ESC|8864 Data Controller Release Notes

Firmware Version 4.11 through 5.04.r15

Last Updated: September 28, 2018

Click here to view this document's Revision History.

This documentation is provided solely for reference. While every effort has been made to ensure that the information in this document is complete, accurate, and up-to-date, ESC reserves the right to expand, alter, or clarify the various sections as necessary. ESC makes no warranty and assumes no liability for the information contained herein.

Technical Support:	512-250-7901
Email:	support@envirosys.com
Fax:	512-258-5836
Customer Community:	https://www.envirosys.com/Support/Customer-Community

Contents

Revision History

NOTE: Beginning with v5.00, the numbering scheme of the 8864 firmware is identified in documentation using the format "vX.YY.rZZ", such as v5.00.r24. The first part of the numbering scheme (v5.00) represents the version of the firmware, which defines the features included in the firmware. The second part of the numbering scheme (.r24) represents the build number. For example, all version v5.02 firmware has the same feature set and would be supported by the same User Guide. Revisions occur when a bug fix is required and a new build is generated. For example, v5.02.r25 would be updated to build v5.02.r26 if a bug were fixed, but would only be updated to version v5.03 when features are added or changed.

The table below identifies revisions to these Release Notes. Please see the ESC Data Controller Downloads page for the latest versions of the software and documentation (requires login).

Data Controller Version	Revision Date	Revision Summary
Version 5.04.r15	09/28/18	Updates for the General Release of v5.04.r15 include: ■ Bug fix for calculating "E" type calibration results correctly. ■ Bug fix for correctly downloading the debounce period for Digitally-Triggered Digital Events.
Documentation Updates Only – Version 5.04.r13 Release	8/9/18	Corrected the description for the following features: ■ Fast Serial Modbus Server / Y (Yes) Setting ■ StackVision Public Key File ■ Serial Monitor Enhancements ■ Modbus Command Monitor (3rd and 4th bullet item) ■ Instrument-Controlled (I-type) Calibrations ■ Logger ID Code ■ Serial Port Modbus Server **NOTE:** Corrections in the document are highlighted in yellow for easier

Data Controller Version	Revision Date	Revision Summary
		identification.
Version 5.04.r13	8/6/18	■ Updated for the General Release of v5.04.r13 firmware. See v5.04.r13 Updates for a description of the updates. ■ Updated screenshots in Upgrading via USB and Upgrading via Ethernet. ■ Added step 13 in the section Upgrading via USB to remove the USB flash drive before rebooting the 8864 data controller.
Version 5.03.r16	2/1/18	Updated for the General Release of v5.03.r16 firmware. See v5.03.r16 Updates for a description of the updates.
Version 5.02.r25	11/2/2017	Updated for the General Release of v5.02.r25 firmware. See v5.02.r25 Updates for a description of the updates in the release.
Version 5.00.r44	10/30/2017	Updated for v5.00.r42 bug fixes. v5.00.r42 Updates for a description of the updates in the release.
Version 5.00.r24 General Release	2/17/2016	Updated for the General Release of v5.00.r24 firmware. See v5.00.r24 Updates for a complete description of updates in the release.
Version 5.00.r24 Limited Release	2/2/2016	Updated for the Limited Release of v5.00.r24 firmware. See v5.00.r24 Updates for a complete description of updates in the release. Also note that the fixes from v5.00.r22 to v5.00.r24 include those in the following list: ■ Settings for I/O Card Overrides are no longer cleared (reset) after an upgrade. ■ Channels download faster from StackVision.

Data Controller Version	Revision Date	Revision Summary
		■ Calibrations no longer cause a memory leak. ■ Stability improvements.
Version 4.56	9/14/15	Updated for the v4.56 firmware release. See v4.56 Updates.
Version 4.50	6/11/2015	Updated for the v4.50 firmware release. See v4.50 Updates.
Version 4.47	5/20/2015	Updated the target v4.47 General Release date. See v4.47 Updates.
Version 4.24	7/28/2014	Updated the target v4.24 General Release date. See v4.24 Updates.
Version 4.24	7/22/2014	Updated for v4.24 Limited Release. Defines v4.24 Updates, and includes new Firmware Upgrade instructions.
Version 4.11	3/28/2014	Initial release for the ESC 8864 Data Controller (see v4.11 Updates).

Contact ESC

Environmental Systems Corporation
10801 North Mopac Expwy Bldg 1, Suite 200
Austin, TX 78759

Corporate Hours: 8:30am – 5:30pm Central Time
ESC Support Hours: 6:00am – 6:00pm Central Time

512-250-7900 (Main Directory)
512-250-7901 (Direct Line to Support)

Corporate Email: esccorp@envirosys.com
Support Email: support@envirosys.com
Website: www.envirosys.com
ESC Customer Community: https://esccommunity.force.com/customer/home/home.jsp

Document Conventions

Convention	Usage
Italics	*For emphasis, italic type is used.*
User interface	User interface items are **bolded** and include window names, screen terminology, dialog boxes, menus and commands, screen terminology, messages, key names, and other terms that appear on the screen.
Menu commands	Menu commands and commands to be typed or selected by the user are **bolded**.
Window Titles	Window titles, selections, and fields are capitalized.
Folder and directory names	Folder and directory names are **bolded**.
Icon names	Icon and button names are **bolded**.
Key names, key combinations, and key sequences	Key names, key combinations, and key sequences are UPPERCASE, e.g. CTRL+SHIFT.
> (right chevron)	Menu commands are separated by an arrow to indicate that items should be selected in order. For example, **File** > **Exit** indicates that you should click **File** and then **Exit**.
	The **TIP** icon indicates a recommendation, shortcut, or other advice when working with a specific feature.
	The **NOTE** icon indicates an important reminder or additional information about a particular item (e.g., informational notes or definitions).
	The **IMPORTANT** icon indicates information about actions that may produce undesirable consequences (e.g., events that could cause the action to fail or to corrupt data). Users should acknowledge this information before proceeding.
	The **CAUTION** icon indicates information about actions that may damage or harm the product. Users should proceed with care when this icon is displayed.

Convention	Usage
	The **WARNING** icon warns about actions that may injure the person performing the action. Users should proceed with *extreme* caution when this icon is displayed and potentially not perform the action at all if the risk of injury is present.

StackVision Support for the ESC 8864 Data Controller

StackVision Version 4.0 is the first software version to support the ESC|8864 Data Controller (8864). If you are replacing an ESC|8832 Data Controller (8832) with an 8864, StackVision must be running Version 4.0 or greater. A configuration that runs in an 8832 will run completely unchanged in an 8864.

> For information about how to upgrade form an ESC 8832 to the 8864, view the article entitled How to Upgrade from an 8832 to 8864 Data Controller (requires login).

Any version of 8864 firmware is compatible with StackVision Version 4.0 and greater. Use the information in the table below to help determine which version of StackVision you need to take advantage of the features provided in a particular version of 8864 firmware.

8864 Firmware Version	Supported StackVision Software Version
Version 5.04.r13	Version 5.1.106
Version 5.03.r16	Version 5.1.106
Version 5.02.r25	Version 5.1.106
Version 5.00.r42	Version 4.9.108
Version 5.00.r24	Version 4.9.108
Version 4.56	Version 4.8.37
Version 4.50	Version 4.7.37
Version 4.47	Version 4.7.37
Version 4.24	Version 4.4.22
Version 4.11 (initial release)	Version 4.0.28

Release Notes Overview

Information in the following table identifies firmware updates for the ESC|8864 Data Controller beginning with firmware version 4.11. Use the hyperlinks in the table below to learn more about what's included in this document.

Section	Description
New Features and Bug Fixes	Identifies new features and bug fixes in recent firmware releases for the ESC 8864 Data Controller: ■ v5.04.r13 Updates ■ v5.03.r16 Updates ■ v5.02.r25 Updates ■ v5.00.r42 Updates ■ v5.00.r24 Updates ■ v4.56 Updates ■ v4.50 Updates ■ v4.47 Updates ■ v4.24 Updates ■ v4.11 Updates (initial firmware release)
Firmware Upgrade	Provides instructions for upgrading the ESC 8864 firmware using a USB flash drive or an Ethernet connection.
ESC 8864 and ESC 8832 Model Comparison	Includes a side-by-side comparison of the ESC 8864 and ESC 8832 data controllers.
ESC 8864 Frequently Asked Questions	Provides information for the most common questions ESC receives about the ESC 8864.
ESC 8864 Data Controller Features	Includes information about the improved capabilities of the ESC 8864 technical specifications, hardware/firmware capabilities, and new touchscreen navigation. This section also describes the initial ESC 8864 release (v4.11) and is updated when future firmware updates become available.

New Features and Bug Fixes

New features and bug fixes in the ESC 8864 Data Controller are identified in the following sections:

- [v5.04.r15 Updates](#)
- [v5.04.r13 Updates](#)
- [v5.03.r16 Updates](#)
- [v5.02.r25 Updates](#)
- [v5.00.r42 Updates](#)
- [v5.00.r24 Updates](#)
- [v4.56 Updates](#)
- [v4.50 Updates](#)
- [v4.47 Updates](#)
- [v4.24 Updates](#)
- [v4.11 Updates](#)

v5.04.r15 Updates

Firmware v5.04.r15 includes the following bug fixes:

- **"E" Type Calibration Calculations:** Version v5.04.r15 now calculates "E" type calibration results correctly when the calibration has Response Times (Data Times) of 1 minute or less. This issue only affected firmware v5.04.r13.

- **Download of Debounce Period for Digitally-Triggered Digital Events:** A bug has been fixed that prevented downloading the debounce period correctly for Digitally-Triggered Digital Events.

The ESC 8864 Version 5.04.r15 firmware is available for download in the ESC Customer Community on the ESC|8864 Data Controller Downloads page (requires login). If you have not yet worked with ESC to upgrade to this firmware version, you can use the Firmware Upgrade procedure in this document to upgrade to the latest firmware version or any other firmware version.

v5.04.r13 Updates

The ESC 8864 Version 5.04.r13 firmware is available for download in the ESC Customer Community on the ESC|8864 Data Controller Downloads page (requires login). If you have not yet worked with ESC to upgrade to this firmware version, you can use the Firmware Upgrade procedure in this document to upgrade to the latest firmware version or any other firmware

New Features and Bug Fixes

version. The following sections identify updates in this release:

- New Features and Enhancements
- Bug Fixes

New Features and Enhancements

Firmware v5.04.r13 includes the following new features and enhancements:

- **PS-9 Calibration Support:** The 8864 has been updated with the following new "E" type calibration fields. (See *C-Configuration Menu > C-Configure Calibrations > N-Enter New Cal Program > E-Externally Initiated Cal*.)

