MURPHY

RTR
READY TO RUN

ML380

FOR ISUZU 4JJ1T & 4LE2 ENGINES

MURPHY
by **ENOVATION** CONTROLS

Installation and Operations Manual

In order to consistently bring you the highest quality, full-featured products, we reserve the right to change our specifications and designs at any time. The latest version of this manual can be found at www.murphybyenovationcontrols.com.

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Introduction

The Murphy Ready to Run Panel family offers users a wide range of control and monitoring solutions for Isuzu engines. The Ready to Run Panel kits allow for a number of mounting configurations. The panels come ready, right out of the box for a quick and easy installation.

The ML380 Panel using the PowerView® 380 Display features built-in shutdown for low oil pressure, high temperature and high speed. The engine speed and other set points are configurable from the display. The ML380 is the only model that features a remote option.

Your kit contains a control box, enclosed ECU bracket mount and engine harness. With an installation time of less than 10 minutes, it makes sense to run your new engine with a Murphy solution.

Mounting Dimensions

FRONT VIEW

BOTTOM VIEW
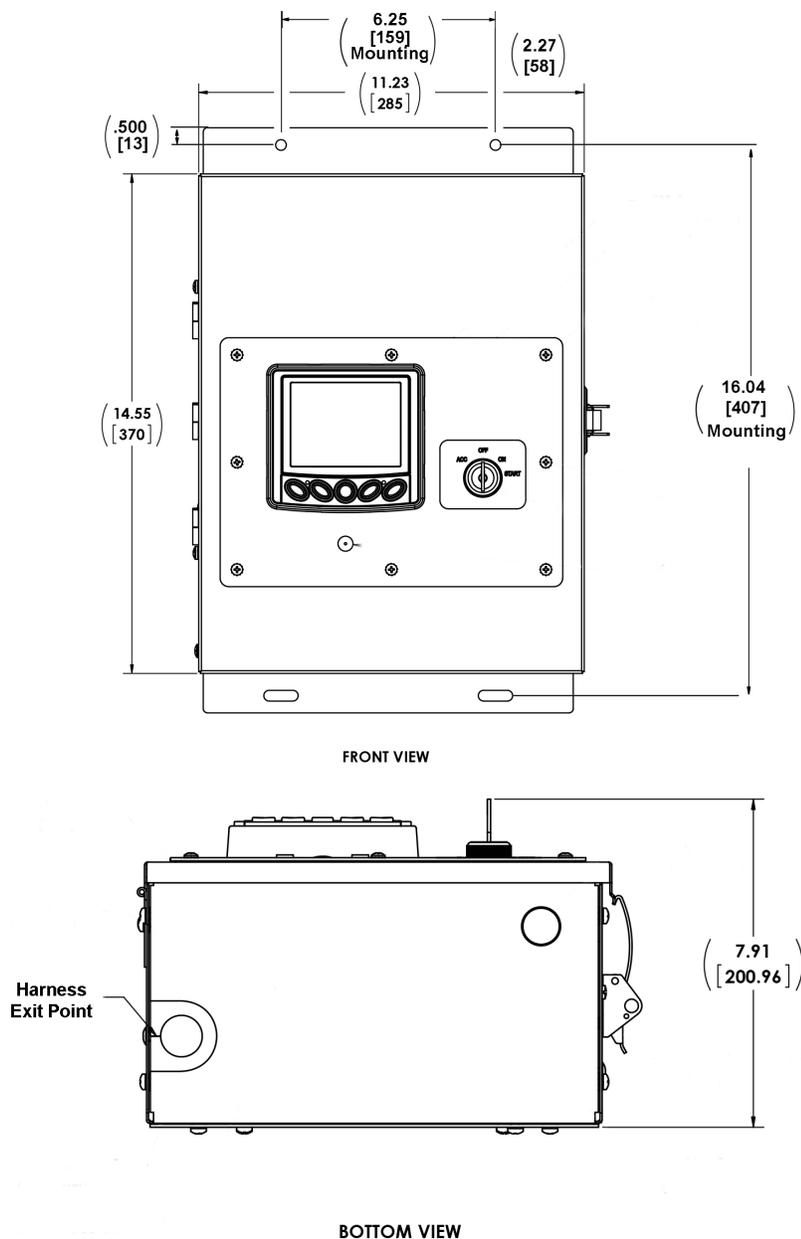
ECU Mounting (4JJ1T and 4LE2)

