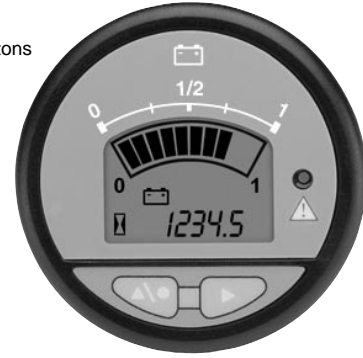




Without buttons

With buttons



**CURTIS INSTRUMENTS, INC.** 200 Kisco Avenue, Mt. Kisco, NY 10549 • Tel. (914) 666-2971 • [www.curtisinst.com](http://www.curtisinst.com)

## 1.0 Technical Specifications

### 1.1 Electrical

**Operating Voltage Range** +/- 25% of nominal voltage

**Operating Current Range** Values reflect keyswitch in "on" position.

Gauge	Operating Voltage (VDC)	Nominal (mA)	Max (mA)
12VDC	12	19	35
12 - 48VDC	12	14	20
	24	16	20
	36	16	20
	48	17	20

### 1.2 Mechanical

**Display:** LCD with 10-segment bar and 5 digit numeric (5mm high)

**Hour Meter Range & Resolution:** 9,999.9 Maintenance Hours  
99,999 Total Hours

**Hardware:** Mounting Bracket

**Panel Cutout:** 52 mm / 2 1/16" diameter

### 1.3 Environmental

**Shock** SAE J 1378 Amplitude  
44-55 g, half sine, 9-13 ms duration

**Vibration** SAE J 1378 Double amplitude of 1.53mm with frequency sweep  
for 10-80-10 Hz (20 g max) at 1 minute intervals

**Operating Temp.:** -40°C to +85°C

**Storage Temp.:** -50°C to +90°C

**Humidity:** 95% RH (non-condensing)

**IP Rating:** 65 Front & Rear with AMP connector installed  
65 Front, 40 Rear with Molex connector installed

## 2.0 Installation

### 2.1 Terminal Assignments

Molex Pin #	Description	AMP Pin #
8	<b>V (+)</b> <b>Supply Voltage Positive Terminal</b> For BDI applications, connection should be made as close to battery positive as possible.	4
4	<b>V (-)</b> <b>Supply Voltage Negative Terminal</b> For BDI applications, connection should be made as close to battery as possible.	8
2	<b>Keyswitch (+)</b> When V+ is applied the keyswitch turns on the gauge display. For BDI applications, monitoring continues when keyswitch is turned off.	6
6	<b>Setup Enable (+)</b> When V+ is applied the gauge can be programmed via the front panel buttons if so equipped. (see section 3.6)	2
7	<b>Hour Meter Enable (+)</b> When V+ is applied accumulation of time occurs with keyswitch turned on.	3
5	<b>Input A</b> Input for a voltage based sender OR auto ranging pin in BDI applications. See schematic diagrams for AMP and Molex connectors.	1
1	<b>Input B</b> Input for resistance based senders.	5
3	<b>FET Output</b> MOSFET (0.5A) open drain type internally tied to V(-).	7

### 2.2 Typical Wiring Diagrams

See wiring schematic drawings on last page.

## 2.3 Mounting

### Caution!

Bracket is placed over gauge in reverse fashion for ease of shipping. Bracket has been designed to remain secured to the gauge upon proper installation. Once installed correctly, attempts to remove bracket from gauge may result in damage to the bracket.

See complete drawing with notes on page 4.

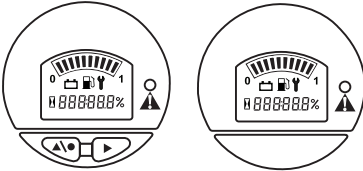
Curtis enGage™ II instruments are mounted in a 52mm round cutout. Serrations on the barrel of the gauge, combined with the mounting bracket provided, insure fast and trouble free installation. To insure proper installation, the 2 locking tabs on either side of the inner diameter of the bracket should be aligned with the serrations on the barrel of the gauge (see drawing above). Next, slide the bracket over the barrel of the gauge and press it firmly against back of panel. You should hear the tab sliding over the serrations.

