



TTD™ Series Configurable Fault Annunciator

Installation and Operations Manual

For Firmware >= 9.8

Warranty - A limited warranty on materials and workmanship is given with this FW Murphy product.
A copy of the warranty may be viewed or printed by going to <http://www.fwmurphy.com/warranty>



FW Murphy has made efforts to ensure the reliability of the TTD System and to recommend safe usage practices in system applications. Please note that in any application, operation and controller failures can occur. These failures may result in full control outputs or other outputs, which may cause damage to or unsafe conditions in the equipment or process connected to the TTD system.

Good engineering practices, electrical codes and insurance regulations require that you use independent external protective devices to prevent potentially dangerous or unsafe conditions. Assume that the TTD system can fail with outputs full on, outputs full off or that other unexpected conditions can occur.

Please read the following information before installing the TTD annunciator.

This installation information is intended for all TTD Series models. A visual inspection of this product before installation for any damage during shipping is recommended.

Disconnect all power and be sure machine is inoperative before beginning installation.

Installation is to be done only by a qualified technician.

Observe all Warnings and Cautions at each section in these instructions.

The device shall be wired in accordance with Class I, Division 2 wiring methods.

This equipment is suitable for use in Class I, Division 2, Groups B, C and D hazardous areas.

WARNING – Explosion Hazard – Substitution of components may impair suitability for Class I, Division 2.

Please contact FW Murphy immediately if you have any questions.

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Product Description

The TTD product is a solid-state fault annunciator and shut-down control system designed to protect engines, compressors and their associated equipment. The TTD monitors 48 normally open and/or normally closed sensors. Each of the 48 channels can be configured for Shutdown or Alarm Only. Any channel can be locked out by one of the two Start-Run timers or configured as Class C, ESD or Ignore. The annunciator provides logic for both closing of a fuel valve and grounding of an ignition after a time delay.

Incorporated in the TTD non-volatile memory:

- Run Hours/Elapsed Time Meter (hours roll over at 499,999)
- Last 10 Shutdowns with associated run hours
- Last 4 Alarms with associated run hours

Optional Features (Model Dependent):

- Pre/Post lube timed functionality
- Tachometer w/ Overspeed and Underspeed setpoints
- Lubricator No-Flow detection for up to 4 pulsing proximity switches

Display Head (TTD-H)

The Display Head shows operational and configuration data. Configuration parameters are entered via keypad or transferred using PC and MConfig™ software. The operator interface will accept digital inputs directly on the back of the unit. Power is provided to the Display Head via a direct-mounted power supply or a cable connecting to a remote mounted power supply. The display head contains the microprocessor, the liquid crystal display (LCD), the membrane keys for configuring the sensors inputs and the sensor input terminal blocks.

The TTD liquid crystal display annunciates any fault from the sensor channel, displays engine speed and run hours/elapsed time. Other features for the TTD model are: built-in Test Mode to test the sensor circuits without shutting down; Pre-lubrication and Post-lubrication timers; and onboard backup battery to retain the fault display after shutdown on ignition-powered units.

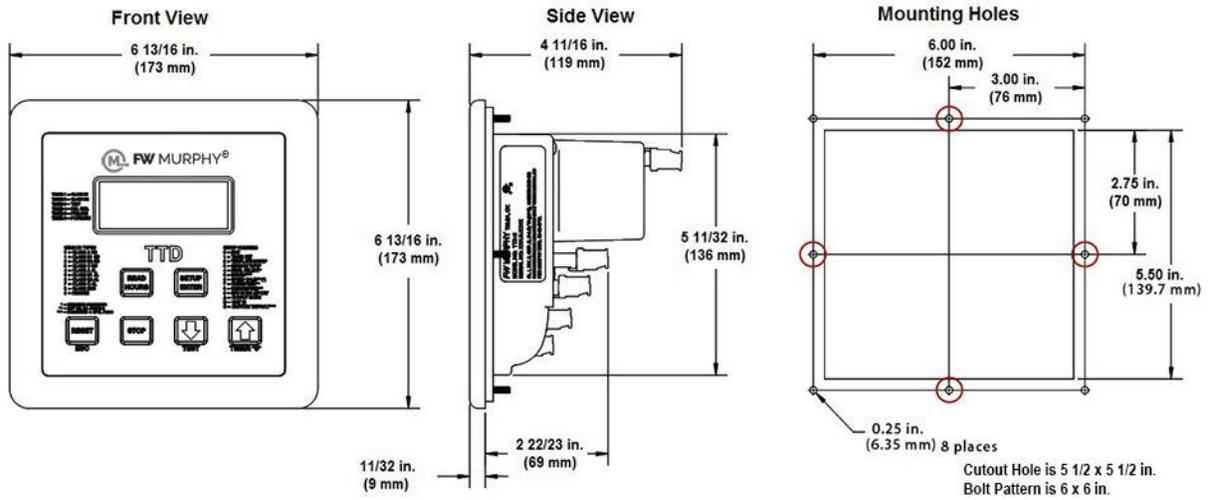
Power Supply

The Power Input and Control Output Terminals are mounted on the Plug-in Power Supply (PSU-2). The Power Supply also includes a RS485/RS232 serial communication port (Modbus RTU server) to interface with microcontrollers, PCs, PLCs and/or communication and control systems. The serial communication provides read and write register capability with selectable baud rates up to 38,400 bps.

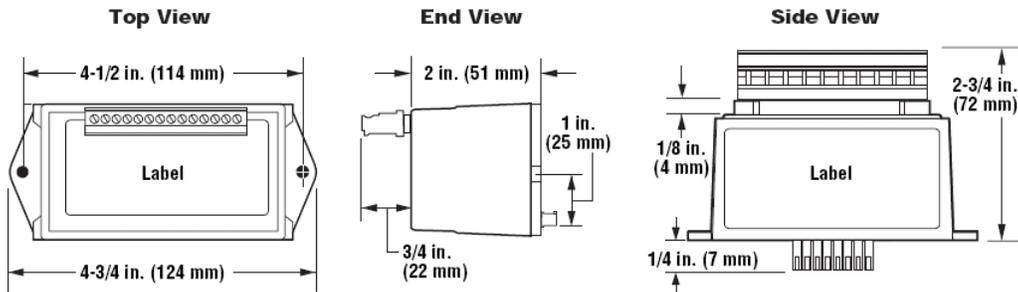
All PSU-2 Power Supply models are reverse polarity protected and can be powered by 10-32 vdc or 90- 400 vdc negative ground CD ignition. The TTD annunciator is fully operable with the internal battery. The external 12-32 vdc power enables communications support (Modbus server) and turns on the display backlight.

Dimensions

TTD Display Head



Power Supply



Installation

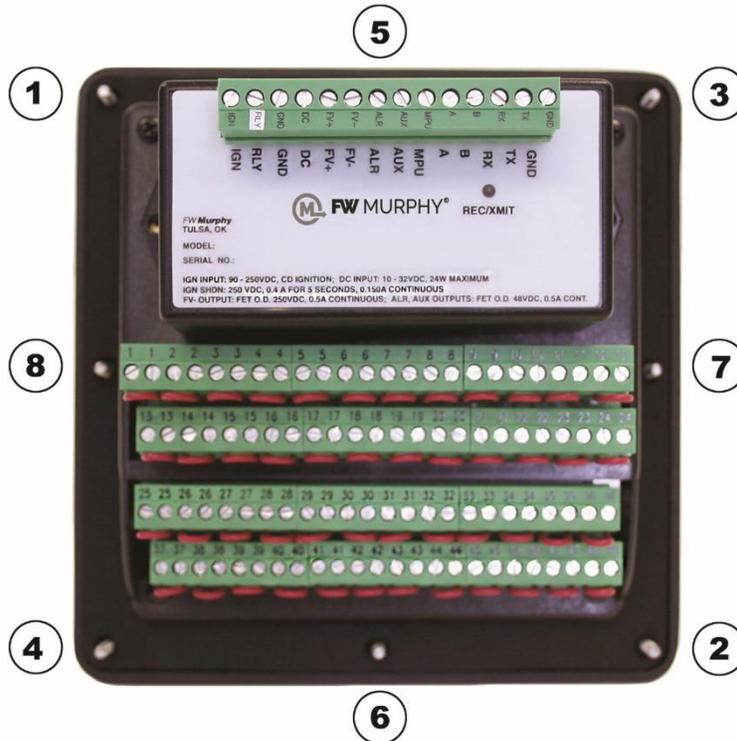
Mounting the Unit

The TTD head was designed to be mounted within a weatherproof enclosure. It is intended for mounting in a flat panel. A square mounting hole of 5-1/2 in. (140 mm) and 8 mounting screw holes are needed.

WARNING! Perform the mounting operation with power source off.

Stud Tightening Pattern

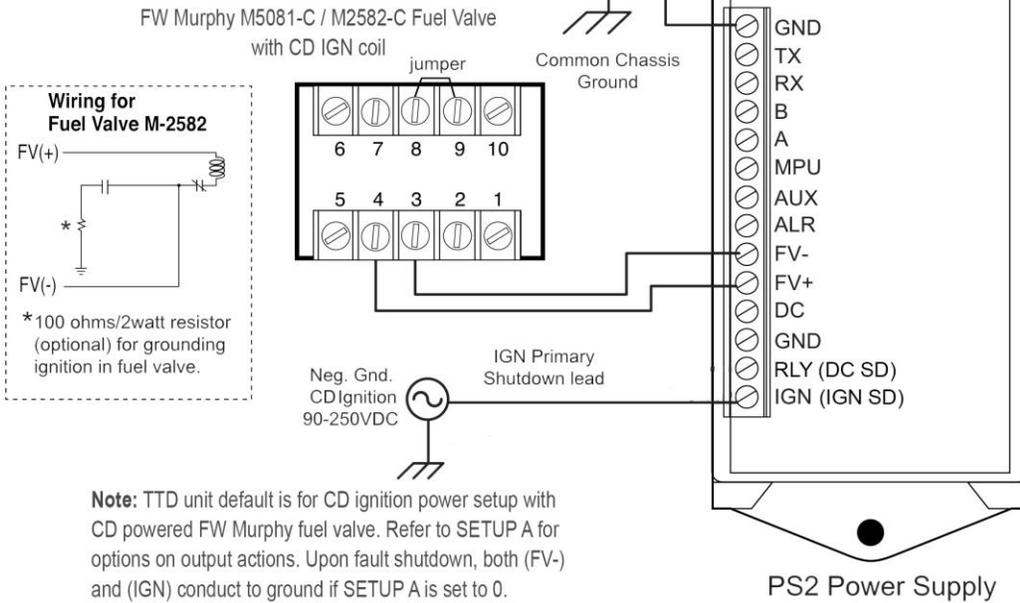
The following stud tightening instructions are required to maintain the IP66 rating when installation requires the display to be mounted in an enclosure door exposed to atmospheric conditions.



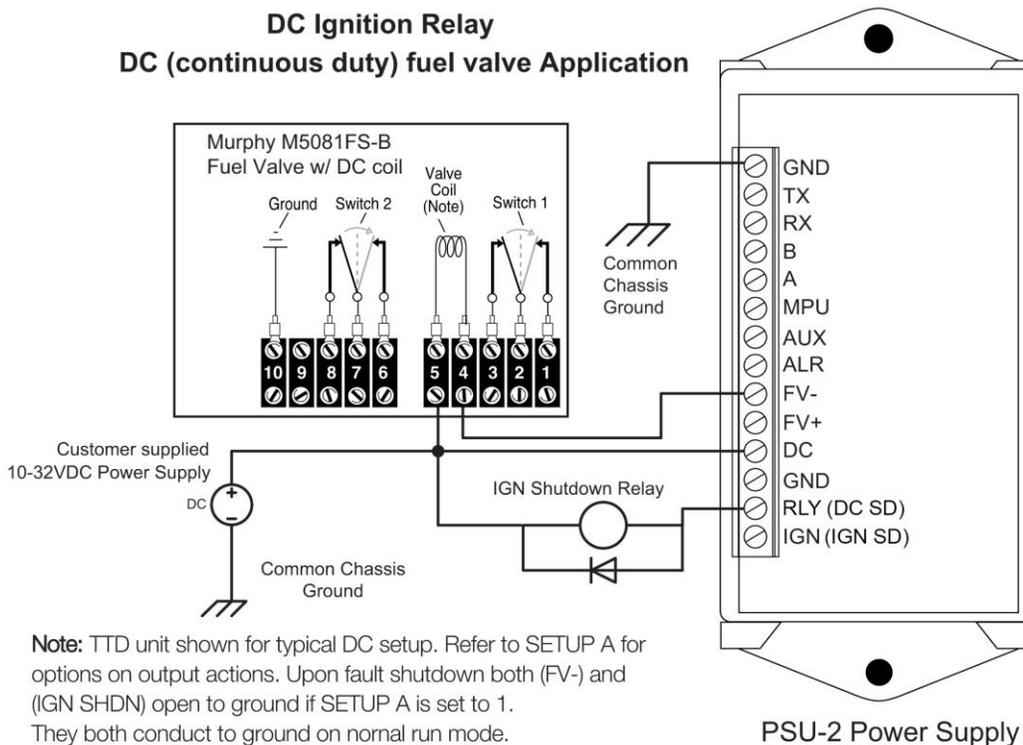
- Stud tightening pattern should be followed:
 1. Top left corner
 2. Bottom right corner
 3. Top right corner
 4. Bottom left corner
 5. Top center
 6. Bottom center
 7. Right center
 8. Left center
- Tighten the 5/16" holding nuts to 9 in. /lbs.