CUSTOMER TO SEAT INTO
CUSTOMER-INSTALLED ECU

CUSTOMER-INSTALLED BAP SENSOR

ECU MOUNTING SLOTS

LEAVE EACH BOLT OUT ENOUGH TO
HOOK INTO THE MOUNTING SLOTS
ON THE ECU BRACKET

SUPPLIED ECU HARNESS
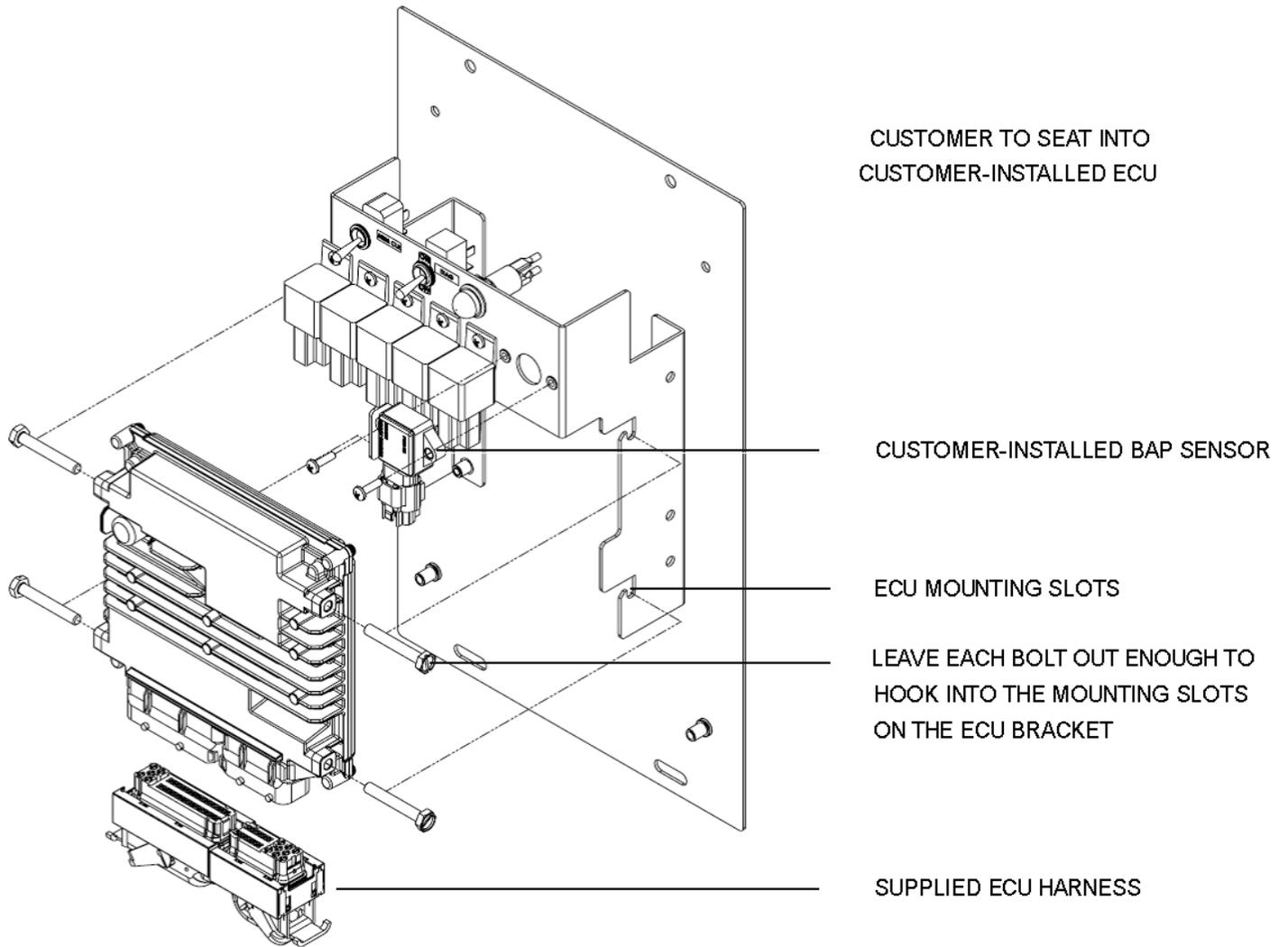
Engine Harness – included with panel

4JJ1T Harness

4LE2 Harness

4 BATTERY
B−
B−
B−
B+
B+
B+ 12
4 B+

3/8" LOOM 00031260
48
12

ALT ALT
75

78
AIR TEMP

3/4" LOOM 00002888
24

FP1, FP2
FUEL PUMP
90

START
60
START

ZIPLOCK BAG 6

3/8" LOOM 00031260
12 POS. CONN.
5
5

3/8" LOOM 00031260
8 POS. CONN.
5

6 POS.

WIRE GP
5
GLOW PLUG

5
20 POS. CONN.

