FARMER BOY®

Edstrom

C-440S

Controller

Installation and Operation Manual

OP-000027

February 2011

Revision C

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CE Declaration of Conformity

Edstrom

EC Declaration of Conformity

The undersigned representing the following supplier

Edstrom Industries Inc.
819 Bakke Ave.
Waterford, WI 53185

Herewith declare that the Products   **Controllers**
Product identification   **C-440S, C-110S and Cool Sense**

are in conformity with the provisions of the following EC directives when installed in accordance with the installation instructions contained in the product documentation.
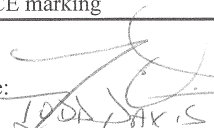
89/336/EC   EMC Directive as amended by 93/68/EC and 2004/108/EC

And that the standards referenced below have been applied:

EN61000-6-1:2007	Electromagnetic compatibility (EMC) - Part 6-1 : generic standards - Immunity for residential, commercial and light-industrial environments
EN61000-6-3:2007	Electromagnetic compatibility (EMC) — Part 6-3: Generic standards — Emission standard for residential, commercial and light-industrial environments
EN61000-3-2:1995	Electromagnetic compatibility (EMC) - Part 3-2 : limits – Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)
EN61000-3-3: 2006	Electromagnetic Compatibility (EMC) - Part 3: Limits - Section 3: Limitation of Voltage Changes, Voltage Fluctuations and Flicker in Public Low-Voltage Supply Systems, for Equipment with Rated Current Less Than or Equal to 16 A per Phase and Not Subject to Conditional Connection

Year of CE marking   2009

                                                         Authorized Representative in the Community

Signature: Signature:
Name: Name: JAMES S. WILSON
Position: DIRECTOR   Position: EUROPEAN BUSINESS MANAGER
Date: 02/26/09   Date: 27th February 2009

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RoHS/WEEE Exemption Statement

Edstrom agricultural livestock watering and cooling products have been exempted, through a third party auditor, from the 2001/95/EC (RoHS) and 2002/96/EC (WEEE) directives based on its classification as permanently fixed equipment.

Contents

Important Safety and Service Information

Please use caution when installing, operating, or servicing this equipment. It is the user's responsibility to read and understand the content of this manual before installing this equipment.

SAVE THESE INSTRUCTIONS

Hazard Statement Definitions

This manual contains the following hazard statement definitions.

Indicates the possibility of death or personal injury.

Indicates the possibility of minor or moderate injury or equipment damage.

Special Safety Notices

This manual contains the following types of special notices.

IMPORTANT: Indicates information that is necessary to understanding a topic or performing a procedure.

NOTE: Indicates information that may be helpful in understanding a topic or performing a procedure.

Product Warnings

Electrical shock. Never stand in water when handling electrical equipment. Water is a conductor of electricity. Standing in water while operating this equipment can cause electrocution or electrical shock resulting death or severe personal injury.

Electrical shock. Disconnect the main power before servicing any electrical components. Failure to do so can cause electrical shock resulting in personal injury.

Product Cautions

Equipment damage. Do not open any electrical enclosure unless you are trained in the operation and service of electrical equipment. Failure to do so can result in personal injury.

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2-Year Warranty

Edstrom warrants its *C-440S Controller* against defects in material and workmanship for two years from the date of purchase as follows:

If a defect is found in the controller unit during the first two years from date of purchase, return the unit prepaid, and it will be repaired or replaced at no cost to you.

This warranty does not apply to damage caused by misuse, neglect, accident, environmental hazard, or improper application of installation. The warranty label on the unit indicates the Date of Manufacture. Unless additional proof of date of purchase is provided, the warranty coverage will be computed using the Date of Manufacture. For your records, write down your Date of Purchase and Serial Number from your controller unit (located on the bottom of the front panel).

Model:_____ Serial No._____

Date of Purchase_____

The warranty is valid regardless of original point of purchase (dealer or factory direct). To eliminate delays, all warranty claims should be filed directly with *Edstrom*. Any product repaired or replaced under this warranty will, itself, be warranted for one year, or for the remainder of warranty period of the original product being repaired or replaced.

Return Policy

This return policy applies to all *C-440S Controllers* regardless of warranty status. If there is a circuit board malfunction on the *C-440S Controller*, the door may need to be returned to *Edstrom* where a replacement door and circuit board is shipped in return. Replacement doors are honored under the 2-year warranty for all *C-440S Controllers*. If this warranty has expired or has a duration period of less than one year, *Edstrom* applies a separate 1-year warranty for the replacement door.

