

S7999B System Display

PRODUCT DATA



APPLICATION

The S7999B System Display reduces burner/boiler setup time by letting you create a fuel/air modulation curve (profile) for ControlLinks™ that allows for safe and efficient operation at all points along the modulation curve. The display uses a wizard-like process to assist you through the commissioning process.

The S7999B can be used on systems with one or two fuels and on systems with or without flue gas re-circulation (FGR).

The S7999B can monitor a single (Local) burner/boiler system or up to 99 burner/boiler systems connected via System Modbus™ network. Each burner control, fuel/air ratio control, and expanded annunciator present on each burner system can be viewed individually to determine its status.

Universal Digital Controllers (UDC) can be used for several burner/boiler applications, and the S7999B can control the UDCs during their operation. Applications supported include:

- stack temperature
- water/steam PID load control
- steam/fuel flow monitoring
- thermal shock
- feed pump level control

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FEATURES

- Allows configuration of the R7999 ControlLinks™ Controller.
- Allows monitoring of the R7999 ControlLinks™ Controller.
- Allows monitoring of 7800 SERIES burner control.
- Allows monitoring of S7830 Expanded Annunciator.
- Allows monitoring and control of UDC2500/3200/3500 Universal Digital Controllers.
- Allows switching view between multiple burner systems.
- Dynamically locates attached burner systems (auto seeks).
- Allows 4-20 mA firing rate hysteresis adjustment.
- Allows Actuator control accuracy adjustment.
- Allows off-line profile curve building.
- Allows programmable expanded annunciator terminal naming.
- Allows burner system naming.
- Allows ControlLinks™ R7999 EEPROM backup and restore.
- Color 3.5 in. x 4.625 in. (5.7 in. diagonal) user interface display.
- Touch screen.
- Two RS-485 communication ports (COM 1, COM 2).
- LED indicators:
 - Power.
 - EtherNet™ Communication traffic.
 - Local Fuel/Air configuration port or System Modbus™ communication.
 - Modbus™ communication.
- Audio feedback.
- Flush mounting.
- Touch screen disable for screen cleaning.
- 12 Vdc power supply.
- Screen saver.
- Contrast control.
- Volume control.
- Real-time data trending analysis.
- Graphic user interface.

SOFTWARE UPGRADE

You can download new software for the S7999B through the Internet. Downloading software should only be done when recommended by Honeywell. This feature is intended to permit field upgrades for bug fixes and to install new features.

Requirements for downloading new software:

- Ethernet connection for Internet access (RJ45 male connector). Carefully insert the RJ45 connector into the Ethernet jack in the lower right corner on the back of the display to ensure no damage to the jack.
- Dynamic IP addressing (from DHCP server).

IMPORTANT

If these requirements can't be met at the location of the S7999B, this procedure should not be done or the S7999B should be moved to a location where these requirements can be met. Failure to satisfy these requirements can result in the S7999B becoming inoperable when the upgrade steps are followed.

The above requirements can be checked prior to execution of the software upgrade procedure on the Ethernet Setup page (see Advanced Setup section). On the Ethernet Setup page a connectivity check can be performed to validate whether access to the Honeywell server is possible.

The S7999B must be reset to initiate the download procedure. Initial boot procedure of the device permits the user to enter into Advanced Startup options within the first five seconds after power up.

Follow these steps:

1. Select the Advanced Startup Options button.
A Warning message is displayed. If you don't want to proceed with the software upgrade, you can cancel the procedure at this time.
2. Select OK to proceed.
3. Select the "Force Application Update" checkbox.
4. Deselect the "Use Existing Application" checkbox.
5. Select the Continue button.

The software upgrade is automatic after the above steps. The S7999B connects to the Honeywell server, which verifies the configuration file, erases the old application and downloads the new one.

The S7999B may have difficulty finding the new configuration file at first. In this case, the procedure automatically starts over again until it works.

SPECIFICATIONS

Electrical Ratings:

S7999B:

+12 Vdc input, maximum of 500 mA current drain.

Included Power Supply:

Inputs: 85 to 264 Vac, 47-63 Hz; 120 to 370 Vdc

Output: 12 Vdc; 0 to 2.1 A.

Power: 25W

Storage Temperature: -13°F to +155°F (-25°C to +60°C).

Humidity:

95% maximum relative humidity.

Approvals:

Underwriters Laboratories, Inc.

Operating Temperature: 14°F to 122°F (-10°C to +50°C)

Dimensions: See Fig. 1.

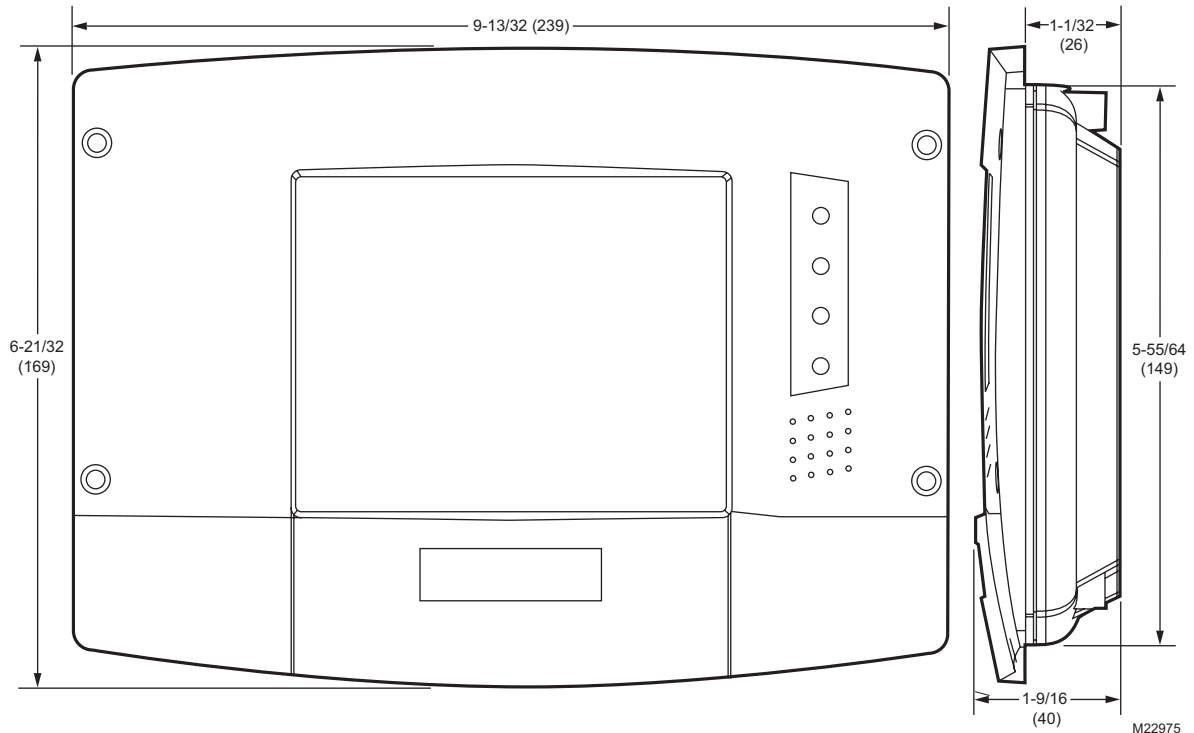


Fig. 1. S7999B dimensions in in. (mm).

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This Class A digital apparatus complies with Canadian ICES-003.

Cet Appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

SAFETY FEATURES

The S7999B contains software that incorporates many features that are designed to guide you safely through the commissioning process. Safety, however, is your responsibility.

Read all documentation carefully and respond appropriately to all error messages.

Be aware that as you command the R7999 to open and close actuators, the R7999 is designed to prevent you from opening or closing them too rapidly. When any of the system actuators are below 20% of their open position, the R7999 effectively limits any actuator from traveling more than three degrees without moving the other actuators in the system. When all the actuators are over 20% of their open position, the limit increases to 10 degrees.

WARNING

Explosion Hazard.
Improper configuration can cause fuel buildup and explosion.

Operators of this display may move fuel and/or air actuators to positions that can create hazardous burner conditions. Improper user operation may result in PROPERTY LOSS, PHYSICAL INJURY or DEATH.

The S7999B System Display device is to be used only by experienced and/or licensed burner/boiler operators and mechanics.

INSTALLATION INSTRUCTIONS

The S7999B can be configured in several different modes: local, switchable, and system. One of these modes is selected for the S7999B in the User Preferences page. The mode chosen determines the role and scope that this S7999B has in the configuration.

LOCAL MODE

The S7999B manages only a single burner/boiler system attached to COM 2 port (see Fig. 6). In this mode, COM 1 has several options:

- Not used (see Fig. 6). The device's responsiveness can be improved slightly if COM 1 is not used.
- ControlLinks™ commissioning (see Fig. 8)
- Connected to System Modbus™ Network (see Fig. 10).

NOTE: This configuration only allows one S7810M and one ControlLinks™, which can be on the COM 1 port or on the S7810M ControlBus.

SWITCHABLE MODE

The S7999B manages a series of Modbus™ nodes (up to 99 addresses) consisting of 7800 SERIES Burner Controls, ControlLinks™, and UDC devices (see Fig. 2).

SYSTEM MODE

S7999B manages a series of (up to 99) local systems in a S7999B Modbus™ network (see Fig. 12).

Both Switchable and System configurations allow multiple burner/boiler systems to be viewed at the S7999B. The Switchable configuration differs from the System configuration in two ways:

- **Method of viewing the systems**
In the Switchable configuration, only one system can be viewed at a time, and the user must “switch” between each Local system via a drop-down menu. In the System configuration, all Local systems are displayed graphically, and the user “zooms” into a specific system for more information.
- **Addressing the Modbus™ nodes or systems**
In the Switchable configuration, addressing the Modbus™ nodes is done manually, and careful Modbus™ addressing is required because duplicate addresses aren't allowed. Manual assignment of UDC controllers to their respective systems is required. In the System configuration, Modbus™ addresses of the nodes are learned by the System S7999B, so manual assignment isn't necessary. Be sure not to duplicate Modbus™ addresses in the nodes.

Switchable S7999B Configuration

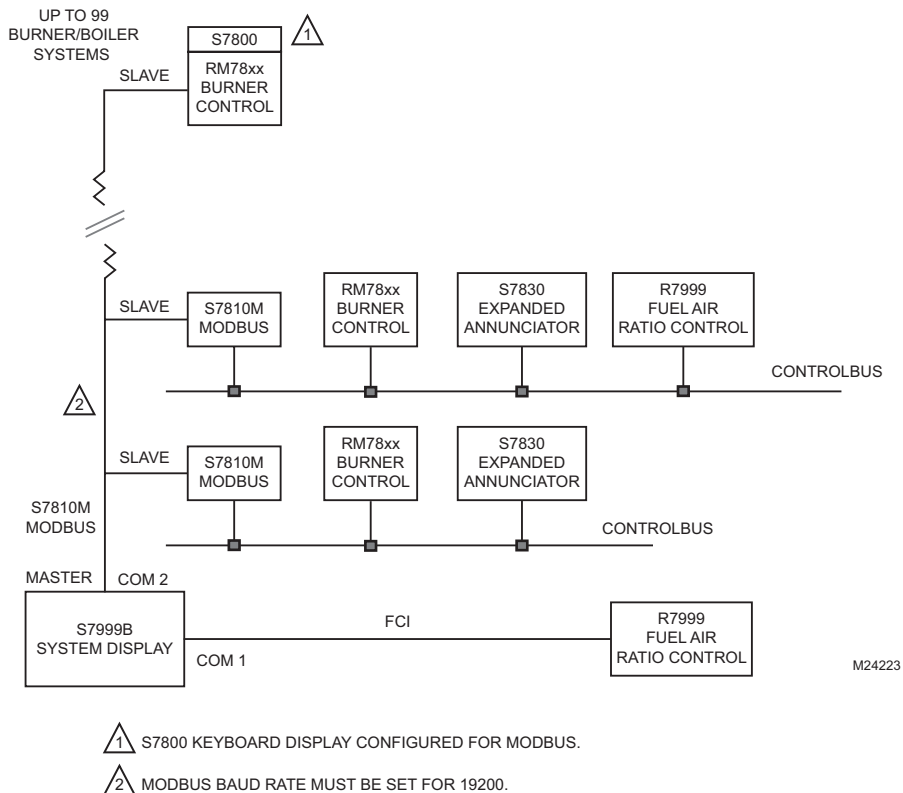
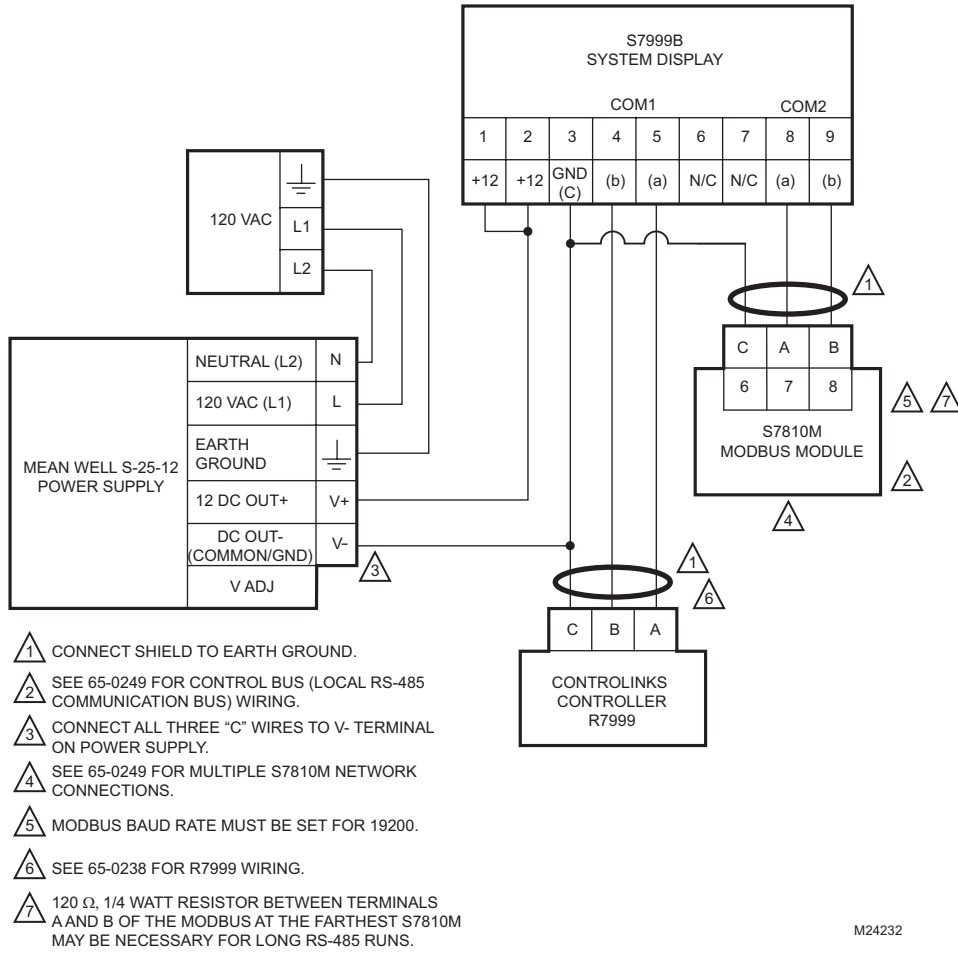


Fig. 2. Switchable S7999B configuration (S7810M Modbus™).

The S7999B can optionally connect directly to the R7999 from COM 1 using the cable and installation procedures specified in the R7999 Product Data Sheet. This connection is from the COM 1 terminal pins and is only mandatory when commissioning the R7999. The R7999 can remain connected to COM 1 following commissioning, but it is considered its own burner/boiler system, i.e., not part of any other system present on the S7810 Modbus™ network. This R7999 connection is called the Local F/A Configuration port.

The Modbus™ network on COM 2 consists of wiring the S7810M devices together as slaves to the S7999B. An S7810M device is required for each burner/boiler system. Up to 99 burner/boiler systems can be connected in this configuration (unless other slave devices are included in the Modbus™ wiring). Fig. 3 depicts this wiring.



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Fig. 3. Switchable S7999B wiring diagram.

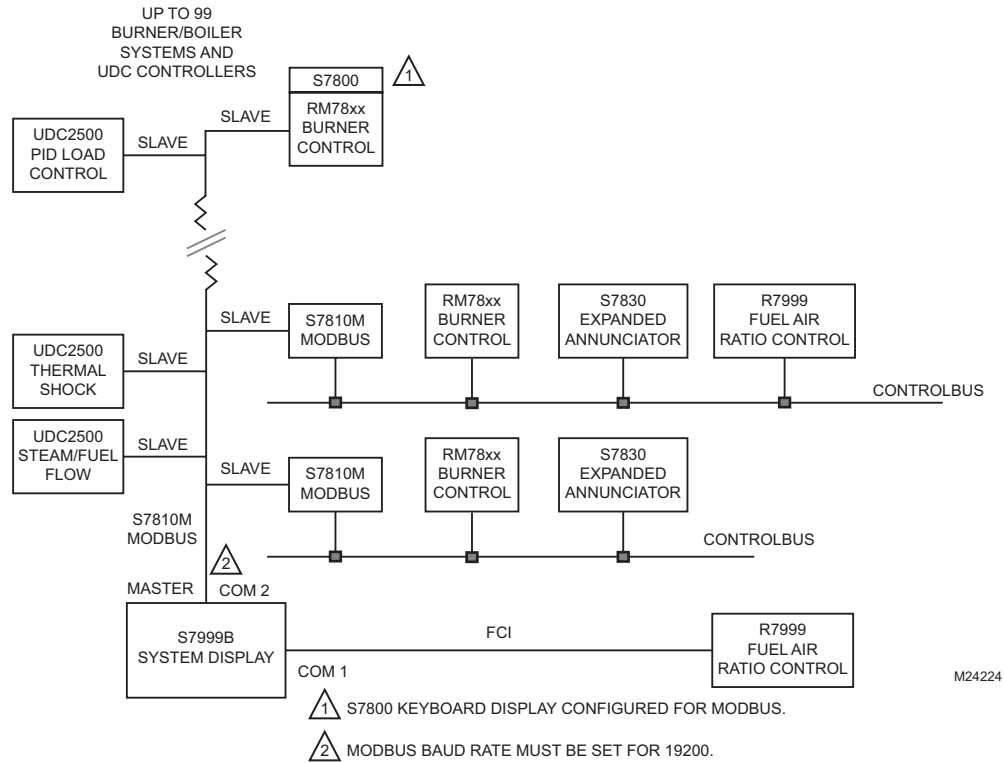
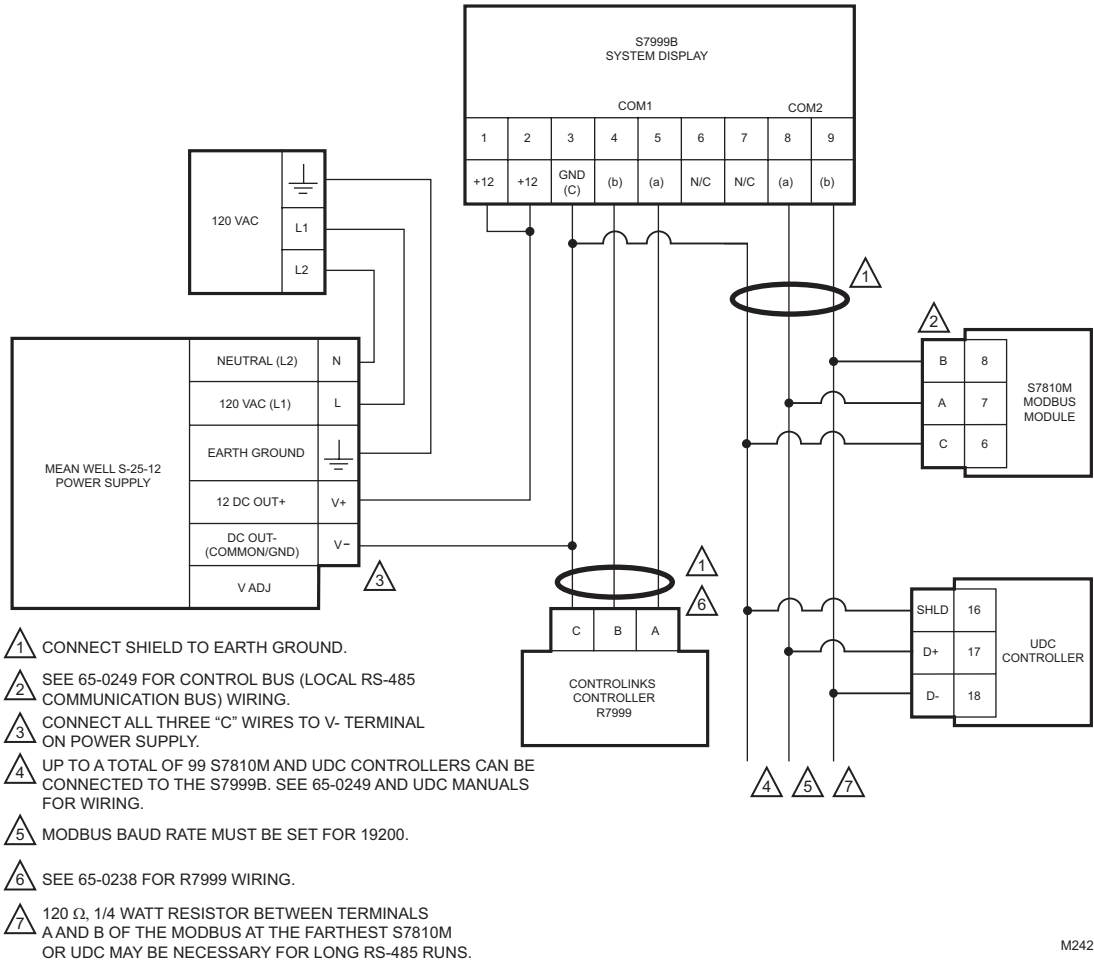


Fig. 4. Switchable S7999B configuration with UDC controllers.

UDC controllers may be added to the switchable configuration (see Fig. 4). The UDC controllers share the Modbus™ with the S7810M devices, so the total number of burner/boiler systems is reduced by the number of UDC controllers on the

network. A combined total of 99 devices are permitted on the Modbus™ network. Wiring for this configuration is shown in Fig. 5.



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Fig. 5. Switchable S7999B wiring diagram with UDC Controller.

Manual assignment of the UDC controllers to their associated burner/boiler system is required to allow UDC controllers on the S7810 Modbus™ network. No automatic assignment is possible.

Careful Modbus™ addressing is required when inserting UDC controllers in this configuration since duplicate addresses aren't allowed. Default Modbus™ addresses for the UDC controllers may need to be changed for them to work properly in the network.

Local S7999B Configuration

The S7999B can be configured to manage a single burner/boiler system only. In this configuration a single S7810M device is included in the wiring along with zero or more UDC controllers that perform one of the burner control applications. Multiple UDC controllers can be connected in this network.

Typical configuration results in only a single instance of each UDC application type installed on the network, but the system isn't restricted to just one instance. Multiple UDC controllers for any application type can be included.

Three variations of this configuration based on COM 1 port usage are possible:

- ControlLinks™ R7999 commissioning
- Subsystem of System Modbus™ network
- No additional connection

Fig. 6 depicts the configuration when COM 1 isn't used for any other connection, i.e., the S7999B manages exclusively just the burner/boiler system connected to the COM 2 port.

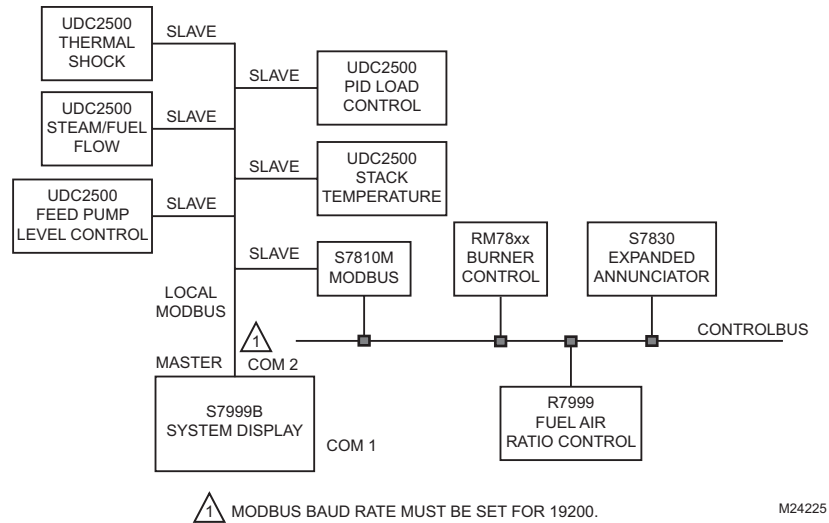


Fig. 6. Local S7999B configuration (COM 1 not used).

In this configuration, the R7999 may be connected to the ControlBus, and its status is visible from the S7810M. Only one S7810M is connected, but multiple UDCs can be connected in this configuration. Fig. 7 shows the wiring for this configuration.

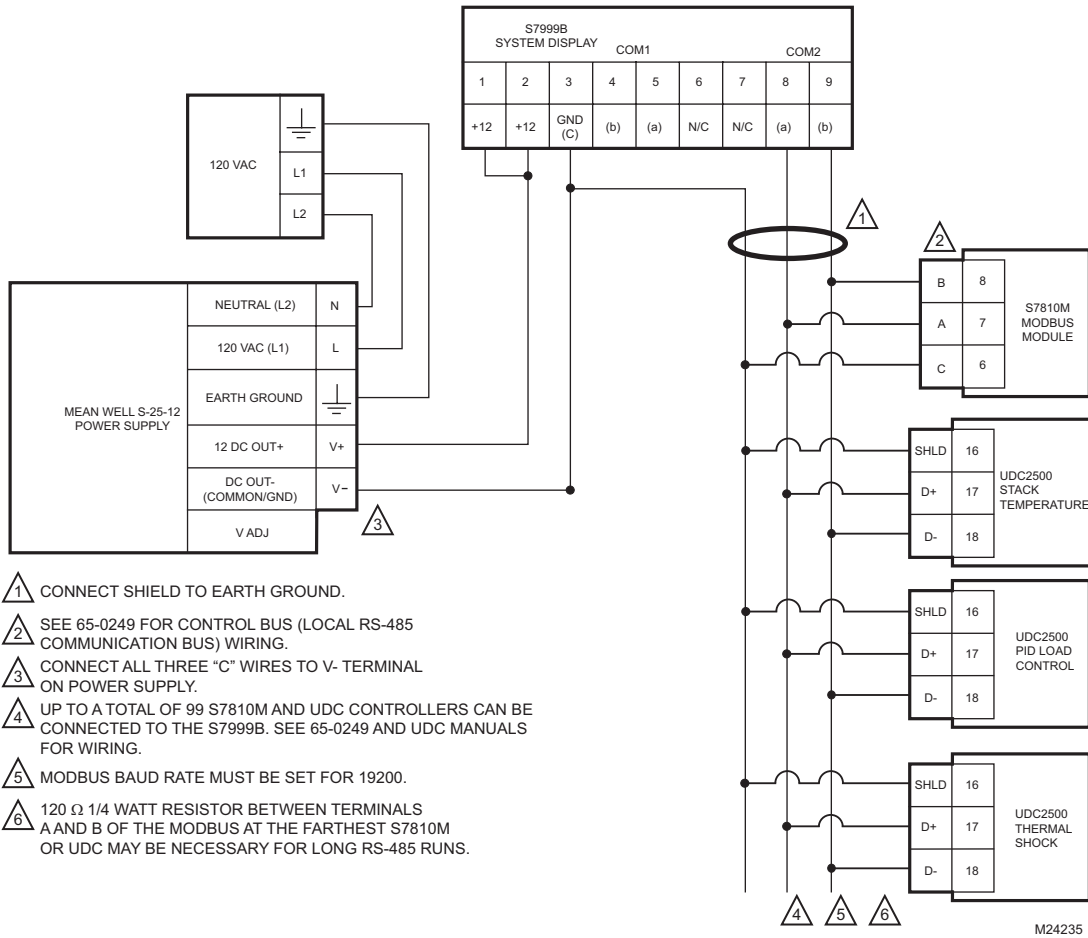


Fig. 7. Local S7999B wiring diagram (COM1 not used).

Fig. 8 depicts the configuration when COM 1 is used for ControlLinks™ R7999 commissioning.

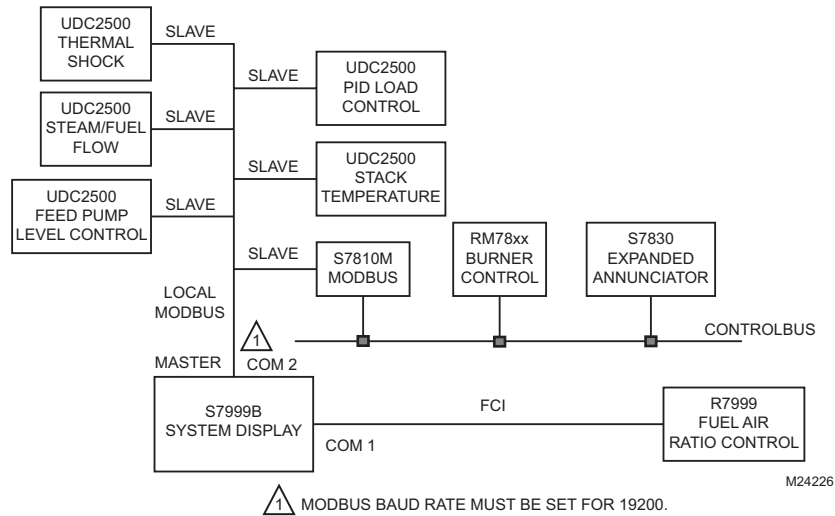
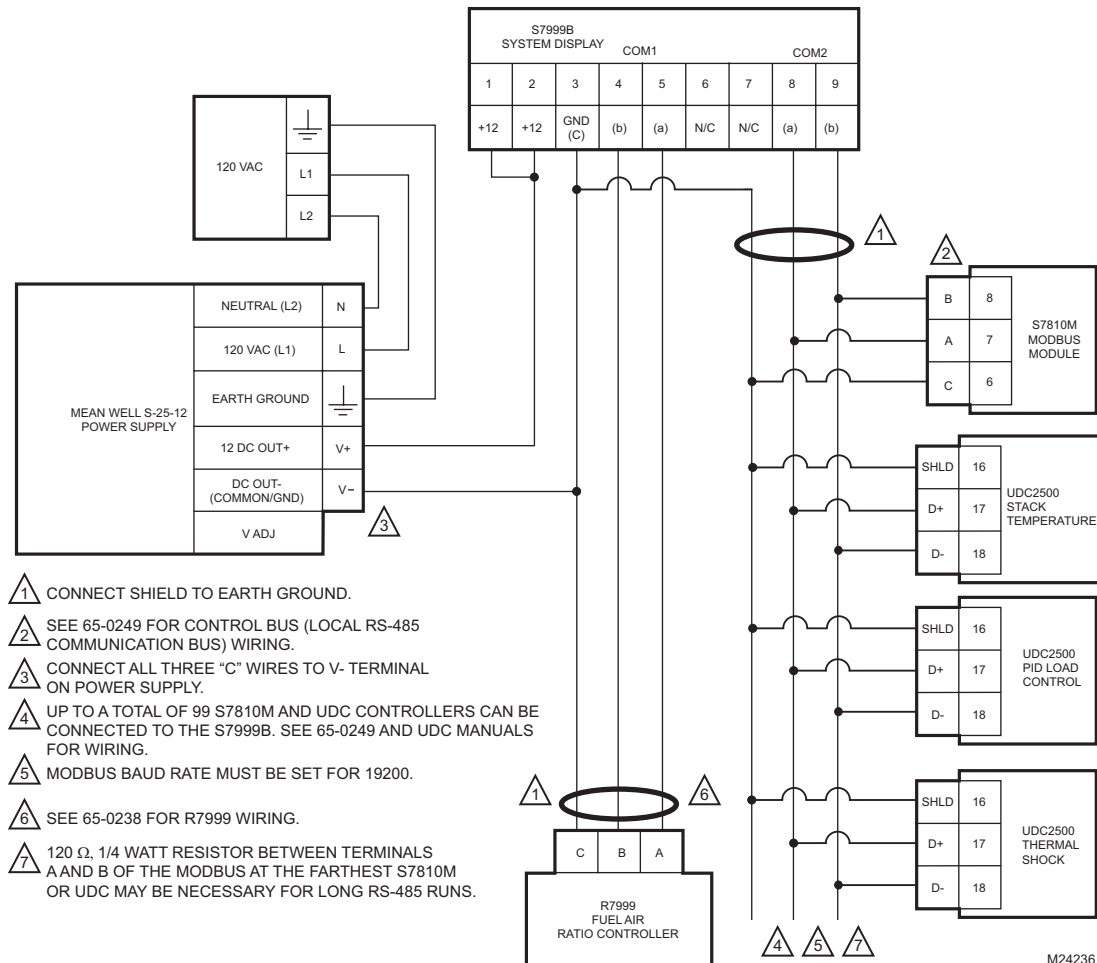


Fig. 8. Local S7999B configuration with ControlLinks™ commissioning.

In this configuration, the R7999 is connected to COM 1 and not to the Controlbus. When the burner/boiler system is configured in this way it is not visible at the System S7999B (because COM 1 is not connected to the System S7999B).



- 1 CONNECT SHIELD TO EARTH GROUND.
- 2 SEE 65-0249 FOR CONTROL BUS (LOCAL RS-485 COMMUNICATION BUS) WIRING.
- 3 CONNECT ALL THREE "C" WIRES TO V- TERMINAL ON POWER SUPPLY.
- 4 UP TO A TOTAL OF 99 S7810M AND UDC CONTROLLERS CAN BE CONNECTED TO THE S7999B. SEE 65-0249 AND UDC MANUALS FOR WIRING.
- 5 MODBUS BAUD RATE MUST BE SET FOR 19200.
- 6 SEE 65-0238 FOR R7999 WIRING.
- 7 120 Ω, 1/4 WATT RESISTOR BETWEEN TERMINALS A AND B OF THE MODBUS AT THE FARTHEST S7810M OR UDC MAY BE NECESSARY FOR LONG RS-485 RUNS.

Fig. 9. Local S7999B wiring with ControlLinks™ commissioning.

Fig. 10 depicts the configuration when this S7999B is a subsystem of the System Modbus™ burner system network.