6
16±1
8−RED
BATT +
CHARGE WIRE FOR ALTERNATOR
ALT B+
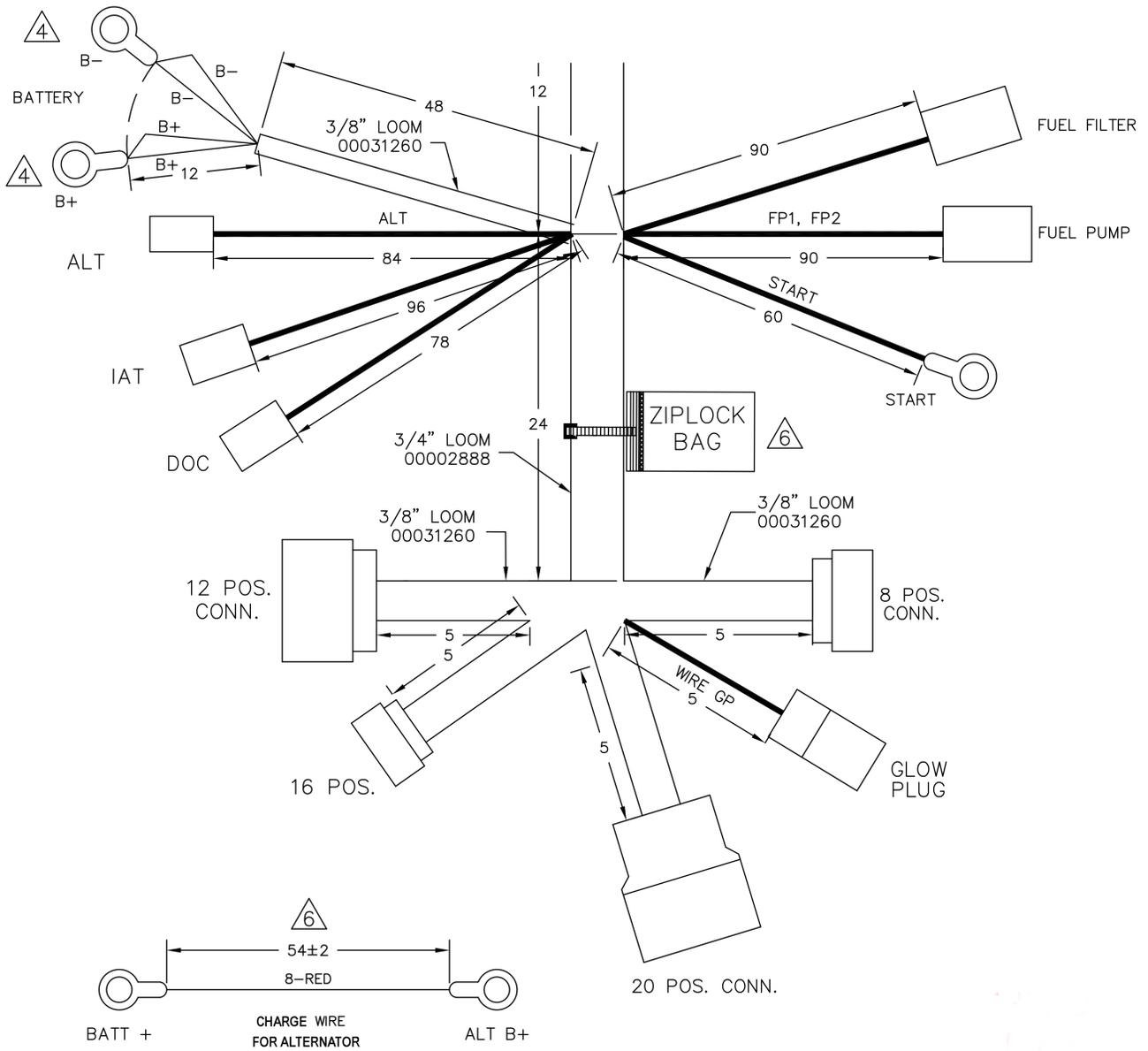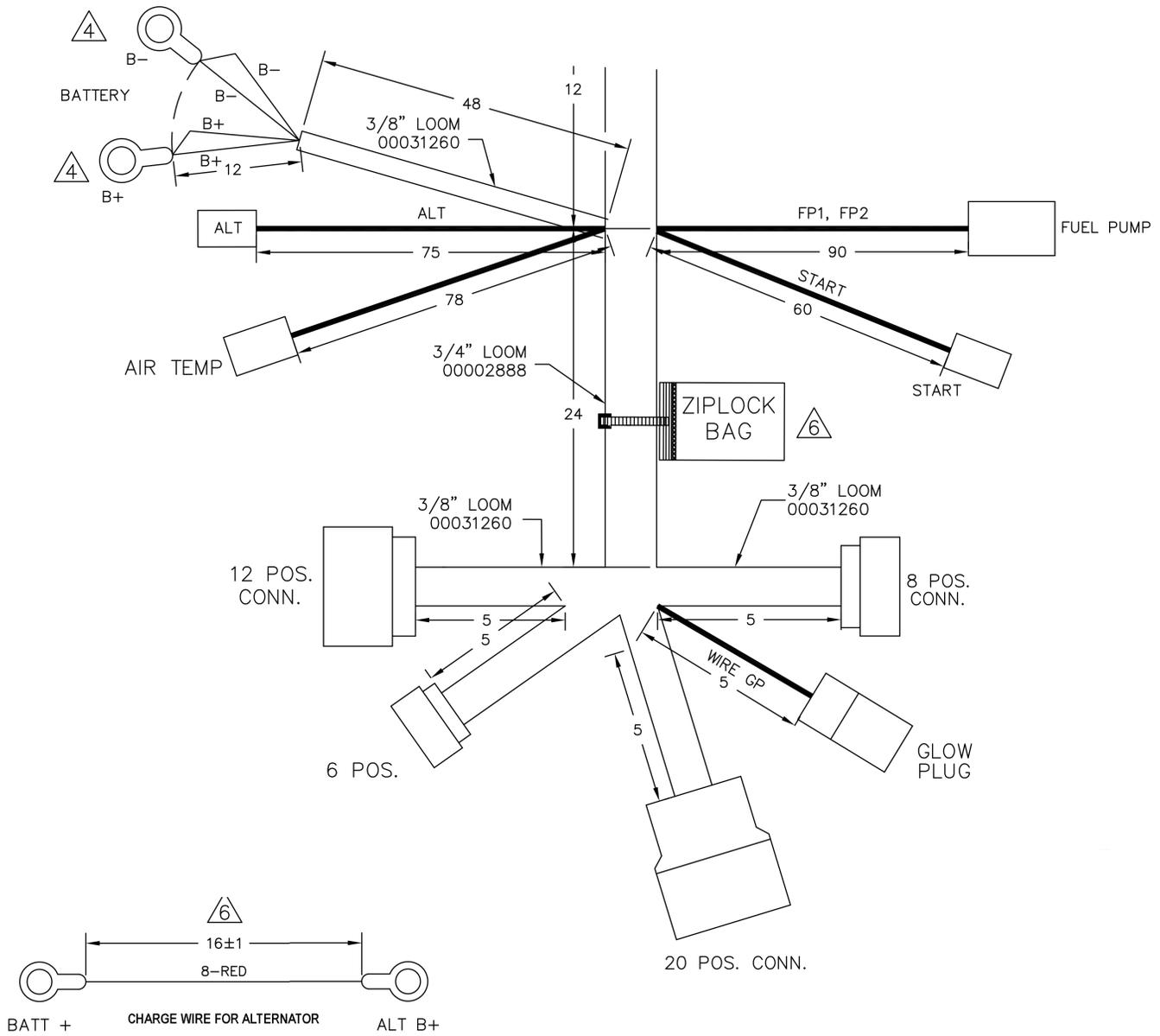
Optional Accessories

Remote Panel Option Kit
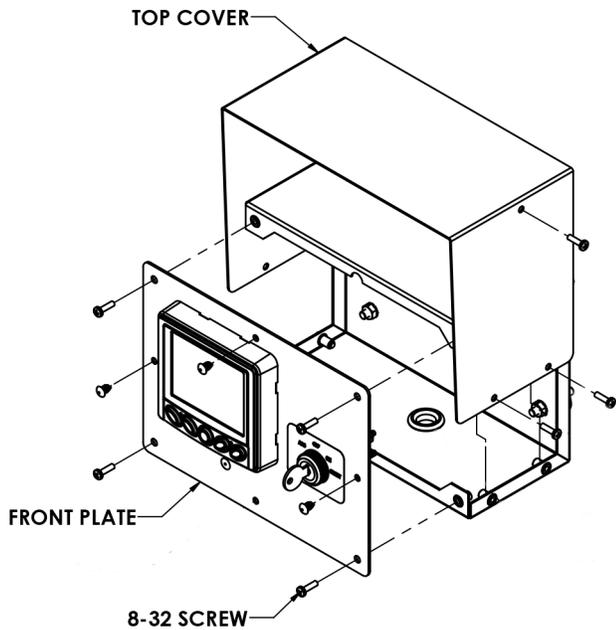
NOTE: When choosing this option, both of the following part numbers must be purchased.