You must have authorization from *Edstrom* before returning the controller door to the factory.

NOTE: While Return items can be processed through a dealer, it is recommended that all customers contact *Edstrom* directly for return assistance.

Follow the procedure below to return the *C-440S Controller*.

1. On the sticker on the bottom edge of the controller door, observe the serial numbers of the controller and record for reference.

   NOTE: All warranty information is dependant upon the proof of purchase and the serial number on the door.

2. Contact *Edstrom's* Teleservice (see *Contacting Teleservice*).

3. Upon receiving authorization to return the door, follow the instructions provided by Teleservice for returning the door and receiving a replacement door.

   NOTE: If the return is under warranty, a replacement door is sent out immediately. If the controller is not under warranty, a replacement door is sent out upon receiving the return door, a receipt of payment, or submission of credit card information.

4. Record the Return Authorization (RA) number provided by Teleservice for your own personal record.

5. Go to *Removing and Packing the Controller Door for Return Shipment* on page 11 to prepare the *C-440S Controller* door for return shipment.

Contacting Teleservice

If problems or questions arise concerning the operation of the equipment, contact *Edstrom* for free technical support. You can call the *Edstrom* plant in Waterford, WI, fax a description of your problem, or send an e-mail. All contact information appears in the table below.

Phone	E-mail	Fax
1-800-558-5913	teleservice@edstrom.com	1-262-534-5184 Attention: Teleservice

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Chapter 1 – Installation

Mount Controller and Install Power and External Fuse Connections

Figure 1-1 illustrates the steps required to mount the controller and install the power cord and external fuse holder wires.

⚠️ Electrical shock. Do not plug the 24 VAC transformer into an outlet until all wiring connections have been made. Failure to do so can result in electrical shock.

⚠️ To avoid potential interference or damage to the equipment, do not plug the 24 VAC transformer into a circuit that supplies large electric motors, electric fence chargers, or other equipment with large current draw.
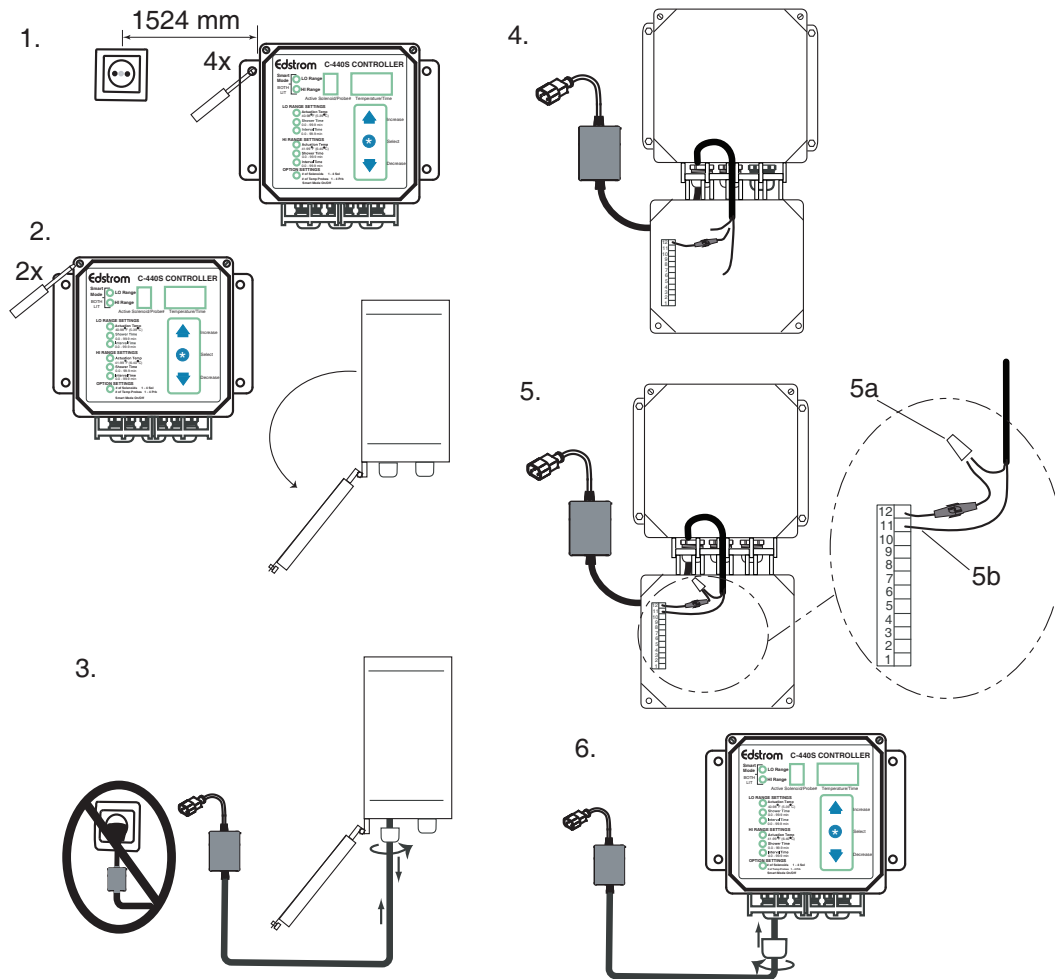
Figure 1-1. Power cord connections.

