Franklin Fueling Systems

SMART CONTROLLER I

INSTALLATION GUIDE

The information in this publication is provided for reference only. While every effort has been made to ensure the reliability and accuracy of the information contained in this manual at the time of printing, we recommend that you refer to “franklinfueling.com” for the most current version of this manual. All product specifications, as well as the information contained in this publication, are subject to change without notice. Franklin Fueling Systems does not assume responsibility and expressly disclaims liability for loss, damage, or expense arising out of, or in any way connected with, installation, operation, use, or maintenance by using this manual. Franklin Fueling Systems assumes no responsibility for any infringement of patents or other rights of third parties that may result from use of this manual or the products. We make no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

For technical assistance, please contact:

Franklin Fueling Systems
3760 Marsh Rd.
Madison, WI 53718
USA

Web: franklinfueling.com
Telephone:
USA and Canada: +1.608.838.8786, +1.800.225.9787
USA and Canada Technical Support: +1.800.984.6266
UK: +44 (0) 1473.243300
Mexico: 001.800.738.7610
China: +86.10.8565.4566

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Introduction

Conventions used in this manual

This manual includes safety precautions and other important information presented in the following format:

NOTE: This provides helpful supplementary information.

IMPORTANT: This provides instructions to avoid damaging hardware or a potential hazard to the environment, for example: fuel leakage from equipment that could harm the environment.

⚠ **CAUTION**: This indicates a potentially hazardous situation that could result in minor or moderate injury if not avoided. This may also be used to alert against unsafe practices.

⚠ **WARNING**: This indicates a potentially hazardous situation that could result in severe injury or death if not avoided.

⚠ **DANGER**: This indicates an imminently hazardous situation that will result in death if not avoided.

Questions and concerns

In case of emergency, follow the procedures established by your facility. If you have questions or concerns about safety or need assistance, use the information below to contact Franklin Fueling Systems:

Web: franklinfueling.com
Telephone:
USA and Canada: +1.608.838.8786, +1.800.225.9787
USA Technical Support: 1.800.984.6266
UK: +44 (0) 1473.243300
Mexico: 001.800.738.7610
China: +86.10.8565.4566

Operating precautions

Franklin Fueling Systems (FFS) equipment is designed to be installed in areas where volatile liquids such as gasoline and diesel fuel are present. Working in such a hazardous environment presents a risk of severe injury or death if you do not follow standard industry practices and the instructions in this manual. Before you work with or install the equipment covered in this manual, or any related equipment, read this entire manual, particularly the following precautions:

IMPORTANT: Always reference the Installation and Owner's manual that came with the equipment for the most current, complete installation and safety precaution details. Where applicable, this manual may contain notations of previous equipment features for your reference since the release of software revision 1.2.

⚠ **CAUTION**: Use only original FFS parts. Substituting non-FFS parts could cause the device to fail, which could create a hazardous condition and/or harm the environment.

⚠ **WARNING**: Follow all codes that govern how you install and service this product and the entire system. Always lock out and tag electrical circuit breakers while installing or servicing this equipment and related equipment. A potentially lethal electrical shock hazard and the possibility of an explosion or fire from a spark can result if the electrical circuit breakers are accidentally turned on while you are installing or servicing this product. Refer to this manual (and documentation for related equipment) for complete installation and safety information.

⚠ **WARNING**: Before you enter a containment sump, check for the presence of hydrocarbon vapors. Inhaling these vapors can make you dizzy or unconscious, and if ignited, they can explode and cause serious injury or death. Containment sumps are designed to trap hazardous liquid spills and prevent environmental contamination, so they can accumulate dangerous amounts of hydrocarbon vapors. Check the atmosphere in the sump regularly while you are working in it. If vapors reach unsafe levels, exit the sump and ventilate it with fresh air before you resume working. Always have another person standing by for assistance.

⚠ **WARNING**: Follow all federal, state, and local laws governing the installation of this product and its associated systems. When no other regulations apply, follow NFPA codes 30, 30A, and 70 from the National Fire Protection Association. Failure to follow these codes could result in severe injury, death, serious property damage, and/or environmental contamination.

⚠ **WARNING**: Always secure the work area from moving vehicles. The equipment in this manual is usually mounted underground, so reduced visibility puts service personnel working on it in danger from moving vehicles that enter the work area. To help prevent this safety hazard, secure the area by using a service truck (or some other vehicle) to block access to the work area.