    - **OOC Only** (calibration level)**:** If checked, this calibration sequence can mark a channel as OOC (add the "T" flag in the controller), but it cannot remove the OOC ("T" flag).

    - **Hold Pattern** (phase level)**:** If configured, the phase will not end until both the digital inputs match the hold pattern (i.e., the pattern is TRUE) and the phase duration time has expired. If the Hold Pattern is not configured, then the phase ends when the timer expires.

    - **Data Type** (expected value level)**:** Determines the source of the "actual value" result for this phase/channel. If the Data Type is "I" or blank, then the data is averaged from the channel readings. If the Data Type is "A" then the actual value for this phase is the average of the actual values of previous phases that have their Data Type set to "I" and are the same Injection Level as this phase. If the Data Type is "R", then the actual value is computed as the R^2 of the previous phases that are marked as Data Type = "A".

    - **Injection Level** (expected value level)**:** Sets the injection level (L, M, H, or none) for this phase. It is used if the Data Type for this phase/channel is set to "A" to indicate which previous phases should be averaged.

- **Upgrading via USB:** The *Download Code Menu* screen has been updated to include the following message when the 8864 firmware upgrade has completed. See *S-Status Menu > S-System Maintenance > D-Download Code > U-USB Download*.

    ```
    Upgrade Complete, please remove USB drive if installed
    ```

- **Values in Quick Expected Value Editor and Front Panel Touchscreen:** The same values now display in both the front panel touchscreen and Quick Expected Value Editor. See *C-Configuration Menu > C-Configure Calibrations > Q-Quick Expected Value Editor*.

- **Fast Serial Modbus Server:** This new option is available in the Configure Modbus configuration screen. It provides the functionality identified in the following list. See *C-Configuration Menu > S-Configure System Parameters > M-Configure Modbus*.

    - **Default "N" (no) Setting:** Data controller operates normally. If a serial port is configured as "MB-RTU" (such as a serial Modbus server), the end of the Modbus command is defined as "no characters received for 100ms".

    - **"Y" (yes) Setting:** The data controller ends the command if no further characters are received for 50 ms. The "detect-the-end-of-the-Modbus-command" timeout

time only affects receiving commands for the Modbus server and does not affect the "Response Timeout" that controls the timeout on the Modbus Client commands in the server.cfg.

- **StackVision Public Key File:** The name of the StackVision public key file is no longer case sensitive and can be any combination of upper and lower case letters, such as `stackvision.pub` or `StackVision.PUB`.

- **Serial Monitor Enhancements:** The serial port monitor screen includes performance and display improvements, including the ability to monitor the communications between the outside port and internal 8864 tasks without interrupting the communications. See *S-Status Menu > S-System Maintenance > V-View Serial Port Data*.

- **Secure Communications Enhancement:** The 8864 will now periodically send a "Server Keep Alive" packet to the BitVise SSH Server on StackVision so that BitVise will keep the secure tunnels open, even if no active communications are occurring over the tunnels.

- **Modbus Command Monitor:** Use this new screen to monitor incoming commands received from a user-selected MB-RTU serial port or Ethernet Modbus Server port, as well as monitor the rate at which the commands are received. Other features of this screen include:

  - Updates once every second.
  - Starts over when the screen is exited and re-entered.
  - Displays up to 18 incoming commands per screen. Commands are identified in the "Modbus Command Received" column. Use Ctrl-N and Ctrl-P to navigate between additional monitor screens.
  - If the same command is received more than once, the total count of the received command is displayed in the "Count" column.
  - Displays a list of the number of invalid commands received (such as bad number of characters or bad CRC).
  - If the user-selected interface is a serial port, displays a list of the number of valid commands addressed to a different Modbus address.
  - Shows the average time between commands.
  - Identifies the originating IP address of commands.
  - Displays the following information at the bottom of the screen: serial port or Ethernet interface being monitored; total number of received commands while the monitor is running; and the length of time the monitor has been running (hours, minutes, seconds as hh:mm:ss).

Bug Fixes

Firmware v5.04.r13 includes the following bug fixes:

- **Instrument-Controllerd (I-type) Calibrations:**
  - In firmware versions v5.02 and v5.03, an I-type calibration may report data that

has been taken up to one "Data Time" too early. For example, with a 30-minute phase and a 5-minute Data Time, the data should be taken from 0:25 to 0:30. Instead, the data could be taken as soon as from 0:20 to 0:25. This may not be an issue if the data time is small. This issue does not apply to "A-type" (automatic) or "E-type" (externally-initiated) calibrations. This has been fixed in v5.04.

- In firmware versions v5.02 and v5.03, if an I-type calibration phase ends before the configured data time has elapsed, a "NaN" (not a number) is recorded for the phase result. In v5.04, the calibration correctly reports the average of the data during the entire phase.

- **Logger ID Code:** A bug has been fixed that caused the Logger ID Code to migrate incorrectly when upgrading firmware from v4.24 or earlier.

- **Editing Expected Value from Front Panel Touchscreen:** The 8864 no longer locks up when editing the Expected Value using the front panel touchscreen.

- **Editing Calibration Start Time from Front Panel Touchscreen:** The 8864 no longer locks up when editing the Calibration Start Time using the front panel touchscreen.

- **Data Controller Dump:** Configuration settings in the Setup Secure Communications screen are now included in the controller dump text file when running a Data Controller Dump. See *S-Status Menu > Dump Setup(s) > P-Dump All to Curr Port*.

- **Using Backspace Key When Editing Calibration Start Time:** The backspace key now works when editing calibration start times from the front panel touchscreen.

- **Serial Port Modbus Server:** When a serial port is acting as a server and a section for that port is included in the server.cfg file, a CRLF is then no longer substituted for LF in the response string.

- **Serial Monitor Performance:** A bug has been fixed that caused a performance issue when viewing serial port data. See *S-Status Menu > S-System Maintenance > V-View Serial Port Data*.

- **Data Push (Push Polling) Update:** The 8864 no longer crashes when Data Push is disabled while calibrations are running.

- **Ethernet Network Security Enhancement:** The 8864 has been updated to ignore all received Ethernet ICMP route redirect packets.

- **Modbus 8832 Status Registers:** A bug has been fixed that caused Modbus 8832 status registers to be off by one register and channel flags to be written to the wrong 8832 Modbus Table status register.

v5.03.r16 Updates

The ESC 8864 Version 5.03.r16 firmware is available for download in the ESC Customer Community on the [ESC|8864 Data Controller Downloads](#) page (requires login). If you have not yet worked with ESC to upgrade to this firmware version, you can use the Firmware Upgrade procedure in this document to upgrade to the latest firmware version or any other firmware version. The following sections identify updates in this release:

- New Features and Enhancements
- Bug Fixes

⚠️ **CAUTION:** Firmware v5.03.r16 does not support the rainfall counter on the 8864 Meteorological card (channel type 9). It does, however, support the type Z (Modbus) rainfall counter. Do not install v5.03.r16 on units that use a Met card rainfall counter. A later version of firmware will support the MET rainfall counters.

New Features and Enhancements

Firmware v5.03.r16 includes the following new features and enhancements:

- **Security Improvements:** Several improvements to network security were made as the result of a third-party security audit. These include out-of-bound checking, NULL pointer dereferencing, and buffer overflow prevention.

- **Rearranged Menu Items Related to Secure Communications:** Menu items previously in the "Configure Secure Connections" menu have been moved to the new "Setup Secure Communications" menu shown in the next example (*C-Configuration Menu > S-Configure System Parameters > X-Configure Secure Communications > S-Setup Secure Communications*).

```
ESC 8864  v5.03r16  ID:88    Setup Secure Communications    01/11/18 13:59:38

     Secure StackVision Comm (Y/N): N
     SV SSH Server IP:port         : 0.0.0.0:2222
     SV polling IP:port            : 127.8.8.99:9881
     SV emulation IP:port          : 127.8.8.99:22
     SV https IP:port              : 127.8.8.99:443

     Secure Modbus Comm (Y/N)      : N
     Modbus SSH Server IP:port     : 0.0.0.0:2222
     Modbus client IP:port         : 127.8.8.99:502

     FINISHED (Configure Now)       01/11/18 12:47:02
     NOTE: This May Take Several
     Seconds to Complete
```

Bug Fixes

Firmware v5.03.r16 includes the following bug fixes:

- **Quotation Marks in Digital Input or Output Label:** An error no longer occurs when the digital input or digital output label contains a quotation mark. If quotation marks are present, the front panel LCD displays a blank line. The label field (Label Text) does not support quotation marks (*C-Configuration Menu > R-Configure Digital I/O > I-Edit Digital Input Labels or O-Edit Digital Output Labels*).

- **Multiple Met Cards Detected:** When multiple Met Cards are detected, the 8864 now starts up normally and an error no longer occurs. Up to six (6) total cards of the following types are supported: Current In, Voltage In, Met Card. The 8864 data controller supports multiple Met Cards installed in the same unit. This update resolves Article 1149 in the ESC Customer Community.

- **USB Drives Formatted Without Partition Tables:** Small USB drives formatted without a partition table will not work in the 8864.

- **Negative Numbers in Modbus Double-wide Integer Registers:** Negative numbers now display correctly when the value of the channel is negative. Negative numbers no longer display the positive value "4.295E+9". This update resolves Article 1756 in the ESC Customer Community.

- **Parallel Modbus and Ethernet Client Support:** Up to 10 Ethernet Client sections (Client 0 to Client 9) can now be configured in the server.cfg file when Parallel Modbus is enabled. An Ethernet Timeout Error no longer occurs when multiple Ethernet Client sections are used. This update resolves Article 1719 in the ESC Customer Community.

- **Data Push, Met Channels, and Data Controller Reboot:** If Met channels are configured and Data Push is enabled, the 8864 data controller no longer unintentionally reboots (*C-Configuration Menu > S-Configure System Parameters > D-Data Push*). This update resolves Article 1088 in the ESC Customer Community.

- **Data Controller Reboots When Constituent Channels are Deleted:** If a channel that is used in an equation (the constituent channel) is deleted while the math channel is still configured, the 8864 data logger no longer reboots unintentionally. This update resolves Article 1375 in the ESC Customer Community.

