This selection will establish the following settings for Analog Inputs 1-4:

Menu Item	Choices/Description
Analog Inputs Warnings	Setpoint (numeric value), Rule (Greater than Setpoint, Less than Setpoint), Action Delay (numeric value in mS). Note: Warning is disabled when the warning Setpoint =0. When the defined Rule condition is true, and Action Delay time outs, a popup message will show.
Analog Inputs Shutdowns	Setpoint (numeric value), Rule (Greater than Setpoint, Less than Setpoint), Action Delay (numeric value in mS) Note: Shutdown is disabled when the warning Setpoint =0. When the defined Rule condition is true, and Action Delay time outs, the display will disable the ECU enabled output.
Alt excite fail warning	This selection provides the charging fail warning if enabled. There are two different charging fail triggering conditions: • If a digital output function is set to “Alt excite”, the output will try to excite the alternator, and a charge fail warning will be triggered if voltage does not increase after 5 attempts. • If Alternator Potential (SPN 167) or Electrical Potential (SPN 168) CAN messages are present, a charge fail warning will be triggered after 1 minute if voltage does not increase.
Digital Inputs Shutdown or Warning	Select Shutdown or Warning when the input is active. • Action Delay (numeric value in mS). If action delay set to 0, the fault will be triggered immediately. Note: the relevant input function must not be “Disabled”.

Medium/Low Menu Access Control

By default all menu items are available to all password access levels (OEM, Medium and Low). An OEM password is required to edit access to the following menu items for Medium and Low password users:

- Display Settings
- Engine Settings
- System Settings
- Advanced Settings
- IO Settings
- Throttle Settings
- Communication Setup
- Diagnostics
- Customize Display Interface
- Main Screen Gauge Setup
- Engine Special Functions

Change Passwords (OEM, Medium and Low)

This selection will allow you to select your own password in place of the factory-set password for the OEM, Medium and Low menu access levels of security.

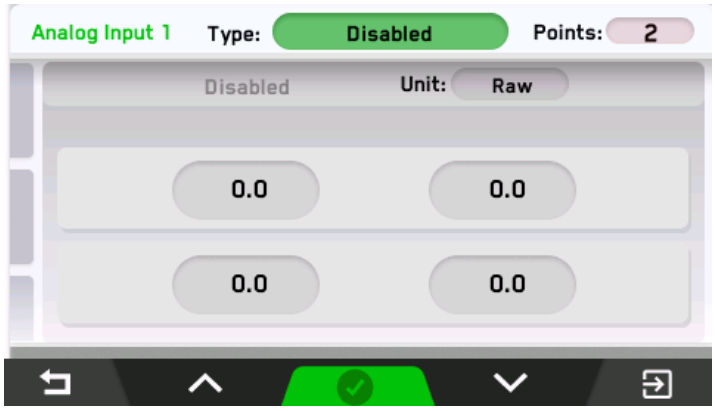
IO Settings

This menu item controls the parameters for the:

- Analog Inputs
- Digital Inputs
- Analog Outputs
- Digital Outputs
- Frequency Input Pulse.

Analog Inputs

Analog Inputs 1 through 4 will display the following screen when selected:



Step	Action
1	Select IO Settings, then Analog Inputs from the Main Menu. Press Button 5 to select and enter.
2	Choose the Analog Input to edit and press Button 5 to enter.
3	On the above-displayed screen, press Button 2 or 4 to scroll through these choices: Disabled, Resistive Digital, 0_5V Digital, Resistive, 4_20mA, 0_5V. Press Button 5 to move to the next field.
4	Repeat Step 3 with the Points, Unit and numerical values fields until your changes are complete.
5	Press button 3 to confirm the changes, or button 1 to exit and discard changes

Renaming Analog Inputs

For each Analog Input, the option exists to Rename that input. Select Rename Analog Input (#) and the following screen will appear to create a different name.

Use the buttons below the arrow keys to move the cursor along the keyboard. Select a letter and then press Button 3 to enter it. When complete, highlight Done and press Button 3 to confirm.

Digital Inputs

There are three Digital Inputs, and for each one there will be a function and an active state. Digital input 1 and 2 are normally closed (NC) (i.e., the state is high when nothing is connected). Digital input 3 is normally open (NO) (i.e., the state is low when nothing is connected).