Typical Installations for TTD Power and Control Inputs/Outputs

Application wiring for: Negative Ground CD Ignition Power CD Fuel Valve Ground CD Ignition



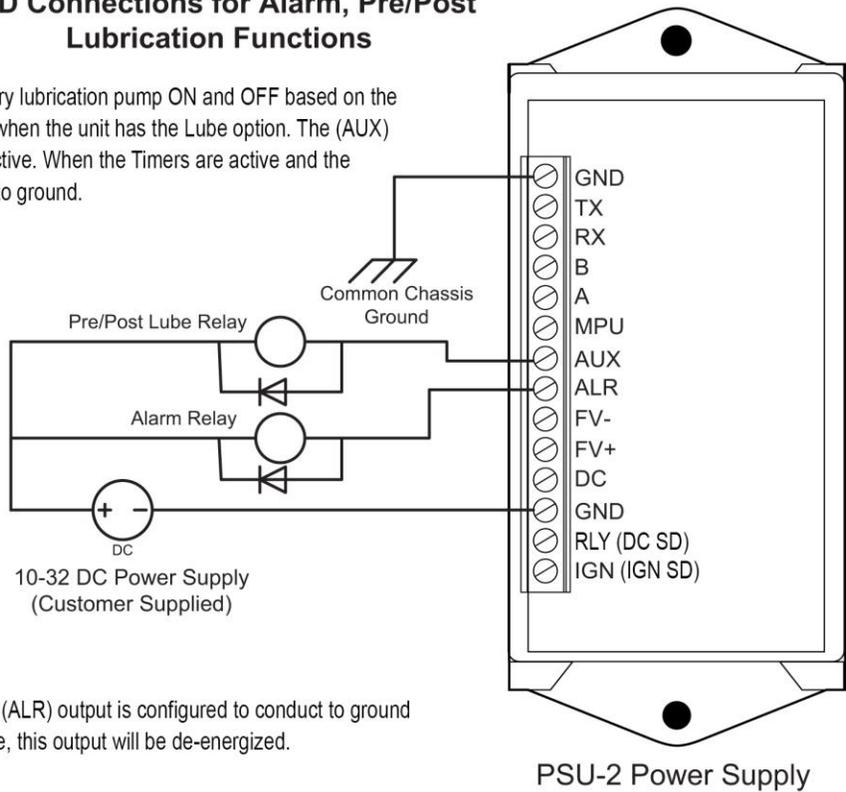
Installation for DC Power DC Ignition Relay DC (continuous duty) fuel valve Application



TTD Connections for Alarm, Pre/Post Lubrication Functions

Note: The (AUX) output is for turning the auxiliary lubrication pump ON and OFF based on the setting on the Timer 5 and Timer 6 in SETUP 1 when the unit has the Lube option. The (AUX) terminal conducts to ground when Timers are active. When the Timers are active and the operator presses Timer 0, the contact will open to ground.

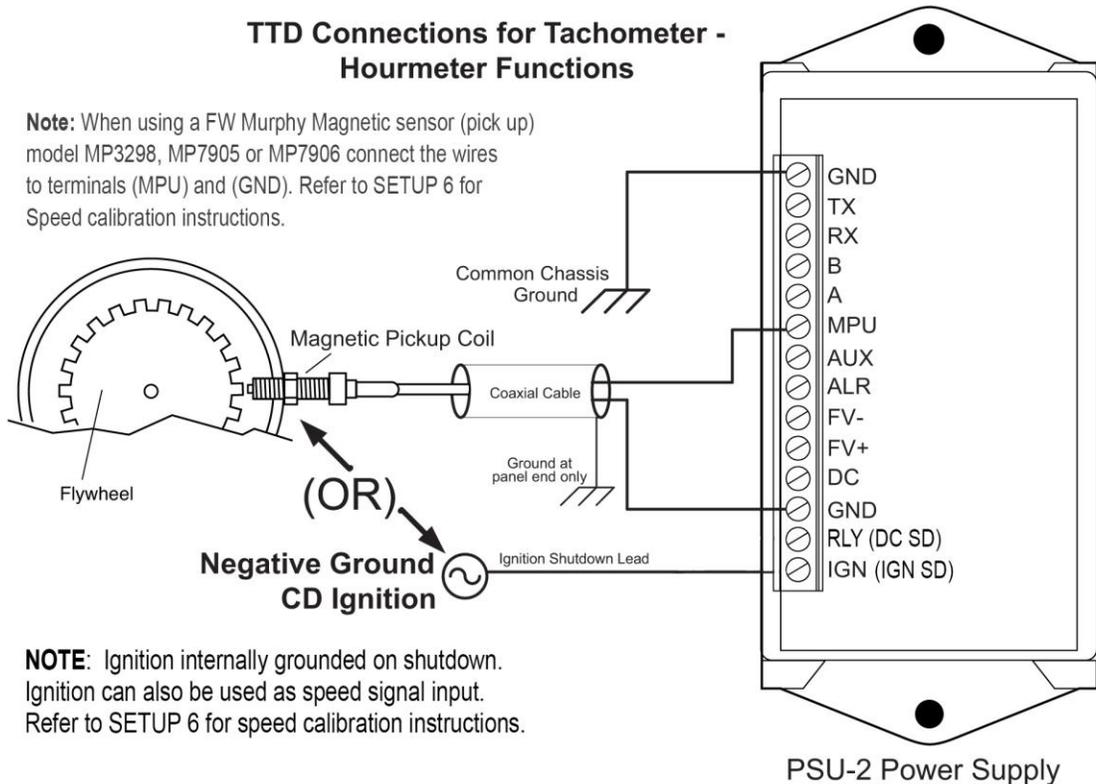
Note: If SETUP A is selected between 0-3, the (ALR) output is configured to conduct to ground upon detecting an ALARM condition to turn on an audible horn, light or other interface device. This output will open when either the RESET key is pressed or the ALARM condition returns to normal. The ALARM message will remain on the display until the RESET key is pressed acknowledging the ALARM. The (ALR) output is also energized during SHUTDOWN. Pushing the STOP key will not energize the (ALR) output.



Note: If SETUP A is selected between 4-7, the (ALR) output is configured to conduct to ground during RUN mode. If any SHUTDOWN is active, this output will be de-energized.

TTD Connections for Tachometer - Hourmeter Functions

Note: When using a FW Murphy Magnetic sensor (pick up) model MP3298, MP7905 or MP7906 connect the wires to terminals (MPU) and (GND). Refer to SETUP 6 for Speed calibration instructions.



NOTE: Ignition internally grounded on shutdown. Ignition can also be used as speed signal input. Refer to SETUP 6 for speed calibration instructions.

SETUP A = Output Mode Configuration

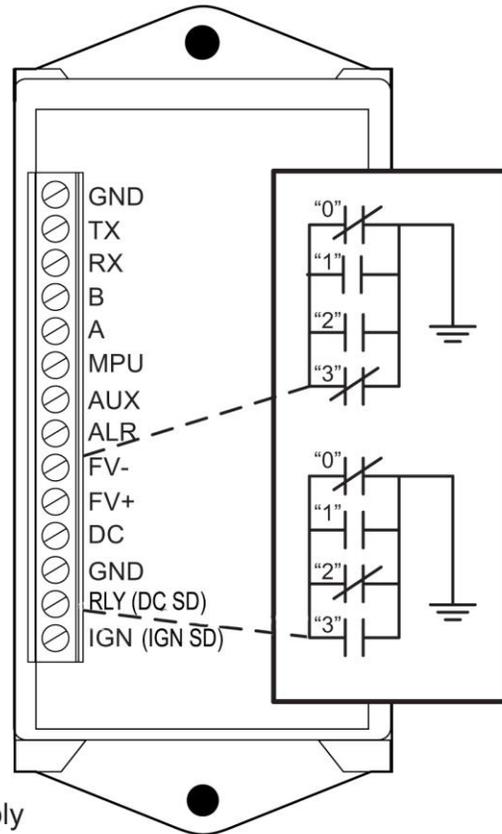
Upon shutdown the (FV-) fuel valve and (RLY) terminals will change stages and either conduct to ground or be open to ground. Their Mode of operation depends on the setting in SETUP A. This sketch represents the options on those settings 0 through 7.

Shutdown Mode					
Output Mode	IGN Kill	Relay	FV-	ALR	AUX
0	Closed	Closed	Closed	Closed – alarm detected Open – no alarm	Open
1	Open*	Open	Open	Closed – alarm detected Open – no alarm	Open
2	Closed	Closed	Open	Closed – alarm detected Open – no alarm	Open
3	Open*	Open	Closed	Closed – alarm detected Open – no alarm	Open
4	Closed	Closed	Closed	Closed – Run Mode Open – Shutdown	Open
5	Open*	Open	Open	Closed – Run Mode Open – Shutdown	Open
6	Closed	Closed	Open	Closed – Run Mode Open – Shutdown	Open
7	Open*	Open	Closed	Closed – Run Mode Open – Shutdown	Open

Closed indicates closed to ground and open indicates open to ground state when unit is in Shutdown state.

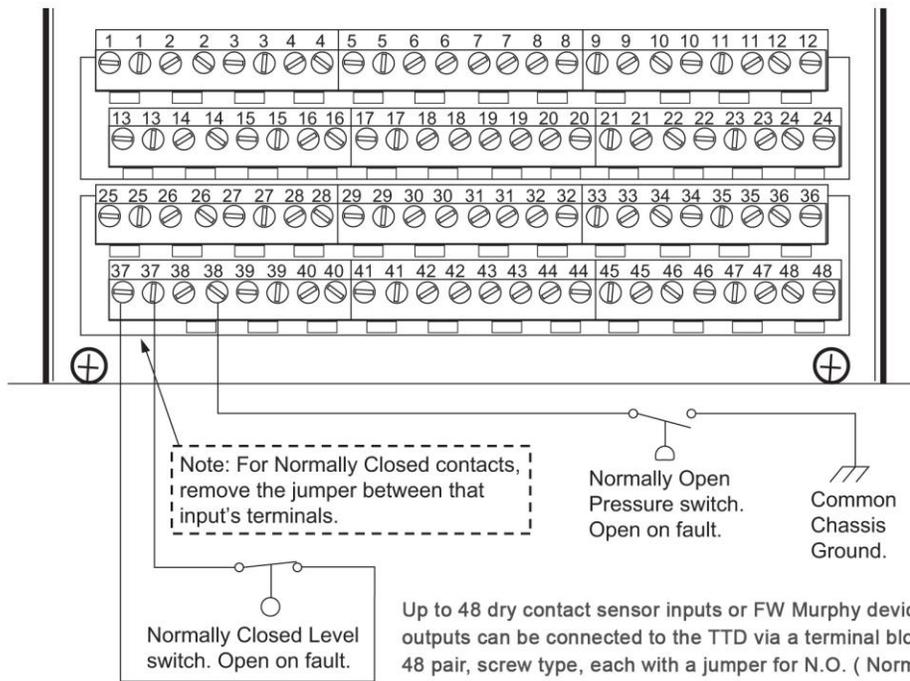
Contacts are shown in Shutdown state.