- **Modbus Swap Code:** The Modbus Swap code in the server.cfg file now works as expected (*S - Status Menu > V - View Modbus Master Status > C - View Modbus Client Cfg File*).

- **Channel Name with Percent Sign:** Using a percent sign (%) in a channel name no longer causes gibberish characters to scroll across the Calibration Status screen when the percent sign is a data channel in the calibration. This update resolves Article 1919 in the ESC Customer Community.

- **8864 Firmware Upgrade to v5.03:** The 8864 can be upgraded to v5.03 from any previous version of 8864 firmware. Upgrading to v5.00 as an intermediate version is no longer necessary.

- **Rainfall Counter Channel Type 9 Download:** The rainfall counter channel (type "9" - Met Card) now downloads correctly from StackVision. This update resolves Article 1965 in the ESC Customer Community.

■ **Rainfall Counter Channel Type Z Download:** The rainfall counter channel (type "Z" - Modbus) now downloads correctly from StackVision. This update resolves Article 1966 in the ESC Customer Community.

v5.02.r25 Updates

The ESC 8864 Version 5.02.r25 firmware is available for download on the ESC|8864 Data Controller Downloads page (requires login). If you have not yet worked with ESC to upgrade to this firmware version, you can use the Firmware Upgrade procedure in this document to upgrade to the latest firmware version or any other firmware version. The following sections identify updates in this release:

■ New Features and Enhancements

■ Bug Fixes

⚠️ **CAUTION:** v5.02.r25 only correctly upgrades firmware v5.00. You must upgrade to v5.00 before upgrading to v5.02. Refer to the ESC Communities Article Upgrading Directly from v4.xx to v5.02 (login required) if you have already upgraded an 8864 directly from v4.xx to v5.02.

New Features and Enhancements

The ESC 8864 firmware includes the following new features and enhancements:

New Features

The ESC 8864 includes the following new features:

■ **Push Polling:** Added the ability to push newly acquired data once per second to StackVision without waiting for the scheduled StackVision polling cycle.

■ **Parallel Modbus:** Added Modbus clients that run in parallel, so that one bad analyzer doesn't affect Modbus communication with other analyzers or a DCS.

■ **Calibration Counters:** Added math functions that read the calibration out-of-control counters (26-hour OOC, 8-hour grace, time since last run, etc.), allowing the user to configure startup calibrations that avoid issues with "grace-period-based" calibrations.

■ **User Names/Passwords:** Replaced "password-based" login security with user name/password logins. This allows each user to have different user names and passwords, if desired. The system administrator can set the security access level of each user independently.

■ **Account Management:** Added user account management so that an administrator can add, delete, or edit user accounts.

■ **Password Rules:** Added password complexity and password-change rules that can be used to satisfy corporate IT policies.

- **Download server.cfg:** Added the ability to store the Modbus client configuration (server.cfg file) in the StackVision database so that it can be automatically downloaded with the rest of the data logger configuration in "Logger Tools" in StackVision.

- **Secure Communications:** Added secure, encrypted communications between the 8864 and StackVision.

- **Outbound-Only Connections:** Added the ability for the 8864 to StackVision communications to be established entirely "out-bound" instead of "in-bound" through a firewall.

- **Close Ethernet Ports:** Added the ability to optionally close all in-bound Ethernet ports on the 8864 to improve network security.

- **Secure FTP:** Removed unsecure, unencrypted FTP and replaced it with secure, encrypted SFTP.

- **Modbus Trace:** Added a Modbus trace screen and dump-to-file feature so that a user can see the Modbus commands being sent and received, greatly improving Modbus debugging.

- **DNS Support:** Added the ability to configure a DNS server so that server names can be used instead of IP addresses.

- **Met Card:** Added support for the 8864 Met Card (limited to one per 8864).

- **Double-wide Modbus:** Added support for double-wide Modbus registers. This includes 2-register (32-bit) long integers and 4-register (64-bit) floating-point numbers.

- **Modbus MSB First:** Added the ability to specify channel-by-channel if the most-significant register or the least-significant register appears at the lowest Modbus address for the channel.

Enhancements

The ESC 8864 includes the following feature enhancements:

- **Validation Type 4:** Removed the 26-hour out-of-control (OOC) check from validation type 4.

- **Download Speed:** Improved the configuration download speed.

- **System Configuration Menus:** Reworked the System Configuration screens so that they are now sub-menus of the "System Configuration" screen instead of separate pages.

- **Gratuitous ARP:** The 8864 will now announce itself to any connected Ethernet networks, avoiding the need to "ping" out from the logger.

- **Auto-Refreshing Line Changes Log:** The "View Input Line Changes" display in the character-based screens (MDI) now auto-refreshes.

- **Write Math Constants in Cal Phases:** Added the ability to optionality write to a math constant at the end of a calibration phase instead of the start of the recovery period.

- **Shorter Calibration Data Times:** Added the ability to configure shorter data times in calibration phases. Instrument-initiated calibrations can be configured down to 1s, while automatic calibrations can be configured down to 2s.
- **Increased Number of Cals:** Expanded the maximum number of calibration and digital event sequences that can be configured to 200.
- **Increases Size of Calibrations:** Expanded the maximum number of channels and phases allowed in each calibration sequence to 64 each.
- **Rainfall Counter:** Rainfall Counter (type "Z") channels now read their count from Modbus inputs. A new MET Rainfall Counter (type "9") reads the rainfall counter on the new 8864 Met card (limited to one per 8864).
- **Coldstart Password:** The 8864 now requires that the user enter their current login password to perform a cold start.
- **Debounce DI-Triggered Events:** Added a configurable debounce period before digitally-triggered digital events.
- **View server.cfg File:** Removed the need to type in the file name to get to the "View Modbus Client Cfg File" screen.
- **Disabled Outdated Security:** Disabled TLS v1.0 and weak SSL ciphers on the 8864's web interface.

Bug Fixes

The ESC 8864 firmware includes the following bug fixes:

- **Garbage Edit Characters:** Garbage characters sometimes appear in edit fields on the character-based (MDI) screens.
- **Ethernet Responses:** Ethernet packets now always respond to the same interface that originated the request.
- **8832 Modbus Tables:** The legacy 8832 Modbus output tables cannot start at any address except the default value.
- **Modbus Channel Flags:** Modbus (type "Q") channels' Instantaneous Flags are not displayed on the Real Time Engineering Flags screen
- **Hold On Time Out:** The "Hold On Time Out" setting in the server.cfg file is not holding the last reading
- **Restart After Cal Edited:** The 8864 restarts when a calibration is started after being edited, if the "Display Status of Single Cal" screen is also running.
- **Counter Channels Deleted:** Counter (type "N") channels are sometimes deleted when the controller reboots for the first time after they are downloaded.

v5.00.r42 Updates

The ESC 8864 Version 5.00.r42 firmware was released to certain customers on an as-needed basis to address specific bugs. If you have not yet worked with ESC to upgrade to this firmware version, you can use the Firmware Upgrade procedure in this document to

upgrade to the latest firmware version or any other firmware version.

Updates in Version 5.00.r42 include the following bug fixes:

- **Modbus Channels Stop Updating:** Modbus (type "Q") channel readings stop updating if the channel's instantaneous flags registers are read via Modbus.

- **Modbus Channels Have the Wrong Value:** Modbus (type "Q") channels' instantaneous registers read 32,768 (instead of the last scan's value) from the start of an input scan interval until the first new value is written to the instantaneous registers. Also, the channels' instantaneous registers read 32,768 (instead of 0) when there is no Modbus communication during a complete scan interval.

- **"Use Time-on-line Validation" flag is ignored:** The "Use Time-on-line Validation" flag is ignored for base averages less than one minute. This works correctly for base averages of one minute or longer.

- **Validation Flags Not Passed:** On an Average Math (type "P") channel, the base average validation flags are not passed to the Extended Averages.

- **Digital Inputs Slow:** Sometimes the 8864 is slow to respond to Digital Inputs lines closing.

- **Instrument-Controlled Cal Timing:** Instrument-Controlled calibration timing is sometimes incorrect.

- **Voltage Input Scaling Incorrect:** The analog-input voltage scaling factors are not correct after download for analog input (type "A") channels that are configured to monitor channels on voltage-input I/O cards. This does not affect 4-20 mA inputs.

- **Information Flags Not Passed:** Information flags (V, W, X, Y, Z) are not passed to Extended 2 averages after a power failure.

- **DAC Modbus Floats Wrong:** The Modbus floating point registers for the analog outputs (DACs) do not contain the correct values.

- **TOLs in Counter Channel Equation:** The 8864 locks up when a TOL (type "T") or MTOL (type "U") channel is referenced in a counter channel (type "N") equation.

- **MDI Formatting:** The front-panel character-based (MDI) screen only displays 24 lines when it should display 25 lines. This affects the formatting of some of the MDI screens.

- **Adding New Phase to a Cal:** The data controller reboots after adding a new calibration phase to an existing calibration.

- **Server.cfg May Not Restart:** If the 8864 restarts unexpectedly, then the Modbus Client processing of the server.cfg file stops.

- **Reboot with Large Configs and Busy Modbus:** The 8864 will sometimes reboot when running a large configuration with significant Modbus activity.

v5.00.r24 Updates

NOTE: Beginning with v5.00, the numbering scheme of the ESC 8864 firmware will be formatted as "vX.YY.rZZ", such as v5.00.r24. The first part of the numbering scheme (vX.YY) represents new features in the new version. The second part of the numbering scheme (.rZZ) represents the revision number of the new version. Revisions for a new version occur when a fix for a critical bug is required.

IMPORTANT: If you previously installed Limited Release v5.00.r22, the fixes from v5.00.r22 to v5.00.r24 include those in the following list:
- Settings for I/O Card Overrides are no longer cleared (reset) after an upgrade.
- Channels download faster from StackVision.
- Calibrations no longer cause a memory leak.
- Stability improvements.

The ESC 8864 Version 5.00.r24 firmware was released on 2/17/2016 and is available for download on the ESC|8864 Data Controller Downloads page (requires login). If you have not yet worked with ESC to upgrade to this firmware version, you can use the Firmware Upgrade procedure in this document to upgrade to the latest firmware version or any other firmware version.