Digital Input Options	Description
Functions	**Disabled**
	Strat/Stop
	Throttle Decrease This function will be set automatically if the Throttle Type is set to Switch and the switch throttle decrease input is set to any of the digital inputs.
	Throttle Increase This function will be set automatically if the Throttle Type is set to Switch and the switch throttle increase input is set to any of the digital inputs.
	Stop Engine
	Regen Request
	Neutral Switch
	Park Brake
	Park & Neutral
	Engine Idle
	Preset Speeds 1, 2, 3 or 4
	Crank Abort

Continued

Digital Input Options	Description
	User 1
	User 2
	User 3
Active State	**Active High**
	Active Low

Analog Outputs

This menu option will set the Analog Outputs to either Disabled or Buzzer.

Digital Outputs

This menu option will set the parameters for Digital Outputs 1 through 4.

Functions	Description
Disabled	
PreStart Delay	The delay time can be set when this function is selected. External relay required
Crank	The crank cut time can be set when this function is selected. External relay required
ECU Enable	The enable delay time is controlled by ECU Enable Delay in the Advanced Settings. External relay required
Regen Lamp	Lamp can set blink timer
Shutdown Lamp	Lamp can set blink timer
Common Alarm	Lamp can set blink timer
Not In Auto	Lamp can set blink timer
Engine Running	Lamp can set blink timer
Alt Excitor	External relay required, while engine is running the excitor will try every 10 seconds to excite alternator. After 5 attempts, if the voltage remains below the Alt Excitor Setpoint, charge fail warning will be set.

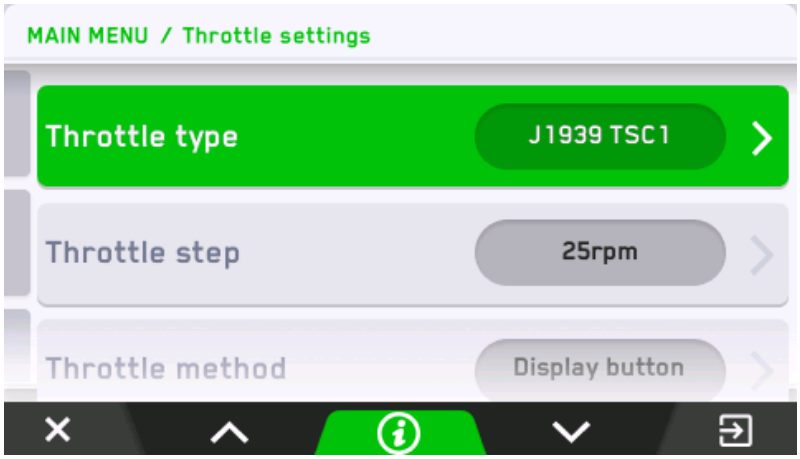
Frequency Input Pulse

This option allows the setting of the Frequency Input Pulse.

Throttle Settings

This menu item controls the parameters for the Throttle:

- Throttle Type
- Throttle Step
- Maximum RPM
- Idle RPM
- Target RPM Type
- Throttle Method
- Preset Speed (if Throttle Type is Preset Speed)
- Switch throttle decrease input (if Throttle Type is Switch)
- Switch throttle increase input (if Throttle Type is Switch)
- Knob throttle input (if Throttle Type is Knob)



Throttle Type

This option allows the setting of the Throttle designation.

Menu Item	Description
J1939 TSC1	Operator can use this setting to throttle engine manually with display's push buttons.
Preset speed	Operator can select preconfigured speed with displays' push button or inputs as trigger.

Continued

Menu Item	Description
Switch	Switch inputs are required, and functions are used as digital when selected
Knob	Analog input is used as resistive when selected
Pressure maintain	Analog input pressure is used as maintain pressure reference

Throttle Step

This option controls the throttle increase/decrease step size between requested target engine speed. .

Max and Idle RPM

This allows the operator to set the limit for max and idle engine speed.

Target RPM Type

This option allows the operator to select how your RPMs will be displayed as RPM or Percentage. if percentage is selected the display will calculate the target RPM between the idle and maximum speed based on 0 to 100%.

Throttle Method

This setting determines how the increase or decrease of RPMs will be accomplished.

- If analog input is selected, the input will be automatically set as 0-5V, and range is 0 – 100%. These settings can be modified in the analog inputs. The “Throttle Type” must select J1939 TSC1.