Refer to Setup A - Output Mode section of this manual for more information on the Setup A.



PSU-2 Power Supply

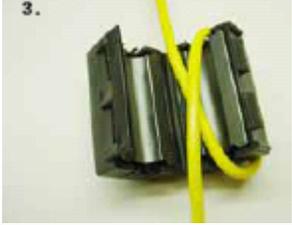
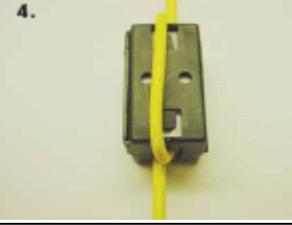
TTD Input Terminal Block Connections



TTD G-Lead Choke Installation Instruction

IMPORTANT: This installation is recommended when connecting an ignition primary lead to the TTD Annunciator to avoid potential electrical noise problems. This choke was specifically selected for the application.

The choke (FW Murphy part number 50000774) ships with each TTD annunciator.

 <p>1.</p>	<p>1. Open the choke and lay it on the table.</p>
 <p>2.</p>	<p>2. Lay the wire across the inside of the choke as shown.</p>
 <p>3.</p>	<p>3. Wrap the wire around the outside of the choke as shown.</p>
 <p>4.</p>	<p>4. Wrap the wire back across the inside of the choke as shown. The wire should lay next to the wire from step 2.</p>
 <p>5.</p>	<p>5. While holding the wires, carefully close the choke as shown. Be careful not to pinch the wire when closing the choke.</p> <p>NOTE: Keep the wire loops on the outside of the choke as small as possible.</p>

Backup Battery Replacement



WARNING! Before disconnecting or connecting equipment, switch the power OFF and, if possible, lock it out. Assure the area is in a non-hazardous condition before beginning the installation of any new equipment or repairing existing equipment. Bypassing these precautions may present an environment in which explosive hazards are present. If you are working in a hazardous location, take the appropriate precautions to assure the safety of all personnel and equipment.

The TTD Annunciator contains a Backup Power Battery (shipped loose with the TTD Annunciator) located in the power supply module.



While this battery has a potential life of up to 1 year, it may require replacement. The LOW BATT icon will appear when the internal backup battery voltage is below 5.0 volts. If the battery is missing or the voltage falls below 4.6 volts, the LOW BATT icon will blink. Replace the battery when the LOW BATT icon displays in the lower left corner.



NOTE: Internal backup battery is not used during normal operation. Backup battery supplies power to operate TTD Annunciator when CD Ignition is the only source of power and it is not operating (Shutdown), or the user supplied +DC power source has been disconnected.

When CD Ignition or DC voltage is present, power is not consumed from the internal backup battery.

To replace the battery, follow these steps:

	<ol style="list-style-type: none">1. Remove the 2 cover screws and flat washers located on sides of the PSU-2 Power Supply.2. Carefully unplug the Power Supply from the Display Module by pulling the Power Supply straight up off the connectors.
	<ol style="list-style-type: none">3. Turn the Power Supply over to access the Backup Battery compartment.4. Use caution not to damage other components in the Power Supply compartment while removing and replacing the Backup Battery. Suggested replacements for the Backup Battery: 6 VDC, 1300 mAh, DL223A (also called CRP2) lithium battery, available from FW Murphy (p/n 00005125).5. Plug the Power Supply back into the Display Module and reinstall the two cover screws with flat washers.6. Power up the system and resume normal operations.

Initial Power Up

Power On Self Test (POST)

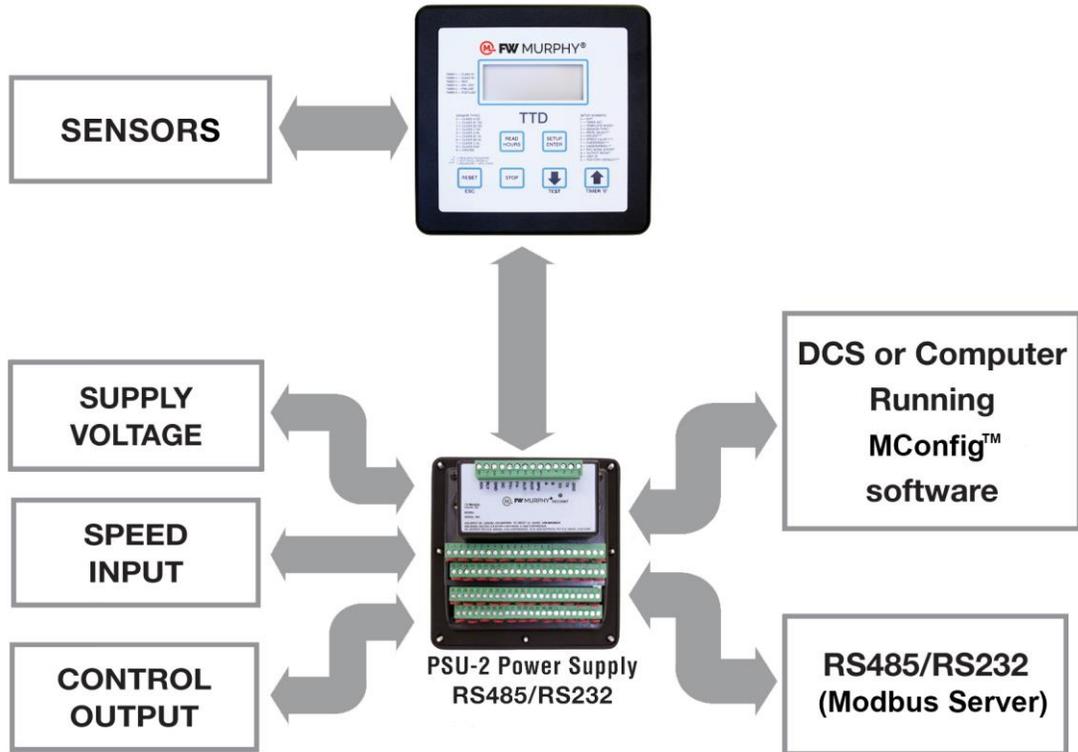
- The TTD will perform a Power On Self Test (POST) during the initial power up which will check for the following errors (in this order):
 - Low Device Voltage (code 53)
 - Crystal Failure (code 54)
 - Loss of SPI link (code 61)
 - Legacy Operation Mode (code 64)
- If the error is Low Device Voltage (code 53) or Legacy Operation Mode (code 64), the unit will go to the PoStErr display after testing for two seconds.
- If the error is Crystal Failure (code 54) or Loss of SPI link (code 61), the unit will reset three times to try to correct the problem. If the error is not corrected within 3 retries, the unit will go to the PoStErr display.
- The PoStErr will be displayed on the TTD as shown below:

The image shows the text "PoStErr" in a large, monospaced, digital-style font. Below it, the text "XX" is displayed in a smaller, similar font. This represents the error code displayed on the TTD.

Where XX = 53, 54, 61 or 64

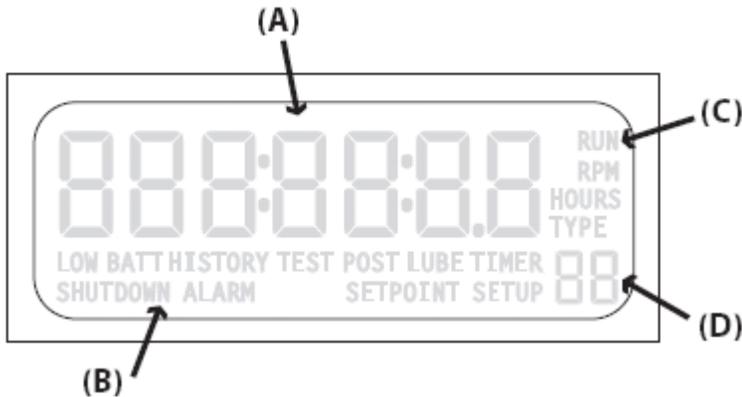
- Fault code 64 will not cause a shutdown during normal operation of the TTD beyond the initial POST test. This code means the extended hourmeter, and output modes present in TTD-H ≥ 9.8 are not supported by the PSU.
- In the event of error code 53 the supply voltage or internal battery voltage to the annunciator will need to be verified and corrected. Once complete, unit can be reset and used for normal operation.
- Fault Code 53 will deny user access to setup menus as this represents a lack of power necessary to access the EEPROM. If the Setup Menu is accessed and a Code 53 becomes active, the user will see Err 53, and the TTD will exit the Setup Menu and return to the last state (running, stopped, etc).
- Fault code 53 will not cause a shutdown during normal operation of the TTD beyond the initial POST test.
- In the event of error codes 53, 54, 61 or 64, which do not clear, **the entire unit (TTD and PSU) needs to be returned to FW Murphy for evaluation.**

Product Features



The Display

The TTD annunciator features a static LCD display (A) with backlight (external DC is required). The operating temperature is between -40° to $+85^{\circ}$ C. The applicable icon and number (B, C and D) will be displayed to clarify the display readings or alert the operator to an operating condition.



Display Icons

RUN – run mode

RPM – screen value

HOURS – screen value

TYPE – channel type configuration

LOW BATT – low battery warning (displayed if the condition exists)

HISTORY – alarm or shut-down history

TEST – test mode

LUBE – pre-lubrication timer

POSTLUBE – post-lubrication timer

SHUTDOWN – stop mode

ALARM – alarm(s) warning (displayed if the condition exists)

SETPOINT – edit setpoint value

SETUP – setup menu(s)

Front Panel Key Functionality



The operator can interface with the TTD Annunciator in one of two ways. One is via the Front Panel keypad. The second way an operator can interface is with the FW Murphy MConfig™ software. This provides the user with a Template displaying the TTD Annunciator setup and status by reading the Modbus RTU Holding registers. Set-up selections can be made, and the configuration saved to file for future reference. The software is free and can be downloaded from www.fwmurphy.com

TTD Keypad Features

NOTE: Because the keys have more than one function depending on the operational mode the system is in at the time, the following TTD Keypad Functionality blocks indicate the keypad action seen if that key is pressed. The **LOW BATT** icon can show in any mode if the battery charge is low.

Shutdown Mode

SHUTDOWN indicates the TTD identified a fault condition and alerts the operator with cause of shutdown code.

The current condition on the display indicates the **SHUTDOWN** icon is on.



	Key	Function
	Read Hours	(B) Shows the operation hours for the displayed History record*.
(B)	Setup/Enter	Press and hold the key for 5 seconds to access the Setup Menu: The model number displays (C) and then the SETUP icon displays (D).
(C)	Up Arrow	Shows the previous History record (E)*.
(D)	Down Arrow	Shows the next History record*.
(E)	Reset	Press [RESET] to start the Run Mode.

*When not in the Setup Mode, History contains records for last 10 shutdowns and last 4 alarms.

Run Mode

The condition on the display indicates the **RUN** and **RPM** icons are shown and the **ALARM** icon may be on.



	Key	Function
	Read Hours	(G) Shows the current operation hours. RUN icon indicates the hour meter is in increment mode.
	Setup/Enter	Press and hold the key for 5 seconds to access the Setup Menu: The model number displays and then the SETUP icon displays.
	Timer 0 / Up Arrow	Press [TIMER 0] to clear the active displayed timer. For example: B1, B2 and other timers. Also used for exiting or ending test mode operation.
	Test / Down Arrow	Press [TEST] to enable the Test Mode timer. Also used for extending or resetting the test timer. (H)
	Reset	Press [RESET] to reset the active displayed timer. <u>DO NOT</u> use to reset Test Mode Timer. This reset button will reset all class lockout timers.
	Stop	Press [STOP] to begin the Shut-down sequence.

Setup Mode – Menus

The condition on the display indicates the **RUN** and **SHUTDOWN** icons may be on.



Key	Function
Setup/Enter	If the unit is in SETUP 0, pressing [ENTER] exits the unit from the Setup Mode. If the unit is in any other Setup, pressing [ENTER] accesses the submenu for that Setup.
Up Arrow	Press [UP ARROW] to navigate to the next menu.
Down Arrow	Press [DOWN ARROW] to navigate to the previous menu.
Reset/ESC	Press [ESC] to exit from the Setup Menu and return to the operational display for the current mode.
Stop	If the system is in Run Mode, pressing and holding the [STOP] key for 2 seconds will begin the Shut-down sequence.

