



EPIC Series Console 2.0 Operations

1.1 — Last update: 6 November 2023

HindlePower Inc

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1. EPIC 2.0 – Operations



Complete your [5-year warranty](#)

SECTION TOPICS

[5-Year Warranty](#)

[Introduction](#)

[Video – Benefits & Features](#)

1.1. 5-Year Warranty

WARRANTY

EPIC CONSOLE WARRANTY

[applies only to product(s) delivered within United States and Canada]



Product Details:

Model:	EPIC Console
Factory Ordering Code:	
Serial Number:	
Date Shipped:	
Date Energized:	

☒ Standard Warranty

This product is warranted to be free from defects in material and workmanship for a period of five (5) years from date of manufacture.

During the term of the warranty period: parts, assemblies, or components deemed to be defective will be repaired or replaced at the manufacturer's option, free of charge. All costs related to removal, reinstallation and transportation will be paid by the purchaser/ customer and/or operator of the product. Evaluation, repair and/or replacement of any defective part(s) are FOB manufacturer's factory.

This warranty does not cover products or parts that are damaged from improper use or abuse, as determined by the manufacturer. Accessory items or additional items carry only their respective manufacturer's warranty. Consumable items (such as fuses and electrolytic capacitors), which wear out under normal use are specifically not covered by this standard warranty. Any consequential damage due to diagnosis or repair by any party other than the manufacturer's authorized personnel is not covered under this warranty.

☐ Extended Spare Parts Warranty

The manufacturer's extended warranty includes all items as mentioned in the 'Standard Warranty' as previously listed, plus reasonable in/ out freight costs related to a warranty claim for parts. Said freight cost is based on either standard UPS rates or common carrier only, as appropriate. Contact your sales representative for more information & pricing regarding the extended spare parts warranty.

Extended Warranty Term Options:

- ___ 1 additional year = 5% of the original purchase price
- ___ 3 additional years = 8% of the original purchase price
- ___ 5 additional years = 10% of the original purchase price

To elect an Extended Warranty as listed above:

1. Check off the desired extended warranty term option.
2. Calculate the price based on the above schedule and your original purchase price.
3. Fill in the missing information on both pages of this certificate.
4. Return a copy of both pages of this completed certificate with an appropriate purchase order to your place of purchase.
5. A confirmation of the extended warranty will be sent to you for display on the console with details regarding the extended warranty and claims for warranty consideration.

* Requests for returns or warranty claims must be made via manufacturer's Return Material Authorization (RMA) instructions and assignment. Contact your sales representative for more information & pricing regarding returns or warranty claims. Returns that do not follow this procedure will not be honored.

Election to any of the above offered extended warranties must be done within the terms of the initial standard warranty.

Extended Warranty Purchase Details:

PO # for Extended Warranty:

Date:

Contact:

Phone:

Fax:

1.2. Introduction



The EPIC Series Console 2.0 is a flexible and expandable modular cabinet capable of housing a complete dc power system for indoor or outdoor use. Separate bays for batteries and electronic components (e.g., charger, dc distribution, etc.) in the console increase safety and reliability of internal components. The modular design of the unit allows for expansion to meet future requirements. The console is compatible with all wall-mountable AT Series battery chargers, and the smaller floor-mountable units.

Adjustable multi-tier, multi-step battery rack assemblies are available, making the EPIC Series Console 2.0 configurable to almost all battery systems. Optional corrosion-resistant spill containment protection is available, installed underneath the battery racks. Internal environmental control options are available to handle extreme weather conditions.

The EPIC Series Console 2.0 will extend battery life through an environmentally controlled thermal management system. The console provides a means for the operator to remotely monitor the system, and aids in NERC requirements through the following features:

- Intrinsically safe hydrogen mitigation system incorporating separate bays for battery and electrical modules with a ventilation system ensuring hydrogen from the battery bay

never reaches the electrical bay per IEEE 1635 requirements.

- The Hindle Health System™, which monitors and controls the internal environment and system components, will alert via Hindle Health System™ status LEDs when attention is required.
- * Easy access to system and internal components without any specialized tools via front and optional rear doors, simplifying maintenance.

1.3. Video – Benefits & Features



<https://www.youtube.com/embed/rb-07B1Jtpg?rel=0>







2. Safety








	SECTION TOPICS
	Key to Safety Symbols
	Equipment Misuse Examples
	DANGERS
	WARNINGS
	CAUTIONS

2.1. Key to Safety Symbols





SAFETY INSTRUCTIONS – PLEASE READ AND FOLLOW TO AVOID SERIOUS INJURY OR DEATH

SYMBOL	MEANING
	Imminently hazardous situation, which if not avoided, WILL result in death or serious injury.
	Potentially hazardous situation, which if not avoided, could result in death or serious injury.
	Potentially hazardous situation, which if not avoided, could result in minor or moderate injury (e.g. minor burns, bruising from pinch points, minor chemical irritation). May also be used to alert against unsafe practices.
	Important information not related to personal injury (e.g. messages related to equipment or property damage).
	LOCKOUT TAGOUT is required before servicing.
	VENTILATION MANDATORY. Maintain at least 6in / 152mm of free air on all vented surfaces for cooling. Allow sufficient clearance to open front panel for servicing.

	Refer to manual.
	SAFETY ALERT. Indicates that a hazardous situation exists. TO REDUCE RISK OF INJURY OR DEATH, refer to accompanying documents, and follow all steps or procedures as instructed.
	DANGEROUS HIGH VOLTAGE inside product enclosure. TO REDUCE RISK OF FIRE OR ELECTRIC SHOCK, do not attempt to open enclosure or gain access to areas where you are not instructed to do so. SERVICING IS TO BE DONE ONLY BY QUALIFIED SERVICE PERSONNEL.
	Allow at least 3 minutes for internal components to discharge to a safe level after performing lockout tagout to prevent exposure to DANGEROUS HIGH VOLTAGE.
	DANGER! Risk of Arc Flash (only for ATevo units with input voltage over 416 Vac)
	EXPLOSIVE GAS can be produced from batteries during normal operation. Never smoke, use an open flame, or create arcs in the vicinity of the ATevo or the battery.
	Do not operate equipment without all guards and/or covers in place.

2.2. Equipment Misuse Examples

! Use of equipment in a manner not specified by manufacturer may impair protection provided by the EPIC Series Console 2.0 and result in **SERIOUS INJURY OR DEATH**

SYMBOL	EXAMPLE
	Do not use the equipment for any purpose not described in this manual.
	Do not operate this equipment without all guards and covers in place.



Do not operate this equipment from any power source that does not match voltage rating stamped on equipment. Refer to Manufacturer's Identification Label for operational requirements.

2.3. DANGERS

⚠ DANGER



Imminently hazardous situation, which if not avoided, WILL result in death or serious injury.

SYMBOL	INSTRUCTION
	Do not touch any uninsulated parts of the EPIC Series Console 2.0, especially the input and output connections, as there is the possibility of electrical shock.
	During normal operation, batteries may produce EXPLOSIVE GAS! Never smoke, use an open flame, or create arcs in the vicinity of the EPIC Series Console 2.0, or any batteries stored inside it.











2.4. WARNINGS

⚠ WARNING



Potentially hazardous situation, which if not avoided, could result in death or serious injury.




SYMBOL	INSTRUCTION
	Remove all jewelry, watches, rings, etc. before proceeding with installation or servicing to avoid electrical shock hazards.

	Do not operate the EPIC Series Console 2.0 with any power source that does not match the specified AC and DC voltage ratings. Refer to the data nameplate decal affixed to the inside of the electrical bay front door for operational requirements.
	Do not operate the EPIC Series Console 2.0 with any supplied guards removed or improperly installed.
	Do not install the EPIC Series Console 2.0 in any environment for which it is not designed.
	Do not operate the EPIC Series Console 2.0 if it has been damaged in any way. Refer to qualified service personnel.
	Before using the EPIC Series Console 2.0, read all instructions and cautionary markings on: a) this equipment, b) battery, and c) any other equipment to be used in conjunction with EPIC Series Console 2.0
	Do not use the EPIC Series Console 2.0 for ANY purpose not described in this manual.
	Turn OFF the EPIC Series Console 2.0 before connecting or disconnecting equipment, battery charger, batteries, etc. to prevent arcing, burning and/or equipment damage.
	De-energize and lock out all AC and DC power sources to the EPIC Series Console 2.0 before servicing.
 	Do not disassemble the EPIC Series Console 2.0. Only qualified service personnel should attempt repairs. Incorrect reassembly could result in explosion, electrical shock or fire.

2.5. CAUTIONS



! Potentially hazardous situation, which if not avoided, could result in minor or moderate injury (e.g. minor burns, bruising from pinch points, minor chemical irritation). May also be used to alert against unsafe practices.

SYMBOL	INSTRUCTION
	Maintain at least 6in / 152mm of free air on all vented surfaces for cooling.
	Allow sufficient clearance to open the front and/or rear doors.
	This manual contains important safety and operating instructions, and therefore should be stored for easy access.

3. Receiving & Mounting

SECTION TOPICS
Storing & Receiving
Unpacking & Inspecting
Reporting Damages & Making Returns
Moving
Mounting
Confirming Console Configuration
Examining Console Layout
Options

3.1. Storing & Receiving

Storing EPIC Console

If you store the EPIC Series Console 2.0 for more than a few days before installation, store it in its original shipping container, in a temperature controlled, dry climate. Ambient temperatures of 0 to 122 °F / -18 to 50 °C are acceptable.

Storage should not exceed two (2) years due to limited shelf life of DC filter capacitors of AT series battery chargers (if installed) when they are not in service.

Receiving

The manufacturer does not assume any liability for damage during transportation or handling. Therefore, upon receipt of EPIC Series Console 2.0 (or related products) immediately unpack, inspect for damage or shortage ([Section 3.2](#)), and report issues found ([Section 3.3](#)).

3.2. Unpacking & Inspecting

Carefully remove all shipping materials from EPIC Series Console 2.0, and save until you are sure it is undamaged. Remove console from shipping pallet. Inspect for possible damage, using checklist below. If damage found, follow the instructions for proper reporting in [Section 3.3](#).

Inspection Checklist

- Includes all items on packing list.
- Model number on data nameplate ([Section 3.6](#)) matches your order
- Enclosure exterior and interior are not marred or dented.
- No visible damage to exterior or interior components.
- Internal components are secure.
- Hardware is tight.
- Wire terminations are secure.
- User's Manual is included.

3.3. Reporting Damage or Shortage

Reporting Damage or Shortage

If damage or shortage is found, notify the delivery person and make notation on all copies of carrier's receipt before signing. If such is discovered after delivery, notify carrier immediately and request an inspection. The manufacturer does not assume any liability for damage during transportation or handling. Should the products require an inspection by (or return to) the manufacturer, please contact your sales representative for further instructions.

3.4. Moving

Once you have established that the EPIC Series Console 2.0 is undamaged, use the instructions on the following pages to move the unit safely:

[Identifying Dimensions & Weight](#)
[Methods for Moving](#)



Do NOT lift, push, or relocate the EPIC Series Console 2.0 with batteries of any type installed within the enclosure.

3.4.1. Identifying Dimensions & Weight

Dimensions

Identify the dimensions of your EPIC Series Console 2.0 by the number of bays in the unit.

Dimensions by # of Bays (in./mm)			
Bays	Height	Depth	Width

1	83.36/2168	43.00/1092	36.74/933
2	83.36/2168	43.00/1092	72.99/1854
3	83.36/2168	43.00/1092	109.24/2775
4	83.36/2168	43.00/1092	145.49/3695
5	83.36/2168	43.00/1092	181.74/3695

Total System Weight vs. Shipped Weight

Since the EPIC Series Console 2.0 ships from the manufacturer without batteries installed, total weight of the complete system of console, batteries, charger, etc., is not available with this manual.

To get the total weight of the system, add the weight of the battery and any field installed equipment to the EPIC Series Console 2.0 weight shown in the approval drawings included with this manual.

Please consult your battery manufacturers' literature for battery weights.

3.4.2. Methods for Moving

The standard EPIC Series Console 2.0 does not have top-lifting eyes for moving, though this option is available, as discussed in [Section 3.8 Options](#). To move the standard-equipped console on its supplied shipping pallet, use a forklift. Once the pallet has been moved to the console's desired mounting location, supplied lifting straps can be used to lift the console, remove the pallet, and return the console to the floor.

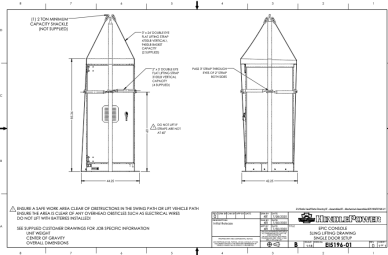
Lift Strap Instruction Video

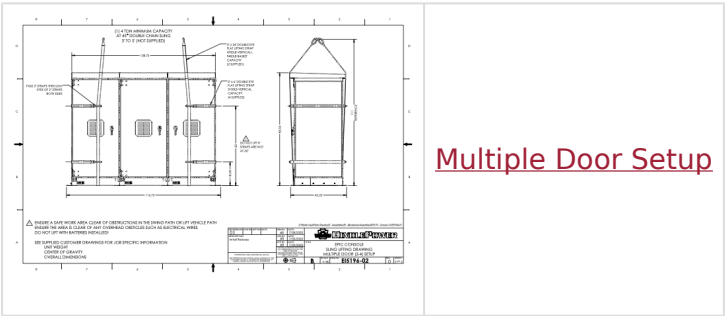


https://www.youtube.com/embed/_j642IH8qOI?rel=0

Lift Strap Diagrams


Based on the number of doors in your unit, click on the appropriate link to see an enlarged diagram of how the lift straps should be placed before lifting.

Thumbnail	Link
	Single Door Setup



With the optional lifting eyes, the console can be transported using rigging connection points on the roof. The sling angle, as measured from the sling to the roof of the enclosure should be no less than 60 degrees.

3.5. Mounting

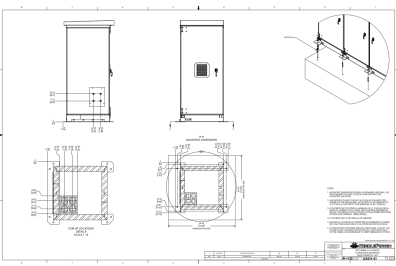


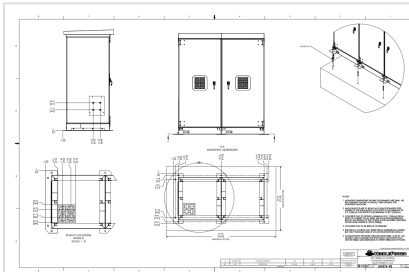
WARNING

Do NOT lift, push, or relocate the EPIC Series Console 2.0 with batteries of any type installed within the enclosure.

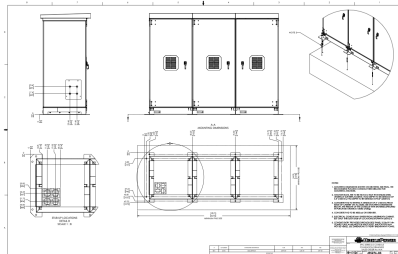
The EPIC Series Console 2.0 is designed for floor mounting on a permanent, flat, leveled surface, preferably concrete or other fireproof material. The surface must be capable of supporting the weight of the complete system of console and installed components. Since the EPIC Series Console 2.0 ships from the manufacturer without batteries installed, total weight of the complete system of console, batteries, charger, etc. is not available with this manual. Please consult your battery and charger manufacturers’ literature for appropriate weights and add these to the shipped weight to obtain the total system weight.

Refer to appropriate Foundation Mounting Drawing, according to the number of bays your unit has, for mounting dimensions, shipped weight, and mounting instructions.

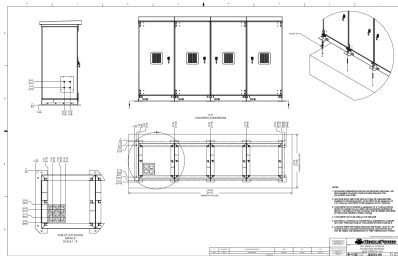
Thumbnail	Link
	JE5276-01 Single Bay Foundation Mounting Drawing



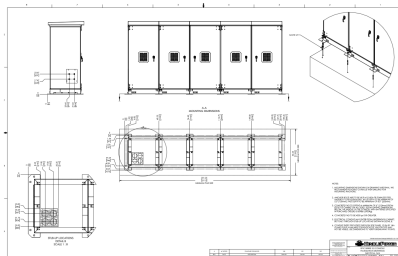
[JE5276-02 Two Bay Foundation Mounting Drawing](#)



[JE5276-03 Three Bay Foundation Mounting Drawing](#)



[JE5276-04 Four Bay Foundation Mounting Drawing](#)



[JE5276-05 Five Bay Foundation Mounting Drawing](#)

Basic notes that apply to all consoles, which are also found on the drawing are:

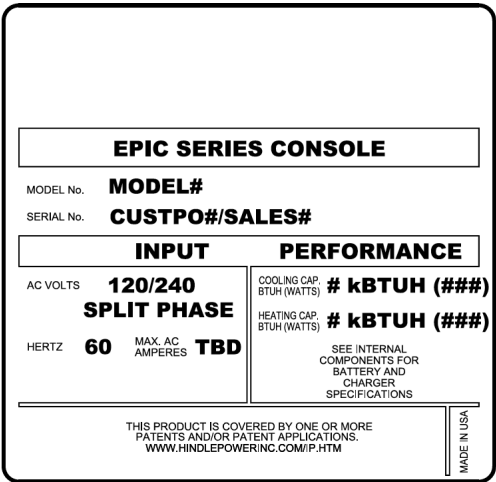
1. We recommend placing the console then drilling for mounting anchors. Mounting holes are on the console's mounting feet.
2. Anchor bolts are to be HILTI M12 HDA-TR Stainless Steel Undercut for seismic compliance (not supplied).
3. Hole Depth minimum of 5.3" [135mm]; Pad Depth minimum of 8.0" [203mm].
4. Lag the enclosure to the fireproof surface. Follow NEC (NFPA-70), all safety standards, and fire codes of the site in which the console is to be installed.
5. Concrete pad should extend a minimum of 6" [153mm] from edge of cabinet on all sides, and be 4000 psi or greater.
6. Electrical conduit may enter from underneath cabinet, but only through electrical bay shown in Detail B on Foundation Mounting Drawing.
7. Electrical conduit may also enter through side channel. There are (3) #2 and (1) #1 size

conduit holes available for knockouts as seen in Foundation Mounting Drawing. Knockouts may not be visible; use dimensions to verify breakaway points.

3.6. Confirming Console Configuration

Obtaining Model Number from Data Nameplate

The EPIC Series Console 2.0 features a data nameplate attached to the inside upper corner of the door, normally of the electrical bay.



The listed model number is applicable only to the actual enclosure, not the battery charger, batteries, nor any other self-contained device mounted inside the cabinet which is not an accessory of the EPIC Series Console 2.0. The model number refers to the type of enclosure as described below.

The serial number may be number-sequenced to represent multiple units of similar design, but not multiple stations of a single assembly. The input ratings refer to the console’s internal electrical system which may include battery chargers and all environmental accessories (hot/ cold weather kits) if supplied. See information listed on the console’s internal components (e.g., batteries, battery charger, dc distribution, etc.) for output ratings of those particular items.

How to Read Configured Model Number

The factory-configured model number of your EPIC Series Console 2.0 is coded to describe the size and type of cabinet, as well as the included features and options.

Please find the model number on the data nameplate and write it in the space provided above the table on the next page. Refer to the codes in the table to determine the configuration of your particular console.

JF5046-02

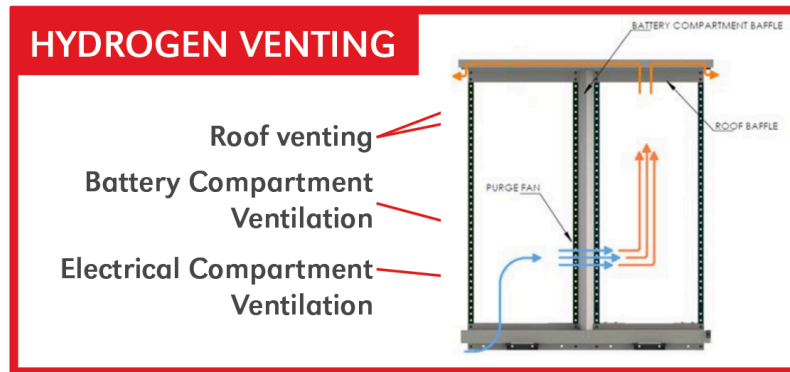
Quote # / Sales # _____

EPIC DC Power Console Series 2.0**ORDERING CODE**

Position	Feature	Feature Description	Feature Selection	Code
1	A	Series	EPIC Series Console	C
2			2	2
3	B	Construction Material	Carbon Steel / Grey	G
			Carbon Steel / White	W
			Stainless Steel	S
4	C	Total # Of Battery Sections	None	N
			# Of Battery Sections	#
5	D	Total # Of Electrical Sections	None	N
			# Of Electrical Sections	#
6	E	Battery Section Access	Front	F
			Front and Rear	R
7	F	Battery Section Environmental Options	Heater	H
			Air Conditioner	A
			Heater & Air Conditioner	B
8	G	Battery Rack Configuration Code	1st Digit	#
9			2nd Digit	#
10	H	Seismic Battery Bracing	None	N
			Supplied	S
11	I	Battery Section Spill Containment	None	N
			Supplied, NiCd	K
			Supplied, Pb	L
12	J	Electrical Section Access	Front	F
			Front and Rear	R
13	K	Electrical Section Environmental Options	None	N
			Heat	H
14	L	Electrical Section Configuration code	1st Digit	#
15			2nd Digit	#
16			3rd Digit	#
17	M	Hydrogen detection	None	N
			Supplied	H
18	N	Fire Safety	None	N
			Smoke Detector	S
			Fire Extinguisher	E
			Detector & Extiguisher	B
19	O	Not Used	Not Used	X
20	P	Not Used	Not Used	X
21	Q	Custom Requirement	None	N
			Requested	C
22	R	Customer identification	1st Digit	#
23			2nd Digit	#
24			3rd Digit	#

3.7. Examining Console Layout

Designed for Thermal Management & Ventilation (Hydrogen Purging)



The EPIC Series Console 2.0 is a flexible and expandable modular cabinet capable of housing a complete dc power system for indoor or outdoor use. Models consist of 1–5 bays, with combinations of electrical and battery bays according to customer needs. The console design meets [IEEE 1635-2018, “Ventilation and Thermal Management of Batteries for Stationary Applications.”](#) By means of the following design features, it purges hydrogen to a level of less than 1% and ensures that hydrogen from the battery bay never reaches the electrical bay:

- Separate bays for batteries and electronic components (e.g., charger, dc distribution, etc.) as described in the next two sections.
- Exhaust fans in the eave of each roof — battery and electrical bays.
- Make-up air vent in each door — battery and electrical bays.
- [Hindle Health System™](#) monitoring and control of the internal environment and system components. Alerts via HHS status LEDs when attention is required.
 - Alarms when components that are part of the ventilation system have failed (see [Section 7.4](#)).
 - Alarms for 1% and 2% hydrogen should hydrogen detectors be installed (see [Section 7.4](#))

Electrical Bay

The EPIC Series Console features an electrical bay on the left-hand side and a battery bay on the right. This standard left-right configuration may be reversed on custom orders. The electrical bay houses most of the electrical system components. This may include the battery charger, DC distribution, AC distribution, environmental controls and the Hindle Health System. This also houses any third party electrical equipment the user may want to install after installation.

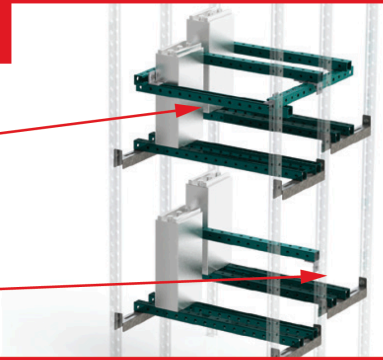
Battery Bay

The battery bay of the EPIC Series Console is typically customized for a specified battery. Adjustable battery shelves are supplied made of 12 GA Unistrut and protected with a plastic cover. A single shelf or two-tier system of shelves may be supplied. Individual battery shelves may be 1-step or 2-step, based upon battery system requirements.

BATTERY RACKING

Seismic battery rack
meets IEEE 693,
CBC 2013 and IBC 2012
(OPTIONAL)

Adjustable UniStrut®
in horizontal and
vertical positions



The total mountable area of the battery shelf system varies based upon ordered configuration and intended batteries. An optional corrosion-resistant spill containment system may be provided underneath battery racks. The battery bay will also house heaters, air conditioner, temperature probes, hydrogen detector and smoke detector if these options are being utilized.

Separation Baffle

The EPIC Series Console features a non-conductive, non-corrosive, phenolic, vertical separation baffle between the electronic and battery bays. This design helps control the battery bay environment and separates any hydrogen that may de-gas from the battery from the electrical equipment. It is also important to note that the [Hindle Health System described in Section 8](#) automatically purges the battery bay so that concentrations of hydrogen cannot reach explosive levels.

3.8. Options

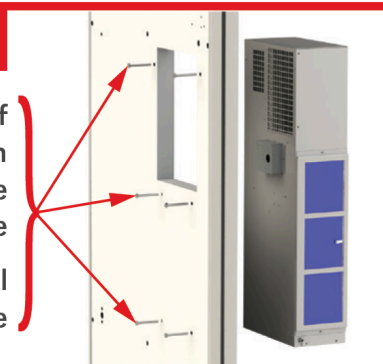
Click on any toggle below to see a description of the available option:

Battery Bay Cooling

AIR CONDITIONER

6 Points of
connection
to ensure
no leakage

Easy to install
& remove



Battery bay cooling is managed by the EPIC Controller which controls all installed air conditioner units. This option will ensure that internal temperature will remain below 77°F / 25°C even if external ambient temperature should reach 120°F / 49°C. Multiple air conditioning units may be utilized depending on the size of the console. Each air conditioner will have its

own feed breaker to allow for continued cooling if maintenance should be required on one of the units.

Battery bay temperature is automatically controlled by the EPIC Controller. The user does not need to set a thermostat. Temperature thresholds are pre-programmed. The Hindle Health System will alarm if the internal temperature exceeds 77°F / 25°C. This will indicate that one of the air conditioners may not be operating properly.

Battery Bay Heating

Battery bay heating is managed by the EPIC Controller which controls all installed heaters. This option will ensure that internal temperature will remain above 73°F / 23°C even if external ambient temperature should reach -30°F / -34°C. Consoles that have a number of battery bays equipped with this option will have a heater in each battery bay. Battery bay temperature is automatically controlled by the EPIC Controller. The user does not need to set a thermostat.

The Hindle Health System will also alarm if the internal temperature drops below 73°F / 23°C, indicating that the heater may not be operating properly.

The battery bay heating option is a fan-forced, up-flow electric air heater that is wall-mounted to the separation baffle in the lower left corner of the battery bay. The heater is tested to UL standards, factory rated at 120V, 208V, and dual field rated at 208V/240V, equipped with high-temperature safety shutoff, and capable of delivering 40-55 CFM.

Seismic Compliance



The seismic compliance option will allow you to meet seismic requirements using built-in adjustable battery bracing and anchoring per drawing JE5276-00.

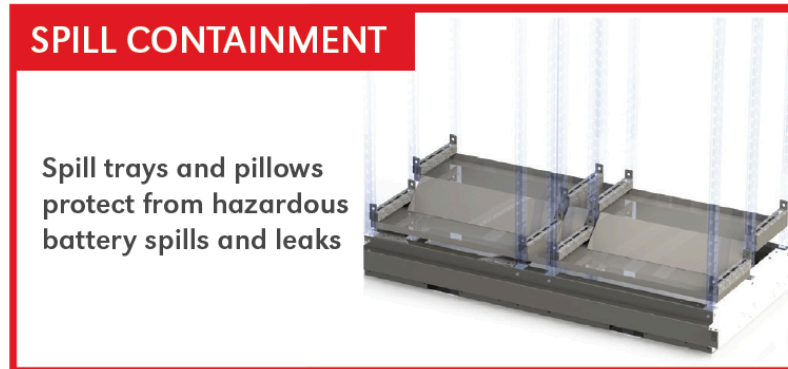
The following standards will be met:

- IBC (2012): International Building Code; Seismic certified, essential equipment
- CBC (2013): California Building Code; Seismic certified, essential equipment
- IEEE 693 (2018): IEEE Recommended Practice for Seismic Design of Substations; High, Seismic certified, essential equipment (up to 1000 lbs./door or width of bay)
- IEEE 693 (2018): IEEE Recommended Practice for Seismic Design of Substations; Moderate, Seismic certified, essential equipment (up to 2000 lbs./door or width of bay)

Console Lighting

The lighting option makes it easier to see anywhere inside the console. The lighting is a series of sealed LEDs that span the entire length of the console. The lighting option can be ordered with automatic door switches or a master light switch housed in the electrical bay of the console.

Spill Containment



The spill containment option allows for safe-keeping of battery acid if a spill should happen to occur. Each battery bay will have four (4) acid absorbing pillows on a tray located in the bottom of the console. These trays are designed to be easily removed in the event of a spill so that new pillows can be replaced.

GFI Outlet

The GFI outlet option allows the user to add multiple outlets to the electrical bay. This provides a source of power for tools, test equipment, or external device charging.

Leg Extension Kit

The 10" (254 mm) leg extension kit option allows for more ground clearance from the bottom of the console to the pad that the console is mounted on. The mounting layout of these extensions mimics the mounting design of the console so the same layout will work with or without. This option would be utilized in areas of increased snow accumulation or flooding. Assembly of the kit is required.

Crane Lifting Kit



The lifting eyes allow for transport or installation of the Epic series console using rigging connection points on the roof. The sling angle, as measured from the sling to the roof of the enclosure, should be no less than 60 degrees.



Do NOT lift, push, or relocate the EPIC Series Console 2.0 with batteries of any type installed within the enclosure.

4. Wiring

Standard System Wiring

The EPIC Series Console 2.0 is supplied without power cabling, since application requirements and local/site codes supersede the console manufacturing standards. All user-supplied system wiring (e.g., ac line feed, battery charger, battery, dc distribution, ...) connected to, from, and within the console should meet National Electric Code (NEC) standards as well as local/site codes. Confirm polarity of all dc cabling before making connections.