Part #	Description
32090057	Remote Panel for ML380 (uses PV380 controller)
78001143	Extension Harness for 32090057 ML380 remote panel (20' long)

Analog Throttle Knob Option
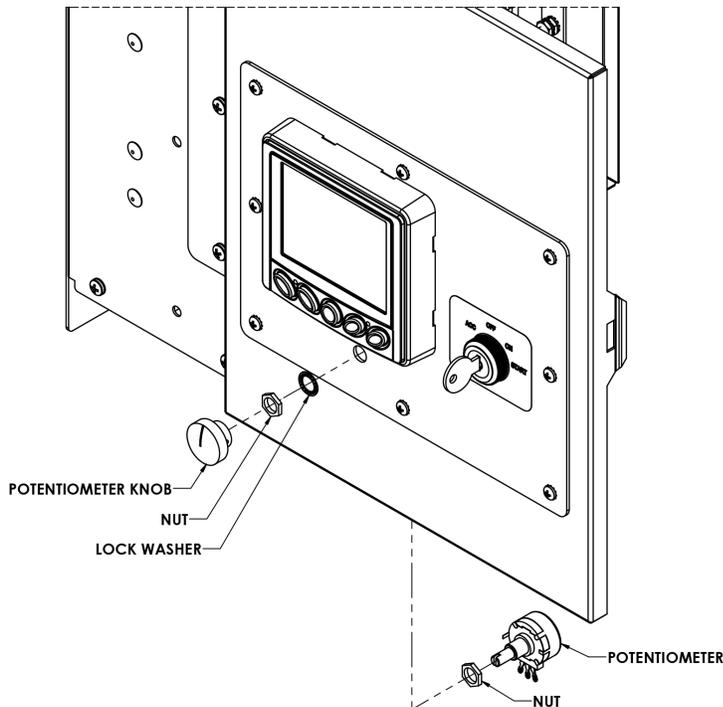
Part #	Description
65090020	Analog Throttle Knob Option Kit
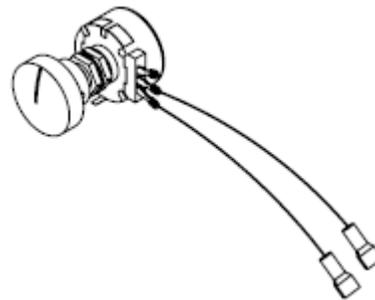
Engine and Transmission Parameters

The following are some of the engine and transmission parameters that can be displayed in standard units.

- % Load
- Engine Speed
- Engine Temperature
- Machine Hours of Operation
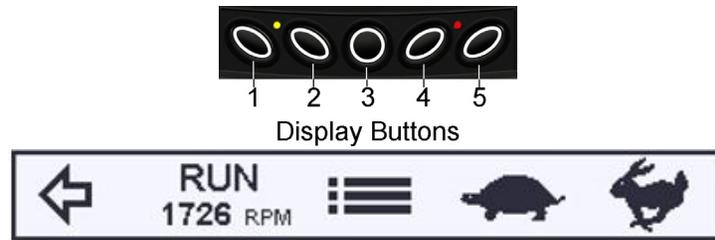- Total Machine Hours
- Battery Voltage
- Coolant Temperature

- Engine Oil Pressure
- Fuel Temp
- BAP Pressure
- Fuel Rate
- Air Inlet Temp
- Active Fault Codes
- Stored Fault Codes

Navigation and Keypad Functions

The keys are:

1   2   3   4   5
Display Buttons

When directed to press a symbol within the procedural steps, it is referring to the button below the displayed symbol.

Each display button may have alternating functions within the configuration as shown in the tables below.

Key 1	Function
⇐	Alternates between parameter screen sets from the Home screen
⇧	Moves highlight up when in certain menu selections
Brightness /Contrast	Displays the Brightness and Contrast menu when the Main Menu is displayed
⇐	Moves the cursor left one character when in the OEM Password screen

Key 2	Function
⌁	Displays the Service Reminders screen
⇩	Moves highlight down when in certain menu selections
↻	Resets that particular service reminder
Language / Units	Displays the screen to select the language of the unit along with the specific units for pressure and temperature
Run / Idle	When pressed, the engine will throttle to either Run Speed or Idle Speed

Key 3	Function
≣	Displays the Main Menu entrance point
⊣	Serves as the Escape/Return to Previous Menu button

Key 4	Function
🐢	Decreases the Throttle set point
+	Increases specified amounts or cycles through available options for a selection
Stored Codes	Displays the Stored Codes when in Diagnostic Messages
⇨	Moves the cursor one slot at a time to the right
Software Version	Displays the Software Version screen when in the Utilities menu
Utilities	Displays the Utilities menu when on the Main Menu screen

Key 5	Function
🐇	Increases the Throttle set point
↵	Serves as the Enter key for menu selections
−	Decreases specified amounts or cycles through available options for a selection
←	Moves the cursor to the next cell when customizing parameters on the home screen
OEM	Enters the OEM Menu
⚠	Displays the Diagnostic Messages screens

First-Time Startup

When power is applied to the ML380, the **Warning** and **Shutdown** lights illuminate and the Murphy logo displays.

If a preheat message is being actively broadcast from the Engine Control Unit (ECU), a **Wait to Start** symbol displays below the Murphy logo as shown in the next image.