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Installing Solenoid Valve and Temperature Probe Cables

Figure 1-2 illustrates the steps required to complete the solenoid and probe cable installation.

NOTE: Up to four solenoid valves and four temperature probes can be installed on a *C-440S Controller.* .

⚠️ Electrical shock. Do not plug the transformer into the outlet until all wiring connections have been made. Failure to do so can result in electrical shock.
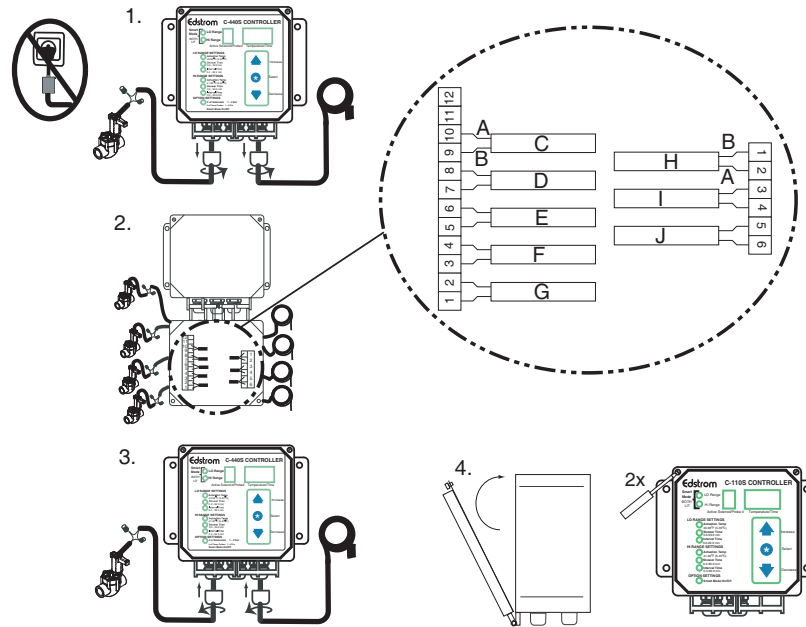

Figure 1-2. Solenoid valve and temperature probe cable wiring.

Below is an explanation of Figure 1-2.

Item	Description
A	+ Red
B	- Black
C	Factory-installed temperature probe 1
D	Solenoid valve 1
E	Solenoid valve 2
F	Solenoid valve 3
G	Solenoid valve 4
H	Temperature probe 2
I	Temperature probe 3
J	Temperature probe 4

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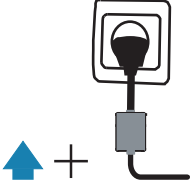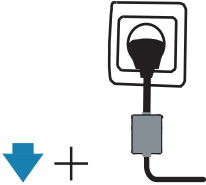**1-800-845-3374 • www.farmerboyag.com**

Chapter 2 – Startup, Configuration, and Operation

The *C-440S Controller* uses temperature ranges to control a shower. The low range actuation temperature (**LO RANGE SETTINGS Actuation Temp**) specifies the temperature when the controller initially activates a shower. The high range actuation temperature (**HI RANGE SETTINGS Actuation Temp**) specifies the temperature when a more intense cooling cycle is activated.

Selecting Configuration at Power Up

The *C-440S Controller* begins operation when energized. While powering up the controller, a default configuration setting can also be chosen. Table 2–1 lists the required actions needed to access configuration settings.

Table 2–1. Selecting a Configuration at Power Up.

Configuration	Required Action
Default Valid Range See Table 2–2	
Fahrenheit See Table 2–3	
Celsius See Table 2–3	

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Default Configurations

The *C-440S Controller* has two default pre-programmed configurations, Fahrenheit and Celsius. Refer to Table 2–2 and Table 2–3 to view the settings associated with these configurations. Refer to Table 2–1 for instructions on returning the controller to a default configuration.