All system wiring supplied with the EPIC Series Console 2.0 uses XLPE wire per HindlePower standard CB0002-00.

The console accepts 120/240 VAC split phase as its standard input. Operation is powered by 120 VAC (line, neutral). Battery chargers connected to the console operate from 240 VAC (line, line). Non-standard inputs may be made using an isolation transformer.

As noted in [Section 3.7](#), the EPIC Console may be supplied with more than one type of bay and may have multiple bays of each type. Each bay — battery bay or electrical bay — will contain electrically powered equipment, so is supplied with NEMA two-hole ground pads for grounding such equipment.

Optional Wiring

If ordered as such, the EPIC Series Console 2.0 may be supplied with system cabling from an installed battery charger to an installed dc distribution system. Also, the console may be supplied with user-specified battery cabling of required length and gauge. Pre-wired battery cabling is end-marked with positive (+) red, and negative (-) black leads.

Communications Ports

The EPIC Controller has two RS-485 serial ports and one Ethernet port. One of the RS-485 ports (COM1) operates as a Modbus master port; the other RS-485 port (COM2) operates as a slave port using either the Modbus or DNP protocols. The RS-485 Modbus master port allows the controller to access information from Modbus slave devices such as AT series and ATevo battery chargers. The RS-485 slave port, when connected to an external SCADA system, allows remote access to all the EPIC Controller alarms, set points, and status indications.

COMMUNICATION PORTS



5. Controls & Navigation



SECTION TOPICS

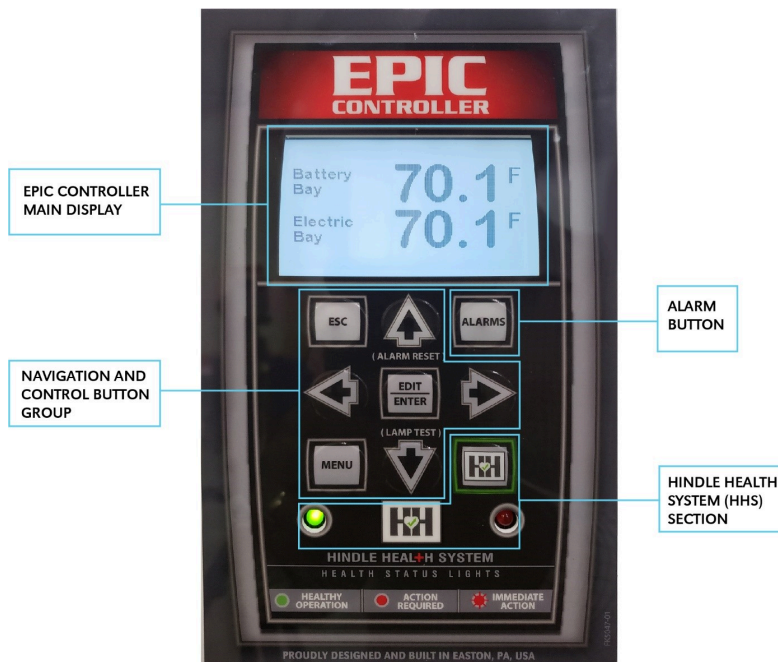
[EPIC Controller](#)

[Overview of Screens](#)

[Main Menu and Navigation](#)

5.1. EPIC Controller

EPIC Controller is organized into four (4) major groups or sections.



Click on each of the following sections to learn more about each of these major groups or sections:

Main Display

A back-lit Liquid Crystal Display (LCD) shows all system status and configuration information. The display is discussed in [Section 5.2, Overview of Screens](#)

Navigation and Control Button Group

This group of buttons (MENU, ESC, EDIT/ENTER, LEFT, RIGHT, UP, and DOWN) is used to navigate through EPIC Series Console 2.0 screens and menus. These controls are discussed in [Section 5.3, Main Menu & Navigation](#).

Alarms Button

The ALARMS buttons is used to access a screen which displays alarm statuses. The alarms screen is discussed in [Section 7, Alarms & Indicators](#).

Hindle Health System (HHS) Section

The Hindle Health System section consists of the HEALTH BUTTON (HH) and the **RED** and **GREEN** health indication LEDs at the bottom of the panel. The Hindle Health System is discussed in [Section 8, Hindle Health System](#).

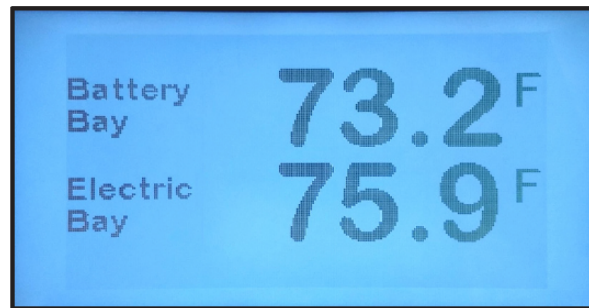
5.2. Overview of Screens

EPIC Controller's display is a back-lit Liquid Crystal Display (LCD) that is capable of displaying various text sizes and graphical objects. The graphical display, in combination with the front panel control buttons, provides a powerful interface that is easy to use. The various screens include user prompts and navigation icons to simplify the experience.

EPIC screens can be grouped, by function, into five basic types. Click on the expandable toggles below for more details:

HOME Screen

The HOME screen is the primary screen for the user; it shows current battery bay and electric bay temperatures. If your EPIC Series Console has only one door, or one type of bay, one of these values will show a dashed line to indicate that the second temperature zone is not present. Icons for HEAT, A/C and FAN will also appear at the top left of the HOME screen when the associated climate control is active.



System Settings Screens

These screens, described in [Section 6, Startup & Configuration](#), are used for changing set points and configuration.

Alarm Screen

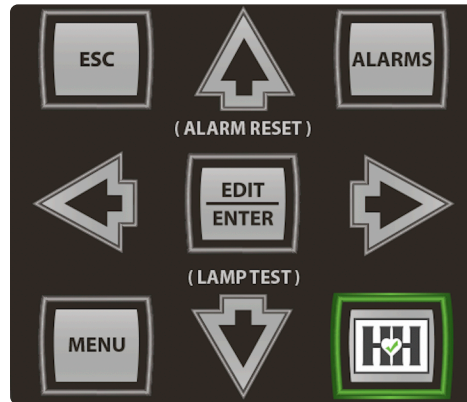
The alarm screen, accessed by pressing the ALARMS button, shows all current alarms. You will be alerted to an active alarm by either a steady or blinking **RED** Hindle Health System (HHS) LED. Alarms are discussed briefly in [Sections 5.3.4](#) and [5.3.5](#), and in depth in [Section 7](#).

Hindle Health System Screens

Hindle Health System screens are associated with the Hindle Health button (HH). When (HH) is pressed, the EPIC Controller enters a user-assisted self-diagnostic mode. Screens prompt the user to participate in a series of tests that confirm that the EPIC Series Console 2.0 is operating correctly. The Hindle Health System is discussed briefly in [Section 5.3.5](#) and in depth in [Section 8](#).

5.3. Main Menu & Navigation

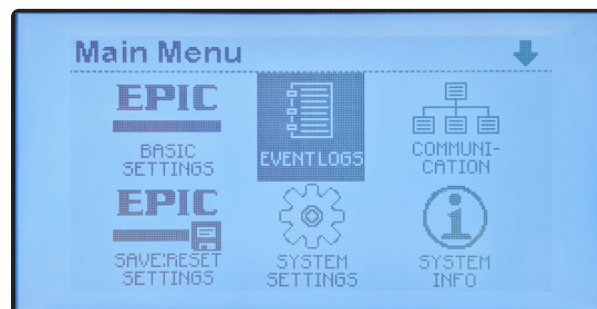
The navigation control buttons (MENU, ESC, EDIT/ENTER, LEFT, RIGHT, UP and DOWN) are used to navigate through EPIC Series Console 2.0 screens and menus. This system is intuitive to most people as it is similar to universally-adopted television remote control navigation buttons.



- [Menu and Arrow Buttons](#)
- [EDIT/ENTER Button](#)
- [Navigation Conventions in this Manual](#)
- [Escape \(ESC\) Button](#)

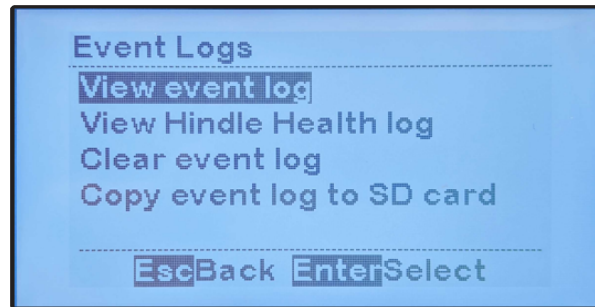
5.3.1. Menu and Arrow Buttons

Press the MENU button to access the Main Menu. The five menu selection icons appear. Use the UP, DOWN, LEFT, or RIGHT arrow buttons to navigate. Icons appear in inverse video when selected. In the screenshot below, the user has already pressed the DOWN arrow to select “Event Logs”.

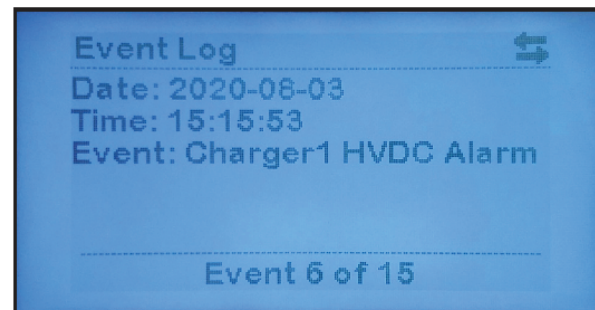


5.3.2. EDIT/ENTER Button

Pressing the EDIT/ENTER button will activate the feature or function selected onscreen. As an example, in the prior screenshot, ‘Event Logs’ was selected. Pressing EDIT/ENTER with this selection will open the Event Logs screen.



Pressing EDIT/ENTER with 'View event log' selected, as shown above, takes the user to an event log entry as seen below.



The previous screenshot is an example where a left and right arrow icon appear in the top right of the display. This indicates that pressing either LEFT or RIGHT arrow buttons will show additional events. These buttons are also used when moving between numbers when setting parameters.

5.3.3. Navigation Conventions in this Manual

In the previous two pages, a sequence of commands was executed that caused a sequence of screens to display. That example was provided to illustrate the use of the UP, DOWN, LEFT, RIGHT arrow buttons, and the EDIT/ENTER button for navigation.

The full command sequence shown was:

1. Press MENU to open the Main Menu screen.
2. Press DOWN to select EVENT LOGS.
3. Press EDIT/ENTER to open 'Event Logs' screen.
4. Press UP OR DOWN arrows to navigate to 'View event log'.
5. Press EDIT/ENTER to open an event log screen.

Using a full command sequence with every command in this manual would lead to needless repetition and excessive document length. As the above example illustrates, most of the

repetition comes from listing every navigation button push. Because the EPIC Controller uses a simple, nearly universal navigation system that is used by most tv remote controls, it is not necessary to list the following navigation button pushes: UP, DOWN, RIGHT, LEFT or EDIT/ENTER. This convention results in a streamlined sequence of EPIC-specific commands.

For our example, this is:

1. Press MENU to open the Main Menu screen.
2. Execute the EVENT LOGS command on the Main Menu.
3. Execute the “View event log” command on the Events Logs screen.

To simplify further, we use a shorthand convention that makes use of the “>” character between commands.

Navigation Convention: Command > Command > Command

With this convention, the previous example’s command sequence is:

MENU > EVENT LOGS > “View event log”.

Screen Convention:

In the same way that the character “>” is used between commands in a sequence, the same character appears between a sequence of screens.



5.3.4. Escape (ESC) & Alarm Buttons

Escape (ESC) Button

In general, pressing ESC returns back one menu level. Examples below illustrate its use:

- If Main Menu displayed: ESC will return to HOME screen.
- If in SYSTEM SETTINGS screen, pressing ESC will return to Main Menu. Pressing ESC again will return to the HOME screen.

Alarms Button

The ALARMS button shows the Active Alarm List – five alarms per page. If more than five alarms are active, use UP and DOWN arrows to scroll through the list.

EPIC Console alarms light the COMMON alarm LED on the front panel; there are no dedicated LED alarm indicators on the front panel (as there are for ATevo Battery Chargers). See [Section 7](#) for details on alarms.

5.3.5. Hindle Health System Button

The [HH] button initiates the EPIC Console's Hindle Health System (HHS). The user is guided through a series of tests that verify that the console and connected equipment are working properly. The HHS monitors the internal environment and system components and will alert you when attention is required via the HHS status LEDs – that appear on the door of the EPIC Series Console 2.0 and on the EPIC Controller. This information can be reported via Modbus or DNP protocols using an RS-485 serial port or Ethernet.



- The **GREEN** indicating LED lets the user know, from a distance, the system is operating properly and maintaining system reliability.
- The **STEADY RED** indicator lets the user know there is an alarm or issue that requires action, but the console is still maintaining system reliability.
- A **BLINKING RED** indicator lets the user know there is an alarm that requires immediate action because system reliability is at risk.

Test results are logged with a time and date stamp, as discussed in [Section 9, Event Logs](#). The HHS can monitor many parameters. Most will be standard console features, but with the integration of an AT Series or ATevo battery charger more can be added. Any equipment within the EPIC Console system, including but not limited to: battery chargers, converters, heaters, air conditioners, smoke alarms, hydrogen detectors, fans, door alarms, and voltage sensing equipment can be monitored. Any device able to communicate a common alarm can be integrated into EPIC's HHS.

A complete description of the tests performed by the Hindle Health System can be found in [Section 8](#).

✿ If your console was shipped before all these HHS capabilities were functional, contact the manufacturer at 610-330-9000 to obtain a firmware update that will enable them.

6. Startup & Configuration

SECTION TOPICS

[Startup](#)

[EPIC Series Console 2.0 Main Menu](#)

[Configuring Basic Settings](#)

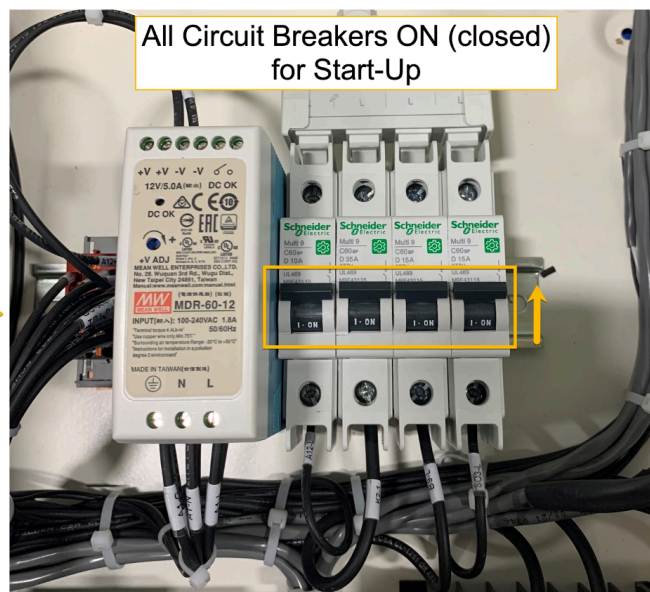
[Configuring System Settings](#)

[Accessing System Information](#)

[Accessing Communication Settings](#)

[Accessing Event Logs](#)

6.1. Startup



6.1.1. Startup Sequence & Factory Settings

When you start the EPIC Series Console 2.0 for the first time, it will:

- Use the FACTORY SETTINGS listed in the following table. (If necessary after startup, you may change some settings using the instructions in [Section 6.3, Configuring Basic Settings](#).)
- Take about 15 seconds to start.

Factory Settings			
Parameter	Description	Temperature (°F)	Temperature (°C)
Battery Bay Low Temp Alarm	Temperature within battery bay at which "Battery Bay Low Temperature Alarm" becomes active.	60.0	15.6
Battery Bay Low Set Point	Temperature within battery bay at which heater turns ON.	70.0	21.0
Battery Bay Target	Target temperature to be maintained in the battery bay. It is calculated (not set) as the midpoint between Battery Bay Low Set Point & Battery Bay High Set Point.	73.4	23.0
Battery Bay High Set Point	Temperature in the battery bay at which air conditioner turns ON.	77.0	25.0
Battery Bay High Temp Alarm	Temperature within the battery bay at which "Battery Bay Overtemp Alarm" becomes active.	100.0	37.8
Electrical Bay Low Temp Alarm	Temperature within electrical bay at which "Electrical Bay Low Temperature Alarm" becomes active	32.0	0.0
Electrical Bay High Temp Alarm	Temperature within electrical bay at which "Electrical Bay Overtemp Alarm" becomes active.	120.0	48.9

6.1.2. Checking Installation & Starting Up

Prior to powering up the EPIC Series Console 2.0 for the first time, it is recommended that:

- You have followed installation instructions carefully.
- You check that AC input supply voltage and battery voltage match information on the EPIC Series Console 2.0 nameplate ([Section 3.6](#)).

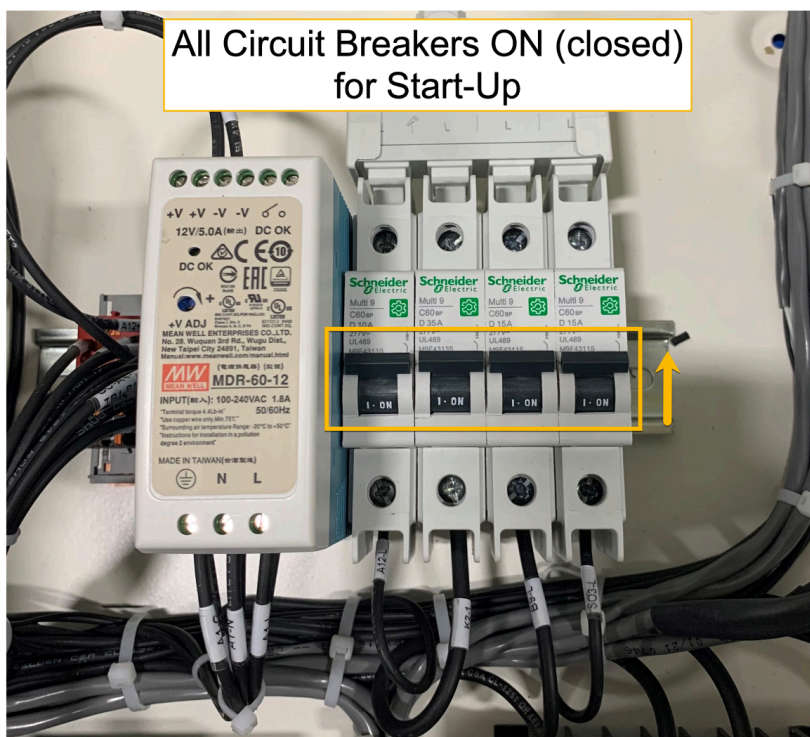
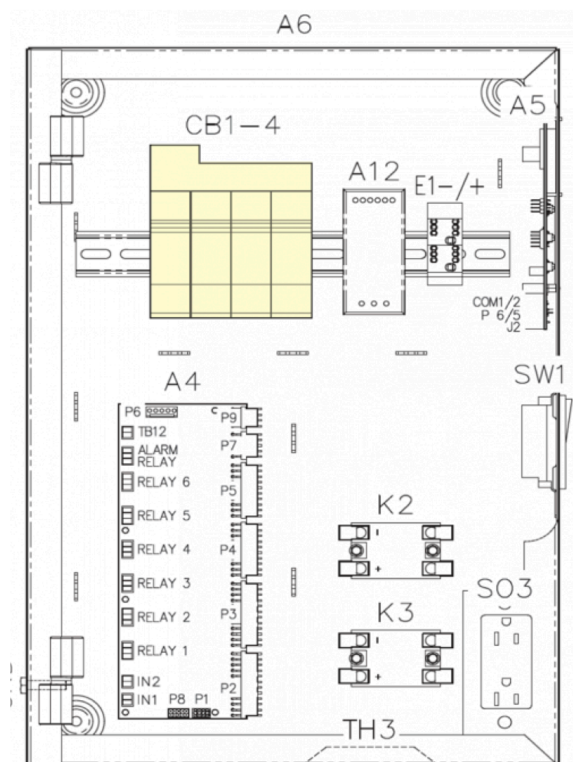


Installation and connections must be made by a professional electrician. Ensure that the console is properly grounded.

Start up as follows:

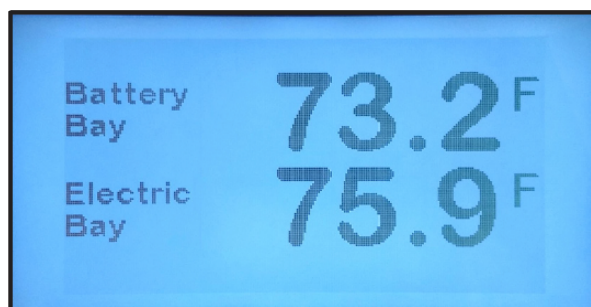
1. Turn ON (close) all AC input breakers located inside the EPIC Controller – as seen in the circuit diagram and photo below.
2. Turn ON battery charger breakers (if applicable).
3. You will briefly see EPIC Controller version, followed by the HOME screen which displays the current battery and electric bay temperatures. The **GREEN** Hindle Health System light should be lit.

- If you see a **RED** Hindle Health System light, or the display does not light, turn off all AC breakers and recheck connections, then repeat steps 1-3.
- If you continue to receive a **RED** Hindle Health System light or still do not have a lit display, please call 610-330-9000 for technical support.



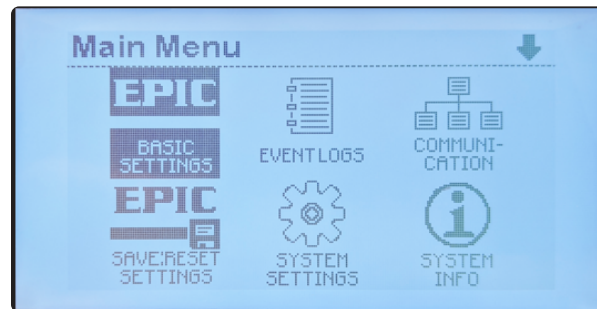
6.1.3. HOME Screen

The default HOME screen appears after the system has started, showing the current battery and electric bay temperatures.



6.2. EPIC Console Main Menu

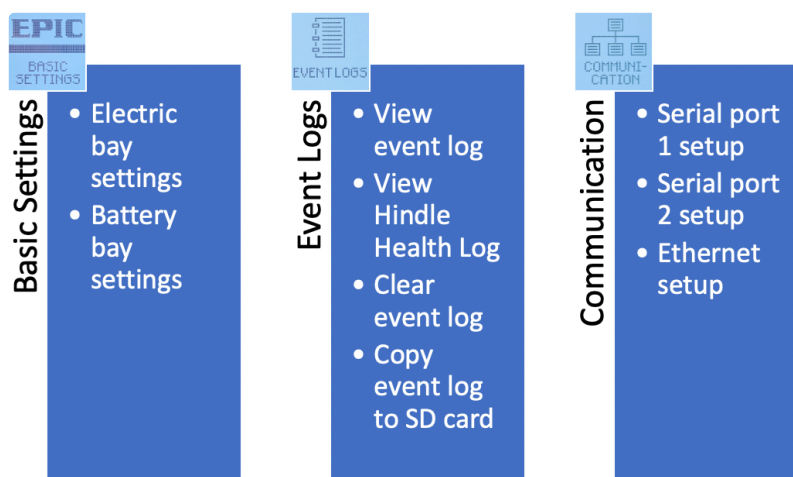
Press "MENU" to access the Main Menu. The five menu selection icons appear. Use the UP, DOWN, LEFT, or RIGHT arrow buttons to navigate. Icons appear in inverse video when selected; in the picture below, "Basic Settings" is selected.




Pressing the EDIT/ENTER button will activate the selected feature or function. Pressing the ESC button will return back one menu level. If the Main Menu is being displayed and ESC is pressed, the display will return to the HOME screen. Pressing the ESC button while in the SYSTEM SETTINGS screen will return to the Main Menu. Pressing ESC again will return to the HOME screen.

6.2.1. Main Menu Overview


The diagram below provides a quick overview of tasks you can perform using each of the menus that are discussed in more detail on the next page. Afterward, you will see how to perform the tasks that can be done from each menu.






Save: Reset Settings

- Backup to memory card
- Restore from memory card
- Reset to defaults



System Settings

- Time
- Date
- Temperature
- Scale





System Information

- Software version
- Relay board version

6.2.2. Main Menu Icons

The table below describes the function of all of the buttons in the main menu:

Icon	Function
	Opens configurable options for Basic Settings which include temperature setpoints f !(center) or the battery and electrical bays. Refer to Section 6.3 for instructions.
	Opens a list of Event Log functions. You can view and clear logged events. Refer to Section 6.7 to learn how to access these logs and to Section 9 to examine log functions in detail.



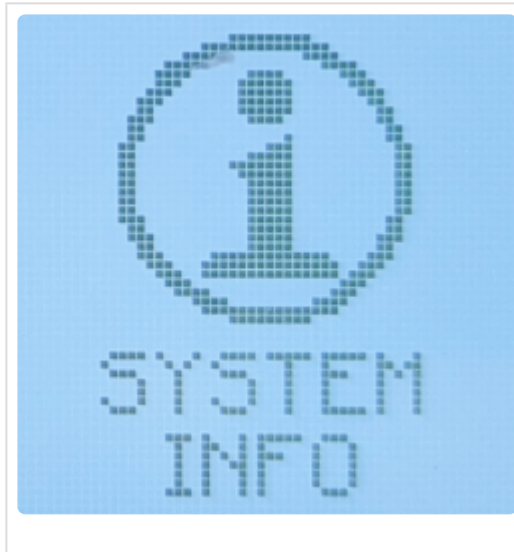
Used to configure communications ports. It shows all communications ports, and whether or not they are assigned and configured. Refer to [Section 6.6](#) for details to learn how to access these settings and to [Section 10](#) to examine these settings in detail.



Used to save a user's custom settings to an SD memory card, load saved custom settings to EPIC from the memory card, or to restore factory default settings. See [Section 6.8](#) for details.



Opens configurable options for System Settings such as time, date, and temperature scale. See [Section 6.4](#) for instructions.



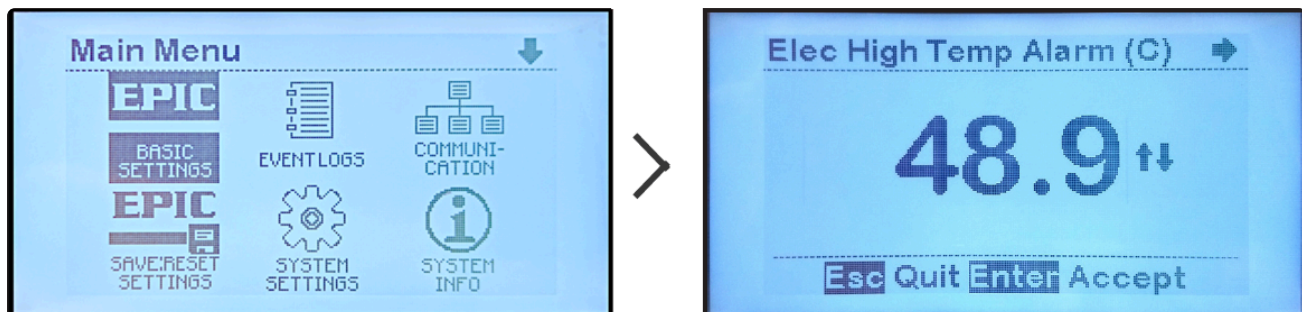
Allows you to scroll through a screen of system information.

6.3. Configuring Basic Settings

This section details the configuration of basic settings — as listed in the [Startup Sequence & Factory Settings, Section 6.1.1](#). Most of these settings may be adjusted if necessary as follows:

How to Configure Basic Settings

To enter Basic Settings mode, select MENU > BASIC SETTINGS. EPIC will display the first parameter that may be adjusted and its current numerical setting.



To accept the value for a parameter, press EDIT/ENTER, or use the RIGHT or LEFT arrow key to move to another parameter.

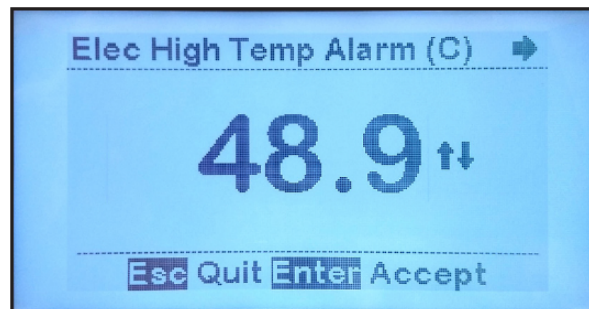
To change a parameter, do the following:

- Press UP or DOWN to change setting value. To increase or decrease in value rapidly, press and hold the UP or DOWN button.
- Once desired setting is displayed, press EDIT/ENTER to store it.

Clicking on each parameter below will reveal a screenshot of and additional details about the parameter:

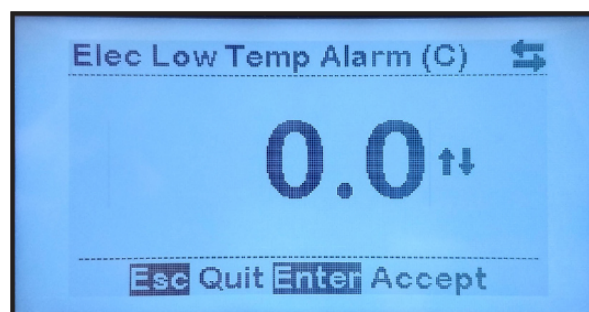
Electrical Bay High Temp Alarm

The first parameter to display is the Electrical Bay High Temp Alarm. This is the temperature within the electrical bay at which the “Electrical Bay Overtemp Alarm” becomes active. Default is 48.9°C or 120°F. Press the RIGHT key to see another parameter.