First Screen
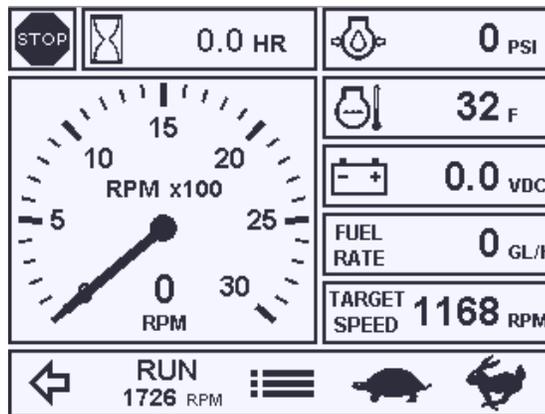
Second Screen
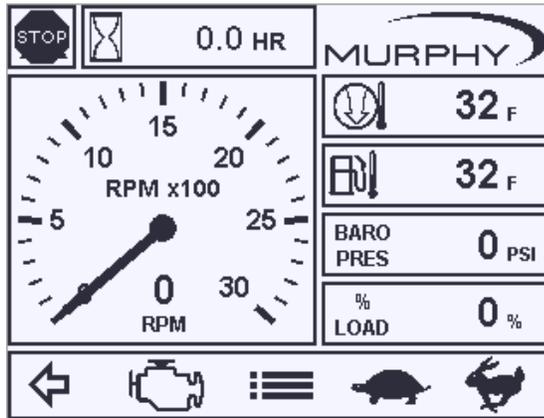
Parameter Gauge Settings
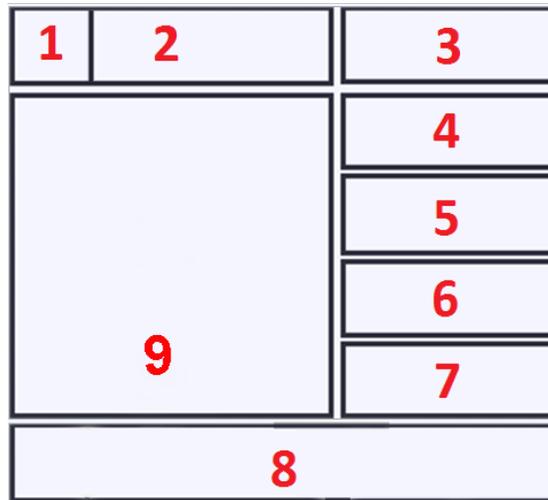
1. **Warning or Shutdown area**: this icon area represents Warnings, Shutdowns and Service Indicators.

Area	Icon(s)	Function(s)
1	STOP	Shutdown
	⚠	Warning
	🔧	Service Indicator

2. **Hourmeter Area:** The Hourmeter area displays the current engine or machine hours.

3-7. Parameter Area: The following parameters are the electronic engine defaults until other parameters are selected from the menu.

- Engine Oil Pressure (numeric)
- Engine Temperature (numeric)
- Battery Voltage (numeric)
- Fuel Rate (numeric)
- Target Speed

Areas 4 through 7 on the second screen are the only areas that may be customized.

8. Button Selection Display: The button functions can change depending on the screen display.

9. Tachometer Display: The tachometer is the most important reading and is shown in the largest area that will fit the screen. This represents the Engine Speed with a 3,000 RPM dial.

Adjusting the Menu Selections

Brightness and Contrast

Follow these steps to adjust the Brightness and Contrast:
1. Press ▤ to display the Menu.
2. Press **Brightness / Contrast**. Brightness will have the arrow beside it.
3. Press ✚ and ▬ to adjust the selection.
4. Press ⭣ to move the arrow to Contrast, and repeat step 3 to adjust.
5. Press ⎗ to save and exit the menu.

Language and Units

Follow these steps to adjust the Language:

> **NOTE**: At the time of this printing, English is the only language programmed into the ML380. If this should change, follow these steps to adjust the Language and Units:

1. Press ▤ to display the Menu.
2. Press **Language / Units.** Language will be highlighted.
3. Press ⬅ to cycle through any available languages.
4. Press ⭣ to move the highlighting to Units for Pressure.
5. Press ⬅ to cycle through PSI, KPA and BAR.
6. Press ⭣ to move the highlighting to Units for Temp.
7. Press ⬅ to cycle through Fahrenheit (F) or Celsius (C).

> **NOTE**: Changing the Units for Temperature to F will change the Units for Pressure to PSI. Changing the Units for Temperature to C will change the Units for Pressure to KPA.

8. Press ⎗ to save and exit the menu.

Diagnostic Messages

Follow these steps to display the Diagnostic Messages:

1. Press ☰ to display the Menu when Throttle is enabled or ⚠ when Throttle is disabled.
2. Press ⚠ once more if needed. The following screen will appear:

```
DIAGNOSTIC MESSAGE    3  OF   4

SPN:      66    FMI:  3 OC:      3

CHECK COOLANT TEMP SENSOR




ADDRESS: 24    DEVICE ID: <id>

  ⇧       ⇩       ⬅       Stored
                          Codes
```

Press the ⇧ and ⇩ to scroll through additional messages if any are present. Each saved code shows the SPN (Suspect Parameter Number), FMI (Failure Mode Identifier) and OC (Occurrence Count). The OC indicates if the same fault occurred more than once. If available, a text explanation of the Warning or Shutdown and the Device ID Address also displays.

To view the Stored Codes, press **Stored Codes**. Stored codes are requested from the ECU. While the data is being requested, REQUESTING and RECEIVING DATA will be displayed. If data is not received from the ECU, TIMEOUT will be displayed. Pressing **Stored Codes** will request data from the ECU again. If data is received, the Diagnostic Message screen (#) of (#) will appear. Press the ⇩ and ⇧ to scroll through additional messages, if any are present. Press **Get Faults** to receive additional Stored Faults.

Press ⬅ twice to exit the menu.