Switch throttle decrease/increase input

Operator can select which input for switch throttle input. The selected input will be used as digital input. When the input is active engine will continue step towards to the Max/Idle RPM.

Knob throttle input

Operator can select which input for Knob throttle input. The selected input will be used as resistive input. The default resistance range is set to 0 to 1000ohm, the range can be modified in the I/O settings. When engine started if the knob position not at home (minimum) position, a popup up messages will show to asked operator to return the knob to home position.

Pressure maintain

Only visible when Throttle type is set to “Pressure maintain”.

Parameters	Description
Maintain pressure	Throttle maintain reference pressure
Deadband pressure	This pressure will be add/takeaway to the maintain pressure and create a steady throttle zone
Pressure type	To define application type: suction or discharge
Maintain pressure input	Select one analog input for maintain pressure

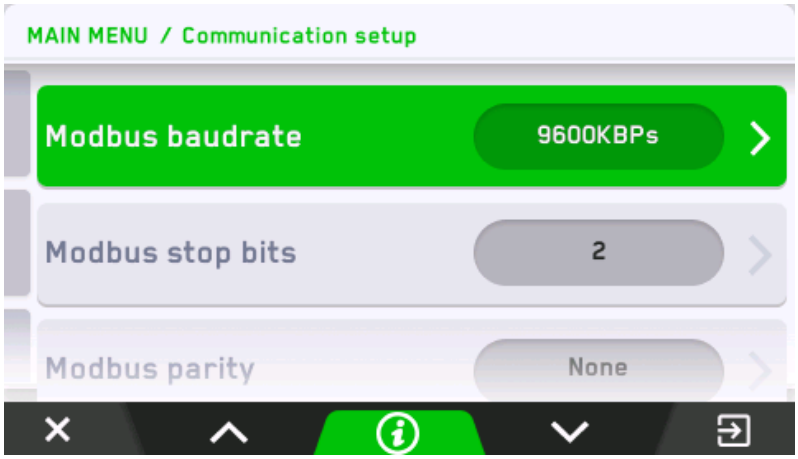
Operation note:

After machine has been setup and ready for Pressure maintain to taking over control, press the 5th button () on the main screen to bring up the hidden button, then press the button 1 to toggle Maintain ON or OFF.

Communication Setup

This menu sets the Modbus and CAN communication.

- Modbus baud rate
- Modbus stop bits
- Modbus parity
- Modbus slave address (display is used as slave)
- CAN baud rate
- CAN termination resistor



Modbus Baud Rate

This menu item allows the operator to set the baud rate for Modbus communication. Default set to 38400 Kbps

2400 Kbps
4800 Kbps
9600 Kbps
19200 Kbps
38400 Kbps
57600 Kbps
115200 Kbps

Modbus Stop Bits

This menu item allows the operator to set the Stop Bits for Modbus communication. Default set to 1.

1
2

Modbus Parity

This menu item allows the operator to set the Parity for the Modbus communication. Default to None

None
Odd
Even

Modbus Slave Address

This menu item allows the operator to set the Slave Address for Modbus communication. Default to 1.

CAN Baud Rate

This menu item allows the operator to set the Baud Rate for CAN communication. Default to 250Kbps

10 Kbps
20 Kbps
50 Kbps
100 Kbps
125 Kbps
250 Kbps
500 Kbps
800 Kbps
1 Mbps

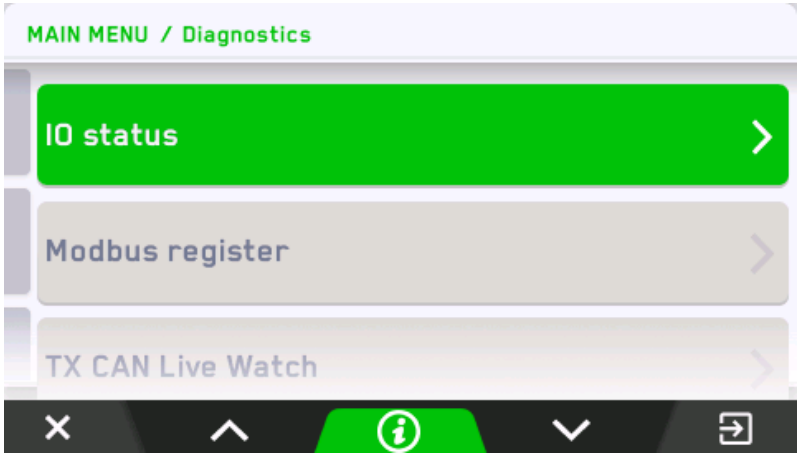
CAN Termination Resistor

Operation note:

The PV485 Display hardware does not have a built-in termination resistor. The CAN bus must be externally terminated per J1939 specifications.