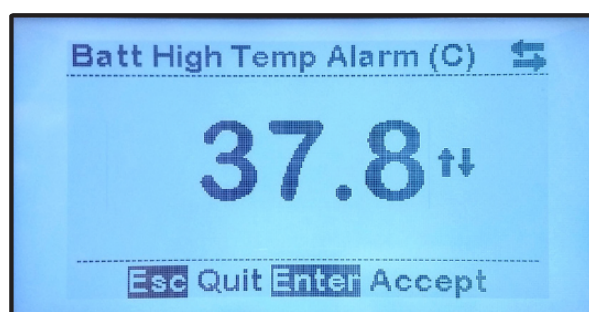
Electrical Bay Low Temp Alarm

Temperature within the electrical bay at which the “Electrical Bay Low Temperature Alarm” becomes active. Default is 0°C or 32°F.



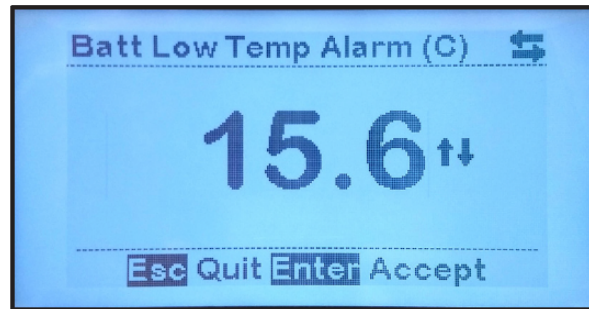
Battery Bay High Temp Alarm

Temperature within battery bay at which “Battery Bay Overtemp Alarm” becomes active. Default is 37.8°C or 100°F.



Battery Bay Low Temp Alarm

Temperature within battery bay at which “Battery Bay Low Temperature Alarm” becomes active. Default is 15.6°C or 60°F.



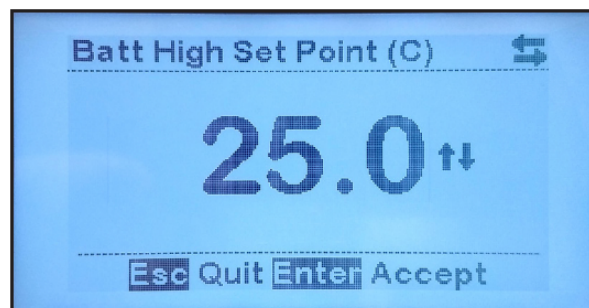
Battery Bay Target

Target temperature for battery bay. This value is not set; it is calculated as the midpoint between the Battery Bay High Set Point and Battery Bay Low Set Point. If the target temperature desired is 23°C (73.4°F), the user might achieve this by selecting low and high set points, discussed below, so the temperature in the console can fluctuate within a comfortable range, such as the default 21°C to 25°C (70°F to 77°F) or slightly larger, without forcing the air conditioner and/or heater to cycle too often, or possibly compete with one another.

!https://manula.s3.amazonaws.com/user/19367/img/spacer-800x6.png!

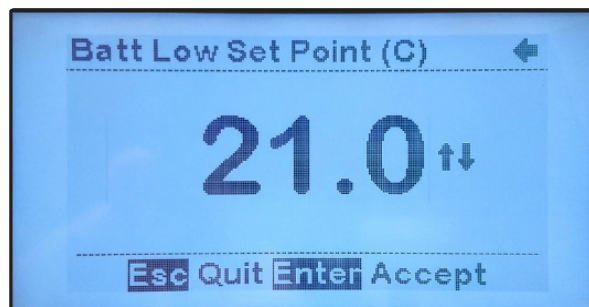
Battery Bay High Set Point

Temperature within battery bay at which air conditioner turns on. Default is 25°C or 70°F.



Battery Bay Low Set Point

Temperature within battery bay at which heater turns on. Default is 21°C or 70°F. After setting or accepting this parameter's value, you will return to the Main Menu.

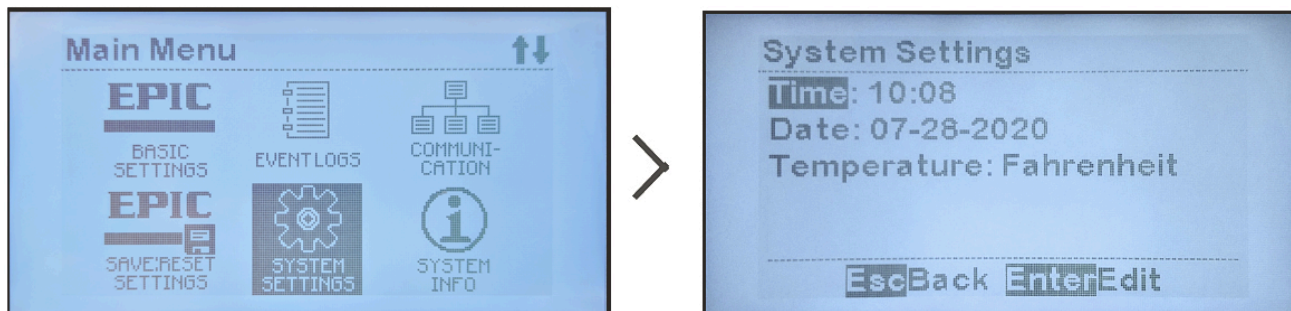


6.4. Configuring System Settings

This section details configuration of the EPIC Series Console 2.0 system parameters, including date, time, and temperature (Fahrenheit or Celsius).

How to Configure System Settings

To enter System Settings mode, select MENU > SYSTEM SETTINGS. The EPIC Controller will display a page of parameters.

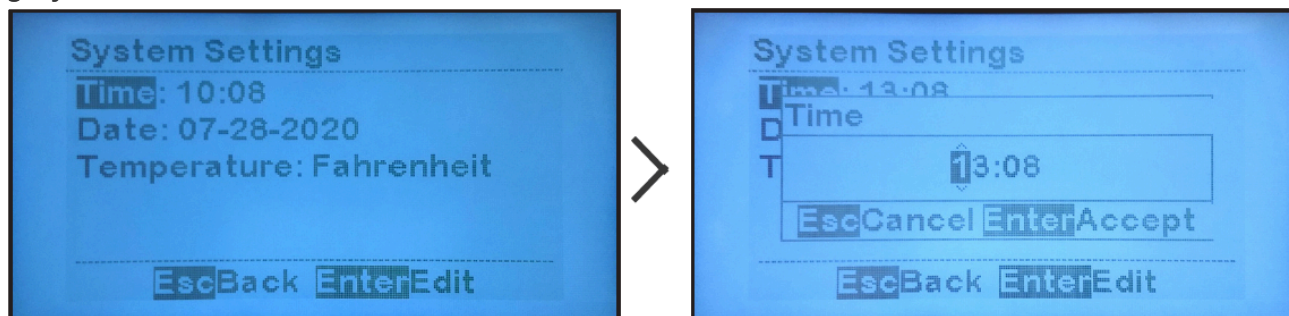


To change a parameter, do the following:

- Navigate to it using UP and DOWN; select it with EDIT/ENTER.
- Press LEFT and RIGHT to navigate to the digit to be modified (if applicable).
- Press UP and DOWN to change setting value.
- Once desired setting is displayed, press EDIT/ENTER to store it.

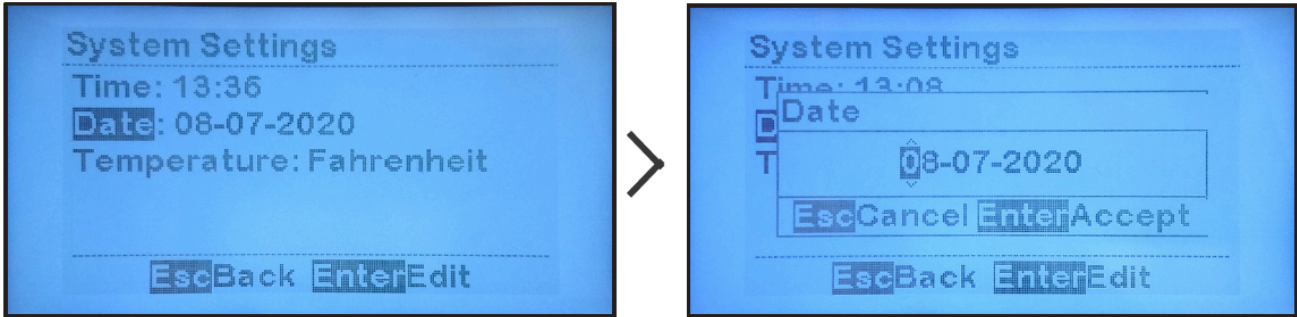
Clicking on each parameter below will reveal a screenshot of how the parameter is changed:

Setting System Time

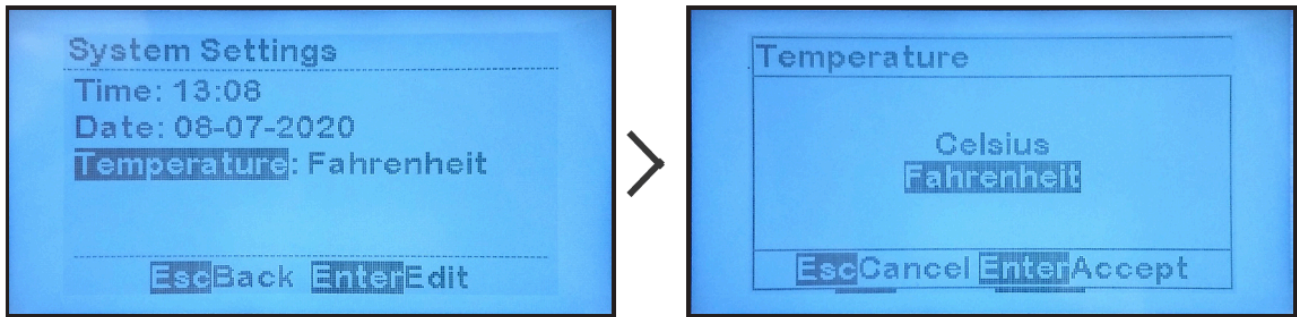


✿ EPIC Series Console 2.0 uses a 24-hour clock (e.g. 2:30 PM is 14:30)

Setting System Date

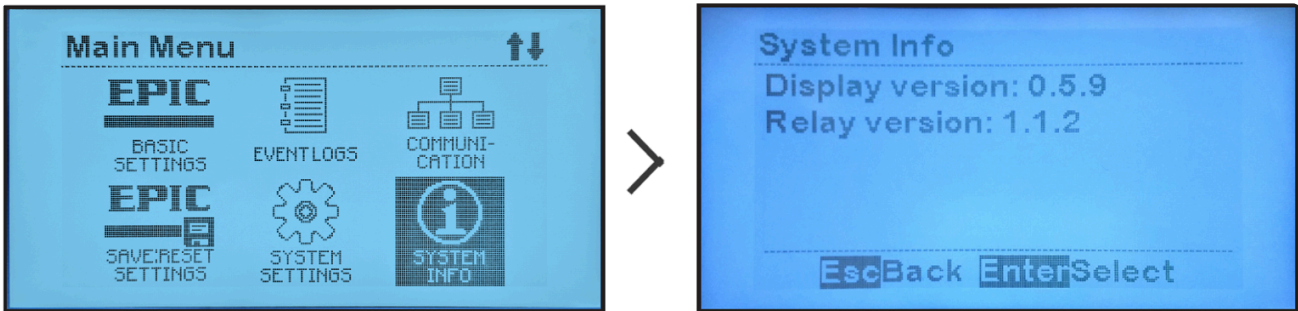


Setting System Temperature Scale



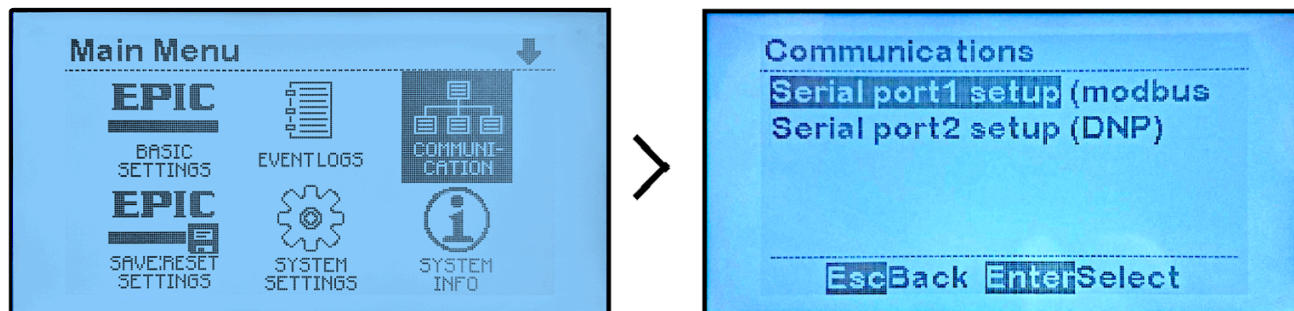
6.5. Accessing System Information

To access a summary of your console’s system information, select MENU > SYSTEM INFO. The firmware version numbers for the display board and relay board will display.



6.6. Accessing Communications Settings

To access the communications settings, select MENU > Communication. Reference the EPIC Series Console Communications Manual for details on setting communication protocols and configuring parameters for all available communications ports.



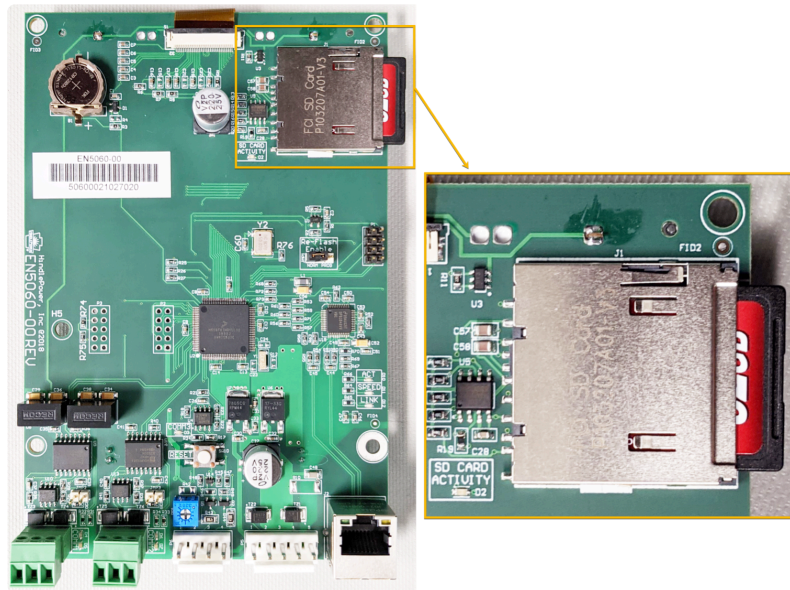
6.7. Accessing Event Logs

To access the event log and Hindle Health log, select MENU > Event Log. Details about both logs and how to clear them are discussed in [Section 9](#).



6.8. Save/Reset Settings – Optional SD Memory Card Features

The EPIC Series Console 2.0 provides a socket for an Optional SD Memory Card. To access it, open the front panel, locate the Main Control Board attached to the door, and look on the top right.



This section discusses features provided by use of the memory card, such as:

- Saving configuration settings for backup.
- Loading custom settings saved from one console into other consoles where it's desired to use the same settings.
- Saving and transferring an event log for archiving or evaluation.

6.8.1. Installing SD Memory Card

Purchasing the SD card through an EPIC Series Console 2.0 supplier will ensure that it has been tested and verified to work with the EPIC Series Console 2.0.

When installing the SD card, face the contacts down toward the Main Control Board. Gently press the card into the socket until you feel the card locking mechanism 'click'. To remove, gently press the card further into the socket then allow it to 'snap' back to disengage from the locking mechanism. Pull the SD card out.

6.8.2. Copying Event Log File to SD Card

EPIC Series Console 2.0 Event Log can be transferred onto SD Memory Card then to a Personal Computer (PC) or other electronic device for archiving or evaluation. The file is stored in ASCII text format for easy import into spreadsheets or other third party software.

To copy the Event Log to SD Memory Card:
MENU > EVENT LOGS > 'Copy event log to SD card'



The screen will briefly confirm the file was copied successfully. The event log file is written to a file named EVENTSxx.LOG where 'xx' is a sequential number.

Each time the event log file is stored it is written to a new file whereby 'xx' increments by one. This prevents previous event log files stored on the SD Memory Card from being overwritten.

6.8.3. Storing/Recalling Settings to/from Memory Card

All settings can be stored onto SD Memory Card, including battery bay and electrical bay temperature set points, alarm settings, and system time, date, and temperature scale preferences.

To copy EPIC Series Console 2.0 settings to SD Memory Card:
MENU > SAVE:RESET SETTINGS > "Backup to memory card"



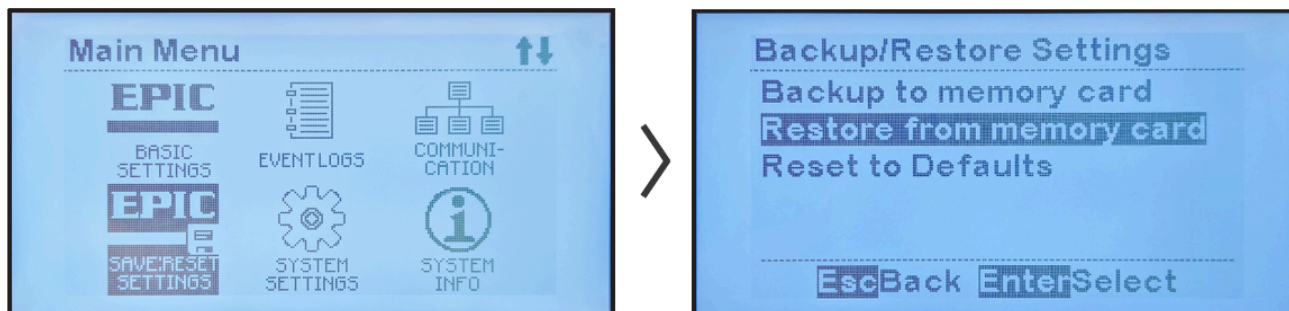
The screen will briefly confirm the file was copied successfully. The configuration file is written to a file named CONFIGxx.EPC where xx is a sequential number that begins with 00 and increases by 1 for each file written ensuring that other configurations on the card will not be overwritten.

You may use this saved configuration file to:

- Restore configuration in case someone inadvertently changes a setting and doesn't remember the original setting.

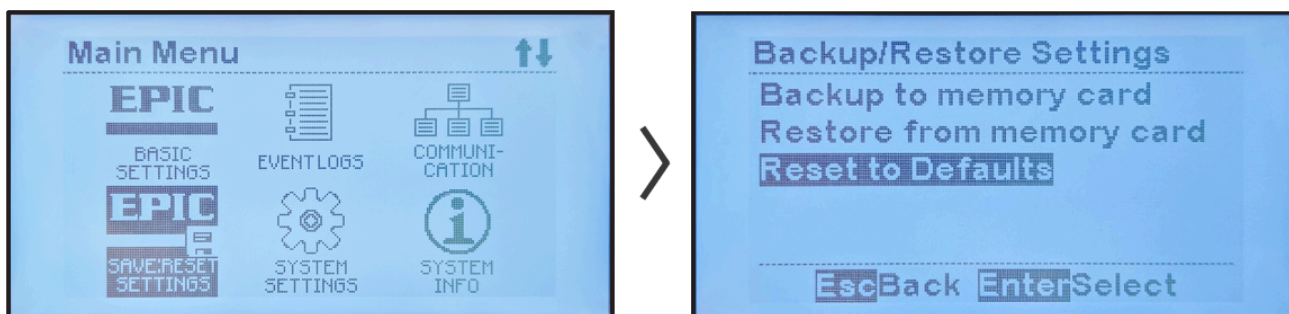
- Clone configuration to a similar console to eliminate need to set up parameters manually.
- Configure a replacement Main Control Board automatically.

To copy EPIC Series Console 2.0 settings from SD Memory Card to the Main Control Board:
MENU > SAVE:RESET SETTINGS > “Restore from memory card”



The screen will briefly confirm the file was copied successfully. The EPIC Series Console 2.0 will restart with the restored configuration settings.

To restore EPIC Series Console 2.0 settings to the [factory default settings, Section 6.1.1](#):
MENU > SAVE:RESET SETTINGS > “Reset to Defaults”



The screen will briefly confirm that EPIC Series Console 2.0 has been restored to the factory default settings.

6.8.4. Upgrading Firmware via Memory Card

A powerful EPIC Series Console 2.0 feature is that the Main Control Board firmware (or software) can be easily updated in the field without uninstalling any boards – using an SD Memory Card. The process takes a few minutes to perform.

To upgrade EPIC Series Console 2.0 firmware, first obtain the latest file from the supplier.

Filename Convention

Firmware update files have a unique name which makes it possible to store multiple firmware update files on an SD card. Firmware files are named to indicate the firmware version contained in the file. The output file is in 8.3 format (not a long filename). Firmware files distributed for release will employ a file name that uses the following convention:

xxMMNNBB.hpb

In this convention, xx is “ec” for EPIC Controller. MMNNBB represents the version where MM is the major version, NN the minor version and BB build (i.e., minor minor version). The version numbers are padded with a leading 0 for consistency. The extension “hpb” is an acronym for Hindle Power Binary.

Here are some firmware filename examples that use this convention:

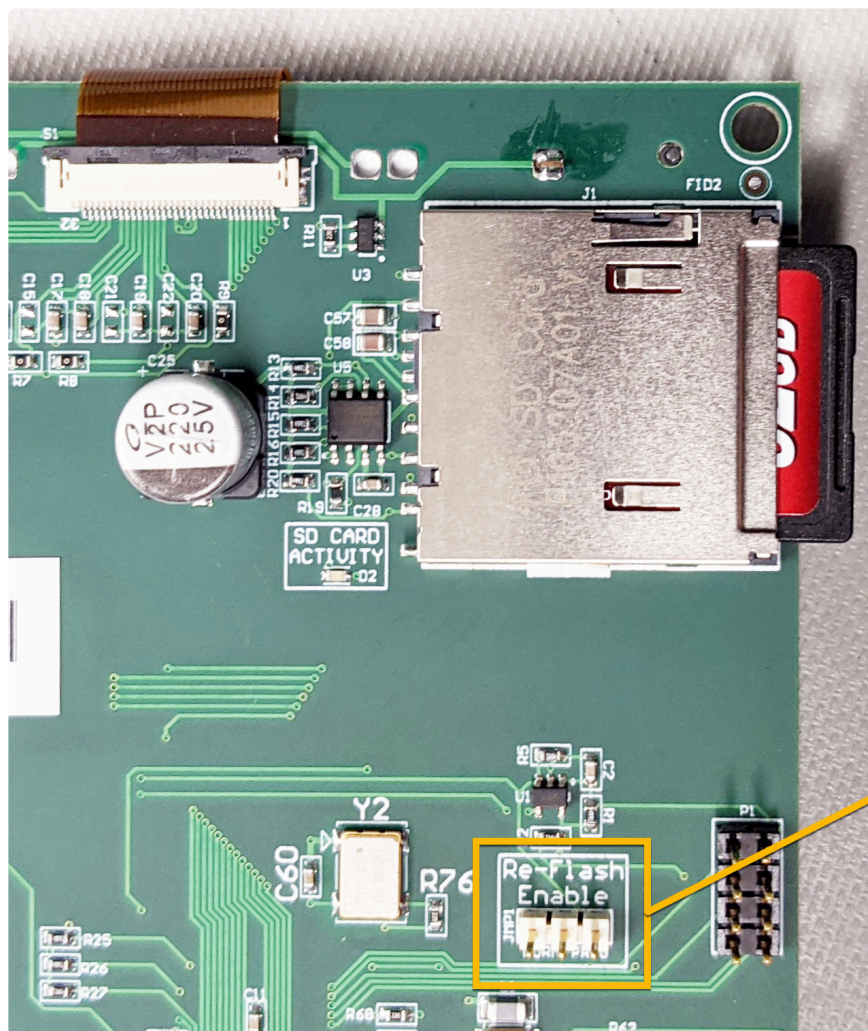
Epic controller firmware filename examples

- ec010409.hpb – v1.4.9
- ec010605.hpb – v1.6.5

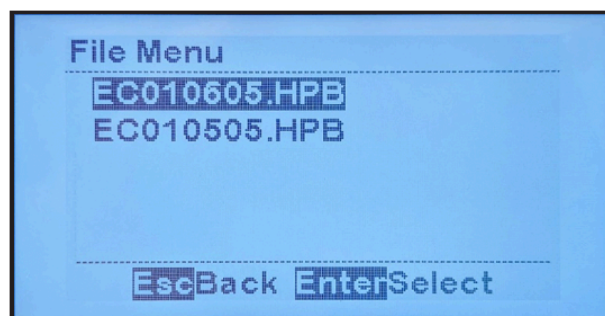
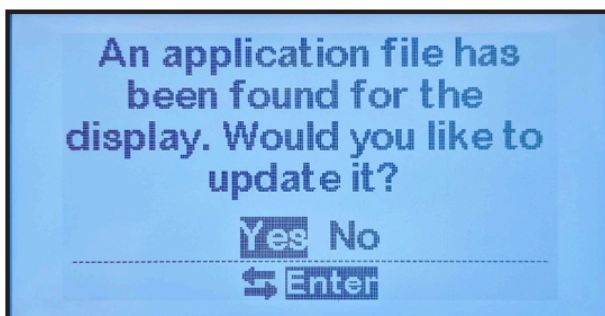
Firmware Upgrade Procedure

Next, copy these files onto an SDHC Memory Card 32GB or less, using either a personal computer (PC) with an SD Memory Card slot, or a USB to SD Memory Card adapter. When the files are on the SD Memory Card transfer them to EPIC Series Console 2.0.

1. Open the EPIC Series Console 2.0 front panel door, and locate the SD Memory Card socket on the back of the Main Control Board.
2. Directly below the socket will be a ‘RE-FLASH ENABLE JUMPER’.
3. Move jumper JMP1 on the back of the controller board from position NORM to PROG.
4. Insert SD Memory Card with a valid EPIC firmware update file into the SD card socket.



5. Binary files will be automatically detected, and you will be prompted whether you would like to apply an update. Select "Yes" if desired and press the ENTER key.
6. A file selection screen will appear. Use the UP and DOWN arrow keys to select the update you would like to apply and press the ENTER key.



7. A message will be displayed, notifying you that the screen will be blank while the update is in progress, after which, the controller will reset. Press the ENTER key to begin the update.
8. The update will take approximately 45 seconds and the controller will reboot and report whether the update succeeded or failed. The health LEDs will show green for a successful update and red for a failed update. After 5 seconds, the EPIC splash screen will be displayed with the firmware version number and the controller will start up.



9. Move the jumper JMP1 from positions PROG back to NORM.

7. Alarms & Indicators

SECTION TOPICS
Hindle Health System Status LEDs
Alarm LED Summary
Viewing Alarms
Alarm Descriptions

7.1. Hindle Health System Status LEDs

The Hindle Health System (HHS) monitors the internal environment and system components and will alert via the HHS status LEDs when attention is required.

- The **GREEN** indicating LED lets the user know, from a distance, that:
 - The system is operating properly and maintaining system reliability.
 - No alarms are present.
- The **STEADY RED** indicator lets the user know there is an alarm or issue that requires action, but the console is still maintaining system reliability.
- A **BLINKING RED** indicator lets the user know there is an alarm of critical importance and system reliability is at risk.

Third-party devices, such as battery chargers, that can communicate a digital or analog signal for alarm or value can also be integrated into the Hindle Health System so that device alarms will trigger a console alarm, be recorded as an event log, and illuminate either the green or red LED.

7.2. Alarm LED Summary

There are three types of alarms; each will be discussed in a section below:

Alarms that Cause **STEADY RED** LED

The following alarms will cause the **RED** HHS LED to illuminate:

- Relay Board Failure
- Battery Bay Alarms:
 - Battery Bay High Temperature
 - Battery Bay Low Temperature
 - Battery Bay Temperature Controller Failure
 - Battery Bay Fan Failure
- Electrical Bay Alarms:

- Electrical Bay High Temperature
- Electrical Bay Low Temperature
- Electrical Bay Tempco Failure
- Electrical Bay Fan Failure

Alarms that Cause **STEADY RED** LED (for Included Options)

The following alarms will cause the **RED** HHS LED to illuminate only if the optional components/features indicated are included and have an alarm condition:

- Hydrogen Alarms:
 - Hydrogen 1%
 - Hydrogen 2%
- Smoke Alarm
- Door Open
- Air Conditioner 1 / 2 Failure
- Charger Alarms:
 - Charger 1 / 2 Comm Failure
 - Charger 1 / 2 High Voltage DC
 - Charger 1 / 2 Low Voltage DC
 - Charger 1 / 2 DC Output Failure
 - Charger 1 / 2 AC Input Failure
 - Charger 1 / 2 Positive Ground Fault
 - Charger 1 / 2 Negative Ground Fault

Alarms that Cause **BLINKING RED** LED

The following alarms will cause the **RED** HHS LED to blink:

- Control Board Failure
- Fire Suppression Active Alarm

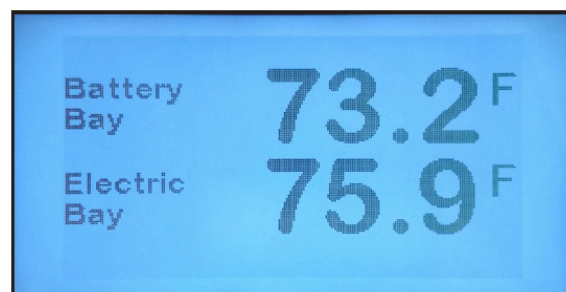
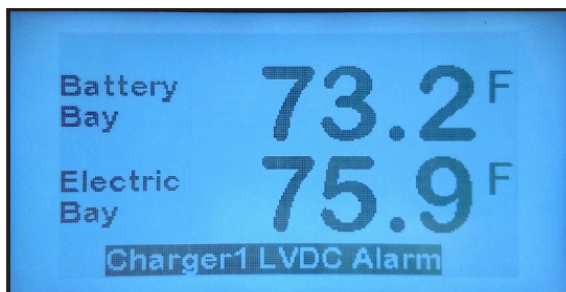
7.3. Viewing Alarms

Alarms can be viewed in three ways as seen by clicking on each toggle below:

Active Alarm Bar

The Active Alarm Bar is located at the bottom of the HOME screen. Key points regarding the Active Alarm Bar:

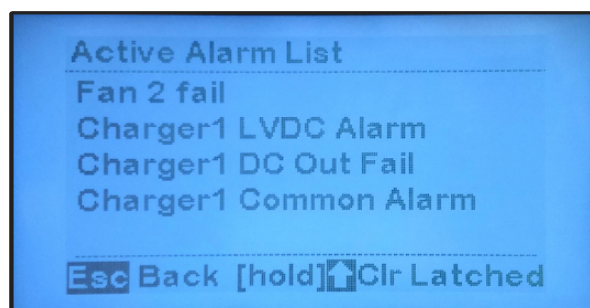
- It reports any and all active alarms; it is blank if there are none.
- If multiple alarms are active, it cycles through each alarm.