Software Version

To display the software version information (useful for Enovation Controls' personnel to identify which configuration the customer is using), follow these steps:

1. Press ☰ to display the Menu.
2. Press **UTILITIES.**
3. Press **Software Version**. The following screen will appear:

```
              Versions

Configuration          2 . 8 . 100XX
Boot Loader   00 . 00 . 00000 . 00
Firmware      00 . 00 . 00000 . 00




                 ⬅
```

4. Press ⬅ to exit the Menu.

OEM Menu

Further settings and controls are accessed after the required four digit password (**3482**) is correctly entered on this screen:

```
ENTER OEM PASSWORD


     0000
       _
       🔒

  ⬅  ➡  ⏏  +  ↵
```
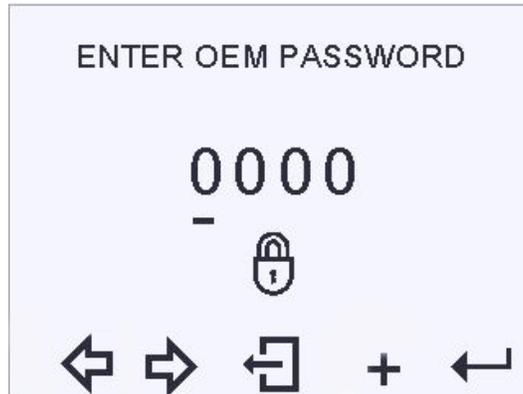
1. Press ☰ to display the Menu.
2. Press **UTILITIES.**
3. Press **OEM,** and the above screen will appear.
4. Press **+** to enter the correct first number of the password then press ➡ to move the cursor to the next digit.
5. Repeat Step 4 until all digits of the password are entered.
6. Press ↵ to enter the menu. The following screen will appear:

```
              OEM
Parameters              Enter
Inputs                  Enter
5V Output            Disabled
CAN                     Enter
Throttling              Enter
Service Intervals       Enter
Sets/Resets             Enter

  ⬆    ⬇    ⏏        ↵
```

NOTE: Menu options cannot be changed and saved while the engine is running:
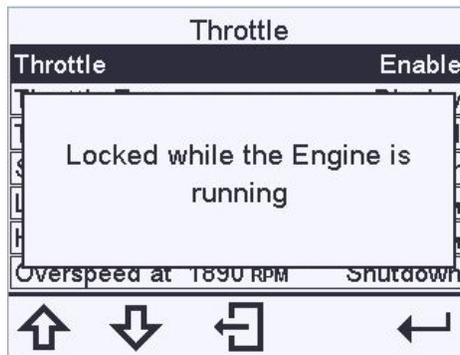
Parameters

As noted previously, some parameters can be substituted for the defaults that were listed. The following screen will display upon entering the Parameters menu:
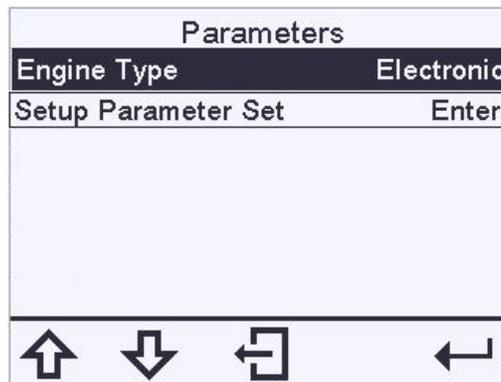
Menu Selection	Description
Engine Type	The default is electronic
Setup Parameter Set	As noted earlier, parameters (found at the end of this document) can be substituted for the defaults

Set Up Parameter Set

Upon entering this menu selection, the following screen will appear:

Menu Selection	Description
Use Defaults	**Restoring Default Gauge Setup** appears when this option is selected
Customize Digital Gauges	Enter this menu, and a screen similar to the following will appear: Press ➪ to cycle through the available parameters for each cell. When the appropriate parameter displays, press ←, and the cursor will move to the next cell. Repeat this process until all cells have the appropriate parameters. End this process by pressing ⮐ to return to the previous menu.

Input / Output Table

Default values for the supported parameters are:

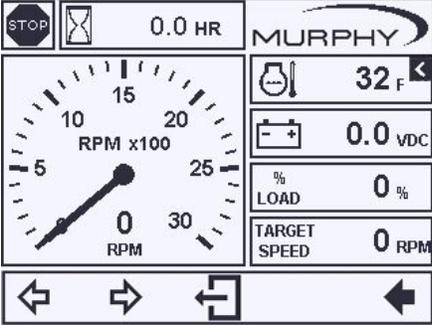| Input	Connector – Pin	Sender	Usage
Input #1	J1-5 6-pin connector Pos 5	Throttle Knob	Throttle
Output #1	6-pin connector Pos 4	-	Run Output

CAN

ECU and Display Source Addresses

Follow these steps to listen to or change the ECU Source Address:

1. Press ☰ to display the Menu.
2. Press **UTILITIES**.
3. Press **OEM,** and the Enter OEM Password screen will appear.
4. Press ➕ to enter the correct first number of the password, then press ➪ to move the cursor to the next digit.
5. Repeat Step 4 until all digits of the password are entered.
6. Press ⬅ to enter the menu then ⬆ until CAN is highlighted. Press ⬅ to enter.
7. Highlight ECU Source Address (default address is ALL), and press ⬅ to enter.
8. On the Listen to ECU Addresses screen, use ➕ or ➖ to display 0 through 253 or All.
9. Press ⮐ to save the selection. A message may appear stating:

**Change ECU Address to (selection). This change requires a power
cycle to take effect.**

Press YES to accept or NO to reject.

10. Highlight Display Source Address (default address is 228), and press ⬅ to enter.

11. Use ➕ or ➖ to adjust the source address from 0 through 253. Press ⌫, and the following message will appear:

**Change Display SRC Address to (selection). This change requires a
power cycle to take effect.**

12. Press YES to accept or NO to reject.

13. Press ⌫ to exit out of the menu.

Fault Conversion

From the CAN menu, highlight Fault Conversion, and press ⬅ to cycle through the available choices:
J1939 V-1, J1939 V-2, J1939 V-3 and J1939 V-4. Press
⌫ when done.

No Fault Pop-Up

From the CAN menu, highlight No Fault Pop-Up, and press ⬅ to cycle through Enabled or Disabled.
Press ⌫ when done.

Throttling

The display is capable of commanding engine speed via J1939 TSC1 messaging. Throttle – Enable/Disable
selection determines if the throttling is active.