This menu section provides the operator diagnostics tools to aid in troubleshooting.

- IO status
- Modbus Register
- TX CAN Live Watch
- RX CAN Recorder
- DM1 Logger
- Stored ECU Fault Codes



IO Status

Please refer to I/O Status Screen (page 10).

Modbus Register

This menu item allows you to review all mapped Modbus registers, descriptions and live status.

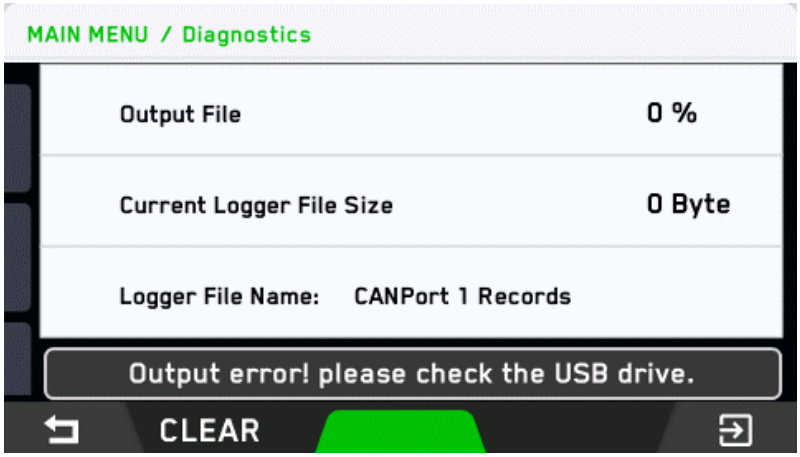
TX CAN Live Watch

This menu item allows you to view the live status of all transmitted CAN messages.

RX CAN Recorder

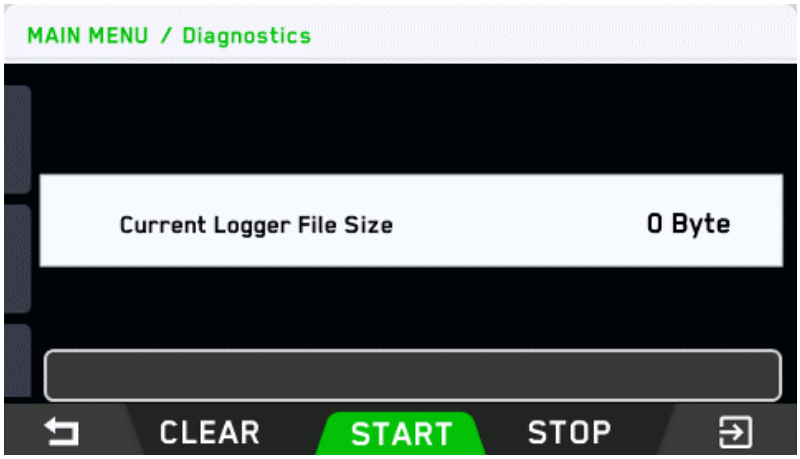
This menu item allows the operator to create a received CAN traffic recording file and export it to a USB drive, which can later be used for analysis. The recorder will automatically record CAN traffic for 10 seconds then export the file to a USB drive.

NOTE: It is required to have a USB drive plugged into the USB port prior to use of this function. If there is an output error message, retry with a different USB drive then press button 5 to export.



DM1 Recording

This menu item allows the operator to make a DM1 recording file and export it to a USB drive, which can later be used for analysis. Press the start button to begin logging the DM1 messages. To export, first press the STOP button (4) and then press button (5) to save the file to the USB drive.