Setup Mode – Edit Settings

The condition on the display indicates the **SETUP** icon shows, and either the **RUN** or **SHUTDOWN** icons may show.



Key	Function
Setup/Enter	Press [ENTER] to exit or advance a Setup menu and save changes.
Up Arrow	Press [UP ARROW] to increment the value to the maximum range. Holding the key accelerates the incrementing action.
Down Arrow	Press [DOWN ARROW] to decrement the value to the minimum range. Holding the key accelerates the decrementing action.
Reset/ESC	Press [ESC] to exit or advance the Setup Menu without saving your changes.
Stop	If the system is in Run Mode, pressing and holding the [STOP] key for 2 seconds will begin the Shut-down sequence.

NOTE: Editing of selected setpoints can be accomplished during run mode. Please note these changes will **NOT** take effect until unit has returned to a Shutdown state. During the Shutdown state, these settings are written to the EEPROM, which stores settings for operation. This EEPROM **CANNOT** be written to during a Run operation.

Operational Display Messages

Several messages display during the start-up and run sequence. This tutorial shows the screens that will display as the system starts. With the unit in shut-down state and ready to start, press the [RESET] key. If Class A channels are not faulted and the unit is equipped with the Pre/Post Lube option, the unit goes into the Pre-Lube cycle. If the unit does not have the Pre-Lube option, it will go to the B1 Timer display.

<p>Pre-lubrication Timer Reading</p> 	<p>Lube Timer 5 shows the remaining time on the cycle, and the LUBE icon shows on the display. The Pre-Lube cycle can be completed either by the timer reaching zero or by the operator pressing [TIMER 0]. Pressing the [TIMER 0] key will zero the time on the active visible timer only. All other active undisplayed timers will remain the same. All outputs are in a shut-down state during LUBE TIMER</p>
<p>B1 Timer Reading</p> 	<p>Once the Pre-Lube cycle completes, the outputs change state, and the B1 and B2 timers start. This display shows TIMER 1 as the remaining B1 time counts down. If this is a TTD unit with optional Tachometer, the display alternates between the active TIMER and RPM readings. If the TTD unit does not have Tachometer, the active TIMER reading alternates with the HOURS reading.</p>
<p>B2 Timer Reading</p> 	<p>Once the B1 Timer finishes, any time remaining on the B2 timer will show in the display, and the TIMER 2 icon will be visible in the lower right-hand corner of the display.</p>
<p>RPM Reading - Shows RPM** - Run Mode</p> 	<p>On TTD models supplied with tachometer, once the B1 and B2 timers have expired, the unit goes to a normal Run Mode. Both the RUN and RPM icons will be visible, and the display gives the RPM reading. TTD units without the Tachometer display the HOURS reading.</p>
	<p>Any conditions such as LOW BATT or ALARM alert the operator by having the icon show on the display. LOW BATT indicates low voltage on the Backup battery and may indicate it is time to replace the battery.</p>
<p>Ignition Delay Timer Reading</p> 	<p>At the detection of a fault, the TTD annunciator starts the shut-down sequence. The ignition delay timer shows the time remaining on the timer before the ignition is grounded or turned off. In addition, the fault channel shows on the left side of the display and flashes.</p>

<p>Post-lubrication Timer Reading</p> 	<p>If the TTD annunciator is equipped with the Pre/Post Lube option and there is time remaining in the sequence, the POSTLUBE icon and the TIMER 6 icon displays showing the remaining time on the timer.</p>
<p>Shutdown Code - Shows Channel Tripped</p> 	<p>When the Post-Lube time counts down, the Fault Channel numeric display moves to the right. The HISTORY icon is visible, and the current shutdown is indicated in the lower right-hand corner by 01. This is the only time History records are available from the Front panel. History records can be read via the Modbus registers at any time.</p>
<p>Hourmeter Reading @ Shutdown Record #1</p> 	<p>The TTD annunciator stores the Shutdown and Alarm History. The last 10 shut-down codes and 4 alarms are stored with the hourmeter reading when they occur. For example, if the unit is shut-down from sensor input 35, the display shows 01 in the lower right-hand corner of the display to indicate the last shutdown, and the SHUTDOWN icon appears. Press the [UP ARROW] key to see the History of the last 10 shutdowns. For more information, see Accessing Shutdown & Alarm History.</p>
<p>Hourmeter Reading - Running Hours</p> 	<p>If this is a TTD unit with Tachometer option and the unit is in the Run Mode and the [READ HOURS] key is pressed, the display shows the running hours for 5 seconds. The display then returns to the RPM reading.</p>
<p>Run Mode Showing RPM Reading</p> 	
<p>Test Timer Reading</p> 	<p>Push the [TEST] key to start the Test Timer for up to 5 minutes. The TEST icon shows in the display. Test Mode allows the operator to simulate faults without the outputs changing state. In Test Mode, all other functions operate normally. Faulted inputs display, but the system is not shutdown, and the ALARM is not turned on. When more time is needed to simulate inputs, the operator can press [TEST] again for up to an additional 5 minutes of time. Press [RESET] to reset the fault and then press the [TIMER 0] to exit the Test Timer. These shutdowns override Test Mode:</p> <ul style="list-style-type: none"> - Emergency Shutdown (47,48) - Overspeed (50) - Manual Stop (52) - Underspeed (51) - Loss of Ignition (49) - Optional Additional ESD, if chosen as ESD <p>If Class C functions are used, they will need to be bypassed to test other sensors. When exiting Test Mode with Class C functions, press the [RESET] and [TIMER 0] keys simultaneously.</p>

<p>Alarm Code - Shows the Channel Tripped</p> 	<p>In an alarm situation, the ALARM icon is turned on, and the alarm point or channel displays. If the unit is equipped with a Tachometer option, the active point or channel alternates with the running hours at the time of the alarm.</p> <p>If a fault is detected or an alarm occurs, the appropriate fault codes display</p>
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Fault Codes

Fault Codes	Description
1-48	Indicates the channel that has faulted or alarmed
49	Loss of Ignition (When the CD ignition falls below 90 VDC± 10%, the firmware activates the fault)
50	Overspeed
51	Underspeed
52	Manual Stop
53	Low Device Voltage (internal diagnostic)
54	Crystal Failure (internal diagnostic)
60	Watchdog Timer
61	Loss of SPI Link (internal diagnostic)
62	Low DC Voltage (Alarm)
63	Low Backup Battery (Alarm)

Backlight used as Status Indication

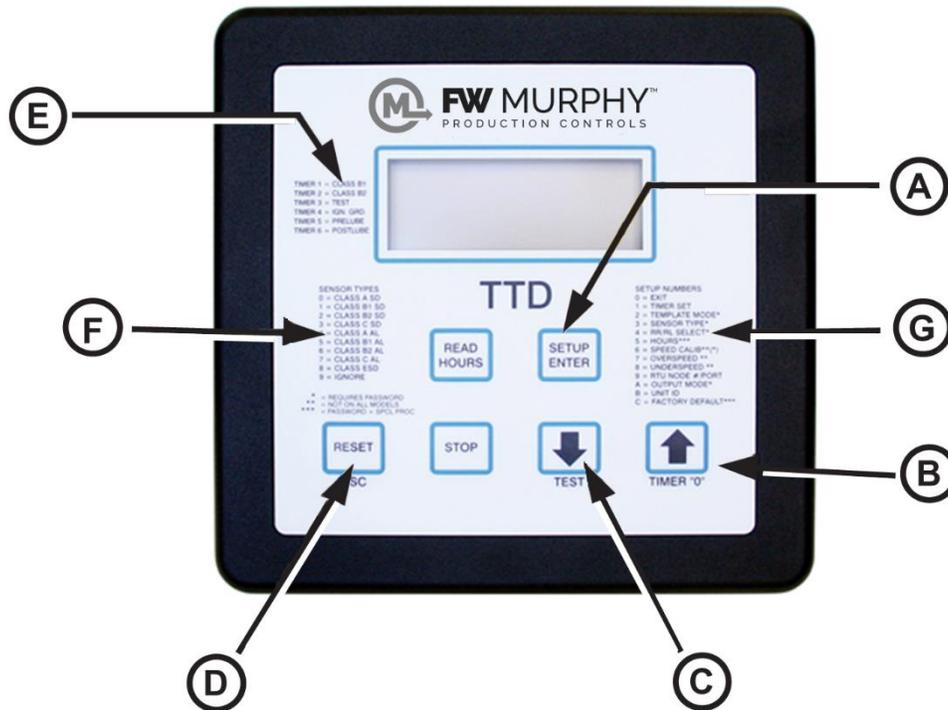
If DC power is connected, the backlight functionality is implemented on Div. 2 power supplies.

Run Mode – The backlight will be yellow under this condition.

Shutdown Mode – The backlight will turn red under this condition. When a shut-down fault is detected, the backlight will blink. The backlight blinking continues for 5 minutes and can be aborted if the user presses any key. After 5 minutes, the backlight stays red. During manual shut-down sequence, the backlight will be red.

Configuration / Setup of the TTD Annunciator

Navigating the TTD Front Panel



The TTD Annunciator can be set up by using the Front Panel. The Setup Mode can be entered from either **RUN** or **SHUTDOWN**. However, settings can only be changed when the **SETUP** icon is blinking.

- (A) [SETUP or ENTER] key
- (B) [UP ARROW] key
- (C) [DOWN ARROW] key
- (D) [ESC] escape key
- (E) Timer information
- (F) Sensor types
- (G) Setup numbers

Entering Setup Mode

	<p>To enter the Setup Mode, press the [SETUP/ENTER] key and hold until the display shows HOLD. Continue to press the [SETUP/ENTER] key until the model number is displayed.</p>
	<p>The HOLD display counts down for 6 seconds, shows the model number for 3 seconds and then shows SETUP 0 to indicate the unit is in Setup Mode.</p>
	<p>Press the [UP ARROW] or [DOWN ARROW] key to move through the Setup values.</p>
	<p>After selecting a different Setup to view, press the [SETUP/ENTER] key to display the current configuration of that set up value. To change a setting, press [SETUP/ENTER] again to access the menu choices.</p>
	<p>Enter changes by using the [UP ARROW] or [DOWN ARROW] key. The only time a new value can be entered is when the Setup icon is blinking.</p>
	<p>Press the [SETUP/ENTER] key again to save the new value. The display will show SAVE for a few seconds and then return to the Setup menu.</p>
	<p>To exit without saving the change, press [ESC]. Press [ESC] again to exit from the Setup Mode completely. The display will show ESC and then return to the operational screen.</p>

Access During Run and Shutdown

Setup menus and settings can be viewed during **RUN** or **SHUTDOWN**, but most menus cannot be changed while in Run Mode. To assure changes can be made, access Setup menus while in Shutdown Mode. Press and hold the [SETUP/ENTER] key for 6 seconds to enter the Setup Mode. The display shows HOLD while the seconds count down.

When the countdown completes, the TTD annunciator is in Setup Mode. The unit model message displays for about 3 seconds before the SETUP 0 message shows. At this point, use the [UP ARROW] key to increment to another Setup Mode.

Password Protected Settings



THIS SYMBOL INDICATES PASSWORD PROTECTED

(M)



Some settings are password protected. If a password is required to change a setting, CODE 00 displays indicating a numeric password should be entered (M). If an incorrect password is entered, ERROR (N) displays for a few seconds, and the CODE 00 (M) notation returns to the display.

(N)



The password will only need to be entered once during any editing session. The password is reset when the editing session is exited or is timed-out due to keypad inactivity. Entering a code 0 allows read-only access to Setup menus.

Use the [UP ARROW] and/or [DOWN ARROW] keys to enter the numeric password specific to that TTD annunciator.

Inactivity Time Out

(O)



Set up procedures need to be started and completed in a timely manner.

If the TTD annunciator is in any Setup Mode, the display function returns to the previous level of entry if there are no key presses within 30 seconds. For example, the TTD annunciator is in SETUP 3 (O), channel 25 is selected and the choice of Sensor Type is displayed (P). After 30 seconds of keypad inactivity, the TTD returns to SETUP 3 (Q).

(P)



If another 30 seconds pass with no keypad activity, escape is activated, and the unit returns to the operational screens.

(Q)



Setup 1 – Timer Setup



THIS SYMBOL INDICATES EDITING DURING RUN MODE ALLOWED

(R)



This manual explains Setup values in order starting with SETUP 1. However, once the SETUP icon is blinking, the [UP ARROW] or [DOWN ARROW] keys can be used to increment to any Setup option. Once the option is reached, press the [SETUP/ENTER] key to access the adjustments for that Setup.