Table 2–2. Default Valid Range Configuration.

Temperature Unit	Smart Mode	Number of Solenoids/ Zones	Number of Temperature Probes	LO RANGE SETTINGS Actuation Temperature	HI RANGE SETTINGS Actuation Temperature	LO RANGE SETTINGS and HI RANGE SETTINGS Shower Times	LO RANGE SETTINGS Interval Duration	HI RANGE SETTINGS Interval Duration
Fahrenheit or Celsius	On (enabled) or Off (disabled)	1 to 4	1 to 4	40 to 98° F 5 to 39° C	41 to 99° F 6 to 40° C	0 to 99.9 minutes	0 to 99.9 minutes	0 to 99.9 minutes

Table 2–3. Fahrenheit and Celsius Configuration Settings.

Temperature Unit	Smart Mode	Number of Solenoids/ Zones	Number of Temperature Probes	LO RANGE SETTINGS Actuation Temperature	HI RANGE SETTINGS Actuation Temperature	LO RANGE SETTINGS and HI RANGE SETTINGS Shower Times	LO RANGE SETTINGS Interval Duration	HI RANGE SETTINGS Interval Duration
Fahrenheit	Off (disabled)	4	1	75°	90°	3 minutes	10 minutes	5 minutes
Celsius	Off (disabled)	4	1	24°	33°	3 minutes	10 minutes	5 minutes

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Configuration Settings

Table 2–4 provides an overview of the *C-440S Controller* configuration settings.

Table 2–4. Configuration settings.

Configuration Setting	Description
LO RANGE SETTINGS **Actuation Temp**	The low range temperature at which the shower is actuated
LO RANGE SETTINGS **Shower Time**	The low range shower duration time
LO RANGE SETTINGS **Interval Time**	The duration of the interval used when the sensed temperature is less than the high range actuation temperature
HI RANGE SETTINGS **Actuation Temp**	The high range temperature at which the shower is actuated
HI RANGE SETTINGS **Shower Time**	The high range shower duration time
HI RANGE **Interval Time**	The duration of the interval used when the sensed temperature in a zone is greater than or equal to the high range actuation temperature.
OPTION SETTINGS **# (Number) of Solenoids**	The number of solenoids connected to the controller.
OPTION SETTINGS **# (Number) of Temp Probes**	The number of temperature probes connected to the controller.
OPTION SETTINGS **Smart Mode On/Off**	If **Smart Mode**, the interval time can be adjusted based on the actual temperature. As the air temperature increases, the interval time between showers automatically decreases, and as the air temperature decreases, the interval time between showers automatically increases. If **Smart Mode** is on, the *C-440S Controller* calculates the interval time based on the temperature reading from the probe. If **Smart Mode** is off, user-defined interval times are used.

Changing Configuration Settings

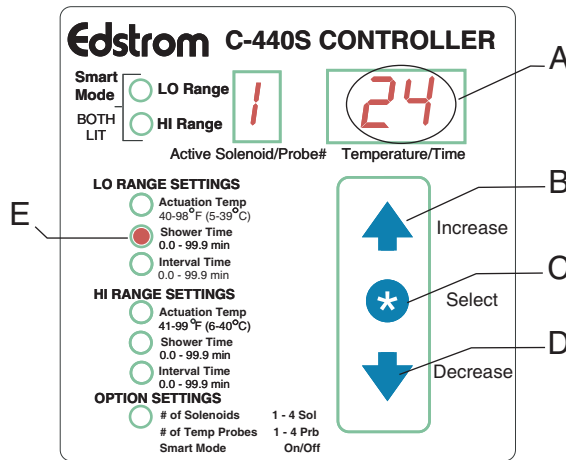Figure 2-1 illustrates how to adjust the configuration settings.

Figure 2-1. Modifying configuration settings.

Below is an explanation of Figure 2-1.

Item	Description
A	Current temperature in degrees or time in minutes
B	Press to increase configuration setting value or enable **(On)** Smart Mode
C	Press to access/exit configuration settings or scroll to next setting
	Press to scroll through the configuration settings
	When **Smart Mode On/Off** is illuminated, press to exit the configuration settings
D	Press to decrease the configuration setting value
E	The Light Emitting Diode of setting currently illuminated

NOTE: The controller exits the configuration settings after 12 seconds of idle time. Any settings that were changed will be saved.