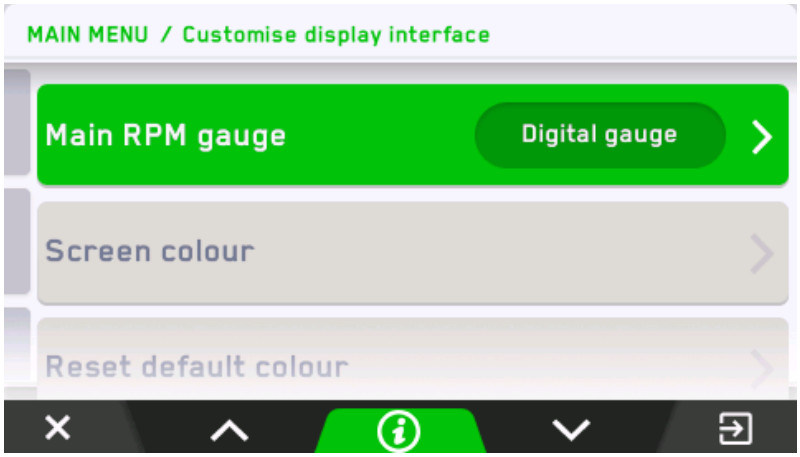
Stored ECU Fault Codes

This selection allows the operator to query the Engine ECU for a review of its stored fault codes. Some engine manufacturers and models may not support this feature.

Customize Display Interface

This menu item allows the operator to change how the display presents engine information.

- Main RPM gauge
- Screen color
- Reset default color
- Upload splash image

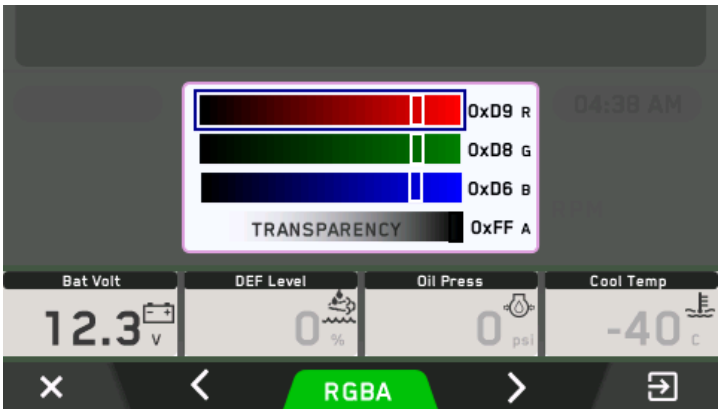


Main RPM Gauge

This option allows the operator to set the style of the Main RPM Gauge as a Digital Gauge or a Rotary Gauge.

Screen Color

This page allows the operator to change the color of various screen elements to align the theme to the intended application's design language. Color settings of the display are tied to Day/Night mode. If the display is currently in Day mode, the chosen colors will be associated with the Day selection. Likewise, if the display is in Night mode, the chosen colors will be associated with the Night mode selection. Use Button 5 to select displayed cells on the screen and save the chosen color. The screen below shows the main page editor.



Press Button 3 (RGBA) to move the highlight to change Red, Green, Blue, or Transparency (Alpha) of the selected object.

Reset Default Color

To return the display to its factory default color(s).

Upload Splash Image

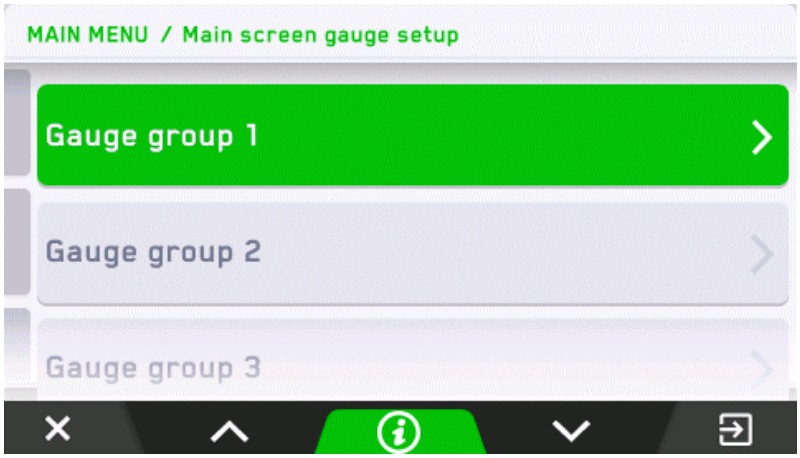
To upload a logo that will appear on the display as it boots up, follow these steps:

NOTE: To be compatible with the PV485 display, the uploaded image must be 480 x 272 pixels.