(S)



All timers are configured in SETUP 1. (R) When the SETUP icon is blinking, press the [SETUP/ENTER] key to reach the specific timer to be set. (Setup icon should blink about once a second.)

Use the [UP ARROW] or [DOWN ARROW] keys to change the configuration. Once the change is completed, press the [ENTER] key to save the changes. The unit will display SAVE (S) for few seconds, then

move to the next timer.

If a change is made and the [ESC] key is pressed, the TTD moves to the next timer without accepting the change. If no changes were made to the setting, press the [ESC] key to return to SETUP 1, or press [ENTER] to move to the next timer.

Continue to press [ENTER] to move through all timers and review values or make changes to values as necessary.

Timer 7 Delay Before No-Flow Shutdown

(T)



When an internal input detects a No-Flow condition, the Channel number that detected the condition is displayed along with Timer 7 and its countdown.

(T) Shows the Timer 7 display during No-flow delay before shutdown.

(U) Shows Setup 1 – Timer 7 menu.

(U)

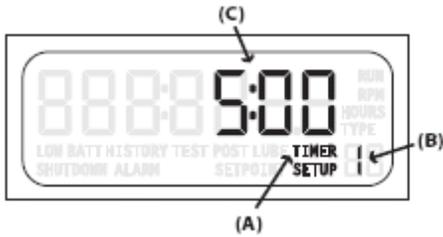


Timer 7 will not be armed until Timer 1 has expired. During Timer 1 countdown, the channels enabled as No-Flow (CH41 - CH44) will be ignored.

Setting Timer 7 to zero (Ø) will cause an immediate shutdown when Timer 1 has expired, if No-Flow is detected on any of the four enabled channels.

To enable or disable the No-Flow function use SETUP 4B thru 4E.

The active timer is indicated by the **TIMER** icon (A), timer number (B) and numeric display (C).



Timer	Timer Class	Timer Range
Timer 1	Class B1	0 to 5 minutes
Timer 2	Class B2	0 to 10 minutes
Timer 3	Test	0 to 5 minutes
Timer 4	IGN GND	0 to 20 seconds
Timer 5*	Pre-lube	0 to 5 minutes
Timer 6*	Post-lube	0 to 10 minutes
Timer 7**	Delay Before No-Flow Shd.	0 to 10 minutes

* When timer is set to zero (0), the timer's feature is disabled or turned off.

** Delay-Only Timer: it does not enable or disable No-Flow functionality.

NOTE: If more than one Timer is active at the same time during Run Mode, the Timers will be displayed by the TTD in the following priority:

1. Timer 3
2. Timer 1
3. Timer 2
4. Timer 7

Timers not active during the Run Mode will not occur at the same time.

Setup 2 – Sensor Mode



PASSWORD PROTECTED

(D)



(D) SETUP 2 is a feature that offers choices for predetermined configurations of sensor class to input channel. These choices can emulate an existing annunciator being replaced or configure a new installation by using the closest template. Units from the factory are set to an Emulation Template default of 0 with all inputs set to Class A.

(F)



Once the unit is in Shutdown Mode, enter SETUP 2 and choose from one of the eight pre-configured Emulation Template Settings or chose 0 and configure each individual sensor channel per your specifications/ requirements. Review the template settings in the first column of the Emulation Table and enter that number to select the template. (F)

Emulation Table

Template Settings	B1 Lockout	B2 Lockout	Class A	Class C	Remote Reset	Remote Lockout	Local ESD	Remote ESD		
0	<i>Only when SETUP 2 is set to "0" can individual channels be set in SETUP 3</i>									
1	TTD		N/A	N/A	46 (1-46)	N/A	(45*)	(46*)	(47**)	(48**)
2	TTD	Mark II	8 (16-23)	N/A	32 (1-15, 24-40)	4 (41-44)	(45*)	(46*)	(47**)	(48**)
3	TTD	Mark III	9 (1-9)	N/A	31 (10-30, 32-40, 48)	4 (41-44)	(45*)	(46*)	(47**)	(31**)
4	TTD	Mark IV, LCDT	15 (1-15)	N/A	29 (16-44)	N/A	(45*)	(46*)	(47**)	(48**)
5	TTD	Mark IV, LCDT+	15 (1-15)	N/A	25 (16-40)	4 (41-44)	(45*)	(46*)	(47**)	(48**)
6	TTD	Generic	16 (1-16)	4 (17-20)	20 (21-40)	4 (41-44)	(45*)	(46*)	(47**)	(48**)
20	DD-20 / DD-40 (mode 4)	Altronic	8 (10-17)	None	12 (20-27, 30-32, 40)	N/A	(45*)	(46*)	N/A	N/A
40	DD-40 (mode 1)	Altronic	16 (10-17, 20-27)	None	24 (30-37, 40-47, 1-8)	N/A	(45*)	(46*)	N/A	N/A
42	DD-40 (mode 2)	Altronic	12 (10-17, 20-23)	4 (24-27)	24 (30-37, 40-47, 1-8)	N/A	(45*)	(46*)	N/A	N/A
43	DD-40 (mode 3)	Altronic	10 (10-17, 20-21)	2 (22-23)	24 (30-37, 40-47, 1-8)	4 (24-27)	(45*)	(46*)	N/A	N/A
<p>* If Remote Reset and Remote Lockout are selected in SETUP 4, any previous setting on channel 45 and 46 will be overridden.</p> <p>** Channel 47 and 48 are defaulted to Class ESD, which means they will override the Test function and shutdown the unit. They can be changed if desired.</p> <p>*** () – numbers in parenthesis indicate terminal/channel numbers. The number in front of the () is the number of points in that template.</p> <p>NOTE: When using the Altronic DD20 or 40 Emulation in a non-tachometer TTD, the overspeed channel must be configured.</p>										

(G)



After selecting and saving a template, any channel can be reconfigured by changing a single channel in SETUP 3. To do this, return to SETUP 2 and enter 0 as the template setting (G). The point on the template originally selected is not changed with this action. Next, go to SETUP 3 and change channels, as necessary, to the preferred configurations.

(H)



Terminals 45 & 46 are enabled in SETUP 4 for Remote Reset and Remote Lockout functionality. If they are not enabled, they can be configured the same as the other channel. If they are enabled, they will override any previous setting. Remote Reset can only be used in terminal 45, and Remote Lockout can only be used in terminal 46.

(I)



Terminals 47 and 48 are defaulted to Class ESD. This means they will override the Test function and Shutdown the unit. The functionality on these channels can be changed, if desired.

When Template 20 is selected (H), the channel assignments will duplicate the DD20. Remaining channels are configured as Class A but can be modified in SETUP 3 once SETUP 2 is set to 0. This also applies to Template 40, 42 and 43 with the exception of channels 50 to 57 that are assigned to TTD terminals 1 to 8.

If Template 20, 40, 42 or 43 are used in a unit without the tachometer option, the overspeed channel must be configured.

TTD Terminal Block Configuration Template 20 (DD-20)

1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12
13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24
25	25	26	26	27	27	28	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36	36
37	37	38	38	39	39	40	40	41	41	42	42	43	43	44	44	45	45	46	46	47	47	48	48

TTD Terminal Block Configuration Template 40 (DD-40 Mode 1)

50	50	51	51	52	52	53	53	54	54	55	55	56	56	57	57								
1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12
13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24
25	25	26	26	27	27	28	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36	36
37	37	38	38	39	39	40	40	41	41	42	42	43	43	44	44	45	45	46	46	47	47	48	48

TTD Terminal Block Configuration Template 42 (DD-40 Mode 2)

50	50	51	51	52	52	53	53	54	54	55	55	56	56	57	57								
1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12
13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24
25	25	26	26	27	27	28	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36	36
37	37	38	38	39	39	40	40	41	41	42	42	43	43	44	44	45	45	46	46	47	47	48	48

TTD Terminal Block Configuration Template 43 (DD-40 Mode 3)

50	50	51	51	52	52	53	53	54	54	55	55	56	56	57	57								
1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12
13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	24	24
25	25	26	26	27	27	28	28	29	29	30	30	31	31	32	32	33	33	34	34	35	35	36	36
37	37	38	38	39	39	40	40	41	41	42	42	43	43	44	44	45	45	46	46	47	47	48	48

Class A
Class A
Class B1
Class B2
Class C

Setup 3 – Sensor Type



PASSWORD PROTECTED

Unit must be in Shutdown Mode to edit.

Individual sensor channel can be changed in SETUP 3 (A). As shown in the Sensor Types table, any channel can be set to one of the 11 available configurations. SETUP 2 must be set to 0 to make any changes in SETUP 3.

(A)



Press [SETUP/ENTER].

Use the [UP ARROW] key to increment and change the Channel number.

(B)



Press [SETUP/ENTER].

Use the [UP ARROW] key to select the Type (B).

Press [SETUP/ENTER] to SAVE the changes.

Sensor Types

#	Class	Definition
0	Class A	Shutdown always armed, testable.
1	Class B1	Shutdown armed after Class B1 Start-Run Lockout timer expires, testable.
2	Class B2	Shutdown armed after Class B2 Start-Run Lockout timer expires, testable.
3	Class C	Shutdown armed after input seen healthy first time (2 second debounce), testable.
4	Class A Alarm	Alarm only; always armed.
5	Class B1 Alarm	Alarm only; armed after Class B1 Start-Run Lockout timer expires.
6	Class B2 Alarm	Alarm only; armed after Class B2 Start-Run Lockout timer expires.
7	Class C Alarm	Alarm only; armed after input seen healthy first time (2 second debounce).
8	ESD	Emergency stop, always armed, non-testable, skips postlube timer.
9	Ignore	Channel disabled.
10	Special Lockout	Special Lockout is a fixed 5-minute timer. This timer starts at the same time as the B1 and B2 timers. While timing, the channel assigned this type is locked out. Unlike the B1 and B2 timers, this timer cannot be reset or zeroed while the unit is running. The timer is reset only after shutdown or normal stop.
11	Remote Reset	Only applies to CH45. This setting must be enabled through Setup 4 Menu to be used. If contact is closed between the two terminals or not grounded, a remote reset signal is seen.
12	Remote Lockout	Only applies to CH46. This value must be enabled through Setup 4 Menu to be used. If contact is closed between the two terminals, or not grounded, a remote lockout signal is seen, and the Class B1 and B2 timers are not allowed to time, and Class C faults are not allowed to arm.
13	No-Flow	-L models only: Armed after individual channel pulse timer expires and Delay Before No-Flow timer Start-Run Lockout timer has expired. Applies to channels 41-44 models only. See Timer 7 setting and Setup 4 for individual no-flow proximity switch time settings.

Up to 48 dry contact sensor inputs or FW Murphy device transistor outputs can be connected to the TTD via a terminal block with 48 pair, screw type, each with a jumper for N.O. (Normally Open) or N.C. (Normally Closed) configuration.

Setup 4 – Remote Reset Remote Lockout Select and No-Flow Enable Delay



(D)



Press the [ENTER] key to read SETUP 4A. Press a second time to read SETUP 4B.

(D) Use SETUP 4A to set the Remote Reset/Remote Lockout configuration of preselected channels 45 and 46.

(E)



(E) Remote Reset and Lockout are enabled by this setup and will override any template setting. When the Remote Reset feature is enabled, a closed contact between the 2 terminals (i.e. not grounded) on channel 45 resets the TTD annunciator in the same manner as when using the [RESET] key.

Limit close duration to 1 second. On models with lube option, Remote Reset will start the Prelube timer.

The Remote Lockout feature resets and inhibits the Class B1, B2 and C timers and fault inputs. Any faults configured as B1, B2 or C are ignored when channel 46 sees a closed contact between the 2 terminals (i.e. not grounded). When the contact is open (or grounded), the timers will be allowed to time and arm the faults. This feature is intended to be used with automatic start/stop signals, typically connected to a run confirmation signal to enable the faults after running. Upon an auto-stop, the Remote Lockout should be re-activated by closing the channel 46 contact, until the next start auto-start signal.

With the unit running and closed contact on channel 46, the display will flash and display the B1 timer. On units with Tachometer, the display will flash and alternate between RPM reading and B1 timer.