NOTE: Configuration changes are not guaranteed to take effect until the first complete shower cycle after exiting configuration changes. For example, if changing the shower time for a particular zone while a shower is active for that zone, the new shower time will not take effect until the next time the controller initiates a shower for that zone.

Set Variable Shower Time

Follow this procedure to set the interval time between showers.

1. Press ⬆ + ⬇ + ✳ and connect the transformer to the power connection.

2. Press ✳ repeatedly until the **Smart Mode On/Off** Light Emitting Diode illuminates. **OFF** appears in the **Temperature/Time** window.

3. Press ⬆. **On** appears in the **Temperature/Time** window and **1** appears in the **Active Solenoid/Probe #** window.

4. Press ⬆ to select the desired function shown below.

Table 2–5. Variable Shower Time Functions.

Function Number	Function Description
1	Shower times remain constant. The interval time between showers varies between the low and high setting as the ambient temperature changes.
2	The shower and interval times vary between the low and high setting setpoints as the ambient temperature changes. The interval time decreases with the increasing temperature, and the shower time increases with increasing temperature.
3	The shower interval time remains constant while the shower time varies as the ambient temperature changes.

Information Displayed on the Control Panel

The *C-440S Controller* displays specific information according to whether it is idle, showering, or in an interval. The following sections provide an overview of the information displayed in each period.

Idle

See Figure 2-2 for an illustration of the information displayed when the controller is idle.
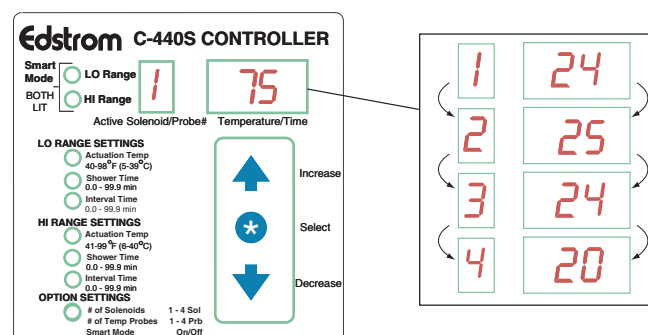

Figure 2-2. C-440S Controller with each zone and corresponding temperature displayed.

Shower

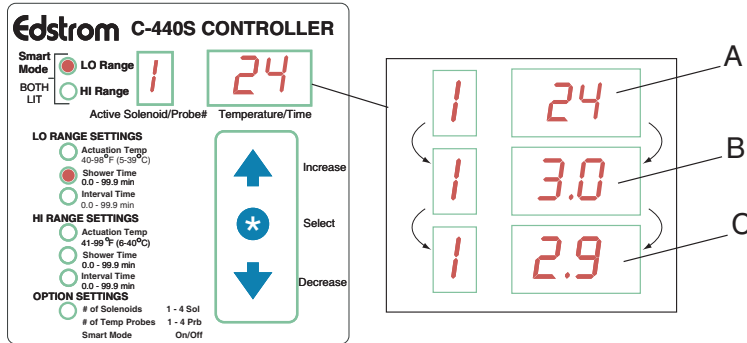See Figure 2-3 for an illustration of the information displayed during a shower.

Figure 2-3. Current temperature (A) Duration of shower for active zone (B) Remaining Shower Time (C).

Interval

See Figure 2-4 for an illustration of the information displayed during an interval.
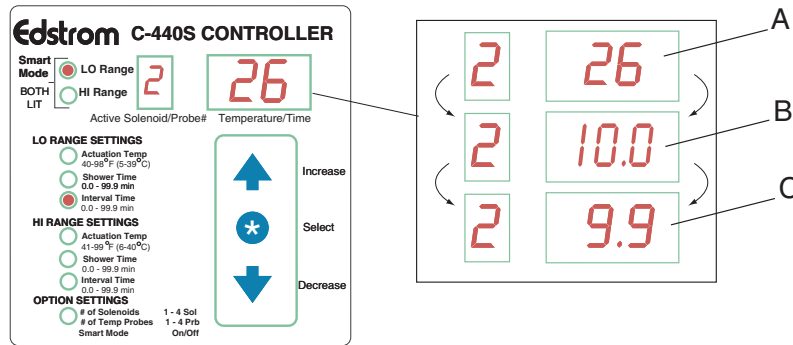

Figure 2-4. Current temperature (A) Duration of interval time for active zone (B) Remaining interval time (C).

Chapter 3 – Maintenance and Troubleshooting

Maintaining the Temperature Probes

Follow this procedure to calibrate the temperature probe. A thermometer is required for calibration.

