



Catalyst Monitoring System User Manual

PHILLIPS & TEMRO
industries®



Hazard Warnings



**Do not attempt to work on unit while there is electrical current flowing to unit.
Ensure all power is off to eliminate possibility of electrical shock.**



Electrical Shock Warning

**To avoid risk of injury from electrical shock, all
work should be performed by a certified
electrician.**



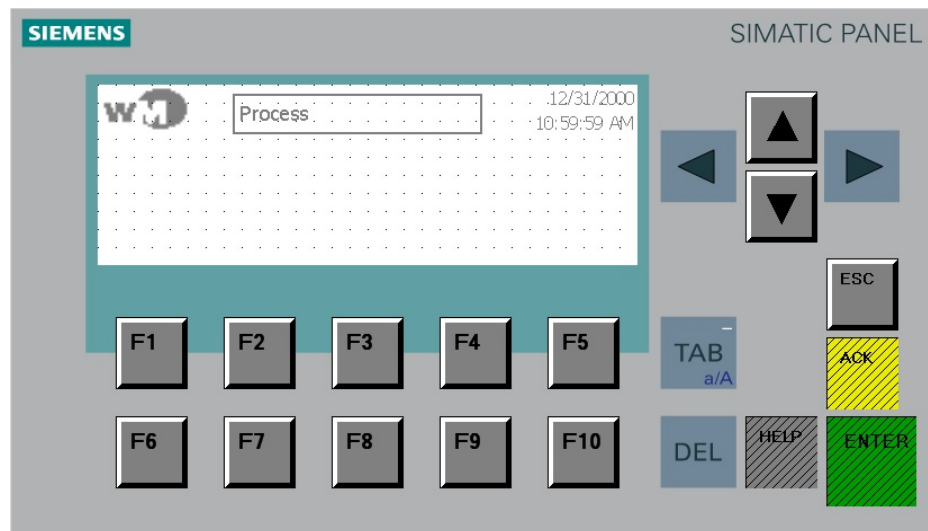
High Temperature Warning

**To avoid risk of fire and burns , ensure all
flammable items are kept clear of area.**

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Key Functions



	Scroll Right within Screen		Scroll Left within Screen
	Scroll Up within Screen		Scroll Down within Screen
	Tab Function		Delete Function
	Escape Function		Enter Function
	Help Function		Alarm Acknowledge Function
	Unassigned		Unassigned
	Unassigned		Unassigned
	Unassigned		Unassigned
	Unassigned		Unassigned
	Unassigned		Unassigned