Active Alarm List

The Active Alarm List displays all active alarms.

To view the Active Alarm List, press the ALARMS button. The Active Alarm List can display up to five active alarms at once but it is scrollable to view any additional alarms present.



If any of the alarms in the list are latched, then the “Clr Latched” command will appear at the bottom of the screen. Fan alarms latch and must be cleared manually; this will be discussed with an example in [Section 7.4, Alarm Descriptions](#).

Alarm Logs

Alarms are system events that are stored in the EPIC Console Controller’s event log with a time and date stamp. The same is true for alarm clearing (return to non-alarm state). [Section 9, Event Logs](#), contains additional information.

7.4. Alarm Descriptions

EPIC Console alarms:

- Do not have dedicated LEDs to indicate when they are active.
- Illuminate the **RED** Hindle Health System LED on the Controller (steady or blinking) and activate the common alarm relay.
- Get stored in the event log along with the time and date they occur, and may be cleared.
- Will be reported to any protocol master polling the Controller.

These alarms are detailed in the toggles found below each of the four alarm categories below:

Communications Failure Alarms

Relay Board Failure Alarm

Activate when the Control Board loses communications with the Relay Board.

Charger Comm Failure Alarm (if installed)

Activated when communications with connected battery chargers cannot be established or have failed. Alarms from the charger will not display or clear until communications have been reestablished.

EPIC Console Temperature Alarms

High Temperature Alarm

Activated when the temperature exceeds the high temperature set point. There is a separate alarm for each temperature probe. The high temperature set points are adjustable.

Low Temperature Alarm

Activated when the temperature exceeds the low temperature set point. There is a separate alarm for each temperature probe. The low temperature set points are adjustable.

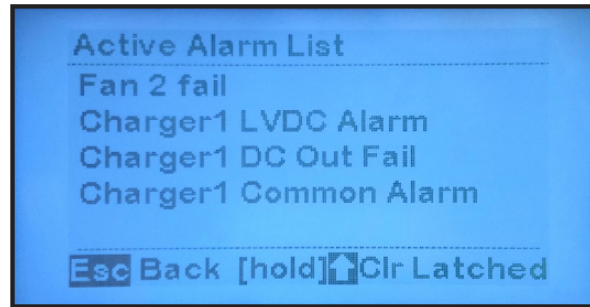
Tempco Failure Alarm

Activated when a temperature probe has failed or reads a temperature outside its designed range. There is a separate alarm for each temperature probe. There are no set points associated with the valid temperature range; the range is a property of the temperature sensor. The HOME screen shows “ – – – ” for failed or out-of-range readings.

EPIC Console Ventilation/Environment Alarms

Fan Failure Alarm

Activated when a fan does not spin when power is applied. Each fan is numbered and has a separate alarm. Refer to the console drawings to determine the location of the failed fan, if necessary. There are no adjustable set points associated with fan failure. Fan failure alarms latch. This means that when there is a fan failure, the alarm will stay active even after the alarm condition has cleared and will require the user to manually clear the latched alarm. This helps avoid the situation of a user not being alerted to intermittent fan failure because the fan happens to be operational and the Hindle Health System **GREEN** LED happens to be lit while the user is present, even though it failed temporarily while the user was not present. Alarm latching lets the user know that the fan did fail even though it currently is operational and has the green LED lit.



To understand how fan alarm latching works, let's consider another example. A user notices the red Hindle Health System LED is illuminated, goes to the Active Alarm List, and sees four active alarms. Subsequently, the user replaces Fan 2 which clears the alarm condition. However, because fan failures latch, the **RED** LED remains lit and the alarm still appears on the Active Alarm List screen. Notice that the "Clr Latched" command appears at the bottom of the Active Alarm List when any of the alarms are latched. To clear the latched alarm, the user must press and hold the UP arrow key on the Alarms List screen. After doing so, only three alarms will remain on the Active Alarm List in this example.

Hydrogen 1% Alarm

Activated when the hydrogen detector (optional) detects a level of 1% hydrogen in the battery bay.

Hydrogen 2% Alarm

Activated when the hydrogen detector (optional) detects a level of 2% hydrogen in the battery bay.

Smoke Alarm

Activated when the smoke detector (optional) detects the presence of smoke in the battery bay.

Fire Suppression Active Alarm

Activated when the fire suppression system (optional) discharges. All active HVAC components, including fans, heater, and air conditioner, are shut down to prevent venting of the fire suppressing gas or adding fuel to a fire. The fire suppression alarm is a latching alarm (See Fan Failure Alarm above for an explanation of latching alarms).

Door Open Alarm

Activated when the door sensor (optional) detects that the battery bay door is open.

Air Conditioner Failure Alarm

Activated when fault signal from the air conditioner indicates a problem.

Charger Alarms (if installed)

Charger High Voltage DC Alarm

Activated when: (1) there is a high DC voltage alarm condition on a connected charger, or (2) a

charger is in high voltage shutdown. The Alarm screen will indicate which charger has alarmed.

Charger Low Voltage DC Alarm

Activated when there is a low voltage DC alarm condition on a connected charger. The Alarm screen will indicate which charger has alarmed.

Charger DC Output Failure Alarm

Activated when there is a DC Output Failure alarm condition on a connected charger. The Alarm screen will indicate which charger has alarmed.

Charger AC Input Failure Alarm

Activated when there is an AC Input Failure alarm condition on a connected charger. The Alarm screen will indicate which charger has alarmed.

Charger Positive Ground Fault Alarm

Activated when a positive ground fault condition is detected by a connected charger. The Alarm screen will indicate which charger has alarmed.

Charger Negative Ground Fault Alarm

Activated when a negative ground fault condition is detected by a connected charger. The Alarm screen will indicate which charger has alarmed.

Charger Common Alarm

Activated by all alarms from AT10 chargers, and any ATevo charger alarms that have been configured to activate a Common Alarm. Please see any of the following ATevo operations manuals for instructions on configuring which alarms activate the Common Alarm.

[ATevo Operations - Single Phase Input - Group I 6-25 Adc Output](#)

[ATevo Operations - Single Phase Input - Group II 30-100 Adc Output](#)

[ATevo Operations - Three Phase Input - 25-1000 Adc Output](#)

8. Hindle Health System

SECTION TOPICS
Overview & Components
Hindle Health System Screens

8.1. Overview & Components

Overview

The Hindle Health System (HHS) is a powerful, user friendly, standard feature that tests and reports on EPIC Series Console 2.0's operational health. Some portions of the HHS continuously run in the background; other parts require user intervention. Third-party devices, such as battery chargers, that can communicate a digital or analog signal for alarm or value can also be integrated into the Hindle Health System.

Components

The Hindle Health System consists of four major components. The details of each are shown by clicking on the toggles below:

Self-Diagnostics

EPIC Series Console 2.0 microprocessors continuously run utilities that check hardware component operation including: memory, communications interfaces, parameters, and discrete devices such as relays. This is done to ensure that the console is maintaining battery temperature and that its hardware will be able to continue to do so. Any errors detected are reported immediately by alarms and/or status updates. The utilities provide possible causes and proposed solutions to resolve issues found.

Hindle Health Button



When pressed, the Hindle Health System will guide you to:

- review results that self-diagnostics has collected.
- check console equipment that self-diagnostics cannot.

It is recommended that users run HHS-guided tests once per quarter. The Hindle Health tests will be described later in this Section.

Hindle Health LED Indicators

Hindle Health LED Indicators are at the bottom of the front panel overlay.

- **GREEN** LED, when lit, indicates the EPIC Series Console 2.0 is healthy with no faults or alarms.

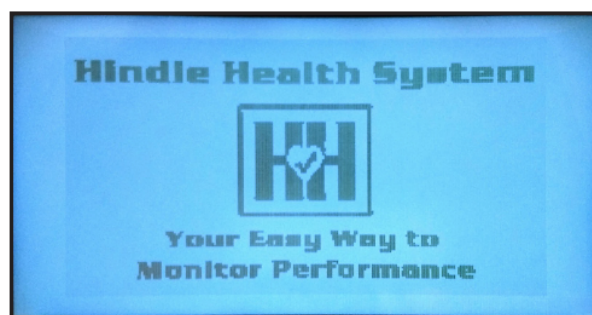
- **RED** LED, when lit, indicates the EPIC Series Console 2.0 or a connected device (charger or third-party device) has an issue. Urgency of action required depends upon if it is:
 - **Blinking** – A critical failure has occurred for the EPIC Series Console 2.0. Immediate action is required. You will need to immediately replace the Control Board as the microprocessor that drives the display and front panel controls has failed. In this case, the console's LCD display may be blank, frozen, or displaying corrupted data.
 - **Steady** – A non-critical alarm has occurred for the EPIC Series Console 2.0, or any alarm has occurred for a connected device (charger, or third-party device that can communicate a digital or analog signal for alarm or value). A non-critical EPIC Series Console 2.0 alarm requires action but does not need to be resolved immediately. In most cases for the EPIC Console, the LCD display will operate and be able to report the issue and give instructions on how to resolve it. If the alarm is for a connected device, you will need to troubleshoot at that device directly to determine its criticality.

Hindle Health Screens

Hindle Health System screens, described in detail in the following pages, allow you to test the EPIC Series Console 2.0 to ensure it is maintaining battery temperature and proper ventilation. You can monitor the condition and/or operation of: indicators filters fans installed HVAC battery temperature history

Step-by-step guidance is provided through the testing process. To start the Hindle Health System, press the [HH] Button.

8.2. Hindle Health System Screens



Hindle Health System screens allow you to test the EPIC Console to ensure it is maintaining battery temperature and proper ventilation. You can monitor the condition and/or operation of:

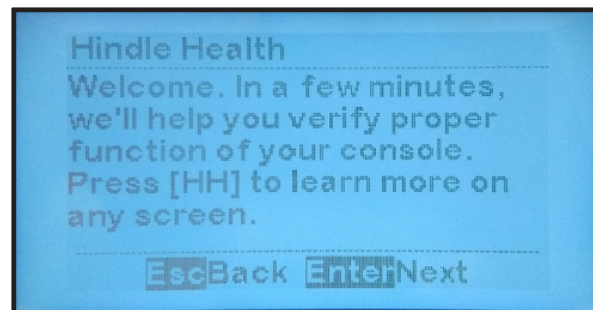
- indicators
- filters
- fans
- installed HVAC

- battery temperature history

Step-by-step guidance is provided through the testing process. To start the Hindle Health System, press the [HH] Button.

The next ten pages will discuss each of the HHS screens.

8.2.1. Introduction Screen

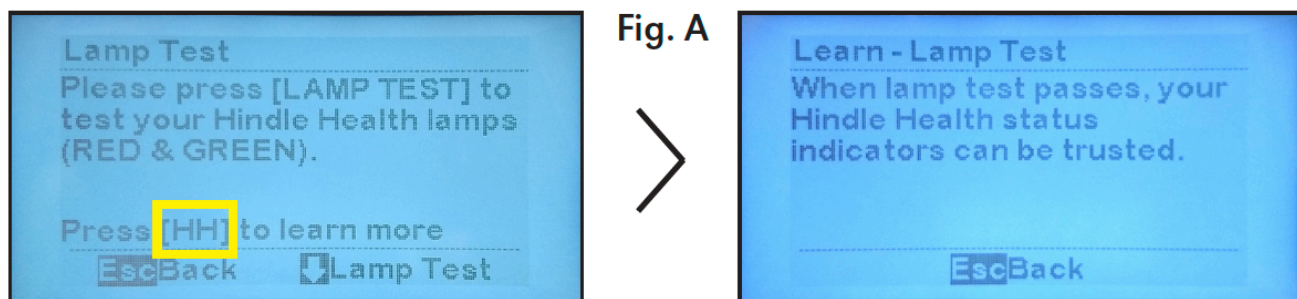


The first screen informs you that the Hindle Health System will help you verify proper function of the console. It also informs you that pressing the Hindle Health button [HH] will provide context sensitive information, and that testing may be discontinued by pressing ESC.

Beginning with the Lamp (LED) Test, the remaining screens are test screens; they prompt you through an interactive process to verify the EPIC Console's operation.

8.2.2. Lamp (LED) Test

You are first prompted to check that the Hindle Health System LED lamps illuminate so they can be trusted to indicate the correct status — healthy or unhealthy. You must press the DOWN arrow to start the lamp test. Pressing [HH] takes you to the Learn More screen that explains why this test is performed (Fig. A).



After the DOWN arrow is pressed, both the **RED** and the **GREEN** lamps should be lit. During operation only one of these LEDs will illuminate to indicate health status, so when you see both

of these LEDs lit during this test, you know that they are both working and can be trusted during normal operation.



The next screen asks you, “Are both Hindle Health lamps lit?” You may learn more about the role of these lamps by pressing the [HH] button before answering. Based on your answer, you will proceed as follows:

- “Yes”: To confirm both lamps are lit. Test passes. Press ENTER to continue (Fig. B).
- “No”: If neither, or only one, of the lamps are lit. Press ENTER to receive further instructions about how to correct this error (Fig. C).

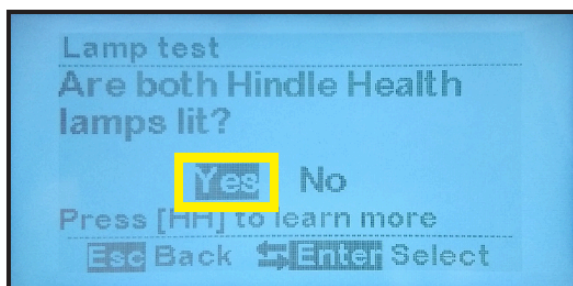


Fig. B

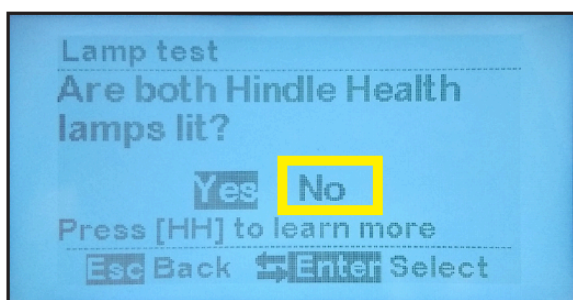
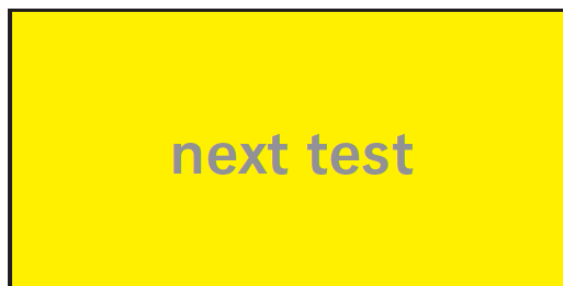
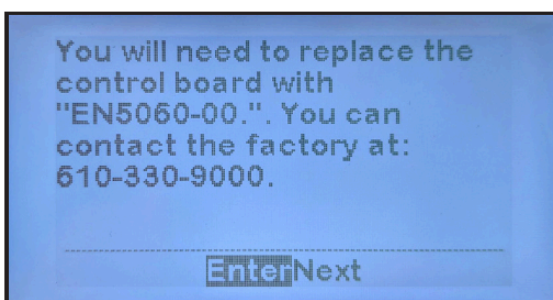


Fig. C

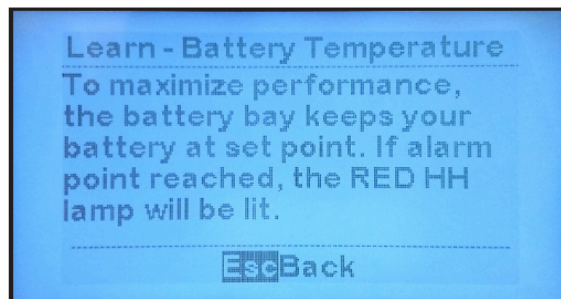


8.2.3. Battery Temperature Test

The second test screen displays the current temperature of the battery along with the setpoint temperature which the console aims to maintain. Further explanation of why this test is performed is available by pressing the [HH] button (Fig. A). Press ENTER to proceed.



Fig. A



The HHS now asks you if the temperature setpoint that displays is acceptable. Based on your answer, you will proceed as follows:

- “Yes”: Setpoint is acceptable. Test passes. Press ENTER to continue to next test (Fig. B).
- “No”: Setpoint needs to be changed. Press ENTER to receive further instructions about how to change the temperature setpoint (Fig. C). Any change should be made after you have finished running or have terminated the Hindle Health System tests.

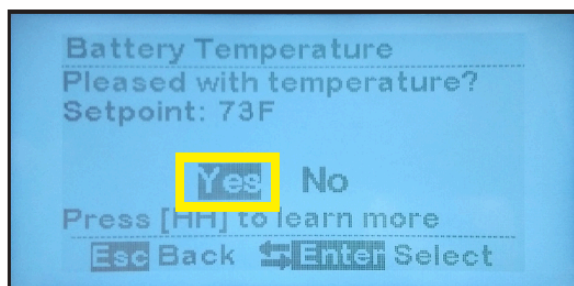


Fig. B

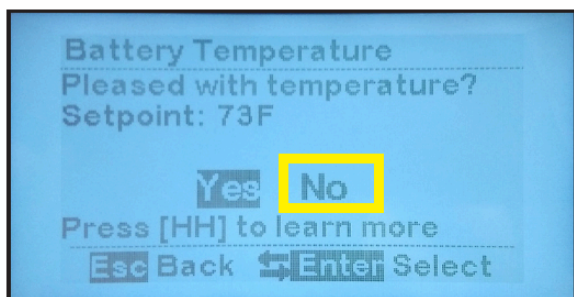
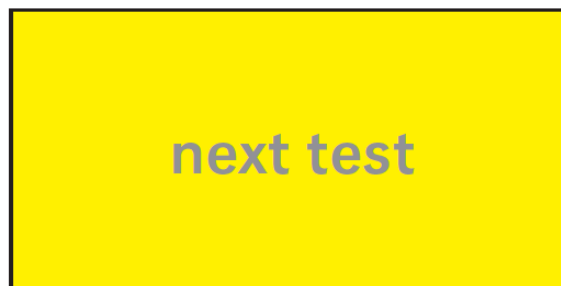
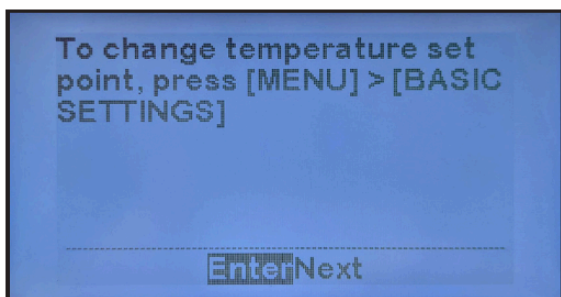


Fig. C



8.2.4. Battery Temperature History

The third test screen displays the 7-day average battery temperature history. If this value is close to the temperature setpoint, the HVAC configuration of your console is able to maintain your desired temperature for extended periods of time at the installation location, which is also explained on the Learn More screen (Fig. A).

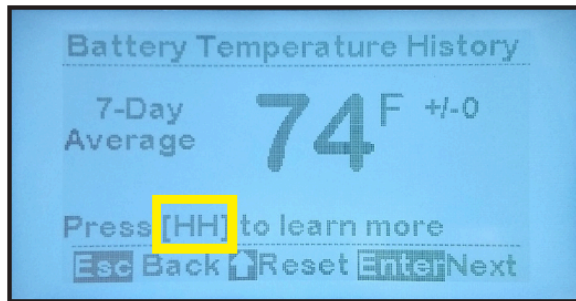
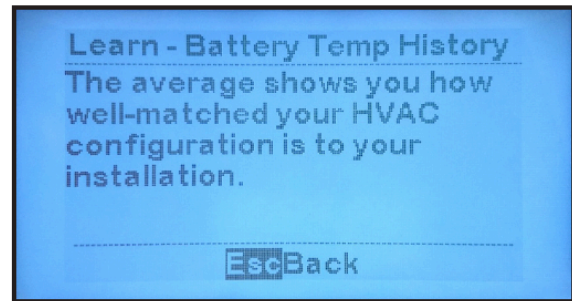


Fig. A



From this screen, it is possible to reset the 7-day average by pressing the UP arrow. If you elect to reset the 7-day average, the system will ask you for confirmation (Fig. B).

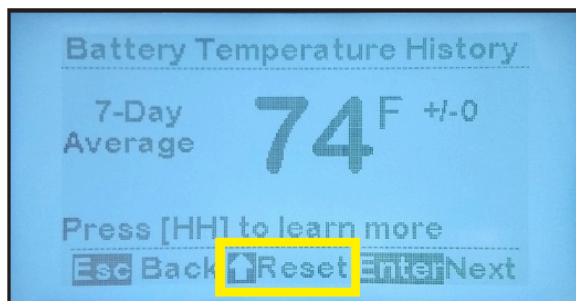
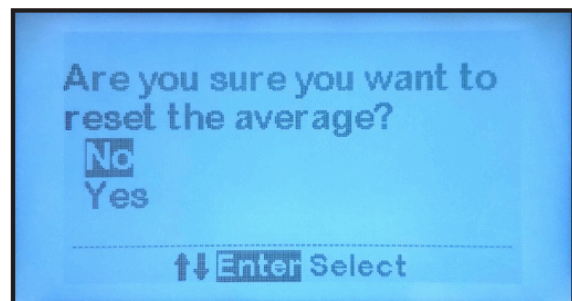


Fig. B



The HHS now asks, “Are you pleased with your HVAC temp. control?”. You may learn more about this question by pressing the [HH] button before answering (Fig. C). Based on your answer, you will proceed as follows:

- “Yes” (Fig.D): HVAC deemed acceptable. Test passes. Press ENTER to continue.
- “No” (Fig. E): HVAC deemed unacceptable. Press ENTER to receive further instructions about changing HVAC to better control battery temperature at your installation.

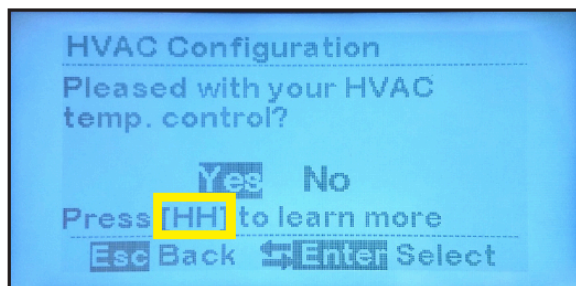


Fig. C

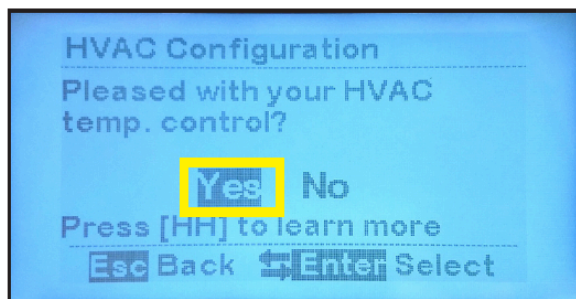
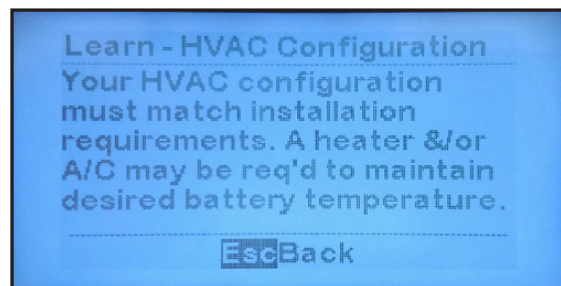


Fig. D

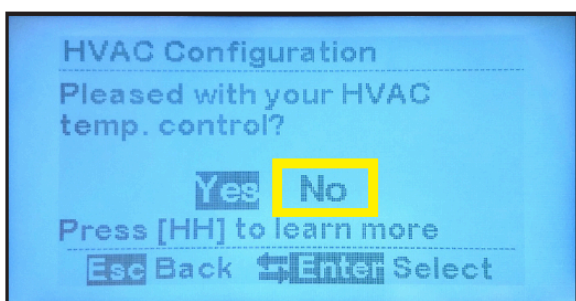
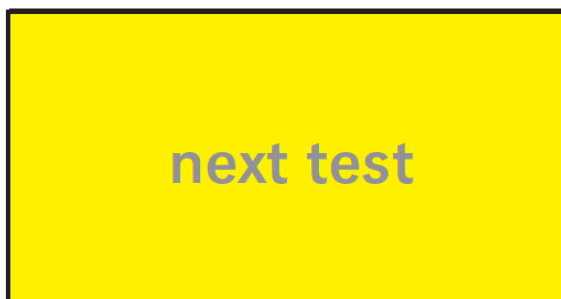
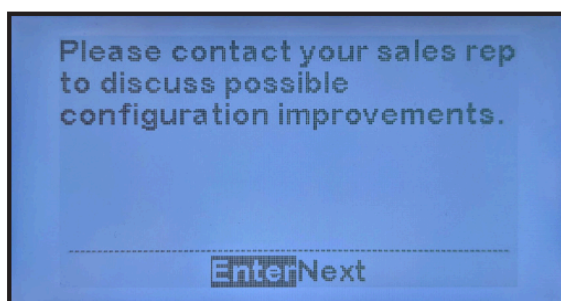


Fig. E



8.2.5. Temperature Self-Test

The fourth test screen, which is visible if your console is equipped with HVAC equipment, shows the results of the temperature self-test, which is performed automatically by the Self Diagnostics Utility every 90 days on any installed heater, air conditioner (A/C), or both.

When this test runs, the utility checks that an installed heater is able to raise the temperature of the battery bay by a specified number of degrees from the bay's temperature at the time the test initiates. It makes a similar check on the A/C's ability to lower the temperature.

The results of the temperature self-test, along with a note about how many days have passed since it was performed, is shown on this screen. A passed self-test, for heater or A/C, is shown by a check mark (Fig. A); a failed self-test is shown by an X (Fig. B). The screen will only show a result for a heater or A/C if it is present. After viewing the result, press ENTER to proceed to the next test.

Further explanation of why this test is performed is available by pressing [HH]. Note that a failed self-test is also indicated by a **RED** HH lamp (Fig. C).

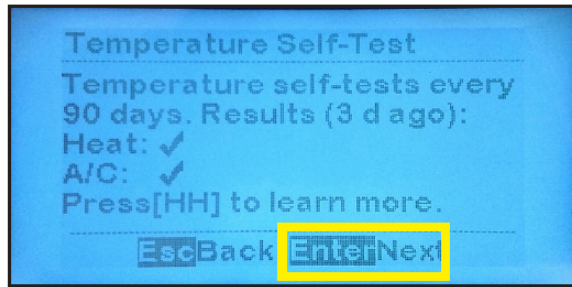


Fig. A

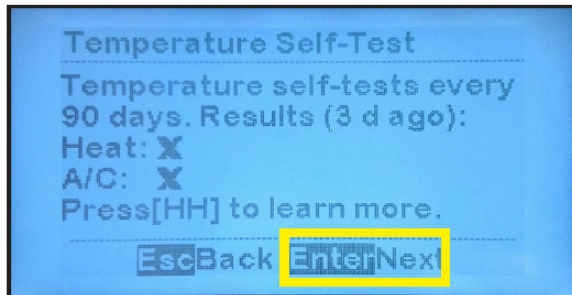


Fig. B

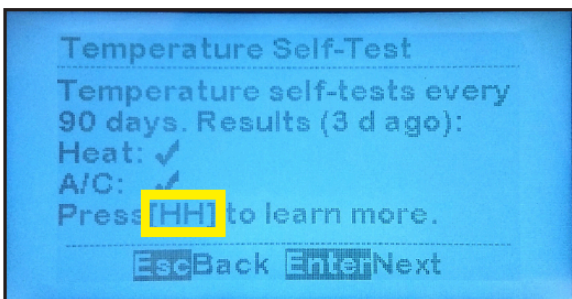
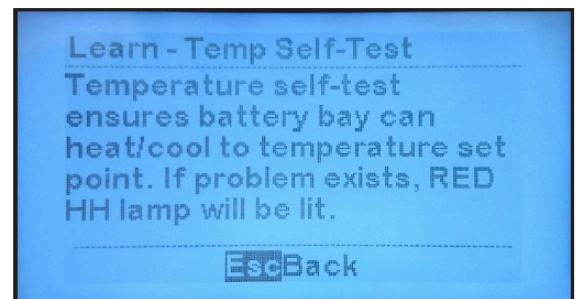


Fig. C



8.2.6. HVAC Power Test

The fifth test screen, which is visible if your console is equipped with HVAC equipment, gives instructions on how to begin a power-up test of this equipment. This test checks that installed heaters and air conditioners will power on when needed to maintain battery temperature. You are told to press the UP arrow key to see the HVAC equipment operate (Fig. A). Doing so will power up this equipment and display the sixth test screen.

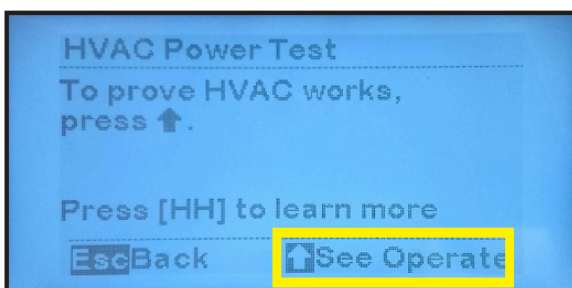
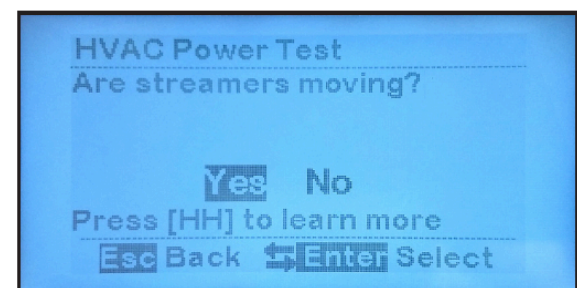


Fig. A



The HHS now asks you if the streamers that are placed near the outputs of the installed HVAC unit(s) are moving, which would provide visual proof that such unit(s) have powered up. You may learn more about this question by pressing the [HH] button before answering.