## 2.4 Interconnect

Curtis enGage™ II mates with either an 8-pin Molex connector (Molex pins P/N 39-00-0039 FOR #18-24 AWG P/N 39-01-2085) or an 8-pin AMP connector (AMP pins P/N 770904-X FOR #18-24 AWG P/N 794821-1). A preassembled mating connector kit (Curtis P/N 15369002=Molex, Curtis P/N 17633308-03=AMP) with crimp-connect terminated wires (approx. 127mm in length) is also available.

## 2.5 Product Identification

### 2.5.1 Programmable Vs. Factory Set Instruments



Curtis enGage™ II gauges are available with or without front panel buttons. Gauges without buttons are factory set and cannot be adjusted in the field. Gauges with buttons have field adjustable parameters and can be programmed per section 2.6.




### 2.5.2 enGage™ II & Multifunction Design

Curtis enGage™ II products can be configured in a variety of ways to maximize customer value and efficiency. Because of this feature, the instruction manual covers a broad spectrum of products. Please note that some sections of the instructions may refer to functions not included with your instrument.

## 2.6 Configuring Your Gauge

Access to these operations is sequential in this order. Adjustments of the following functions can be performed in the Configuration Mode:

1. Time-of-Day Clock
2. Battery Discharge Indicator profiles
3. Maintenance interval
4. Settable hour meter

During configuration, the right button  is used to increment. The left button  is used to: 1. enter a selection; 2. advance to the next configurable item. If no change is desired to a specific gauge function, continue to press the left button  until the next desired function is reached.

The time-of-day clock is entered by setting the hours digits between 01 and 12, then "minutes" digits between "00" and "59".

The profile of the BDI is settable with the front panel buttons. The Discharge Full profile (when the gauge will begin calculating 'discharge') is adjustable from 1.80 through 2.30 volts per cell (VPC) in 0.01 VPC increments. The Discharge Empty profile (when the gauge will indicate 'empty') is adjustable from 1.50 through 2.20 VPC in 0.01 VPC increments.

The maintenance interval (when the gauge signals that maintenance is due) is configurable and should be set after the initial installation. The interval can be set between 1 and 9,999 hours in 1 hour increments.

The settable hour meter can be set to any value between 0 and 99,999 hours. When the gauge is operational, the total hour meter will begin from this value.

### Configuration Notes:

The gauge remains in configuration mode for 30 seconds without input from the user.


When configuring each function (time-of-day, maintenance interval, etc.), you must enter in all data for that function for it to be saved. If incomplete data is entered for a function and the programming mode is timed out (after 30 seconds of no input received by the gauge), the gauge will revert back to what was previously stored for that item.

The gauge remains in configuration mode for 30 seconds without input from the user.

When configuring each function (time-of-day, maintenance interval, etc.), you must enter in all data for that function for it to be saved. If incomplete data is entered for a function and the programming mode is timed out (after 30 seconds of no input received by the gauge), the gauge will revert back to what was previously stored for that item.





If you interrupt the data entry process in the Configuration Mode, the gauge saves data in those sections already completed. To complete configuration, re-enter configuration mode (2.6.1) and simply toggle past the completed sections and resume where you left off.

### 2.6.1 Entering Configuration Mode

- a) Apply main power (9-60VDC) to V+, V-.
- b) Apply V+ (9-60 VDC) to Keyswitch Input.
- c) Apply V+ (9-60 VDC) to Set-up Enable.
- d) Press and hold the left button  on the front panel until the entire display flashes and then release.



### 2.6.2 Setting the Time-of-Day Clock





The display will flash the two "Hours" digits. Press the right button  to increment by one hour, or hold the button to increment continuously. When the desired number of hours is reached, press the left button  once. The display will flash the two "Minutes" digits. Press the right button  to increment by one minute or hold the button to increment continuously. When the desired number of minutes is reached, press the left button  once.

### 2.6.3 Setting the Battery Indicator Profiles





The display will flash the three digits of the discharge full profile (factory setting is 2.09 VPC). Press the right button  to increment by 0.01 VPC or hold the button to increment continuously. When the display reaches 2.30 it will automatically restart at 1.80 VPC. When the desired reset profile setting is reached, press the left button  once.