External Components

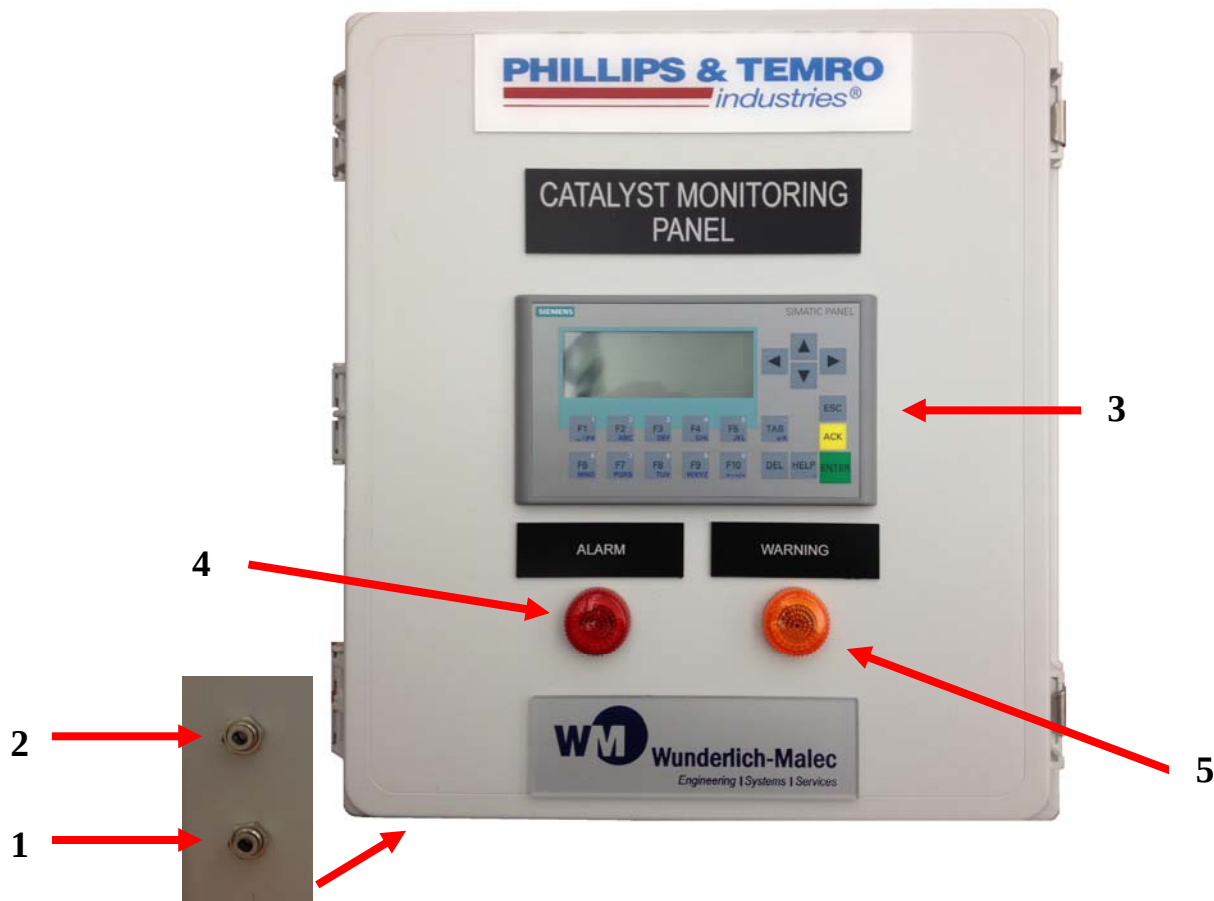


Figure 1. External Components

No.	Article Name	Description
1	Low Pressure Port	Connects to pressure tap downstream of catalyst. Location may vary depending on pressure gauge orientation.
2	High Pressure Port	Connects to pressure tap upstream of catalyst. Location may vary depending on pressure gauge orientation.
3	Controller Interface	Analog and Digital XLE Operator Control Station, 3 inch Mono Display
4	Alarm Indicator Light	Temperature and Differential Pressure Alarm Light
5	Warning Indicator Light	Temperature and Differential Pressure Warning Light

For additional information or assistance contact 952-440-9200 or silencersales@phillipsandtemro.com