Step	Action
1	Select Customize Display Interface, then Upload Splash Image from the Main Menu. Press Button 5 to select and enter.
2	The display will look for a USB memory device with images on it. Insert a USB with the logo file. Refresh the screen if necessary.
3	Files on the USB that are .png, .jpg, .bmp or .gif will appear in a list. Press Button 2 or 4 to highlight the appropriate file. Press Button 3 to confirm.
4	Press Button 1 to exit the menu. Power off/on to see the new splash screen.

Main Screen Gauge Setup

This menu option allows the operator to set the parameter to be monitored by each of the gauges on the main page.



Gauge Groups 1 through 3

Each Gauge group will contain 4 gauges that will each be chosen from 62 parameters.

Accel Ped1 (SPN 91)
Load@RPM (SPN 92)
Actual Engine Torque (SPN 513)
Engine RPM (SPN 190)
Oil Level (SPN 98)
Coolant Level (SPN 111)
Alternator Voltage (SPN 167)
System Voltage (SPN 168)
Battery Voltage
Output Shaft Speed (SPN 191)
In Shaft Speed (SPN 161)
Throttle Position (SPN 51)
Fuel Level (SPN 96)
DEF Level (SPN 1761)
% Soot (3719)
% Ash (SPN 3720)
Urea Level (PGN FF87)
Oil Temp (SPN 175)
Intercooler Temp (SPN 52)
Coolant Temp (SPN 110)
Air Inlet Temp (SPN 172)

Intake Temp (SPN 105)
Exhaust Temp (SPN 173)
Transmission oil Temp (SPN 177)
Fuel Temp (SPN 174)
Aux Temp (SPN 441)
Hydraulic oil Temp (SPN 1638)
DPF Inlet Temp (SPN 3242)
DPF Outlet Temp (SPN 3246)
Trip Fuel (SPN 182)
Total Fuel Used (SPN 250)
Trip Distance (SPN 244)
Total vehicle Dist (SPN 245)
Oil Press (SPN 100)
Coolant Press (SPN 109)
Boost Press (SPN 102)
Air Differential Press (SPN 107)
Transmission oil Press (SPN 127)
Fuel Delivery Press (SPN 94)
Barometric Press (SPN 108)
Aux Press (SPN 1387)
Air Inlet Press (SPN 106)
Hydraulic oil Press (SPN 1762)
Fuel Rate (SPN 183)
Instant Fuel Economy (SPN 184)
Average fuel Economy (SPN 185)
Fan Speed (SPN 1639)
Vehicle Speed (SPN 84)
Current Gear (SPN 523)
Select Gear (SPN 524)
Torque Lock (SPN 573)
Aux IO 1 (SPN 701)
Pedal Switch (SPN 558)
Requested Gear (SPN 525)
Desired Engine Speed (SPN 515)
Engine Timing (SPN 1436)
Engine total Revolutions (SPN 249)
Hydrocarbon loading (SPN 7934)
Analog Input 1
Analog Input 2
Analog Input 3
Analog Input 4

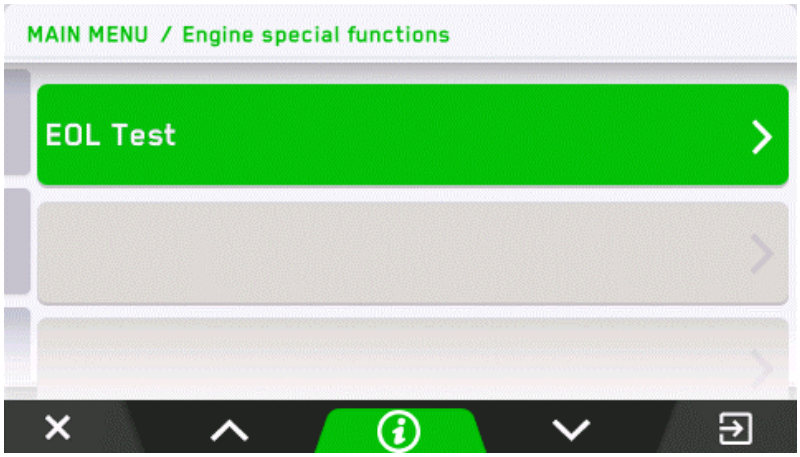
Engine Manufacturer Specific Functions

The availability of these functions is based on the selected Engine Manufacturer.