The display will flash the three digits of the discharge empty profile (factory setting is 1.73 VPC). Press the right button  to increment by 0.01 VPC or hold the button to increment continuously. When the display reaches full it will automatically restart at 1.50 VPC. When the desired reset profile setting is reached, press the left button  once.



### 2.6.4 Setting the Maintenance Interval



The display will flash the left digit (thousands of hours). Press the right button  to increment by one or hold the button to increment continuously. When the desired number is reached, press the left button  once to proceed to the next digit. Repeat this process for all 4 digits.



### 2.6.5 Setting the Total Hour Meter



The display will flash the left digit (tens of thousands of hours). Press the right button  to increment by one or hold the button to increment continuously. When the desired number is reached, press the left button  once to proceed to the next digit. Repeat this process for all 5 digits.

### 2.6.6 Exiting Configuration Mode

The configuration mode can be exited in three ways:

- a) Press and hold the left button  for three seconds.
- b) Leave buttons untouched for 30 seconds.
- c) Press the left button  after selecting the last (right) digit of the last function available.


## 3.0 Operation

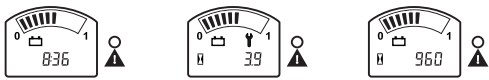



When the main power (9-60 VDC) is applied to V+ and V-, a power-up sequence is initiated. All display segments are illuminated for one second. The display is then turned off until the keyswitch is activated.

### 3.1 Button Use During Normal Operation

#### 3.1.1 Toggling Display Functions

Press the left button  to sequentially toggle between the three numeric gauge functions (time-of-day clock, maintenance hours, total hours).






The following procedures (3.1.2 and 3.1.3) can be done without V+ applied to Setup Enable pin. Press and hold the left button  on the front panel until the entire display flashes and then release.

### 3.1.2 Setting/Changing the Time-of-Day Clock

See Section 2.6.2.

### 3.1.3 Resetting the Maintenance Hour Meter

Press the left button  until the maintenance hour meter function is displayed (the wrench icon will be illuminated). Press and hold both the right button  and the left button  until the display flashes and the maintenance hour meter is reset to zero. This can be performed at any time, independent of the actual maintenance status.

### 3.2 Auto-range

Curtis enGage™ II will automatically recognize one of the following 4 battery voltages: 12VDC or 36VDC - 24VDC or 48VDC based on the status of the auto-range input pin.







### 3.3 Output and Warning LED

Function	LED Activated	FET Activated
Fuel	LMB	LMB
Temp	RMB	RMB
Pressure	LMB & RMB	LMB & RMB
Voltage	2nd LMB & RMB	2nd LMB & RMB
Tach	RMB	RMB
BDI	LMB	LMB
Maintenance Due	LMB	LMB

KEY: RMB = Right Most LCD Bar / LMB = Left Most LCD Bar

### 3.4 LCD Icons

Curtis enGage™ II contains a number of icons to assist the user:

-  a) Hourglass Icon - Turned on (not blinking) to indicate that an hour meter is displayed in the numeric display. Flashes to indicate hour meter accumulation.
-  b) Wrench Icon - Turned on (not blinking) to indicate that the maintenance hour meter is displayed in the numeric display. Flashes when the maintenance interval is reached.
-  c) Colon - Flashes to indicate that the time-of-day clock is being displayed in the numeric display and that time is counting-up.
-  d) Decimal Point - To indicate 1/10 of an hour on the maintenance hour meter
-  e) Fuel or Battery Icon - Turned on (not flashing) depending on which function the gauge is programmed to monitor. It flashes when a low condition is detected.
-  f) Percent - Indicates remaining percentage of interval or level.

### 3.5 Resetting BDI

OCR – Open Circuit Reset

The BDI will reset when gauge is disconnected from discharged battery and reconnected to a fully charged battery.

CTR – Charge Tracking Reset

Battery state-of-charge will be tracked by gauge during charging period(s).