Internal Components

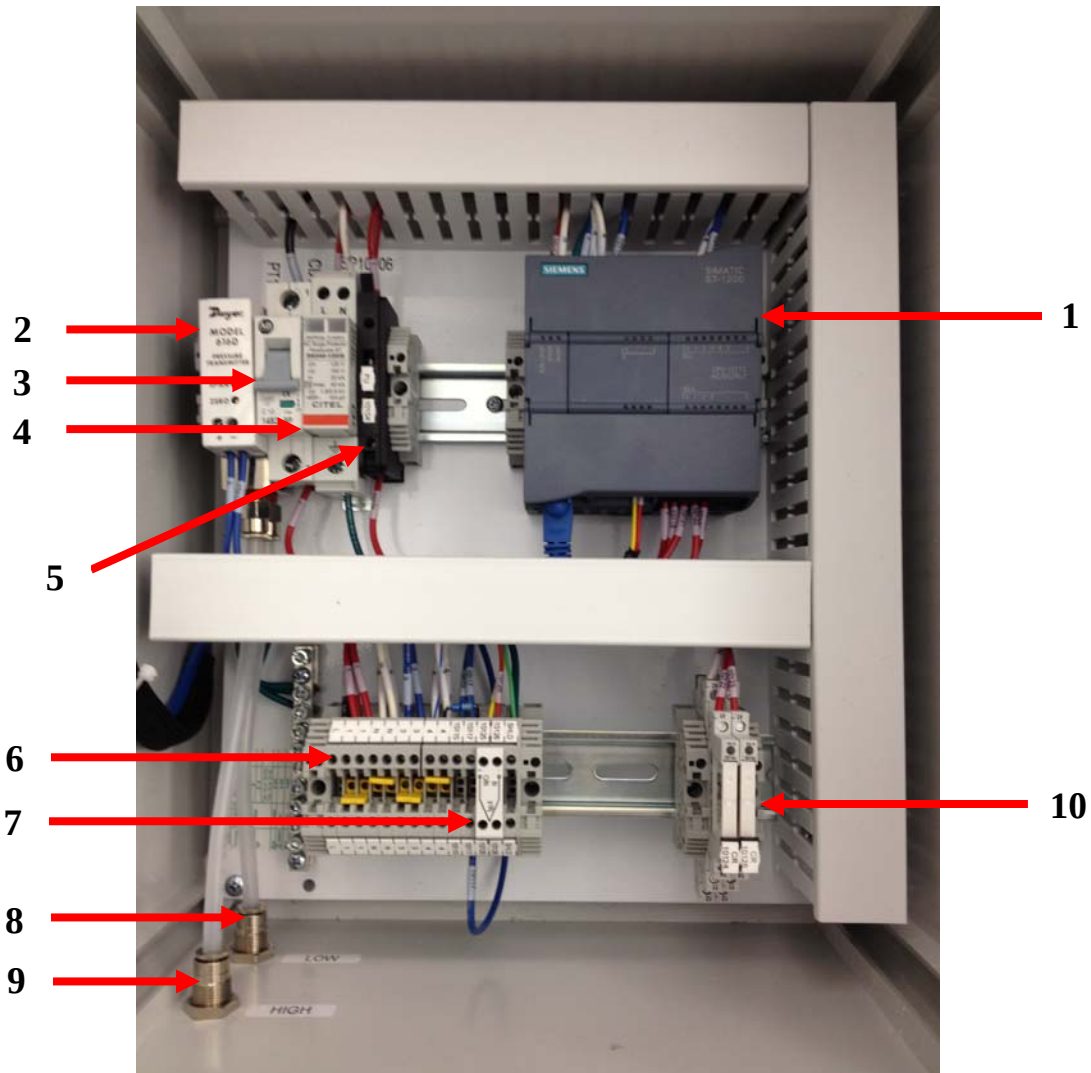


Figure 2. Internal Components

No.	Article Name	Description
1	PLC	Siemens S7 1211C
2	Pressure Transmitter	0-20 Inches H ₂ O, 4-20 mA, Differential Pressure
3	Circuit Breaker	120VAC, 10A, 1 Pole
4	Surge Protector	120 VAC, Gas Tube
5	Fuse	3A, Blown Fuse Indicator, Time Delay Glass
6	Controller Terminal Block	600V, 25A Rated
7	Thermocouple Terminal Block	Type K Thermocouple
8	Low Pressure Port	For Pressure Transmitter
9	High Pressure Port	For Pressure Transmitter
10	Relays	120 VAC, SPDT, 6A

New Product Installation



Do not attempt to work on unit while there is electrical current flowing to unit. Ensure all power is off to eliminate possibility of electrical shock. All work should be performed by a certified electrician.

Step 1. Install Conduit Fitting

Use appropriate conduit knock-out fitting to create access point into enclosure for power and thermocouple wiring.

Step 2. Mount Enclosure

Mounting brackets are included and can be installed on the backside of the enclosure with the provided mounting points. The monitoring system should be protected from direct sun light and exposure to the elements. The monitoring system must also be isolated from vibration and operated within a temperature range of 32° to 122°F (0° to 50°C).