Configuration Settings	
0	Disabled
1	Remote Reset assigned in the CH45 (fixed)
2	Remote Lockout assigned in the CH46 (fixed)
*3	Remote Reset assigned in the CH45 (fixed) and Remote Lockout assigned in the CH46 (fixed)

** If Remote Reset and Lockout are used simultaneously on models with Lube option, Prelube timer is only activated if the unit is faulted or in Manual Stop and receives the Remote Reset signal. The Remote Lockout signal only inhibits the Class B1 and B2 timers. Therefore, the Prelube timer is skipped if the system is already reset when the Remote Lockout is released.*

No-Flow Switch Transition Time

Use SETUP 4b through 4E to set No-Flow switch transition times.

Digital input channels 41 to 44 can be configured for detecting a transition of the switches on a divider block of a compressor system. The channels are scanned to determine if a transition has occurred in an acceptable time. The time range settings are from 0 to 59 seconds. (The default setting is zero.)

(G)



(G) SETUP 4b is the No-flow screen for CH41

(H) SETUP 4c is the No-flow screen for CH42

(I) SETUP 4d is the No-flow screen for CH43

(J) SETUP 4E is the No-flow screen for CH44

(H)



Setting the value to 0 (zero) on any channel will disable the No-flow function for that channel and allows SENSOR MODE (SETUP 2) or SENSOR TYPE (SETUP 3) to determine the Sensor channel functionality.

A non-zero value enables No-flow function for that channel and defines the timeout for the channel. Enabling No-flow function overwrites the channel SENSOR TYPE or SENSOR MODE configuration (reserves the channel only for No-flow use).

The Test Mode will be ignored if the No-flow is enabled for the channel.

(I)



(J)



Because these inputs are always in transition, the channels are always tested for open and close.

NOTE: Use SETUP 1 to configure (TMR7) Timer 7 delay before No-Flow shutdown.

Setup 5 – Hourmeters



PASSWORD PROTECTED

(K)



(K) This setup is for reading and/or resetting the hourmeter. There are two separate hourmeters:

Hourmeter 5A can be reset.

Hourmeter 5b is the TTD internal hourmeter and keeps track of total RUN HOURS.

(L)



(L) 5A Hourmeter Setting. Range 0 to 499,999 hrs. (This hourmeter can be reset.)

(M) 5b Product Life Timer. Range 0 to 499,999 hrs. (This hourmeter cannot be reset.) The Product Life Timer reading can be accessed through the Modbus or via the Setup menu.

(M)



NOTE: The hourmeter registers are in the display head not in the power supply and are not reset by changing the power supply.

Setup 6 – Speed Calibration



PASSWORD PROTECTED

(N)



The optional Tachometer functionality is configured in SETUP 6 (N).

Pulses per Revolution is calibrated as follows:

Press [SETUP/ENTER] to reach SETUP 6A (O).

(O)



Pressing [SETUP/ENTER] a second time increments the display to 6b.

SETUP 6A is the Pulses per Revolution Setting. Speed input can be either Magnetic pickup (MPU) or CD Ignition Primary Signal (IGN). The range is .5 to 450. Use the [UP ARROW] or [DOWN ARROW] keys to reach the desired setting. Use settings .5-16.5 with ignition input for speed, and settings 17-450 for magnetic pickup input (10 kHz max frequency input).

In the Conversion Table, the number of cylinders and cycles of the engine determine the number of pulses per revolution for ignition input. Divide the number of cylinders by 2 for split capacitor ignitions. Multiply the number of cylinders by 2 for throwaway spark ignitions.

Conversion Table		
Cylinders	Cycles	Pulses
1	2	1
2	2	2
2	4	1
3	2	3
4	2	4
4	4	2
5	2	5
6	2	6
6	4	3
8	2	8
8	4	4
10	4	5
12	4	6
16	4	8

(Q)



SETUP 6b (Q) is the RPM Filter Enable and Loss of Ignition selection and setting. Use the [UP ARROW] or [DOWN ARROW] keys to select a value. Choose a setting from the Loss of Ignition Shutdown and RPM Filter Table to choose a monitoring combination.

Value	Loss of Ignition Shutdown	RPM Filter
0 (default)	Enabled	Disabled
1	Disabled	Disabled
2*	Enabled	Enabled
3*	Disabled	Enabled

* If the TTD unit does not have the Tachometer option, only the 0 and 1 values are available.

Loss of Ignition Shutdown is a Class C function that can be armed only after the B1 Timer (TMR1) expires. When enabled and B1 Timer has expired, CD Ignition must be present (above 90VDC) for at least 15 seconds to arm the Loss of Ignition function. After being armed if CD Ignition falls below 90VDC for at least 15 seconds, the Shutdown sequence will begin, and code 49 will be displayed. (See *Fault Code table*.)

NOTE: The tolerance of the CD Ignition voltage detection is $\pm 10\%$. The arming and shutdown delay of 15 seconds is not adjustable.

RPM filter allows for a DEBOUNCE time before a loss of ignition, underspeed or overspeed shutdown occurs. The filter (when enabled) will take 3 more RPM readings (typically 500mS) once the threshold for shutdown has been achieved. If the shutdown is still valid after 3 attempts, a shutdown will occur. If the RPM reading has re-established at a valid state, the unit will remain running.

Setup 7 – Tachometer Overspeed Option



EDITING DURING RUN MODE ALLOWED

(A)



Fault Code 50. (See *Fault Code table*.)

(A) Use SETUP 7 to adjust the Overspeed Setting. The range is 0 to 5000 RPM.

(B) Press [ENTER] to view the Overspeed setting.

(B)



To change the setting, use the [UP ARROW] or [DOWN ARROW] keys to reach the new Overspeed setting and press [ENTER] to save the change.

NOTE: Overspeed is a Class A Type Shutdown and is not locked out or testable during Test Mode.

NOTE: For TTD-T models used with EICS G-Lead/U-Lead for tachometer readings, disable TTD overspeed and underspeed faults, or false shutdowns may occur caused by diagnostic signals sent by EICS on the G-Lead/U-Lead.

Setup 8 – Tachometer Underspeed Option



EDITING DURING RUN MODE ALLOWED

(C)



Fault Code 51. (See *Fault Code table*.)

(C) Use SETUP 8 to adjust the Underspeed Setting. The range is 0 to 5000 RPM.

(D) Press [ENTER] to view the Underspeed setting.

(D)



To change the setting, use the [UP ARROW] or [DOWN ARROW] keys to reach the new Underspeed setting and press [ENTER] to save the change.

NOTE: Underspeed is locked out by the B1 Timer (Timer 1). Underspeed will not cause a fault until the B1 timer expires.

NOTE: For TTD-T models used with EICS G-Lead/U-Lead for tachometer readings, disable TTD overspeed and underspeed faults, or false shutdowns may occur caused by diagnostic signals sent by EICS on the G-Lead/U-Lead.

Setup 9 – Communication Settings



EDITING DURING RUN MODE ALLOWED

(E)



(E) Use SETUP 9 to select ports, characteristics and communication values for remote devices. Use the [UP ARROW] and/or [DOWN ARROW] to reach setting.

(F)



(F) This is the RTU (Remote Terminal Unit) setting. The range is 1 to 99 (Node number).

(G)



(G) This is the Port selection. There are two choices:

- 0 – RS485
- 1 – RS232

(H)



(H) This is the Baud rate selection. There are five choices:

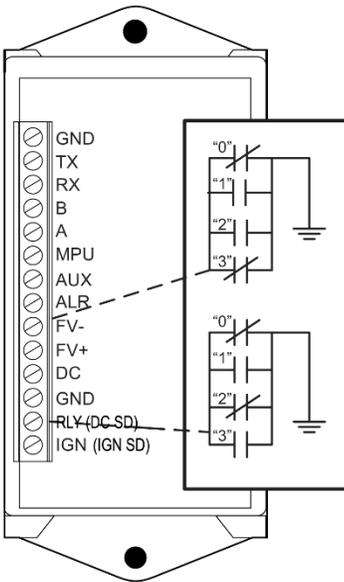
- 0 - 9600,N,8,1
- 1 - 9600,N,8,2
- 2 - 19200,N,8,1
- 3 - 19200,N,8,2
- 4 - 38400,N,8,1 (only if the pulses/rev setting is greater than 16.5)
- 5 - 38400,N,8,2 (only if the pulses/rev setting is greater than 16.5)

Setup A – Output Mode



Upon Shutdown, the FV- (Fuel Valve minus) and the RLY (Relay) terminals change state and either conduct to ground or open to ground. The change of state depends on the configuration of SETUP A.

There are four choices (terminals are shown in the shutdown state):

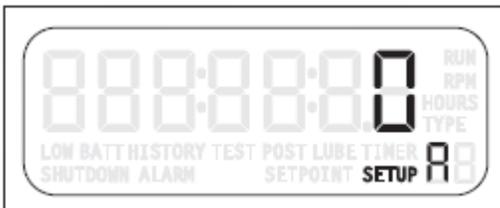


Shutdown Mode					
Output Mode	IGN Kill	Relay	FV-	ALR	AUX
0	Closed	Closed	Closed	Closed – alarm detected Open – no alarm	Open
1	Open*	Open	Open	Closed – alarm detected Open – no alarm	Open
2	Closed	Closed	Open	Closed – alarm detected Open – no alarm	Open
3	Open*	Open	Closed	Closed – alarm detected Open – no alarm	Open
4	Closed	Closed	Closed	Closed – Run Mode Open – Shutdown	Open
5	Open*	Open	Open	Closed – Run Mode Open – Shutdown	Open
6	Closed	Closed	Open	Closed – Run Mode Open – Shutdown	Open
7	Open*	Open	Closed	Closed – Run Mode Open – Shutdown	Open

Table Note: Closed indicates a closed-to-ground state and open indicates an open-to-ground state when the TTD unit is in Shutdown Mode.

Output Mode 0-3 configure the ALR output as Alarm indication. Output Mode 4-7 configure the ALR output as Run indication.

Open* -- These outputs do not change state during a run mode — they remain open. Typically used with IGN as a speed input only and the application does not require grounding ignition on a unit fault.



Use the [UP ARROW] or [DOWN ARROW] key to select the Output Mode setting. Press [ENTER] to save the setting.

Setup B – Unit Identification (ID)



EDITING DURING RUN MODE ALLOWED

(L)



(L) This function enables the operator to assign a six-digit number.

Use the [UP ARROW] arrow key to increment to the SETUP b option.

(M)



(M) Press [SETUP/ENTER] to access the Prefix screen and the [UP ARROW] or [DOWN ARROW] keys to set the Prefix ID. The Range is 0 to 99.

Press [ENTER] to save the selection and the (N) Suffix ID screen displays. Use the [UP ARROW] or [DOWN ARROW] keys to set the Suffix ID. The range is 0 to 9999.

(N)



Setup C – Factory Default



(A)



(A) This option returns all settings except the Product Lifetime register back to the default Factory settings.

Use these instructions to return the TTD unit to the original factory defaults:

1. Enter the correct numeric password. (B)
2. Use the [UP ARROW] key to set the value to 1 (C).
3. Press the [SETUP/ENTER] key to save the change. The screen display returns to SETUP C.
4. Press the [DOWN ARROW] to reach SETUP 0.
5. Press [ENTER]

(B)



6. The EEPN screen displays to verify the factory defaults have been reinstated. (D)

CAUTION: Executing SETUP C resets all settings, registers and hours. Shut-down and alarm histories will also be erased.

(C)



(D)



Voltage Readings

(E)



(E) The internal backup battery, external DC and ignition voltage readings are available in the VOLT menu after SETUP C. These readings are updated approximately every 4 seconds and are read-only.

Press the [ENTER] key to view each of the readings:

(F)



- Internal Backup Battery voltage (F)

Press the [ENTER] key to set the Internal Backup Battery **Low Voltage Alarm**. Press the up/down arrow keys to enable (1); to disable return to 0. Press [ENTER].

(G)



- External DC (G)

Press the [ENTER] key to set the External DC **Low Voltage Alarm**. Press the up/down arrow keys to the desired voltage. Press [ENTER].

(H)



- Ignition Voltage peak (H)

If the ignition is wired to the TTD unit.

If Internal Backup Battery, External DC and CD Ignition are connected and operational, power for the TTD Annunciator has the following priority:

1. External DC is used unless voltage falls below 9VDC.
2. CD Ignition is used unless peak voltage falls below 90VDC.
3. Internal Backup Battery is used when no other voltage is present.