## 4.0 Troubleshooting

### BDI Function

Problem	Possible Cause
No Display	Terminals not connected. Improper voltage.
Stays At FULL	Instrument voltage does not match battery voltage. V+ connected to wrong terminal.
Will Not Reset	Instrument voltage does not match battery voltage. Battery not fully charged. Battery may be defective.
Resets without Charging Battery	Not connected directly to battery terminal.
EMPTY Too Soon	V+ connected to wrong terminal. Instrument voltage does not match battery voltage. Terminals not directly connected to battery.
Will Not / Cannot Configure	Procedure in section 3.6.3 not being followed. No power to Setup Enable pin.

### Sender Function

Problem	Possible Cause
No Display	Terminals not connected. Improper voltage.
Stays At FULL	V+ connected to wrong terminal. Sender or sender connection problems.
EMPTY Too Soon	V+ connected to wrong terminal. Sender or sender connection problems.


### Maintenance Function

Problem	Possible Cause
Will Not Reset	Section 3.1.3 procedure not being followed.

## 5.0 Maintenance

The enGage™II 3000 Series is not serviceable.

## Safety Instructions

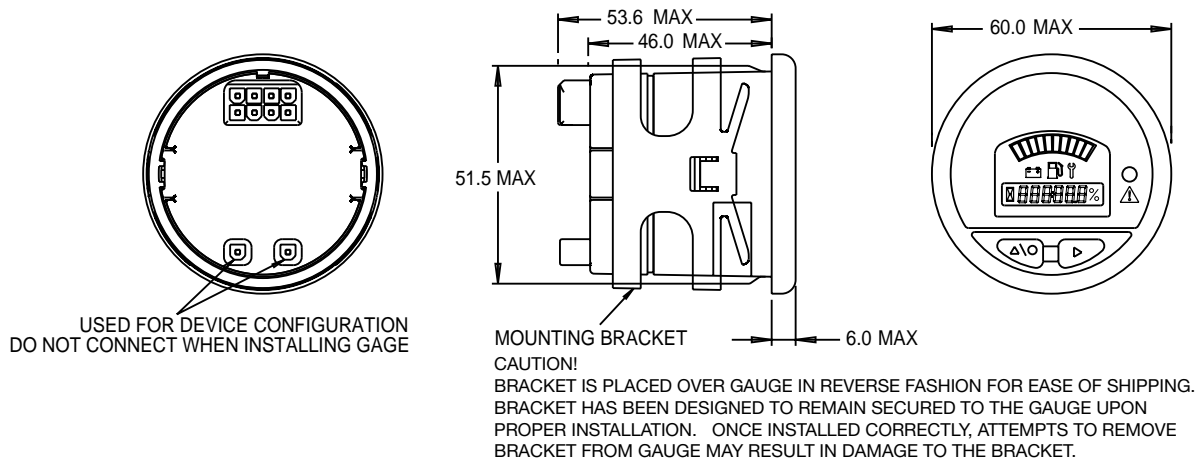
- This instrument was manufactured and tested according to the applicable technical standards. It complies with all the safety regulations as shipped from the factory.
- Installation and startup must be performed by skilled personnel.
- Failure to install and operate the unit in accordance with these instructions may result in damage or injury.
- If safe operation of the instrument can no longer be ensured, stop and secure it against accidental operation.
- If instrument failure or malfunction may cause personal injury or material damage, use additional safety measures such as limit switches, guards, etc.
- Read the Operating Instructions carefully before startup.
- Note the safety instructions marked with this warning symbol  in this manual.

## Guarantee

Curtis Instruments' products and/or components are guaranteed against defects in workmanship and material for a period of two years, or as defined in the individual product literature, from date of shipment from our factory, when applied in a proper application within specified ratings. This guarantee is limited to repair or replacement F.O.B. our factory. There is no further warranty or implied representation, guarantee, promise or agreement as to any Curtis Instruments product and/or component. Curtis Instruments, Inc., cannot assume responsibility or accept invoices for unauthorized repairs to its products and/or components, even though defective. In no case will Curtis Instruments' responsibility extend to products, components or equipment not of its manufacture. Under no circumstances shall Curtis Instruments, Inc., be liable for any special or consequential damages or loss of profits or other damages. Returned goods will not be accepted unless identified by a Curtis Return Material Authorization (RMA).