Step 3. Install Thermocouple

Install thermocouple connection into the monitoring system by inserting a stripped K type wire into the open slot on the thermocouple terminal block and tightening the overhead screws until secure. Polarity of the thermocouple wire and terminal block must match to function properly. In typical type K thermocouple wires, the yellow wire refers to positive polarity while the red wire correlates to negative polarity. For location of the power terminal block, refer to Figure 2. The completed wiring should be similar to what is seen in Figure 3.

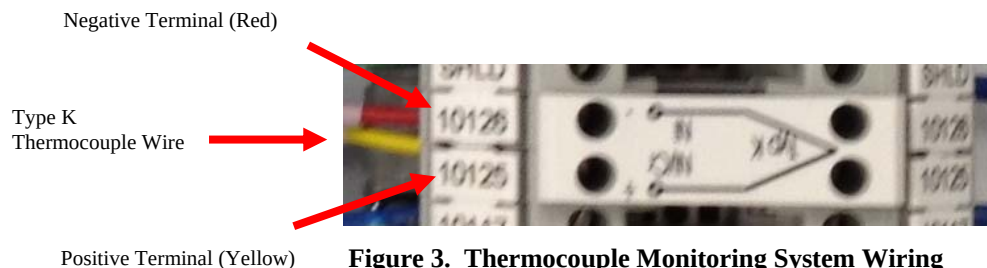


Figure 3. Thermocouple Monitoring System Wiring

With the top of the thermocouple removed, feed the thermocouple wire thru the side opening and secure the positive and negative terminals using the internal screws. Each terminal is marked with the appropriate polarity for which must be connected. The final wiring assembly should resemble Figure 4.

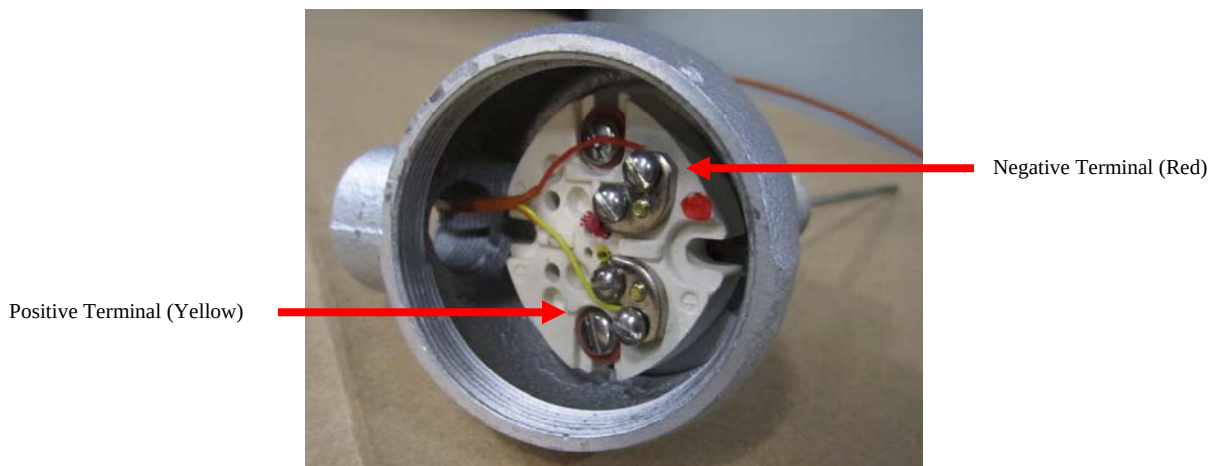


Figure 4. Thermocouple Internal Wiring

Location of thermocouple port on catalyst housing can be seen in Figure 6. On smaller catalyst housing models the thermocouple probe may contact the housing. It is recommended that the probe end has at least 1/2" clearance from the catalyst housing wall. A 1/2" NPT pipe nipple is recommended in these applications.

Step 4. Install Power Connection



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Install power connection by inserting the stripped power wires into the L (Phase or Live) and N (Neutral) slots on the power terminal block and tightening the overhead screws until secure. Live and neutral wire positions are interchangeable with incoming AC current. The ground wire must be installed into the grounding terminal and secured using the overhead screw. For location of the power terminal block, refer to Figure 2. The completed wiring should be similar to what is seen in Figure 5.