1. Unplug the *C-440S Controller* transformer from the outlet.

2. Press + .

    C and **1** flash alternately in the **Active Solenoid Probe #** window.

    NOTE: The *C-440S Controller* can offset a temperature probe reading by ± 5 °F or ±3 °C from the probe's actual temperature reading.

3. Insert the thermometer in a zone away from sunlight and water and record the temperature.

4. Take one of these actions.

If the reading on the thermometer is...	Then...
The same as the current temperature reading on the controller	Go to step 5.
Higher than the current temperature reading on the controller,	Press ⬆ to raise the temperature value on the controller
Lower than the current temperature reading on the controller,	Press ⬇ to decrease the temperature value on the controller.

5. When the temperatures match on the controller and thermometer, take one of these actions.

If...	Then...
Additional probes need to be calibrated,	Repeat steps 1 through 5.
No other probes need to be calibrated,	Press ✳ to exit calibration.

Replacing a Temperature Probe

Figure 3-1 illustrates the steps to replace a temperature probe on the *C-440S Controller*.

Electrical shock. Disconnect the main power before servicing any electrical components. Failure to do so can cause electrical shock resulting in personal injury.
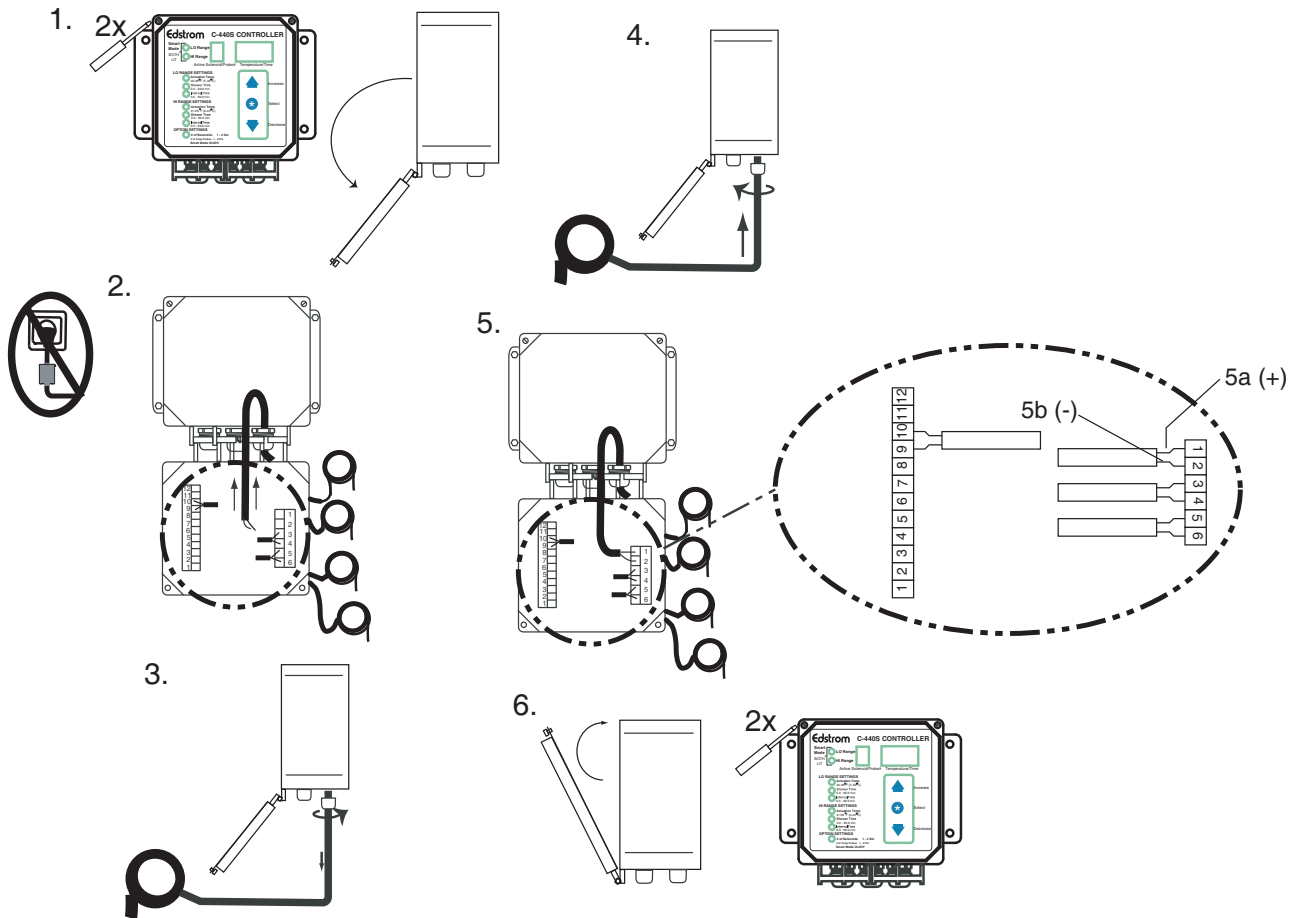