Based on your answer, you will proceed as follows:

- “Yes” (Fig. B): HVAC units have powered up. Test passes. Press ENTER to continue.
- “No” (Fig. C): At least one HVAC unit has not powered up. Press ENTER to receive instructions about resolving this problem.

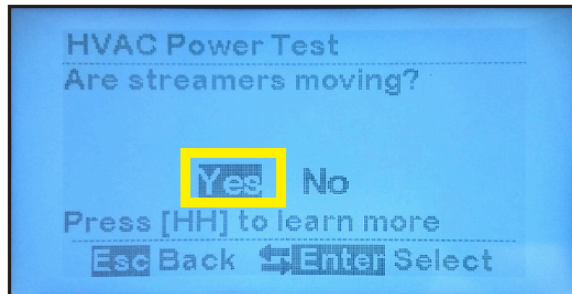


Fig. B

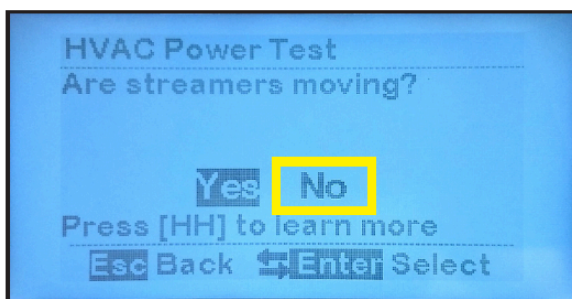
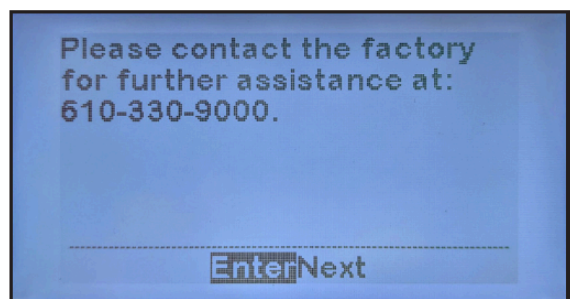


Fig. C



8.2.7. Exhaust Fan Self-Test

The seventh test screen shows the results of the exhaust fan self-test, which is performed automatically by the Self Diagnostics Utility every 2 days. When it runs, the utility checks that all exhaust fans — the two in the battery bay and the single fan in the electrical bay — power on for proper ventilation.

The results of the exhaust fan self-test is shown on this screen. A passed self-test is shown by a check mark (Fig. A); a failed self-test is shown by an X (Fig. B). After viewing the result, press ENTER to proceed to the next test.

Further explanation of why this test is performed is available by pressing [HH]. Note that a failed self-test should also be indicated by a RED HH lamp (Fig. C).

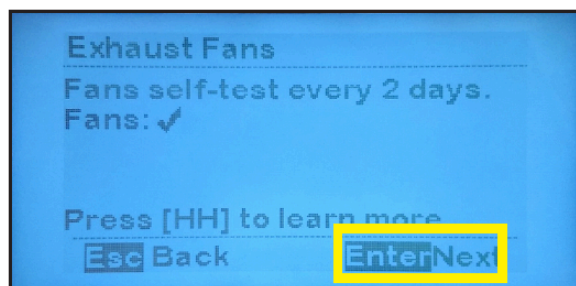


Fig. A

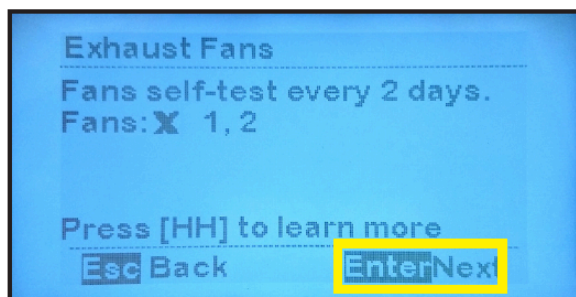
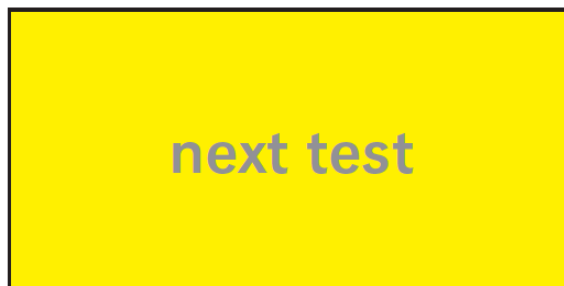


Fig. B

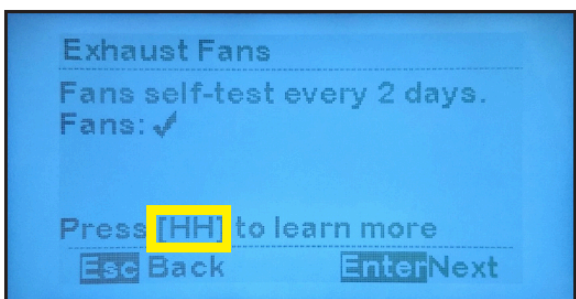
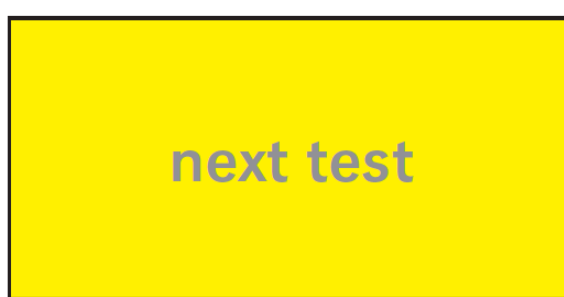
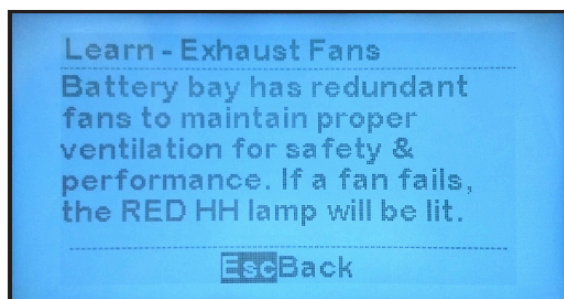


Fig. C



8.2.8. Exhaust Fan Power Test

The eighth test screen tells you how to begin a power-up test of exhaust fans. This test checks that this equipment will power on when needed to maintain ventilation of the battery and electrical bays. You are told to press the UP arrow key to begin (Fig. A). Doing so will power up all exhaust fans and display the ninth test screen.

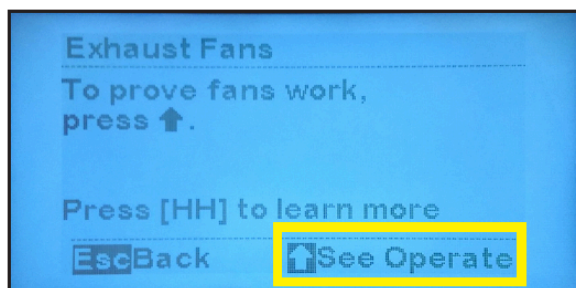
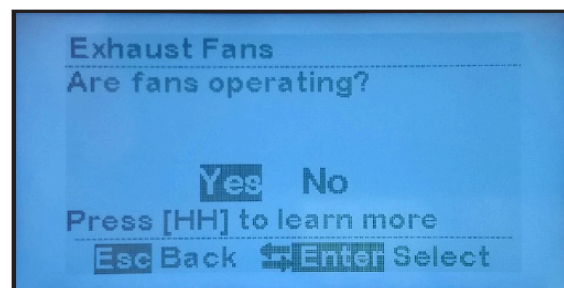


Fig. A



The HHS now asks you if the fans are operating. Locate the fans using the layout label on the bay doors, and see that they have begun moving. You may learn more about this question by pressing the [HH] button before answering. Based on your answer, you will proceed as follows:

- “Yes” (Fig. B): Fans have powered up. Test passes. Press ENTER to continue to next test
- “No” (Fig. C): At least one fan has not powered up; Press ENTER to receive instructions about resolving this problem.

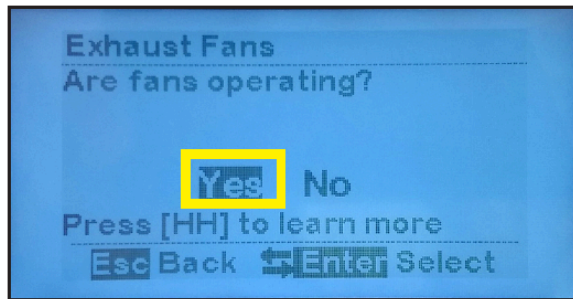


Fig. B

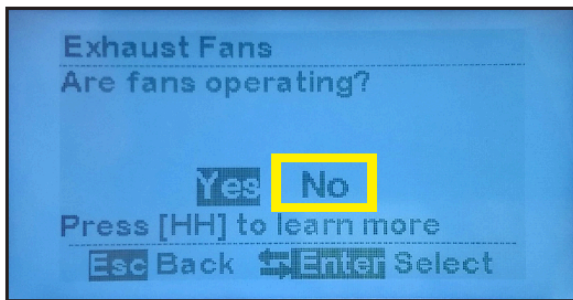
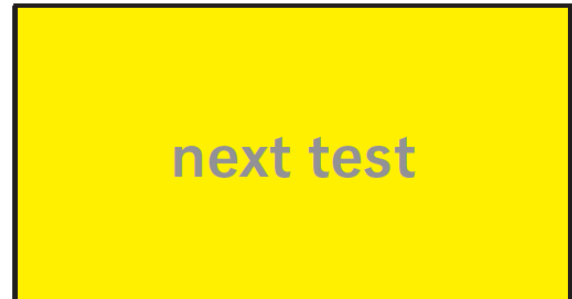
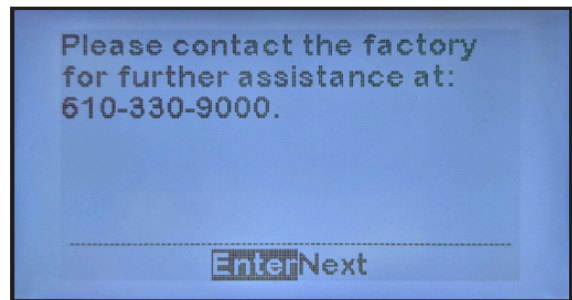


Fig. C



8.2.9. Filters Visual Check

The tenth test screen advises you to check that the filters at the console ports and air conditioner are clear of debris, which is followed by a screen where you confirm that you have left them in a clean state (Fig. A). If you answer “Yes”, the test passes and you continue to a summary screen.

If, for some reason, you are unable to clear the filters, or if you need to obtain replacements, answer “No” and you will receive instructions for contacting the factory to correct the matter. Pressing [HH] provides benefits of filter cleaning (Fig. B).

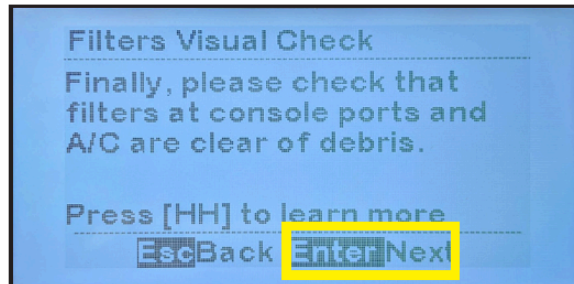


Fig. A

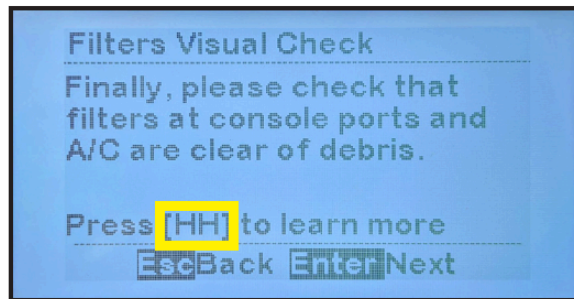
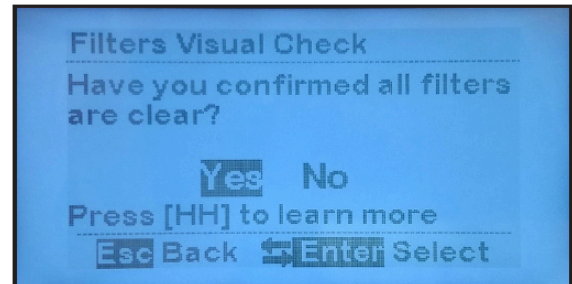
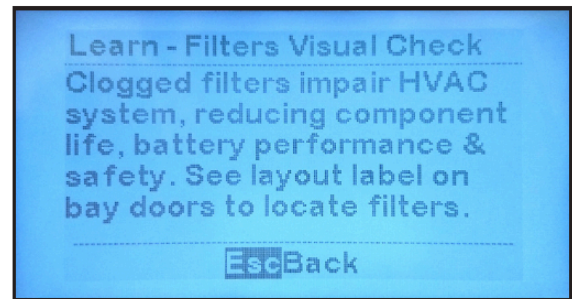


Fig. B



8.2.10. Health Test Summary

When all testing has been completed, you can view 2 screens that summarize test results. Tests that pass display a checkmark. An example where all the tests pass is shown in Fig. A below.

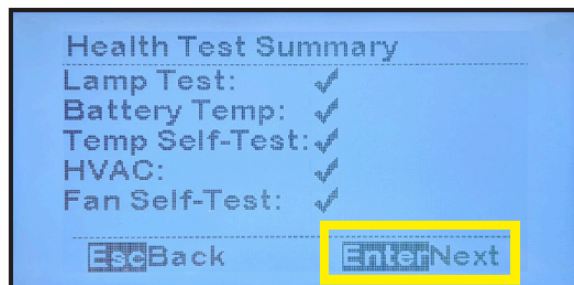
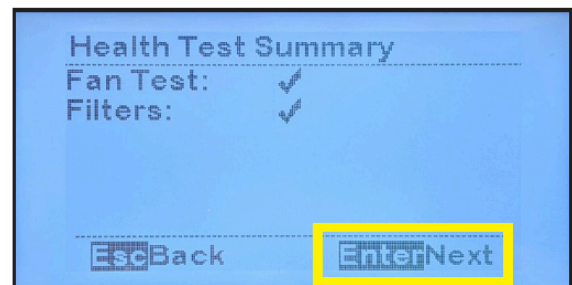


Fig. A



Tests that have failed display an X and specify the equipment which did not pass — heater, air conditioner, or fan (including fan number). An example of this is shown in Fig. B.

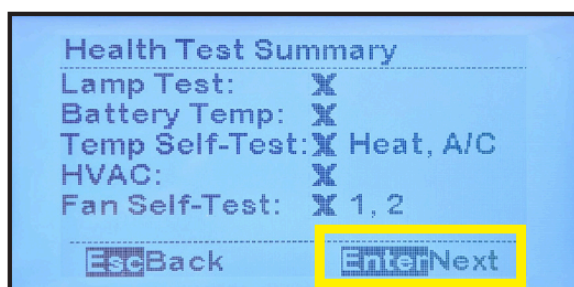
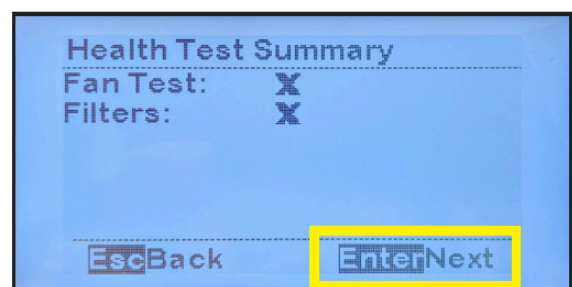
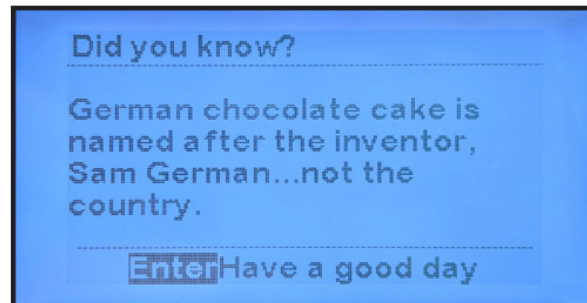


Fig. B



Congratulations! By regularly taking just a few minutes to run the Hindle Health System — preferably every 3 months — you can be confident that the EPIC Console keeps your battery

properly ventilated and at a temperature that maximizes its performance. Every good deed deserves a reward, right? That's why the Hindle Health System concludes with a fun fact. Enjoy!



After the Hindle Health System completes testing, the EPIC Console will return to the Home Screen. An event will be added to the log file along with a time and date stamp. The results of each test are included in the log file. The result status will indicate that each test either PASSED, FAILED or was NOT RUN.

9. Event Logs

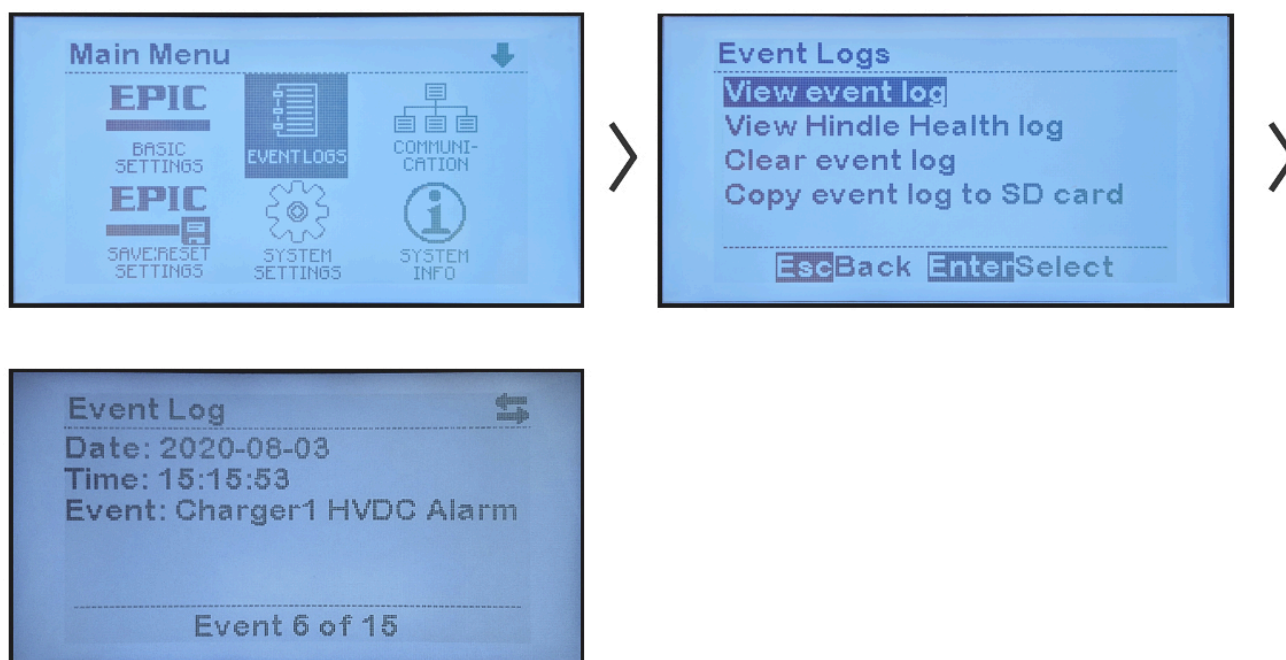
Event Logging is accessed via the EVENT LOG Main Menu. There are two event logs: one for events such as alarms and setpoint changes, and another for Hindle Health events. Hindle Health events that may be logged include results from: (1) user tests performed within the Hindle Health System such as checking the power-up of HVAC equipment, and (2) periodic self-tests that Hindle Health System performs such as temperature checks and fan tests.

Click on the toggles below to find out how to view and clear logs.

Viewing Event Log

To view an event log such as an alarm or setpoint change:

MENU > EVENT LOGS > “View event log”.



The most recent event stored — which has the highest number — will appear, but you can scroll through events as follows:

- Press RIGHT arrow: number will decrease; view events in reverse-chronological order.
- Press LEFT arrow to start at Event 1, then continue pressing LEFT arrow: view events in chronological order.

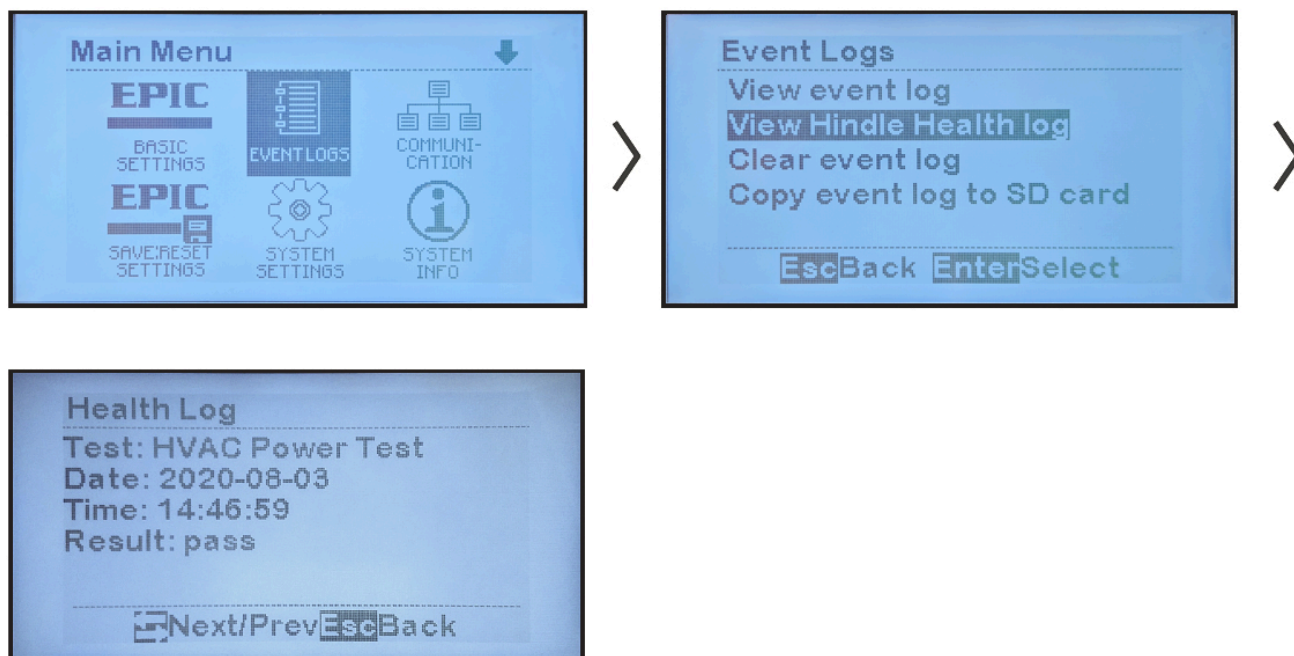
Events include setpoint changes and when an alarm becomes active and is cleared. The log will show the date and time the event occurred, the event name, and the status change that created the event.

For more information on the alarms listed in the event log refer to [Section 7, Alarms & Indicators](#).

Viewing Hindle Health Log

To view the log for Hindle Health System (HHS) events:

MENU > EVENT LOGS > “View Hindle Health log”



The most recent HHS event or test stored will appear — but without a number since Hindle Health log events are unnumbered — but you can scroll through them with the RIGHT/LEFT arrows. The log will show the date and time the event occurred, the event name, and the pass or fail status of the test. If a test was not run, this too is indicated.

Clearing Event Logs



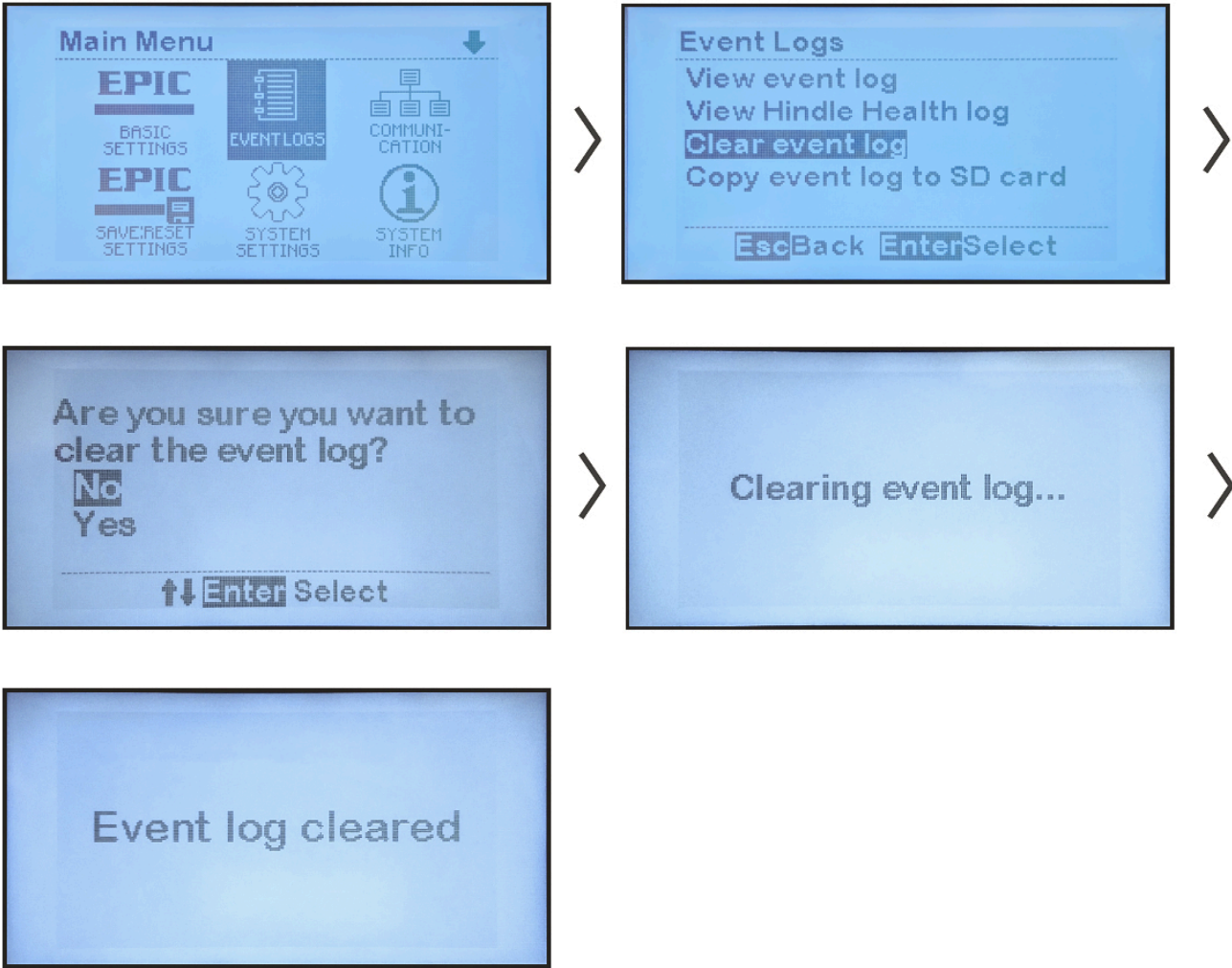
Clearing event logs deletes all stored event history.

Event logs are stored in internal nonvolatile memory on the Control Board. They can be erased by selecting “Clear Event Log” which will clear both the Event Log and the Hindle Health Log.

To clear the logs:

MENU > EVENT LOGS > “Clear event log” > “Yes” to confirm

EPIC will show progress while clearing the log, then show “Event log cleared” when done.



10. Communications

SECTION TOPICS

[Overview of Communications](#)

[Serial Communications Configuration](#)

[Ethernet Communications Configuration](#)

[DNP3](#)

[Modbus](#)

10.1. Overview of Communications

SECTION TOPICS

[Communications Safety](#)

[Ports](#)

[Protocols](#)

[EPIC Controller Communications](#)



[Ethernet Communications](#)

10.1.1. Communications Safety



SAFETY INSTRUCTIONS - PLEASE READ AND FOLLOW TO AVOID SERIOUS INJURY OR DEATH

Safety warnings below apply only when working with the communications features of the EPIC Console Controller. When performing any other operation or service task, it is necessary to reference the [full set of safety instructions in this manual](#).

SYMBOL	INSTRUCTION
	Do not touch any uninsulated parts, especially the input and output connections, as there is the possibility of electrical shock.
	Remove all jewelry (watches, rings, etc.) before proceeding with installation or servicing to avoid electrical shock hazards.

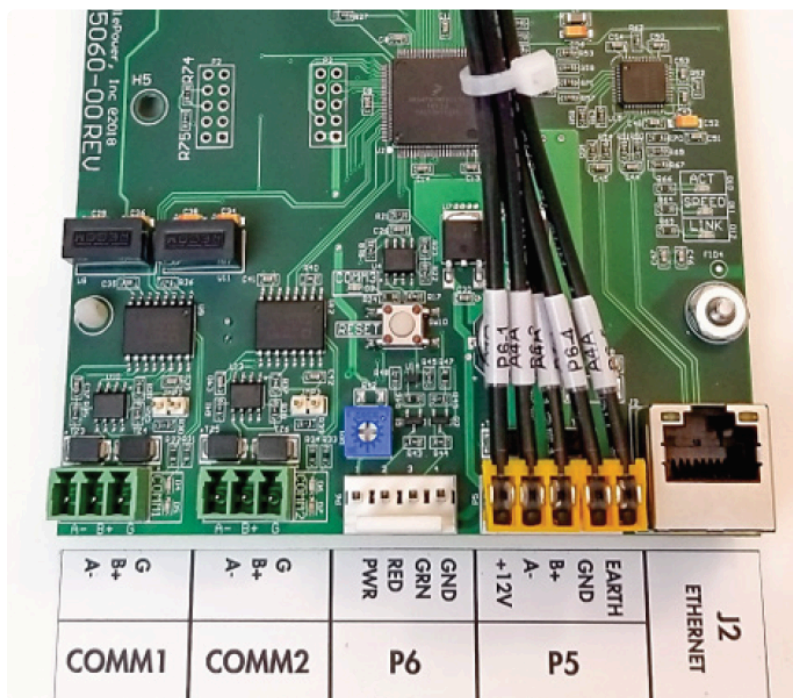
NOTICE

Use a ground strap while installing these sensitive components.