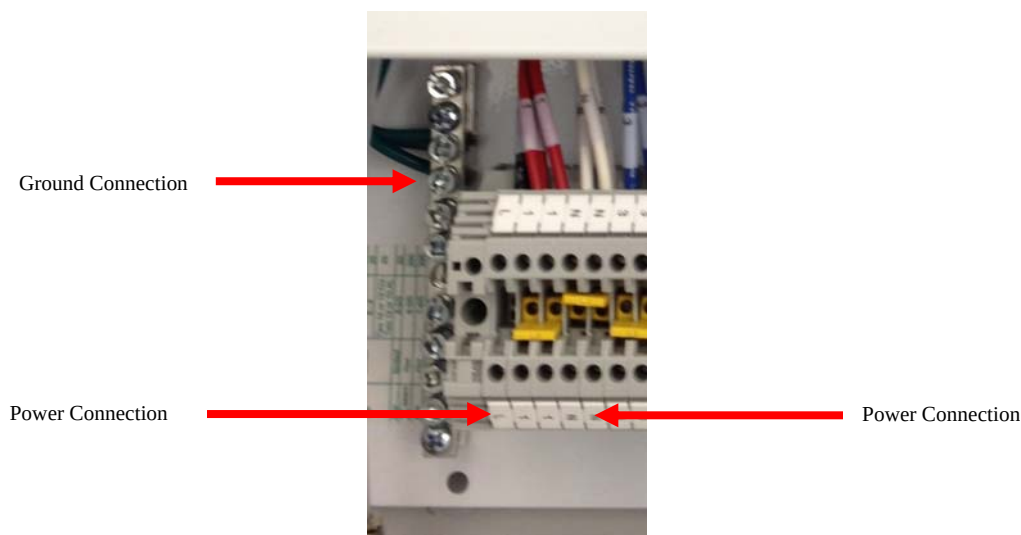


Figure 5. Power Wiring

Step 5. Install Pressure Connections



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Install the included compression tube fittings and 12" stainless steel tubing into the high and low pressure ports on the catalyst housing. To allow for heat dissipation the included stainless steel tubing must be installed. Additional piping from catalyst housing to monitoring system must be provided by the user. The high pressure port on the sensor (labeled "high") must be connected to the pressure tap upstream of the catalyst while the low pressure port (labeled "low") must be connected to the pressure tap on the housing downstream of the catalyst. Locations of the pressure taps on a typical catalyst housing are seen in Figure 1. 1/8" NPT is used on pressure sensor for port connections. Incorrect installation of high and low pressure taps will result in a "++++" display for differential pressure. Reversing the high and low pressure ports should yield a positive differential pressure reading.

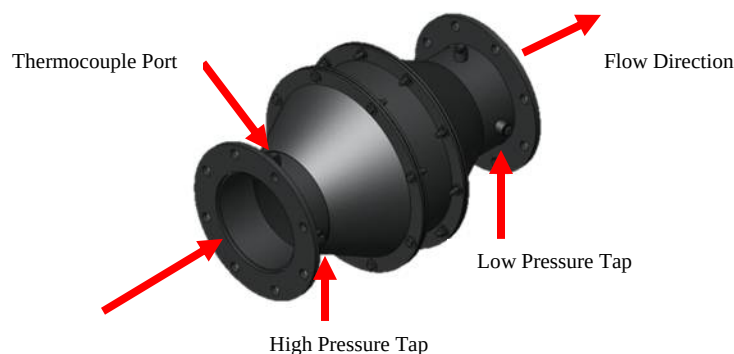


Figure 6. Catalyst Housing Port Locations

System Startup

Step 1. Install SD Memory Card

To begin initial startup of the system, ensure the SD card is installed in the memory card slot located behind the cover on the top side of the controller as seen in **Figure 7**. If the memory card is not installed, insert the memory card into the slot by depressing the SD card until it is securely locked into the controller. Without the memory card installed monitoring data will not be recorded.