If the operator selects:

Deutz Engine:

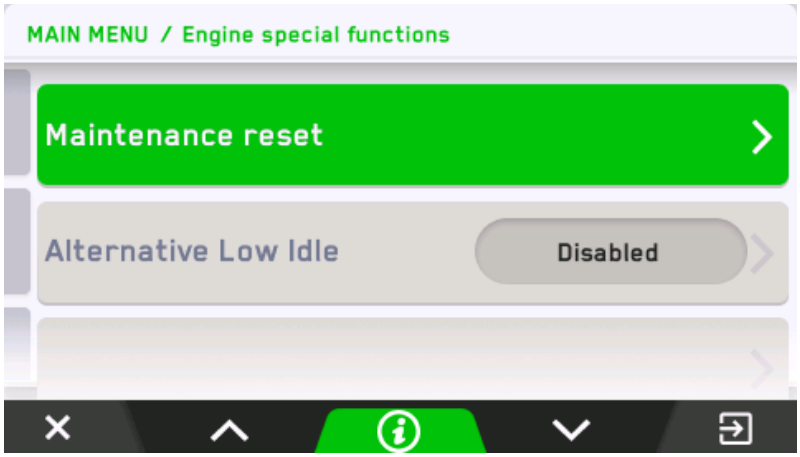
EOL Test is available, this allows the operator to conduct an end of line test/full regeneration.



CAT or Perkins:

Maintenance Reset will reset the Service infomation (SPN916).

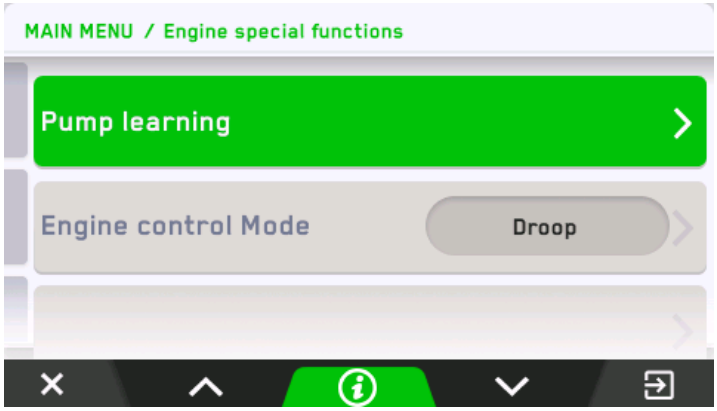
Alternative Low Idle can be used as a Lower Low Idle for prolonged idling period without Electrical Load or an elevated idle for fast warmup. When used as a Lower Low Idle, special attention is required on the current electrical load to avoid discharging the machine battery.



Kubota:

Pump Learning is available on engines equipped with the Denso ECU. The display will automaticaly send pump learning settings to the engine ECU.

Engine Control Mode	Description
Droop	Choosing Droop for Engine Control Mode is like a mechanical engine's governor. The engine speed follows “Accelerator Pedal Position [%] (0% - 100%)”. However, when the load is increased, the engine speed drops like a mechanical engine.
Isochronous	The engine speed follows “Target Engine Speed [rpm]”.Even if the load is increased, the engine speed is controlled to a constant speed. However, if the load demand is bigger than the maximum power curve, the engine cannot keep the engine speed constant. The lowest engine speed and the highest engine speed are specified by each engine model.



FPT:

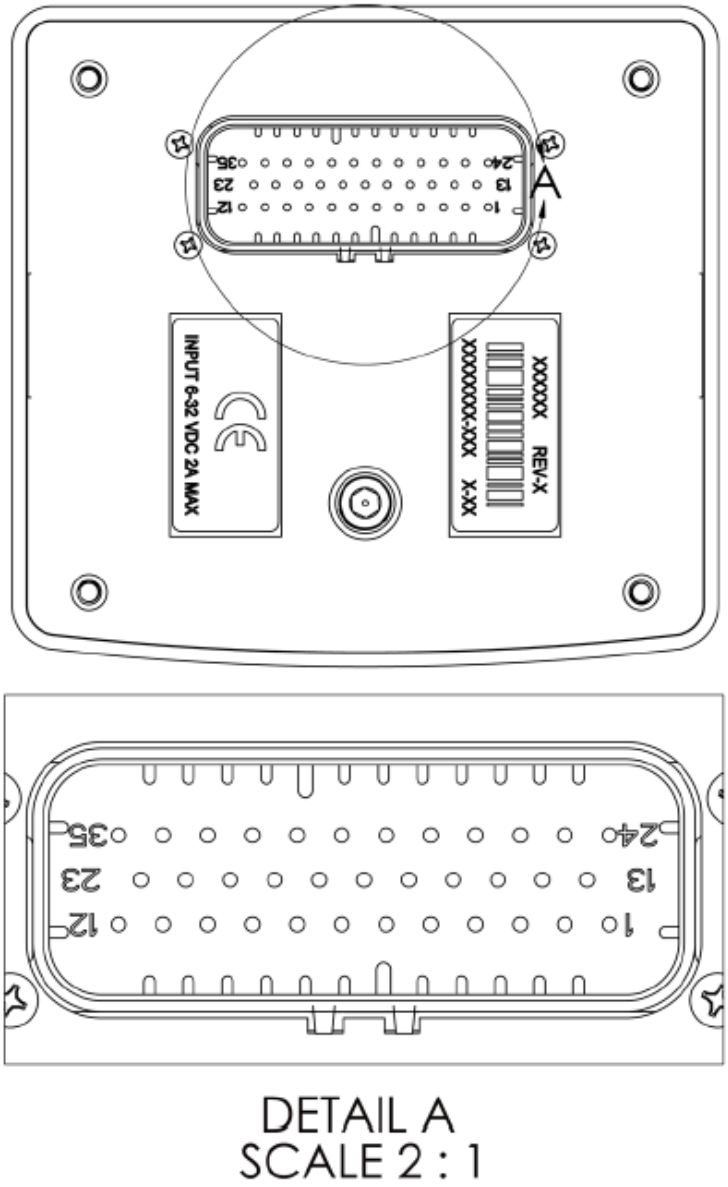
Menu Item	Description
High Idle Speed decrease	Useful in working conditions where the application cannot run at a natural engine high-idle speed. Here the operator can change the speed setpoint.
Low Idle Speed increase	Useful in working conditions where the application cannot run at a natural engine low-idle speed. Here the operator can change the speed setpoint.

Volvo:

Menu Item	Description
Governor mode select	• Engine speed mode request • Torque mode request
Idle speed select	• Normal running speed request • Idle speed request
Frequency select	• Primary engine speed request (1500rpm) • Secondary engine speed request (1800rpm)
Idle calibration state	• Normal • Idle calibration in process
Preheat request	• Inactive • Active
Engine restored operation	• Inactive • Active
Disable fuel	• Inactive • Active

Wiring Instructions

PIN Specifications for AMPSEAL Style Connection



DETAIL A
SCALE 2 : 1

Pin #	Pin Assignments
1	USB D-
2	USB ID
3	Digital Output 1 (Low side, 500 mA)
4	Digital Output 3 (Low side, 500 mA)
5	Frequency Input (Alternator and Mag)
6	Digital Input 1
7	Digital Input 3
8	A/D Input 2 (0-5v, 4-20 mA, Resistive)
9	A/D Input 4 (0-5v, 4-20 mA, Resistive)
10	Analog Output (0-5 V)
11	N/C
12	N/C
13	USB Shield
14	CAN -
15	Digital Output 2 (Low side, 500 mA)
16	Digital Output 4 (Low side, 500 mA)
17	Freq Input Return
18	Digital Input 2
19	A/D Input 1 (0-5v, 4-20 mA, Resistive)
20	A/D Input 3 (0-5v, 4-20 mA, Resistive)
21	A/D Gnd
22	Analog Output Gnd
23	N/C
24	USB D+
25	USB Vbus
26	CAN +
27	Ignition
28	Batt+
29	Batt-
30	Batt2+
31	N/C
32	N/C
33	N/C
34	RS485 -
35	RS485 +

PIN SPECIFICATIONS FOR AMPSEAL STYLE CONNECTION

Accessories

P/N 78-00-0824 – Wiring Harness, Loose leads, 24 inches

P/N 78-09-0077 – Programming Harness

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