10.1.2. Ports

The EPIC Controller has two Communication Ports. One port is used to communicate to HindlePower devices, such as chargers, internal to the console. The second port allows the user to remotely observe status, or perform functions, that are accessible from the EPIC Controller front panel display. The user communication port supports DNP3 Level 2 and Modbus SCADA protocols over 2-wire RS-485 at BAUD rates from 9600 to 115.2K.

EPIC has one (1) standard RJ-45 Ethernet connector and supports copper 10/100 Mbps Ethernet connections. It supports multiple protocols (Modbus and DNP3) simultaneously.



10.1.3. Protocols

DNP3 Overview

Communications options support DNP3 Level 2 protocol and change events with unsolicited messaging.

Serial Settings Supported

Parity	Data Bits	Stop Bits
--------	-----------	-----------

no	8	1
no	8	2
even	8	1
odd	8	1

Refer to [Section 10.4](#) regarding DNP3 protocol and point lists.

Modbus Overview

Communications options can be set to communicate on standard Modbus networks with RTU mode.

Transmission Mode	Serial Settings Supported		
RTU	Parity	Data Bits	Stop Bits
	no	8	8
	no	8	2
	even	8	1
	odd	8	1

Refer to [Section 10.5](#) regarding Modbus protocol and register sets.

10.1.4. EPIC Controller Communications

EPIC Controller Communications has two (2) Serial Communications ports supporting connections to RS-485 networks. Serial ports must be configured correctly before connecting to the network.

RS-485

RS-485 is a standard, defining electrical characteristics of drivers and receivers for use in balanced digital multi-point systems. RS-485 networks can be used effectively over long distances in electrically noisy industrial environments. Multiple devices may be connected to the same network.

Some RS-485 networks may require termination resistors at both ends of the serial network. The decision of whether or not to use termination resistors should be based on the BAUD rate, the cable distance, and the type of cable being used to build the network. In most cases for BAUD rates less than 19.2K, termination resistors are not required. If termination resistors are

used, the network must be designed with the appropriate biasing resistors to ensure reliable communications.

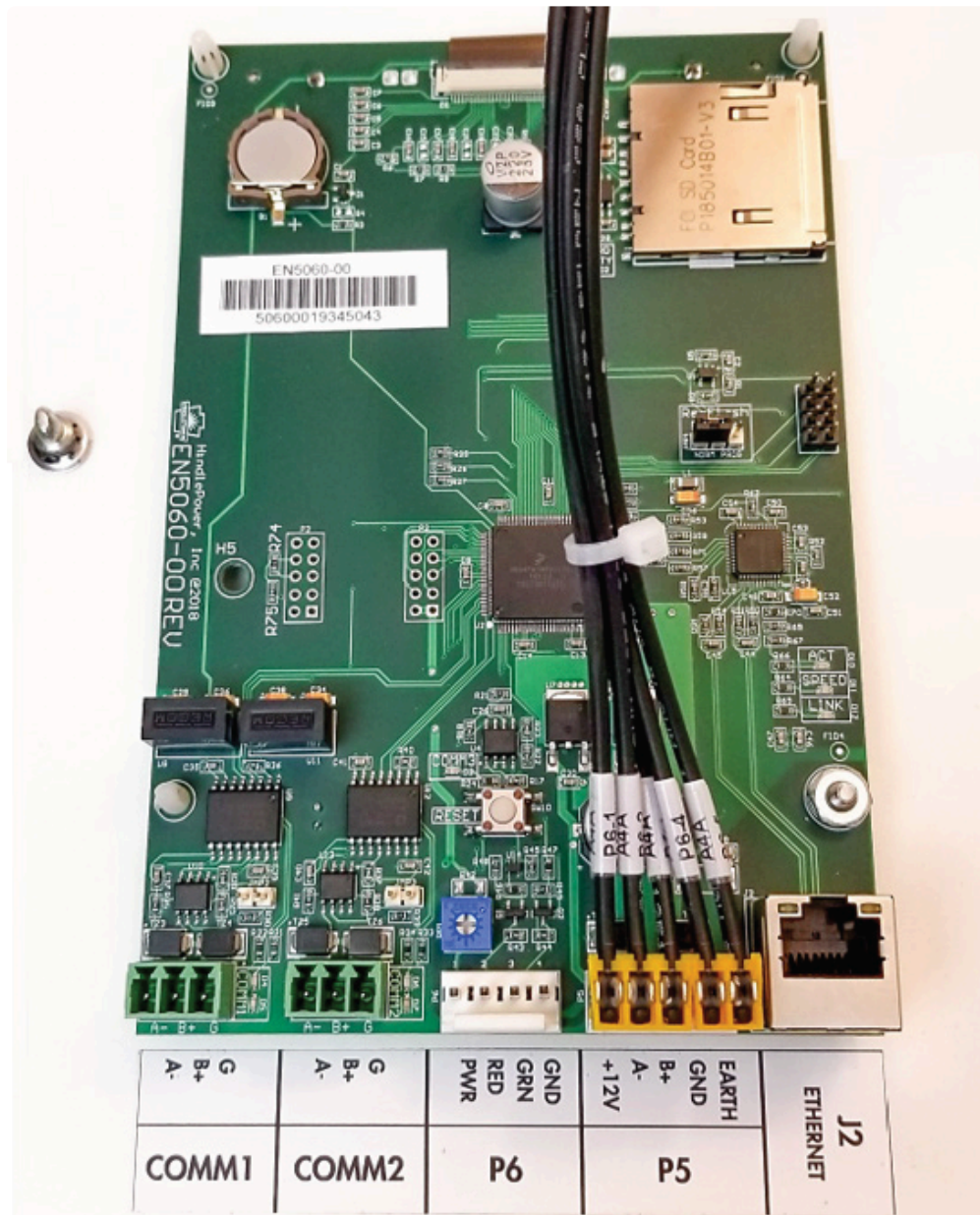
Biasing resistors ensure that the network remains in idle state when all drivers are tri- stated. To guarantee that the receivers remain in a known state, $\pm 200\text{mV}$ must be maintained across the RS\ 485 inputs, (A) or (-) and (B) or (+). When termination resistors are used, this requires a significantly lower value of biasing resistors which results in greater DC-loading of the network.

Network design and biasing resistor calculations depend on the number of network nodes, the type of drivers and receivers on the network, and any biasing already designed into other devices sharing the network. As a result, termination resistor decisions, and biasing resistor calculations are beyond the scope of this manual. For more information on biasing and termination details see the following references:

- EIA/TIA-485 Standard Telecommunication Industry Association
 - <http://www.tiaonline.org/standards>
- RS-422/RS-485 Application Note Copyright: B&B Electronics
 - <http://www.bb-elec.com/Learning-Center/All-White-Papers/Serial/RS-422-and-RS-485-Applications-eBook.aspx>
 - <http://www.ATSeries.net/PDFs/RS422+485AppNote.pdf>

2-wire RS-485 Connections

To make connections between the EPIC Controller and an RS-485 network, open the EPIC Controller display door. As seen below, two (2) RS-485 ports are located on the bottom left corner of the EN 5060-00 display board that is mounted in the EPIC Controller enclosure. Attach (A-), (B+), ground(G) to the communication port. Instructions for configuring RS-485 ports are in [Section 10.2](#) of this manual.



10.1.5. Ethernet Communications

EPIC has one (1) standard RJ-45 Ethernet connector and supports copper 10/100 Mbps Ethernet connections. It supports multiple protocols (Modbus and DNP3) simultaneously.

Ethernet

Ethernet is a family of computer networking technologies used in local area networks (LANs). Several variants of Ethernet are available. Newer variants typically use copper twisted-pair or fiber optic links with hubs or switches to form the network. Ethernet permits a large number of devices to be interconnected and allows the devices to communicate via multiple protocols concurrently.

Ethernet Connections

EPIC can be connected to a 10/100 Mbps Ethernet network with a standard Ethernet RJ-45 cable. Plug one end of the cable into the EPIC Ethernet connector and the other end into an Ethernet hub, switch or directly into the SCADA master. Refer to [Section 10.3](#) to assign protocol and set communications parameters (IP address, Netmask, Gateway, etc).

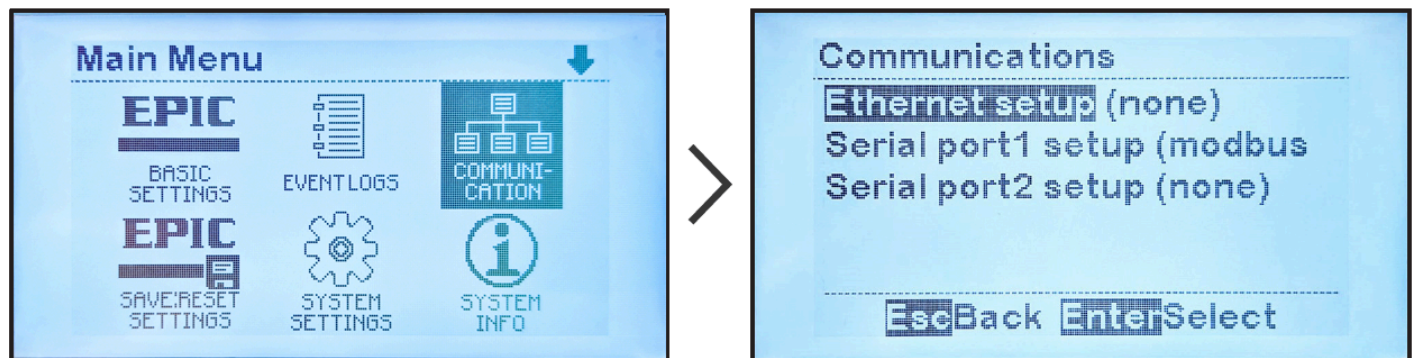
Optional Fiber Ethernet Interface

Although Ethernet interfaces are standardized, many variants of Ethernet over fiber exist. The variants are based on different data rates, fiber type, wavelength, and connector types.

The EPIC Optional Fiber Ethernet Interface can be configured to accommodate most if not all of these variants. Due to the vast number of variants and continuous addition of new ones, the specific offerings and capabilities needed to interface to your fiber Ethernet network need to be verified with your EPIC distributor.

10.2. Serial Communications Configuration

To configure the Ethernet port or either of the two (2) Serial ports, select MENU > COMMUNICATION. The EPIC Controller will display the ports that may be configured.



To change settings for a port, do the following:

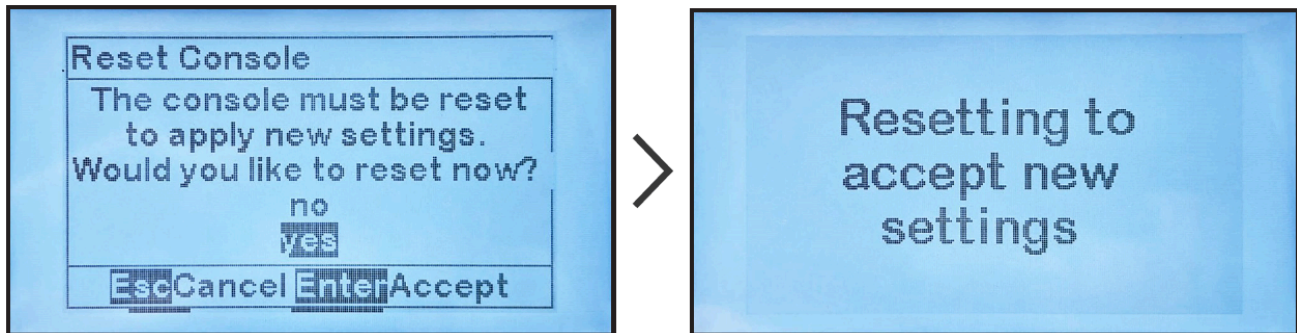
- Press Menu button.
- Navigate to the communication icon by using the UP, DOWN, LEFT, and RIGHT arrows singly or in combination; select it with EDIT/ENTER.
- Press UP or DOWN to navigate to parameter to configure.
- Press EDIT/ENTER to select parameter.
- For numbers, use LEFT and RIGHT to navigate to digit to edit, then UP or DOWN to change digit value, then EDIT/ENTER to store new value.
- If options presented, use UP or DOWN to select the option, then EDIT/ENTER to store new

option.

All commands in this manual are presented with a shorthand communication:

Command > Command > Command, omitting navigation buttons like UP, LEFT, and ENTER.

For any change to Communications parameters to be applied, the EPIC Console must be reset. You will be prompted to do so as follows:



SECTION TOPICS

[Assigning PORT Protocol](#)

[Changing Common PORT Parameters](#)

[Changing DNP3 Serial PORT Parameters](#)

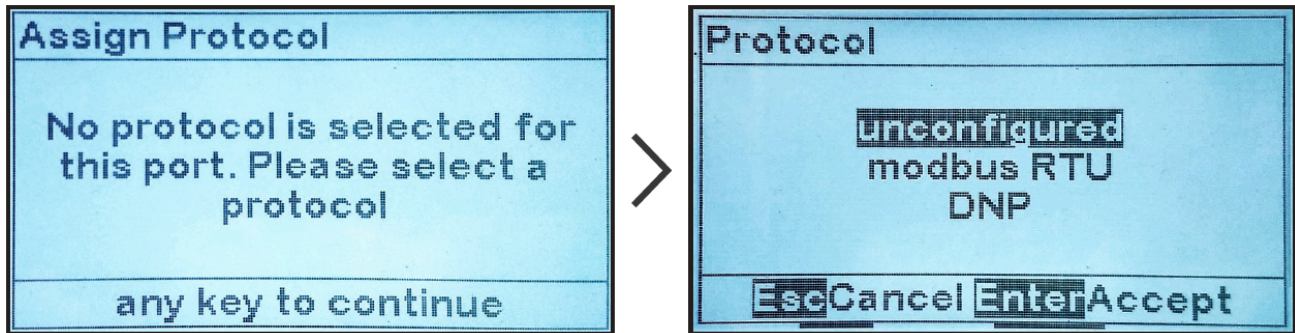
[Changing Modbus Serial PORT Parameters](#)

10.2.1. Assigning Port Protocol

When configuring a PORT, set the protocol first. If a serial PORT is not assigned a protocol, “(none)” will appear next to the PORT name. If the Serial PORT is already assigned a protocol, see [Section 10.2.2](#) for instructions on how to change the PORT configuration.

To assign a protocol to an unassigned serial PORT:

MENU > COMMUNICATION > select unassigned port > any key > select protocol



10.2.2. Changing Common PORT Parameters

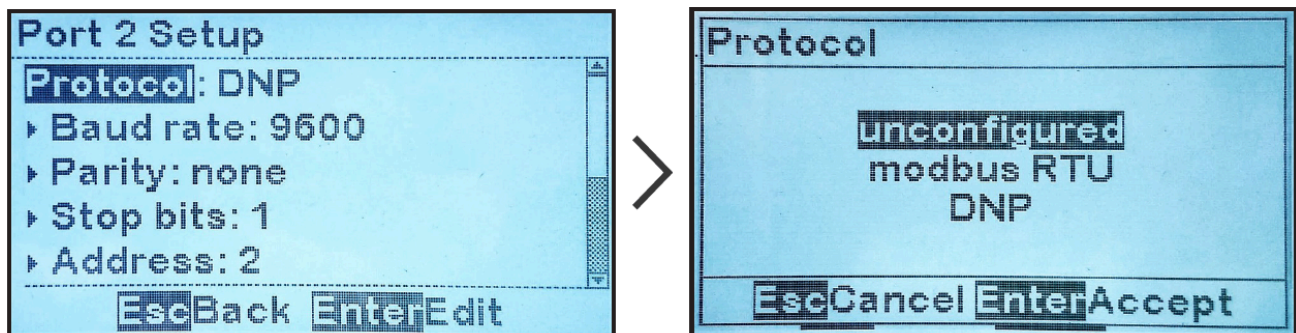
Several serial PORT configuration parameters are used by all protocols; other parameters are used only by specific protocols. This section specifies configuration of parameters used by all protocols. Click on any of the toggles below for instructions on changing a specific parameter.

✱ First assign protocol to port per [Section 10.2.1.](#)

Port Protocol:

To change the protocol assigned to a port:

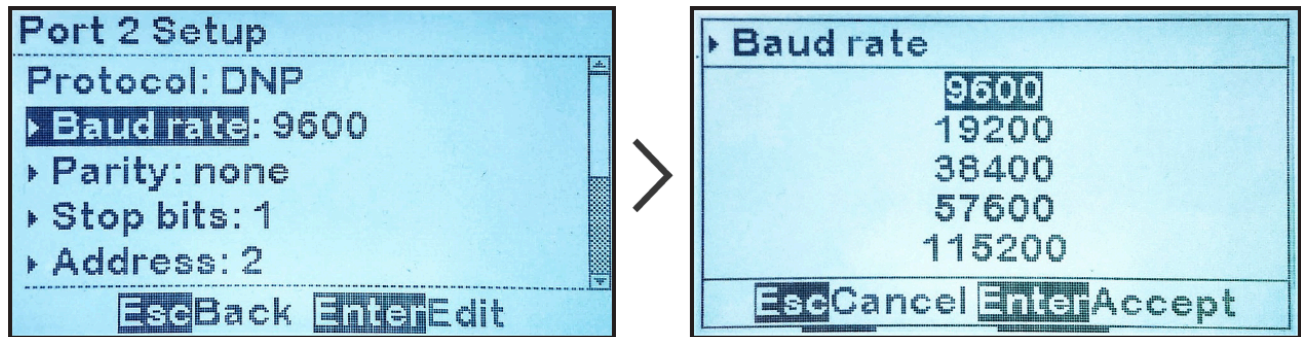
MENU > COMMUNICATION > select port with assigned protocol > "Protocol:" > select from choices



Baud Rate

To change Baud Rate:

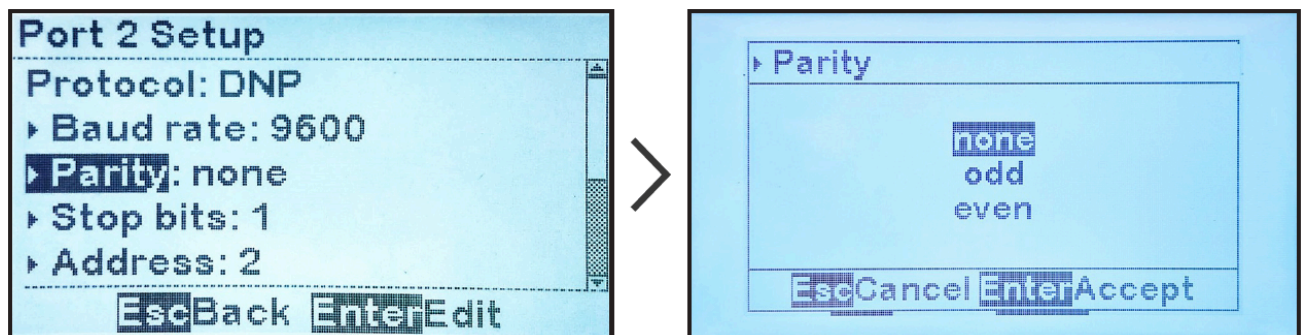
MENU > COMMUNICATION > select port with assigned protocol > "Baud rate:" > select from choices



Parity

To change parity:

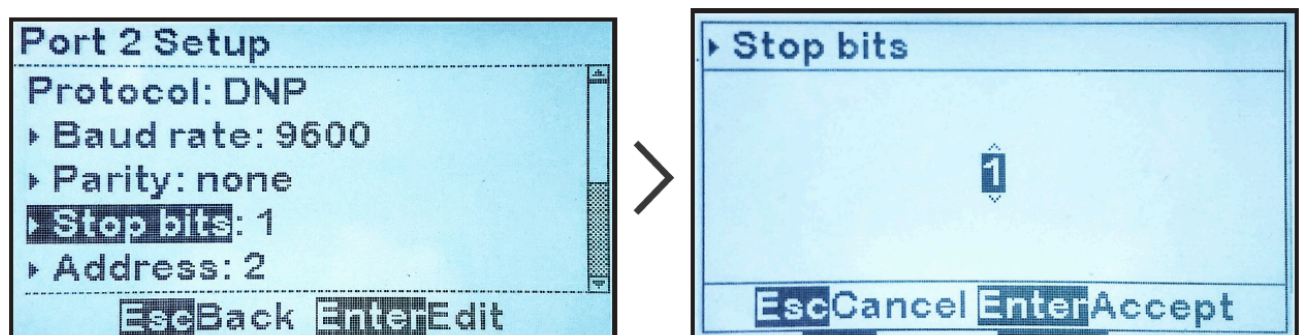
MENU > COMMUNICATION > select port with assigned protocol > "Parity:" > select from choices



Number of Stop Bits

To change the number of Stop bits:

MENU > COMMUNICATION > select port with assigned protocol > "Stop bits:" > select from choices



10.2.3. Changing DNP3 Serial PORT Parameters

This section describes how to change serial port configuration parameters used by the DNP3 protocol. Refer to [Section 10.2.2](#) to change parameters common to all protocols.

* DNP must have already been assigned as port's protocol per [Section 10.2.1](#).

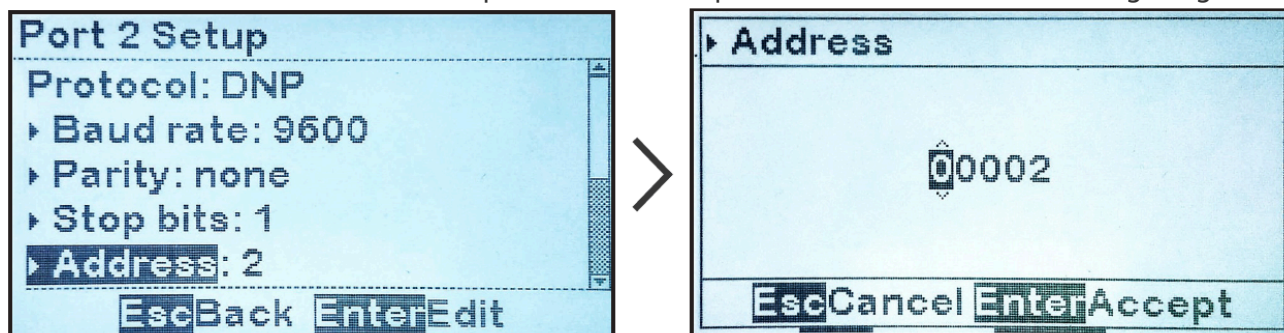
DNP3 protocol requires a unique device source address from 1 to 65535 and specific configuration parameters associated with the unsolicited response feature.

Click on any of the toggles below for instructions on changing a specific parameter:

DNP Source Address

To change the DNP source address:

MENU > COMMUNICATION > select port with "DNP" protocol > "Address:" > change digit

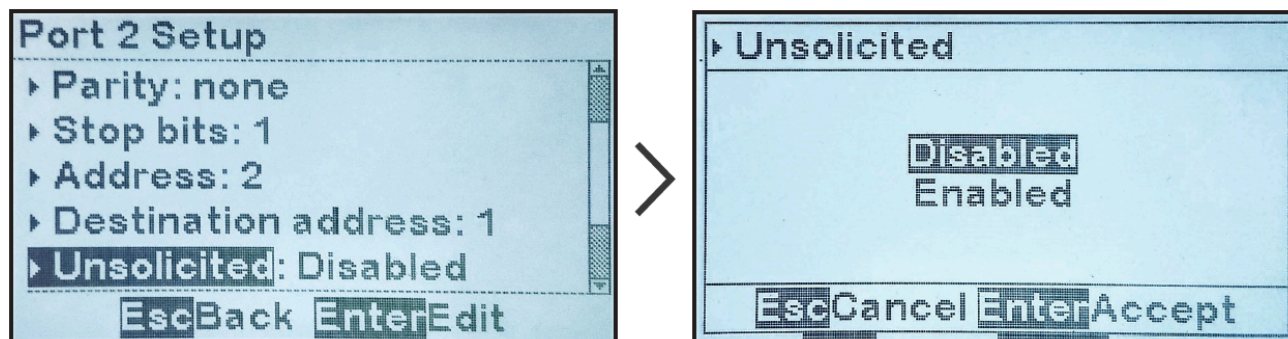


Enable/Disable DNP Unsolicited Responses

To enable or disable DNP unsolicited responses:

MENU > COMMUNICATION > select port with "DNP" protocol > "Unsolicited:" > select option

* Unsolicited responses are rarely used in DNP protocols. Before enabling unsolicited responses check with the network administrator to make sure the network is capable of supporting DNP unsolicited responses.

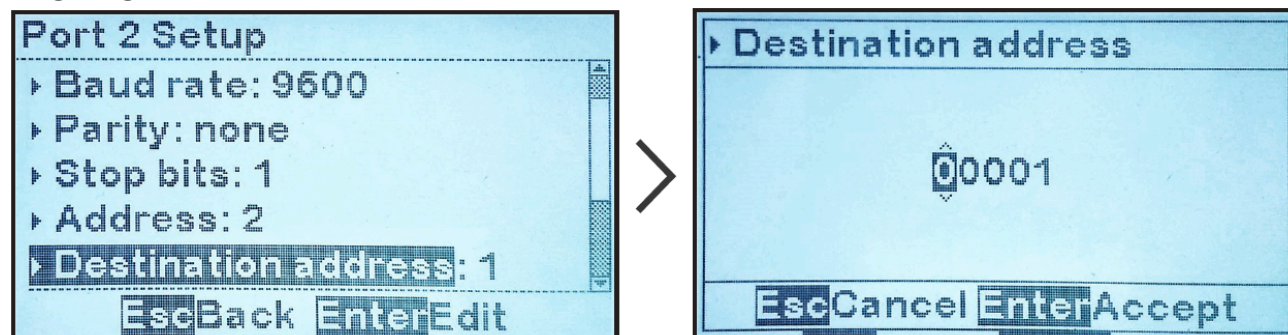


* The remaining DNP parameters are only used when DNP unsolicited responses are enabled.

DNP Unsolicited Response Destination Address

To change DNP unsolicited response destination address:

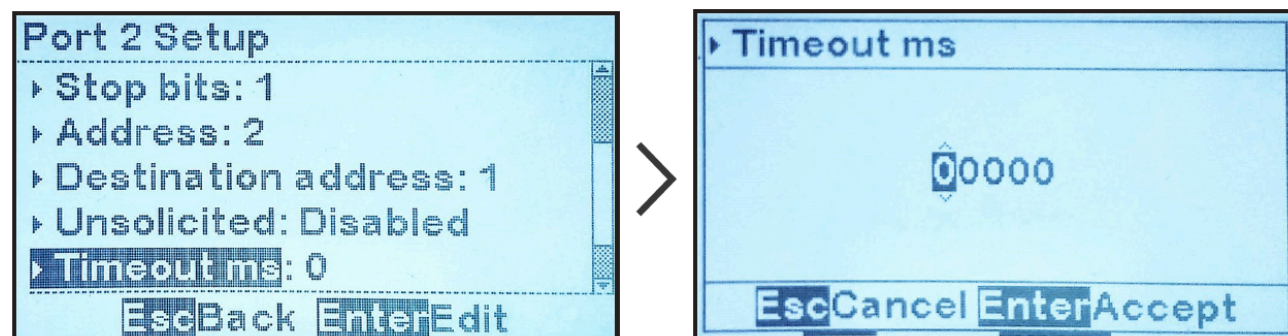
MENU > COMMUNICATION > select port with "DNP" protocol > "Destination address:" > change digits



DNP Unsolicited Response Acknowledgment Timeout

To change DNP unsolicited response acknowledgment timeout:

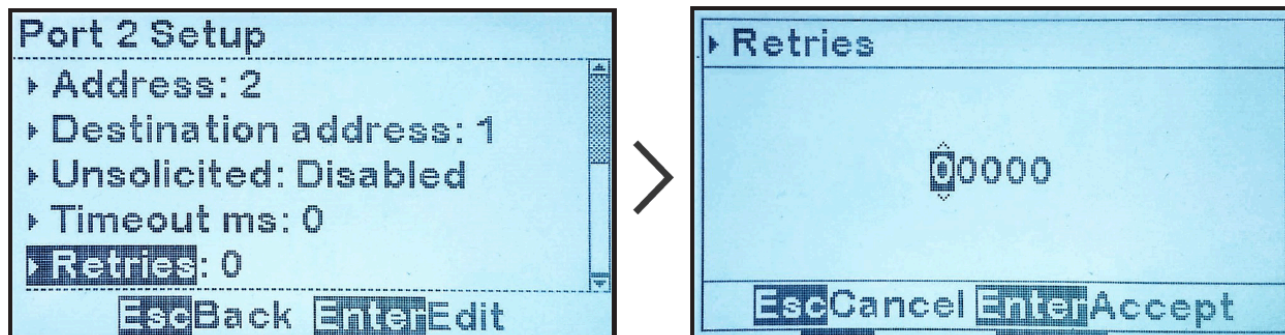
MENU > COMMUNICATION > select port with "DNP" protocol > "Timeout ms:" > change digits (value is in milliseconds)



DNP Number of Unsolicited Response Retries

To change DNP number of unsolicited response retries:

MENU > COMMUNICATION > select port with “DNP” protocol > “Retries:” > change digits



10.2.4. Changing Modbus Serial PORT Parameters

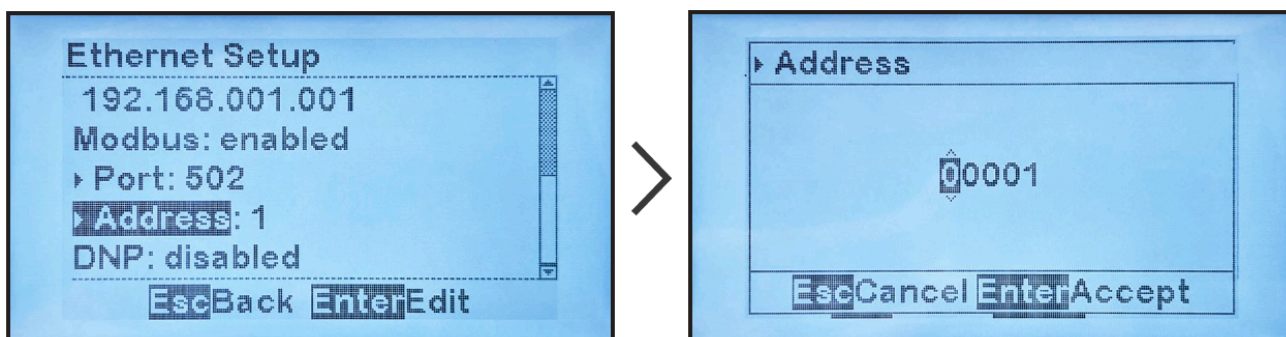
This section describes how to change serial port configuration parameters used by Modbus protocol. Refer to [Section 10.2.2](#) to change parameters common to all protocols.