Throttle	
Throttle	Enable
Throttle Type	Display
Throttle Mode	Manual
Setpoints	Enter
Low Speed Limit	1000 RPM
High Speed Limit	2000 RPM
Overspeed at 2098 RPM	Shutdown
⬆ ⬇ ⌫ ⬅	

The Low and High Speed Limits are the minimum and maximum RPM for the engine when Throttle is
enabled.

To change the default settings, press ⬅ while highlighting the following:
- Throttle (Disable or Enable)

- Throttle Type (Display or Knob)
- Throttle Mode (Manual or Preset)

By default, Throttle Type is Display.

Display: If the Throttle Type is Display, the user can throttle the engine by pressing the keys on the ML380 display.

Throttle Mode – Manual: When Throttle Type is Display and Throttle Mode is Manual, the user can throttle the engine to any speed between the Low Speed limit and High Speed limit using the rabbit and turtle keys on the main screen.

Throttle Mode – Preset: When Throttle type is Display and Throttle Mode is Preset, the user can throttle the engine at various preset values (Set Points). The user can ramp up the engine speed to the next (higher) set point by pressing the Speed 3 key on the main screen. The user can ramp down the engine speed to the previous (lower) set point by pressing the Speed 2 key on the main screen.

Optional Accessory Potentiometer Throttle Knob: If the Throttle Type is set to Knob, the user can throttle the engine using a 10K ohm potentiometer on resistive input 3. As long as Throttle Type is Knob, Throttle Mode will only be manual. Please see page 7 for Accessory part numbers and installation information.

When the knob is at the minimum position, the engine will be throttled at Low Speed and will be ramped up to High Speed as the knob is moved from the minimum position to the maximum position. If the Resistive Input 3 reads any resistance value above 11K ohm, the engine will be ramped down to Low Speed (usually happens when the connection with the potentiometer is lost or not connected).

When the knob is not at the minimum position when the engine is started (at key on), the engine runs at Low Speed and displays the message "Turn Knob to minimum position" to the user until the knob is brought down to the minimum position. This avoids the engine going to some higher speeds at startup.

If the Throttle Mode is set to Manual, the following changes can be made:
- Ramp Rate (set from 100 to 400 RPM/sec)
- Inc/Dec Step Size (set from 10 to 100 RPM)

During Manual Throttling, notice the following symbols:

Denotes decrement engine speed.

Denotes increment engine speed.

Each button can be held down to continuously and smoothly change the throttle set point to the minimum of four times of INC/DEC step size per 250ms or ramp rate per second.

During Manual Throttling, the Set Points screen will appear as follows:

Throttle Setpoints	
Idle Speed	1000 RPM
Run Speed	1800 RPM
Ramp Rate	100 RPM
Inc/Dec Step Size	50 RPM

⬆ ⬇ ⤶ + –

When Throttle Mode is Preset, three Set Point options are available:

Throttle Setpoints

Speed 1 (S1)	255 RPM
Speed 2 (S2)	255 RPM
Speed 3 (S3)	255 RPM
Ramp Rate	100 RPM

When Preset is selected, select the following:
- Set Speed 1 – set between the Low Speed and Set Speed 1
- Set Speed 2 – set between Set Speed 1 and Set Speed 3
- Set Speed 3 – set between Set Speed 2 and High Speed
- Ramp Rate per second – set between 100 and 400 RPM

The Low and High Speed Limits are the minimum and maximum RPM for the engine when Throttle is enabled.

Low Speed Limit – set from 500 to High Speed

High Speed Limit – set from Low Speed to 4,000 RPM

Overspeed at (high speed limit settings) – choose from Shutdown (default), Warning or Disabled

Overspeed Shutdown – By default this is a shutdown but can be changed to a warning or disabled. When the Overspeed type is Shutdown, Engine Speed is over the Overspeed shut-down limit. An internal DM1 will be shown on the screen, and Digital Output will be turned off with a red lamp active on the ML380. When the Overspeed type is Warning, Engine Speed is again over the Overspeed shutdown limit, but only an internal DM1 message is shown along with an amber lamp active on the ML380. Overspeed set point will be 5% (value is shown) over the high speed limit all the time:

Throttle

Throttle	Enable
Throttle Type	Display
Throttle Mode	Manual
Setpoints	Enter
Low Speed Limit	800 rpm
High Speed Limit	1800 RPM
Overspeed at 1890 RPM	Shutdown

Service Intervals

The following engine service intervals can be set in 10-hour increments. The defaults are zero.

- Engine Oil
- Fuel Filter
- Engine Air Filter
- Hydraulic Oil
- Service Engine
- Service Machine

Whenever a timer expires, a pop-up warning symbol/message is shown for 15 seconds every 10 minutes along with illuminating the amber LED to communicate a service interval has expired. The warning shall persist until the timer is reset. If no service intervals are set, this functionality is not enabled.

Follow these steps to display the Service Intervals Menu:

1. Press ☰ to display the Menu.
2. Press **UTILITIES.**
3. Press **OEM.**
4. Enter OEM password by pressing ✚ until the appropriate number is in the first slot.
5. Press ⇨ to move the cursor to the second position.
6. Repeat Steps 4 and 5 until the password is complete.
7. Press ↵ to enter. The OEM menu will appear.
8. Press ⬇ until Service Intervals is highlighted, and press ↵ to enter.
8. The Engine Oil reminders will appear first. Press ✚ to scroll through the reminders for Fuel Filter, Engine Air Filter, Hydraulic Oil, Service Engine and Service Machine.
9. To reset the reminders, press ⬇ to move the cursor down to Reset. Press (OK).

> **NOTES**:
> **(1)** If the type is set to Engine Hours, the unit must be connected to an ECU and be receiving data to reset the service reminder. If Engine Hours data is not being received, the service reminder will not reset.
> **(2)** The interval remaining time may be negative when the service reminder is expired.

Sets/Resets

| Resets	
Clear Fault Codes	Enter
Set Machine Hours	0.0 HR
Clear Machine Hours	Enter
Restore Defaults	Enter

⬆ ⬇ ⏏ ↵

Clear Fault Codes: To clear existing Fault Codes, press ⬅ while highlighting this selection. A **Request Sent to Clear Faults** message will display.