Updates in Version 5.00.r24 include the following new features:

- **ESC 8864 XML Configuration File:** The ESC 8864 configuration can now be retrieved as an XML file. This allows the configuration to be compared with the configuration stored in StackVision.

- **Calibration Sequences / Digital Events:** A bug was fixed that could cause calibration sequences or digital events to be skipped.

- **Counter Channel (Type N):** The new type N counter channel is a very flexible channel type that can count or total values based on a configurable start and stop signal.

  As an example, you can use this channel to totalize emissions during a startup event or count the number of startup events over a configurable time period. The new channel type is available for selection in the list of channel types when configuring a new channel (*Main Menu > Configuration Menu > Configure (Data) Channels > Enter New Configuration*).

- **Delay on DI-Triggered Digital Events (Delay Before Output Trigger):** You can now configure a delay period after a digital event program has triggered before output conditions are set. This is configured when setting up a DI-Triggered Digital Event (*Main Menu > Configuration Menu > Configure Dig. Event Program > New DI-Triggered Dig. Event*).

- **"Round to Significant Digit" Functions in Math Equations:** New "round to significant digits" functions, SIG1 through SIG9, can now be configured in math equations. The function SIG1() rounds to 1 significant digit; SIG2() rounds to 2 significant digits; and so on to SIG9() which rounds to 9 significant digits. Leading zeros to the right of the decimal point are not considered significant and are not counted as significant digits.

As an example, to round a value to 3 significant digits for a channel named NOXLBS with a value of 0.00123456, configure the math equation as SIG3(NOXLBS). The SIG3 function calculates the value as 0.00123.

- **Improved Data Storage Scheme:** An improved data storage scheme increases the maximum amount of data stored per channel.

- **Modbus server.cfg File:** The server.cfg file includes the following improvements:

  - **Section Headers:** A section header can now be configured to contain either "8832" or "8864". For example, the section defining the Ethernet Modbus commands can be titled either "[8832 Client 0]" or "[8864 Client 0]". This allows server.cfg files from the ESC 8832 to be executed unchanged in an ESC 8864, while allowing the section titles to be changed to "8864" if desired.

  - **Hold On Timeout (optional):** The server.cfg file now includes the option to hold the previous value in the Modbus registers when a Modbus command times out. This prevents the value of "8000 (hex)" from being written if the command times out.

- **Current Status of I/O Card Overrides:** The labels on the screens System Configuration Screen#2 and System Backup Configuration Screen #2 have been revised to improve clarity. These screens now show the current status of I/O card overrides and what will occur after the next cold start.

- **"Isolated In" Now Used with Isolated Digital Input I/O Cards:** The screens System Configuration Screen#2 and System Backup Configuration Screen #2 now show "Isolated In" when an Isolated Digital Input I/O card is installed. Previously both Isolated and Non-isolated Digital Input cards were shown as "Status In" on these screens.

- **Parameters Moved to CTRL-R and CTRL-U Screens:** Parameters previously shown on the System Configuration Screen have been moved to the CTRL-R and CTRL-U screens. This eliminates the duplicate places that a particular parameter can be configured.

- **Decrease in Delay to Wait After a Modbus Timeout:** The delay to wait before trying again after a Modbus timeout has occurred has been decreased from 10 seconds to 5 seconds. This change decreases the number of bad Modbus channel readings when using the default 10 second Modbus channel scan rate.

- **More Button Improvements:**

  - The "More" button on the LCD front panel is now only enabled when a keyboard is connected. Previously in some situations, the "More" button remained enabled when a keyboard was not installed.

  - Disabling both Ethernet ports no longer disables the "More" button.

- **Delay Time Negative Values:** Negative values are no longer allowed for delay times in Digital Event Programs or Calibrations.

v4.56 Updates

The ESC 8864 Version 4.56 firmware is available for download on the ESC|8864 Data

Controller Downloads page (requires login). The following sections identify updates in this release:

- New Features
- Bug Fixes

NOTE: If you have not yet worked with ESC to upgrade to Version 4.56, you can use the Firmware Upgrade procedure in this document to upgrade to this firmware version or any other firmware version.

New Features

User-initiated calibrations and Digital-input-initiated calibrations can now be started using the front panel Graphical User interface (GUI).

Bug Fixes

The ESC 8864 firmware includes the following bug fixes:

- The ESC 8864 no longer reboots automatically after it has run continuously for 48 days and 13 hours since the last reboot.
- All characters in a polling response string are now transmitted correctly via Serial Ports 1-3 when they are configured as "LLM-RTS" and at a low baud rate.
- StackVision consoles no longer lock up under some situations when displaying "current" type data. Current data objects on StackVision consoles collect the instantaneous data from the data controller. This fix will also no longer prevent users from emulating to the controller or connecting to the controller via PuTTY in the event that the console lock-up occurs.

Return to v4.56 Overview

v4.50 Updates

The ESC 8864 Version 4.50 firmware is now available on the ESC|8864 Data Controller Downloads page (requires login). Updates for this release include the following bug fixes:

- 8864s with built-in Analog-to-Digital calibration values above the nominal value no longer cause a reboot in certain rare circumstances.
- The lower case "t" flag can now be configured in the new "Action Flags" field in the Analog Output (DAC) configuration screen.
- Serial Port 0 now sends all characters if it is set to LLM-RTS. This was not an issue for Serial Ports 1, 2, and 3.

NOTE: If you have not yet worked with ESC to upgrade to this firmware version, you can use the Firmware Upgrade procedure in this document to upgrade to Version 4.50 or any other firmware version.

---

v4.47 Updates

The ESC 8864 Version 4.47 firmware is now available on the ESC|8864 Data Controller Downloads page (requires login). Updates for this release as well as those since v4.24 are identified in the following sections:

- New Features
- Bug Fixes

> **NOTE:** If you have not yet worked with ESC to upgrade to this firmware version, you can use the Firmware Upgrade procedure in this document to upgrade to Version 4.47 or any other firmware version.

New Features

The ESC 8864 firmware includes the following new features:

- Implemented the "Retry Count" field in the Modbus server.cfg configuration file, with a maximum of 5 retries.
- Implemented the "Swap Code" feature in the Modbus server's server.cfg file.
- Allowed the download of the Modbus server.cfg file via USB.
- Doubled the maximum math equation size to 512 characters. Requires a new version of StackVision to be able to download.
- Increased the maximum number of operators in a math equation by a factor of 10. Requires a new version of StackVision to be able to download.
- Added a new channel validation type "4" that is the same as a type "3" validation but does not have the calibration requirement.
- Added the ability to hold DAC outputs when any configurable flag is set on the channel. Requires a new version of StackVision to be able to download.
- Added the ability to configure up to 96 DACs to allow "pseudo" DACs and be able to hold values for Modbus.
- Increased the font size of the text-based MDI when shown on the front-panel LCD.
- Added a new "Disabled" option to the "Alarm Printer Port" configuration settings.
- Implemented validation to the MDI to prevent the Ethernet ports from being manually configured on the same subnet or same gateway.
- Increased the number of entries in the system log by a factor of 10.
- Added the two digit year to the time tags in the system log.
- Increased the maximum number of entries in the line changes log by a factor of 10.
- Added a filter to the line changes log so that you can show only a particular line number or all line numbers.
- Added the ability to stay connected via Ethernet through a factory reset.

Return to v4.47 overview.

Bug Fixes

The ESC 8864 firmware includes the following bug fixes:

- Continuous 5 second reboots when GUI Cals Menu selected. This release provides a fix that improves system performance when running cals.

- Missing Modbus scans cause "B<" flags on Modbus channels.

- When using the Modbus client (server.cfg) to read integer registers from an external Modbus server, invalid values are included in the average when there is no response from the server.

- Integer Modbus channels are not updated if the 8832 table is set for 1 to 99 floats and <99 channels are configured.

- Modbus channel values are not held between updates to the 8832 client Modbus registers even though "Hold Data Between Updates" is configured as "Y".

- Reading from the Modbus server instantaneous flag registers produce incorrect results.

- Modbus data mapping is sometimes offset by one when reading instantaneous values from a Modbus server.

- Modbus instantaneous flags are not passing up to the channel's averages.

- Changes to "Enable 8864 Modbus Tables" made in the System Configuration Menu are not being saved to the System Backup Configuration Menu.

- The Modbus checksum is shown incorrectly on the MDI (just a display issue).

- The calibration status is not correct on the "Calibration Last Status" screen on the GUI.

- There is a long delay when connecting via SSH (PuTTY).

- The Average Math (P type) channel configured instantaneous validation and informational flags are not passed up to the Extended 2 average after the data controller is rebooted. This is also a bug in the 8832.

- Active digital output lines will switch to their inactive state if a reboot is caused by a save to the System Configuration Menu.

- Reboot when configuring only the storage time on a General Channel.

- Reboot when the central alarm task is disabled.

- Reboot if the number of runs in a multi-run calibration is greater than 1 and the interval between runs is 0s.

- Reboot when only part of the Modbus Scale Factor is edited in the MDI.

- Reboot when the <esc> key is pressed when editing a channel name.

- Extra serial ports show up in serial port selection lists.

- Error message not sent when invalid channel equations are downloaded.

- "Alarm Printer Port" changes do not take effect until the unit is rebooted.

- On restart, the GUI sometimes doesn't return to the exact page it was on prior to restart.

- The DD and DE commands sometimes do not report all input changes.

- The "More" button on the LCD does not allow access to the MDI for 30 sec after a cold start

- If a new relay output card is installed, the state of the relay outputs is undefined until an output line is switched, or until the next cold start. This is also a bug in the 8832.

- Transient issues with the touchscreen.

Return to v4.47 overview.

v4.24 Updates

The ESC 8864 Version 4.24 firmware was released on 7/22/14 and is now available on the ESC|8864 Data Controller Downloads page (requires login). If you have not yet worked with ESC to upgrade to the current v4.24 Limited Release, you can use the new Firmware Upgrade procedure in these release notes to upgrade to this or any future release.

Please note that v4.24 is a mandatory update for any system running v4.16 or earlier. Version 4.24 includes system updates that are integral to the operation of the ESC 8864 Data Controller. (See Bug Fixes for more information.)

This release provides new features and enhancements, including an increase in the number of math ("K") constants, improved Ethernet capabilities, and additional MODBUS features. The release also includes bug fixes for touchscreen functionality, system start-up, download speeds, MODBUS communications, and a fix for memory leaks and periodic restarts.