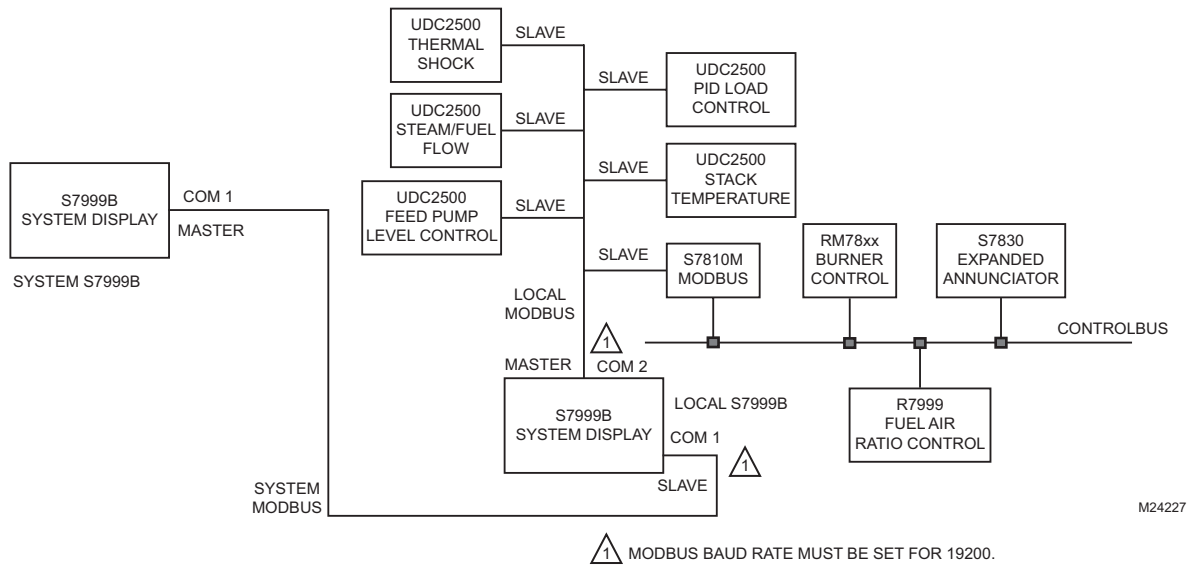


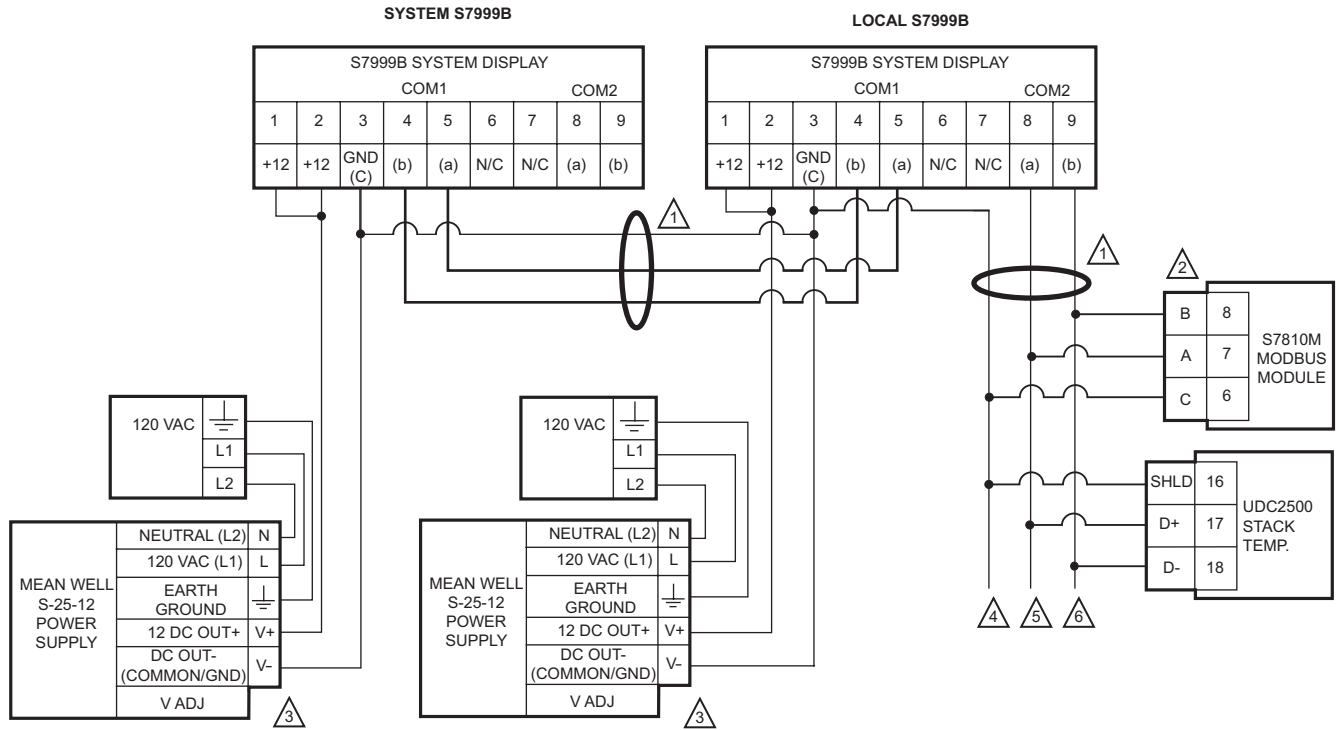
Fig. 10. Local S7999B with connection to System Modbus™ network.

In this configuration, the Local S7999B is a Modbus™ slave to the S7999B that has the system view perspective (System S7999B). Data about the local burner system is made available to the System S7999B when it accesses the interface registers in the Local S7999B.

The Local S7999B automatically detects UDC controllers connected to its network and displays them on the Home page as they are found. No user involvement is necessary at the S7999B to make the UDC controller visible to it.

The application type or function of the UDC controller is automatically determined by the Local S7999B.

Each Local burner/boiler system can be designated as either a burner system or a boiler system. This designation is specified in the Local S7999B. Each system can also be named. This system (equipment) name is displayed on the Home page. You can quickly search for the S7810M and UDC controllers on the Local Modbus™ network.



- 1 CONNECT SHIELD TO EARTH GROUND.
- 2 SEE 65-0249 FOR CONTROL BUS (LOCAL RS-485 COMMUNICATION BUS) WIRING.
- 3 CONNECT ALL THREE "C" WIRES TO V- TERMINAL ON POWER SUPPLY.
- 4 UP TO A TOTAL OF 99 S7810M AND UDC CONTROLLERS CAN BE CONNECTED TO THE S7999B. SEE 65-0249 AND UDC MANUALS FOR WIRING.
- 5 MODBUS BAUD RATE MUST BE SET FOR 19200.
- 6 120 Ω, 1/4 WATT RESISTOR BETWEEN TERMINALS A AND B OF THE MODBUS AT THE FARTHEST S7810M OR UDC MAY BE NECESSARY FOR LONG RS-485 RUNS.

Fig. 11. Local S7999B with connection to System Modbus™ network wiring.

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System S7999B Configuration

The S7999B can be configured to monitor all burner/boiler systems via a System Modbus™ network. One S7999B is designated the System S7999B (master) on the network, and the other S7999Bs are designated as a Local S7999B (slave) to provide system status for their respective burner/boiler system.

Fig. 12 depicts this type of configuration. Only S7999Bs are wired together in this configuration (using the COM 1 ports).

Only one S7999B can be configured as the System S7999B on this Modbus™ network. This S7999B assumes the Modbus™ master role on the COM 1 port. Only the System S7999B can view any burner/boiler system on the network; the Local S7999B can only view its own burner/boiler system.

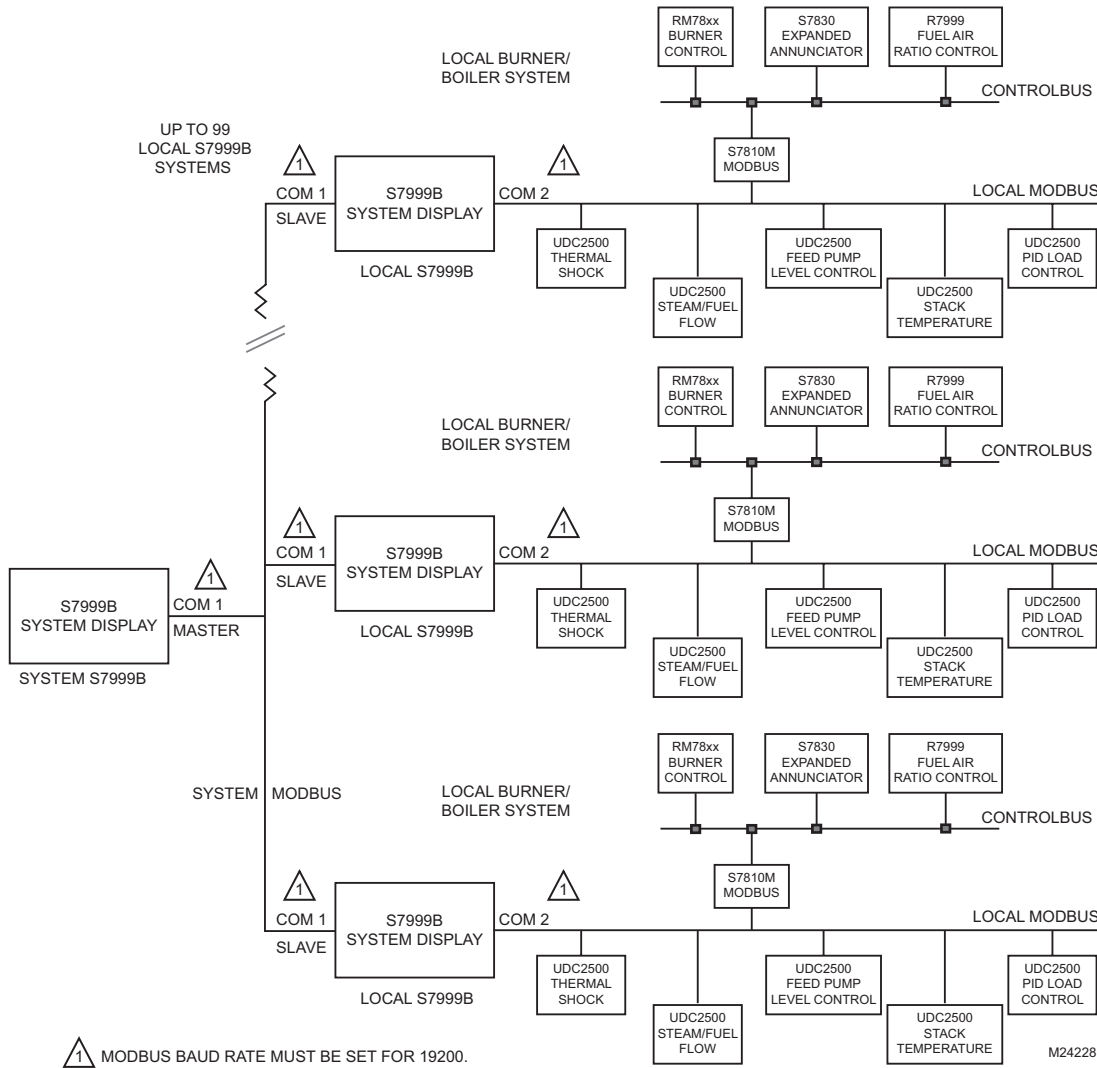
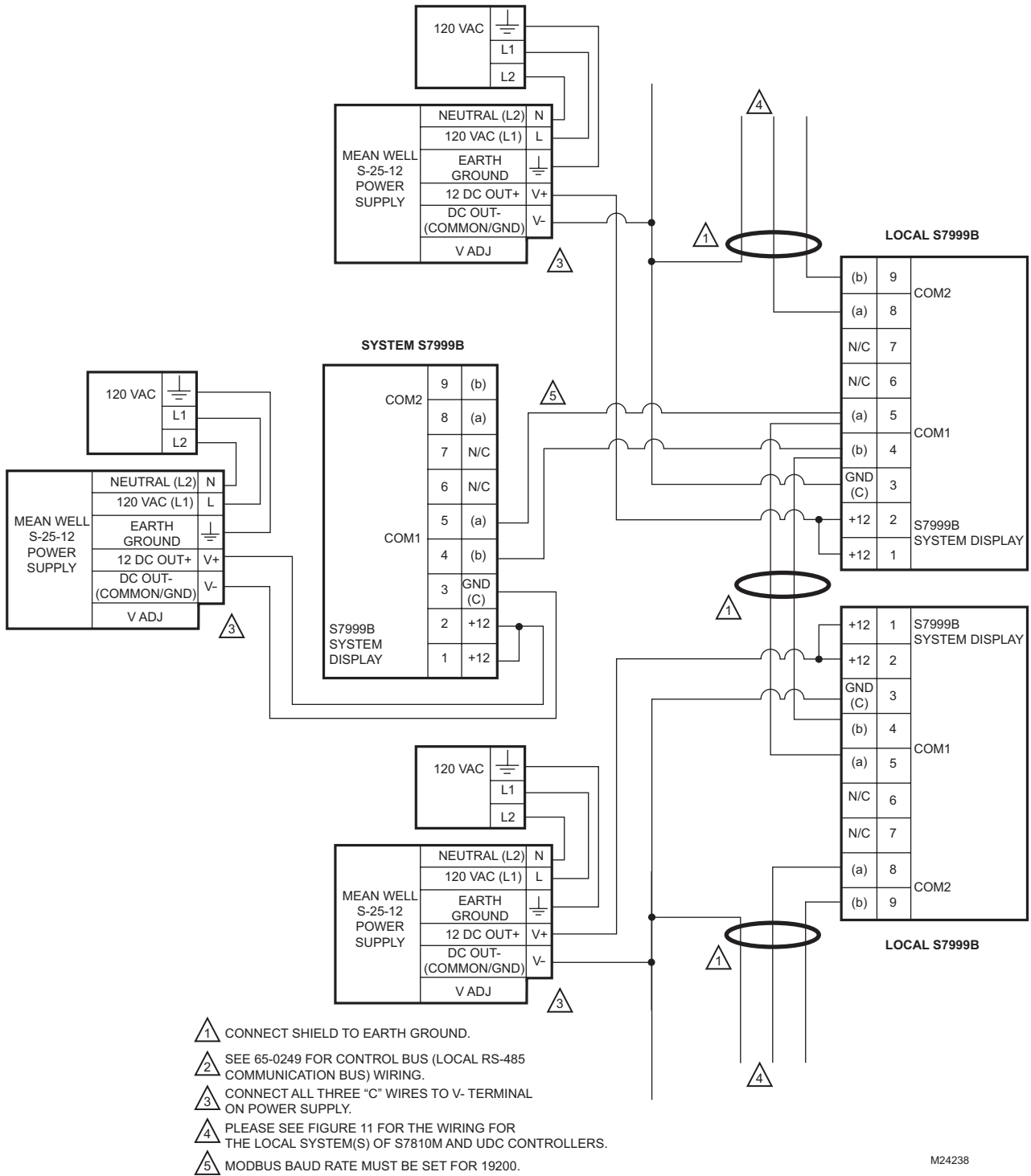


Fig. 12. System Modbus™ network.

Up to 99 Local burner/boiler systems can be connected together and displayed at the System S7999B.

A Modbus™ register interface is used in the Local S7999B to provide status data to the System S7999B. Many of the register addresses and definitions for the burner control, expanded annunciator, and R7999 have the same definitions that the S7810M specifies in its interface.

At the System S7999B a quick search for Local S7999Bs on the System Modbus™ network can be performed. This function is expected to be used after a new Local burner/boiler system is attached to the System Modbus™ network. If the quick search isn't done, a slower, automatic search eventually finds new Local burner/boiler systems.



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Fig. 13. System Modbus™ network wiring.

INSTALLING THE HARDWARE

Mounting the S7999B and Power Supply

The S7999B can be mounted on the door panel of an electrical enclosure.

1. Select the location on the door panel to mount the unit; note that the device will extend into the enclosure at least one inch past the mounting surface.
2. Provide an opening in the panel door 8-1/8 in. wide by 5-7/8 in. high.
3. Place the S7999B in the opening and use it as a template to mark the location of the four mounting screw holes. Remove the device and drill pilot holes at the marked location.
4. Using the pilot holes as guides, drill 1/4 in. holes through the door panel.
5. Place the S7999B in the opening, aligning the mounting holes in the device with the drilled holes in the panel.
6. Secure the S7999B to the panel with four #6-32 screws and nuts provided.
7. Select a location inside the enclosure for mounting the power supply.
8. Using the power supply as a template, mark the locations of two mounting holes in the enclosure.
9. Remove the power supply and drill pilot holes.
10. Drill 1/4 in. holes through the panel at the marked locations and secure the power supply with the two #6-32 screws and nuts provided.
11. Remove the 9-pin connector plug from the back of the S7999B.
12. Wire the connector to the power supply and the RS-485 cables using the wiring diagram in Fig. 14.
13. Insert the 9-pin connector plug back into the S7999B and secure firmly.

Installing the ControlLinks™ and Burner Control Hardware

Use the following ControlLinks™ instructions to install the system hardware: See Fig. 3 for wiring block diagram.

- 65-0238 R7999 ControlLinks™ Control Controller.
- 65-0239 ML7999 ControlLinks™ Control Actuator.
- 65-0240 Q7999 Wiring Subbase.
- 65-0101 S7830 Expanded Annunciator.
- 65-0249 S7810M Modbus™ Module.
- 65-0084 Q7800 Wiring Subbase.
- 65-0109 R78xx Flame Amplifier
- 65-0089 ST7800 Purge Card
- 65-0090 S7800 KDM
- 65-0288 S7800A1142 KDM
- 65-1085 7800 SERIES Relay Modules

Installing the Universal Digital Control Hardware

Use the following documents to install the UDC2500, UDC3200, and UDC3500 hardware.

- 51-52-25-124 UDC2500 Quick Start Guide.
- 51-52-03-36 UDC2500 Specification.
- 51-52-25-127 UDC2500 Product Manual.
- 51-52-25-129 UDC3200 Quick Start Guide.
- 51-52-03-39 UDC3200 Specification.
- 51-52-25-119 UDC3200 Product Manual.
- 51-52-25-130 UDC3500 Quick Start Guide.
- 51-52-03-40 UDC3500 Specification.
- 51-52-25-120 UDC3500 Product Manual.

Refer to addendums at the end of this document for configuration parameters specifically designed for the application that the UDC controller provides.

QUICK SETUP

1. Make sure the S7999B 9-pin connector is properly aligned and pressed firmly in place.
2. Make sure the 3-pin connector is connected securely to the ControlLinks™ controller RS-485 communication port.
3. Make sure the S7810M Modbus™ wiring is correct.

WARNING

Electrical Shock Hazard.

Can cause severe injury, death or equipment damage.

Line voltage is present at the 120 Vac power supply.

4. Make sure the +12 Vdc power supply is connected securely to the 120 Vac power source.

Wiring

The S7999B must be appropriately wired for both power and communications. An external 12V power supply with an appropriate power rating is connected to both pins 1 and 2 to power the device.

Communication is done over two RS-485 busses:

- COM 1: a bus directly to the R7999 device or to the Modbus™ network that connects all S7999Bs together (System Modbus™)
- COM 2: a bus to the Modbus™ network containing S7810M devices and UDC controllers.

S7999B wiring connections are listed in the table below:

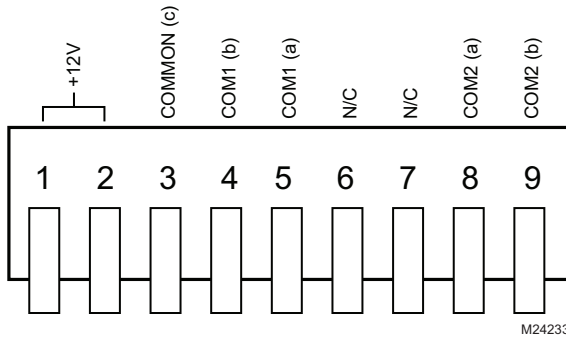


Fig. 14. S7999B connector terminals.

Table 1. 9-pin Connector Terminals

Pin #	Function
1	12V input
2	12V input
3	Ground (Power, COM 1, COM 2)
4	COM 1 (b) to R7999 (B) or System S7999B Modbus™ Data +
5	COM 1 (a) to R7999 (A) or System S7999B Modbus™ Data -
6	Not used
7	Not used
8	COM 2 (a) to S7810M/UDC Modbus™ Data -
9	COM 2 (b) to S7810M/UDC Modbus™ Data +

An RJ45 jack can optionally be wired with a 10 base-T Ethernet cable for Internet access.

The S7999B communicates with the UDC controllers via a 3-wire RS-485 interface using the Modbus™ protocol.

The System S7999B communicates with Local S7999Bs via a 3-wire RS-485 interface using the Modbus™ protocol.

The S7999B is compatible with R7999 build 140 and newer, and with S7810M build 6020 and newer.

STARTING THE DISPLAY

Home Page

Make sure a screen similar to Fig. 15, 16, or 17 appears after the S7999B is completely powered up.

The Home page is the main screen that leads to all other pages and is used to select one of the following actions:

- Commission the ControlLinks™ Fuel/Air Ratio Control (attached to COM 1 port only):
 - Commission Button: Press to start commissioning a new system or modify/review the commission settings of an existing systems.

NOTE: ControlLinks™ Fuel/Air Ratio Controls (R7999) located on burner systems viewable from the Modbus™ network can not be commissioned through the S7999B. The R7999 can only be commissioned when it is attached to the COM 1 port and the Home page view context is set to “Local Fuel/Air Control”.

- Monitor a burner system:
 - Press the icon corresponding to the part of the system you wish to monitor. Press the Fuel/Air Control Configuration button to view more parameter settings of the Fuel/Air Ratio control.
- Monitor application controller.
- S7999B Setup and Diagnostics.
 - Press the setup button to configure S7999B settings.
 - Verify the version number of the S7999B software, adjust display settings, test the display and reset the S7999B.

The number of actuators displayed on this page will vary depending on the number of actuators previously wired to the ControlLinks™ Fuel/Air Ratio Control and configured via the S7999B configuration tool.

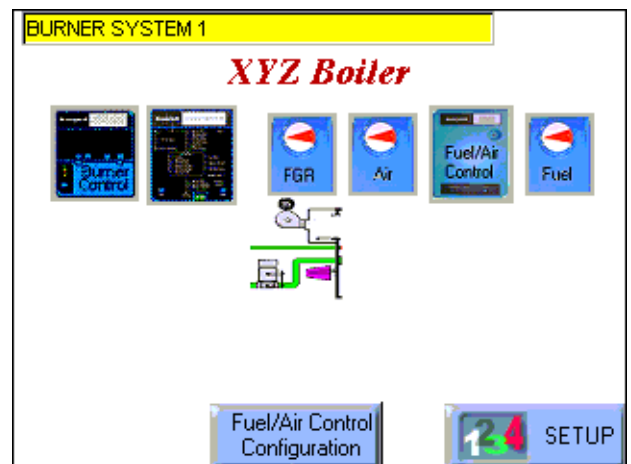


Fig. 15. Switchable S7999B Home Page.

No title is displayed on this page unless specified in User Preferences. The custom title entered by the user is displayed on the page when selected by the user.

A burner or boiler icon displays on the page designating which type of system it represents. The user chooses which type of system it is in User Preferences.

If the following screen (Fig. 16) appears, then no R7999 and no burner systems are seen by the S7999B. Check for proper wiring connections and make necessary corrections.



Fig. 16. Home Page—disconnected.

Local S7999B Home Page

Below each UDC controller icon one key status variable can be selected for display.

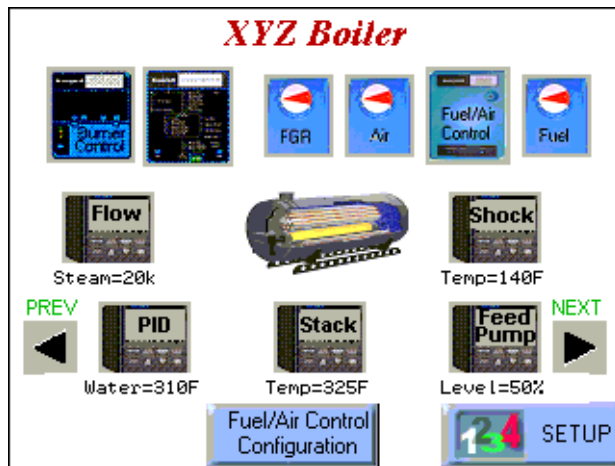


Fig. 17. Local S7999B Home Page.

The table below lists the possible selections the user can choose for display.

Table 2. Local S7999B Home Page Status Variables

UDC controller	Status variable
Stack Temperature controller	Current temperature
Stack Temperature controller	High/Low temperature alarm
Stack Temperature controller	FGR permissive alarm
PID Load controller	Current water temperature
PID Load controller	Current steam pressure
PID Load controller	Low Fire Hold alarm
Feed Pump Level controller	Current vessel level
Feed Pump Level controller	High water alarm
Steam/Fuel Flow Monitor	Current steam flow
Steam/Fuel Flow Monitor	Current gas flow
Steam/Fuel Flow Monitor	Current fuel oil flow
Thermal Shock controller	Current water supply temperature
Thermal Shock controller	Optimal temperature alarm

Each UDC controller icon is a button that the user selects to advance to a status page that displays information about just the UDC controller selected. Information displayed varies by controller type.

Up to 5 UDC controllers can display on the page at one time. If the Local burner/boiler system has more than 5 UDC controllers, then a “More” button displays on the page that allows the user to select which UDC controller to see more status for (advance to UDC controller status page).

When the COM 1 port on the Local S7999B is configured for ControlLinks™ commissioning, the Fuel/Air Ratio Control (R7999) and actuator buttons are present on the page when the port is connected to the R7999 or when the R7999 is connected to the S7810M.

When the R7999 is connected to the COM 1 port in this configuration, it is considered to be a component of the Local burner/boiler system. The R7999 and actuators are displayed on the page in the same manner as when the R7999 is connected to the S7810M ControlBus except for the following:

- All 4 actuators may be displayed when the R7999 isn't commissioned yet and two fuel actuators exist. One fewer UDC controller button is displayed in this case.
- Commission button displays on the page to allow R7999 commissioning.

An R7999 connected to the S7810M ControlBus supersedes an R7999 connected to the COM 1 port in case two R7999's are detected in the same Local burner/boiler system. Status of the R7999 attached to the COM 1 port is ignored until the other R7999 is disconnected from the S7810M ControlBus.

System S7999B Home Page

A burner or boiler icon is displayed on the page for each Local burner/boiler system detected. The icon type displayed is based on the type of system the Local S7999B states that it is. The name of the burner/boiler system is displayed above the icon. This system name is also obtained from the Local S7999B.

The burner or boiler icon on the page is a button that can be selected by the user to zoom in to show just the components of that burner/boiler system (burner control, R7999, UDC controllers, etc.) in the same manner as seen on the Local S7999B Home page (see Fig. 18). All status pages visible from the Local S7999B Home page are also accessible after zooming in on a specific burner/boiler system.

Below each burner or boiler icon one key status variable can be selected for display. The table below lists the possible selections the user can choose for display. A different variable can be displayed for each burner/boiler system.



Fig. 18. System S7999B Home Page.

A fault audio alarm bell button displays in top-left corner of Local Home page instead of the top-right to accommodate the Return Back button.

No title is displayed on this page unless specified in User Preferences. The custom title entered by the user is displayed on the page when selected by the user.

If you want to go from a Local mode to a System mode (all burner/boiler systems on the System Home page), press the Return Back button in the top-right corner of the page (see Fig. 19). This button is the same icon that displays in the same position on all pages that have a title.

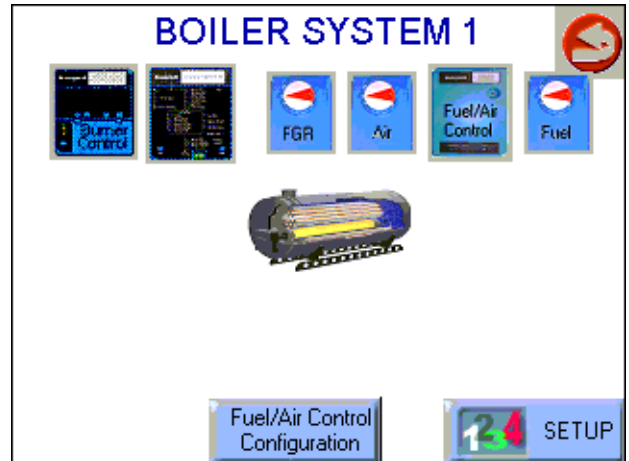


Fig. 19. System Home Page—zoomed in.

Table 3. System S7999B Home Page Status Variables

Burner/boiler system component	Status variable
Burner Control	Sequence state
Burner Control	Fault code
Burner Control	Flame Signal Strength
R7999	Fuel selection
R7999	Fault code
R7999	Firing rate
Stack Temperature controller	Current temperature
Stack Temperature controller	High/Low temperature alarm
Stack Temperature controller	FGA permissive alarm
PID Load controller	Current water temperature
PID Load controller	Current steam pressure
PID Load controller	Low Fire Hold alarm
Feed Pump Level controller	Current vessel level
Feed Pump Level controller	High water alarm
Steam/Fuel Flow Monitor	Current steam flow
Steam/Fuel Flow Monitor	Current gas flow
Steam/Fuel Flow Monitor	Current fuel oil flow
Thermal Shock controller	Current water supply temperature
Thermal Shock controller	Optimal temperature alarm

If more Local burner/boiler systems exist in the network than can reasonably fit on the page, Previous page and Next page buttons (see Fig. 20) are used to move between the burner/boiler systems on the page. These buttons appear only when the total number of burner/boiler systems exceeds the display limit. Unlike the switchable S7810M Modbus™ network, no yellow burner system button is displayed in the top left corner of the page to switch between burner/boiler systems.

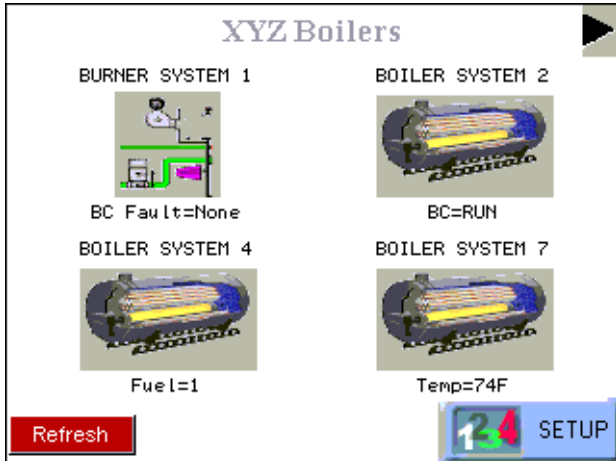


Fig. 20. System S7999B scrolling.

Switchable S7999B Home Page

SYSTEM SETUP AND CONFIGURATION

DISPLAY OPERATION

Because the S7999B System Display operates like a wizard, you cannot open screens randomly. You must step through them one at a time, and provide the information necessary for one before you can move on to another. The screen descriptions are provided below so that you can understand the purpose of each and view the selections, parameters, and information that is available or required on each.

NOTE: Most screens have a Home button which appears as an icon of a building structure in the upper left corner of the screen and a Back button which appears as an icon of an arrow returning to its origin in the upper right corner of the screen. The Home button returns the user immediately to the Home page and terminates any operation in progress. Care should be taken with this button during commissioning. The Back button returns the user to the previous screen.

Setup Page

System S7999B ONLY

The user can perform a dedicated search for burner/boiler systems (Local S7999Bs) connected on the System Modbus™ network on this page. The search scans through all 99 Modbus™ addresses to locate all systems currently included in the network and displays their Modbus™ address and burner/boiler system name, as discussed in the View Context section.

Local S7999B ONLY

The user can perform a dedicated search for all burner/boiler system controls (S7810M and UDC controllers) connected on the Local Modbus™ network on this page. The search scans

through all 99 Modbus™ addresses to locate all controllers currently included in the network and displays their Modbus™ address and controller type. These controllers are automatically associated with the local burner/boiler system.

View Context

The S7999B can display the status of the R7999 attached to the F/A Config port or the status of one of the 99 burner systems attached to the Modbus™ port. Only one of these burner systems can be shown at a time, however, on the S7999B. The user selects which burner system to view by selecting the burner system button located in the upper left corner of the Home page. This button is a yellow title bar that contains the name of the current burner system that has the view context. Pressing the burner system button causes a dialog box (Fig. 21) to display, listing all the known burner systems.

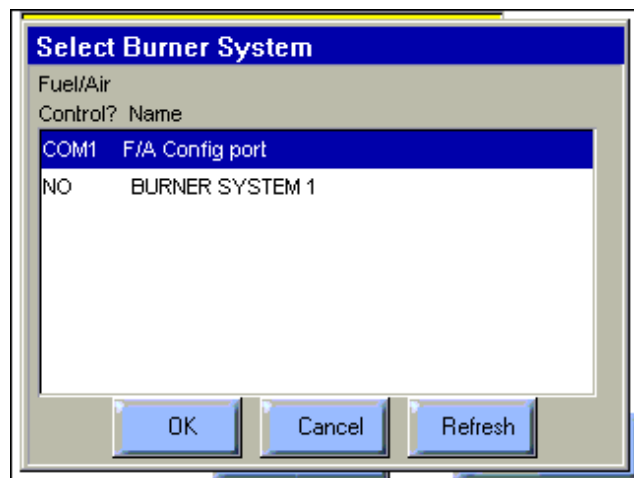


Fig. 21. Select Burner System.

In case more burner systems exist than can fit on the screen, a scroll bar displays on the right side of the list, allowing the user to scroll up and down to find the desired burner system.

Select the burner system to switch to and then press the OK button to make the view context switch. Press the Cancel button to not switch the view context and remain with the current burner system.

The selection at the top of the list, labelled "F/A Config Port" is the one for the ControlLinks™ Fuel/Air Ratio Control attached to the F/A Config port. All other selections are for burner systems attached to the Modbus™ network.

If a burner system is not included in the list that should be, it is possible that the S7999B has not found that burner system yet. The "Refresh" button on the screen can be selected to cause the S7999B to do a quick scan of all burner systems on the Modbus™ network. The list of burner systems will be refreshed in the window when the scan is completed.

Keyboard

Some pages request user entry of character names. When this type of input is asked from the user, a keyboard page displays, similar to Fig. 22. A text box at the top of the screen

displays the current (or default) setting of the user input. The user can append to this text, clear it to an empty value, or backspace to remove characters at the end of the text.

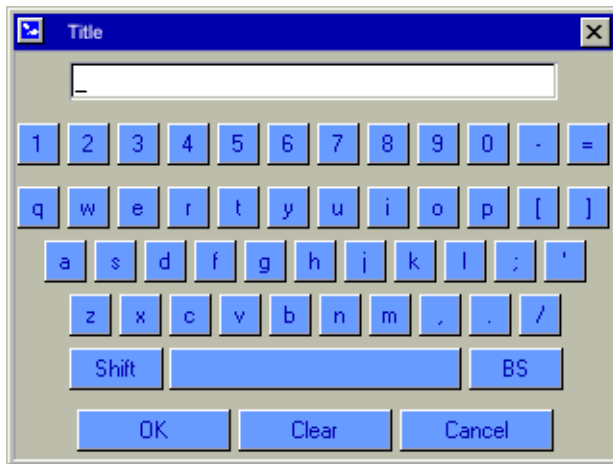


Fig. 22. Keyboard.

A “Shift” key on the left side of the screen allows the user to shift the keyboard between upper and lower case characters. Touching the “Shift” button toggles the keyboard from one mode to the other (continuous touching of the “Shift” button is not required). An “OK” button on the bottom of the screen is selected when the user is done entering (editing) the text input. A “Cancel” button on the bottom of the screen allows the user to ignore any text changes that have been made and keep the original text value. Selecting either the “OK” button or the “Cancel” button returns the user to the page displayed prior to the keyboard page.