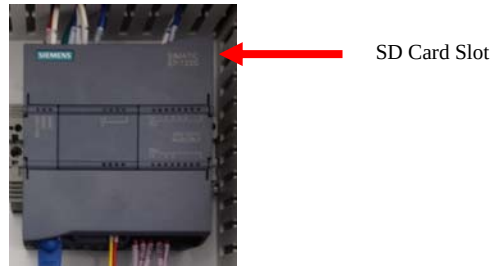


Figure 7. SD Memory Card Install

Step 2. Powering On System



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Power the system by putting the circuit breaker into the "ON" position. The external display will turn on and the system will perform a self-test to ensure the system is functioning properly. Refer to Figure 2 for circuit breaker location. In the case the system is not functioning properly contact a Phillips & Temro representative.

Step 3. Setting Time and Date

Enter the time and date set screen by putting the cursor in the screen field located at the top and scrolling to the "Date/Time" screen. To edit the time and date values move cursor to text box located to the right of the "Set Time" button. Enter correct date and time in the exact format shown below. Move cursor over to the "Set Time" button and hit the Green Enter button on the interface panel.

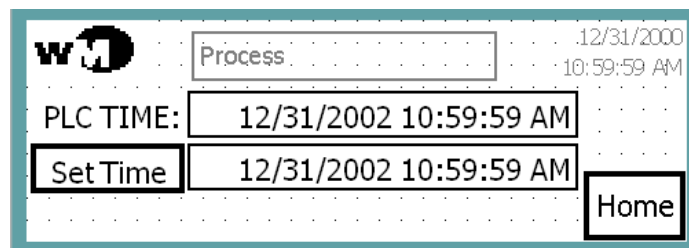


Figure 8. Date/Time Set Screen

Step 4. Setting Warning and Alarm Setpoint Values

To specify warning and alarm values for the differential pressure across the catalyst unit and inlet exhaust temperature, enter the set point screen seen in

Figure 9 by putting the cursor in the screen field located at the top and scrolling to the "Setpoints" screen. You will be prompted to input a password. (Contact your Phillips & Temro representative for the default password.) Within the set points screen the values for each are specified using the ENTER and arrow functions. Put cursor in appropriate text box and enter values using the function keys and then pressing enter. **The steady state pressure drop from a "clean" catalyst must be accounted for within the warning and alarm values.** For example: if "clean" catalyst reading is at 5 in-H₂O, the warning and alarm values should be set at 6 and 7 in-H₂O respectively. Recommended set values for differential pressure warning and alarm to comply with RICE NESHAP regulations are seen in Table 1.

Figure 9. Differential Pressure Warning/Alarm Set Screen

Table 1. Recommended Differential Pressure Alarm Set Points

	Recommended Set Point for RICE NESHAP Compliance
Warning	Initial "Clean" Differential Pressure + 1 in-H ₂ O
Alarm	Initial "Clean" Differential Pressure + 2 in-H ₂ O

Recommended high temperature values for RICE NESHAP compliance are seen in Table 2, however catalyst capabilities must be considered to prevent failure of the catalyst.

Table 2. Recommended High Temperature Alarm Set Points

	Recommended Set Point for RICE NESHAP Compliance
Warning	1200 °F
Alarm	1350 °F

*Catalyst capabilities must be considered when setting high temperature alarm set points

Step 5. Setting Low Temperature Alarm Disable

As an additional feature the alarm lights can be disabled when the engine is shut off and is at ambient temperature while continuing to record data on the monitoring system. The alarms are disabled by one of two things: the low temp warning set point, or a motor running input wired to the controller.

If there is a motor running status wired to the controller, set the low temp set point to 0 and the controller will only look at motor running status as the means of alarming. Alarms will be disabled when motor is not running.

If there is not a motor running status wired to the controller then the low temp warning set point will need to be set to disable alarming under a “no run” condition. To specify the temperature at which the alarm lights are disabled see Figure 10. Enter the set points screen by putting the cursor in the screen field located at the top and scrolling to the “Setpoints” screen. You will be prompted to input the password. (Contact your Phillips & Temro representative for the default password.) Within the set points screen the values for each are specified using the ENTER and arrow functions. The default value for the low temperature alarm disable should be set at **200 °F**.