NOTE: The TTD Annunciator will operate normally under Internal Backup Battery power except communication functions and backlight will be disabled.

If Underspeed and/or Loss of Ignition are enabled, the TTD may shut down when CD Ignition is not present. The tolerance for CD Ignition detection is $\pm 10\%$.

Software Version

(I)



The Version menu (I) offers a quick and easy way to check the firmware versions in the TTD components.

To verify the current firmware, press [ENTER] to access the Version SETUP H or SETUP P. Press [ENTER] the first time to view SETUP H. Pressing [ENTER] a second time reaches SETUP P.

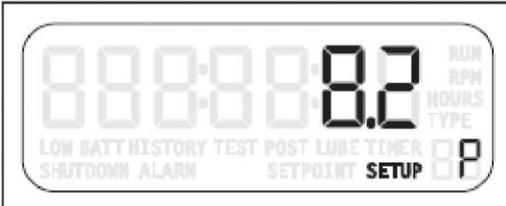
(J)



SETUP H indicates the software version in the Display Head. In this sample (J), the version is 8.0. (Read 8 point 0)

SETUP P indicates the software version in the Power Supply. In this sample (K), the version is 8.2. (Read 8 point 2)

(K)



Communications

Communications Port

A single bi-color (GREEN/RED) LED will be provided to give visual indication of active transmit and receive traffic.

Interface: Factory configured for RS485; field-selectable for RS232 or RS485

Baud/Configuration: 9600, 19.2K, 38.4K (*); N,8,1;N,8,2 half-duplex communication (set-up configuration is in SETUP 9)

Connection: There will be 2-screw terminals provided for RS485.

These will be printed or labeled as A and B. A is the non-inverting (+) signal. B is the inverting (-) signal.

There will be 3-screw terminals provided for RS232.

These will be printed or labeled as RX, TX and GND. RX is the receive signal, TX is the transmit signal, and GND is the signal ground reference.

() 38.4K Baud will not be available when IGN input is selected as the source for RPM calculations. When MPU is selected, this feature is available for selection.*

Modbus Holding Register Table

Modbus Holding Register Ranges	
Readings	
Setpoints	
Fault snapshots	
Readings for firmware 9.8 or newer	
Setpoints for firmware 9.8 or newer	
Fault snapshots for firmware 9.8 or newer	

Reg	Variable	Format	Units	RO RW	Description	Min	Max	Default	Range
400001	RPM	u16bit	RPM	RO	Speed reading for -T model numbers	0	5000	-	Readings
400002	Legacy ETM (*)	u16bit	hours	RO	Legacy Elapsed Time Meter *firmware v9.8 supports > 65k hours use registers 400171 and 400172 to read hours	0	65535	-	
400003	Class B1 Timer Rem.	u16bit	sec	RO	Lockout time remaining	0	300	-	
400004	Shutdown/Alarm Code	u16bit	enum	RO	Enumerated value of fault status (1-48 for terminal block channel) 0 = None detected 49= Loss of ignition 50 = Overspeed 51 = Underspeed 52 = Manual stop 53 = Low device voltage (internal diagnostic) 54 = Crystal failure (internal diagnostic) 60 = Watchdog timer (internal diagnostic) 61= Loss of SPI link (internal diagnostic) 62 = Low DC voltage (alarm) 63 = Low backup battery (alarm)	0	63	-	
400005	Output Status	u16bit	bmp	RO	Bitmapped digital output status Bit 0 = Ignition (1 = grounded, 0 = ungrounded) Bit 1 = Fuel valve (1 = grounded, 0 = ungrounded) Bit 2 = Alarm (1 = grounded, 0 = ungrounded) Bit 3 = Auxiliary (1 = grounded, 0 = ungrounded)	0	15	-	
400006	Input Status Ch 1 – 16	u16bit	bmp	RO	Digital input 1-16 Status Bit 0 = Channel 1, Bit 15 = Channel 16 0 = contact open / grounded 1 = contact closed / ungrounded	0	65535	-	
400007	Input Status Ch 17 – 32	u16bit	bmp	RO	Digital input 17-32 Status Bit 0 = Channel 17, Bit 15 = Channel 32	0	65535	-	
400008	Input Status Ch 33 – 48	u16bit	bmp	RO	Digital input 33-48 Status Bit 0 = Channel 33, Bit 15 = Channel 48	0	65535	-	
400009	Class B2 Timer Rem.	u16bit	sec	RO	Lockout time remaining	0	599	-	
400010	Test Timer Rem.	u16bit	sec	RO	Time remaining	0	300	-	
400011	Ign Ground Timer Rem.	u16bit	sec	RO	Time remaining	0	20	-	
400012	Prelube Timer Rem.	u16bit	sec	RO	Time remaining for -L model numbers	0	300	-	
400013	Postlube Timer Rem.	u16bit	sec	RO	Time remaining for -L model numbers	0	599	-	

Reg	Variable	Format	Units	RO RW	Description	Min	Max	Default	Range
400014	No-Flow Timer Rem.	u16bit	sec	RO	Time remaining for –N model numbers	0	599	-	Readings
400015	TTD-H SPI	u16bit	raw	RO	Factory diagnostic use	0	65535	-	
400016	PS - TTD Sync Flag	u16bit	raw	RO	Factory diagnostic use	0	65535	-	
400017	TTD-PS SPI	u16bit	raw	RO	Factory diagnostic use	0	65535	-	
400018	Internal Battery Voltage	u16bit	Vx10	RO	Internal backup battery voltage	0	65535	-	
400019	External System Voltage	u16bit	Vx10	RO	External DC voltage	0	65535	-	
400020	Ignition Voltage	u16bit	Vx10	RO	Ignition voltage	0	65535	-	
400021	Class B1 Timer	u16bit	sec	RW**	Lockout timer duration (see setup 1)	0	300	300	Setpoints
400022	Class B2 Timer	u16bit	sec	RW**	Lockout timer duration (see setup 1)	0	599	599	
400023	Ignition Ground	u16bit	sec	RW**	Ignition ground cycle duration (see setup 1)	0	20	3	
400024	Prelube Timer	u16bit	sec	RW**	Prelube cycle duration (see setup 1)	0	300	300	
400025	Postlube Timer	u16bit	sec	RW**	Postlube cycle duration (see setup 1)	0	599	599	
400026	Sensor Mode Setting	u16bit	enum	RW*	Emulation Table Template (see setup 2)	0	43	1	
400027	Sensor Type #1	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400028	Sensor Type #2	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400029	Sensor Type #3	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400030	Sensor Type #4	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400031	Sensor Type #5	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400032	Sensor Type #6	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400033	Sensor Type #7	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400034	Sensor Type #8	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400035	Sensor Type #9	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400036	Sensor Type #10	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400037	Sensor Type #11	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400038	Sensor Type #12	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400039	Sensor Type #13	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400040	Sensor Type #14	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400041	Sensor Type #15	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400042	Sensor Type #16	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400043	Sensor Type #17	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400044	Sensor Type #18	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400045	Sensor Type #19	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400046	Sensor Type #20	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400047	Sensor Type #21	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400048	Sensor Type #22	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400049	Sensor Type #23	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400050	Sensor Type #24	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400051	Sensor Type #25	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400052	Sensor Type #26	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400053	Sensor Type #27	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	

Reg	Variable	Format	Units	RO RW	Description	Min	Max	Default	Range
400054	Sensor Type #28	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400055	Sensor Type #29	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400056	Sensor Type #30	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400057	Sensor Type #31	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400058	Sensor Type #32	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400059	Sensor Type #33	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400060	Sensor Type #34	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400061	Sensor Type #35	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400062	Sensor Type #36	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400063	Sensor Type #37	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400064	Sensor Type #38	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400065	Sensor Type #39	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400066	Sensor Type #40	u16bit	enum	RW*	Sensor type (see setup 3)	0	10	0	
400067	Sensor Type #41	u16bit	enum	RW*	Sensor type (see setup 3)	0	13	0	
400068	Sensor Type #42	u16bit	enum	RW*	Sensor type (see setup 3)	0	13	0	
400069	Sensor Type #43	u16bit	enum	RW*	Sensor type (see setup 3)	0	13	0	
400070	Sensor Type #44	u16bit	enum	RW*	Sensor type (see setup 3)	0	13	0	
400071	Sensor Type #45	u16bit	enum	RW*	Sensor type (see setup 3)	0	13	0	
400072	Sensor Type #46	u16bit	enum	RW*	Sensor type (see setup 3)	0	13	0	
400073	Sensor Type #47	u16bit	enum	RW*	Sensor type (see setup 3)	0	13	0	
400074	Sensor Type #48	u16bit	enum	RW*	Sensor type (see setup 3)	0	13	0	
400075	Remote Reset/Remote Lockout	u16bit	enum	RW*	Enable / Disable (see setup 4)	0	3	0	
400076	Legacy ETM Hour Preset (*)	u16bit	hours	RW*	Legacy Elapsed Time Meter Preset *firmware v9.8 supports > 65k hours use registers 400175 and 400176	0	65535	-	
400077	Pulses Per Revolution	u16bit	x10	RW*	Speed calibration (see setup 6)	5	4500	60	
400078	RPM Filter / Loss Of Ignition	u16bit	enum	RW*	Enable / Disable (see setup 6)	0	3***	0	
400079	Overspeed	u16bit	RPM	RW**	Fault setpoint (see setup 7)	0	5000	1000	
400080	Underspeed	u16bit	RPM	RW**	Fault setpoint (see setup 8)	0	5000	100	
400081	Output mode	u16bit	enum	RW*	Output mode (see setup A)	0	7	0	
400082	ID Prefix	u16bit		RW**	Customer unit identifier (see setup B)	0	99	0	
400083	ID Suffix	u16bit		RW**	Customer unit identifier (see setup B)	0	9999	0	
400084	Password	u16bit		RW**	Device password	0	99	35	
400085	Test Timer	u16bit	sec	RW**	Test mode duration (see setup 1)	0	300	300	
400086	Legacy Product Life Timer (*)	u16bit	hours	RO	Legacy Non-resettable hourmeter *firmware v9.8 supports > 65k hours use registers 400173 and 400174	0	65535	-	
400087	TTD-H Firmware	u16bit	x10	RO	Firmware version for the head	0	65535	-	

Setpoints

Readin
gs

Reg	Variable	Format	Units	RO RW	Description	Min	Max	Default	Range
400088	PSU-X Firmware	u16bit	x10	RO	Firmware version for the power supply	0	65535	-	
400089	TTD Model	u16bit	enum	RO	Detected type based on PSU installed 120 = TTD-2-N 121 = TTD-2-T-N 122 = TTD-2-L-N 123 = TTD-2-T-L-N 124 = TTD-2 125 = TTD-2-T 126 = TTD-2-L 127 = TTD-2-T-L	120	127	-	
400090	OSC Calibration	u16bit		RO	Factory diagnostic use	0	65535	-	
400091	PSU Power-up (PUR or WDT)	u16bit		RO	Factory diagnostic use	0	65535	-	
400092	PSU Update History Shutdown Data	u16bit		RO	Factory diagnostic use	0	65535	-	
400093	No-Flow Timer	u16bit	sec	RW**	No-Flow timer preset (see setup 1)	0	599	0	Setpoints
400094	Ch 41 TON/TOFF	u16bit	sec	RW*	Channel 41 No-Flow Pulse Timer (see setup 1)	0	59	0	
400095	Ch 42 TON/TOFF	u16bit	sec	RW*	Channel 42 No-Flow Pulse Timer (see setup 1)	0	59	0	
400096	Ch 43 TON/TOFF	u16bit	sec	RW*	Channel 43 No-Flow Pulse Timer (see setup 1)	0	59	0	
400097	Ch 44 TON/TOFF	u16bit	sec	RW*	Channel 44 No-Flow Pulse Timer (see setup 1)	0	59	0	
400098	Low External System Voltage	u16bit	Vx10	RW**	Low system voltage alarm (0 = disabled)	0	32	0	
400099	Low Internal Battery Voltage	u16bit	enum	RW**	Low backup battery voltage alarm enable / disable 0 = disabled	0	1	0	
40100	Reserved								
40101	Legacy SD History #1	u16bit	enum	RO	Shutdown code history-most recent shutdown code recorded	1	63	-	Fault Snapshots
40102	Legacy SD #1 ETM	u16bit	hours	RO	ETM at time of shutdown *firmware v9.8 supports > 65k hours use registers 40129 through 40158	0	65535	-	
40103	Legacy SD History #2	u16bit	enum	RO	Shutdown code history	1	63	-	
40104	Legacy SD #2 ETM	u16bit	hours	RO	ETM at time of shutdown	0	65535	-	
40105	Legacy SD History #3	u16bit	enum	RO	Shutdown code history	1	63	-	
40106	Legacy SD #3 ETM	u16bit	hours	RO	ETM at time of shutdown	0	65535	-	
40107	Legacy SD History #4	u16bit	enum	RO	Shutdown code history	1	63	-	
40108	Legacy SD #4 ETM	u16bit	hours	RO	ETM at time of shutdown	0	65535	-	
40109	Legacy SD History #5	u16bit	enum	RO	Shutdown code history	1	63	-	Fault Snapshots
40110	Legacy SD #5 ETM	u16bit	hours	RO	ETM at time of shutdown	0	65535	-	
40111	Legacy SD History #6	u16bit	enum	RO	Shutdown code history	1	63	-	
40112	Legacy SD #6 ETM	u16bit	hours	RO	ETM at time of shutdown	0	65535	-	
40113	Legacy SD History #7	u16bit	enum	RO	Shutdown code history	1	63	-	
40114	Legacy SD #7 ETM	u16bit	hours	RO	ETM at time of shutdown	0	65535	-	
40115	Legacy SD History #8	u16bit	enum	RO	Shutdown code history	1	63	-	
40116	Legacy SD #8 ETM	u16bit	hours	RO	ETM at time of shutdown	0	65535	-	