Power-up Validation

The Home page will appear and the POWER LED will be blinking when the device is properly powered. Select the Setup button to adjust the contrast as desired.

If the screen is dim, check pin 1 wiring connections.

NOTE: An Advanced Startup screen displays for five seconds after power-up before the Home page displays. This screen allows the user to upgrade the software in the S7999B System Display (see Software Upgrade Addendum) and should normally be bypassed.

Communication Validation

Two LEDs exist for I/O traffic, one for the F/A Configuration port and the other for the Modbus™ port.

1. Make sure the LEDs are blinking.
2. If the LEDs are not blinking:
 - a. Make sure the proper connections have been made between R7999 ControlLinks™ Control and the S7999B F/A Config port.
 - b. Make sure the proper connections have been made between the S7999B Modbus™ port and the first S7810 Modbus™ module in the Modbus™ network.
 - c. See “Installing the Hardware” section for proper wiring of the S7999B 9-pin Header Connections.
 - d. Make sure the ports are enabled on the User Preferences page by using the Advanced Setup page.

COMMISSIONING

Commissioning Process

Commissioning the R7999 using the S7999B System Display requires the following general steps:

1. Connecting the R7999 to the S7999B and logging into the system with a password. This prevents unauthorized users from modifying the modulation curve.
2. Specifying the base configuration: one or two fuels, with or without FGR.
3. Selecting system parameters such as Low Fire Hold.
4. Specifying the characteristics of the actuators and setting the valve/damper endpoints for those actuators.
5. Creating a modulation curve (profile) for each fuel and verifying it from maximum to minimum modulation. (While you are commissioning the system, you must monitor the burner operation with appropriate safety instrumentation to verify the modulation curve.)

Commissioning Overview

The following table provides a step-by-step overview of how a system is commissioned.

The Notes column in the table provide references to detailed information when completing the more complex operations.

Table 4. Commissioning Overview.

Step	Action	Notes
1	On the Home page screen, select Commission .	
2	On the WARNING screen, select Commission :	
3.a.	Enter R7999 Commission password.	The S7999B requires you to enter the R7999 Commission password. The factory default password is “password”.
3.b.	Set new password for new R7999 (factory state).	
4	On the Commission Configuration screen, perform the following steps:	

Table 4. Commissioning Overview. (Continued)

Step	Action	Notes
4.a.	Select the base configuration.	The choices are: <ul style="list-style-type: none"> • Unconfigured: selecting this option takes the device back to a factory state and sets the password to "password". • Single Fuel • Single Fuel with FGR • Dual Fuel • Dual Fuel with FGR
4.b.	Select an actuator to configure: Air, Fuel 1, Fuel 2, or FGR.	Actuator buttons corresponding to the base configuration are enabled. Any actuators that have completed configuration (are locked) have a check mark next to the button.
5.a.	Select the Direction of Closed Travel: Clockwise or Counterclockwise.	
5.b.	Select the Actuator's Valve or Damper Type: Fixed Stops or Continuous Rotation.	
5.c.	Select the next button.	
6.a.	Enter the KEY (serial number) of the Actuator.	Manually move the actuator to a midspan position to allow the ID unlocking algorithm to function properly. Please ensure all eight digits are entered correctly. You may confirm that an actuator has been successfully brought on-line by noting its flash rate has changed from a rapid flash to a slow flash, i.e. one blink a second.
6.b.	Select the OK button.	
7.a.	Press Auto Seek on Maximum Open Endpoint screen.	Only for fixed Stop valve or damper type.
7.b.	If necessary, press Open or Close to adjust the actuator position to open Endpoint.	
7.c.	Press Lock button.	
7.d.	Select the Next button.	
8.a.	Press Auto Seek on Maximum Closed Endpoint screen.	
8.b.	If necessary, press Open or Close to adjust the actuator position to Closed endpoint.	
8.c.	Press Lock button.	
8.d.	Select the Next button.	
9	Repeat steps 4.b through 8.d to set the configuration of the other actuators in your system.	
10	If any System Configuration parameters need to be set, select System Configuration button. NOTE: Go to System Configuration section for more information.	
11.a.	Press Next on Commission Configuration screen.	
11.b.	If a saved profile curve exists and is desired, select Advanced Options button instead of the Next button. See Load Profile Curve section.	Curve is loaded and proceeds to curve commissioning screen.
12	On the Curve Commissioning screen, perform the following steps:	
12.a.	Switch the external burner demand switch (power LCI terminal 13) and then select the Start Lightoff button.	Wait for actuators to move to preset Air Purge position.
12.b.	Press Open and/or Close for Air to move the cursor to the desired Air Purge point of the burner.	The R7999 will automatically move the Air actuator to a 62% open position if it is unconfigured.

Table 4. Commissioning Overview. (Continued)

Step	Action	Notes
12.c.	Press Purge button.	A “P” will be displayed on the profile. The R7999 will energize its HFP output (terminal 10) which, in turn, allows the burner control to start the purge time. Wait for purge to complete and cursor to move to preset Lightoff position.
12.d.	Press the Open and Close buttons for Fuel and Air and the FGR (if present) to move the cursor to the desired Lightoff point of the burner.	The damper will automatically move to a 25% open position, while the fuel actuator will remain at the closed position plus 1 degree if it is unconfigured. When used with Honeywell burner controls, the user has 240 seconds to perform this action, otherwise the burner control will lock out.
12.e.	Press Lightoff button.	An “L” will be displayed on the profile, and the R7999 will energize the LFP output (terminal 8), which will allow the burner control to light off the system. The burner should light. Wait for the lightoff to complete and the system to change to the Modulating state.
12.f.	Press Open and Close for Fuel and Air and the FGR (if present) to move the cursor to the Minimum Modulation point for the burner.	
12.g.	Press Min button.	An “m” will be displayed on the profile. NOTE: The min modulation point may be higher or lower than the Lightoff point.
12.h.	Press Open and Close for Fuel and Air and the FGR (if present) to move the cursor to the next desired fuel air mixture point.	The R7999 enforces slope limitations of 1 to 8 and 8 to 1 (in degrees) with the exception of Flat Line or Negative FGR capability. The cursor changes from a cursor to a box when you have moved out of the range of allowable slopes. You are not allowed to enter points when a box shape is present. With controller release 1.4 or greater, the FGR actuator may have negative slopes (maximally negative slope of 1 to 5) anywhere within the modulation band.
12.i.	Press Point button. Or press Maximum Modulation. With Rev. 1.4 controllers or greater, the user may alternatively place a maximum modulation point in place of an intermediate as long as a span of at least 17 degrees exists between the minimum and maximum modulation points.	A dot will be displayed on the profile and a line will connect the minimum modulation point and the first intermediate point. Entering a new Maximum Modulation point causes an pre-existing Maximum Modulation point to change to an intermediate point. This technique of entering each new intermediate point as the new “temporary” Maximum Modulation point has an advantage, which is apparent under light boiler load conditions. The user will be able to use the “Move Along Curve” commands during the next lightoff sequence and hence will be able to more quickly reach the firing rate point where the system was at prior to going out because of low demand. For gas systems where the gas pressure has not been adjusted to match the burner-rated BTU capability, the use should use the maximum Modulation replacement technique to rough in a curve until maximal airflow is obtained. The gas flow may then be adjusted to set the maximum firing rate. The user may then delete all points and immediately re-enter another maximum modulation point.
12.j.	Repeat steps 12.h. and 12.i. until you have created at least six points starting with Min.	R7999 builds 185 and higher require only Min, Lightoff and Max.

Table 4. Commissioning Overview. (Continued)

Step	Action	Notes
12.k.	Press Open and Close for Fuel and Air and the FGR (if present) to move the cursor to the Maximum Modulation point for the burner.	For gas systems of which the gas pressure has not been adjusted to match the burner-rated BTU capability, the user should use the maximum Modulation replacement technique to rough in a curve until maximal airflow is obtained. The gas flow may then be adjusted to set the maximum firing rate. The user may then delete all points and immediately re-enter another maximum modulation point. This may save the user some time by not having to successively delete invalid intermediate points due to the gas pressure change.
12.l.	Press Max button.	An "M" will be displayed on the profile and a line will connect it to the previous intermediate points. The R7999 requires re-verification of any verified curve segments after setting the maximum modulation point.
12.m.	Press Prev. Point/Next Point until the cursor reaches the next lower point on the profile. Alternatively the user may add intermediate points as the effective firing rate is lowered. Jump back to 12.h. if the temporary intermediate points were deleted in 12.k.	The line segment turns color, red to green, to indicate the curve has been walked (verified). FGR line segment turns color from brown to cyan. NOTE: The S7999B requires you to enter at least three points (inclusive of the min and max modulation points) in order to use the "Prev Point" and "Next Point" buttons.
12.n.	Repeat step 12.m. until you have moved along the curve from top to bottom.	The profile is now complete and operational. Status should display "Profile Complete. Ready to Run." The R7999 requires re-verification of any line segment after the maximum modulation point has been altered.
13.a.	If you wish to save the profile you have just created, press Quit button and then the Save button.	The user must insure that the purge point is within the minimum and maximum modulation points before finishing the profile. The purge point can be moved while the burner is firing by simply using the Prev Point, Next Point buttons and pressing the PURGE button at the desired level or at the purge point definition period during the next start up sequence.
13.b.	When you are through with the profile, press Quit and then the Finish button.	The Monitor screen appears. You have successfully commissioned the R7999.

Initiate Commissioning

Begin commissioning/configuring the ControlLinks™ Control device by clicking on the Commissioning button located on the Home page. The Warning screen (Fig. 23) will appear.

You can perform the following actions from this screen:

1. Enter your password to access the commissioning function of the S7999B.
2. Change the password.
3. Monitor.

After reading the warning and accepting the responsibility for configuring a safe and efficient fuel/air profile curve, click on the Commission button to exit the Warning screen and display the Commission Password screen.

Commission Warning Screen

The Commission Warning screen is used to:

- Protect the system from unauthorized users.
- Connect the R7999 to the S7999B for commissioning. Refer to the R7999A,B ControlLinks™ controller specification sheet (Form No. 65-0238).

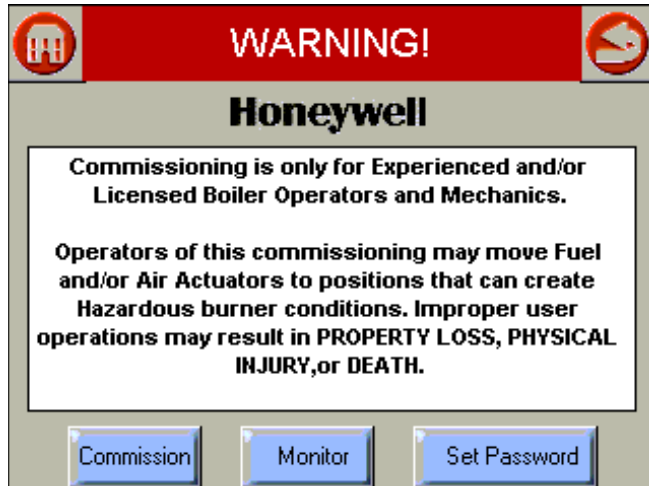


Fig. 23. Commission warning.

NOTE: Clicking the Home, Back or Monitor button will exit Commissioning mode and display the Home page.

Password

You must enter the R7999 Commission password into the system (Fig. 24). The password consists of a minimum of four characters/numbers and a maximum of ten characters/numbers.

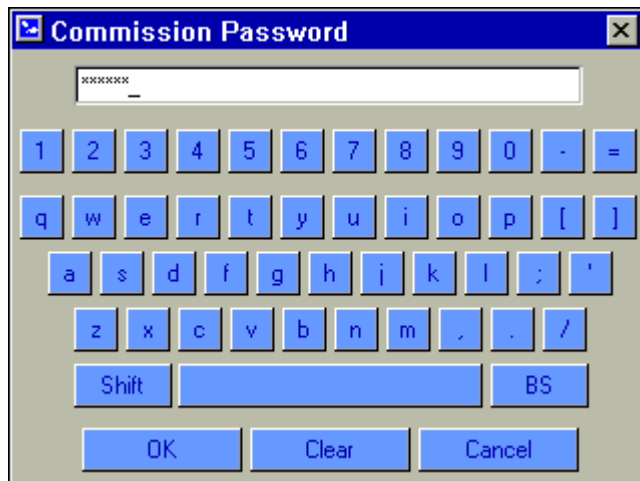


Fig. 24. Commission password.

To change the R7999 Commission password, proceed as follows:

1. Select the Set Password button on the Commissioning Warning screen.
2. Enter the current password in the *Commission Password* field. (The factory default password is "password".)

3. Press OK. The system must be successfully connected in order to change the password.
4. Enter a new password in the *New Password* field.
5. Press OK.

NOTE: The password is not case sensitive. Make sure you write down your new password before you press OK. Once you have pressed this button you cannot enter the system without the password.



Fig. 25. Commissioning login to set password.

Commission Configuration

The Commission Configuration screen is used to:

- Identify the configuration of the system you want to commission, for example, dual fuel system with a FGR or a single fuel system, etc.
- Begin configuration of the actuators.
- Allow the user to set System Parameters.
- Load a curve from the S7999B flash.
- Begin configuration of the modulation curve.

This screen (Fig. 26) selects the type (Base Configuration) of ControlLinks™ Control System to be configured. The Base Configuration defines the number of actuators connected to the ControlLinks™ controller. After the Base Configuration is chosen, the corresponding actuators are enabled as Endpoint Configuration options.

Selecting the Unconfigured Base Configuration sets all the ControlLinks™ Control parameters back to the factory default settings. All user configurable data stored in the ControlLinks™ Control will be deleted by selecting this option. A warning message is displayed to confirm this selection.

Single Fuel configuration enables the Air and Fuel 1 actuator buttons in the Endpoint Configuration options. Single Fuel with FGR enables the Air, Fuel1 and FGR buttons. Dual Fuel enables the Air, Fuel1 and Fuel2 buttons. Dual Fuel with FGR enables all four actuator buttons. Begin configuring the actuators by selecting the enabled buttons.

The user can choose to end the commissioning process before everything is finished, and, if so, this page has the appearance of the following two figures (Fig. 26 and 27), to indicate where the user left off.

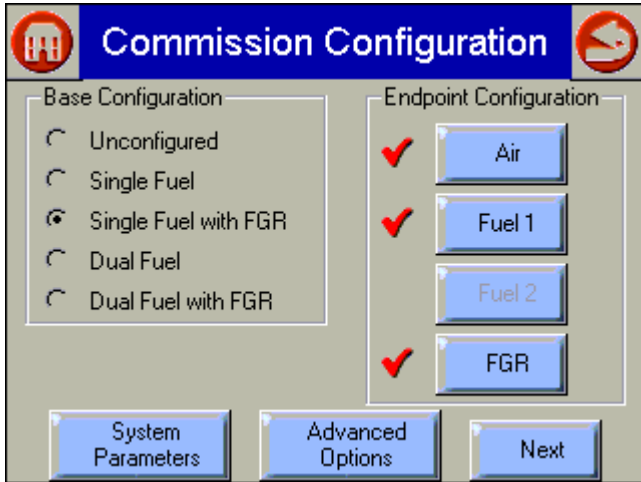


Fig. 26. Commission Configuration—uncompleted commissioning view.

NOTE: Clicking the Home or Back or button will exit this screen and display the Home page.

NOTE: Actuators that have completed their configuration have a checkmark next to their button.

You must perform the following actions from this screen:

1. Select base configuration for the system:
 - a. **Base Configuration**
 - (1) **Unconfigured**—This is the initial (default) option. You can select this option to erase the current configuration and reset to factory configuration.
 - (2) **Single Fuel**—Select if you want to configure only one fuel actuator and one air actuator.
 - (3) **Single Fuel with FGR**—Select if you want to configure a fuel actuator, an air actuator, and an FGR actuator.
 - (4) **Dual Fuel**—Select if you want to configure two fuel actuators and one air actuator.
 - (5) **Dual Fuel with FGR**—Select if you want to configure two fuel actuators, one air actuator, and an FGR actuator.
2. Select and configure all actuators within the base configuration:
 - b. **Air**
Fuel1
Fuel 2
FGR
 - (1) Press a button to configure the actuator. (If you selected 'Single Fuel' or 'Single Fuel with FGR' in the Base Configuration, the Fuel 2 button is not displayed. If you selected 'Single Fuel' or 'Dual Fuel' in the Base Configuration, the FGR button is not displayed.) When you press a button, the *Set Actuator Endpoints* screen is

displayed. When the actuator has been configured, a checkmark is displayed next to the appropriate button. See Fig. 26.

3. Go to the System Parameters screens to set system parameters or view the default system parameters (if necessary).
4. Press the Next button to configure a ControLinks™ curve.
5. Press Advanced Options Load Curve button to load and configure a pre-existing ControLinks™ curve.

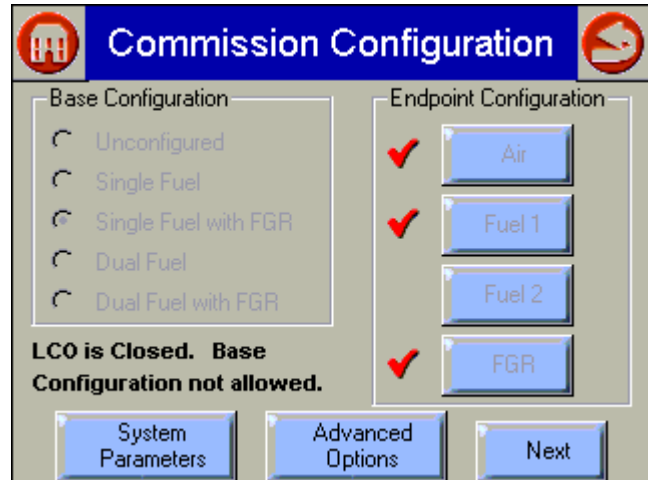


Fig. 27. Commissioning Configuration—completed commissioning view.

Actuator Configuration

Selecting an actuator button displays a page like Fig. 28.

The direction that the actuator travels when it moves to its closed position, and whether the actuator moves in fixed stops or continuously rotates until it is told to stop, is selected on this screen. Press the Next button when the settings are correct for the actuator to advance to the next screen.

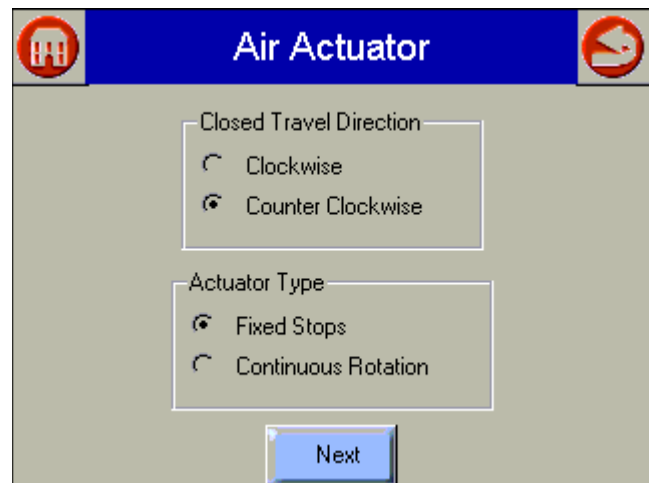


Fig. 28. Selecting Air Actuator type and travel direction.

Actuator Serial Number

This page (Fig. 29) allows the user to enter the serial number to unlock and configure the corresponding actuator.

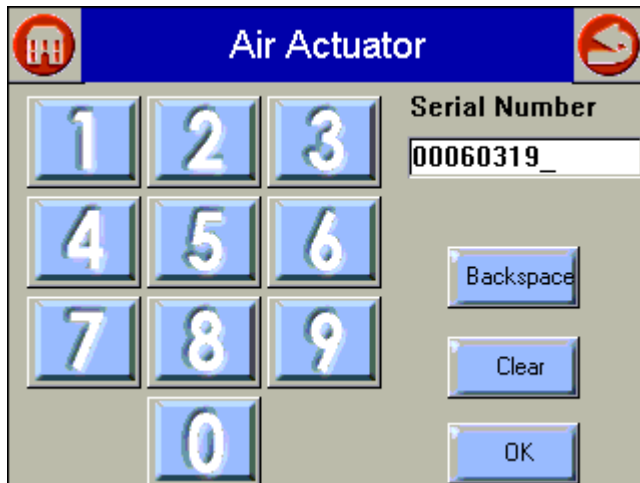


Fig. 29. Entering Air Actuator serial number.

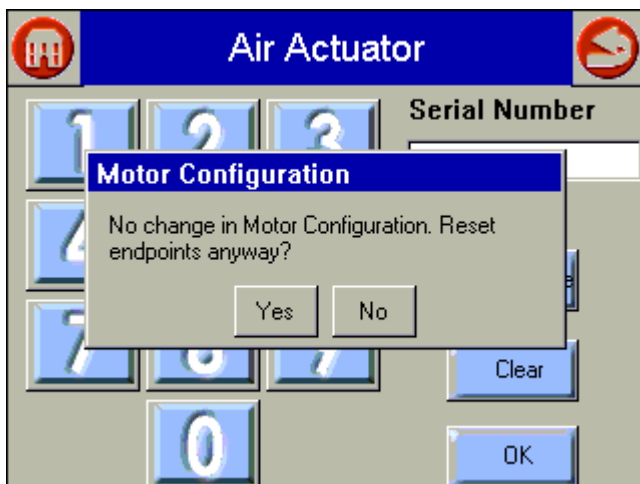


Fig. 30. Air Actuator endpoint reset.

The user must enter the 8-digit serial number into the Serial Number field and press the OK button to proceed.

The Backspace button allows the user to erase the last digit entered into the Serial Number field.

The Clear button erases the entire Serial Number field and forces the user to enter eight new digits.

If the serial number has been entered for the actuator earlier (revisiting the actuator configuration), the current serial number displays. If the OK button is selected at this point, a popup similar to Fig. 30 displays. Answering Yes causes the actuator endpoints to be cleared, requiring the open and closed endpoints to be reset.

NOTE: You must resend the KEY (serial number) any time you revise the closed direction setting or change the type of end-stop selection.

Actuator Endpoints

Set the endpoints as shown (see Fig. 31 and 32).

How To Set the Actuator Maximum Open/Closed Positions

To set the maximum open and closed positions for the actuator, proceed as follows:

1. From the Commission Configuration screen, select the actuator button that needs changing.

NOTE: Buttons are disabled when system is fully commissioned and LCO is on.

2. Closed Travel Direction and Actuator Type screen is displayed. If no changes are needed, select the Next button.
3. Serial Number screen is displayed. If correct serial number is displayed, select the OK button. You will be asked if you want to reset the Open and Closed endpoints in a pop-up screen. Select Yes to reset both of them or No if you want to keep the current settings.
4. Set Maximum Open Position screen displays. If Open position has been previously set, you must select Unlock Position button to allow it to be changed. Press *Auto Seek* and the controller automatically opens (or closes) the actuator to its maximum open (or closed) value.

NOTE: This button is only enabled for actuator types that are fixed stop actuators.

5. When the actuator has been driven to its maximum position, visually verify its position and use the *Open* or *Close* buttons to manually adjust the maximum position if necessary. Press the *Lock Position* button for the endpoint once the appropriate position has been achieved and verified.
6. Repeat Steps 4 and 5 for the Closed position.
7. Press the *Next* button. This will return you to the *Commission Configuration* screen to configure another actuator. After all actuators are configured, press the *Next* button again to display the *Commission Curve* screen.

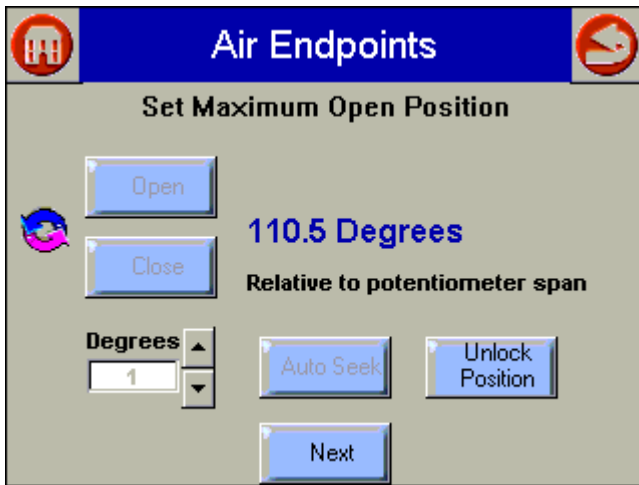


Fig. 31. Set Actuator Max Open Endpoint.

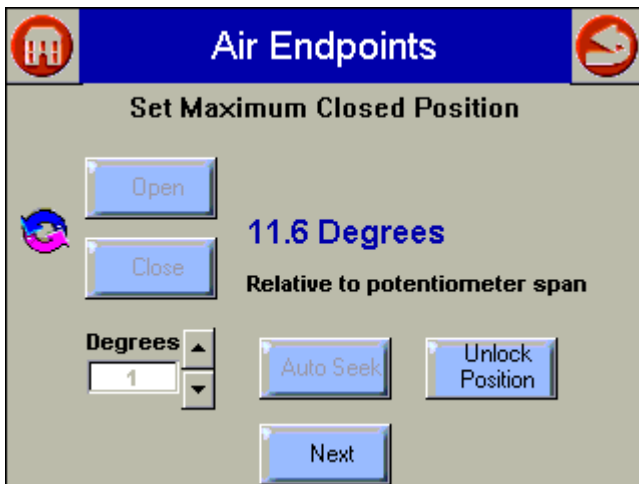


Fig. 32. Set Actuator Max Close Endpoint.

Curve Commissioning

The Commission Curve screen for Fuel 1 or Fuel 2 is used to:

- Enter points on the graph to indicate the Air Purge position, Lightoff position, Maximum and Minimum modulation positions, and intermediate positions for the actuators for the specified fuel (Fuel 1 or Fuel 2).
- Create a curve that provides safe and efficient operation of the burner from minimum to maximum modulation.
- Verify the profile that was created.
- Save the profile you created to a default curve if desired.

The following buttons are displayed on the screen:

1. Fuel/Air/FGR:
 - Open/Close—Press one of these buttons to manually open or close the actuator the number of degrees indicated in the drop-down box (from 0.1 to

10). When you are positioning actuators, while any actuators are below 20%, you can only move the actuator 3 degrees at a time. This is a safety constraint.

2. Point Type Buttons:
 - After positioning the actuator(s), press the appropriate button to save the point on the graph.
 - a. Point—Press to save positions on the curve that are between the max and min modulation points. A point is displayed on the graph each time you press this button. You need at least 5 intermediate points between the max and min modulation points on a curve for a valid profile, except for builds 185 and higher.
 - b. Lightoff—Press to save the lightoff position on the graph. An 'L' is displayed on the graph to indicate the lightoff point. Only one lightoff point is allowed per curve.
 - c. Max—Press to save the maximum modulation position on the graph. An 'M' is displayed on the graph to indicate the maximum modulation point. Only one maximum modulation point is allowed per curve.
 - d. Min—Press to save the minimum modulation position on the graph. An 'm' is displayed in the graph to indicate the minimum modulation point. Only one minimum modulation point is allowed per curve.
 - e. Purge—Press to save the air purge position on the graph. A 'P' is displayed on the graph to indicate the air purge point. Only one air purge point is allowed per curve.
3. Delete:
 - a. Delete Position—Press to delete a point on the curve. To delete the point, you must position the cursor on the point.
 - b. Delete All Positions—Press to delete ALL positions on the curve, including the lightoff, air purge, max and min modulation points. Use this button ONLY when you want to start creating the curve from the beginning.
4. Start Lightoff/Stop Modulation:
 - This button serves a dual purpose. Pressing this button activates the burner controller lightoff sequence. If the lightoff sequence is successful, this button then displays *Stop Modulation*. If the lightoff sequence fails, the *Status* window indicates the problem.
 - If you want to stop the system at any time during the commissioning process, use the *Stop Modulation* button.
5. Previous Point/Next Point
 - Press these buttons to move the actuators along the curve to a previously set position. Use these buttons to reposition the cursor or to 'walk the curve' and verify system operation. As the curve is verified, the color of the curve changes.
 - Curve segments will be displayed in red when not validated. You must 'walk the curve' to verify system operation with the curve.

NOTE: The S7999B requires you to enter at least 3 points (inclusive of the min and max modulation points) to use the "Move Along the Curve" buttons.

6. Quit
 - Press this button when done with the curve at this point. The following buttons display:
 - a. Back:
 - Press to return to the *Commission Configuration* screen.
 - b. Home:
 - Go to Home page.
 - c. Finish:
 - Press to save the profile you have created. The *Finish* button is grayed out until you complete the profile. After you press this button, the *Monitor* screen is displayed. You can exit the program from there.
 - d. Save:
 - Save Curve S7999B flash (Fig. 37 and 38). Control returns to Curve Commission screen.
 - e. Cancel:
 - Cancel Quit and continue curve configuration.

The following screens depict the options possible to create or change the profile curve for the currently selected fuel. The operation of this screen is explained in the Commission Curve screen, defined earlier.

Curve commissioning can only occur after all actuators have been completely configured and locked. The Next button on the Commission Configuration screen is not enabled until this is true. Once the actuators are configured, the Next button brings the user to the Curve Commissioning screen.

NOTE: The Load Curve button also brings the user to this screen. It is also only enabled after the actuators have been configured.

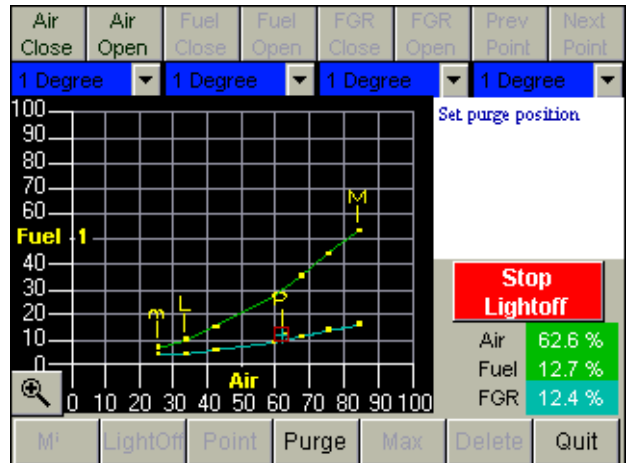


Fig. 34. Purge setting on Commission.

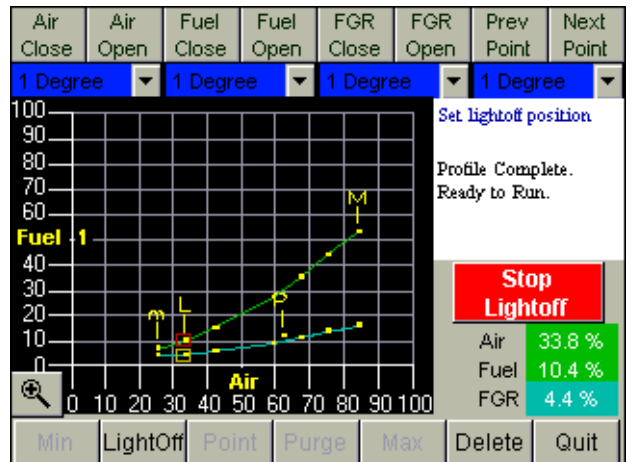


Fig. 35. Commissioning—set lightoff.

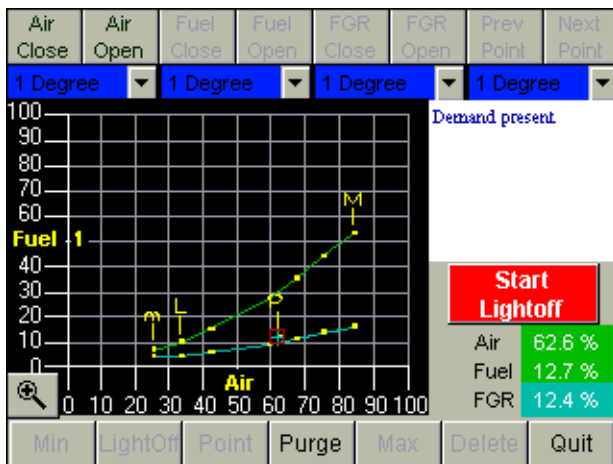


Fig. 33. Start lightoff.

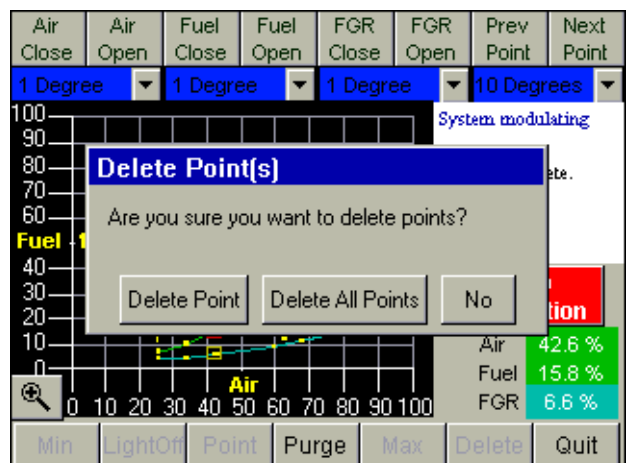


Fig. 36. Commissioning curve—Delete points.

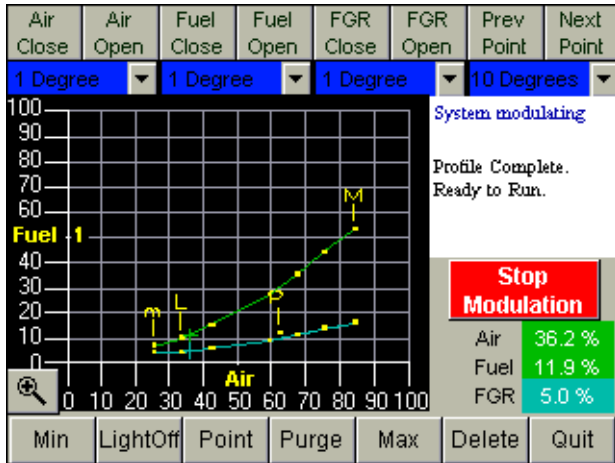


Fig. 37. Completed commissioning curve.

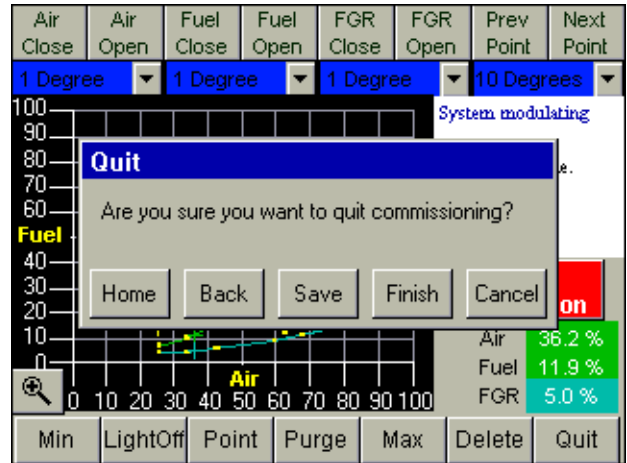


Fig. 40. Quit Commissioning.