✿ Modbus must have already been assigned as port's protocol per [Section 10.2.1](#).

Modbus protocols require a unique device ID address from 1 to 247.

To change the Modbus ID address:

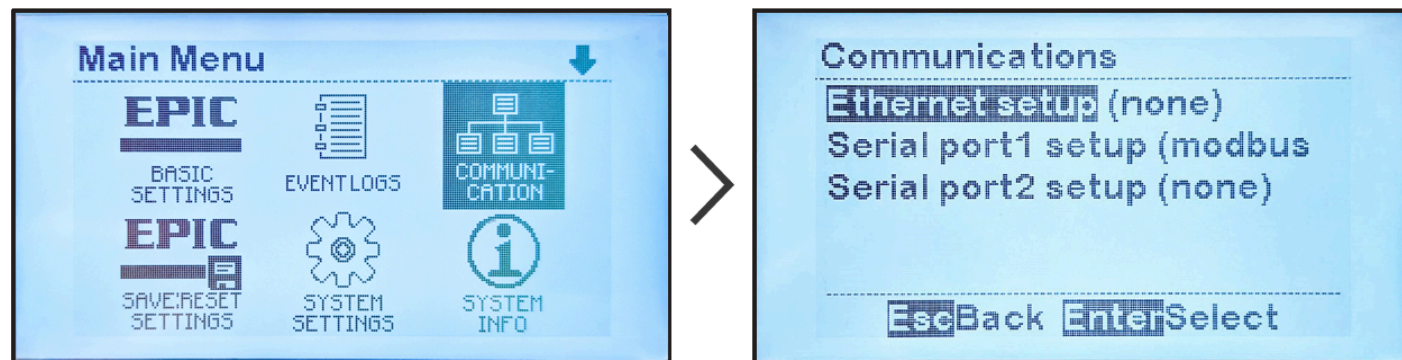
MENU > COMMUNICATION > select port with “Modbus” protocol > “Address:” > set digits



10.3. Ethernet Communications Configuration

To configure the Ethernet port or either of the two (2) Serial ports, select MENU >

COMMUNICATION. The EPIC Controller will display the ports that may be configured.



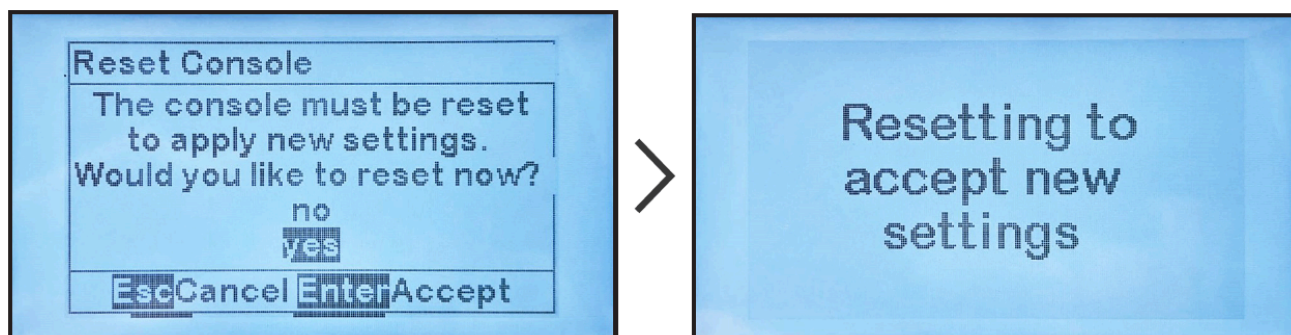
To change settings for a port, do the following:

- Press Menu button.
- Navigate to the communication icon by using the UP, DOWN, LEFT, and RIGHT arrows singly or in combination; select it with EDIT/ENTER.
- Press UP or DOWN to navigate to parameter to configure.
- Press EDIT/ENTER to select parameter.
- For numbers, use LEFT and RIGHT to navigate to digit to edit, then UP or DOWN to change digit value, then EDIT/ENTER to store new value.
- If options presented, use UP or DOWN to select the option, then EDIT/ENTER to store new option.

All commands in this manual are presented with a shorthand communication:

Command > Command > Command, omitting navigation buttons like UP, LEFT, and ENTER.

For any change to Communications parameters to be applied, the EPIC Console must be reset. You will be prompted to do so as follows:



SECTION TOPICS

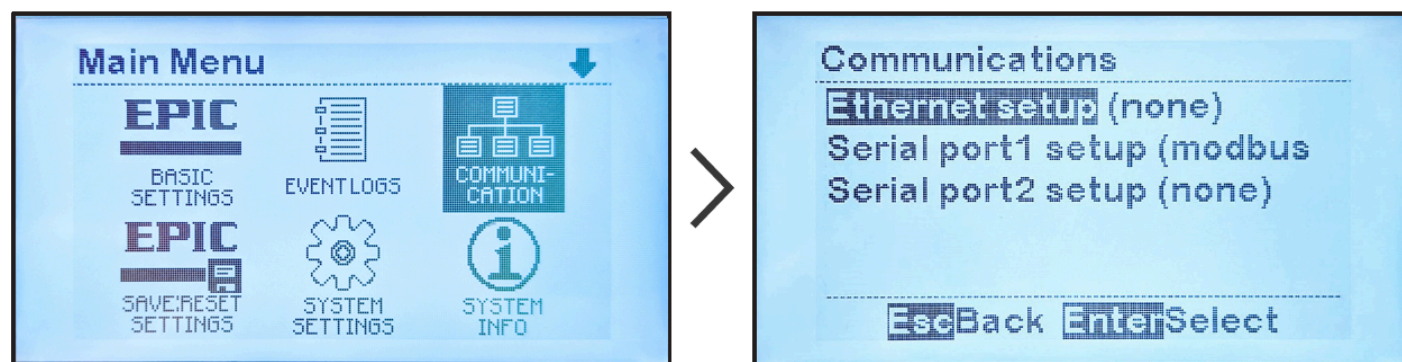
[Enabling Ethernet Adapter](#)

[Changing Common Ethernet Parameters](#)[Enable/Disable DNP Communications via Ethernet](#)[Configuring DNP Ethernet Parameters](#)[Enable/Disable Modbus Communications via Ethernet](#)[Configuring Modbus Ethernet Parameters](#)

10.3.1. Enabling Ethernet Adapter

To change or verify the EPIC Ethernet Communications Adapter Configuration:

MENU > COMMUNICATION > “Ethernet setup”



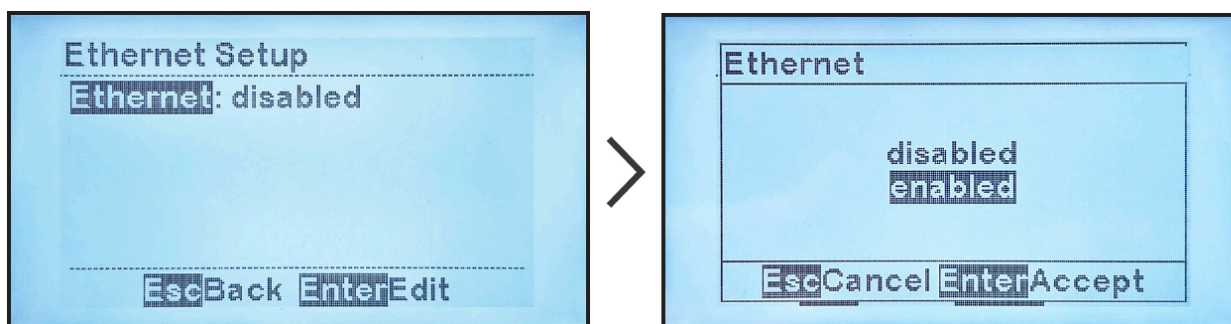
If “(none)” appears after “Ethernet setup” , the Ethernet adapter will need to be enabled as discussed below.

Enabling Ethernet Adapter

The first step in configuring the Ethernet Adapter is to enable it.

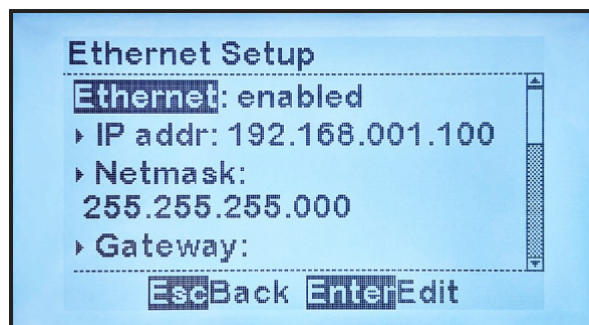
To enable the Ethernet Adapter:

MENU > COMMUNICATION > “Ethernet setup” (as shown above) > “enabled”



Ethernet configuration parameters will now appear. Refer to [Sections 10.3.2 to 10.3.6](#) for how

to configure remaining Ethernet parameters.



10.3.2. Changing Common Ethernet Parameters

Several Ethernet configuration parameters are used by all protocols; other parameters are used only by specific protocols. This section specifies configuration of parameters used by all protocols.

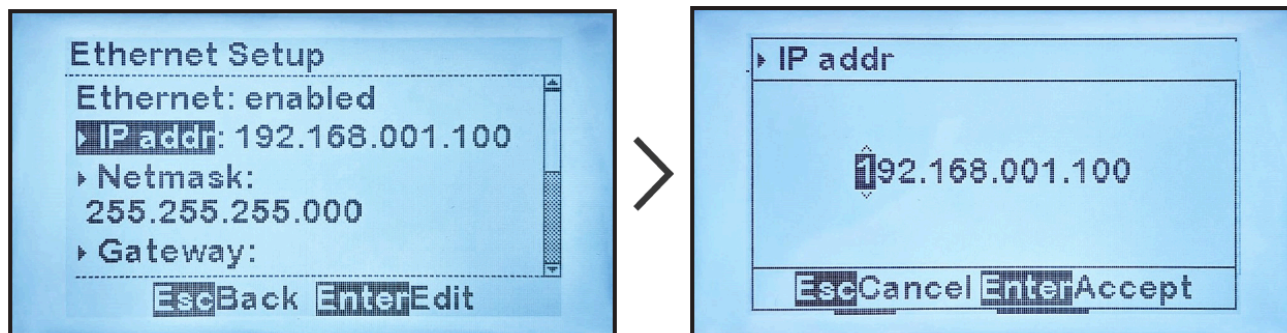
✿ Ethernet adapter must have been enabled per [Section 10.3.1](#).

Click on any of the toggles below for instructions on changing a specific parameter.

IP Address

To change the IP address:

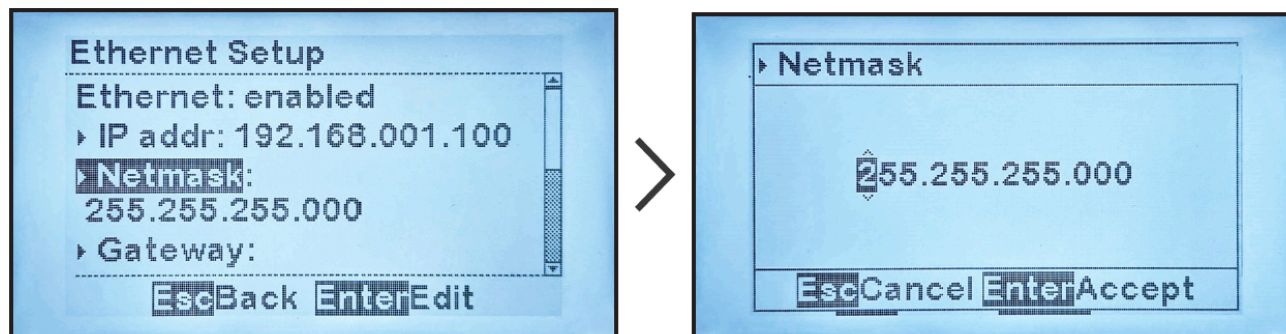
MENU > COMMUNICATION > "Ethernet setup" (as shown in [Section 10.3.1](#)) > "IP addr:" > change digits



Netmask

To change the Netmask:

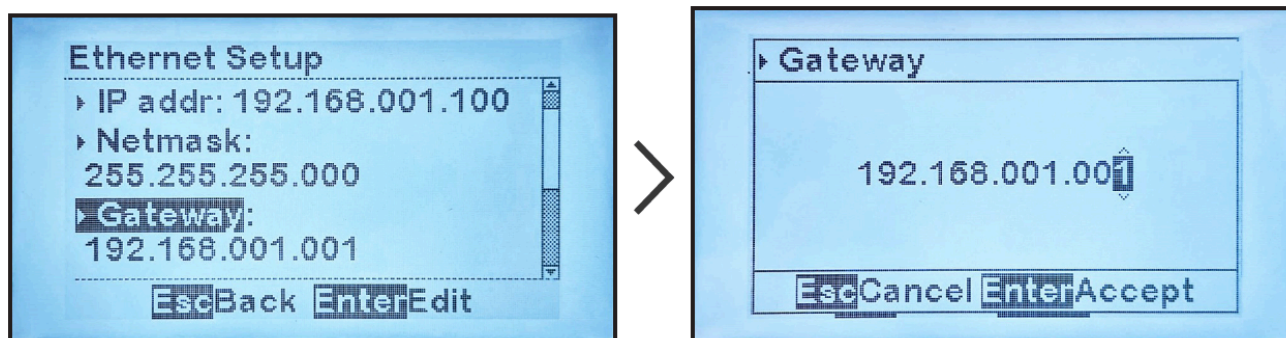
MENU > COMMUNICATION > "Ethernet setup" (as shown in [Section 10.3.1](#)) > "Netmask:" > change digits



Gateway

To change the Gateway:

MENU > COMMUNICATION > “Ethernet setup” (as shown in [Section 10.3.1](#)) > “Gateway:” > change digits



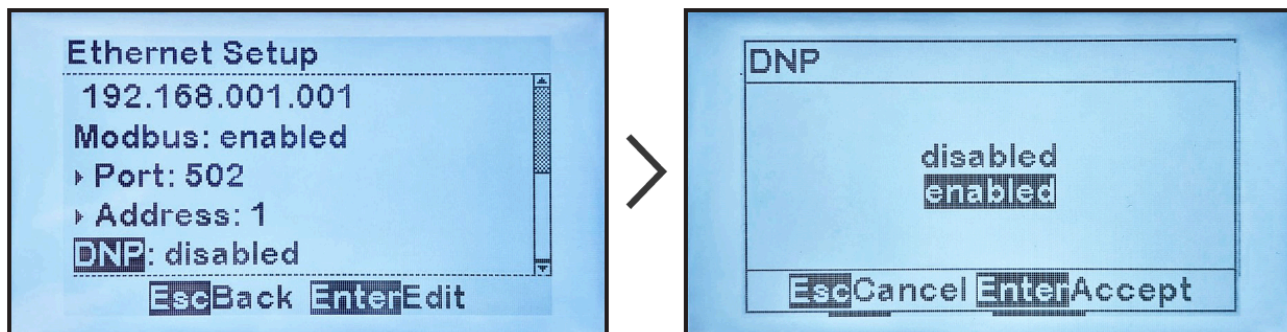
10.3.3. Enable/Disable DNP Communications via Ethernet

The EPIC Ethernet adapter is capable of communicating via multiple protocols simultaneously.

After enabling the Ethernet adapter ([Section 10.3.1](#)) and checking common parameter configuration ([Sections 10.3.2](#)), you may enable or disable DNP communications:

To enable or disable DNP communications via Ethernet:

MENU > COMMUNICATION > “Ethernet setup” (as shown in [Section 10.3.1](#)) > “DNP:” > select “enabled” or “disabled”



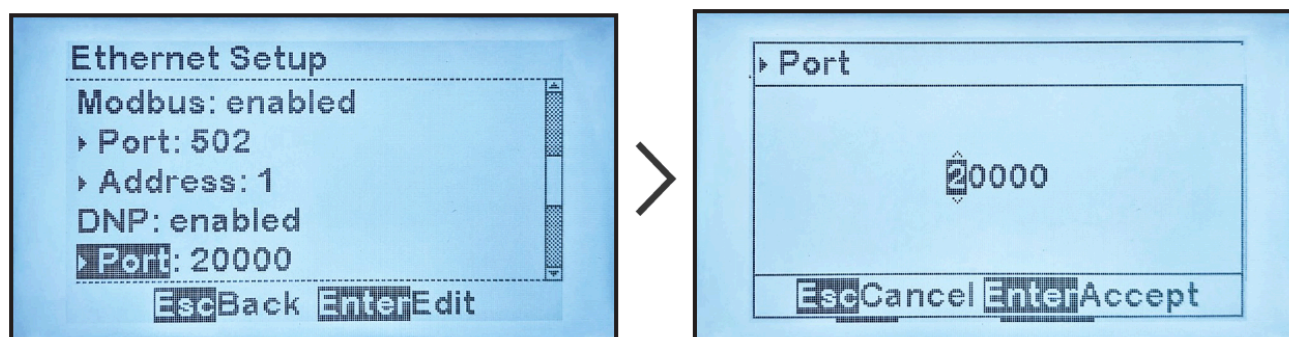
10.3.4. Configuring DNP Ethernet Parameters

DNP Ethernet protocol requires configuration of the parameters described in the toggles below. Click on each for instructions that include screenshots:

DNP Ethernet Port Number

To change the DNP Ethernet Port number:

MENU > COMMUNICATION > “Ethernet setup” (as shown in [Section 10.3.1](#) ethernet-adapter})
> “Port:” (located after “DNP: enabled”) > change digits

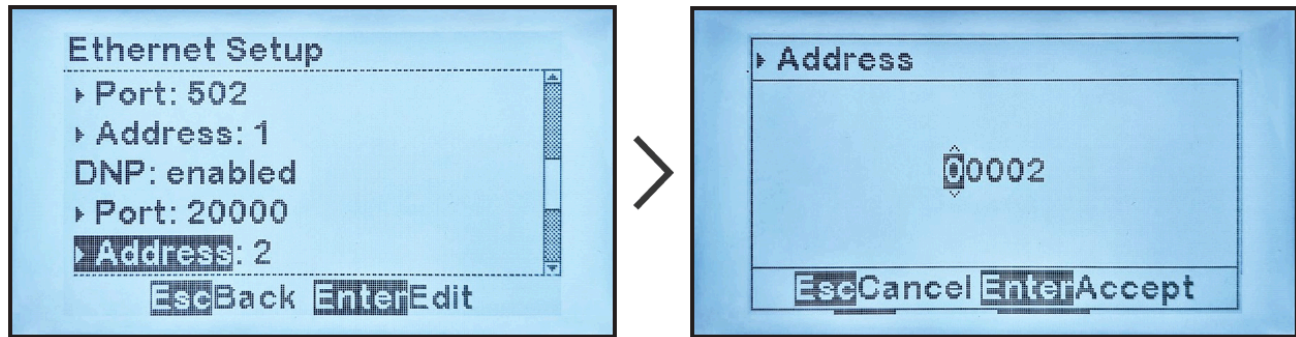


✿ Default DNP Ethernet Port is 20000. It is highly recommended that this port number not be changed.

DNP Source Address

To change the DNP source address for the Ethernet interface:

MENU > COMMUNICATION > “Ethernet setup” (as shown in [Section 10.3.1](#) ethernet-adapter})
> “Address:” (located after “DNP: enabled”) > change digits

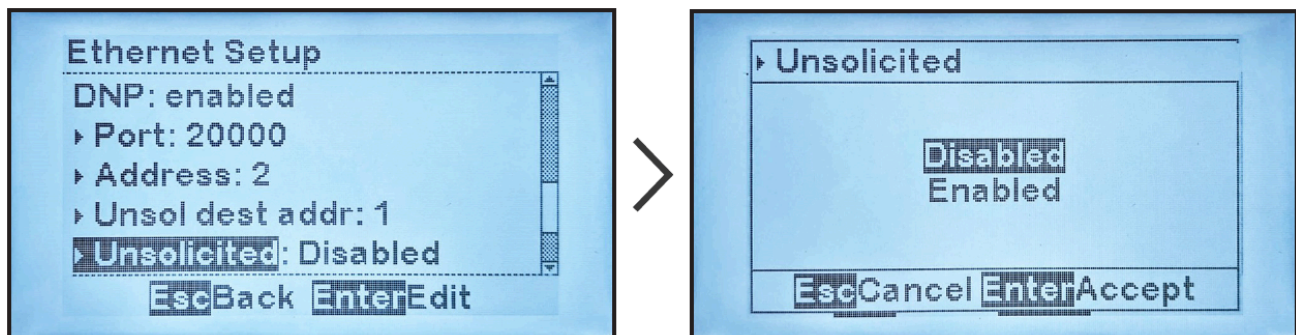


Enable/Disable DNP Unsolicited Responses

To enable or disable DNP unsolicited responses for the Ethernet interface:

MENU > COMMUNICATION > “Ethernet setup” (as shown in [Section 10.3.1](#) ethernet-adapter})
 > “Unsolicited:” (located after “DNP: enabled”) > select “enabled” or “disabled”

- * Unsolicited responses are rarely used in DNP. Before enabling unsolicited responses check with network administrator to make sure network is capable of supporting DNP unsolicited responses.

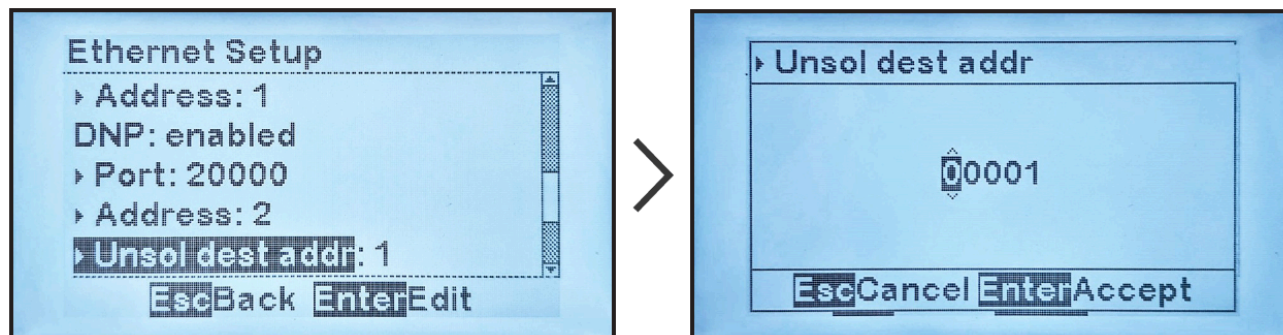


- * Remaining DNP parameters are only used when Ethernet DNP unsolicited responses are enabled.

DNP Unsolicited Response Destination Address

To change the DNP unsolicited response destination address:

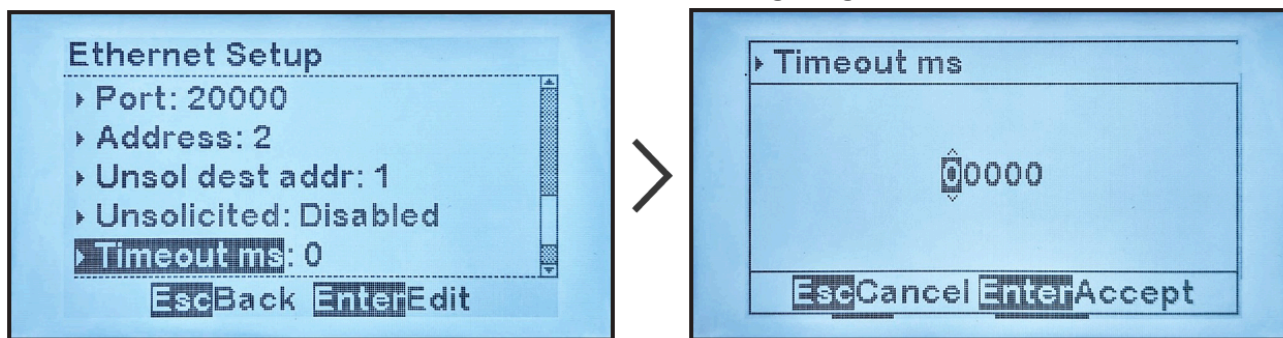
MENU > COMMUNICATION > “Ethernet setup” (as shown in [Section 10.3.1](#) ethernet-adapter})
 > “Unsol dest addr:” (located after “DNP: enabled”) > change digits



DNP Unsolicited Response Acknowledgment Timeout

To change the DNP unsolicited response acknowledgement timeout:

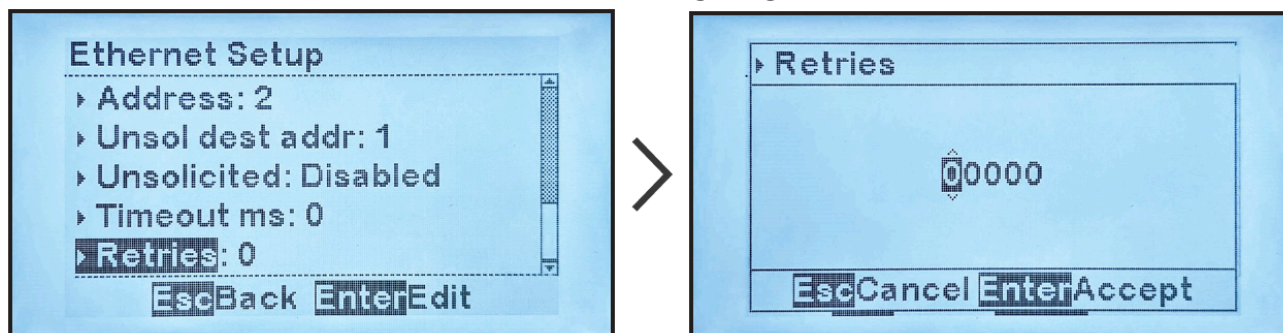
MENU > COMMUNICATION > “Ethernet setup” (as shown in [Section 10.3.1](#) ethernet-adapter})
 > “Timeout ms:” (located after “DNP: enabled”) > change digits



DNP Number of Unsolicited Response Retries for Ethernet Interface

To change the DNP number of unsolicited response retries for the Ethernet interface:

MENU > COMMUNICATION > “Ethernet setup” (as shown in [Section 10.3.1](#) ethernet-adapter})
 > “Retries:” (located after “DNP: enabled”) > change digits



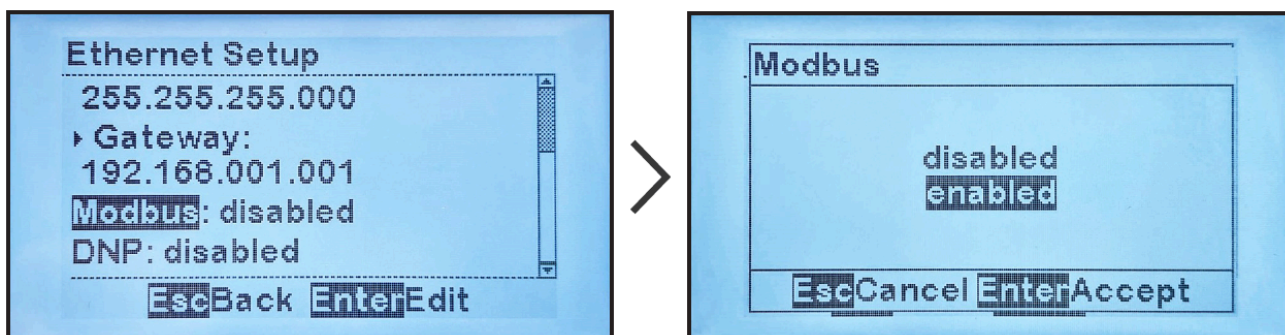
10.3.5. Enable/Disable Modbus Communications via Ethernet

The EPIC Ethernet adapter is capable of communicating via multiple protocols simultaneously.

After enabling the Ethernet adapter ([Section 10.3.1](#)) and checking common parameter configuration ([Section 10.3.2](#)), you may enable or disable Modbus communications.

To enable or disable Modbus communications via Ethernet:

MENU > COMMUNICATION > “Ethernet setup” (as shown in [Section 10.3.1](#)) > “Modbus:” > select “enabled” or “disabled”

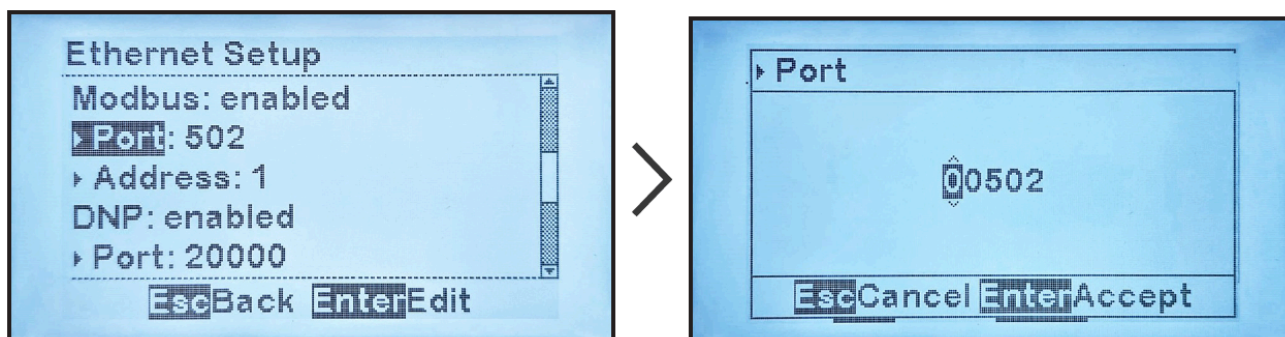


10.3.6. Configuring Modbus Ethernet Parameters

Modbus Ethernet protocol requires configuration of the following specific parameters:

To change the Modbus Ethernet Port number:

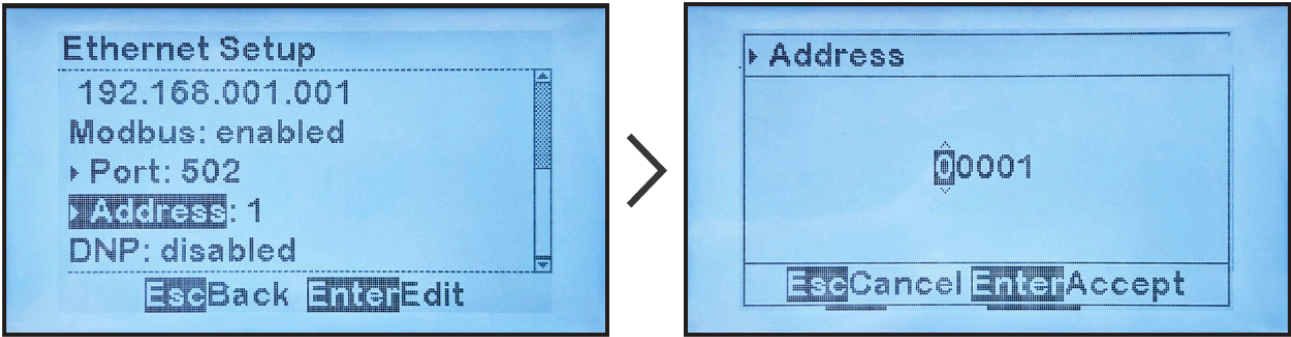
MENU > COMMUNICATION > “Ethernet setup” (as shown in [Section 10.3.1](#)) > “Port:” (located after “Modbus: enabled”) > change digits



* Default Modbus Ethernet Port is 502. It is highly recommended that this port number not be changed.