The following sections provide further detail on the updates in the ESC 8864 v4.24 firmware:

- New Features
- Bug Fixes

NOTE: Starting with v4.24, ESC has moved the ESC|8864 Data Controller to the same Limited Release / General Release process used with ESC|StackVision. If you have not yet worked with ESC to upgrade to the v4.24 firmware during Limited Release, you can use the new Firmware Upgrade procedure to upgrade to this or any future release.

New Features

The ESC 8864 firmware v4.24 includes the following new features:

- Increased the number of math ("K") constants from 32 to 99.

- Increased the number of Ethernet console tasks from 4 to 8 so that you can have up to eight SSH (PuTTY) and StackVision polling tasks active at the same time (the front panel MDI counts as one of the tasks).

- Implemented keyboard function keys just like in the 8832, except they are fixed at the default functions and cannot be remapped.

- Added the ability to enable/disable Ethernet ports at the integrator login level.

- Updated the system to apply changes to the serial port interface type when the controller is rebooted, instead of requiring a cold start.

- Rearranged the Ethernet configuration screens to be more logical.

- MODBUS updates:

  - Added the ability to write instantaneous status flags to a type "Q" MODBUS channel.

  - Added the ability to read the DAC outputs as both integers and floats from the MODBUS registers.

  - Implemented new MODBUS time-of-day registers.

Return to v4.24 overview.

Bug Fixes

The ESC 8864 firmware v4.24 includes the following bug fixes:

- Repaired a memory leak in the ESC 8864's web browser that was causing periodic resets, LCD lockups, and (sometimes) cold starts. This is the main reason that this release will be mandatory.

- Repaired the system start-up process to ensure that the LCD display initializes properly after a power failure.

- Fixed sporadic issues with the touchscreen not working, and ensured that the touchscreen interface no longer resets to the home screen when the time is set backwards by StackVision.

- Increased the speed that math ("K") constants can be downloaded from StackVision.

- Fixed an issue that caused the More button on the touchscreen to sometimes be disabled even if a USB keyboard is installed.

- Implemented the following Modbus fixes:

  - Data is no longer written into the wrong MODBUS register if the legacy 8832 tables are configured for both integer and float registers.

  - The MODBUS poll interval no longer allows the MODBUS client to run "full out" and ignore the configured poll interval.

  - Digital events now work correctly when an I/O card is "overridden" to be a relay out card.

  - Writing negative numbers to MODBUS channels now works correctly.

  - The system now allows the ability to write to MODBUS coil number 999.

  - The ESC 8864 no longer locks up if the 8832 legacy MODBUS tables are reconfigured from "all float" to "all integer."

- Fixed an issue where, if the ESC 8864 loses connection to the MODBUS server, an 8000 (hex) was incorrectly written by the MODBUS master's server.cfg data map section to an integer MODBUS channel. These 8000 (hex) values should have been ignored and a "0 B" should have appeared in the base average. Instead, the value was incorrectly interpreted by the MODBUS channel as -32,768 (decimal) and averaged into subsequent intervals. This issue did not affect float registers.

Return to v4.24 overview.

v4.11 Updates

Version 4.11 is the initial firmware release for the ESC 8864. All updates are defined in the ESC 8864 Data Controller Features section.

If you plan to upgrade from the ESC 8832 or are considering an upgrade in the future, review the following sections for information related to the upgrade:

- ESC 8864 and ESC 8832 Model Comparison
- ESC 8864 Frequently Asked Questions

Firmware Upgrade

NOTE: Beginning with v5.00, the numbering scheme of the ESC 8864 firmware is identified in documentation using the format "vX.YY.rZZ", such as v5.00.r24. The first part of the numbering scheme (vX.YY) represents new features in the new version. The second part of the numbering scheme (.rZZ) represents the revision number of the new version. Revisions for a new version occur when a fix for a critical bug is required.

ESC regularly publishes new versions of firmware for the ESC|8864 Data Controller. Announcements about new firmware versions are posted in the ESC Customer Community and are available for download on the ESC|8864 Data Controller Downloads page (requires login). Information about new features and improvements can also be found in the ESC|8864 Data Controller Release Notes online help file. These files are available to customers with an active ESC support agreement. Use the information in the Release Notes to help determine if a new firmware version should be installed on your system's data controllers.

You can also contact ESC with any questions you may have about the procedures described in this document. If you prefer to have ESC perform the upgrade as a turnkey service, please contact ESC Sales.

CAUTION: Upgrading the firmware in the ESC 8864 will "cold start" the data controller, which causes all configuration and stored data to be erased. Before starting an upgrade, it's important to make sure you have the current configuration saved in StackVision and that all data has been collected from the ESC 8864.

Failure to follow these instructions could result in the loss of compliance data.

IMPORTANT: ESC recommends that upgrades be performed offline or during a scheduled outage to prevent any data loss. If these steps are performed while operating, it may result in the loss of compliance data.

To save space and transfer time, firmware upgrades are stored in an archived .zip file labeled with the firmware and release number, such as **ESC8864_ V5.00.r24_FirmwareUpgrade.zip**. The "zip" file must be unzipped to extract the actual upgrade file.

The upgrade file is labeled using a numbering scheme in the format *8864_ Upgrade_X.YY.rZZ.bin*. An example of an actual upgrade file is **8864_Upgrade_ 5.00.r24.bin**. For more information about his numbering scheme, see the note

at the beginning of this topic.

Use either of the following methods to upgrade the firmware of the ESC 8864:

- Upgrading via USB: Use this method to load the new firmware version from a USB flash drive that connects locally to one of the USB ports on the ESC 8864. (A USB flash drive is also referred to as a USB thumb drive.)

- Upgrading via Ethernet: Use this method to transfer the new firmware across a remote Ethernet connection.

Upgrading via USB

Follow the steps below to use a USB flash drive to upgrade the ESC 8864 firmware. Before starting the procedure, first review the following the following caution notes.

CAUTION: ESC **highly** recommends that you obtain an "as-found" dump of the current ESC 8864 configuration prior to performing an upgrade. This provides a baseline to troubleshoot problems if, for some reason, the configuration in the ESC 8864 is not the same as the configuration in StackVision. Only skip this step if you are absolutely certain that the configuration in StackVision matches the configuration in the 8864. For directions, refer to the article How do I get a snapshot of the data controller configuration? in the ESC Customer Community (requires login). **Failure to obtain an as-found dump of the configuration may result in your CEM system not operating properly or collecting incorrect data.**

CAUTION: If your ESC 8864 uses Modbus, ESC **highly** recommends that you retrieve a copy of the Modbus configuration file "server.cfg" directly from the ESC 8864. Only skip this step if you are absolutely certain that you have an exact copy of the server.cfg file that was last loaded into the 8864. For directions, refer to the article How do I get a snapshot of the data controller configuration? in the ESC Customer Community (requires login). Failure to obtain the correct server.cfg may result in your CEM system not communicating correctly with instruments or other external devices such as DCS systems.

Complete the following steps:

1. Download the ESC 8864 firmware upgrade file from the 8864 Data Controller Downloads page in the ESC Customer Community (requires login).

2. Unzip the upgrade file and then transfer it to a USB flash drive using the following steps:

   a. Place the file in the "root" of the flash drive and not in a folder.

   b. Verify the firmware upgrade file is the only file in the root and that it has a file name that ends with ".bin" (for example, *8864_Upgrade_5.00.r24.bin*).

3. Insert the flash drive in an available USB port on the ESC 8864.

4. Open the character-based MDI screen on the front panel of the ESC 8864 by pressing the **More** button on the graphical interface.

   A USB keyboard must be installed in order for the **More** button to be available for selection.
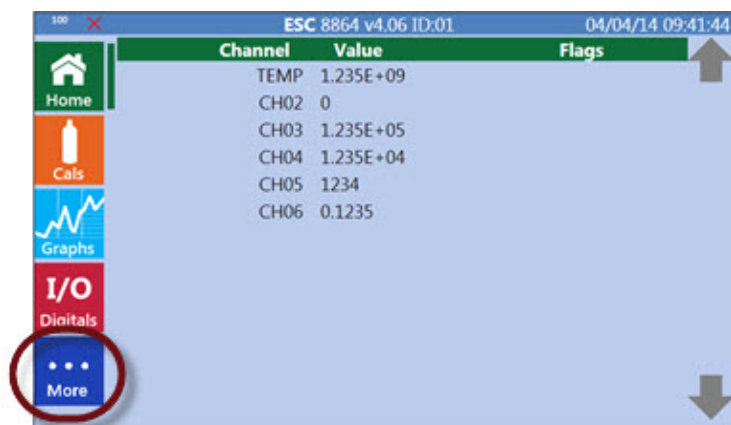
5. Log in to the MDI interface using the integrator-level password. If you do not know the integrator-level password, contact your CEMS Administrator or ESC support.

6. "Cold start" the data controller by logging in with the password **COLD START**.

   IMPORTANT: This deletes all configuration and data. Be sure to read the warnings at the beginning of this procedure if you have concerns.

7. After cold starting the data controller, the ESC 8864 reboots to the Graphical menu. Press the **More** button and then log on using the integrator-level password.