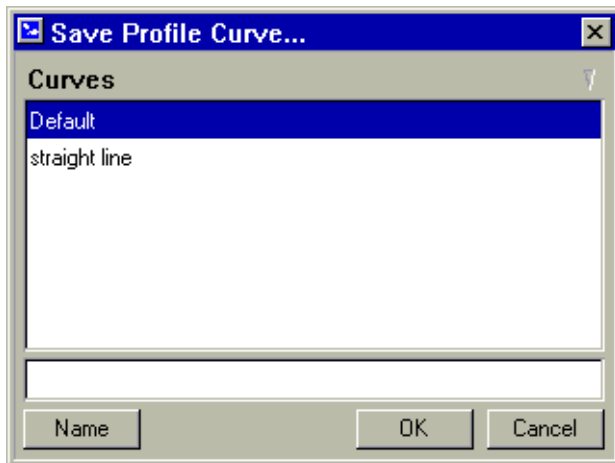


Fig. 38. Commissioning—save profile curve.

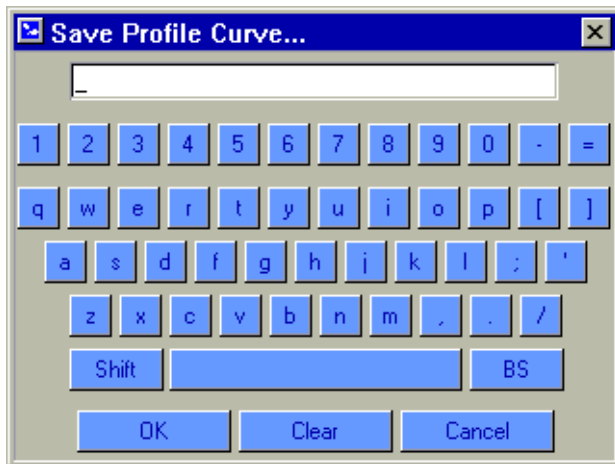


Fig. 39. Save curve, enter name.

System Parameters

NOTE: All System Parameter pages are disabled until all actuators are configured.

1. Press the System Configuration button on the Commission Configuration screen to set system parameters. System parameters let you choose advanced features that use the auxiliary 4-20mA input such as: low fire hold and/or FGR holds, configure actuator positions during standby, configure the position of the non-selected fuel actuator, configure action of the FGR actuator during purge, adjust the postpurge timing parameter, and select a maximum firing rate limit via the manual potentiometer input.
2. Setting these parameters is optional. If you do not set system parameters, the default values will be used. See Default System Parameters for the default value/setting for each parameter.

NOTE: The selection of Xma (auxiliary mA) operation system parameters result in a common attribute between the operation of both fuel selections. For example, selecting low fire hold will apply to both fuels.

- a. **Home**—Press to go to Home page.
- b. **Back**—Press to return to the previous screen.
- c. **Next**—Press to move to the next screen for additional system parameters.
- d. **Set**—Save the settings shown on the current page.
- e. **Finish**—Press when finished setting system parameters. Returns to Commission Configuration screen.

If you make changes to the system parameters on the screen, they are not saved until you press the Set button.

System parameters you can set include:

- Stack or boiler water temperature sensor operating parameters.
- Controller timing (postpurge time).
- Auto/manual maximum firing rate option via the manual potentiometer input.
- Program standby positions and nonselected fuel position.
- FGR behavior during purge.
- XmA Operation (Auxiliary mA input).

Auxiliary Sensor Configuration

The first page that displays after the “System Configuration” button is selected is shown in Fig. 41 and 42.

Fig. 41. Setting Auxiliary Sensor Parameters.

Fig. 42. Auxiliary Sensor Configuration—Set Minimum Degrees.

Select an Operation from the dropdown list:

1. Disabled means the input is ignored.
2. Low Fire Hold—Selecting this option field enables an algorithm that protects the boiler from thermal shock. Upon successful progression to modulation, the R7999 holds the burner at the lightoff point until the auxiliary temperature input exceeds the programmed threshold.
3. FGR Hold—After successful progression to modulation, the R7999 holds the FGR closed until the auxiliary temperature input exceeds the programmed threshold.
4. FGR and Low Fire Hold—Selecting this option enforces both of the above actions.

- a. **Max (20 mA)**—This field lets you set the maximum sensing range of the transducer. The maximum value must be between -40°F and 1400°F .
- b. **Min (4 mA)**—This field lets you set the minimum sensing range of the transducer. The minimum must be less than the maximum by at least 100°F .
- c. **Threshold**—This field lets you set the threshold temperature at which you want the low fire hold or FGR hold or Low Fire and FGR hold to be released. The threshold temperature must be less than the maximum and greater than the minimum.
- d. **Differential**—This field lets you set the differential temperature at which the system will revert to a hold condition. The threshold must be set lower than the threshold but greater than the minimum.

Remember to press the Set button before moving to a different page.

When the “Next” button is selected, the following figure displays.

Fig. 43. Miscellaneous Commissioning Parameters.

Controller timing: Postpurge Timeout—Use the dropdown list to select how long the system should wait at the postpurge position once the postpurge state has been detected. It is important that the postpurge timeout time be at least as long as the burner control time, especially when the air damper is configured to close while in standby.

Auto/Manual Switch

- a. Select either Normal or Maximum Firing Rate Limit.
- b. When the Maximum Firing Rate Limit is selected, the R7999 (when in auto mode) reads the value of the manual potentiometer input and does not allow modulation beyond its interpreted value. The manual potentiometer input equates 0 to 500 ohms as a 4 mA firing rate input and 4500 ohm or greater as a 20 mA input; all other values are determined by linear interpolation. The behavior during manual switch setting is not affected, i.e., the firing rate input is derived directly from the potentiometer value and the controller mA input is ignored.

FGR Behavior During Purge—Lets you set the position of the FGR actuator during the purge cycle. The options are *Remain Closed* or *Follow FGR Curve to Purge Position*.

Remember to press the Set button before moving to a different page.

When the “Next” button on this page is selected, the following page displays.

Actuator Standby Positions (Presets)

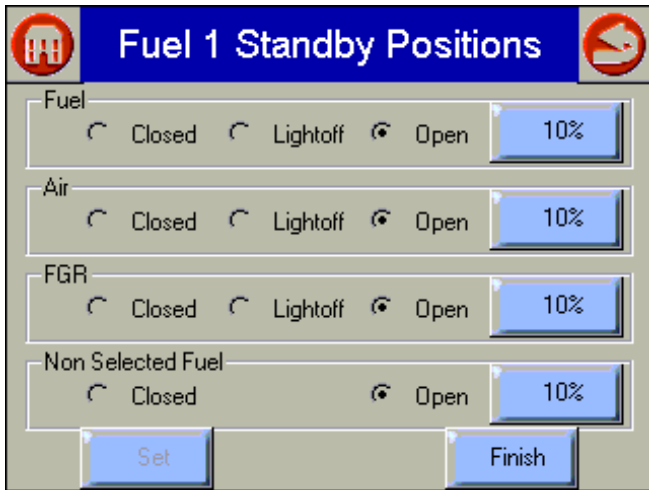


Fig. 44. Fuel Standby Positions Preset.

Program Standby Position—Lets you set the position of the actuators when the controller is in the standby position. For each actuator, select *Closed*, *Lightoff* or *Open*. If you select *Open*, you must enter a value in the appropriate field to indicate how wide the actuator should be opened (percentage of the actuator span value).

Program Non Selected Fuel Position—Lets you set the position of the fuel actuator of the fuel that is not currently being used. Select *Closed*, *Lightoff* or *Open*.

Remember to press the Set button before moving to a different page.

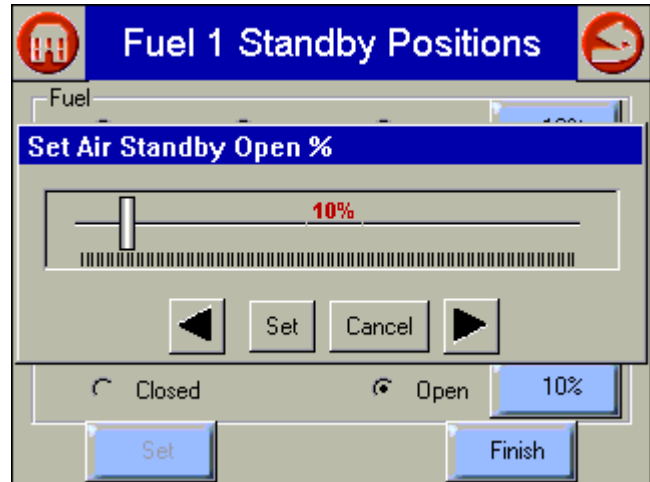


Fig. 45. Fuel Standby Positions—Set Standby Open Percentage.

Default System Parameters

The default values/settings for each system parameter are shown in Table 2. See also Fig. 69–73.

Table 5. Default Values/Settings for System Parameters

Parameter	Default
Xma Operation	
Operation	Disabled
Max (20 mA)	NA
Min (4 mA)	NA
Threshold	NA
Differential	NA
Controller Timing	
Postpurge time	30 seconds
Automanual Switch	
Automanual Switch	Normal Mode
Program Standby Position	
<i>Fuel Selection 1</i>	
Fuel	Closed
Air	Closed
FGR	Closed
<i>Fuel Selection 2</i>	
Fuel	Closed
Air	Closed
FGR	Closed
Program Non-Selected Fuel Position	
Fuel Selection 1	
Fuel Selection 2	Closed
Fuel Selection 2	
Fuel Selection 1	Closed
FGR Behavior During Purge	
FGR Behavior During Purge	Remains Closed.

Advanced Options

Some advanced commissioning options are available by selecting the “Advanced Options” button on the Commissioning Configuration page (Fig. 46).

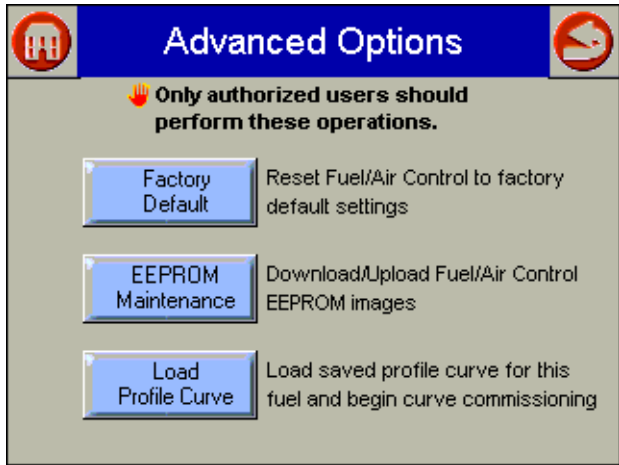


Fig. 46. Advanced Options.

Factory Default

To reset the Fuel/Air Ratio Control to factory default, select the “Factory Default” button. A confirmation pop-up box displays (Fig. 47) before the reset occurs. The user selects the “Yes” button to continue with the reset. This feature is only enabled for R7999 controllers that are build 180 and newer.

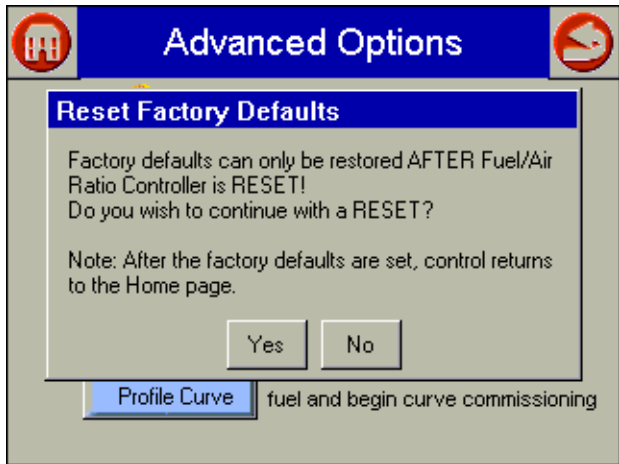


Fig. 47. Advanced Options—Reset Factory Defaults.

Fuel/Air Ratio Control EEPROM Maintenance

Data in the Fuel/Air Ratio Control internal and external EEPROMs can be saved to non-volatile (flash) storage in the S7999B. This data includes the commissioning settings and

other run-time information used by the R7999. The EEPROM image data can be stored in the S7999B (downloaded) and restored later (uploaded) back into the same R7999 or a replacement. EEPROM images for only one R7999 can be saved in the S7999B.

When no EEPROM images are stored in the S7999B, the following figure displays (Fig. 48).

Internal EEPROM contains hysteresis, control accuracy and other factory settings. External EEPROM contains actuator settings, curve data and other settings made by the user during commissioning of the R7999.

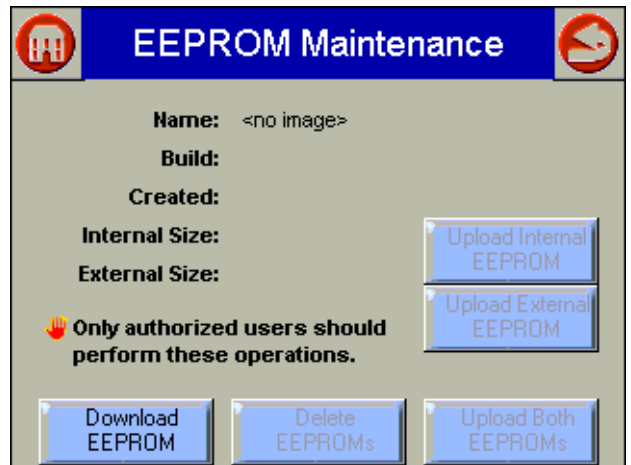


Fig. 48. EEPROM Maintenance—No image.

If EEPROM images exist, the name assigned to the images, the R7999 build associated with the images, the date and time that the backup images were created, and the sizes of the images are displayed on the screen (Fig. 49).

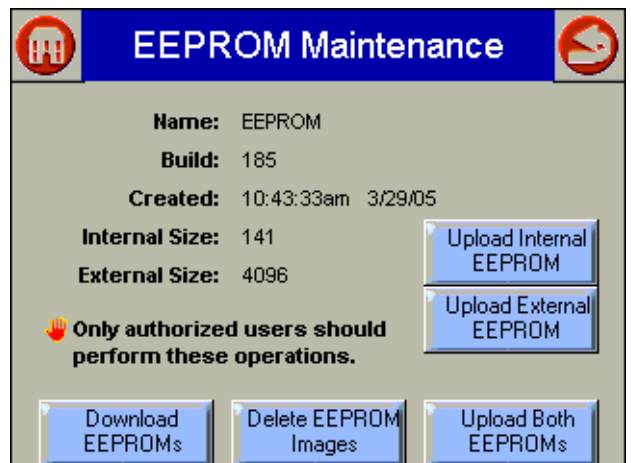


Fig. 49. EEPROM Maintenance—Images exist.

If the EEPROM images don't match with the R7999 build, an error is displayed (Fig. 50) and no uploading is permitted.

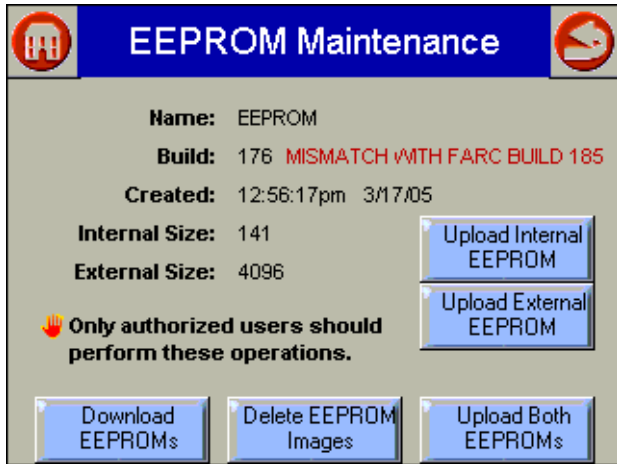


Fig. 50. EEPROM Maintenance—Image mismatch with R7999.

To download the R7999 EEPROM data to the S7999B, the “Download EEPROM” image button is selected. The user is asked to confirm that this action should proceed (Fig. 51).

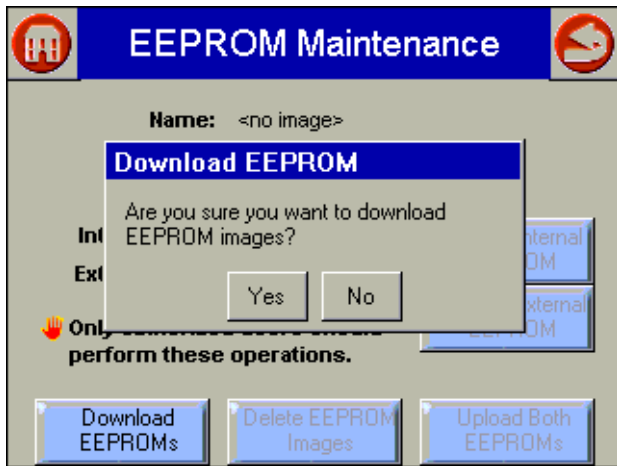


Fig. 51. EEPROM Maintenance—Download images.

When the user chooses to continue with the download, the user is asked to enter an image name to associate with the EEPROM data (Fig. 52). After the name is entered, the “OK” button is selected. To abort the download, the “Cancel” button is selected.

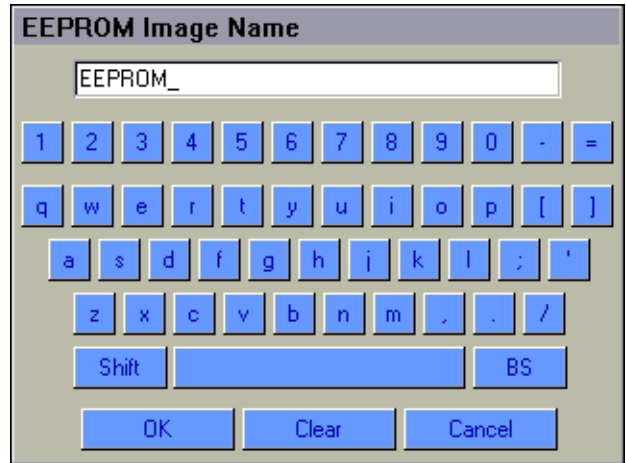


Fig. 52. EEPROM Maintenance—Enter image name.

The download takes less than a minute to execute. The user should wait until the download is complete before touching the screen.

The user can choose to upload the internal EEPROM only, the external EEPROM only, or both EEPROM images. In any case, the user is asked to confirm this action (Fig. 53) before proceeding.

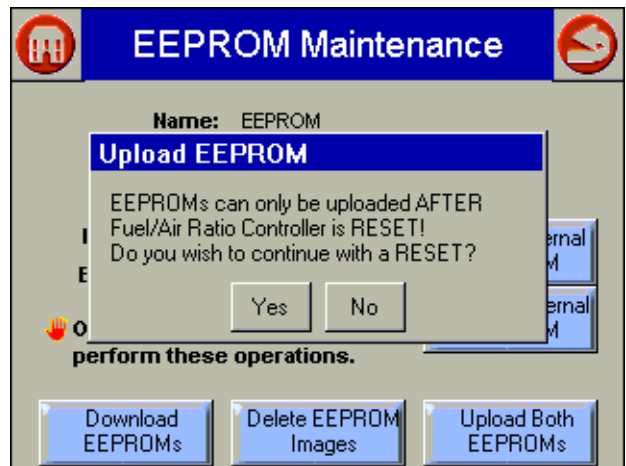


Fig. 53. EEPROM Maintenance—Upload images.

If the user chooses to remove the EEPROM image data from the S7999B flash, the user selects the “Delete EEPROMs” images button. The user is asked to confirm this action (Fig. 54) before proceeding.

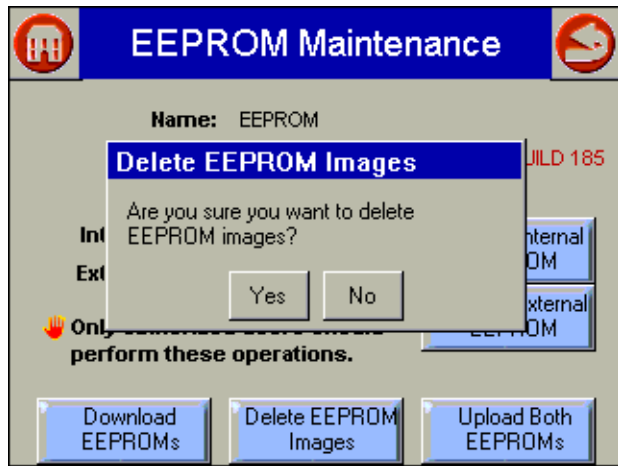


Fig. 54. EEPROM Maintenance—Delete Images from S7999B.

Load Profile Curve

A profile modulation curve stored in the S7999B can be loaded for use as the active curve for commissioning. When the user selects the “Load Profile Curve” button, the following screen (Fig. 55) displays.

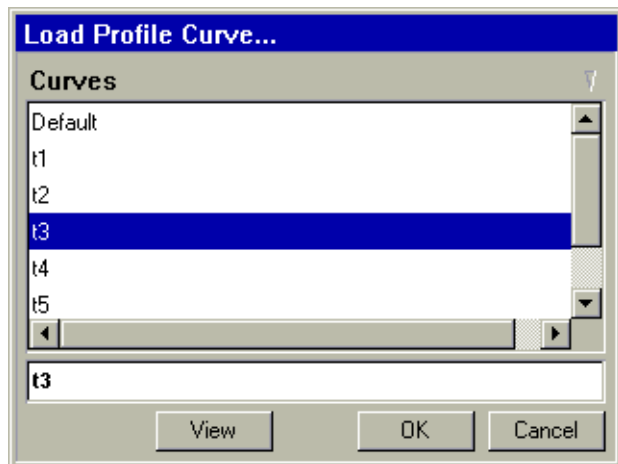


Fig. 55. Load Profile Curve.

A list of all defined profile curves is given. The user selects which one to load and presses the “OK” button to load it. A view of the curve can be seen before loading by pressing the “View” button.

MONITORING

The Honeywell devices attached to the burner system are represented by icon buttons on the Home page. (See View Context for more information about which burner system is displayed.) To obtain status information about each device, the user selects the button that corresponds to the device. A new page displays with status information exclusively about that device.

If any device is currently in a fault condition, the device icon is displayed with a red color. Also, if audio alarm is enabled for fault conditions (see User Preferences), an audio alarm sounds while the fault continues to exist. To turn off the audio alarm, the user must go to the device status page to view the fault history or press the Alarm Silence icon on the Home page.

Burner Control (7800 SERIES)

Monitoring the 7800 SERIES burner control is performed by clicking on the Burner Control icon on the Home Screen. Status information similar to that displayed in Fig. 56 appears.

NOTE: Pressing the Home or Back buttons in the upper corners of the screen will exit the status screen and return to the Home page.

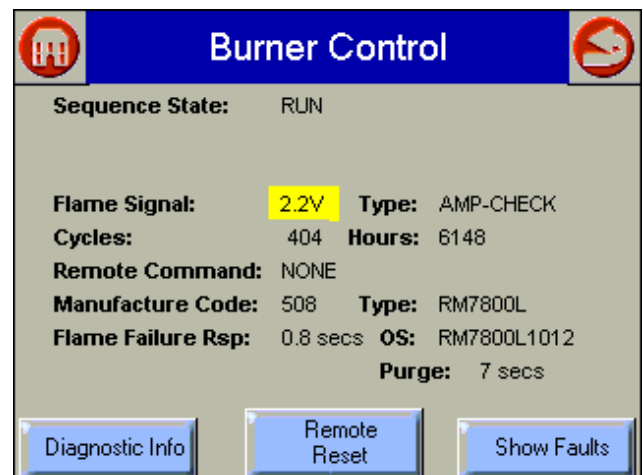


Fig. 56. Burner Control status.

If the burner control is currently in a lockout condition, the lockout cause is displayed on the screen (Fig. 57). The lockout fault is also visible in the fault history. If audio alarm is enabled for fault conditions (see User Preferences), then an audio alarm sounds when the lockout occurs. To turn off the audio alarm, the user views the fault history through the “Show Faults” button or by resetting the burner control.

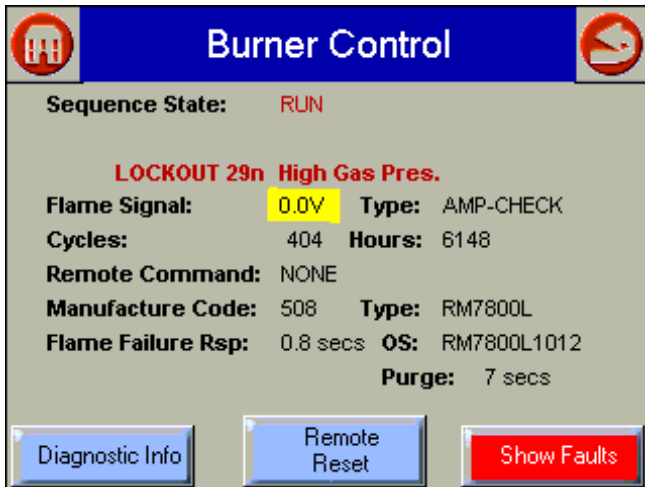


Fig. 57. Burner Control status—lockout.

The “Diagnostic Info” button displays the terminal and jumper states of the burner control (Fig. 58).

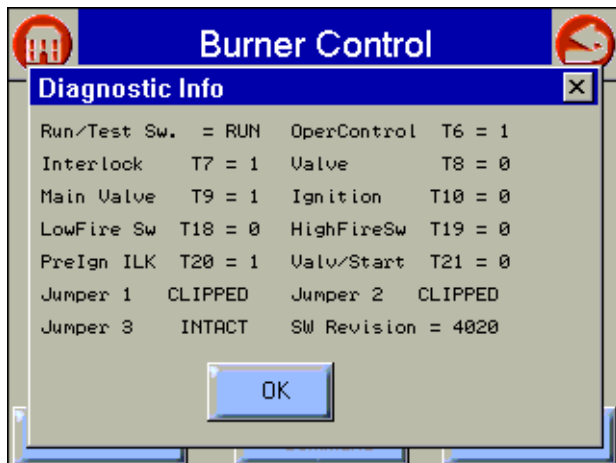


Fig. 58. Burner Control—diagnostic information.

The “Remote Reset” button allows the user to remotely reset the burner control (Fig. 61). Extreme care should be exercised before proceeding with the reset (Disabled for S7810M1029).

The user must log in with a valid S7999B System password before performing a remote reset (Fig. 59 and 60).

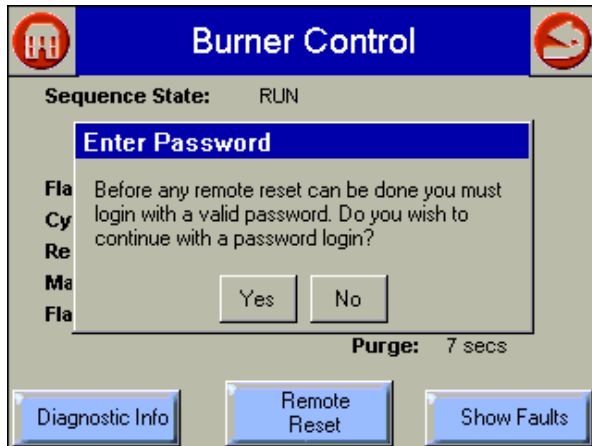


Fig. 59. Burner Control—enter password.



Fig. 60. Burner Control—password login.

Finally, confirm that the Burner Control is to be remotely reset.

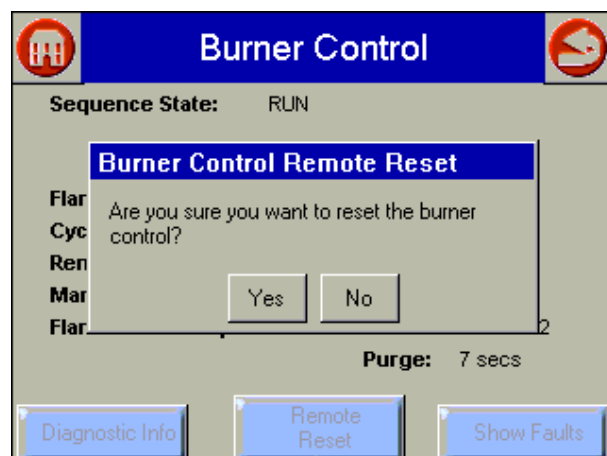


Fig. 61. Burner Control—Remote Reset.

The “Show Faults” button displays the burner control fault history (Fig. 62). This button has a red color when the burner control is currently in a fault (lockout) condition.



Fig. 62. Burner Control—fault history.

If timestamps are enabled (see User Preferences), the time the fault occurred is displayed in the history (Fig. 63). Pressing the “Show Time” button will also show the fault timestamps.

NOTE: Fault timestamps are cleared after the S7999B resets or when switching to a different burner system.



Fig. 63. Burner Control—fault history with time listing.

If you press the button showing the value for the Flame Signal (yellow button), trending information is displayed as shown in Fig. 64. You can select the time span of the display by pressing the Seconds, Minutes, Hours, or Days button (it changes depending on what time span is currently displayed).

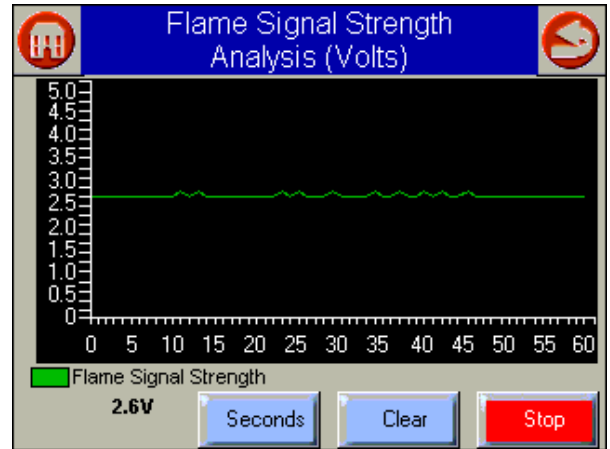


Fig. 64. Flame Signal Strength trend analysis.

S7830 Expanded Annunciator

Monitoring the S7830 Expanded Annunciator is performed by clicking on the Expanded Annunciator icon on the Home page.

The expanded annunciator has 19 different terminals indicating separate conditions. A scroll bar on the bottom of the screen is used to move the terminal states on the page so that all of them can be seen (Fig. 65–67). A colored LED located to the left of the terminal indicates whether the terminal state (and condition) is on (green) or off (red). Current State is the status of the burner equipment control, limit and interlocks.

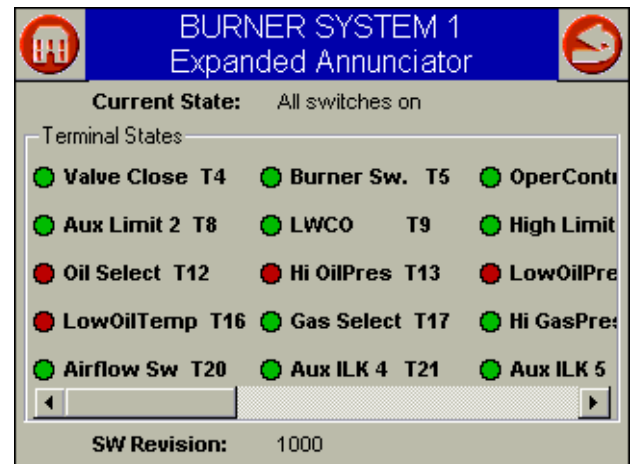


Fig. 65. Expanded Annunciator status—left view.

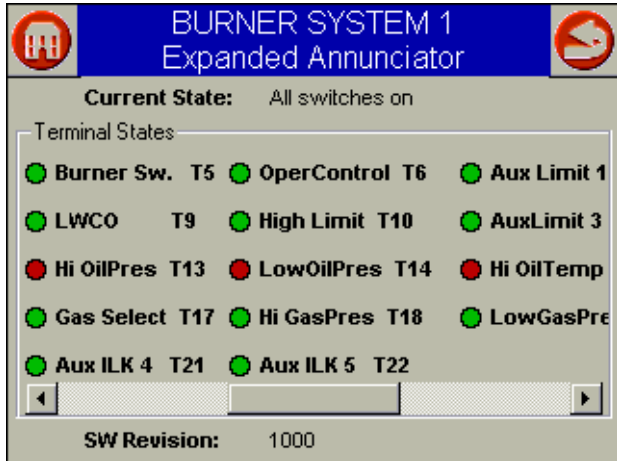


Fig. 66. Expanded Annunciator status—middle view.

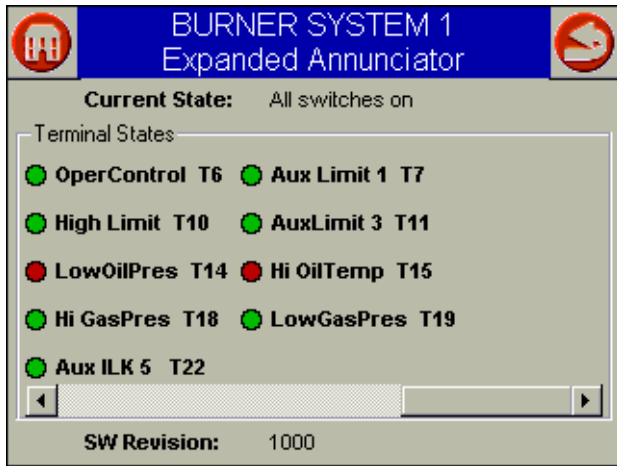


Fig. 67. Expanded Annunciator status—right view.

NOTE: Pressing the Home or Back button in the upper corners of the screen will exit the status screen and return to the Home page.

ControlLinks™ Fuel/Air Ratio Control (R7999)

Monitoring the ControlLinks™ Fuel/Air Ratio Control system is performed by clicking on the Fuel/Air Control icon located on the Home page to display the current configuration status, actuator positions and terminal states:

- Fuel:**
 - Displays the current position of the fuel actuator.
- Air:**
 - Displays the current position of the air actuator.
- FGR:**
 - Displays the current position of the FGR actuator (if present).
- Firing Rate:**
 - Displays the current firing rate position (in milliamps).
- Aux Temperature Input:**
 - Displays the actual interpreted temperature reading from the auxiliary input. If the function is disabled, the value indicates “disabled.”
- Status:**
 - Indicates system status, for example, manual modulation, air purge, lightoff sequence, etc.
- Cycle:**
 - Indicates the current cycle of the system, with one being the first call-for-heat cycle since the system was commissioned.
- Active Alarm:**
 - Indicates if the system is in an Alarm state.
- Alarm History (use Show Faults buttons):**
 - Displays all alarms that have been generated. The dropdown box displays the cycle the alarm occurred in and the alarm type.
- Inputs/Outputs:**
 - All Outputs and Inputs are displayed and their current state is noted. See R7999 Outputs and Inputs on page 64 for a description.
- Back/Home:**
 - Go to Home page.