Set Machine Hours: Press ➕ and ➖ to adjust the hours. Every button press increments/decrements by 0.1 hour. Holding the button down will increment/decrement by 20 hours every 250ms.

Clear Machine Hours: To clear existing Machine Hours, press ⬅ while highlighting this selection. A **Machine Hours Cleared** message will display.

Restore Defaults: To restore factory defaults to the display, press ⬅ while highlighting this selection. The following screen will appear:
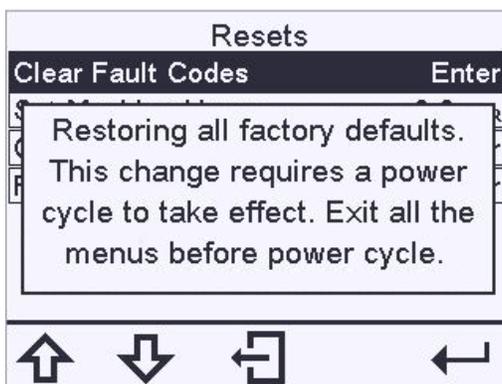
Press ⬅ to acknowledge this message and exit out of the menu. Back out of all menus before cycling the power.

Diagnostics and Service

LED Indicators

The ML380 features amber (Warning) and red (Shutdown) LEDs on the front keypad. These are illuminated according to the J1939 error definition for alarms and shut-down conditions.

Indicator Lamps

On each gauge screen and menu (where space allows), the following indicator lamps shall be shown:

Icon	PGN	SPN	Description
STOP	DM1		**Stop Diagnostic Lamp**: indicates an active DM1 stop fault
⚠	DM1		**Warning Diagnostic Lamp**: indicates an active DM1 fault

Supported PGNs

The following table of parameters shall be available for selections based on being actively broadcast on the CAN bus:

	Description	PGN	Icon
1	Accelerator Pedal Position 1	61443	ACCEL PED1
2	Percent Load at Current RPM	61443	
3	Engine Speed	61444	
4	Actual Engine Torque	61444	
5	Trip Distance	65248	TRIP DIST
6	Total Vehicle Distance	65248	VEH DIST
7	Total Engine Hours	65253	ENG HRS
8	Trip Fuel	65257	TRIP FUEL
9	Total Fuel Used	65257	FUEL USED
10	Engine Coolant Temperature	65262	
11	Fuel Temperature	65262	
12	Engine Oil Temperature	65262	
13	Engine Intercooler Temp	65262	INTC TEMP
14	Fuel Delivery Pressure	65263	
15	Engine Oil Level	65263	
16	Engine Oil Pressure	65263	
17	Coolant Pressure	65263	

Description		PGN	Icon
18	Coolant Level	65263	
19	Wheel Based Vehicle Speed	65265	VEH SPD
20	Fuel Rate	65266	FUEL RATE
21	Instantaneous Fuel Economy	65266	FUEL ECON
22	Average Fuel Economy	65266	AVG ECON
23	Barometric Pressure	65269	BARO PRES
24	Air Inlet Temperature	65269	
25	Boost Pressure	65270	BST PRES
26	Intake Temperature	65270	
27	Air Filter Dif. Pressure	65270	
28	Exhaust Gas Temperature	65270	
29	Alternator Potential	65271	ALT VOLT
30	Electrical Potential	65271	
31	Battery Potential Voltage	65271	
32	Transmission Oil Pressure	65272	
33	Transmission Oil Temp	65272	
34	Fan Drive	65213	
35	Auxiliary Temperature	65164	AUX TEMP
36	Auxiliary Pressure	65164	AUX PRES
37	Selected Gear	61445	SLECT GEAR
38	Current Gear	61445	CURNT GEAR
39	Output Shaft Speed	61442	OUT SFT SP

	Description	PGN	Icon
40	Input Shaft Speed	61442	IN SFT SPD
41	Torque Converter Lockup	61442	TORQ LOCK
42	Auxiliary IO Status 1	65241	AUX IO 1
43	Accelerator Pedal Switch	61443	PEDAL SWT
44	Engine Desired Op Speed	65247	DES ENG SP
45	Throttle Position	65266	THROTTLE
46	Air Inlet Pressure	65270	
47	Actual Engine Timing	65159	ENG TIMING
48	Total Engine Revolutions	65253	ENG REVOLU
49	Requested Gear	65256	REQ GEAR
50	Fuel Level	65276	
51	Hydraulic Pressure	61448	
52	Hydraulic Temp	65128	
53	Machine Hours	61444	

PV380 Specifications

Electrical

Display	3.8" (9.65 cm) QVGA (320x240 pixels); monochrome transflective LCD with heater, MTFB 50,000 hours
Resolution	QVGA, 320 x 240 pixels
Backlighting	White LED
CAN	(1) CAN 2.0B (J1939 protocol and proprietary messaging), (1) RS-485 serial (Modbus)
Protocols	J1939, NMEA 2000
Connection	Deutsch DT Series 6- and 12-pin
Keyboard	5 tactile buttons

Input	(4) resistive analog:
	    (3) analog; 0-5V analog or digital
	    (1) frequency; 2-10,000Hz, 3.6-120VAC

Output	(1) 500mA; switched low-side (1) 5V supply (250mA); protected
Voltage	6-36 VDC; reverse-polarity protected

Environmental

Operating Temperature	-40º C to +85º C (-40° F to +185° F)
Storage Temperature	-40º C to +85º C (-40° F to +185° F)
Protection	IP66 and 67 (IEC/EN 60529)

Emissions and Immunity	Electromagnetic Compatibility: 2004/108/EC and 2006/95/EC directives:
	    EN 61000-6-4:2001 (emission)
	    EN 61000-6-2:2001 (immunity)
	    EN 50121-3-2 and EN 12895
	    J1113/2, 4, 11, 12, 21, 24, 26 and 41

Vibration	7.86g random vibe (5-2,000Hz)
Shock	±50g shock in 3 axes

ENOVATION CONTROLS CORPORATE HEADQUARTERS
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TULSA, OK 74146

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