8. Select **S - Status Menu** to open the Status Menu.

9. Select **S - System Maintenance** to open the System Maintenance menu.

```
ESC 8864  v5.04r12  ID:01        Logger Status Menu       06/20/18 09:55:09

     P Power Fail Menu
     L Line Changes Log Menu
     M Message Menu
     A Alarm Status/Log
     C Report Current Cal Status
     1 Display Status of Single Cal
     V View Modbus Master Status
     I System Information
     D Dump Setup(s)
     U Reboot
     S System Maintenance

     T View Secure Comm Status
```

10. Select **D - Download Code** to open the Download Code Menu.

```
ESC 8864  v5.04r12  ID:01        System Maintenance       06/20/18 09:59:02

     V View Serial Port Data
     L Log Serial Port Data
     D Download Code
     P Connectivity Tests
     A Create Debug Archive

     S Download Server.cfg
     C Cold Start
```

11. Select **U - USB Download** and then type **Y** at the prompt *"Are You Sure (Y/N)?"*.

```
ESC 8864  v5.04r12  ID:01        Download Code Menu        06/20/18 10:01:49

     U USB Download
     E Ethernet Download
```

12. Verify the flash drive containing the upgrade file is plugged in the USB port, then press **Enter**.

```
ESC 8864  v5.04r12  ID:01        Download Code Menu        06/20/18 10:05:46


   Please plug in a USB drive containing the firmware upgrade file.

   Press ENTER to continue.
```

The ESC 8864 will decrypt, extract, uncompress, and verify the upgrade file before installing it. This process will take 2 to 3 minutes to complete. It will display status messages during this process as shown in the following example.

```
ESC 8864  v5.04r12  ID:01        Download Code Menu        06/20/18 10:05:53


   Please plug in a USB drive containing the firmware upgrade file.

   Press ENTER to continue.

   Clearing system config...
   Attempting USB Upgrade
   Attempting Upgrade with /media/sdb1/8864_Upgrade_5.04r12.bin
   Decrypt Archive
   79.5MiB 0:02:19 [ 584KiB/s] [=====================>] 100%
   Extract Upgrade Archive
   79.5MiB 0:02:20 [ 579KiB/s] [=====================>] 100%
   Uncompress Filesystem Archive
     78MiB 0:03:49 [ 347KiB/s] [=====================>] 100%
   Verify filesystem archive
    200MiB 0:00:12 [15.4MiB/s] [=====================>] 100%
   Root Device /dev/sda6
   Format /dev/sda5
   Install on /dev/sda5
    200MiB 0:01:37 [2.06MiB/s] [=====================>] 100%
   Upgrade Complete, please remove USB drive if installed
   Press Any Key to Cold Start and Complete the Upgrade Process...
```

13. Remove the USB flash drive from the 8864 USB port.

14. Press **Enter** on the keyboard to reboot the ESC 8864 and complete the upgrade.

15. Download the full configuration from StackVision. If needed, refer to the topic Download Configuration Changes to Controller in the ESC|StackVision Online Help file.

16. ESC recommends that you obtain an "as-left" dump of the newly downloaded ESC 8864 configuration. This will provide a comparison to the "as-found" configuration dump that you created before starting this procedure, which will help troubleshoot problems if, for some reason, the as-found configuration in the ESC 8864 is not the same as the configuration in StackVision.

    Only skip this step if you are absolutely sure the configuration in StackVision matches the configuration in the ESC 8864 and you did not perform an "as-found" configuration dump. For directions, refer to the article How do I get a snapshot of the data controller configuration? in the ESC Customer Community (requires login).

17. If your system uses Modbus, make sure to reload the server.cfg file. For directions, refer to the topic File Transfer Using FTP or File Transfer Using USB in the section Application Note: Modbus Client.

18. Verify polling/communication has been re-established with StackVision by selecting **Tools** > **Controller Tools** from the menu in the StackVision Client and making sure you have a "green" status.

Upgrading via Ethernet

Follow the steps below to upgrade the ESC 8864 firmware remotely via an Ethernet

connection. Please review the following warnings before proceeding.

> ⚠️ **CAUTION:** ESC **highly** recommends that you obtain an "as-found" dump of the current ESC 8864 configuration prior to performing an upgrade. This will provide a baseline to troubleshoot problems if, for some reason, the configuration in the ESC 8864 is not the same as the configuration in StackVision. Only skip this step if you are absolutely certain that the configuration in StackVision matches the configuration in the ESC 8864. For directions, see the article How do I get a snapshot of the data controller configuration? in the ESC Customer Community (requires login). **Failure to obtain an as-found dump of the configuration may result in your CEM system not operating properly or collecting incorrect data.**

> ⚠️ **CAUTION:** If your ESC 8864 uses Modbus, ESC **highly** recommends that you retrieve a copy of the Modbus configuration file "server.cfg" directly from the ESC 8864. Only skip this step if you are absolutely certain that you have an exact copy of the server.cfg file that was last loaded into the ESC 8864. For directions, see the article How do I get a snapshot of the data controller configuration? in the ESC Customer Community (requires login). **Failure to obtain the correct server.cfg may result in your CEM system not communicating correctly with instruments or other external devices such as DCS systems.**

Complete the following steps:

1. Connect to the character-based MDI interface of the ESC 8864 by using either **Emulate to Logger** in StackVision or the free terminal emulation software called **PuTTY**.

   For instructions about how to download and use PuTTY to connect to an ESC 8864, see the section *Startup and Operation > Remote Connections to the Data Controller* in the ESC 8864 Data Controller online help. You can download a copy of the PuTTY software using the web address www.putty.org.

2. Log in to the MDI interface using the integrator-level password. If you do not know the integrator-level password, contact your CEMS Administrator or ESC support.

```
ESC 8864  v5.04r12  ID:01          Home Menu          06/20/18 09:51:35

     H Help Screen
     L Login / Set User Level
     C Configuration Menu
     D Real-Time Display Menu
     R Report Generation Menu
     S Status Menu
     O Log Out / Exit
     X Serial Commo to Port
```

3. "Cold start" the logger by logging in with the password **COLD START**.

> **IMPORTANT:** This deletes all configuration and data. Be sure to read the warnings at the beginning of this procedure if you have concerns. After the cold start, the ESC 8864 will re-boot. Again, connect to the ESC 8864 using either **Emulate to Logger** in StackVision or the PuTTY software program. Log on again using the integrator-level password.

4. Transfer the ESC 8864 firmware upgrade file to a Windows PC that has network access to the ESC 8864. Make sure the firmware upgrade file has been unzipped (the file name must end in ".bin"). Move the firmware upgrade file to the root folder of C: drive.

5. Click the Windows **Start** button and select **Run**. Type **cmd** in the Open field of the Run dialog box, then press **OK**. This opens the Windows command window (cmd.exe).

6. At the command prompt, type the IP address of the ESC 8864 using the format *ftp xxx.xxx.xxx.xxx*. Then press **Enter** on the keyboard.

7. When prompted for a user name and password, type **das** as the user name and the integrator-level password of the logger. If you do not know the integrator-level password, contact your CEMS Administrator or ESC support.

   After entering the password, the system displays an *ftp>* prompt as shown in the next example.

   ```
   C:\>ftp 192.168.1.111
   Connected to 192.168.1.111
   220 Service ready for new user.
   User <192.168.1.111:<none>>: das
   331 User name okay, need password.
   Password:
   230 User logged in proceed.
   ftp>
   ```

8. At the ftp> prompt, type **lcd ** and then press **Enter** on the keyboard. If the firmware upgrade file is not located in the root folder on C: drive, replace the backward slash (\) with the full Windows path to the firmware upgrade file.

   ```
   ftp> lcd \
   Local directory now C:\.
   ftp>
   ```

9. At the ftp> prompt, type **put 8864_Upgrade_xxxxx.bin** making sure to replace **xxxxx** with the version of the firmware. Then press **Enter** on the keyboard. The transfer process may take a few minutes to complete depending on the speed of the network connection.

```
ftp> put 8864_Upgrade_V5.04.bin
200 Command okay.
150 File status okay; about to open connection.
226 Closing data connection. Requested file action successful.
ftp: 56774528 bytes ent in 18.70Seconds 3036.23Kbytes/sec.
ftp>
```

10. After the transfer process completes, type **bye** at the ftp> prompt and then press **Enter** on the keyboard. This closes the connection to the ESC 8864.

```
ftp> bye
221 Service closing control connection
C:\>
```

11. Click the close button (**X**) to close the Windows command window (cmd.exe).

12. Connect to the character-based MDI interface of the ESC 8864 by using either **Emulate to Logger** in StackVision or the free terminal emulation software called **PuTTY**.

    For instructions about how to download and use PuTTY to connect to an ESC 8864, see the section *Startup and Operation > Remote Connections to the Data Controller* in the ESC 8864 Data Controller online help. You can download a copy of the PuTTY software using the web address www.putty.org.

13. Log in to the MDI interface using the integrator-level password. If you do not know the integrator-level password, contact your CEMS Administrator or ESC support.

```
ESC 8864  v5.04r12  ID:01         Home Menu          06/20/18 09:51:35

      H Help Screen
      L Login / Set User Level
      C Configuration Menu
      D Real-Time Display Menu
      R Report Generation Menu
      S Status Menu
      O Log Out / Exit
      X Serial Commo to Port
```

14. Select **S - Status Menu** to open the Logger Status Menu.

```
ESC 8864  v5.04r12  ID:01        Logger Status Menu      06/20/18 09:55:09


    P Power Fail Menu
    L Line Changes Log Menu
    M Message Menu
    A Alarm Status/Log
    C Report Current Cal Status
    1 Display Status of Single Cal
    V View Modbus Master Status
    I System Information
    D Dump Setup(s)
    U Reboot
    S System Maintenance

    T View Secure Comm Status
```

15. Select **S - System Maintenance** to open the System Maintenance menu.

```
ESC 8864  v5.04r12  ID:01        Download Code Menu      06/20/18 10:01:49

    U USB Download
    E Ethernet Download
```

16. Select **D - Download Code** to open the Download Code Menu.

```
ESC 8864  v5.04r12  ID:01        Download Code Menu      06/20/18 11:13:16


    U USB Download
    E Ethernet Download
```

17. Select **E - Ethernet Download** and then select **Y** when prompted *Are You Sure (Y/N)?*

18. Verify the firmware upgrade file has successfully transferred, then press **Enter** on the keyboard.

```
ESC 8864  v5.04r12  ID:01        Download Code Menu      06/20/18 11:13:16

  Please transfer file via FTP.

  Press ENTER after transfer completes.
```

The ESC 8864 will decrypt, extract, uncompress, and verify the upgrade file before installing it on the ESC 8864 as shown in the following example. The process takes 2 to 3 minutes to complete.

```
ESC 8864  v5.04r12  ID:01        Download Code Menu        06/20/18 10:05:53


   Please transfer file via FTP.

   Press ENTER after transfer completes.

   Clearing system config...
   Attempting FTP Upgrade
   Attempting Upgrade with /data/Ftp/8864_UPGRADE_V4.11.BIN
   Decrypt Archive
   54.1MB 0:00:30 [1.79MB/s] [=========================>] 100%
   Extract Upgrade Archive
   54.1MB 0:00:26 [2.02MB/s] [=========================>] 100%
   Uncompress Filesystem Archive
   52.6MB 0:00:44 [1.17MB/s] [=========================>] 100%
   Verify filesystem archive
    132MB 0:00:04 [31.1MB/s] [=========================>] 100%
   Root Device /dev/sda5
   Format /dev/sda6
   Install on /dev/sda6
    132MB 0:00:21 [6.06MB/s] [=========================>] 100%
   Upgrade Complete
   Press Any Key to Cold Start and Complete the Upgrade Process...
```

19. Press **Enter** on the keyboard to reboot the ESC 8864 and complete the upgrade.

20. Download the configuration from StackVision. For instructions, refer to the article How do I upgrade my data controller firmware? in the ESC Customer Community (requires login).