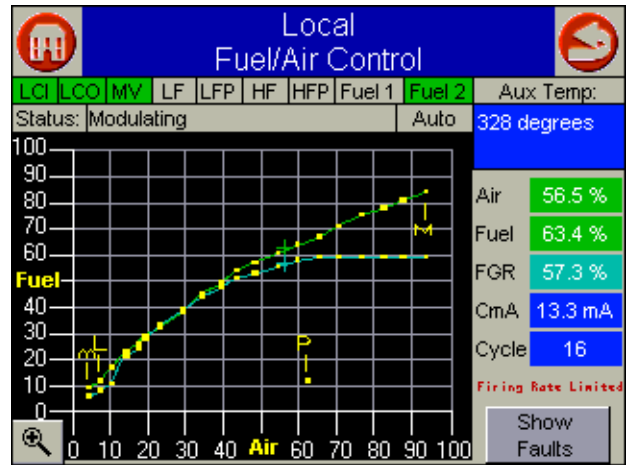


Fig. 68. Fuel/Air Ratio Control status.

You can zoom in on the modulation curve by selecting the magnifying glass icon in the lower left corner of the screen (Fig. 69). Select the (-) magnifying glass icon to zoom out and return back to the original status screen.

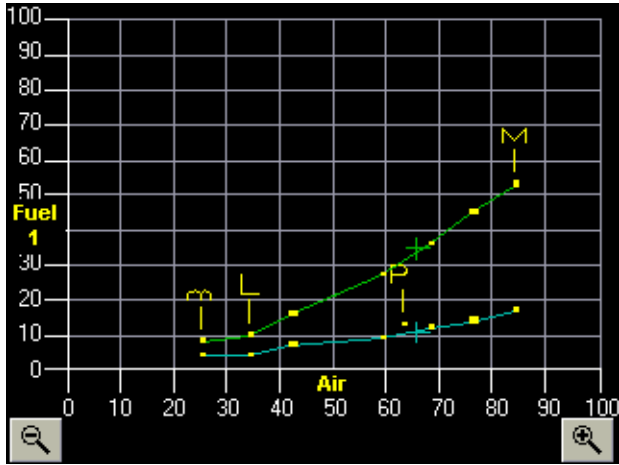


Fig. 69. Zoom in on the modulation curve.

The Fuel/Air Ratio Control faults history can be viewed by selecting the “Show Faults” button (Fig. 70). This button has a red color when the Fuel/Air Ratio Control is currently in a fault condition. If audio alarm is enabled for fault conditions (see User’s Preferences), then an audio alarm also sounds when the fault occurs. The audio alarm continues to sound until either the fault is cleared (e.g., R7999 is reset) or the fault history is viewed, or the Alarm Silence icon is pressed on the Home page.

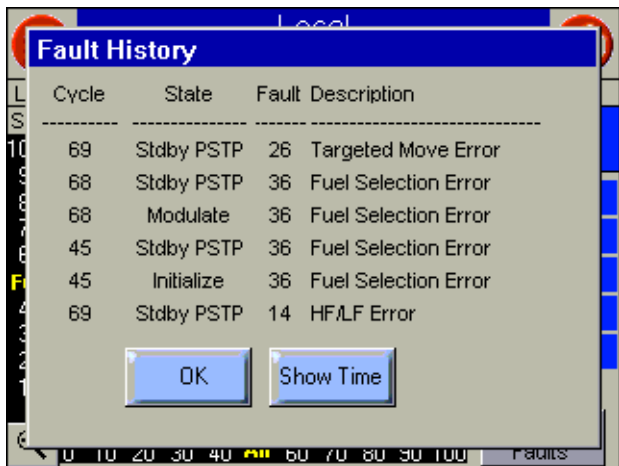


Fig. 70. Fuel/Air Ratio Control—fault history.

If timestamps are enabled (see User’s Preferences), then the time that the fault occurred is also displayed in the history (Fig. 71).

NOTE: Timestamping Values are cleared after the S7999B resets, or when switching to a different burner system or from/to the local Fuel/Air Control.

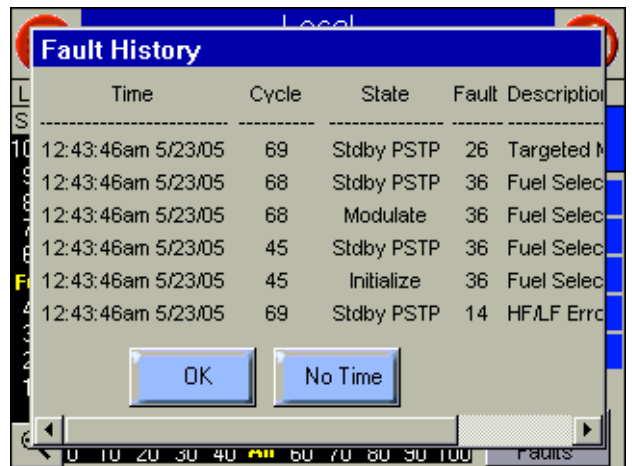


Fig. 71. Fuel/Air Ratio Control—fault history with time.

Fuel/Air Ratio Control Configuration

Commission configuration selections and diagnostic information about the Fuel/Air Ratio Control can be viewed by selecting the “Fuel/Air Ratio Control Configuration” button on the Home page. A configuration page like the one in Fig. 72 displays to show this information.

NOTE: Postpurge Time Out is available only for the local Fuel/Air Control.

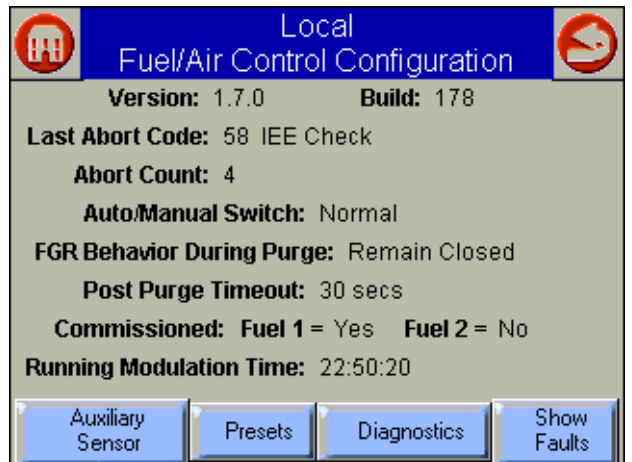


Fig. 72. Fuel/Air Ratio Control configuration.

Running Modulation Time is an accumulative time of how long the Fuel/Air Ratio Control has been in a modulated state, i.e., when it has been controlling the actuators in an active run state following a successful lightoff. This running time accumulates over each cycle of the Fuel/Air Ratio Control and will stop when the Fuel/Air Ratio Control is not in a modulate state.

The “Auxiliary Sensor” button displays configuration settings made for the auxiliary sensor input to the Fuel/Air Ratio Control (Fig. 73). It also displays the current reading of the auxiliary sensor.

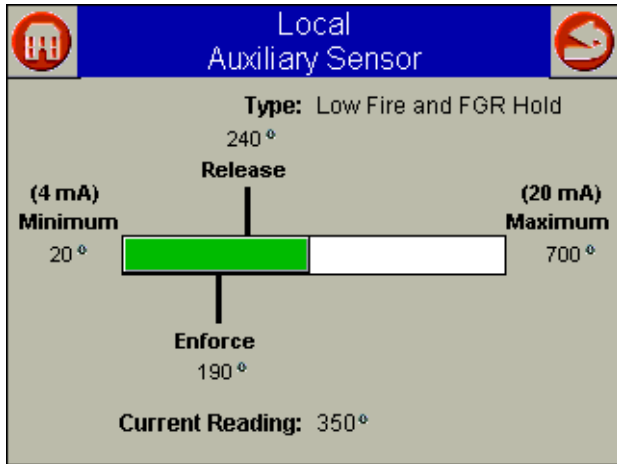


Fig. 73. Auxiliary sensor status.

The “Presets” button displays the actuator preset settings for the currently selected fuel (Fig. 74). Presets are actuator positions used for the three indicated states on the left side of the screen.

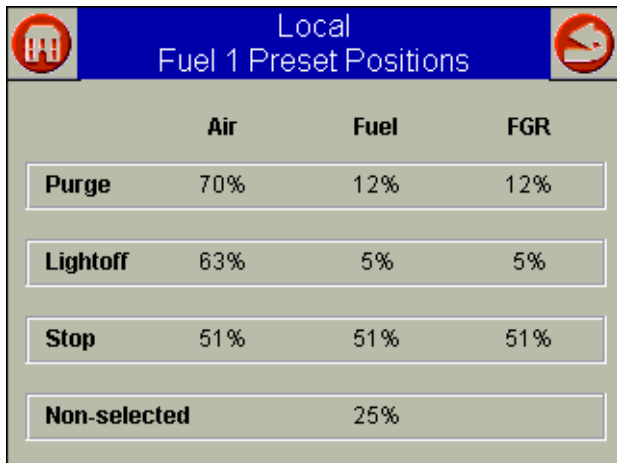


Fig. 74. Fuel preset settings.

The “Diagnostics” button displays diagnostic information about the Fuel/Air Ratio Control (Fig. 75). Current hysteresis value can be viewed or changed by selecting the “Hysteresis” button. See the Set Hysteresis section for more information regarding this button selection.

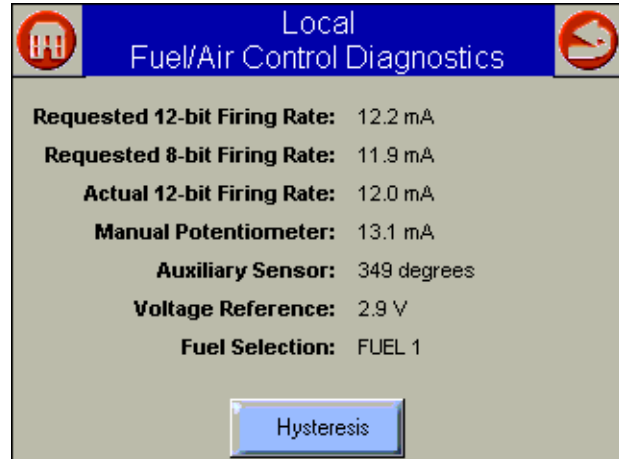


Fig. 75. Fuel/Air Ratio Control diagnostics.

The “Show Faults” button displays the Fuel/Air Ratio Control fault history (Fig. 76) in the same manner that it does on the Fuel/Air Ratio Control status page. This button provides another place to display these faults.

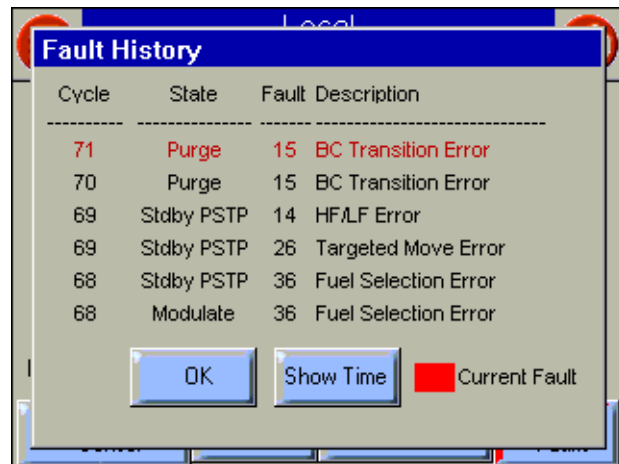


Fig. 76. Fuel/Air Ratio Control fault history.

Set Hysteresis

This feature is available for all ControlLinks™ Fuel/Air Ratio Control software builds except 127, 140 and 176 (see Home page screen for build number). The Fuel/Air Ratio Control must be updated to use this feature. This feature is also only available for the Fuel/Air Ratio Control attached to the F/A Config. port.

The hysteresis value controls the amount of hysteresis for the 4 to 20 mA firing rate (CmA) input signal. Adjusting the hysteresis value determines when the R7999 reacts to a firing rate change in the opposite direction. The R7999 only reacts to a firing rate change in the opposite direction when it has increased/decreased more than the user-selected hysteresis value. However, the R7999 always follows the firing rate signal as it changes in the same direction.

For example: When a hysteresis value of 0.5 mA has been selected and the firing rate drops from 12 mA to 10 mA, the R7999 will not begin to follow an increased firing rate until it increases to a value of 10.5 mA or higher. All firing rate values

between 10 mA and 10.5 mA are interpreted as a value of 10 mA. The configured actuators remain at their corresponding 10 mA firing rate position until a new firing rate is accepted.

Increasing the hysteresis value may reduce the amount of actuator dither/hunting and premature wear-out due to a noisy environment or an intelligent firing rate controller continuously attempting to satisfy a very precise setpoint.

Use the green LED buttons on the Hysteresis screen for large changes to the hysteresis value (Fig. 77). Use the up/down buttons on the bottom of the screen to slowly fine-tune the desired hysteresis selection. Pressing the “Set Hysteresis” button will cause the R7999 to reset and the new value will be written into nonvolatile memory.

The user is asked to confirm setting the hysteresis to the new value (Fig. 78). The “Reset to Current” button causes the current value to be copied to the proposed new value field, similar to an undo operation. See Fig. 77 and 78.

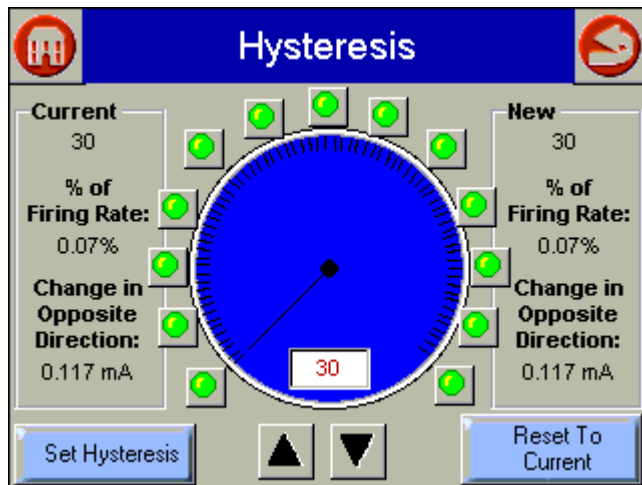


Fig. 77. Set Hysteresis.

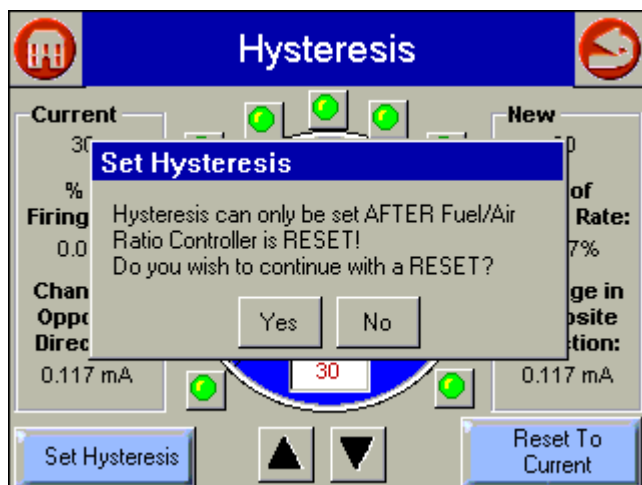


Fig. 78. Confirm setting—Hysteresis.

Actuator

The status of each actuator can be viewed by clicking on the icon on the Home page corresponding to that actuator. A screen similar to that in Fig. 79 is displayed.

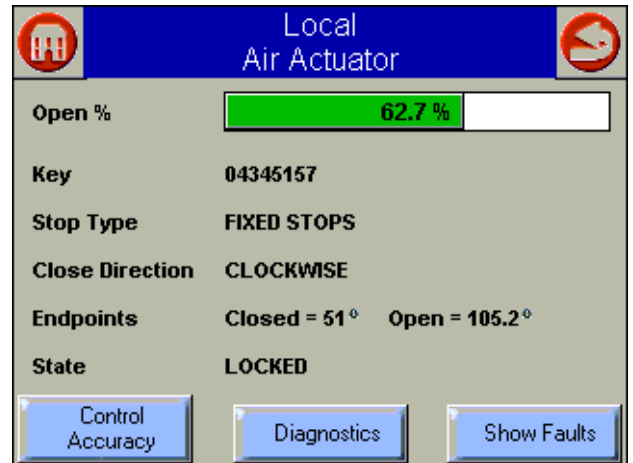


Fig. 79. Actuator status.

For Modbus™ burner systems, some of this information is not available: Key, Stop Type, Close Direction, and State. This information is blank on the screen in this case.

For actuators on the F/A Config port, the State status indicates whether the actuator has been configured (key, stop type, and close direction has been set) or not by displaying “CONFIGURED” for its state. If the actuator has been configured and also has its endpoints locked, the state displays a “LOCKED” status.

Actuator fault history can be viewed by selecting the “Show Faults” button (Fig. 80).

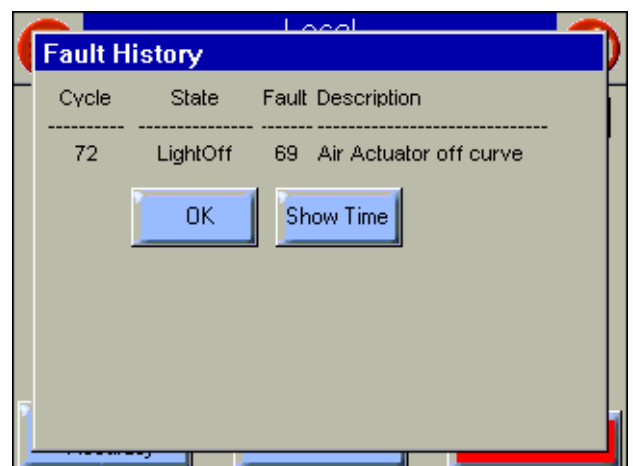


Fig. 80. Actuator fault history.

Diagnostic information about the actuator can be viewed by selecting the “Diagnostics” button. Diagnostic data for all actuators display at the same time to give a quick snapshot of all actuator activity. The data can be displayed in degrees (Fig. 81) or in analog-to-digital counts (Fig. 82).

	Air	Fuel 1	Fuel 2	FGR
Current Position:	30°	28.5°	90.4°	30.9°
Pot Position:	29°	27.6°	87.5°	30°
Total Resistance:	111.3°	111.2°	111.3°	111.3°
Wiper Resistance	18.3°	17.5°	34.3°	18.2°
Circuit Ch A:	0	1	1	1
Circuit Ch B:	1	1	1	1
Resistance Dev:	-2	1	-2	0
Total Span:	54.2°	20.2°	96.3°	20°

Fig. 81. Actuator diagnostics—in degrees.

	Air	Fuel 1	Fuel 2	FGR
Current Position:	1067	1015	3219	1102
Pot Position:	1033	982	3115	1067
Total Resistance:	3962	3960	3962	3964
Wiper Resistance	651	623	1222	649
Circuit Ch A:	1	1	1	0
Circuit Ch B:	1	1	1	1
Resistance Dev:	0	1	-2	1
Total Span:	1929	720	3429	711

Fig. 82. Actuator diagnostics—in A/D counts.

The button on the bottom of the screen toggles the user between the formats to display the data in.

Set Control Accuracy

The “Control Accuracy” button, if enabled, allows the user to view the current control accuracy setting and change it, if desired.

This feature is only available for Fuel/Air Control software builds higher than 178. The Fuel/Air Control must be updated to use this feature. The “Control Accuracy” button on the Actuator screen is grayed-out when the Fuel/Air Control software build is 178 or below (see Fuel/Air Ratio Control Configuration page for build number).

The control accuracy setting controls how closely the actuators follow the profile curve configured in a Fuel/Air Control and defines the allowable tolerance for achieving each commanded position. The R7999 system normally drives the actuators to within 0.1 degree (default value) of the programmed curve, but many applications may not require this type of accuracy. Increasing the control accuracy value may reduce the amount of actuator dither/hunting and premature wearout due to a noisy environment or a potentiometer.

When the “Control Accuracy” button is selected, a new page (Fig. 83) is displayed. Pressing the Set Accuracy button causes the Fuel/Air Control to reset and store the user-selected value in the Fuel/Air Control nonvolatile memory.

NOTE: Setting the control accuracy to a value other than 0.1 degree disables 0.1 degree positioning commands available by default when commissioning the curve. This setting applies to all actuators, not just the actuator that has its status displayed.

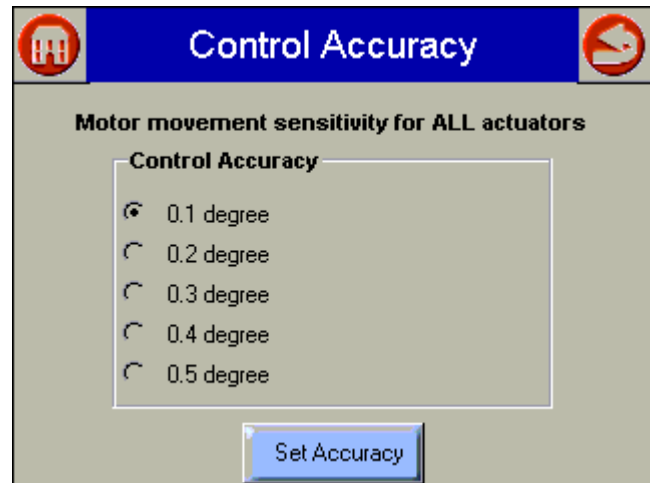


Fig. 83. Set Control Accuracy.

The user is asked to confirm setting the control accuracy to a new value (Fig. 84). The Fuel/Air Ratio Control is reset during this setting change.

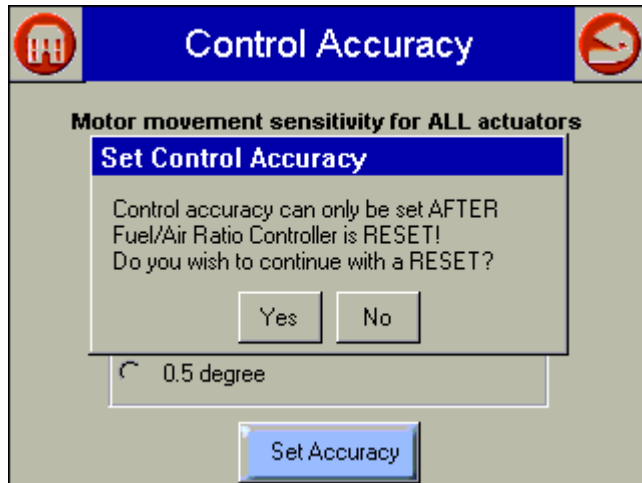


Fig. 84. Confirm Setting—Control Accuracy.

UDC CONTROLLERS

For Switchable mode, the UDC controllers must be manually assigned to their appropriate burner/boiler system. This assignment is done on the Controller Setup page (Fig. 85). This setup page is reached from the “Controllers” button on the Setup page (see Display Setup and Diagnosis).

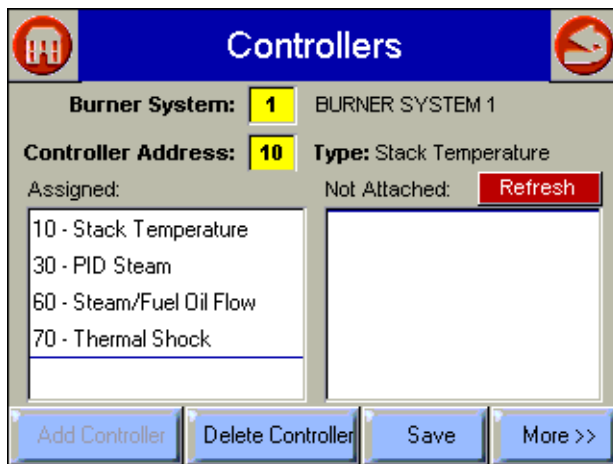


Fig. 85. UDC Controller Setup.

For Local mode, the UDC controllers are automatically assigned, so setup on this page isn't necessary. The Setup page can be used to view which UDC controllers have been assigned, and to manually assign any future UDC controllers expected to be installed. The “Refresh” button also provides a quick search to locate any new UDC controllers that haven't been detected yet. For more setup options for UDC controllers, see the Display Setup and Diagnostics section.

UDC Controller Status

The Home page contains button icons representing the different UDC controllers (see Fig. 17) in the burner/boiler system. Selecting one of these buttons displays a status page similar to the following figure (Fig. 86) providing status and control options for the selected controller.

The name of the burner/boiler system may optionally be displayed in the title at the top of the page. The second line in the title lists application type of the UDC controller.

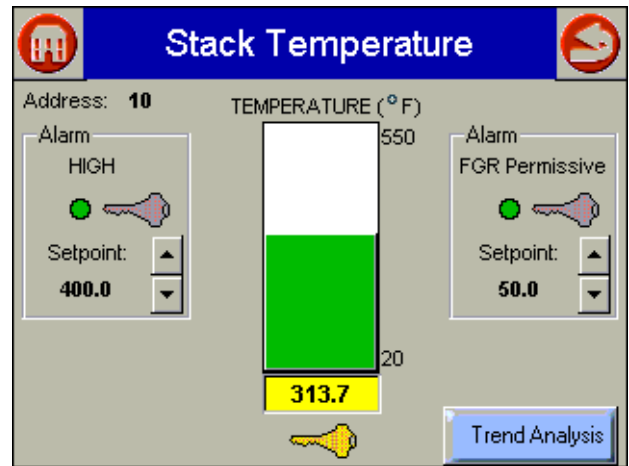


Fig. 86. Stack Temperature Controller.

The current input reading of the UDC controller is displayed in the center of the page along with a bar graph showing the range of the input sensor and the position of the reading in that range. On each side of the input may be zero, one, or two alarm indicators, depending on application type and UDC configuration, to show whether any alarms exist (LED flashes red) or not (LED is green). If the alarm is turned off for this configuration, the alarm text and LED are grayed out. The alarm setpoints can be adjusted with the Up Arrow and Down Arrow buttons to increase or decrease the setting. Below each alarm and input reading are Key buttons that allow the corresponding status to be selected as a key variable for display on the Home page. Pressing the Key button changes the color to yellow, indicating that this status is now a key variable. Pressing the Key button again deactivates it as a key variable. Only one Key button can be selected at a time, because only one key variable status can be displayed on the Home page for each UDC controller.

Local S7999B ONLY

If the UDC controller can have its setpoint adjusted by the S7999B, and an alarm is configured, the user must enter a the S7999B System password to adjust the setpoint. The password is entered when the setpoint is adjusted for the first time on the UDC controller status page. The same S7999B System password is used for all UDC controllers on the Local burner/boiler system. When the user leaves the status page, the password expires, and must be re-entered to adjust the setpoint. The initial password is “s7999b”. The password can be changed on the User Preferences page.

Trend Analysis

You can view a Trend analysis of the primary application sensor input. A 60-second, 60-minute, 24-hour, or 30-day sample history of the sensor reading is kept for each controller input sensor. The trend analysis is displayed as sensor value over time with the graph updated at run-time once every second. You can switch between sample history times (seconds, minutes, hours, days) by pressing the button that shows the measurement currently displayed (seconds, minutes, hours, days).

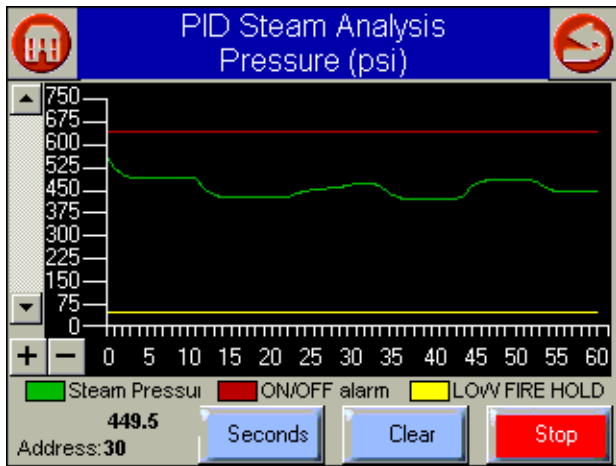


Fig. 87. Trend analysis displayed in seconds.

Trend analysis data can be cleared, by the user. After the data is cleared the trend graph begins with new sample data.

The following table lists which sensor inputs are sampled.

Table 6. Trend analysis controller source data

UDC controller	Data Input
Stack Temperature controller	Stack temperature
PID Load controller	Water temperature
PID Load controller	Steam pressure
Feed Pump Level controller	Vessel level
Steam/Fuel Flow Monitor	Steam flow rate
Steam/Fuel Flow Monitor	Gas flow rate
Steam/Fuel Flow Monitor	Fuel oil flow rate
Steam/Fuel Flow Monitor	Total steam flow
Steam/Fuel Flow Monitor	Total gas flow
Steam/Fuel Flow Monitor	Total fuel oil flow
Thermal Shock controller	Water supply temperature

NOTE: Not all data is sampled per controller. Some data input is dependent on the UDC controller model. For example, a PID Load controller provides water temperature or steam pressure input, but not both, based on the UDC controller model.

UDC controllers that can have more than one concurrent sensor input, such as the Steam/Fuel Flow Monitor, only display one of the sensors at a time. The user decides which sensor input data to view.

The user can select which status from the UDC controller status page to display on the Local Home page, if any, on the UDC controller status page.

Stack Temperature Controller

The current stack temperature is obtained from the UDC controller and displayed in text value and in a bar graph on the page. Upper and lower limits of the stack temperature range are displayed on the page next to the temperature bar graph.

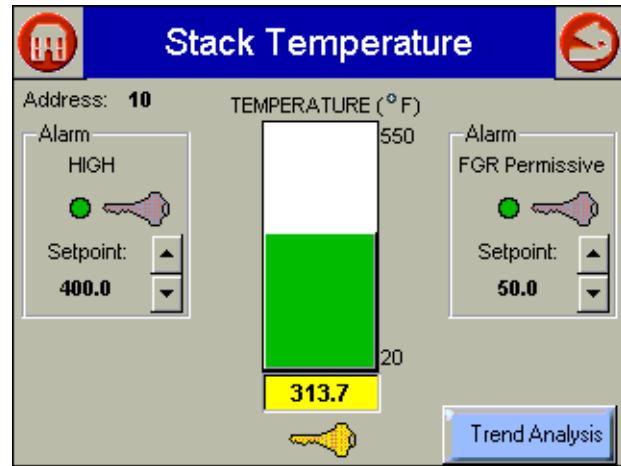


Fig. 88. Stack Temperature Controller.

If a High Temperature alarm is configured in the UDC controller, the alarm is displayed on the page along with the current alarm setpoint. An LED displayed on the page indicates whether the alarm is active (red) or inactive (green).

If a High Temperature alarm is configured in the UDC controller, the user can adjust the setpoint.

If an FGR Permissive alarm is configured in the UDC controller, the alarm setpoint setting is displayed on the page, and the user can adjust the setpoint. An LED displayed on the page indicates whether FGR is permissive (green) or not (red).

PID Load Controller

Current load water temperature or steam pressure is obtained from the UDC controller and displayed in text value and in a bar graph on the page (see Fig. 89 and 90). Upper and lower limits of the water temperature/steam pressure range are displayed on the page next to the load bar graph.

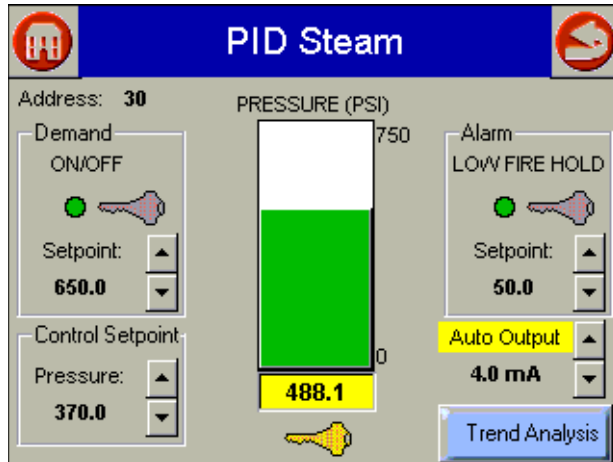


Fig. 89. Steam PID Load Controller.

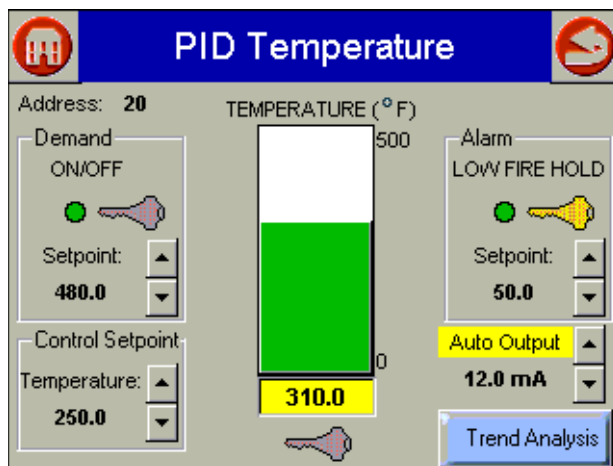


Fig. 90. Water Temperature Load Controller.

The control setpoint for PID modulation is obtained from UDC controller and displayed on the page. The control setpoint can also be adjusted on this page. The control setpoint is set by the user using the Up Arrow and Down Arrow buttons. The UDC controller modulates the burner control toward this target setpoint.

Status of the On-Off relay is obtained from the UDC controller. An LED displayed on the page indicates when demand is on (green) or off (red).

If a Low Fire Hold alarm is configured in the UDC controller, the setpoint of this alarm is obtained from the UDC controller and displayed on the page. The status of the alarm is displayed on the page with an LED that is red when Low Fire Hold has occurred and green when the system isn't in Low Fire Hold.

The user can adjust the alarm setpoint of both alarms. Manual control of the UDC controller output is also permitted by selecting the yellow "Auto Output" button. Adjustment is raised or lowered in 1% (0.16 mA) increments. The S7999B System password (same as Setpoint Adjustment) is required before manual control is permitted. After successful login, the Up Arrow and Down Arrow buttons can be used to change the alarm setpoints.

PID modulation output is obtained from UDC controller and displayed on the page in text value (mA).

Feed Pump Level Controller

The current water supply level (percent full) is obtained from the UDC controller and displayed both in text value and in a bar graph on the page. Upper (100%) and lower (0%) limits are displayed next to the bar graph.

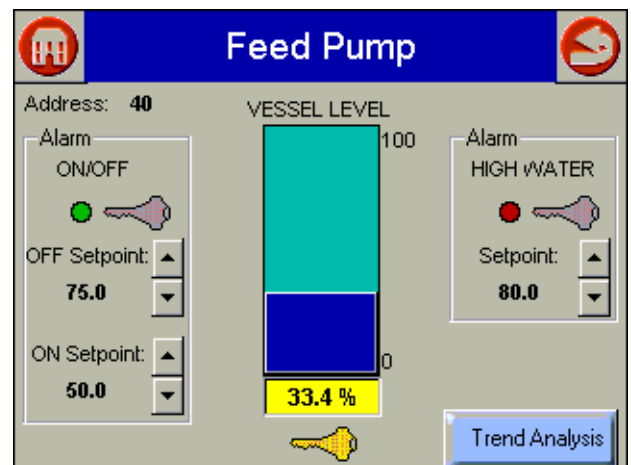


Fig. 91. Feed Pump Level Controller.