H Temp	H Temp	L Temp	HPress	HPress	
Warn SP	Alarm SP	Warn SP	Warn SP	Alarm SP	
DegF	DegF	DegF	"H2O	"H2O	
0000	0000	0000	00.00	00.00	Home

Figure 10. Low Temperature Alarm Disable Set Screen

Step 6. Review Alarm Acknowledge Screen

In addition to the Set Points screen there is an Alarm Acknowledge Screen, shown in Figure 11. Upon startup the system will be in Warning and Alarm because there are no setpoints set in the PLC. Once you have input setpoints in the previous steps you will need to go to the “Alarm Acknowledge” Screen and clear the alarms. To navigate to this screen in **Error! Reference source not found.** put the cursor in the screen field located at the top and scroll to the “Alarm Ack” screen. To clear the alarm, move the cursor down to the “Ack” button and hit enter. To return to the home screen, move the cursor over to the “Home” button and hit enter. There is also a running log of alarms which will indicate issues such as PLC Fault or Com Loss.

1/1/1999 12:00:00 PM K Message Text Message...	▲
1/1/1999 12:00:00 PM K Message Text Message...	
1/1/1999 12:00:00 PM K Message Text Message...	
1/1/1999 12:00:00 PM K Message Text Message...	▼
Ack	Home

Figure 11. Alarm Acknowledge Screen

Information Screens

Process Screen and Alarm Indication

The current differential pressure and inlet temperature readings can be viewed on the “Process” Screen seen in Figure 12; this is also the Home screen upon startup. This screen also indicates Engine Running status as well as the pressure and temperature alarm statuses.

*note – Alarms will be invisible under normal conditions.

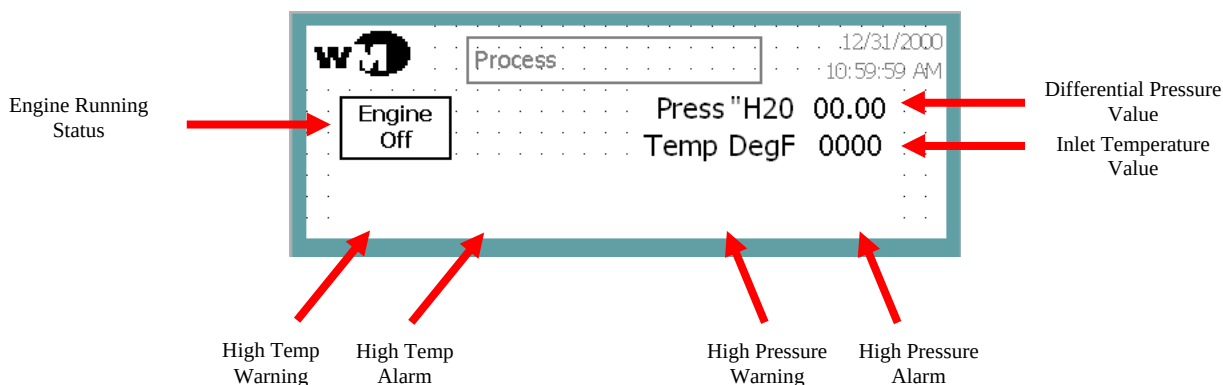


Figure 12. Process Screen

Differential Pressure Trend

A real time plot of the differential pressure values being recorded can be seen by navigating to the screen in Figure 13 by putting the cursor in the screen field located at the top and scroll to the “Press Trend” screen. Differential pressure (in-H₂O) is plotted on the y-axis while time is plotted on the x-axis allowing for real time trends to be seen. You can also view the current value to the right of the graph. To return to the Home screen, put cursor on Home button and hit enter.



Figure 13. Differential Pressure Trend

Inlet Temperature Trend

The recorded values for the inlet temperature are plotted in real time and can be seen by navigating to the screen in Figure 14 by putting the cursor in the screen field located at the top and scroll to the “Temp Trend” screen. Temperature (F) is plotted on the y-axis while time is plotted on the x-axis. To return to the Home screen, put cursor on Home button and hit enter.