21. If your system uses Modbus, make sure to re-load the *server.cfg* file. For instructions, refer to the section entitled *File Transfer Using FTP* or *File Transfer Using USB* in the "Modbus Client Application Note" of the *ESC 8864 Data Controller User Guide* (Application Note - Modbus Client > Modbus Configuration File > File Transfer).

22. ESC recommends that you obtain an "as-left" dump of the newly downloaded ESC 8864 configuration. This will provide a comparison to the "as-found" configuration dump that you created before starting this procedure. This will help with troubleshooting problems if the "as-found" configuration in the ESC 8864 is not the same as the configuration in StackVision.

    Only skip this step if you are absolutely certain that the configuration in StackVision matches the configuration in the ESC 8864 and you did not perform an "as-found" configuration dump. For directions, see the article How do I get a snapshot of the data controller configuration? in the ESC Customer Community (requires login).

23. Verify polling/communication has been re-established with StackVision by selecting **Tools** > **Controller Tools** from the menu in the StackVision Client. Verify a "green" status is present.

ESC 8864 and ESC 8832 Model Comparison

ESC MODEL 8864	ESC MODEL 8832
General Features ■ CPU – AMD Geode LX 800 ■ Data Bus – 64 bits ■ Speed – 500 MHz ■ Dimensions – 17"W x 5.25"H x 14"D ■ Weight – 12 pounds	**General Features** ■ CPU – Motorola MPC860 Power QUICC ■ Data Bus – 32 bits ■ Speed – 50 MHz ■ Dimensions – 17"W x 5.25"H x 14"D ■ Weight – 15 pounds
Memory ■ 2048 MB Flash – firmware, configuration, and data ■ 256 MB DRAM – working memory ■ 64K L1 cache and 128K L2 cache	**Memory** ■ 6 MB total – firmware, configuration, and data ■ 32 MB DRAM – working memory
Communications ■ Dual 10/100Mbps Ethernet interfaces ■ USB – Three USB 2.0 (two rear, one front) ■ Serial Port 0 – optically isolated RS-232 or RS-485 ■ Serial Port 1 – RS-232 or RS-485 (optional) ■ Serial Port 2 – RS-232 or RS-485 (optional) ■ Serial Port 3 – RS-232 or RS-485 (optional)	**Communications** ■ Single 10Mbps Ethernet interface ■ USB – (none) ■ Serial Port 0 – optically isolated RS-232 or RS-485 ■ Serial Port 1 – optically isolated RS-232 or RS-485 ■ Serial Port 2 – RS-232 (optional) ■ Serial Port 3 – RS-232 (optional)
Display ■ TFT active matrix LCD ■ 16 Million Color ■ 800x480 ■ Capacitive touch-screen	**Display** ■ LCD ■ 16 Color ■ 640x240
I/O Cards	**I/O Cards**

ESC MODEL 8864	ESC MODEL 8832
■ Modular – 8 points per card ■ Card configuration – automatically detected ■ Wiring connectors (same as 8832)	■ Modular – 8 points per card ■ Card configuration – must be manually set
Configuration ■ Channels – greater than 200 ■ Digital I/O points – 999 maximum ■ Channel Names – 20 characters (coming soon) ■ Configuration Upload to StackVision – (coming soon)	**Configuration** ■ Channels – 99 maximum ■ Digital I/O points – 88 maximum ■ Channel Names – limited to 8 characters ■ Configuration Upload to StackVision – (unavailable)

ESC 8864 Frequently Asked Questions

This section provides information for the following Frequently Asked Questions (FAQs):

- What is an ESC 8864?
- Why is ESC coming out with the new ESC 8864?
- What is the MATS rule and am I subject to the rule?
- Do we need an ESC 8864 to comply with MATS? Can we use our ESC 8832?
- Why is ESC asking about our needs for an ESC 8864?
- Can an 8864 directly replace an ESC 8832?
- What will the ESC 8864 do for us that the ESC 8832 is not doing now?
- When is end of support scheduled for the ESC 8832?
- Will future StackVision upgrades force the upgrade of the ESC 8832?
- Can we trade in the current ESC 8832s?
- Can we use the ESC 8832 I/O cards that we already have in the ESC 8864?
- Why would we want to upgrade ESC 8832s to ESC 8864s?
- Where can I find additional information about the ESC 8864?

What is an ESC 8864?

The 8864 Data Controller is ESC's next-generation CEMS controller, replacing the current 8832 Data Controller in our product lineup. You probably have an 8832 installed in your CEMS shelter.

Both the 8832 and the 8864 are responsible for the interface between the measurement analyzers in the CEMS rack and the ESC StackVision data acquisition system (DAS). The 8832 and the 8864 are also responsible for controlling the CEM system calibrations by switching on gas solenoids, performing the timing, and recording the results. Normally an ESC Data Controller is mounted in the CEMS rack with the NOx and other measurement analyzers.

Why is ESC coming out with the new ESC 8864?

There are several reasons for coming out with the 8864, but one reason is that many of our customers are installing new Hg and PM monitors because of the new MATS rule. They will need additional capacity (more channels, more

storage, more digital I/O, etc.) in their controller.

Another reason is that parts are increasingly difficult to find for the 13 year-old 8832 design. Some parts, such as the LCD are already end-of-life from the manufacturer. Consequently, ESC will not manufacture and sell new 8832s once the 8864 is launched.

What is the MATS rule and am I subject to the rule?

The "MATS" rule is the new "Mercury and Air Toxics Standards" that can be found in 40 CFR 63, Subpart UUUUU. These rules are MACT (Maximum Achievable Control Technology) standards for hazardous air pollutants (HAPs). The rule applies to coal- and oil-fired electric generating units (EGUs) and requires the continuous monitoring of mercury, PM, and possibly acid gasses. For the purposes of the rule, EPA defines an EGU as follows:

Electric utility steam generating unit (EGU) means a fossil fuel-fired combustion unit of more than 25 megawatts electric (MWe) that serves a generator that produces electricity for sale. A fossil fuel-fired unit that cogenerates steam and electricity and supplies more than one-third of its potential electric output capacity and more than 25 MWe output to any utility power distribution system for sale is considered an electric utility steam generating unit.

If you don't fall under the definition of an EGU, then the MATS rules doesn't apply to you. But if you are an EGU, then you may need to install new Hg and/or PM analyzers.

Do we need an ESC 8864 to comply with MATS? Can we use our ESC 8832?

As of our current understanding of the MATS rule, we believe that the 8832 will handle MATS requirements.

However, if you are subject to MATS you may be adding new regulatory instruments and recording and reporting additional data values. If you are planning on adding new analyzers to your existing 8832s, then you may want to take a look and see how much free memory, I/O points, and idle time you have available on each of your 8832s.

You can then determine how many new inputs, calculations, and data storage you will need to support any new instruments at each monitoring location. Of course, some of the MATS calculations will only need to be added to StackVision and won't need to be available in the controller (like the 30-day rolling averages), but the instrument-related values will need to be in the controllers. The amount of new space that you will need also depends on how many "diagnostic" parameters (in addition to the actual measurement parameters) from the new instruments that you may choose to store.

If you need more capacity, you can either replace the existing 8832 with an 8864, or add an additional 8864 for the new instruments–and that decision depends on available rack space and your preference.

If you have any questions about how to look at the controller idle time, free configuration memory and free data storage space, then please call ESC support.

Why is ESC asking about our needs for an ESC 8864?

Since the first reporting for the MATS rule goes into effect in 2015, we expect that many customers may want an 8864 in 2014, so we wanted to make sure that we have enough in the manufacturing pipeline for everyone.

Can an 8864 directly replace an ESC 8832?

Yes, in almost all applications, an 8864 can directly replace an 8832. The 8864 has exactly the same physical dimensions and will fit in the same space in the CEMS rack as the existing 8832. The 8864 uses the same wiring connectors and can be dropped in easily for an 8832.

In addition, a configuration that will run in an 8832 will run completely unchanged in an 8864. Just download it from StackVision into the new 8864.

What will the ESC 8864 do for us that the ESC 8832 is not doing now?

In addition to using new parts that we should be able to get for years into the future, the 8864 has several improvements over the 8832:

- 10 times the CPU speed
- 10 times the configuration storage space
- 10 times the Ethernet speed
- Over 20 times the data storage
- Dual Ethernet ports
- 3 USB ports for keyboard, mouse, firmware upgrade, etc.
- New capacitive touch-screen front panel
- Better surge suppression on the I/O cards
- Plug-and-play I/O card auto-identification
- New graphical user interface
- Over 250 channels (8832 limit is 99)
- Up to 999 digital inputs (8832 limit is 88)
- Up to 999 digital outputs (8832 limit is 88)
- 20 character channel names
- Sync configuration between StackVision and 8864 (future)

When is end of support scheduled for the ESC 8832?

ESC recently announced that the official end-of-support date for the 8832 is January 1, 2019. After that date the 8832 becomes obsolete. It is important that you upgrade and prepare your systems before then. For more information, see the article When will support of the 8832 Data Logger end? in the ESC Customer Community (requires login). Also refer to the webinar Future of the 8832 or download the webinar slides from the ESC Resource Library.

Will future StackVision upgrades force the upgrade of the ESC 8832?

At this point, we are planning to support the 8832 in software for as long as we can. Luckily, it looks like all of the new MATS regulations for coal- and oil-fired EGUs won't require any changes to the 8832 firmware. But who knows what the future will bring? There could certainly be new requirements that we can't handle in the 8832, but we just don't know.

Can we trade in the current ESC 8832s?

We are not currently offering trade-ins for 8832's, except as specified in Fortress maintenance agreements.

Can we use the ESC 8832 I/O cards that we already have in the ESC 8864?

No. The existing 8832 I/O cards are a different design and will not work in an 8864. ESC has added additional capability in the 8864 so that the cards can be auto-detected in their slots, in addition to adding additional surge suppression and more modern surface-mount parts.

Why would we want to upgrade ESC 8832s to ESC 8864s?

The biggest thing that customers are seeing in the 8864 is the additional channel and I/O capability. For those that are adding instruments for MATS or the Industrial Boiler MACT, it allows them to add the new instruments without maintaining two data controllers. The additional storage is a big plus for some folks, too.