Status of the Start-Stop relay in the UDC controller is displayed on the page as an LED that is green when the relay is in Start mode and red when the relay is in Stop mode. The Start Pump and Stop Pump setpoints (in percent) are obtained from the UDC controller and displayed on the page. The user can adjust these Start Pump and Stop Pump setpoints with the Up Arrow and Down Arrow buttons. Successful password login is required before the setpoints can be adjusted.

If a High Water alarm is configured in the UDC controller, the setpoint of this alarm is displayed on the page. The status of the alarm is indicated by an LED that is red when a status and high water condition exists, and green when safe water level exists. The user can adjust the alarm setpoint on the page.

Flow Monitor

If steam flow is configured in the UDC controller, current steam flow rate is displayed in text value and in a bar graph on the page. Upper and lower limits of the steam flow range are displayed on the page next to the bar graph.

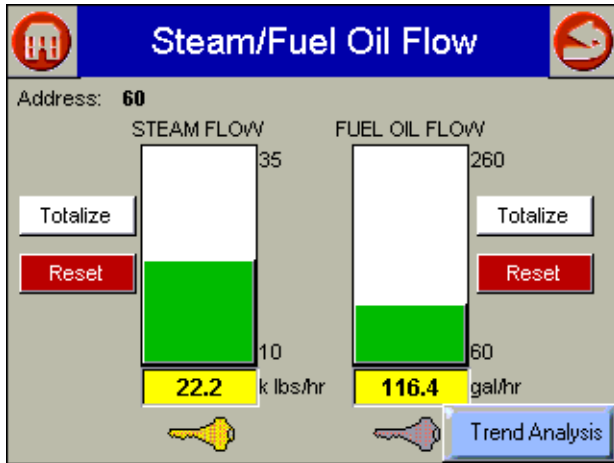


Fig. 92. Steam/Fuel Oil Flow Monitor.

If gas or fuel oil flow is configured in the UDC controller, current gas/fuel oil flow rate is displayed text value and in a bar graph on the page. The upper and lower limits of the Gas/fuel oil flow range are displayed on the page next to the bar graph.

If totalization is configured in the UDC controller, the user can select which flow (steam or gas/fuel oil) to accumulate total units flowed. The user can start, stop, and reset the totalization count in the UDC controller. The total flow is displayed on the page. If the UDC controller has been totalizing prior to displaying this page, the current totalized value displays on the screen and continues to totalize automatically. Totalization doesn't start nor stop automatically when leaving this page.

Thermal Shock Controller

Current water supply temperature is displayed in text value and in a temperature bar graph on the page. Upper and lower limits of the water supply temperature range are displayed next to the temperature bar graph.

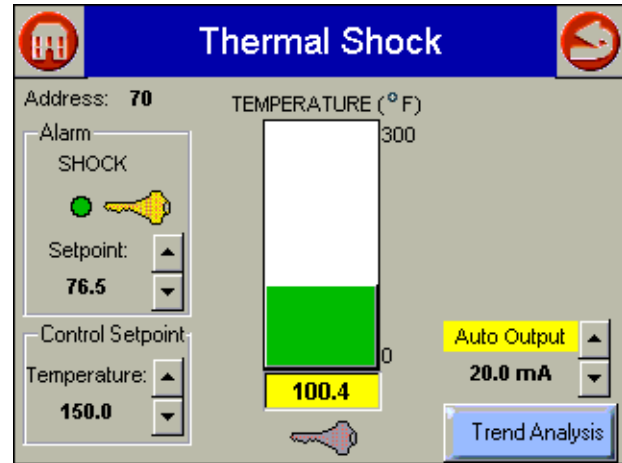


Fig. 93. Thermal Shock Controller.

The control setpoint for optimal water temperature is displayed on the page. This setpoint is used for PID modulation of mixing valve/pump and for shock alarm.

The user can adjust the control setpoint on the page. The status of the shock alarm (when water supply temperature falls below alarm setpoint) is indicated by an LED that is green when temperature is below the setpoint and red when temperature is above the setpoint.

Both setpoints can be adjusted by the Up Arrow and Down Arrow buttons after successfully logging in with the S7999B System password.

Control of the mixing valve/pump can be manually adjusted by selecting the yellow "Auto Output" button. The Up Arrow and Down Arrow buttons are used to adjust the modulation outputs (override) in 1% (0.16 mA) increments.

DISPLAY SETUP AND DIAGNOSTICS

The following pages apply to display setup and diagnostics for the S7999B.

Setup

The Setup button on the Home page is selected to go to these pages. The Setup screen (see Fig. 94) is displayed first. It allows for some S7999B device settings. The Advanced Setup button permits the user to run some diagnostic functions for the S7999B and to set advanced features for run-time operation. See the Advanced Setup section starting with Fig. 111 for these features.

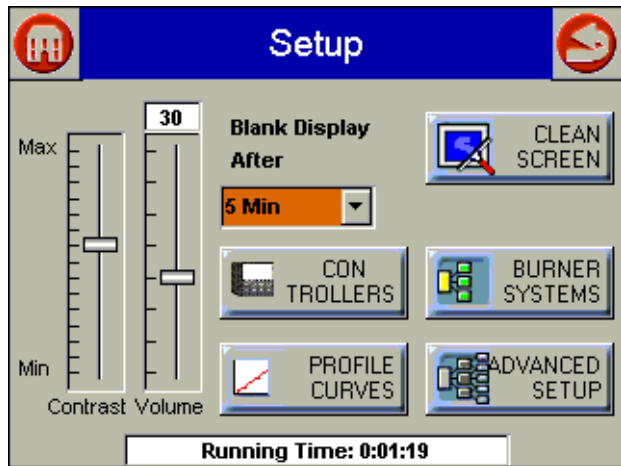


Fig. 94. S7999B setup.

In System S7999B mode the initial setup page is displayed, as shown in Fig. 95.

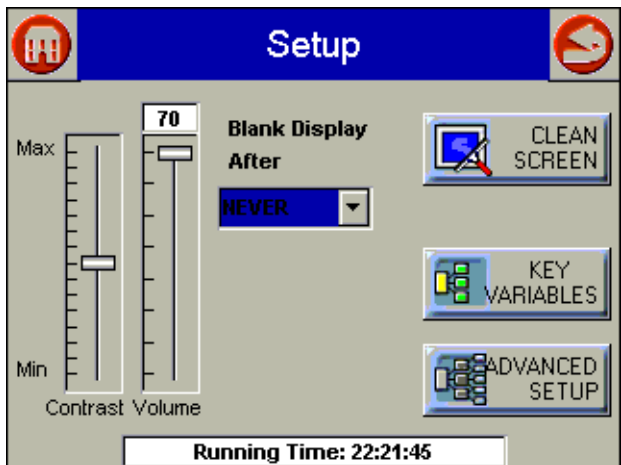


Fig. 95. S7999B setup—initial display.

No “CONTROLLERS,” “BURNER SYSTEMS,” or “PROFILE CURVES” buttons exist on this setup page. Instead a “KEY VARIABLES” button replaces them.

If Contrast or Volume are changed, Fig. 96 displays to allow saving these changes to flash.

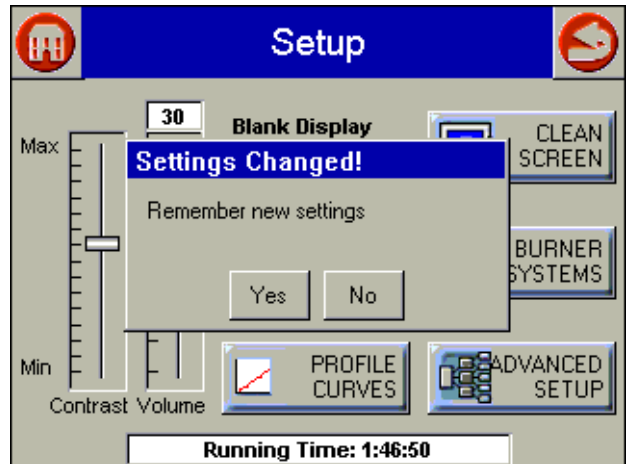


Fig. 96. Setup settings changed.

When the user wants to clean the touch screen, the “CLEAN SCREEN” button is selected to freeze touch input temporarily for 30 seconds to allow the user to clean the screen. (See Fig. 97.)

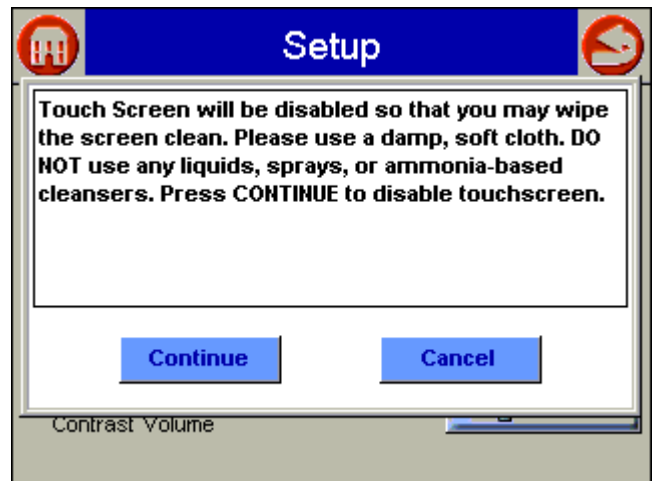


Fig. 97. Clean screen setup.

A countdown screen displays (Fig. 98) during the screen disable period. It disappears when the touch screen is re-enabled.

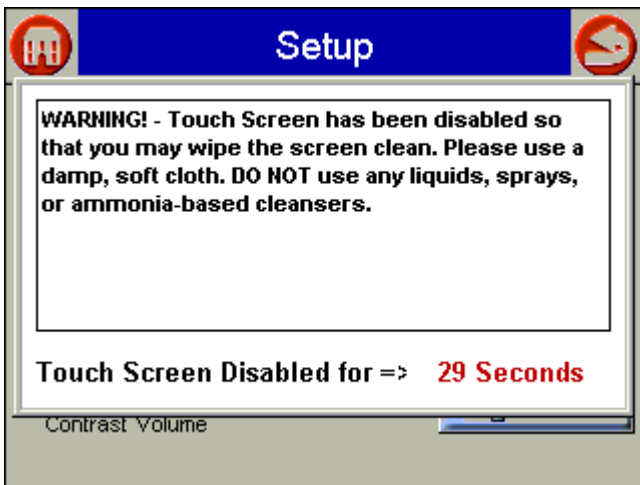


Fig. 98. Screen disabled for cleaning.

Burner System Names

The user can name the different burner/boiler systems on the Modbus™ with custom names that show up on all monitor page titles. The user selects the “BURNER SYSTEMS” or “BOILER SYSTEMS” button to rename the burner/boiler systems and the Burner System Names page displays (Fig. 99). The S7999B uses “Burner System 1-99” or “Boiler System 1-99” as default names which match the Modbus™ address, unless a custom name is defined for it.

NOTE: For Local S7999B mode only, the name of its individual burner/boiler system can be changed. This button selection doesn't exist when the S7999B is in System mode.

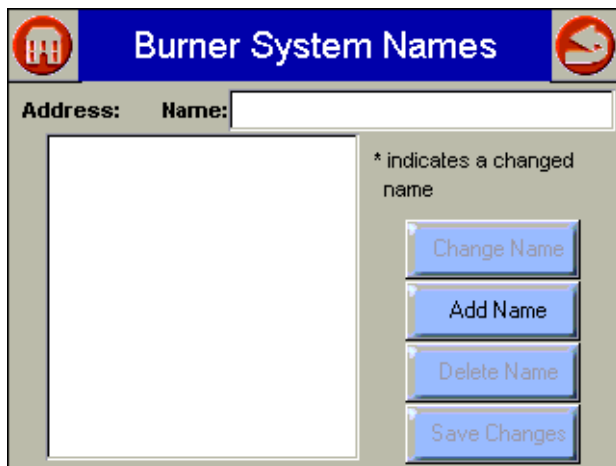


Fig. 99. Burner System Names setup.

To add a name (change default name):

1. Select “Add Name” button (Fig. 99).
2. Enter Modbus™ address (Fig. 100).
3. Type in the name (Fig. 101).
4. Select “OK” button.
5. Entered name appears in Name text box and in list box on original screen (see Fig. 102).

NOTE: For Local S7999B mode, skip step 2.

To change a name:

1. Select the name in the list box (Fig. 102)
2. Touch the name in the Name: text box.
3. Edit the name (Fig. 101).
4. Select “OK” button.
5. Select the “Change Name” button.
6. Entered name appears in Name text box and in list box on original screen (see Fig. 102).

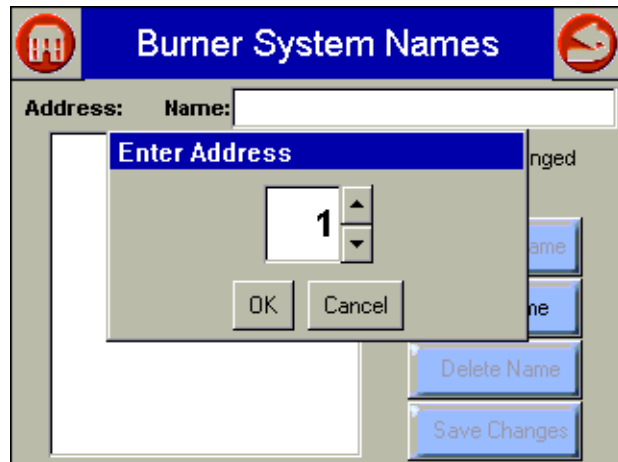


Fig. 100. Burner System Names—Enter Address.

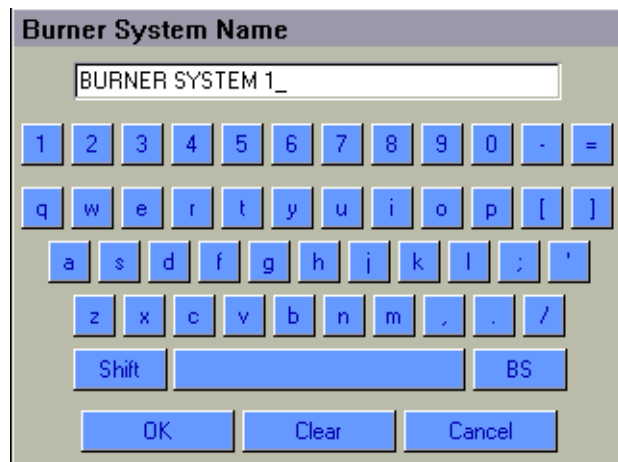


Fig. 101. Burner System Name—Enter Name.

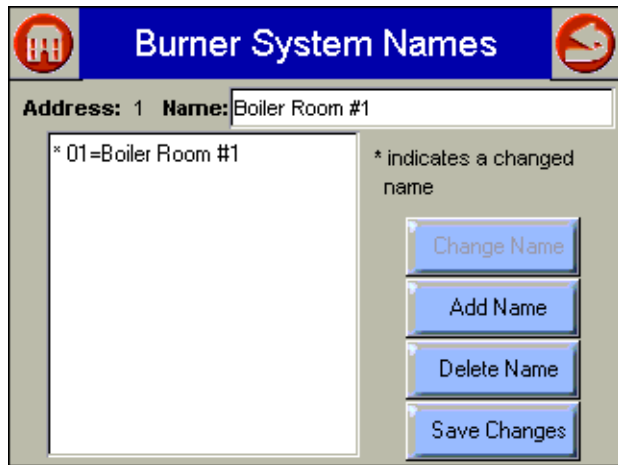


Fig. 102. Burner System Name.

Select the “Save Changes” button to save the names to the S7999B flash; otherwise they will revert to the default names when the S7999B reboots. A confirmation dialog box displays (Fig. 103), asking the user to proceed with the save operation.

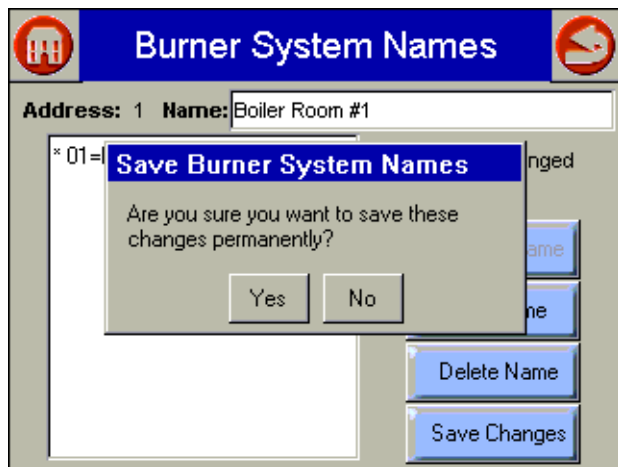


Fig. 103. Save Burner System Names to flash.

In System S7999B configuration only, you can specify which burner/boiler system status variable you want displayed on the System Home page. A separate status variable is selected for each burner/boiler system. These selections can be saved to flash for permanent configuration.

In Local S7999B configuration, you can specify which UDC controller status variable you want displayed on the Local Home page. A separate status variable is selected for each UDC controller. These selections can be saved to flash for permanent configuration.

In a Switchable configuration, you can only configure burner system names when S7999B is configured for S7810M Modbus™ network. In this configuration (S7810M Modbus™ network) you can assign UDC controllers to burner/boiler systems. Assignments can be made without UDC controllers connected to the network (off-line assignment). These assignments can be saved to flash for permanent configuration.

Offline Profile Curve Builder

The Offline Profile Curve Builder is only available on Local S7999B and Switchable modes. It is used to create a curve without having the burner firing (not in Commissioning mode). The S7999B is capable of storing 10 profile curves in its flash memory. The curves can be stored by saving them during commissioning time, building them from scratch, or editing an existing one with this Offline Curve Builder. Each curve may contain up to 24 points, but can be as small as only one point of any type for some user-defined purpose (partial curve). Entire curves can be copied, renamed or deleted. The Curve Builder checks the curve for some validity when it is saved, but it reserves all safety validation to the R7999 at commissioning time. Basic validity checking will display which points have errors and the type of error involved. It does not apply all the same safety checks and rules that the R7999 does, so some points may not get loaded during commissioning. The R7999 may reject any invalid points or slopes that do not fit within actual actuator spans.

When the user selects the “PROFILE CURVES” button, a page similar to Fig. 104 displays.

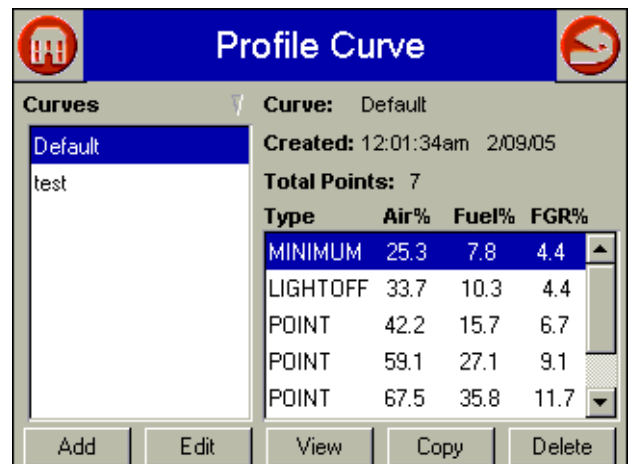


Fig. 104. Offline Profile Curve Builder.

A list of all current profile curves stored in the S7999B flash display on the left side of the screen. Information about the currently selected curve displays on the right side of the screen. Selecting a different curve in the list on the left causes the right side to get updated with information about that curve.

A row of buttons is displayed on the bottom of the screen that provides the user with different curve functions:

- “Add”—to add or create a new profile curve.
- “Edit”—to edit the settings in the currently selected curve.
- “View”—to view the currently selected curve in a fuel/air ratio graph.
- “Copy”—to copy the currently selected curve to another one with a new name.
- “Delete”—to delete the currently selected curve from the profile curve directory (S7999B flash).

Add Curve

To add a new profile curve, select the “Add” button and an Add Profile Curve page displays (Fig. 105). For each point in the curve, perform the following sequence:

- Select the point type drop down list to choose the appropriate point type.
- Select the Air% text box and adjust the open percentage for the air actuator (Fig. 106).
- Select the Fuel% text box and adjust the open percentage for the fuel actuator.
- Select the FGR% text box and adjust the open percentage for the FGR actuator (if applicable).
- Select the “Add Point” button.

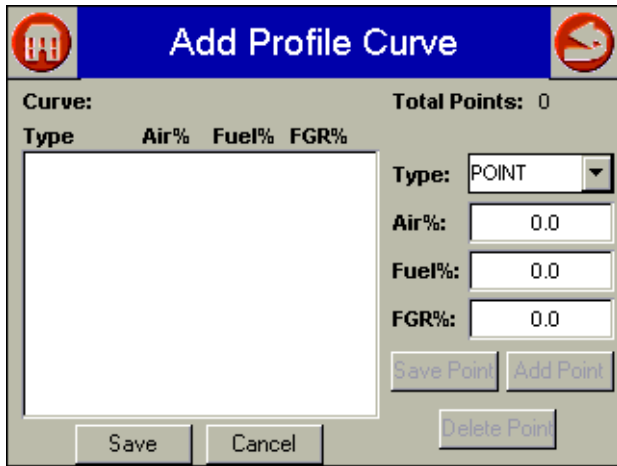


Fig. 105. Add Profile Curve.

As each point is created, the point is added to the list box on the left side of the screen. Up to 24 points can be added to the curve. To edit or delete a point, select the point in the list box, and the right side of the screen updates with the settings of that point. Change any of these settings and select the “Save Point” button to accept the changes or select the “Delete Point” button to remove the point from the profile curve (the list box on the left side of the screen updates itself with the new settings).

NOTE: To create a profile curve with no FGR, enter zero for all FGR values when adding/changing points. Attempting to load a profile curve that has FGR actuator points into an R7999 that does not have an FGR actuator will result in loading just the Fuel/Air curve. Attempting to load a profile curve that has no FGR actuator points into an R7999 that has an FGR actuator will result in no points being loaded or a curve with the FGR line flat on the bottom of the graph.

To save the new curve to the S7999B flash, select the “Save” button. A keyboard window displays, asking the user to enter a name to associate with this curve. This curve is referenced

by the entered name thereafter. After the name is entered, the original Add Profile Curve page displays again as it saves the curve to flash.

NOTE: Prior to saving the curve, the points are validated for some obvious errors before allowing the curve to be saved. If any errors exist, a dialog box displays with the type of error. The user must correct the error before the curve will be saved.

To not save the curve, the “Cancel” button can be selected, causing none of the user input to be saved.

Control returns back to the primary page for Offline Curve Building (Fig. 104) after the “Save” or “Cancel” buttons are selected.

Edit Curve

To edit a profile curve, select the curve in the list on the left side of the screen (Fig. 104) and select the “Edit” button. An Edit Profile Curve page (Fig. 106) displays. To edit the curve settings, perform the following sequence for each point that needs to be changed:

- Select the point you wish to change in the point list on the left side of the screen.
- Change the point type, if needed.
- If the point’s position need to be changed, select the Air%, Fuel% or FGR% text box that needs to change. An edit value dialog box displays (Fig. 107).
- Adjust the open% value.
- Select the “OK” button to accept the new value.
- Select the “Save Point” button to accept the new settings for this point.

As each point is saved, the point list on the left is updated with the changes. Failure to select the “Save Point” button will not commit any changes for that point, and the changes will be lost when exiting the page.

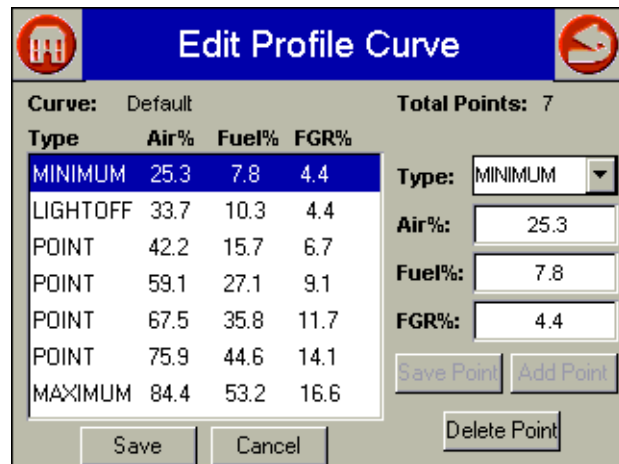


Fig. 106. Edit Profile Curve.

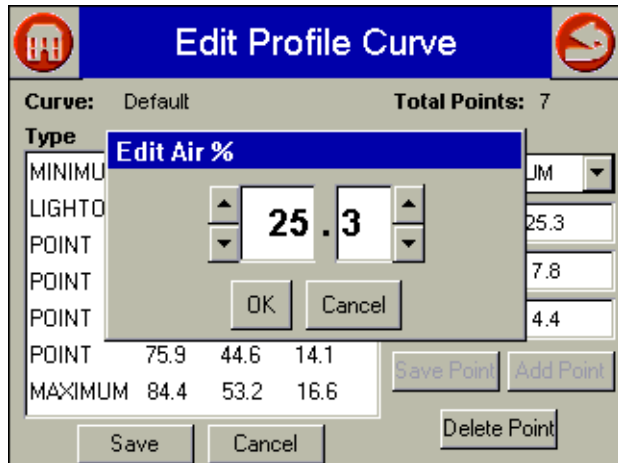


Fig. 107. Edit Air Percentage.

To insert a new point in the curve:

- Select a point in the point list above or below the new point values you wish to insert.
- Edit the point type and actuator open% values.
- Select the “Add Point” button.

As each point is added to the curve, the new point displays in the point list on the left. The point list may be reordered to keep it in Air Open% order. A total of 24 points can exist in the curve.

To delete a point in the curve:

- Select the point in the point list on the left side of the screen that you wish to delete.
- Select the “Delete Point” button.

The deleted point is removed from the point list on the left.

When finished, or, if you want to complete the curve at a later date, select the “Save” button to store the edited curve to flash. Select the “Cancel” button to abort any changes made and return to the Offline Curve Builder page (Fig. 104).

Copy Curve

To copy a curve, select the curve to copy from the curve list on the left side of the screen (Fig. 104). Select the “Copy” button and a dialog box displays, asking the user to confirm the copy (Fig. 108).

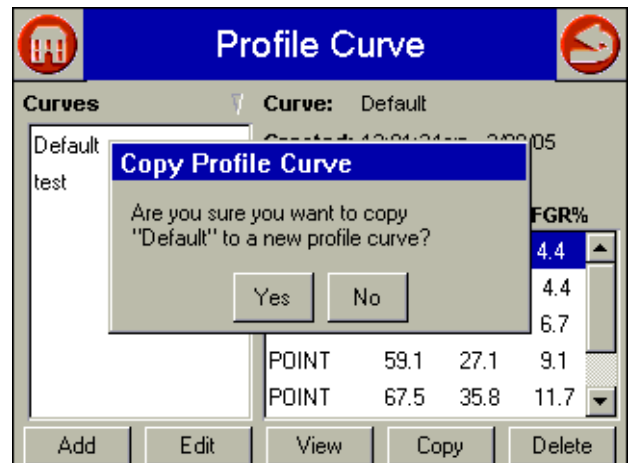


Fig. 108. Copy Profile Curve.

Delete Curve

To delete a curve, select the curve to delete from the curve list on the left side of the screen (Fig. 104). Select the “Delete” button and a dialog box displays, asking the user to confirm the delete (Fig. 109).

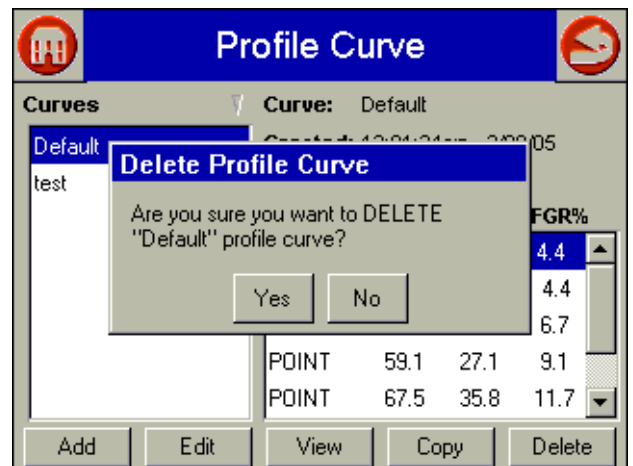


Fig. 109. Delete Profile Curve.

View Curve

To view a profile curve, select the curve from the curve list on the left side of the screen (Fig. 104). Select the “View” button and a graph displays with the curve similar to Fig. 110.

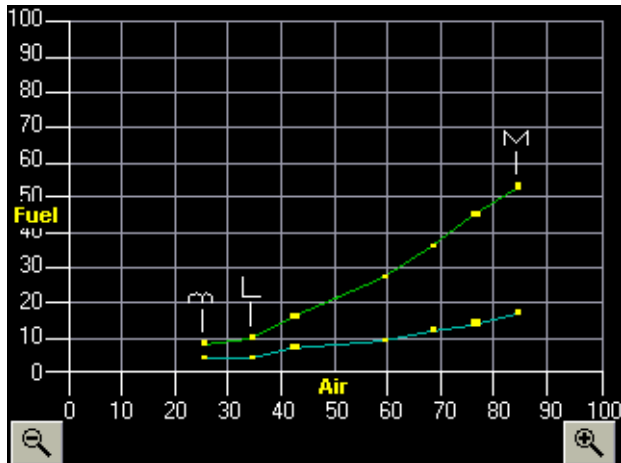


Fig. 110. View Profile Curve.

Up to three levels of zoom can be used to view the curve. The + magnifying glass button on the bottom right side of the screen is used to increase the degree of zoom. The - magnifying glass button on the bottom left side of the screen is used to decrease the degree of zoom and return back to the Offline Profile Curve Builder page (Fig. 104).

Scroll bars display on the bottom and right side of the screen to allow the curve view to be moved for the deeper levels of zoom.

Controllers

The Controllers page (see Fig. 111) is displayed by pressing the CONTROLLERS button on the Setup page (see Fig. 94). This button isn't available in System mode. On the Controllers page, the user can manually assign UDC controllers to specific burner/boiler systems (Switchable mode only) and to search for available UDC controllers on the COM2 port. For Local S7999B mode the found UDC controllers are automatically assigned to the Local S7999B. The Refresh button starts the search procedure.

NOTE: This search locates attached UDC controllers in a fast search rather than the slower background search.

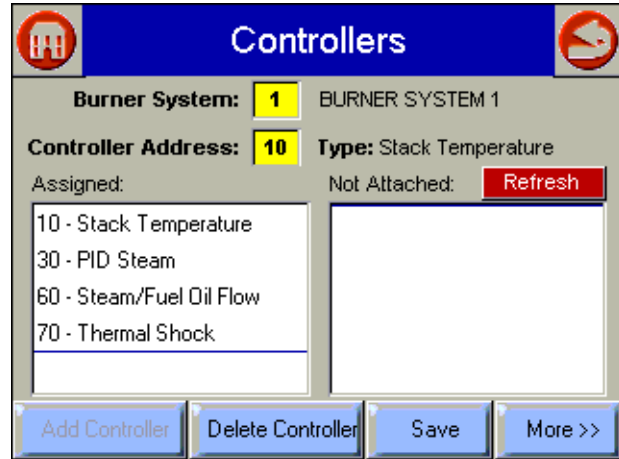


Fig. 111. Controllers setup.

To assign a UDC controller to a burner/boiler system:

1. Select a burner/boiler system button to enter Modbus™ address of the system you want to assign the UDC controller to.
2. Select the controller address button to enter Modbus™ address of the UDC controller or select one of the UDC controllers in the Not Attached list.
3. Press the “Add Controller” button to assign the UDC controller.
4. If the UDC controller is already assigned to another burner/boiler system, a warning dialog box asks you to confirm the change in assignment from the old system to the new one.

To delete a UDC controller assignment:

1. Select the burner/boiler system button to enter Modbus™ address of the system.
2. Select the UDC controller address button to enter Modbus™ address of the UDC controller, or select the UDC controller in the Assigned list.
3. Press the “Delete” button.

The UDC controller becomes unassigned and moves from the Assigned list to the Not Attached list.

NOTE: For Local S7999B mode the burner/boiler system address isn't entered because only assignments for its own system are permitted. Deleting UDC assignments in Local mode is only temporary, because the next time the UDC is found, it will be assigned automatically.

The Save button saves UDC assignments to permanent storage (flash) for Switchable S7999B mode. The More button allows the user to setup additional UDC controller options, as shown in Fig. 112.

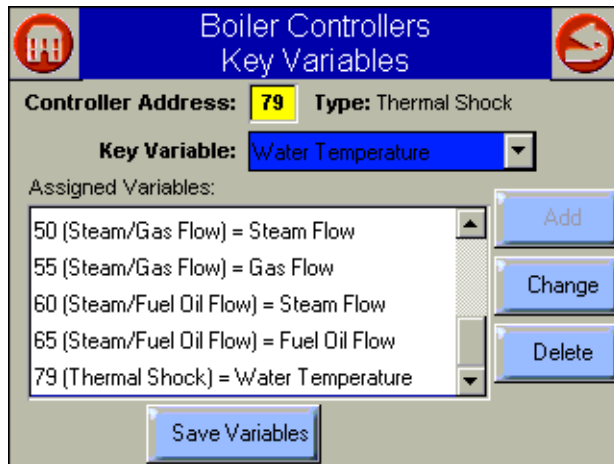


Fig. 112. Burner Controllers Key Variables.

This page allows static assignment of critical UDC controller data (key variables) to display on the Home page. UDC key variable values are displayed below the UDC buttons on the Home page. Each UDC controller can be assigned its own key variable. These static assignments can be saved to permanent storage (flash) and are the default assignments when the S7999B is powered up. Static key variable selections can be temporarily overridden on the UDC status page (see Fig. 88) by pressing the yellow keys, but their assignment returns to these settings when the S7999B is re-booted.

The available key variables depend on the type of UDC controller. The drop-down menu only displays the variables permissible for the UDC controller selected in the "Controller Address" box.

Current key variable assignments are displayed in the Assigned Variables list. The user can change or delete a key variable by selecting it in the list and pressing the Change or Delete buttons. Pressing the Add button allows the user to add new key variable assignments to the list. Pressing the Save Variables button saves the current assignments to permanent storage.

In System S7999B mode, the "KEY VARIABLES" button displays the following figure.

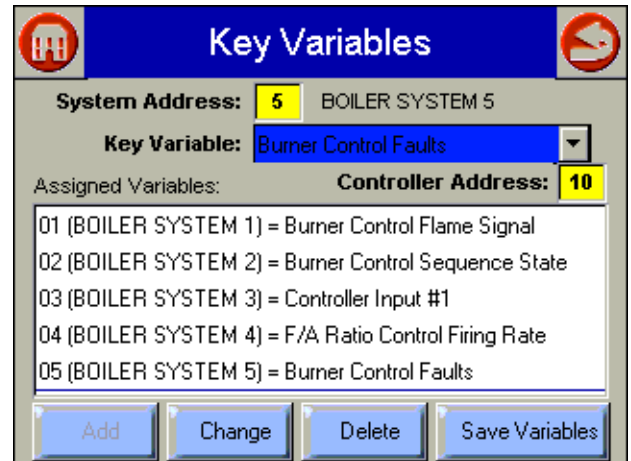


Fig. 113. System S7999 Key Variables.