Figure 14. Inlet Temperature Trend

In-Use Operation

Engine Start-Up

Before starting the engine, the monitoring system should be turned on. This allows for the process of engine start-up to be recorded. During the start-up process the monitoring system may give false warnings and alarms due to low exhaust temperature. These warnings and alarms should deactivate once the engine reaches normal operating temperatures. If they do not, further investigation is required as to the reasons behind the warnings and alarms.

Normal Engine Operation

During normal engine operation, the catalyst monitoring system will continuously monitor temperature and differential pressure and record data at the plot interval specified via the onboard memory card. For a warning or error to be detected the operating condition must remain out of tolerance for 10 seconds. When the operating condition returns to within tolerance the warning or alarm will be deactivated.

Engine Shutdown

During engine shutdown it is recommended that the monitoring system remain active. This allows accurate records to be kept of engine inactivity. Engine shutdown may result in false warnings and alarms as the engine cools. These alarms and warnings will deactivate once the low temperature alarm disable setpoint is reached, if this function is set (described on p.122).

Accessing Data

Method 1

Step 1. Set connected computers Ethernet Settings

Go into My computer and right click on network to open up network properties. Click **change adapter settings**. Navigate to your computers LAN connection of your network card. Double click your connection and when dialog box opens click on **properties**. Double click **Internet Protocol Version 4**. Check the box Use the following IP address. Enter an IP on the same network as the PLC (example – 10.10.0.3)

Step 2. Connect your computer via Ethernet

Disconnect the Ethernet cord that connects the PLC with the OIT screen on the front of the panel and hook your computer up to the PLC directly.

Step 3. Access Data Files

Open Internet Explorer on your computer and type the PLC's IP address in the address bar (10.10.0.1). This will bring up the Controller Diagnostic Application where you can view data about the controller and access the .CSV files being stored on the memory card. You have the choice of viewing live or downloading the file to your computer. Data file will have the month and year as the file name.

Method 2

Step 1. Power Off Monitoring System

Ensure power to the system is turned off by flipping the circuit breaker to the OFF position. Refer to Figure 2 for circuit breaker location within enclosure. **Not powering off system before removing the memory card will result in a PLC Fault which will shut down the controller.** This happens because the PLC program is located on the memory card. To reset the fault you will need to cycle power to the panel with the memory card inserted.

Step 2. Remove SD Memory Card

Remove the SD memory card from the top side of the controller by depressing the memory card. The memory card should then slide out easily from the memory card slot. Location of the memory card slot is seen in Figure 7.

Step 3. Insert Into Memory Card Reader

Insert the SD memory card into an appropriate media card reader on the computer.

Step 4. Access Data Files

The data files from the monitoring system are in a .CSV (Comma Separated Values) format which can be opened using any text editor such as Notepad and Excel. Further data evaluation can also be performed using these tools. A new data file will be created every month and will have the month and year as the file name.

When completed, remove the SD card from computer and insert back into controller making sure to push the card in until secure. The system can then be powered on by flipping the circuit breaker to the ON position.

Warranty Information

Phillips & Temro Industries products are guaranteed for one (1) year from date of purchase by the consumer against defects due to materials and the Company's workmanship only, as either and both of which the Company shall be the sole judge.

The sole obligation hereunder shall be to repair, or at the Company's option to replace products as aforesaid, provided same are returned "Transportation Prepaid" to the Company's nearest plant within the said period.

Other defects or failures due to improper or careless installation, storage or handling, or usage contract to manufacturer's directions, design or specification, as to any and all of which the Company shall be the sole judge, are specifically excluded from this guarantee.

No liability is accepted for return transportation charge, following repaid or replacement as aforesaid or for reinstallation costs. No liability for loss or damage of any nature or kind, whether arising out of or from the use of the produce, whether or not defective, is assumed. No other expressed or implied warranties exist in the absence of special agreement.

For additional information or assistance contact 952-440-9200 or silencersales@phillipsandtemro.com