Figure 3-1. Replacing a temperature probe (temperature probe 2 shown replaced).

IMPORTANT: After the probe is replaced, follow the instructions in *Selecting Configuration at Power Up* on page 3 to energize the controller.

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Replacing the External Fuse

Figure 3-2 illustrates the steps required to replace the external fuse.
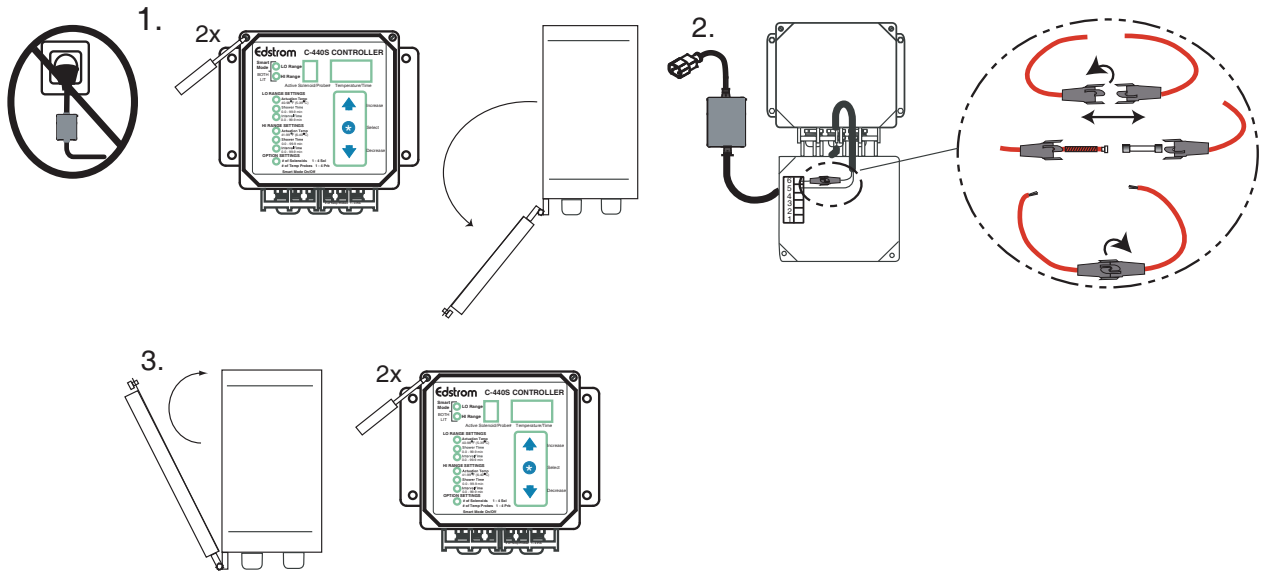
Figure 3-2. Replacing the external fuse.

IMPORTANT: After the external fuse is replaced, follow the instructions in *Selecting Configuration at Power Up* on page 3 to energize the controller.

Removing and Packing the Controller Door for Return Shipment

Follow this procedure to prepare the *C-440S Controller* door for return shipment.

Figure 3-3. Removing the controller door.

1. Remove the controller door as shown in Figure 3-3.
2. Completely cover the controller door with bubble wrap, pack the controller door in a packaging box, and seal the box with packaging tape.
3. Record the Return Authorization Number on the outside of box.