This setup page allows key variables to be assigned for each burner/boiler system displayed on the Home page. The system address button is selected to enter the Modbus™ address of the burner/boiler system.

ADVANCED SETUP

Selecting the "ADVANCED SETUP" button on the Setup page displays more options that can be set by the user (Fig. 114).

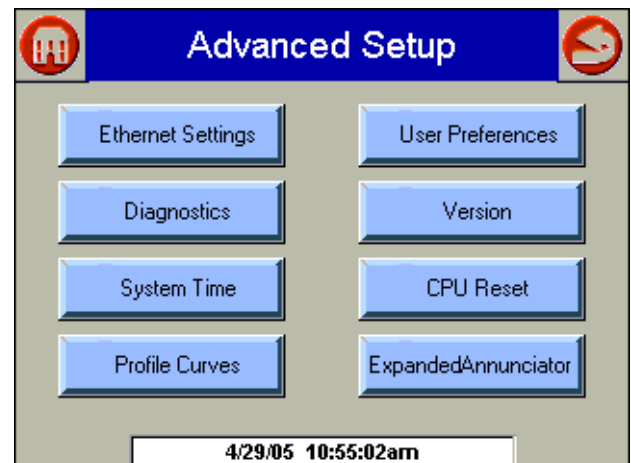


Fig. 114. Advanced Setup.

Ethernet Setup

Ethernet Setup is used to enable Ethernet communications for remote diagnostics, file transfers, and remote support, and is not typically enabled (Fig. 115). This feature should remain disabled unless directed to do so for remote troubleshooting. Once the feature is enabled, the S7999B must be reset to start it at power-up. The Ethernet interface can also be used to transfer profile curve files to/from the S7999B over a local intranet or the Internet.

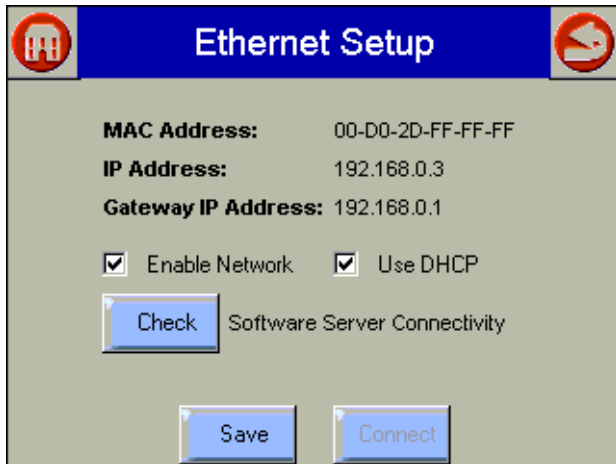


Fig. 115. Ethernet Setup.

A Honeywell software server connectivity check can be performed by selecting the Check button. This button is only enabled when the Ethernet interface is enabled and active. The connectivity check tries for 15 seconds to connect to the Honeywell software server. Successful connection displays a “CONNECTED” message on the screen. An unsuccessful attempt displays “NOT CONNECTED.”

The MAC (Media Access Control) address is a hardware address that uniquely identifies the S7999B on the network. This information is likely only of interest to the network administrator.

The IP (Internet Protocol) address is the address that the S7999B has been assigned by the DHCP server in the local network to use for others to access the S7999B. This address is necessary for the remote user to identify the S7999B in an FTP (File Transfer Protocol) application for transferring profile curves. Like the MAC address, it is displayed for informational purposes for the network administrator.

If the IP address has a private network designation (192.x.x.x), remote access from outside the local network may not be possible. Contact the network administrator for assistance in this case. If the IP address is 255.255.255.255, then no IP assignment has been made, and there is no connection to the network. This possibility could be due to no physical connection to an Ethernet network, or there is no DHCP server present on the Ethernet network. Check with the network administrator for assistance.

The Gateway IP address is displayed for informational purposes for the network administrator. The gateway node provides remote access for devices located off of the local network to the S7999B.

The Enable Network checkbox specifies that the Ethernet interface is on or not when the S7999B is powered up. The selection must be saved to permanent storage (flash) with the Save button for it take effect at boot time. This checkbox should normally be disabled, and enabled when Ethernet access to the S7999B is necessary. This interface must also be enabled for the Software Server Connectivity check to function properly (the Check button). If the Ethernet interface is disabled, the check procedure fails.

The S7999B must be assigned an IP address by a DHCP server for it to operate on the local network, so the Use DHCP box should be checked. However, because the S7999B requires this feature, it ignores the checkbox and always regards it as checked. The checkbox is included for future purposes when dynamic IP addressing isn't required.

Diagnostics

The “Diagnostics” button displays a page (Fig. 116) that permits some S7999B hardware diagnostics to be performed. **Normally, these diagnostics are applicable only for factory testing purposes, but conditions may arise that warrant this testing.**

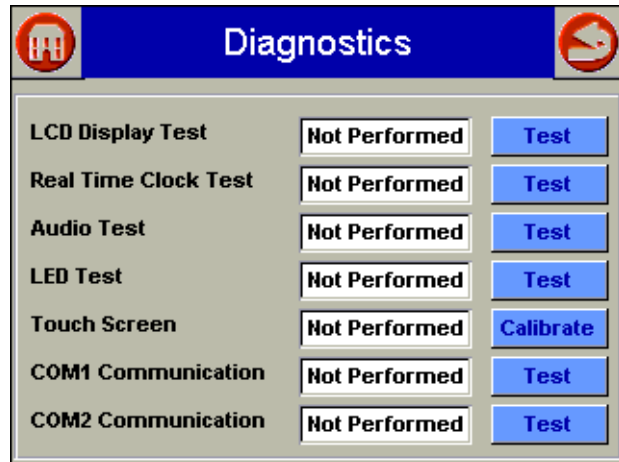


Fig. 116. S7999B Diagnostics.

NOTE: COM 1 and COM 2 Communication testing will always fail unless connected to a Honeywell factory test fixture.

Each test is invoked by selecting the “Test” button next to the diagnostic. The results of the diagnostic test (PASS/FAIL) display in the text box next to the “Test” button.

Touch screen calibration should be performed when the screen does not react correctly to an item touched/pushed on the screen.

A calibration screen (Fig. 117) displays that instructs the user to touch an X on different parts of the screen. When the calibration is done, the result is displayed on the Diagnostics page.

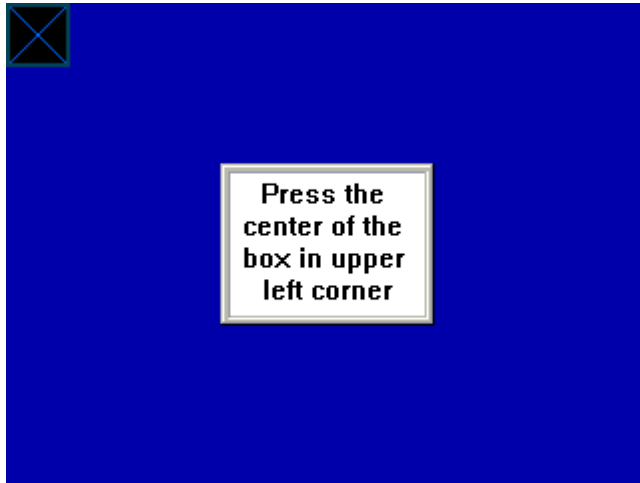


Fig. 117. Touch screen calibration.

System Time

The S7999B system clock is set by selecting the “System Time” button on the Advanced Setup page. A screen similar to the following figure (Fig. 118) displays.

NOTE: Time and date need to be set each time the S7999B reboots.

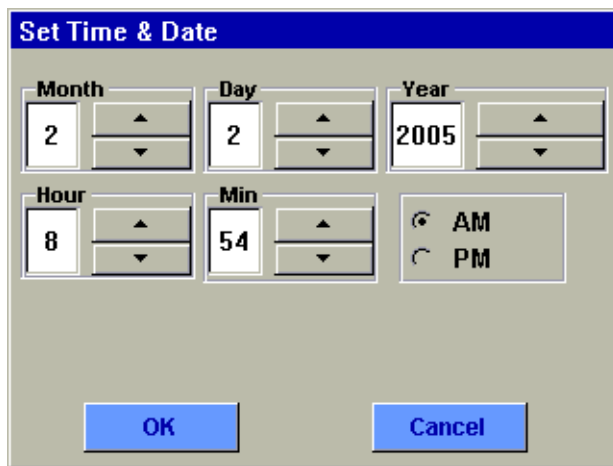


Fig. 118. S7999B Date and Time.

Edit the date and time and select the “OK” button to accept the new settings. Select the “Cancel” button to not change the date or time.

Profile Curve Directory

Miscellaneous directory functions for the profile curves stored in S7999B flash are displayed on a new page (Fig. 119) when the “Profile Curves” button is selected on the Advanced Setup page.

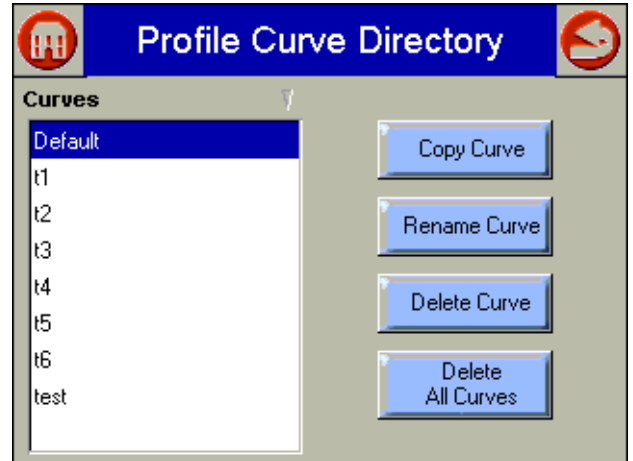


Fig. 119. Profile Curve Directory.

Curves can be copied (duplicated), renamed, or deleted by selecting the corresponding button. A list of profile curves stored in flash is displayed on the left side of the page. Select the curve from this list and then the corresponding button to perform the function. Confirmation dialog boxes display before the function occurs to ensure that the user wants to continue with the function.

Version

The “Version” button on the Advanced Setup page displays manufacturer and software version information (Fig. 120 and 121).

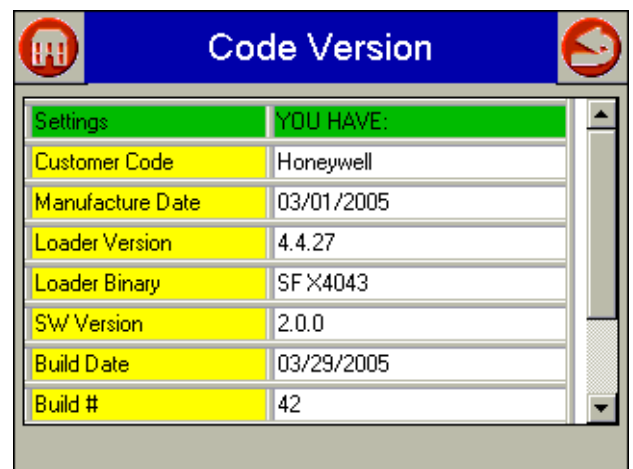


Fig. 120. Code version—top view.

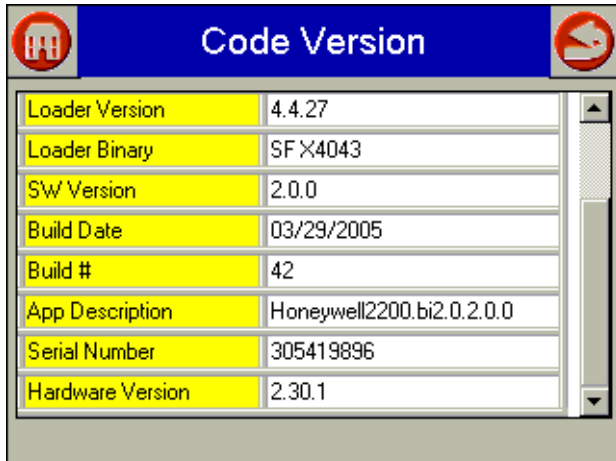


Fig. 121. Code Version—bottom view.

CPU Reset

The user can reset the S7999B and force a power-up by selecting the “CPU Reset” button. A pop-up dialog box confirming the reset request displays (Fig. 122) before the reset proceeds.

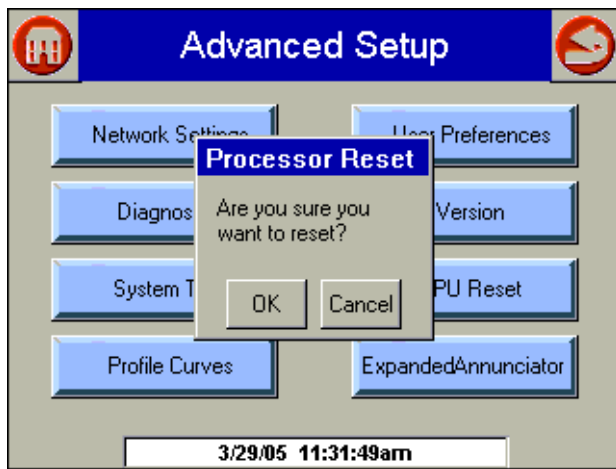


Fig. 122. Processor Reset.

User Preferences

The user can configure the S7999B burner/boiler system mode and network type (Local Modbus™, System Modbus™, and S7810M Modbus™). Configuration selection must be saved to flash and the S7999B reset for the change to take effect.

Selecting the “User Preferences” button displays a page (Fig. 123) with options that the user can turn on (black dot) or turn off (no black dot). Some options are grayed out or don’t appear if they don’t apply, based on other options selected.

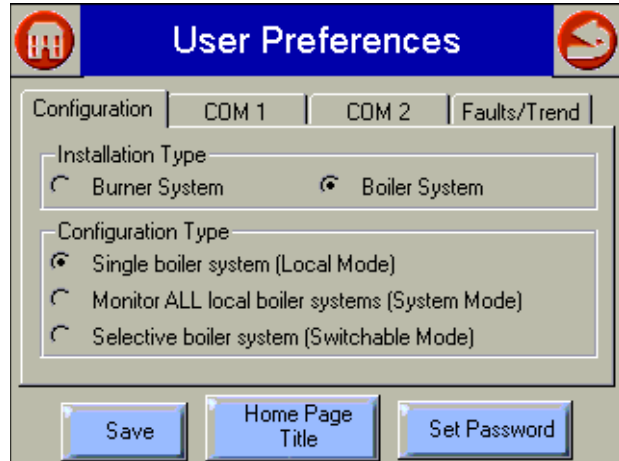


Fig. 123. User Preferences Configuration tab.

CONFIGURATION TAB

The user can configure:

- Installation Type: burner or boiler. This selection will determine the image displayed on the home page as well as the title (“Burner” or “Boiler”) on pages and buttons. This selection also determines the description shown on the System S7999B.
- Configuration Type: Single boiler system (Local Mode), Monitor ALL local boiler systems (System Mode), or Selective boiler system (Switchable Mode).

COM 1 TAB

The user can configure the COM 1 port for one of the following interfaces (see Fig. 124):

- Fuel/Air Control configuration (ControlLinks™ commissioning).
- System S7999B connection.
- Not used.
- The Modbus™ address to use on the System Modbus™ network (enabled for Local S7999B mode only).

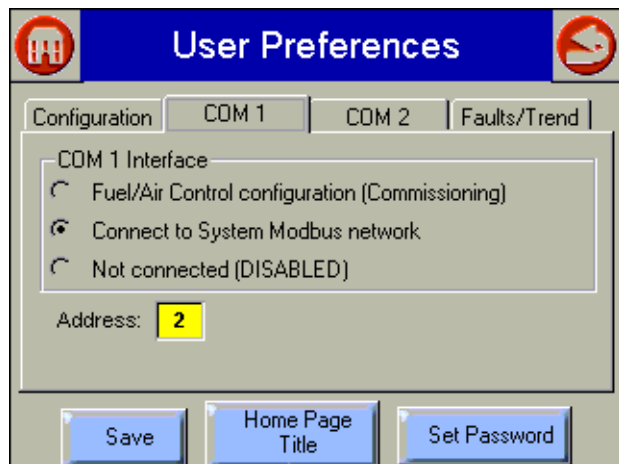


Fig. 124. User Preferences COM 1 tab.

COM 2 TAB

The user can configure the COM 2 port for one of the following interfaces (see Fig. 125):

- Single (Local) burner/boiler system.
- Switchable S7810M multiple burner/boiler system connection.
- Not used.

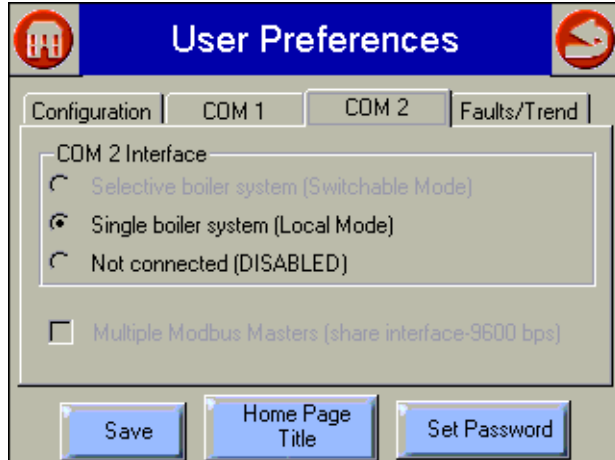


Fig. 125. User Preferences COM 2 tab.

The Multiple Modbus™ Masters checkbox is applicable only for the Switchable mode configuration. This option permits the Modbus™ network on the COM2 port to be shared with another Modbus™ master (PLC, etc.). Special wiring is required for this option to be implemented. Contact Honeywell for more information regarding this feature if needed.

Changes to the COM 1 and 2 ports must be saved to flash and the S7999B reset for the changes to take effect.

FAULTS/TREND TAB

Trend analysis is only available in Local S7999B mode. For more information about Trend Analysis, see the Trend Analysis section on page 44.

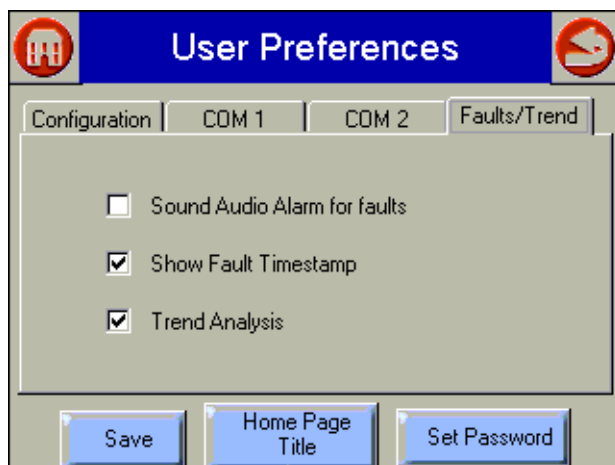


Fig. 126. User Preferences Faults/Trend tab.

The audio alarm setting determines whether an audible alarm should sound when a new fault occurs for one of the burner system devices in the current view context. This option is turned off by default.

The Show Fault Timestamp setting allows the user to decide whether to always show the time that a fault occurs in the fault history or not. This setting only applies to the display of the fault time; it does not affect the recording of the fault time. Therefore, turning this setting off does not mean that past or future fault times are lost. This setting is turned off by default. This feature should only be used with single burner systems as the timestamp is reset when changing to another burner system.

Home Page Title

A custom Home page title may be entered to override the default ControlLinks™ title. The “Home Page Title” button displays a page similar to Fig. 127.

Various fonts and colors may be used. The text box shows how the title will appear on the Home page. If too large a font or too many characters are used, the text will get clipped.

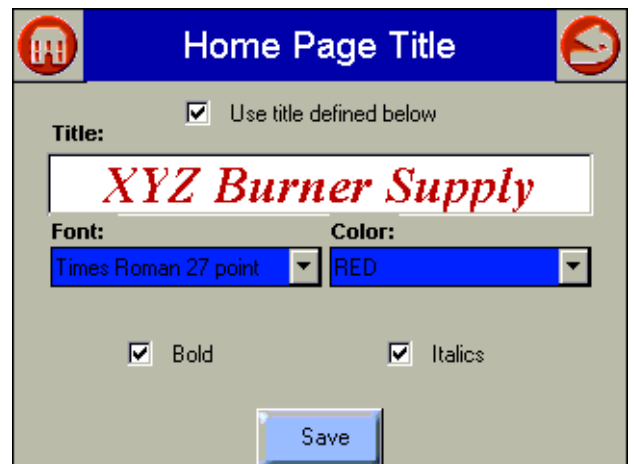


Fig. 127. Home Page Title setup.

Touching the Title text box allows the title text to be edited. A keyboard screen displays (Fig. 128) with the custom title in it. Up to 30 characters can be entered for the title. Selecting the “Shift” button allows the user to switch between upper and lower case letters. Select the “OK” button when done editing the text.

The “Save” button saves the title information displayed on the screen to the S7999B flash. After this information is saved, the settings will persist after an S7999B power reset.

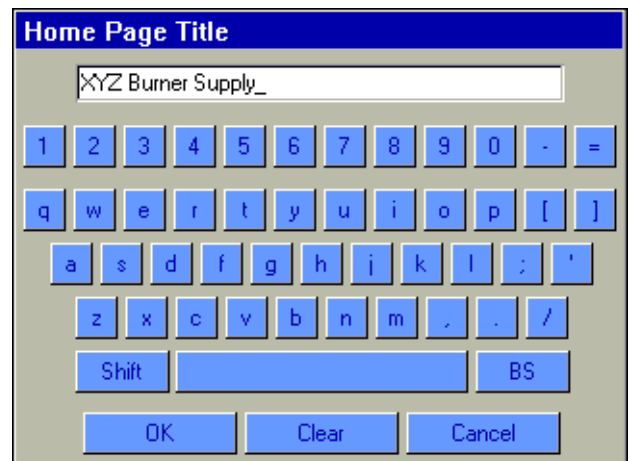


Fig. 128. Home Page Title—Enter Title Name.

The custom title is not displayed on the Home page until the checkbox named "Use title defined below" is checked.

Set Password

The S7999B System password is maintained by selecting the "Set Password" button on the User Preferences page. This password is used to authorize burner control resets and UDC controller adjustments. THIS PASSWORD IS NOT THE ONE USED DURING R7999 COMMISSIONING. The S7999B System password defaults to "s7999b" when shipped from the factory and should be changed to a more secure setting (up to 30 alphanumeric characters). When the "Set Password" button is pressed, a dialog box appears, indicating that the user must first log in with the current password (see Fig. 129).



Fig. 129. Set Password dialog box.

The user continues with the password change by pressing the "Yes" button, which displays a keyboard so the user can enter the current password (see Fig. 130). To cancel the password change, press the "No" button.



Fig. 130. Reset password keyboard.

After the user enters the current password and presses "OK," the user is asked to enter the new password (see Fig. 131). The user enters the new password and presses the "OK" button. Pressing the "Cancel" button will cancel the operation.



Fig. 131. Enter New Password.

Expanded Annunciator Terminal Name Programming

The Expanded Annunciator terminals can be renamed to names other than their default values. Renaming a terminal name results in the new name displaying on the expanded annunciator status page and in any burner control status and faults that are specific to that expanded annunciator terminal.

Each terminal can be renamed with up to 20 alphanumeric characters. The terminal renaming applies to all expanded annunciators on ALL burner systems, i.e., this renaming cannot be applied to individual burner systems.

To rename a terminal, the "Expanded Annunciator" button is selected on the Advanced Setup page. A new page, similar to Fig. 132, displays.

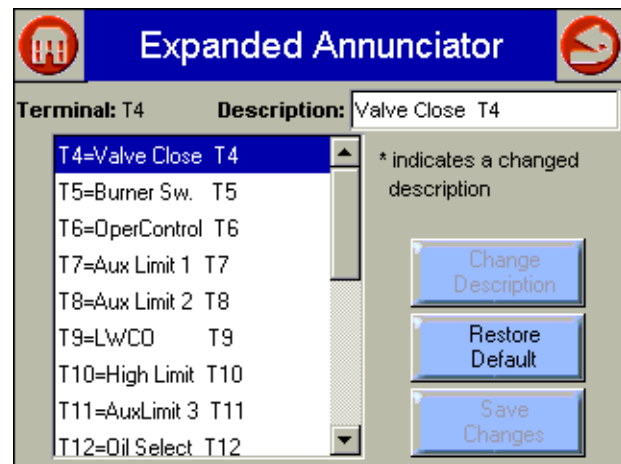


Fig. 132. Expanded Annunciator Setup—T4 changed.

The current terminal name settings are listed on the left side of the screen with a scroll bar to move up and down this list. The user chooses the terminal to rename by selecting it in this list. When the terminal is selected, the current setting is displayed on the top of the screen in the Description text box.

The user presses the Description text box to change the current setting. A keyboard window with the current setting displays (Fig. 133), allowing the user to edit the name. After editing the name, the user selects the OK button to accept it.

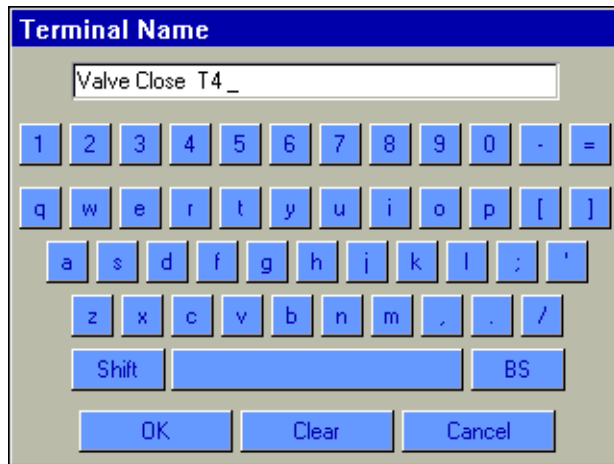


Fig. 133. Expanded Annunciator Setup.

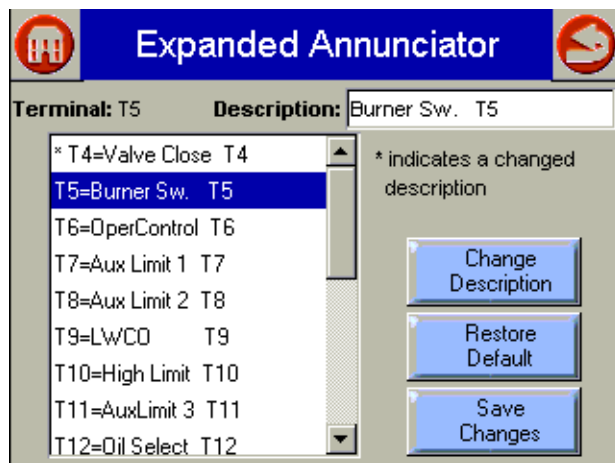


Fig. 134. Expanded Annunciator Setup—Enter Name.

Selecting the “OK” or “Cancel” button returns the control back to the previous page (Fig. 134).

The new name appears in the Description Text box, but it does not get saved into the terminal list until the “Change Description” button is selected. After the “Change Description” button is selected, the new name is placed in the terminal list and the change is denoted by an asterisk character displayed in front of the terminal name.

If any terminal names are renamed with the “Change Description” button, the “Save Changes” button is enabled. This button allows the user to save the current settings permanently to nonvolatile flash in the S7999B. Otherwise, the current settings are persistent only during the power-up time of the S7999B.

Before saving the terminal name settings, a pop-up dialog box asks the user to confirm the save (Fig. 135).

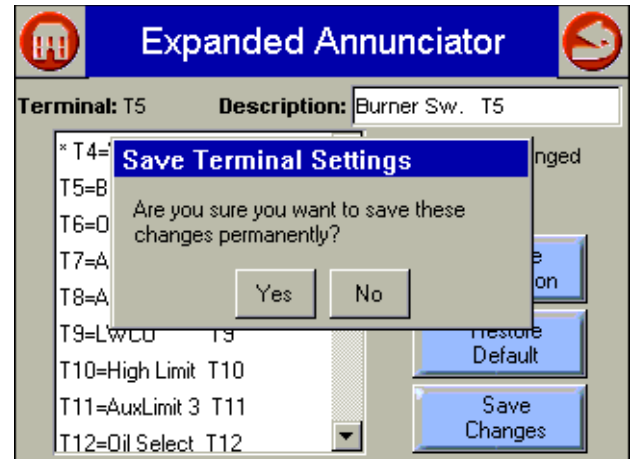


Fig. 135. Expanded Annunciator Setup—Save Terminal Settings.

TROUBLESHOOTING

No Burner Control, Expanded Annunciator, R7999, UDC Controller Buttons

- Check wiring between S7999B and S7810M. Make sure that A terminal in S7810M is connected to COM2 (a) pin in S7999B, B terminal in S7810M is connected to COM2 (b) pin in S7999B, and C terminal in S7810M is connected to (c) pin in S7999B. Check that RS-485 shield is grounded to Earth ground.
- Insert 120Ω, 1/4 watt resistor between terminals A and B on farthest S7810M or UDC controller.
- Check for duplicate Modbus™ addresses in S7810M and UDC controller devices.
- Verify that Modbus™ baud rate is set to 19200 bps in all S7810M and UDC controller devices.

Local S7999Bs Don't Display On System S7999B Home Page

- Check wiring between System S7999B and all Local S7999Bs. Make sure that COM1 port is used in all S7999Bs and Modbus™ pins match each other, i.e., COM1 (a) to COM1 (a), etc.
- Check for duplicate Modbus™ addresses in Local S7999Bs.

Burner Control Locks Out Due to Loss of Air Flow Switch

- The R7999 ControLinks™ controller has a preset of 25% air position/0% fuel for the initial lightoff point. Depending on the air damper topology, this may not provide enough airflow to maintain the air flow switch and cause the burner control to lock out. The R7999 is still functional at this time even though the burner control is locked out. Therefore, before resetting the burner control and restarting the lightoff process, you should first set a new temporary lightoff point to a higher airflow value to prevent the air flow switch from dropping out. The next time through the sequence, the new higher lightoff point may allow the air flow switch to be maintained or you will have to repeat the process, i.e., move the lightoff point air value to a more open value such that the new point can maintain the air flow switch.

Purge Setting Beyond Maximum Modulation Point

- A finished profile requires the purge position to be lower than the maximum modulation. If you encounter a condition where you are required to place the maximum modulation point below the current purge setting, you must first move the purge point to a lower position. The purge position can be moved at any time by reselecting the *Air Purge* button in the *Save Position* command window.

R7999 Cannot Establish Communications

- Beyond the difficulties associated with communications polarity wiring errors, and lack of power to the R7999, there are several subtle system errors that preclude communications. All of the errors are indicated by the green LED and red Lockout LED being continuously “on.” Fuel select problems after power up are indicated with all LED’s being “on” continuously.
 - a. If no fuel select inputs are on, or both fuel selects are made, you cannot establish communications with the controller. The corrective action is to select one of the fuels or remove one of the fuel select inputs.
 - b. R7999 is in a locked out state. The corrective action is to first reset the control. If that does not work, you must remove the fault.

Unable to Land on a Predefined Point

- Under unique actuator loading conditions, it may be difficult to land on an existing programmed point. This can occur while using the “Move Along the Curve” command. It can also occur when you are completing the curve verification process on extremely flat or steep line segments as you reach the end of the curve. If you are experiencing problems, back up from the problem point at least 5 degrees, then move back to the point using a 3-degree, 1-degree or 0.1-degree movement. This should allow you to complete your curve verification or land on a problem point for deletion.

Password no Longer Valid

- Bringing an R7999 to an unconfigured state utilizing the S7999B wipes out the R7999 Commission password and returns it to the “password” setting. Enter a new password.

R7999 FAULT CODES AND CORRECTIVE ACTIONS

The R7999 incorporates two methods to retrieve fault information:

- Press and hold the reset button. The fault code is indicated by the blinks of the LED. All codes are two digits. The 10’s digit is indicated by a series of slow blinks while the 1’s digit is indicated by a series of short blinks following the slow ten’s digit. For example, 64 is made up of six slow blinks followed by four fast blinks. The cadence is repeated as long as you hold the reset button. The device will not reset by the action of the reset switch once it enters the flash mode. To reset the R7999, push and release the reset button within one second.
- Read the code directly from the Monitor screen of the S7999B via the Show Faults buttons.

Table 7. Fault Codes and Corrective Actions.

Fault/ Blink Code	Description	Corrective Action
11	Device is operating properly.	
13	MV input energized at an improper time.	Reset control. Check Burner Control Interface wiring and correct error. This error causes the device to remain in initiate state at power up.
14	HF and LF are energized at the same time.	Reset control. Check Burner Control Interface wiring and correct error. This error causes the device to remain in initiate state at power up.
15	Transition to the requested Burner Control input state is not allowed from the current state. E.g., Standby to Modulate is not allowed.	Check wiring to burner control and/or burner control operation. NOTE: Moving a RM78XX Run/Test switch to Test will Induce this fault during commissioning mode.
21	Internal Error – Time base.	Reset Control ^a .
22	Internal Error – KEY decode.	Reset Control ^a .
23	Internal Error – Rdlow.	Reset Control ^a .
24	Internal Error – Time storage.	Reset Control ^a .
25	Internal Error – Limited move.	Reset Control ^{a,c} .
26	Internal Error – Targeted move.	Reset Control ^{a,c} .
27	Internal Error – LVD.	Reset Control ^a .
28	Internal Error – ISR check.	Reset Control ^a .
31	Internal Fault – A2D Range.	Reset Control ^a .
32	Internal Fault – A2D Matching.	Reset Control ^a .
33	Internal Fault – LCO Drive.	Reset Control ^b .
34	Internal Fault – LCO/I Feedback.	1.) Reset Control ^b . Check actuator wiring. See Channel LED for actuator. 2.) Terminal 14 has voltage present from an external source, correct wiring problem. 3.) ^d .
35	Internal Fault – Commanded State.	Reset Control ^a .
36	Fuel Selection Problem.	Check wiring through fuel select switch, at least one fuel must be selected at any given time (not zero, not two).
37	Fault HFP or LFP output.	Verify correct wiring to burner control. Specifically check wiring at LFP and HFP.
38	Internal Fault – memory curve.	Reset control ^a .
39	Internal Fault – AC sampling .	Reset control ^b .
41	Feedback potentiometer Interface circuit fault—Air.	Verify correct wiring of Potentiometer ^a .
42	Feedback potentiometer Interface circuit fault—Fuel 1.	Verify correct wiring of Potentiometer ^a .
43	Feedback potentiometer Interface circuit fault—Fuel 2.	Verify correct wiring of Potentiometer ^a .
44	Feedback potentiometer Interface circuit fault – FGR.	Verify correct wiring of Potentiometer ^a .
45	Feedback potentiometer wiper resistance problem, Air.	Check for loose potentiometer wiring ^{a,c} .
46	Feedback potentiometer wiper resistance problem, Fuel 1.	Check for loose potentiometer wiring ^{a,c} .
47	Feedback potentiometer wiper resistance problem, Fuel 2.	Check for loose potentiometer wiring ^{a,c} .
48	Feedback potentiometer wiper resistance problem, FGR.	Check for loose potentiometer wiring ^{a,c} .
49	Feedback potentiometer total resistance problem, Air.	Check for loose potentiometer wiring ^{a,c} .