Reg	Variable	Format	Units	RO RW	Description	Min	Max	Default	Range
400117	Legacy SD History #9	u16bit	enum	RO	Shutdown code history	1	63	-	
400118	Legacy SD #9 ETM	u16bit	hours	RO	ETM at time of shutdown	0	65535	-	
400119	Legacy SD History #10	u16bit	enum	RO	Shutdown code history	1	63	-	
400120	Legacy SD #10 ETM	u16bit	hours	RO	ETM at time of shutdown	0	65535	-	
400121	Legacy Alarm History #1	u16bit	enum	RO	Alarm code history-Most recent alarm code recorded	1	63	-	
400122	Legacy Alarm #1 ETM	u16bit	hours	RO	ETM at time of alarm *firmware v9.8 supports > 65k hours use registers 40129 through 40158	0	65535	-	
400123	Legacy Alarm History #2	u16bit	enum	RO	Alarm code history	1	63	-	
400124	Legacy Alarm #2 ETM	u16bit	hours	RO	ETM at time of alarm	0	65535	-	
400125	Legacy Alarm History #3	u16bit	enum	RO	Alarm code history	1	63	-	
400126	Legacy Alarm #3 ETM	u16bit	hours	RO	ETM at time of alarm	0	65535	-	
400127	Legacy Alarm History #4	u16bit	enum	RO	Alarm code history	1	63	-	
400128	Legacy Alarm #4 ETM	u16bit	hours	RO	ETM at time of alarm	0	65535	-	
THESE REGISTERS ARE ONLY SUPPORTED BY TTD AND PSU FIRMWARE 9.8 OR NEWER WITH EXPANDED HOURMETER									
400129	SD History #1	u16bit	enum	RO	Shutdown code history-most recent shutdown code recorded	1	63	-	Fault Snapshots for >= 9.8
400130	SD #1 ETM MSW	u32bit	hours	RO	ETM at time of shutdown	0	499,999	-	
400131	SD #1 ETM LSW								
400132	SD History #2	u16bit	enum	RO	Shutdown code history	1	63	-	
400133	SD #2 ETM MSW	u32bit	hours	RO	ETM at time of shutdown	0	499,999	-	
400134	SD #2 ETM LSW								
400135	SD History #3	u16bit	enum	RO	Shutdown code history	1	63	-	
400136	SD #3 ETM MSW	u32bit	hours	RO	ETM at time of shutdown	0	499,999	-	
400137	SD #3 ETM LSW								
400138	SD History #4	u16bit	enum	RO	Shutdown code history	1	63	-	
400139	SD #4 ETM MSW	u32bit	hours	RO	ETM at time of shutdown	0	499,999	-	
400140	SD #4 ETM LSW								
400141	SD History #5	u16bit	enum	RO	Shutdown code history	1	63	-	
400142	SD #5 ETM MSW	u32bit	hours	RO	ETM at time of shutdown	0	499,999	-	
400143	SD #5 ETM LSW								
400144	SD History #6	u16bit	enum	RO	Shutdown code history	1	63	-	
400145	SD #6 ETM MSW	u32bit	hours	RO	ETM at time of shutdown	0	499,999	-	
400146	SD #6 ETM LSW								
400147	SD History #7	u16bit	enum	RO	Shutdown code history	1	63	-	
400148	SD #7 ETM MSW	u32bit	hours	RO	ETM at time of shutdown	0	499,999	-	
400149	SD #7 ETM LSW								
400150	SD History #8	u16bit	enum	RO	Shutdown code history	1	63	-	
400151	SD #8 ETM MSW	u32bit	hours	RO	ETM at time of shutdown	0	499,999	-	
									Fault Snapshots for >= 9.8

Reg	Variable	Format	Units	RO RW	Description	Min	Max	Default	Range
400152	SD #8 ETM LSW								
400153	SD History #9	u16bit	enum	RO	Shutdown code history	1	63	-	
400154	SD #9 ETM MSW	u32bit	hours	RO	ETM at time of shutdown	0	499,999	-	
400155	SD #9 ETM LSW								
400156	SD History #10	u16bit	enum	RO	Shutdown code history	1	63	-	
400157	SD #10 ETM MSW	u32bit	hours	RO	ETM at time of shutdown	0	499,999	-	
400158	SD #10 ETM LSW								
400159	Alarm History #1	u16bit	enum	RO	Alarm code history-Most recent alarm code recorded	1	63	-	
400160	Alarm #1 ETM MSW	u32bit	hours	RO	ETM at time of alarm	0	499,999	-	
400161	Alarm #1 ETM LSW								
400162	Alarm History #2	u16bit	enum	RO	Alarm code history	1	63	-	
400163	Alarm #2 ETM MSW	u32bit	hours	RO	ETM at time of alarm	0	499,999	-	
400164	Alarm #2 ETM LSW								
400165	Alarm History #3	u16bit	enum	RO	Alarm code history	1	63	-	
400166	Alarm #3 ETM MSW	u32bit	hours	RO	ETM at time of alarm	0	499,999	-	
400167	Alarm #3 ETM LSW								
400168	Alarm History #4	u16bit	enum	RO	Alarm code history	1	63	-	
400169	Alarm #4 ETM MSW	u32bit	hours	RO	ETM at time of alarm	0	499,999	-	
400170	Alarm #4 ETM LSW								
400171	ETM MSW	u32bit	hours	RO	Elapsed Time Meter	0	499,999	-	Readings for >= 9.8
400172	ETM LSW								
400173	Product Life Timer MSW	u32bit	hours	RO	Non-resettable hourmeter	0	499,999	-	
400174	Product Life Timer LSW								
400175	ETM Hour Preset MSW	u32bit	hours	RW*	Elapsed Time Meter Preset	0	499,999	-	Setpoints for >= 9.8
400176	ETM Hour Preset MSW								

(*) Hours greater than 65535 will roll over to 0. This is 16-bit limit of the register. Firmware version < 8.0 supports 65535 hours. Version 8.0 to 9.7 supports up to 99,999 Hours. Firmware version >= 9.8 supports up to 499,999 hours.

* Only accepts Modbus writes during Shutdown Mode.

** Accepts Modbus writes during Run and Shutdown Modes.

*** Range is 0 to 1 for non Tachometer models (See Setup 6.0 – Speed Calibration for details).

Specifications

Power Requirements

PSU-2: 10-32VDC, 10W (max); 90-400VDC CD Ignition, 750uA @ 100VDC (max)

On-Board Backup Power: Lithium battery, 6 VDC, 1300 mAh

Digital Inputs: 48 (a.k.a. Channels)

Sensor Types: Discrete Input, N.O. / N.C., non-incendive (with use of PSU-2)

Magnetic Pickup Input

One Magnetic Pickup Sensor Input: 3.6 - 120 VAC, 2-10 kHz

Outputs

IGN: 0.4A @ 400VDC (*) for 5 seconds

RLY: 0.5A @ 48VDC cont. duty

0.15A @ 400VDC (*) cont. duty

FV- : 0.5A @ 400VDC (*) cont. duty

ALR: 0.5A @ 48VDC cont. duty

AUX: 0.5A @ 48VDC cont. duty

(*) CSA approval for 250VDC maximum

Operator Interface

Display Type: LCD, Static, 80 segment, custom text with LED Backlight

Display Viewable Area: ~ 2.79 x 1 in. (71.04mm x 25.4mm)

Display Contrast: Automatic

Display Backlight: Yellow (Normal Operation), Red (Shutdown)

(Backlight will only be available when unit is powered by DC or AC.)

Voltage Level Monitor: Monitor and display voltage level of DC Supply, CD Ignition and internal battery

Keypad: 6 switches: Ridge Embossed, Metal Dome, Tactile 14 Oz. Trip Force

Enclosure Cutout: 5.50 x 5.50 inches (133 mm)

Operating Temperature: -40 to +85 degrees C

Viewable Temperature: -40 to +85 degrees C

Storage Temperature: -40 to +85 degrees C

Tachometer Accuracy: $\pm 0.5\%$ of the display reading or ± 1 RPM, whichever is greater

Resetable Hourmeter Range: 0 to 499,999 hrs.

Non-Resetable Hourmeter Range: 0 to 499,999 hrs.

Hourmeter Accuracy: ± 1 hour per year

Specifications (continued)

Communication Port

External 12-32 vdc power enables the communication port. A single bi-color (GREEN/RED) LED is provided to give visual indication of active transmit and receive traffic.

Interface: Factory configured for RS485; field-selectable for RS232 or RS485. Only one connection will be active at any time.

Baud/Configuration: 9600, 19.2K, 38.4K (**); N, 8, 1; N, 8, 2 half-duplex communication

Protocol: Modbus RTU server

Connection: There will be 2 screw terminals provided for RS485

There will be 2 screw terminals provided for RS232

There will be 1 screw terminal common for both ports labeled as GND

*(**) 38.4K baud will not be available when IGN input is selected as the source for RPM calculations. When MPU is selected, this feature is available for selection*

Third Party Approvals

TTD-H, PSU-2: CSA Class I, Division 2, Groups B, C and D

TTD-H: IEC 60529 – IP66 (NEMA 4 and 4X equivalent)

Intuitive Display Icons

Display status and assist in setup and operation resulting in greater ease of operation and interface. The appropriate icon will turn on to indicate unit status or navigation through the set-up features.

RUN – Run mode

RPM – Screen Value

HOURS – Screen Value

TYPE – Channel Type Configuration

LOW BATT – Low Battery Warning (displayed only when condition exists)

HISTORY – Shutdown History

TEST – Test Mode

LUBE – Pre-lubrication Timer

POSTLUBE – Post-lubrication Timer

SHUTDOWN – Stop Mode

ALARM – Alarm(s) Warning (displayed only when condition exists)

SETPOINT – Edit Setpoint Value

SETUP – Setup Menu(s)

TTD Replacement Parts and Assemblies

Part Number	Description	Notes
50700597	TTD-H Display Head	Replacement Parts and Assemblies
50700596	PSU-2 Div 2 Power Supply	
50700594	PSU-2-T Div 2 Power Supply w/ Tach	
50700944	PSU-2-L-N Div 2 Power Supply w/Pre/Post Lube and No-Flow	
50700942	PSU-2-T-L-N Div 2 Power Supply w/ Tach, Pre/Post Lube and No-Flow	
00005125	Backup Lithium Battery, 6VCD, 1200mAh	
50000774	Ignition Choke Filter	
00009741	TTD-H Plug Kit, Printed Replacement Terminal Plugs for TTD-H Sensor Inputs	
00009768	PSU-2-Plug, Printed Replacement Plug for PSU-2 Power Connector	
53702325	RS485 to USB Interface Kit (53702325): To configure TTD using MConfig™ software and PC over USB port	Configuration Software

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