Attaching a Replacement Door

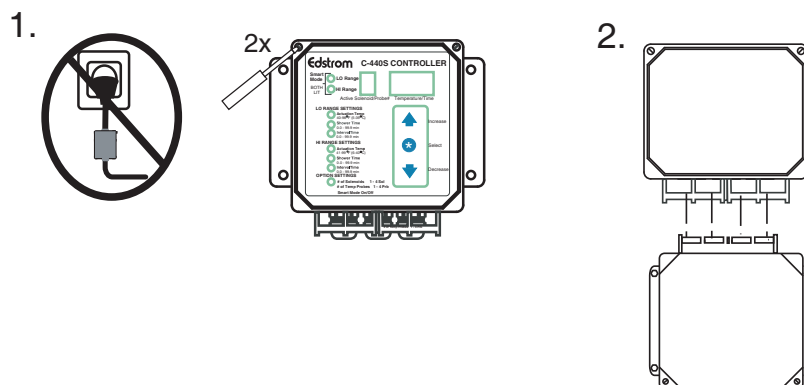All C-440S replacement doors are shipped as part of the *C-440S* Replacement Kit With Door Module. The *Edstrom* part number is 7400-8940-100R. Refer to the kit instructions to attach the replacement door to the controller.

Troubleshooting

Refer to Table 3–1 for applicable troubleshooting information.

Table 3–1. C-440S Controller Troubleshooting.

Symptom	Possible Cause	Corrective Action
The high range actuation temperature (**HI RANGE SETTINGS Actuation Temp**) cannot be set below a certain degree.	The high range actuation temperature (**HI RANGE Actuation Temp**) cannot be set to less than or equal to the low range actuation temperature (**LO RANGE SETTINGS Actuation Temp**).	Decrease the low range actuation temperature (**LO RANGE SETTINGS Actuation Temp**) to at least one degree less than the desired high range actuation temperature (**HI RANGE SETTINGS Actuation Temp**) before setting the high actuation temperature. See *Changing Configuration Settings* on page 6.
The low range actuation temperature (**LO RANGE SETTINGS Actuation Temp**) cannot be set above a certain degree.	The low range actuation temperature (**LO RANGE SETTINGS Actuation Temp**) cannot be set to greater than or equal to the high range actuation temperature (**HI RANGE SETTINGS Actuation Temp**).	Increase the high range actuation temperature (**HI RANGE SETTINGS Actuation Temp**) to at least one degree more than the desired low range actuation temperature (**LO RANGE SETTINGS Actuation Temp**) before setting the low actuation temperature (see *Changing Configuration Settings* on page 6).
The controller display windows are blank	The power supply wiring to the controller is not properly connected.	Check the wiring at the main terminal connector. Refer to *Mount Controller and Install Power and External Fuse Connections* on page 1.
	Power cord transformer is not working properly	Replace the power cord transformer. Contact *Edstrom* to obtain a replacement (see *Contacting Teleservice* on page vii).
	The external fuse must be replaced.	Replace the fuse (see *Replacing the External Fuse* on page 11).
	A short-circuit in the wiring between the controller and solenoid valve is found.	Check the wiring (see *Installing Solenoid Valve and Temperature Probe Cables* on page 2).
Showering occurs when the temperature is lower than the low range actuation temperature (**LO RANGE SETTINGS Actuation Temp**)	The temperature probe is not working properly.	Replace the temperature probe. Refer to *Replacing a Temperature Probe* on page 10.
The C-440S Controller displays **PrF**.	The temperature probe is not working properly.	Check the temperature probe cable wiring to the main terminal connector (see *Installing Solenoid Valve and Temperature Probe Cables* on *page 2*).
		Replace the temperature probe (see *Replacing a Temperature Probe* on page 10).
The C-440S Controller displays **SoF.**	Solenoid valve is not working properly.	Replace the solenoid valve. Contact *Edstrom* (see *Contacting Teleservice* on page vii).

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Chapter 4 – Technical Information

Dimensions

- 7.75 inches x 7.5 inches x 5.5 inches [2362 mm x 2286 mm x 1676 mm]

Utility Requirements

Power

- Input power: 230 VAC ± 10% 50 Hz 0.25 A

Environmental

Temperature

- Operating: 0 to 122° F; -18° to 50° C
- Storage: -13 to 140° F; -25° to 60° C

Humidity

- Relative humidity: 0 to 100% condensing (all cable seals in place and tightened, door closed and securely fastened, and internal seal in place).

Temperature Probes

- Accuracy (before calibration): 0 to 125° F; ± 3° F [0 to 53° C; ± 3° C]

Equipment

C-440S Controller

- Input power, 24 VAC ± 10%, 50/60 HZ, 1 A
- Seven segment high intensity Light Emitting Diode characters
- Non-volatile, user-programmable memory
- Enclosure: National Electrical Manufacturer Association 4x rating
- Relay Output power
  - 24 VAC ± 10%, 50/60 HZ, 1 A
  - 0.8 A inrush (19 VA) 0.5 A ready state (14 VA)

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