Table 7. Fault Codes and Corrective Actions. (Continued)

Fault/ Blink Code	Description	Corrective Action
51	Feedback potentiometer total resistance problem, Fuel 1.	Check for loose potentiometer wiring ^{a,c} .
52	Feedback potentiometer total resistance problem, Fuel 2.	Check for loose potentiometer wiring ^{a,c} .
53	Feedback potentiometer total resistance problem, FGR.	Check for loose potentiometer wiring ^{a,c} .
54	Internal memory function problem, Air.	Repeat actuator ID On-line process.
55	Internal memory function problem, Fuel 1.	Repeat actuator ID on-line process.
56	Internal memory function problem, Fuel 2.	Repeat actuator ID on-line process.
57	Internal memory function problem, FGR.	Repeat actuator ID on-line process.
58	Stuck Reset button.	Turn off remote reset switch. Check operation of controller button.
61	Actuators not reaching lightoff point.	Check for actuator wiring problems or stuck valves/dampers. Place controller in standby and use actuator manual keys to verify actuator travel.
65	Internal Memory fault.	Reset control ^a .
66	Internal Initialization Error.	Reset control ^a . Check the wiring and range capability for both the CmA+- input and XmA+- input (if configured).
67	Fuel Actuator off curve (selected fuel type).	Check for stuck fuel actuator and/or proper shielding on actuator interface.
68	FGR Actuator off curve.	Check for stuck FGR actuator and/or proper shielding on actuator interface.
69	Air Actuator off curve.	Check for stuck Air actuator and/or proper shielding on actuator interface.
71	Verifies that the Air actuator accepted the off-line, on-line, move counterclockwise and move clockwise commands. Furthermore, all potentiometer tests must successfully passed to bring an actuator online.	Check wiring of actuator, verify correct ID is being used. Use Actuator LED to verify that the actuator that is being brought "online". A fast flash in the actuator equates to "off line" state while a 1 second flash equates to an "online" state.
72	Verifies that the Fuel 1 actuator accepted the off-line, on-line, move counterclockwise and move clockwise commands. Furthermore, all potentiometer tests must successfully passed to bring an actuator online.	Check wiring of actuator, verify correct ID is being used. Use Actuator LED to verify that the actuator that is being brought "online". A fast flash in the actuator equates to "off line" state while a 1 second flash equates to an "online" state.
73	Verifies that the Fuel 2 actuator accepted the off-line, on-line, move counterclockwise and move clockwise commands. Furthermore, all potentiometer tests must successfully passed to bring an actuator online.	Check wiring of actuator, verify correct ID is being used. Use Actuator LED to verify that the actuator that is being brought "online". A fast flash in the actuator equates to "off line" state while a 1 second flash equates to an "online" state.
74	Verifies that the FGR actuator accepted the off-line, online, move counterclockwise and move clockwise commands. Furthermore, all potentiometer tests must successfully passed to bring an actuator online.	Check wiring of actuator, verify correct ID is being used. Use Actuator LED to verify that the actuator that is being brought "online". A fast flash in the actuator equates to "off line" state while a 1 second flash equates to an "online" state.
75	Internal memory fault.	Reset Control ^a .
76	Internal check sum error.	Reset Control ^a
82	Actuator secondary fault.	Check Actuator wiring. See Channel LED for Actuator.
83	Air actuator non-responsive.	Check actuator wiring and stuck damper/valve ^c .
84	Fuel 1 actuator non-responsive.	Check actuator wiring and stuck damper/valve ^c .
85	Fuel 2 actuator non-responsive.	Check actuator wiring and stuck damper/valve ^c .
86	FGR actuator non-responsive.	Check actuator wiring and stuck damper/valve ^c .
87	Internal math error.	Reset Control ^a .

Table 7. Fault Codes and Corrective Actions. (Continued)

Fault/ Blink Code	Description	Corrective Action
91	The 4 to 20 mA firing rate input is below 3 mA, Out of Range—Low. (Actuators return to or remain at the minimum modulation point with the alarm on; the control remains operational only to the extent that Minimum Modulation firing operation is allowed.) Not supported on Version 1.2 controllers.	Check CmA+- input (Terminals 39 and 40) for proper operation polarity and range. The input must be within 3.0 mA to 21.0 mA. The voltage at this terminal must be within 0.7 to 5.0 Vdc, respectively. Conditional Alarm—Alarm output is energized; controller continues to run. ^e
92	The manual potentiometer rate input is higher than an allowable range, i.e., Out of Range—High. (The actuators move to the maximum modulation point with alarm on, control will remain operable, yet when MANUAL MODE is selected, maximum modulation and alarm output shall occur.) Auto mode operation is not affected. Not supported on Version 1.2 controllers.	The manual potentiometer is out of range high. Make sure a 5000 ohm ($\pm 10\%$) potentiometer is being used and wiring to it is correct. Shielded cable is recommended. Conditional Alarm—Alarm output is energized; controller continues to run. ^e
93	The auxiliary 4 to 20 mA input must be below 3. mA when configured for use. (The actuators return or remain at the minimum modulation point with alarm on, the control will remain operable only to the extent that Minimum Modulation firing operation is allowed. Not supported on Version 1.2 controllers.	Check XmA+- input (Terminals 37 and 38) for proper operation polarity and range. The input must be within 3.0 mA to 21.0 mA. The voltage at this terminal must be within 0.7 to 5.0 Vdc, respectively. Conditional Alarm—Alarm output is energized; controller continues to run. ^e
94	After LCO is set by the R7999, the Burner Control must provide a Lightoff or Purge request within 20 seconds. (Controller remains in a processing demand condition indefinitely, waiting for valid inputs on the LF, MV and HF inputs; the alarm sounds after the 20-second period expires.) Not supported on Version 1.2 controllers.	Check burner control interface wiring and burner control operation (Terminals 10, 11, 12). The R7999 is waiting for a command via these terminals. Conditional Alarm—Alarm output is energized; controller continues to run. ^e

^a It is possible that a random external electrical noise event has caused a fault checking algorithm to be detected. Resetting the control will allow recalculation of the fault and, provided it is not a hard failure, the device will continue to operate. If the condition will not clear, the control must be replaced.

^b Check AC waveform, severe noise on AC lines can corrupt the sampling of AC signals.

^c Verify actuator total resistance and wiper measurements, check the ability of the actuator to travel full stroke using the Manual override buttons within the actuator. Verify input power to the actuator. If actuator is not functioning, replace the actuator.

^d Verify a short does not exist at terminal 14. The control will need replacement if a sustained fault code 34 exists after the noted items 1 and 2 have been performed. Fuse line voltage power to control system with type SC15 fuse or fuse Limit input (terminal 13) with type SC5 fuse.

^e Conditional Alarm. Causes the alarm output to be energized. The system may still be operating but requires attention in order to modulate or to proceed with the lightoff sequence. The actuators would be positioned at lightoff point, minimum modulation point or maximum modulation point, dependent on what the particular fault is and when the fault is introduced relative to the R7999 operating state.

R7999 OUTPUTS AND INPUTS

The current state of the R7999 outputs and inputs are displayed on the Monitor screen for convenience and diagnostics purposes. The inputs and outputs are defined as follows:

Table 8. Outputs.

Abbreviation	Description	Meaning when ON
LCO	Limit Control Output	Limits are satisfied and demand exits. The R7999 is operational and able to move all actuators.
HFP	High Fire Proved	The R7999 has moved the actuators to the Purge position.
LFP	Low Fire Proved	The R7999 has moved the actuators to the Lightoff position.
Fuel 1	Fuel Select Channel 1	Fuel 1 is selected.
Fuel 2	Fuel Select Channel 2	Fuel 2 is selected.
ALM	Alarm	The system is in an alarm state.

Table 9. Inputs.

Abbreviation	Description	Meaning when ON
LCI	Limit Control Input	Limits are satisfied and demand is present.
HF	High Fire Input	R7999 is being commanded to drive actuators to the Purge position.
LF	Low Fire Input	R7999 is being commanded to drive actuators to the Lightoff position
MV	Main Valve Input	The main valve input is active. Normally only active during "Run," and transitional with LF during lightoff.

UDC CONTROLLER APPLICATION

UDC Controller Interface

The UDC controllers interface to the S7999B via the COM 2 port. The following interface requirements must be specified in the Communications group of the UDC controller.

Table 10. UDC Controller Communication Interface .

Parameter	Setting	Comment
ComADR	10-19=Stack Temperature 20-29=Water Temperature PID Load Control 30-39=Steam Pressure PID Load Control 40-49=Feed Pump/Level Control 50-59=Steam/Gas Flow Monitor 60-69=Steam/Fuel Oil Flow Monitor 70-79=Thermal Shock	Modbus™ slave address
COMSTA	MODB	Modbus™ communication
IRENAB	ENAB	Enable infrared communication port
BAUD	19.2K	19200 bps
TX_DLY	1	Response delay = 1 ms
WS_FLT	FP B	Floating point data order
SDENAB	DIS	Disable shed functionality
UNITS	EGR	Data specified in engineering units
CSRATIO	1	Computer setpoint ratio
CSP BI	0	
LOOPBK	DIS	Disable loopback test

The Modbus™ address setting in ComADR determines the UDC controller application type. Careful assignment of Modbus™ addresses to UDC controllers and S7810M devices is necessary so that duplicate addresses aren't used.

The following application notes describe how the UDC controller is configured to perform different functions in a burner/boiler system. Using the UDC controller models and recommended sensor types for each application is critical to

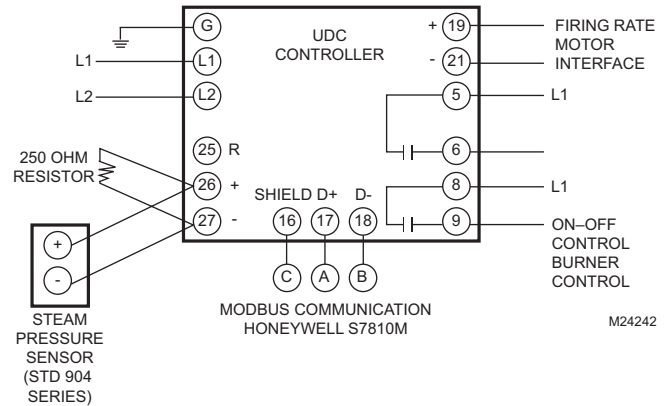
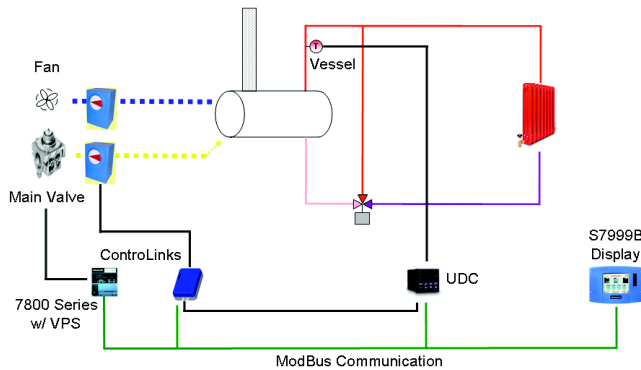
the success of the application. These application notes only provide an introduction to the setup needed. More detailed information for UDC controller setup should be obtained from the appropriate UDC documentation (see Installing the Hardware).

UDC controller parameters applicable for each application are listed, and recommended settings for typical variants of the application are provided.

APPLICATION NOTE

Application: Steam Pressure Load Control

Description: On-off and modulating outputs to start/stop and adjust firing rate to maintain a control setpoint.



Digital Inputs: None

Digital Outputs: On-Off relay

Optional: Modulation Alarm1 (ON when at or below Modulation setpoint, OFF when above Modulation setpoint)

Optional: Low Fire Hold Alarm2 (ON when at or below Low Fire Hold setpoint, OFF when above Low Fire Hold setpoint)

Analog Inputs: Steam pressure sensor (0-750 psi) (4-20mA)

Analog Outputs: PID modulation (4-20mA) to control firing rate. Modulation based on modulation setpoint.

Setpoints:

- Modulation (0-500°F or 0-750 psi)
- On-Off (0-500°F or 0-750 psi)
- Low Fire Hold (0-500°F or 0-750 psi)

Application File:

Range

Controller Model (see footnote)

Algorithm:
CTRALG
TIMER

Output:
OUTALG

Input 1:

IN1 TYP
IN1 HI
IN1 LO

steam01.nge	steam02.nge	steam03.nge	steam04.nge	steam05.nge	steam06.nge	steam07.nge	steam08.nge
0-15 psi	0-15 psi LOW FIRE	0-150 psi	0-150 psi LOW FIRE	0-300 psi	0-300 psi LOW FIRE	0-750 psi	0-750 psi LOW FIRE
1	2	1	2	1	2	1	2
PIDA	PIDA	PIDA	PIDA	PIDA	PIDA	PIDA	PIDA
DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
CURRENT	CURRENT	CURRENT	CURRENT	CURRENT	CURRENT	CURRENT	CURRENT
4-20 mA	4-20 mA	4-20 mA	4-20 mA	4-20 mA	4-20 mA	4-20 mA	4-20 mA
15	15	150	150	300	300	750	750
0	0	0	0	0	0	0	0

Input 2:

IN2TYP

Control:

LSP'S

SP TRK

PWR UP

SP Hi

SP Lo

ACTION

HYST

Options:

AUXOUT

DIGIN1

DIGIN2

Communications:

ComADR

ComSTA

BAUD

TX_DLY

WS FLT

SDENAB

UNITS

LOOPBK

Alarms:

A1S1TY

A1S1VA

A1S1HL

A1S2TY

A2S1TY

A2S1VA

A2S1HL

A2S2TY

ALHYST

ALARM1

BLOCK

DIA AL

Display:

DECIMAL

TUNITS

DIS (Disable)	DIS	DIS	DIS	DIS	DIS	DIS	DIS
1 ONLY	1 ONLY	1 ONLY	1 ONLY	1 ONLY	1 ONLY	1 ONLY	1 ONLY
NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
ALSP	ALSP	ALSP	ALSP	ALSP	ALSP	ALSP	ALSP
15	15	150	150	300	300	750	750
0	0	0	0	0	0	0	0
REVERSE	REVERSE	REVERSE	REVERSE	REVERSE	REVERSE	REVERSE	REVERSE
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
NONE	ToAout	NONE	ToAout	NONE	ToAout	NONE	ToAout
NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
30	30	30	30	30	30	30	30
MODB	MODB	MODB	MODB	MODB	MODB	MODB	MODB
19.2K	19.2K	19.2K	19.2K	19.2K	19.2K	19.2K	19.2K
1	1	1	1	1	1	1	1
FP B	FP B	FP B	FP B	FP B	FP B	FP B	FP B
DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
PV	PV	PV	PV	PV	PV	PV	PV
15	15	150	150	300	300	750	750
HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH
NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
NONE	PV ³	NONE	PV ³	NONE	PV ³	NONE	PV ³
NONE	0	NONE	0	NONE	0	NONE	0
NONE	LOW	NONE	LOW	NONE	LOW	NONE	LOW
NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
0	0	0	0	0	0	0	0
NoLATCH	NoLATCH	NoLATCH	NoLATCH	NoLATCH	NoLATCH	NoLATCH	NoLATCH
DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
ONE	ONE	ONE	ONE	ONE	ONE	ONE	ONE
F	F	F	F	F	F	F	F

¹ DC2500-CE-200R-200-00000-00-0

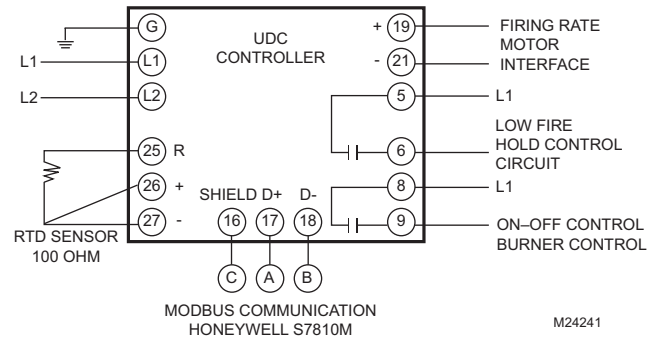
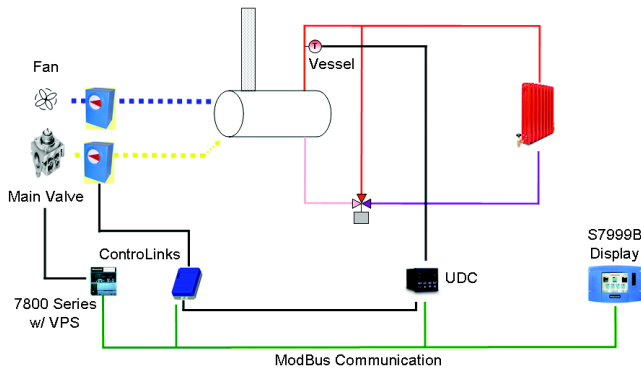
² DC3200-CE-200R-210-10000-00-0

³ Low Fire Hold alarm uses setpoint 1 of alarm 2. If this alarm setpoint is disabled (A2S1TY is NONE), then this alarm is disabled.

APPLICATION NOTE

Application: Water Temperature Load Control

Description: On-off and modulating outputs to start/stop and adjust firing rate to maintain a control setpoint.



Digital Inputs: None

Digital Outputs: On-Off relay

Optional: Modulation Alarm1 (ON when at or below Modulation setpoint, OFF when above Modulation setpoint)

Optional: Low Fire Hold Alarm2 (ON when at or below Low Fire Hold setpoint, OFF when above Low Fire Hold setpoint)

Analog Inputs: Vessel water sensor temperature (0-500°F) (100 Ω RTD)

Analog Outputs: PID modulation (4-20mA) to control firing rate. Modulation based on modulation setpoint.

Setpoints:

- Modulation (0-500°F or 0-750 psi)
- On-Off (0-500°F or 0-750 psi)
- Low Fire Hold (0-500°F or 0-750 psi)

Application File:

Range
Controller Model (see footnote)

Algorithm:
CTRLG
TIMER

Output:
OUTALG

Input 1:
IN1TYP
IN1 HI
IN1 LO

Input 2:
IN2TYP

	temp01.nge	temp02.nge	temp03.nge	temp04.nge
Range	0-300°F	0-300°F LOW FIRE HOLD	0-500°F	0-500°F LOW FIRE HOLD
Controller Model (see footnote)	1	2	1	2
Algorithm:				
CTRLG	PIDA	PIDA	PIDA	PIDA
TIMER	DIS	DIS	DIS	DIS
Output:				
OUTALG	CURRENT	CURRENT	CURRENT	CURRENT
Input 1:				
IN1TYP	100H	100H	100H	100H
IN1 HI	1200	1200	1200	1200
IN1 LO	-300	-300	-300	-300
Input 2:				
IN2TYP	DIS	DIS	DIS	DIS

Control:

LSP'S
SP TRK
PWR UP
SP Hi
SP Lo
ACTION

1 ONLY	1 ONLY	1 ONLY	1 ONLY
NONE	NONE	NONE	NONE
ALSP	ALSP	ALSP	ALSP
300	300	500	500
0	0	0	0
REV	REV	REV	REV

Options:

AUXOUT
DIGIN1
DIGIN2

DIS	DIS	DIS	DIS
NONE	NONE	NONE	NONE
NONE	NONE	NONE	NONE

Communications:

ComADR
ComSTA
BAUD
TX_DLY
WS FLT
SDENAB
UNITS

20	20	20	20
MODB	MODB	MODB	MODB
19.2K	19.2K	19.2K	19.2K
1	1	1	1
FP B	FP B	FP B	FP B
DIS	DIS	DIS	DIS
ENG	ENG	ENG	ENG

Alarms:

A1S1TY
A1S1VA
A1S1HL
A1S2TY
A2S1TY
A2S1VA
A2S1HL
A2S2TY
ALHYST
ALARM1
BLOCK
DIA AL

PROC	PROC	PROC	PROC
300	300	500	500
HIGH	HIGH	HIGH	HIGH
NONE	NONE	NONE	NONE
NONE	PROC ³	NONE	PROC ³
NONE	50	NONE	50
NONE	LOW	NONE	LOW
NONE	NONE	NONE	NONE
0	0	0	0
NoLATCH	NoLATCH	NoLATCH	NoLATCH
DIS	DIS	DIS	DIS
DIS	DIS	DIS	DIS

Display:

DECMAL
TUNITS

ONE	ONE	ONE	ONE
F	F	F	F

¹ DC2500-CE-200R-200-00000-00-0

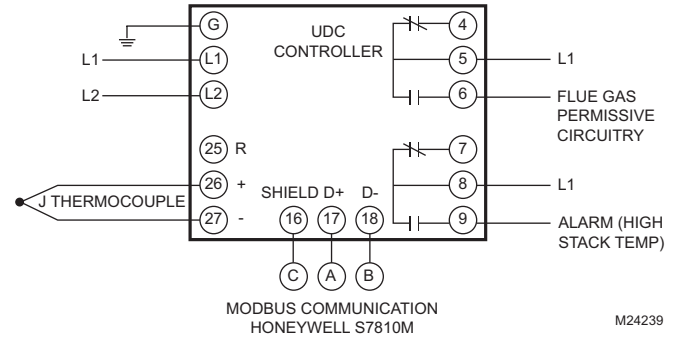
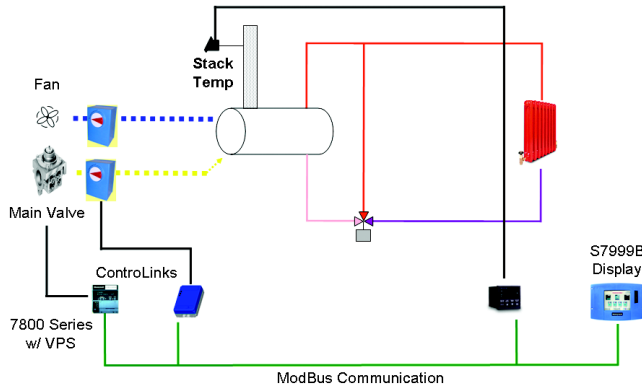
² DC3200-CE-200R-210-10000-00-0

³ Low Fire Hold alarm uses setpoint 1 of alarm 2. If this alarm setpoint is disabled (A2S1TY is NONE), then this alarm is disabled.

APPLICATION NOTE

Application: Stack Temperature

Description: Monitor stack temperature and alarm when temperature is too high. Optionally output an FGR permissive signal when stack temperature reaches permitted level.



Digital Inputs: None

Digital Outputs: High Temperature Alarm (ON when at or above alarm setpoint, OFF when below alarm setpoint).

Analog Inputs: Stack temperature sensor (0-500°F)

Analog Outputs: None

Setpoints:
 High or Low temperature alarm (0-500°F)
 FGR Permissive (0-500°F)

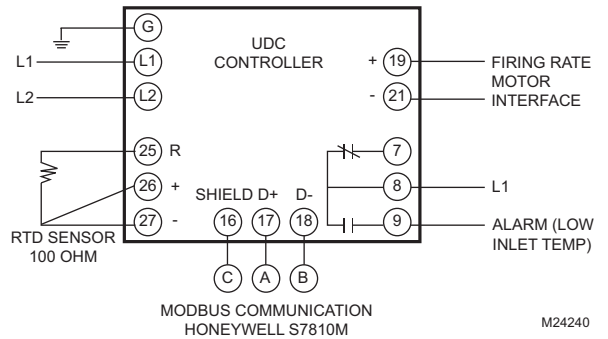
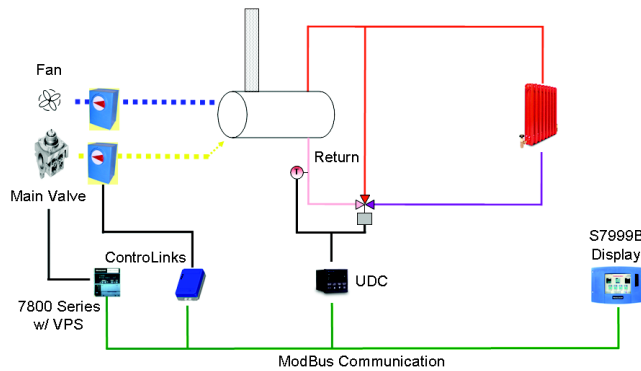
Application File:	stack01.nge	stack02.nge
Description	0-500°F High Stack Temperature	0-500°F High Stack Temperature FGR Permissive
Controller Model	UDC2500 DC2500-EB-200R-100-00000-00-0	UDC2500 DC2500-EB-200R-100-00000-00-0
Algorithm:		
CTRALG	ONOF (ON/OFF)	ONOF (ON/OFF)
TIMER	DIS	DIS
Output:		
OUTALG	RLY (Time Simplex)	RLY (Time Simplex)
Input 1:		
IN1TYP	J L	J L
IN1 HI	550	550
IN1 LO	20	20
Input 2:		
IN2TYP	DIS (Disable)	DIS (Disable)
Control:		
LSP'S	ONE	ONE
SP TRK	NONE	NONE
PWR UP	ALSP	ALSP
SP Hi	500	500
SP Lo	20	20
ACTION	REV	REV

HYST	0.0	0.0
Options:		
AUXOUT	DIS	DIS
DIGIN1	NONE	NONE
DIGIN2	NONE	NONE
Communications:		
ComADR	10	10
ComSTA	MODB	MODB
BAUD	19.2K	19.2K
TX_DLY	1	1
WS FLT	FP B	FP B
SDENAB	DIS	DIS
UNITS	ENG	ENG
Alarms:		
A1S1TY	PROC	PROC
A1S1VA	400	400
A1S1HL	HIGH	HIGH
A1S2TY	NONE	NONE
A2S1TY	NONE	NONE
A2S1VA	--	50
A2S1HL	--	HIGH
A2S2TY	NONE	NONE
ALHYST	0.1	0.1
ALARM1	NO L	NO L
BLOCK	DIS	DIS
DIA AL	DIS	DIS
Display:		
DECMAL	ONE	ONE
TUNITS	F	F

APPLICATION NOTE

Application: Thermal Shock

Description: Modulate a hydronic mixing valve (or pump) to maintain an optimal boiler supply water temperature.



Digital Inputs: None

Digital Outputs: Optimal Temperature Alarm (ON when below alarm setpoint, OFF when at or above alarm setpoint)

Analog Inputs: Water supply sensor temperature (0-300°F) (4-20mA)

Analog Outputs: Proportional modulation (4-20mA) to control actuator for mixing valve. Modulation based on optimal temperature setpoint.

Setpoints: Optimal supply water temperature (0-300°F)

Application File:	shock01.nge
Range	0–300°F
Controller Model	DC2500-CE-200R-200-00000-00-0
Algorithm:	
CTRALG	PIDA
TIMER	DIS
Output:	
OUTALG	CURRENT
Input 1:	
IN1TYP	100L
IN1 HI	300
IN1 LO	-300
Input 2:	
IN2TYP	DIS
Control:	
LSP'S	1 ONLY
SP TRK	NONE
PWR UP	ALSP
SP Hi	300

S7999B SYSTEM DISPLAY

SP Lo	0
ACTION	REV
HYST	--
Options:	
AUXOUT	DIS
DIGIN1	NONE
DIGIN2	NONE
Communications:	
ComADR	70
ComSTA	MODB
BAUD	19.2K
TX_DLY	1
WS FLT	FP B
SDENAB	DIS
UNITS	ENG
Alarms:	
A1S1TY	PROC
A1S1VA	150
A1S1HL	LOW
A1S2TY	NONE
A2S1TY	NONE
A2S1VA	NONE
A2S1HL	NONE
A2S2TY	NONE
ALHYST	0.0
ALARM1	NONE
BLOCK	DIS
DIA AL	DIS
Display:	
DECMAL	ONE
TUNITS	F

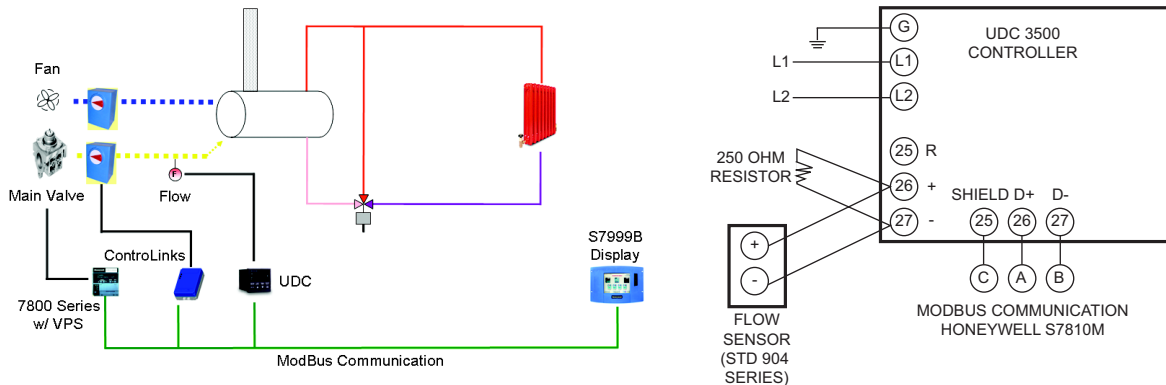
NOTES:

If water supply sensor senses temperature in °C instead of °F, then temperature range (IN1 LO, IN1 HI) and temperature units (UNITS) are manually changed by installer.

APPLICATION NOTE

Application: Flow Monitor

Description: Monitoring and display of steam flow (pounds of steam per hour) or fuel flow (cubic feet or gallons per hour) with totalization calculation options.



M24244

Digital Inputs: None

Digital Outputs: None

Analog Inputs: Steam flow sensor (10k-35k lbs/hour) and / or Gas flow sensor (10k-35k ft³/hour) or Fuel oil flow sensor (60-260 gal/hour) (4-20mA)

Analog Outputs: None

Setpoints: None

Application File:
Description

Range

Controller Model (see footnote)

Algorithm:
CTRALG
TIMER

Output:
OUTALG

Input 1:
IN1TYP
IN1 HI
IN1 LO

Input 2:
IN2TYP

flow01.nge	flow02.nge	flow03.nge	flow04.nge	flow05.nge	flow06.nge	flow07.nge	flow08.nge	flow09.nge	flow10.nge
Steam Only	Steam/Gas	Steam/Fuel Oil	Gas Only	Fuel Oil Only	TOTALIZAT ION Steam	TOTALIZAT ION Steam/Gas	TOTALIZAT ION Steam/Fuel Oil	TOTALIZAT ION Gas	TOTALIZAT ION Fuel Oil
10-35k lbs/hr	10-35k lbs/hr 10-35k ft ³ /hr	10-35k lbs/hr 60-260 gal/hr	10-35k ft ³ /hr	60-260 gal/hr	10-35k lbs/hr	10-35k lbs/hr 10-35k ft ³ /hr	10-35k lbs/hr 60-260 gal/hr	10-35k ft ³ /hr	60-260 gal/hr
1	1	1	1	1	2	2	2	2	2
DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
CURRENT	CURRENT	CURRENT	CURRENT	CURRENT	CURRENT	CURRENT	CURRENT	CURRENT	CURRENT
4-20	4-20	4-20	4-20	4-20	4-20	4-20	4-20	4-20	4-20
35	35	35	35	260	35	35	35	35	260
10	10	10	10	60	10	10	10	10	60
DIS	4-20	4-20	DIS	DIS	DIS	4-20	4-20	DIS	DIS

S7999B SYSTEM DISPLAY

IN2 HI	--	35	260	--	--	--	35	260	--	--
IN2 LO	--	10	60	--	--	--	10	60	--	--
Control:										
LSP'S	1 ONLY	1 ONLY	1 ONLY	1 ONLY	1 ONLY	1 ONLY	1 ONLY	1 ONLY	1 ONLY	1 ONLY
SP TRK	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
PWR UP	ALSP	ALSP	ALSP	ALSP	ALSP	ALSP	ALSP	ALSP	ALSP	ALSP
SP Hi	35	35	35	35	260	35	35	35	35	260
SP Lo	10	10	10	10	60	10	10	10	10	60
ACTION	REV	REV	REV	REV	REV	REV	REV	REV	REV	REV
HYST	--	--	--	--	--	--	--	--	--	--
Options:										
AUXOUT	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
DIGIN1	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
DIGIN2	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
Communications:										
ComADR	50	50	60	50	60	50	50	60	50	60
ComSTA	MODB	MODB	MODB	MODB	MODB	MODB	MODB	MODB	MODB	MODB
BAUD	19.2K	19.2K	19.2K	19.2K	19.2K	19.2K	19.2K	19.2K	19.2K	19.2K
TX_DLY	1	1	1	1	1	1	1	1	1	1
WS FLT	FP B	FP B	FP B	FP B	FP B	FP B	FP B	FP B	FP B	FP B
SDENAB	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
UNITS	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG
Alarms:										
A1S1TY	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
A1S1VA	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
A1S1HL	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
A1S2TY	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
A2S1TY	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
A2S1VA	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
A2S1HL	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
A2S2TY	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
ALHYST	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BLOCK	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
DIA AL	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS	DIS
Display:										
DECMAL	ONE	ONE	ONE	ONE	ONE	ONE	ONE	ONE	ONE	ONE
TUNITS	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE

¹ DC2500-00-200R-210-00000-00-0

² DC3500-00-2A00-220-10000-00-0

APPLICATION NOTE

Application: Feed Pump

Description: Monitor digital inputs to start and stop boiler feedwater and to alarm an open circuit on high water condition.

Digital Inputs: None

Digital Outputs: Start-Stop relay (ON when Start boiler in ON, OFF otherwise)

High Water Alarm (ON when high water alarm input is ON, OFF when high water alarm input is OFF)

Analog Inputs: Level Transmitter (4-20 mA)

Analog Outputs: None

Setpoints:
None

Application File:	pump01.nge
Range	0-100%
Controller Model	DC2500-EB-200R-200-00000-00-0
Algorithm:	
CTRALG	ONOFF
TIMER	DIS
Output:	
OUTALG	RLY
Input 1:	
IN1TYP	4-20
IN1 HI	100
IN1 LO	0
Input 2:	
IN2TYP	DIS
Control:	
LSP'S	1 ONLY
SP TRK	NONE
PWR UP	ALSP
SP Hi	100
SP Lo	0
ACTION	REV
HYST	0
Options:	
AUXOUT	DIS
DIGIN1	NONE
DIGIN2	NONE
Communications:	
ComADR	40
ComSTA	MODB
BAUD	19.2K
TX_DLY	1
WS FLT	FP B
SDENAB	DIS

UNITS	ENG
Alarms:	
A1S1TY	PROC
A1S1VA	75
A1S1HL	HIGH
A1S2TY	NONE
A2S1TY	NONE
A2S1VA	NONE
A2S1HL	NONE
A2S2TY	NONE
ALHYST	50
ALARM1	NoLATCH
BLOCK	DIS
DIA AL	DIS
Display:	
DECMAL	ONE
TUNITS	NONE

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