**All specifications are subject to change without notice.**

### 2.3 Mounting/Dimension Drawing



#### MOLEX CONNECTOR

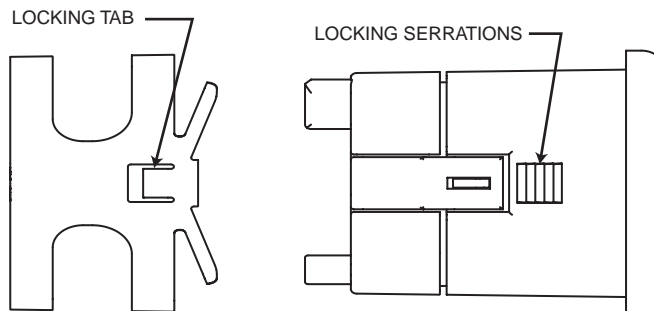
PIN NO.	DESCRIPTION
1	Sense B
2	Keyswitch
3	FET Output
4	V-
5	Sense A
6	Setup Enable
7	Hour Meter Enable
8	V+

#### AMP CONNECTOR

PIN NO.	DESCRIPTION
1	Sense A
2	Setup Enable
3	Hour Meter Enable
4	V+
5	Sense B
6	Keyswitch
7	FET Output
8	V-

#### NOTES:

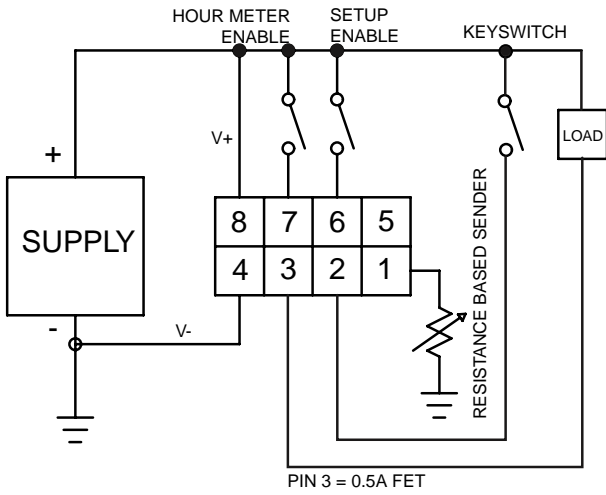
- 1.0 MATING CONNECTOR: 8-PIN MOLEX P/N 39-01-2085 WITH UL RATING 94V-0, PINS P/N 39-00-0039 FOR #18-24 AWG
- 2.0 MATING CONNECTOR: 8-PIN AMP P/N 794821-1 WITH UL RATING 94V-0, INTERFACE SEAL P/N 794772-0, WIRE SEAL 794758-1, PINS P/N 770904-X FOR #18-24 AWG
- 3.0 MATERIAL: CASE-POLYCARBONATE, LENS-CLEAR POLYMETHYLMETHACRYLATE (PMMA), COVER, OVERLAY & MOUNTING BRACKET-POLYCARBONATE.
- 4.0 THIS UNIT IS DESIGNED FOR A MOUNTING PANEL THICKNESS OF 0.8mm - 6.4mm.
- 5.0 PANEL CUTOUT: 52mm DIA DASH PANEL HOLE.



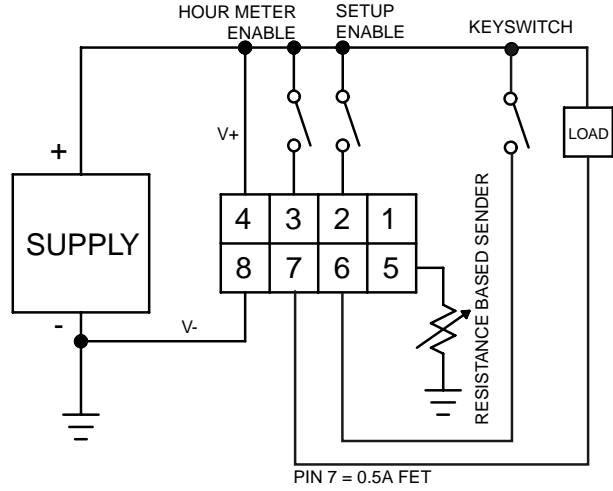
LOCKING TAB MUST ALIGN WITH LOCKING SERRATIONS