Another big driver that we are hearing from customers is a move to upgrade their equipment to a later version in order to stay current and avoid any issues with obsolescence or changes to the regulations in the future -- particularly if they are already doing a capital project and have the ability to justify the upgrade. Easier to do it now when you can, vs. sometime later when you have to.

Other customers want the 8864 in order to take advantage of the dual Ethernet. With increased emphasis on network security, they are telling us that the dual Ethernet ports allow them to put one port on the instrumentation network (to talk to the instruments and DCS) and another on their business network (to communicate with StackVision). This tends to alleviate some of the security concerns that the IT folks have.

Where can I find additional information about the ESC 8864?

The pages listed below provide additional information about the ESC 8864 (requires login):

- ESC 8864 Data Controller Online Help
- ESC 8864 Data Controller Information sheet
- ESC 8864 vs. 8832 Comparison Sheet

ESC 8864 Data Controller Features

Information in this section provides an overview of the features in the initial release of the ESC 8864 Data Controller (Firmware Version 4.11). See the following sections for more information:

- Technical Specifications
- Improved Speed, Configuration Space, and Data Storage
- New Hardware Capabilities
- New Firmware Capabilities
- New Touchscreen Navigation
- More Secure in a Network Environment
- 64-bit Power to Control Your CEMS Systems for the Next Decade
- Built on the Heritage of the ESC CEMS Data Controllers: the 8800, 8816, and 8832

Technical Specifications

Component	Specification
CPU	AMD Geode LX 800
Data Bus	64 bits
Speed	500 MHz
Cache	64K L1 cache and 128K L2 cache
FLASH	2GB - firmware, configuration, and data
DRAM	256 MB - operational data and code execution
Ethernet	Dual 10 100 Mbps
Serial Port 0	Optically isolated RS-485 or optional RS-232
Serial Port 1	Optional RS-232 or RS-485
Serial Port 2	Optional RS-232 or RS-485
Serial Port 3	Optional RS-232 or RS-485
MODBUS	MODBUS protocol is supported on any serial or Ethernet port
LCD	7 inch, 16 Million colors, resolution 800 x 480, TFT active matrix
USB	USB 2.0 – two rear, one front port

Component	Specification
Channels	Greater than 200
Digital I/O Points	999 maximum
Dimensions	17.0w x 5.25h x 14.0d inches (43.2w x 13.3h x 35.6d cm) -- 19-inch rack
Weight	About 12 pounds (4.5 kg)
Power	Universal 110/220V C, 50/60 Hz, less than 6 W

Improved Speed, Configuration Space, and Data Storage

While maintaining all of the capabilities of the previous-generation ESC 8832 Data Controller, the ESC 8864 raises the bar for CEMS controllers. Bringing 64-bit computations to the CEMS world, the ESC 8864 offers ten times the CPU speed, over ten times the configuration storage space, ten times the network speed, and over 20 times the data storage of the ESC 8832. The ESC 8864 provides the power and storage you need as you prepare for the new MATS rules or look to modernize your CEMS shelter.

New Hardware Capabilities

The ESC 8864 has dual Ethernet interfaces, allowing the ESC 8864 to communicate independently and simultaneously with an instrumentation or CEMS network and with the ESC|StackVision server that may be located on the corporate business network. Each network port can support multiple sessions of data polling and remote user interaction; all while the ESC 8864 continues to collect, compute, and store new data.

Three built-in USB ports allow the user to connect external keyboards, trackballs, or mice, as well as supporting USB flash drives.

A new, brilliant, capacitive touch-screen and its accompanying Graphical User Interface (GUI) allows users to perform common functions and interact with the ESC 8864 without the use of a keypad or external device. No searching through menus, just touch and you're done. Better yet, the new GUI is also available remotely via a network connection and a web browser.

New Firmware Capabilities

With the new powerful CPU comes significant enhancements to the data controller firmware. While based on the proven 8832 data collection and calculation engine, the ESC 8864 breaks through the 99 channel limit, allowing the user to configure more instruments and more calculations than ever before. Accompanying the channel expansion, ESC has also raised the limit on the number of digital I/O points, allowing up to 999 to be configured. Adding additional Mercury or particulate matter (PM) monitors is no problem with the ESC 8864.

New Touchscreen Navigation

The new ESC 8864 gives you control of your data, right at your fingertips. The touchscreen graphical user interface (GUI) simplifies access to the data controller's powerful and sometimes complex features. The software has been designed for ease of use by operators, with the following most common tasks available on the touchscreen:

- Start, abort, and edit calibrations.
- Graph the last hour of minute data for any channel.
- Open and close digital outputs.
- Switch to MDI mode for system configuration.

The main parts of the touchscreen are defined below:
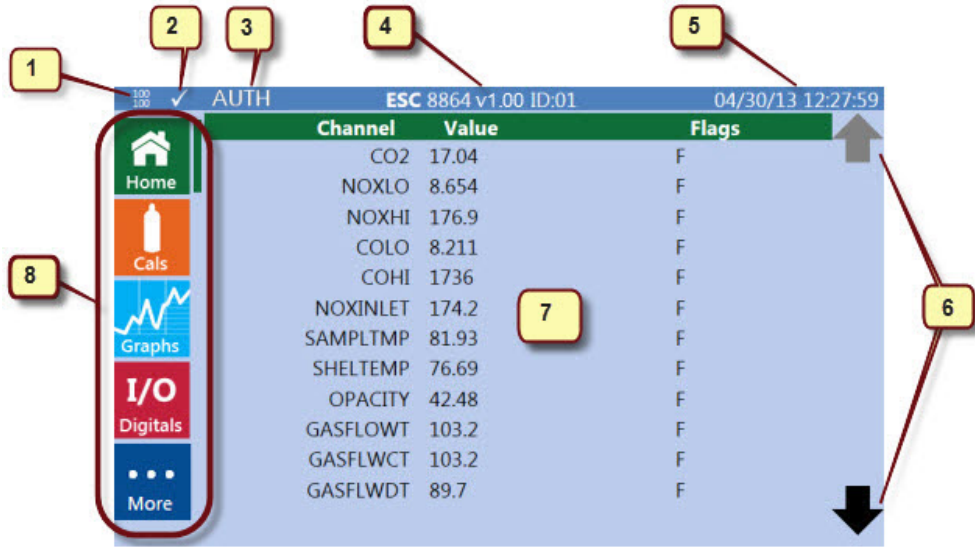
Numbered elements in the image above are described in the following corresponding numbered paragraphs:

1. **Link Lights for Ethernet Ports:** This feature includes the following characteristics. The information displays in the header of all screens.

   - Top number is Port 1.
   - Bottom number is Port 2.
   - 10 indicates a 10 Mbps connection.
   - 100 indicates a 100 Mbps connection.
   - Blank indicates no connection.

2. **Polling Status:** The polling status indicator includes the following characteristics and display on all screens:

   White Checkmark: indicates polling is currently synchronized.

Yellow Question Mark: indicates polling is not currently synchronized.

Red X: indicates data was not polled within the last 5 minutes.

3. **AUTH Indicator:** Attempting to perform any privileged action from the touchscreen (for example, starting or aborting a calibration, toggling a digital output, changing calibration expected values, etc.) will open a Pop-Up Number Pad on the screen. After you enter the correct PIN, the word AUTH is displayed at the top of the screen (to the right of the polling status icon) to indicate that you are logged in to the front panel. After this, you can perform privileged actions without logging in again. The authorized login will timeout after several minutes, or you can logout explicitly by pressing the AUTH indicator.

4. **Firmware Version Number and Controller ID:** The firmware version number is displayed in "v4.xx" format. The "ID:01" portion defines the data controller ID. On other menu screens, this area displays the screen title, such as Active Cal Detail, Cal Status, etc.

5. **Date and Time:** Current date and time. This information is updated once every 1–5 seconds and is displayed in the header on all screens.

6. **Scrolling Buttons:** Press the black up and down arrows at the top and bottom right corners of the screen to scroll the main data area up and down. The arrows are grayed out when not available.

7. **Main Data Area:** Displays data for the active screen.

8. **Navigation Buttons:** Use these buttons to access different menu screens in the 8864 interface.

   The active screen is identified by a colored bar just to the right of the corresponding navigation button. For example, the green bar to the right of the Home button shown in the previous screen example indicates the Home screen is the active screen.

   See the descriptions below for more information.

The touchscreen defaults to the Home screen, but you can access any of the other primary screens listed below by simply pressing their corresponding icon on the left side of the screen.
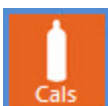
NOTE: Within this documentation, the term "press" means to use your finger or a stylus object to select an item on the touchscreen. The screen has a high sensitivity to touch input; therefore, only a light touch is required to select an item.

View configured channels in a scrollable list.

Value and data flags are updated once every 1 to 5 seconds.

View all calibration sequences, their current status, and the status of their last calibration.

Abort an active calibration.

Manually initiate an automatic calibration.

Change a calibration's expected values.

Provides quick access to current one-minute averages for a chosen channel.
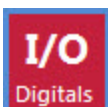
View digital input and outputs, including pseudo I/Os.

Toggle the state of the digital outputs.

Reverse video shows closed inputs or outputs.

For a detailed description of all touchscreen options, see ESC|8864 Data Controller online help on the ESC website.

More Secure in a Network Environment

With the enhanced emphasis on network security, the ESC 8864 has added additional security features. All remote browser connections now require HTTPS and remote terminal sessions now utilize the secure SSH protocol instead of the unencrypted telnet sessions of the past.

64-bit Power to Control Your CEMS Systems for the Next Decade

ESC data controllers are designed to acquire and store CEMS data to ensure that no data is lost in the event of a communication failure with the DAS computer. ESC Data Controllers come with a 90-day guarantee and extended protection can be purchased through the ESC|DASProtect service. DASProtect insures you through the life of your DAS and offers unparalleled service in the industry.

Built on the Heritage of the ESC CEMS Data Controllers: the 8800, 8816, and 8832

For over 30 years, ESC has supplied reliable Data Controllers for CEMS applications. The ESC 8864 continues the tradition of rock-solid controllers that "just work". With a demonstrated Mean-Time-Between-Failure of well over 20 years, it is no wonder that ESC controllers are used nationwide in more CEMS shelters than any other brand. The ESC 8864 is poised to continue that proud tradition.