To change the Modbus ID address for the Ethernet interface:

MENU > COMMUNICATION > “Ethernet setup” (as shown in [Section 10.3.1](#)) > “Address:” (located after “Modbus: enabled”) > change digits



10.4. DNP3

This section provides specifics for implementing DNP3 Level 2 protocol via the EPIC Controller Communications. In conjunction with these documents from the DNP Users Group, “DNP3 Basic 4” and “DNP Subset Definitions,” it provides complete information on how to communicate to a SCADA system via the DNP3 interface.

This implementation of DNP3 is fully compliant with DNP3 Subset Definition Level 2, contains many Subset Level 3 features, and contains some functionality beyond Subset Level 3.

SECTION TOPICS
Device Profile Document
Implementation Table
DNP Point Lists

10.4.1. Device Profile Document

The following table provides a “Device Profile Document” in the standard format defined in the “DNP3 Subset Definitions” document. This table, in combination with the following two (2) items, should provide a complete interoperability/configuration guide for the DNP3 interface.

- [Implementation Table – Section 10.4.2](#)
- [DNP Point Lists – Section 10.4.3](#)

!(center)

DNP3 Device Profile Document			
Vendor Name: HindlePower, Inc. - 1075 Saint John Street - Easton, PA 18042			
Device Name: EPIC Communications Modules			
Highest DNP Level Supported		Device Function	
For Request	Level 2	-	Master
For Responses	Level 2	✓	Slave
Notable objects, functions, and/or qualifiers supported in addition to the Highest DNP Levels Supported (the complete list is described in the attached table):			
Maximum Data Link Frame Size (octets)		Maximum Application Fragment Size (octets)	
Transmitted	292	Transmitted	2048
Received	292	Received	2048
Maximum Data Link Re-tries		Maximum Application Layer Re-tries	
✓	None	✓	None
-	Fixed at 3	-	Configurable
-	Configurable range 0 - 255		
Requires Data Link Confirmation...			
✓	Never		
-	Always		
-	Sometimes		
-	Configurable		

Requires Application Layer Confirmation...								
-	Never							
-	Always							
✓	When reporting event data							
-	When sending multi-fragment responses							
-	Sometimes							
-	Configurable							
Timeouts While Waiting For...								
Data Link Confirm	-	None	✓	Fixed @ 2000	-	Variable	-	Configurable
Complete Appl. Fragment	✓	None	-	Fixed @ _____	-	Variable	-	Configurable
Application Confirm	-	None	✓	Fixed @ 2000	-	Variable	-	Configurable
Complete Appl. Response	✓	None	-	Fixed @ _____	-	Variable	-	Configurable

Others		
Inter-character Timeout	✓	Fixed @ 50ms
Select/Operate Arm Timeout	✓	Fixed @ 5000ms
Binary Input Change Scanning Period	✓	Fixed @ 5000ms
Analog Input Change Scanning Period	✓	Fixed @ 5000ms
Unsolicited Response Notification Delay	✓	Fixed @ 15000ms
Delay Measurement		100ms
Synchronization		1000ms

Sends/Executes Control Operations							
WRITE Binary Outputs		Never	✓	Always		Sometimes	Configurable
SELECT/OPERATE		Never	✓	Always		Sometimes	Configurable
DIRECT OPERATE		Never	✓	Always		Sometimes	Configurable
DIRECT OPERATE - NO ACK		Never	✓	Always		Sometimes	Configurable
Count >1	✓	Never		Always		Sometimes	Configurable
Pulse On	✓	Never		Always		Sometimes	Configurable
Pulse Off	✓	Never		Always		Sometimes	Configurable
Latch On		Never	✓	Always		Sometimes	Configurable
Latch Off		Never	✓	Always		Sometimes	Configurable
Queue	✓	Never		Always		Sometimes	Configurable
Clear Queue	✓	Never		Always		Sometimes	Configurable
Reports Binary Input Change Events when no specific variation requested				Reports time-tagged Binary Input Change Events when no specific variation requested			
	Never				Never		
✓	Only time-tagged			✓	Binary Input Change With Time		
	Only non-time-tagged				Binary Input Change With Relative Time		
	Configurable				Configurable (attach explanation)		

Sends Unsolicited Responses		Sends Static Data in Unsolicited Responses:	
<input type="checkbox"/>	Never	<input checked="" type="checkbox"/>	Never
<input checked="" type="checkbox"/>	Configurable, See DNP configuration section	<input type="checkbox"/>	When Device Restarts
<input type="checkbox"/>	Only certain objects	<input type="checkbox"/>	When Status Flags Change
<input type="checkbox"/>	Sometimes (attach explanation)	No other options are permitted.	
<input checked="" type="checkbox"/>	ENABLE/DISABLE UNSOLICITED Function codes supported		
Default Counter Object/Variation		Counters Roll Over at:	
<input checked="" type="checkbox"/>	No Counters Reported	<input checked="" type="checkbox"/>	No Counters Reported
<input type="checkbox"/>	Configurable	<input type="checkbox"/>	Configurable (attach explanation)
<input type="checkbox"/>	Default Object: 20 and 21	<input type="checkbox"/>	16 Bits
<input type="checkbox"/>	Default Variation	<input type="checkbox"/>	32 Bits
<input type="checkbox"/>	Point-by-point list attached	<input type="checkbox"/>	Other Value: _____
<input type="checkbox"/>		<input type="checkbox"/>	Point-by-point list attached
Sends Multi-Fragment Responses			
<input checked="" type="checkbox"/>	Yes		
<input type="checkbox"/>	No		

Sequential File Transfer Support				
Append File Mode	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
Custom Status Code Strings	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
Permission Field	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
File Events Assigned to Class	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
File Events Poll Specifically	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
File Events Send Immediately	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
Multiple Blocks in a Fragment	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No
Max Number of Files Open	0			

10.4.2. Implementation Table

The following table identifies the variations, function codes, and qualifiers supported by EPIC Controller Communications in both request messages and in response messages.

For some table entries, one of the following notes may apply:

Note 1: The Default variation refers to the variation in the response when the requested variation is '0' or in response to a class 0, 1, 2, or 3 request.

Note 2: For static (non-change-event) objects, qualifiers 17 or 28 are only responded when a specific request is sent with qualifiers 17 or 28, respectively. Otherwise, static object requests sent with qualifiers 00, 01, 06, 07, or 08, will be responded with qualifiers 00 or 01. For change event objects, qualifiers 17 or 28 are always responded except for object 70, which responds with qualifier 1B or 5B.

Implementation Table						
Color Key	Indicates Subset Level 3 Functionality (Beyond Level 2)			Indicates Functionality Beyond Subset Level 3		
Object			Request (Library Parse)		Response (Library will respond with)	
Object Number	Variation Number	Description	Function Codes (dec)	Qualifier Codes (hex)	Function Codes (dec)	Qualifier Codes (hex)
1	0	Binary Input (Variation 0 is used to request default variation)	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
			22 (assign class)	07,08 (limited qty)		
				17,28 (index)		
1	1 (default - see NOTE 1)	Binary Input	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
			22 (assign class)	07,08 (limited qty)		
				17,28 (index)		
1	2	Binary Input with Status	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
			22 (assign class)	07,08 (limited qty)		
				17,28 (index)		
2	0	Binary Input Change (Variation 0 is used to request default variation)	1 (read)	06 (no range, or all)	129 (response)	17, 28 (index)
				07, 08 (limited qty)	130 (unsol. resp)	
2	1	Binary Input Changed without Time	1 (read)	06 (no range, or all)	129 (response)	17, 28 (index)
				07, 08 (limited qty)	130 (unsol. resp)	
2	2 (default - see NOTE 1)	Binary Input Change with Time	1 (read)	06 (no range, or all)	129 (response)	17, 28 (index)
				07, 08 (limited qty)	130 (unsol. resp)	
10	0	Binary Output Status (Variation 0 is used to request default variation)	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
				07,08 (limited qty)		
				17,28 (index)		
10	2 (default - see NOTE 1)	Binary Output Status	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
				07,08 (limited qty)		
				17,28 (index)		

Implementation Table						
Color Key	Indicates Subset Level 3 Functionality (Beyond Level 2)			Indicates Functionality Beyond Subset Level 3		
Object			Request (Library Parse)		Response (Library will respond with)	
12	1	Control Relay Output Block	3 (select)	00,01 (start-stop)	129 (response)	echo of request
			4 (operate)	07,08 (limited qty)		
			5 (direct op)	17,28 (index)		
			6 (direct op, no ack)			
30	0	Analog Input (variation 0 is used to request default variation)	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
			22 (assign class)	07,08 (limited qty)		
				17,28 (index)		
30	1	32-Bit Analog Input	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
			22 (assign class)	07,08 (limited qty)		
				17,28 (index)		
30	2 (default - see NOTE 1)	16-Bit Analog Input	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
			22 (assign class)	07,08 (limited qty)		
				17,28 (index)		
30	3	32-Bit Analog Input without Flag	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
			22 (assign class)	07,08 (limited qty)		
				17,28 (index)		
30	4	16-Bit Analog Input without Flag	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
			22 (assign class)	07,08 (limited qty)		
				17,28 (index)		
32	0	Analog Change Event (variation 0 is used to request default variation)	1 (read)	06 (no range, or all)	129 (response)	17,28 (index)
				07,08 (limited qty)	130 (unsol. resp)	
32	1	32-bit Analog Change Event without Time	1 (read)	06 (no range, or all)	129 (response)	17,28 (index)
				07,08 (limited qty)	130 (unsol. resp)	

Implementation Table						
Color Key	Indicates Subset Level 3 Functionality (Beyond Level 2)			Indicates Functionality Beyond Subset Level 3		
Object			Request (Library Parse)		Response (Library will respond with)	
32	2 (default - see NOTE 1)	16-bit Analog Change Event with-out Time	1 (read)	06 (no range, or all)	129 (response)	17,28 (index)
				07,08 (limited qty)	130 (unsol. resp)	
32	3	32-bit Analog Change Event with Time	1 (read)	06 (no range, or all)	129 (response)	17,28 (index)
				07,08 (limited qty)	130 (unsol. resp)	
32	4	16-bit Analog Change Event with Time	1 (read)	06 (no range, or all)	129 (response)	17,28 (index)
				07,08 (limited qty)	130 (unsol. resp)	
34	0	Analog Input Reporting Deadband (variation 0 is used to request default variation)	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
				07,08 (limited qty)		
				17,28 (index)		
34	1 (default see NOTE 1)	16 bit Analog Input Reporting Deadband	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
				07,08 (limited qty)		
				17,28 (index)		
			2 (write)	00,01 (start-stop)		
				07,08 (limited qty)		
34	2	16 bit Analog Input Reporting Deadband	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
				07,08 (limited qty)		
				17,28 (index)		
			2 (write)	00,01 (start-stop)		
				07,08 (limited qty)		
40	0	Analog Output Status (variation 0 is used to request default variation)	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
				07,08 (limited qty)		
				17,28 (index)		
40	1	32-Bit Analog Output Status	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
				07,08 (limited qty)		
				17,28 (index)		

Implementation Table						
Color Key	Indicates Subset Level 3 Functionality (Beyond Level 2)			Indicates Functionality Beyond Subset Level 3		
Object			Request (Library Parse)		Response (Library will respond with)	
40	2 (default - see NOTE 1)	16-Bit Analog Output Status	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
				07,08 (limited qty)		
				17,28 (index)		
41	1	32-Bit Output Block	3 (select)	00,01 (start-stop)	129 (response)	echo of request
			4 (operate)	07,08 (limited qty)		
			5 (direct op)	17,28 (index)		
			6 (direct op, no ack)			
41	2	16-Bit Output Block	3 (select)	00,01 (start-stop)	129 (response)	echo of request
			4 (operate)	07,08 (limited qty)		
			5 (direct op)	17,28 (index)		
			6 (dir. op, no ack)			
50	0	Time and Date	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
				07,08 (limited qty)		
				17,28 (index)		
50	1 (default - see NOTE 1)	Time and Date	1 (read)	00,01 (start-stop)	129 (response)	00,01 (start-stop)
				06 (no range, or all)		17,28 (index - see NOTE 2)
				07,08 (limited qty)		
				17,28 (index)		
			2 (write)	00,01 (start-stop)	129 (response)	
				06 (no range, or all)		
				07 (limited qty=1)		
				08 (limited qty)		
				17,28 (index)		
60	1	Classs 0, Data	1 (read)	06 (no range, or all)	129 (response)	00,01 (start-stop)
			22 (assign class)			
60	2	Class 1 Data	1 (read)	06 (no range, or all)	129 (response)	17,28 (index - see NOTE 2)
				07,08 (limited qty)		
			20 (enbl. unsol.)	06 (no range, or all)		
			21 (dsbl. unsol.)			
			22 (assign class)			

Implementation Table						
Color Key	Indicates Subset Level 3 Functionality (Beyond Level 2)			Indicates Functionality Beyond Subset Level 3		
Object			Request (Library Parse)		Response (Library will respond with)	
60	3	Class 2 Data	1 (read)	06 (no range, or all)	129 (response)	17,28 (index - see NOTE 2)
				07,08 (limited qty)		
			20 (enbl. unsol.)	06 (no range, or all)		
			21 (dsbl. unsol.)			
			22 (assign class)			
60	4	Class 3 Data	1 (read)	06 (no range, or all)	129 (response)	17,28 (index - see NOTE 2)
				07,08 (limited qty)		
			20 (enbl. unsol.)	06 (no range, or all)		
			21 (dsbl. unsol.)			
			22 (assign class)			
No Object (function code only) - See Note 3			13 (Cold Restart)			
No Object (function code only)			14 (Warm Restart)			
No Object (function code only)			23 (Delay Meas.)			

10.4.3. DNP Point Lists

The EPIC Controller functions as a DNP outstation device. The tables found within each of the toggles below identify all the individual data points provided by this implementation of DNP3.

Binary Input Points

Binary Input Points			
Static (Steady-State) Object Number		1	
Change Event Object Number		2	
Request Function Codes supported:		1 (read)	
		22 (assign class)	
Static Variation reported when variation 0 requested:		1 (Binary Input without status)	
Change Event Variation reported when variation 0 requested:		2 (Binary Input Change with Time)	
Change Event Scan Rate:		5 seconds	
Point Index	Name/Description	If Point Status is Logic '1'	Initial Event Class
0	Fan 1 Status	active	1
1	Fan 2 Status	active	1
2	Fan 3 Status	active	1
3	Fan 4 Status	active	1
4	Fan 5 Status	active	1
5	Fan 6 Status	active	1
6	Fan 7 Status	active	1
7	Fan 8 Status	active	1
8	Fan 1 No Go	active	1
9	Fan 2 No Go	active	1
10	Fan 3 No Go	active	1
11	Fan 4 No Go	active	1
12	Fan 5 No Go	active	1
13	Fan 6 No Go	active	1
14	Fan 7 No Go	active	1
15	Fan 8 No Go	active	1
16	Air Conditioner 1 Status	active	1
17	Air Conditioner 2 Status	active	1
18	Heater 1 Status	active	1
19	Heater 2 Status	active	1
20	Battery Bay High Temperature Warning	active	1
21	Battery Bay Low Temperature Warning	active	1
22	Electronics Bay High Temperature Warning	active	1
23	Electronics Bay Low Temperature Warning	active	1
24	Hydrogen Alarm 1 Percent	active	1
25	Hydrogen Alarm 2 Percent	active	1
26	Smoke Alarm	active	1
27	Door Open Alarm	active	1
28	Dry Contact 1 State	closed	1
29	Dry Contact 2 State	closed	1
30	Dry Contact 3 State	closed	1
31	Dry Contact 4 State	closed	1
32	Dry Contact 5 State	closed	1
33	Dry Contact 6 State	closed	1
34	Dry Contact 7 State	closed	1
35	Dry Contact 8 State	closed	1
36	Dry Contact 9 State	closed	1

37	Dry Contact 10 State	closed	1
38	Charger 1 Comm Failure	active	1
39	Charger 2 Comm Failure	active	1
40	Red Light	active	1
41	Green Light	active	1

Binary Output Points

There are currently no Binary Output points defined.

Analog Input Status Points

The following table lists Analog Inputs. It is important to note that 16-bit and 32-bit variations of Analog Inputs, Analog Output Control Blocks, and Analog Output Statuses are transmitted through DNP as signed numbers. Even for analog input points that are not valid as negative values, the maximum positive representation is 32767.

The “Multiplier” column indicates the value by which each data point is multiplied. Since all data points are sent in integer format, floating point numbers are multiplied by a constant (1, 10, or 100) to maintain decimal information. For example, points with two decimal places of resolution are multiplied by 100 (5.67 is sent as 567) while points with one decimal place of resolution are multiplied by 10 (8.2 is sent as 82). To convert a data point to the correct value, simply divide the point by the “Multiplier” value.

The “Default Deadband” column is used to represent the absolute amount by which the point must change before an analog change event will be generated. The “Default Event Class” column is used to represent the class (1, 2, 3, or none) in which detected change events will be reported. Only the default values for these columns are shown here because the values may be changed by users locally using the EPIC Controller or remotely via DNP.

Analog Input Points				
Static (Steady State) Object Number		30		
Change Event Object Number		32		
Reporting Deadband Object Number		34		
Request Function Codes supported		1 (read),		
		2 (write) – deadbands only		
		22 (assign class)		
Static Variation Reported when variation 0 requested		2 (16-Bit Analog Input)		
Change Event Variation Reported when variation 0 requested		2 (Analog Change Event without Time)		
Reporting Deadband Variation Reported when variation 0 requested		1 (16-Bit Reporting Deadband)		
Change Event Scan Rate		5 seconds		
Point Index	Name/Description	Multiplier (format)	Default Dead-band	Default Event Class
0	DNP Stack Version	1 (XXX.xxx.0)	1	2
1	EPIC Controller Firmware Version	1 (XX.xx.x)	1	2
2	EPIC Relay Board Firmware Version	1 (XX.xx.x)	1	2
3	Battery Bay Temperature (degrees C)	1 (XXX)	1	2
4	Electronics Bay Temperature (degrees C)	1 (XXX)	1	2
5	Tempco 1 Temperature (degrees C)	1 (XXX)	1	2
6	Tempco 2 Temperature (degrees C)	1 (XXX)	1	2
7	Tempco 3 Temperature (degrees C)	1 (XXX)	1	2
8	Tempco 4 Temperature (degrees C)	1 (XXX)	1	2
9	Tempco 5 Temperature (degrees C)	1 (XXX)	1	2
10	Tempco 6 Temperature (degrees C)	1 (XXX)	1	2
11	Tempco 7 Temperature (degrees C)	1 (XXX)	1	2
12	Tempco 8 Temperature (degrees C)	1 (XXX)	1	2
13	AC On Temperature Set Point (degrees C)	1 (XXX)	1	2
14	AC Off Temperature Set Point (degrees C)	1 (XXX)	1	2
15	Heater On Temperature Set Point (degrees C)	1 (XXX)	1	2
16	Heater Off Temperature Set Point (degrees C)	1 (XXX)	1	2
17	Purge Interval Set Point (hours)	1 (XXX)	1	2
18	Purge Duration Set Point (minutes)	1 (XXX)	1	2
19	Heartbeat	1 (XXX)	1	2

✿ Firmware revision format (XXX.xxx.0) represents Major Version.Minor Version.0

- Upper 8 bits of register value are the Major Version
- Lower 8 bits of register value are the Minor Version
- Example: Version 10.6.0 would be 0x0A06 (hex) = 2566 (decimal)

Analog Output Status Points

There are currently no Analog Output Status points defined.

Internal Indication (IIN) Bits

The Internal Indication bits in the following table are defined by the DNP3 protocol.

Internal Indication Bits		
Object Number		80
Request Function Codes Supported		1 (read), 2 (write)
Default Variation reported when variation 0 requested:		
Point Index	Description and Conditions	Writeable?
0	IIN1-0 All Stations – set after a broadcast message (any message using a destination address of 0xffff0 or above) has been received. Does not indicate an error condition	No
1	IIN1-1 Class 1 event data available. Can be set any time. Does not indicate an error condition.	No
2	IIN1-2 Class 2 event data available. Can be set any time. Does not indicate an error condition.	No
3	IIN1-3 Class 3 event data available. Can be set any time. Does not indicate an error condition.	No
4	IIN1-4 Time synchronization required. Can be set any time. Does not indicate an error condition.	No
5	IIN1-5 Local mode. Set if some points are uncontrollable via DNP.	No
6	IIN1-6 Device Trouble.	No
7	IIN1-7 Device restart. Set only under specific conditions. Does not indicate an error condition.	Yes
8	IIN2-0 Function Unknown. Generally means that the function code (octet 2 of the request header) cannot be processed.	No
9	IIN2-1 Object Unknown. Generally means that the function code could be processed but the object group / variation could not be processed.	No
10	IIN2-2 Parameter Error. Generally indicates that both the function code and object group / variation could be processed but that the qualifier / range field is in error.	No
11	IIN2-3 Buffer Overflow. Indicates that an event buffer has overflowed, and that change events, of at least one type, have been lost.	No
12	IIN2-4 Already Executing.	No
13	IIN2-5 Bad configuration.	No
14	IIN2-6 Reserved. Always 0.	No
15	IIN2-7 Reserved. Always 0.	No

10.5. Modbus

This section provides specifics for implementing Modbus protocol via the EPIC Controller Communications. The Modbus protocol was implemented using the Modicon Modbus Protocol Reference Guide PI-MBUS-300 Rev. J.

Supported Function Codes

- 01 – Read Coil Status
- 02 – Read Input Status
- 03 – Read Holding Registers
- 04 – Read Input Registers
- 05 – Read Single Coil
- 06 – Preset Single Register
- 15 – Force Multiple Coils
- 16 – Preset Multiple Registers

Modbus Register Definitions

The following toggles contain tables that identify all the individual registers provided by this implementation of Modbus.

Modbus Binary Outputs (Coils)

There are currently no Binary Output registers defined.

Modbus Binary Inputs

Modbus Binary Inputs		
Address	Name/Description	If Status is ON (Logic '1')
10001	Fan 1 Status	active
10002	Fan 2 Status	active
10003	Fan 3 Status	active
10004	Fan 4 Status	active
10005	Fan 5 Status	active
10006	Fan 6 Status	active
10007	Fan 7 Status	active
10008	Fan 8 Status	active
10009	Fan 1 No Go	active
10010	Fan 2 No Go	active
10011	Fan 3 No Go	active
10012	Fan 4 No Go	active
10013	Fan 5 No Go	active
10014	Fan 6 No Go	active
10015	Fan 7 No Go	active
10016	Fan 8 No Go	active
10017	Air Conditioner 1 Status	active
10018	Air Conditioner 2 Status	active
10019	Heater 1 Status	active
10020	Heater 2 Status	active
10021	Battery Bay High Temperature Warning	active
10022	Battery Bay Low Temperature Warning	active

10023	Electronics Bay High Temperature Warning	active
10024	Electronics Bay Low Temperature Warning	active
10025	Hydrogen Alarm 1 Percent	active
10026	Hydrogen Alarm 2 Percent	active
10027	Smoke Alarm	active
10028	Door Open Alarm	active
10029	Dry Contact 1 State	closed
10030	Dry Contact 2 State	closed
10031	Dry Contact 3 State	closed
10032	Dry Contact 4 State	closed
10033	Dry Contact 5 State	closed
10034	Dry Contact 6 State	closed
10035	Dry Contact 7 State	closed
10036	Dry Contact 8 State	closed
10037	Dry Contact 9 State	closed
10038	Dry Contact 10 State	closed
10039	Charger 1 Comm Failure	active
10040	Charger 2 Comm Failure	active
10041	Red Light	active
10042	Green Light	active

Modbus Input Registers

The following table lists the Modbus Input Registers.

For each point, the “Multiplier” column indicates the value by which the register data are multiplied. Since all data are sent in integer format, floating point numbers are multiplied by a constant (1, 10, or 100) to maintain decimal information. For example, registers with two decimal places of resolution are multiplied by 100 (5.67 is sent as 567) while registers with one decimal place of resolution are multiplied by 10 (8.2 is sent as 82). To convert a register to the correct value, simply divide the register value by the “Multiplier” value.

Modbus Input Registers		
Address	Name/Description	Multiplier (format)
30001	Modbus Stack Version	1 (XXX.xxx.0)
30002	EPIC Controller Firmware Version	1 (XX.xx.x)
30003	EPIC Relay Board Firmware Version	1 (XX.xx.x)
30004	Battery Bay Temperature (degrees C)	1 (XXX)
30005	Electronics Bay Temperature (degrees C)	1 (XXX)
30006	Tempco 1 Temperature (degrees C)	1 (XXX)
30007	Tempco 2 Temperature (degrees C)	1 (XXX)
30008	Tempco 3 Temperature (degrees C)	1 (XXX)
30009	Tempco 4 Temperature (degrees C)	1 (XXX)
30010	Tempco 5 Temperature (degrees C)	1 (XXX)
30011	Tempco 6 Temperature (degrees C)	1 (XXX)
30012	Tempco 7 Temperature (degrees C)	1 (XXX)
30013	Tempco 8 Temperature (degrees C)	1 (XXX)
30014	AC On Temperature Set Point (degrees C)	1 (XXX)
30015	AC Off Temperature Set Point (degrees C)	1 (XXX)
30016	Heater On Temperature Set Point (degrees C)	1 (XXX)
30017	Heater Off Temperature Set Point (degrees C)	1 (XXX)
30018	Purge Interval Set Point (hours)	1 (XXX)
30019	Purge Duration Set Point (minutes)	1 (XXX)
30020	Heartbeat	1 (XXX)



Firmware revision format (XXX.xxx.0) represents Major Version.Minor Version.0

- Upper 8 bits of register value are the Major Version
- Lower 8 bits of register value are the Minor Version
- Example: Version 10.6.0 would be 0x0A06 (hex) = 2566 (decimal)

Modbus Holding Registers

There are currently no Holding Registers defined.

11. Maintenance

Running Hindle Health System Regularly

The primary way to ensure that your EPIC Console performs reliably is to regularly run the Hindle Health System (HHS). It is recommended to do so once per quarter. This is done by pressing the Hindle Health System button on the front console and following its guidance. In just a few minutes, HHS will guide your maintenance checks on door filters and HVAC filters (if installed), and provide you with feedback on system operation that will give you confidence that everything is operating well and is capable of continually maintaining temperature and ventilation for your battery.

Performing Maintenance on Attached Batteries & Chargers

Remember, also, to perform the maintenance that is recommended in the manual(s) for any batteries and battery chargers that you are storing in the EPIC Console.

Ordering Replacement Parts

Every EPIC Series Console 2.0 ships with a supplemental Parts Data Package Report, itemizing all components within the unit.

Contact your sales representative to place an order for spare or replacement parts. Please provide the following information for each component:

- Model number and serial number of your EPIC Console ([Section 3.6](#))
- Reference designator, factory part number and description
- Quantity required

Troubleshooting Errors

For help in troubleshooting the causes of and resolving errors that appear on the Alarm Screen or while running the Hindle Health System, please contact the factory at 610-330-9000.

12. Appendix – Document Control Information

Revision Numbers: Document and Page

Document revisions are controlled by the application which was used to produce this online manual which is found at <https://www.manula.com>. The document revision number is displayed in the header for all pages.

Each page of the manual may be revised by the manufacturer on a regular basis in order to provide customers updated information in a timely manner. The revision date of each page is shown in the footer of each page.

Parts Data Package

A job-specific customized Parts Data Package report is supplied with every shipped EPIC Series Console 2.0. The data listed in this report supercedes any information featured in product literature, standard documentation, and/or quote documents. The parts and quantities listed are applicable only to the console featuring the same serial number listed on the Parts Data Package report.

Drawings

A customized record drawing package is available for any EPIC Series Console 2.0, featuring a unit-specific drawing list / data nameplate detail, outline drawing, itemized internal component layout, electrical schematic with component ratings, and a full connection diagram. If the standard drawings featured in this manual are not sufficient, please contact your sales representative for drawing availability from the battery charger manufacturer.

Any job-specific custom drawings supplied with an EPIC Series Console 2.0 supercede the standard drawings featured in the manual. The standard drawings featured in the manual may not be included with custom printed manuals, when job-specific custom drawings are supplied.

Online Availability of Related Information

Other related product operating manuals, feature and accessory special instructions, standard drawings (including the ones listed in this manual), field service instructions, and product application notes for the EPIC Series Console 2.0 are available online at <https://hindlepowerinc.com/products/epic-dc-power-systems/epic-series-console-20/>. Saved in Adobe Acrobat Portable Document Format (PDF), they are readily available for downloading and printing.

If revision levels differ between the drawings embedded in this manual and the full online PDF

drawings, refer to document with the higher revision level. For document availability of private-labeled manuals and/or standard drawings, please contact your sales representative or visit the web site listed on the back cover of this manual.