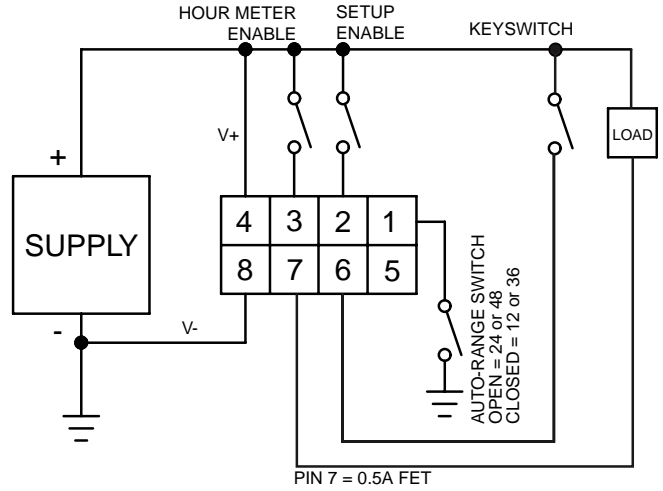
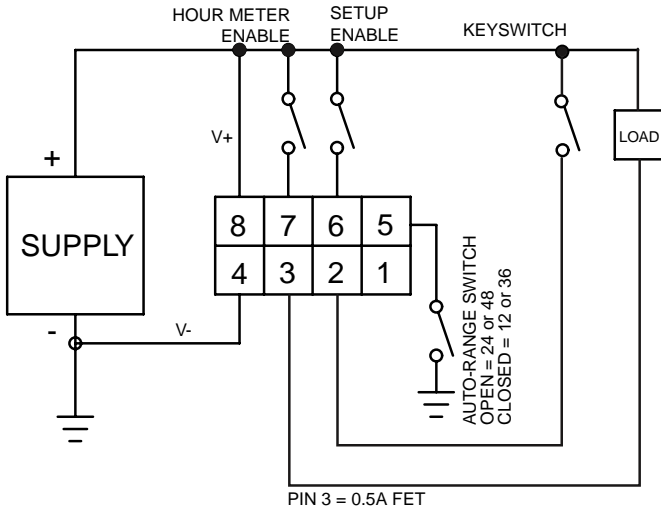
**Molex Connector**



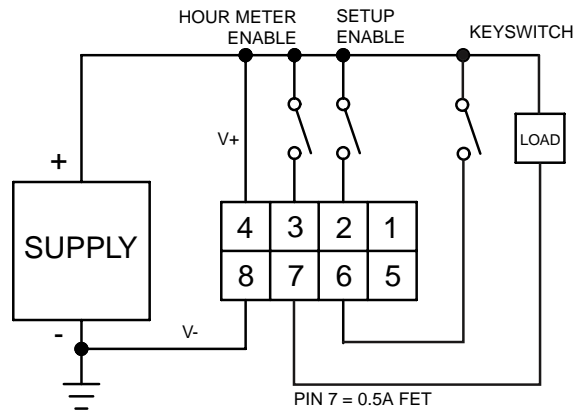
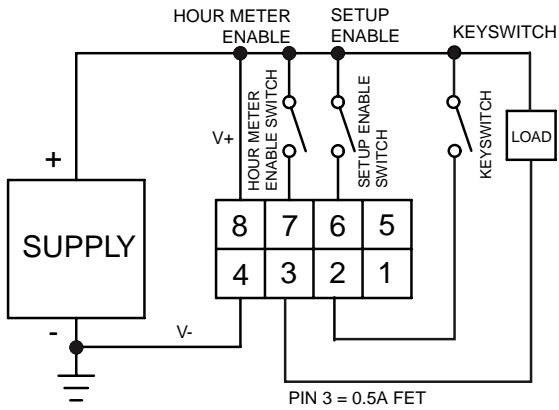
**AMP Connector**



**Resistive based sender input (i.e. temp, fuel and pressure).**



**BDI (with auto-range switch)**



**Voltmeter**