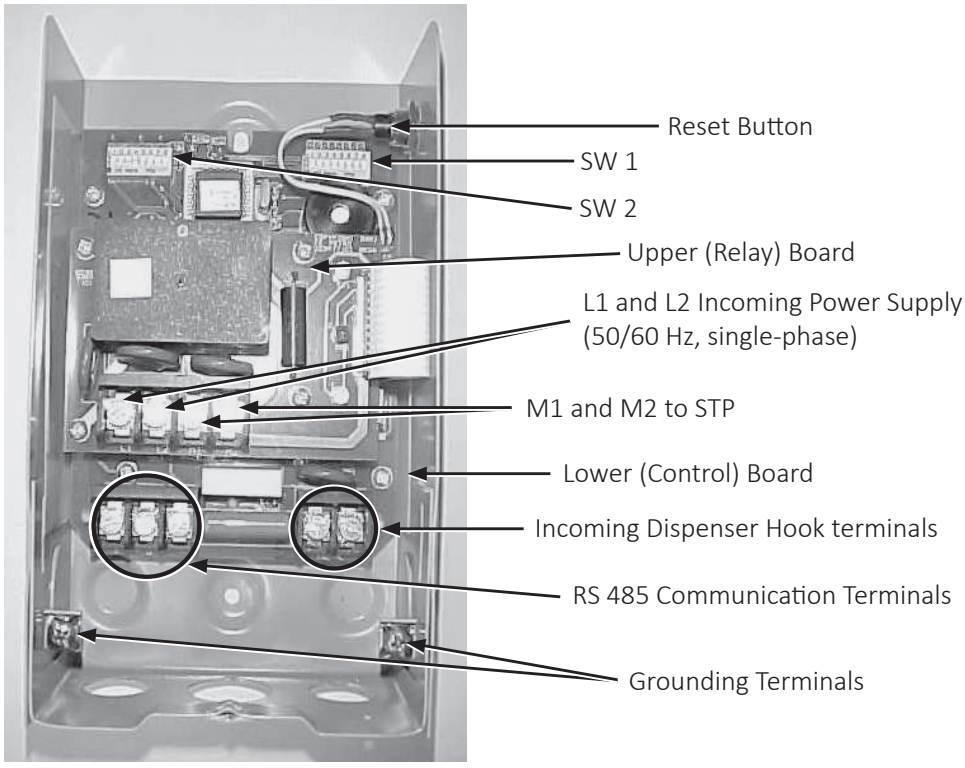
⚠ **WARNING**: Discharge static electricity from the splice kit to ground before you install it, and make sure it is properly grounded while in service.

⚠ **WARNING**: Make sure you check the installation location for potential ignition sources such as radio waves, ionizing radiation, and ultrasound sonic waves. If you identify any potential ignition sources, you must make sure safety measure are implemented.

⚠ **WARNING**: Always disconnect both power supplies (110-250V Hook and the 208-240V input) before installing or servicing. Failure to do so could result in severe injury or death.

Installation

Installation instructions



NOTE TO INSTALLER: When the installation is complete, make sure you leave this manual with the service station owner.

NOTE TO STATION OWNER: Save these instructions for future use, and make sure you provide them to anyone who services this equipment.

NOTE: Wiring diagrams are in the "Troubleshooting" chapter of this manual.

1. Install the STP according to its installation documentation.

IMPORTANT: The unit can be damaged if you turn on the power when the motor leads are shorted together or to ground.

2. Use an ohmmeter to verify that the motor leads (M1 and M2) are not shorted to ground.
3. Remove the STP-SCI cover, and install the base on a wall or other flat surface.

NOTE: You must install the STP-SCI indoors. It can operate at an ambient temperature of 40º – 105º F (4º – 41º C).

4. Connect the 208-240 VAC input power to L1 and L2, and connect the ground wire to the terminals as shown in the "STP-SCI Stand Alone wiring diagram." Do not apply input power until you are instructed to do so.
5. Connect the motor leads to M1 and M2, and connect the ground wire to the terminals as shown in the "STP-SCI Stand Alone wiring diagram."
6. Connect the Dispenser Hook Signal to the terminals, 110-250 VAC Supply, and Return according to the "STP-SCI Stand Alone wiring diagram" or "STP-SCI Master-Slave wiring diagram" (whichever is appropriate). The hook signal can come from a dispenser, isolation relay, or STP-DHI. For more information, refer to the "STP-DHI Installation and Owner's Manual" (part number 223844101).
7. If you are setting the controller to the stand alone configuration, set SW1 and SW2 poles 1-8 according to the "STP-SCI Stand Alone wiring diagram." (The stand alone configuration is the default factory setting.) For Master-Slave and/or Alternating Circuit (AC) configurations, please see the "STP-SCI Master-Slave wiring diagram."

Master-Slave/Alternating Circuit

The Master-Slave feature (see the "STP-SCI Master-Slave wiring diagram") allows you to turn on additional STPs when an STP needs help due to loading (flow rate) or an abnormal condition exists. The AC feature (see the "STP-SCI Alternating Circuit wiring diagram") continuously alternates the lead pump, so it turns on a different STP each time all dispensers are shut off and at least one dispenser is turned back on. The Master-Slave/AC configuration (see the "STP-SCI Master-Slave/Alternating Circuit wiring diagram") combines the features of Master-Slave and AC.

⚠ **CAUTION**: Line leak detection performance can be affected when you use multiple STP-SCIs. FFS does not recommend using the AC feature in conjunction with electronic line leak detection. Some electronic line leak detector manufacturers require the master to always be turned on first. Please refer to the manufacturer's requirements.

NOTE: STP-SCI is not compatible with the STP-SC or STP-SCB in Master-Slave or AC configurations.

NOTE: Master-Slave does not work with PMA33, PMA75B (50 Hz PMA), or PMAH150B (50 Hz PMA).

NOTE: In software revision 1.4 and prior, the AC configuration functions the same as a Master-Slave/AC configuration.

NOTE: Wiring diagrams are in the "Wiring Diagrams" section of the "Troubleshooting" chapter.

1. Connect the communication cable, RS 485, to terminals (+, G, and –) wire "+" together, "G" together and "-" together then wire the shielded cable drain wire to Ground (G) at one end only, Use at least 22 AWG three conductor shielded cable with drain wire.
2. Make sure the Dispenser Hook Signal is connected to the STP-SCI designated as master according to the "STP-SCI Master-Slave wiring diagram" the "STP-SCI Alternating Circuit wiring diagram" and the "STP-SCI Master-Slave/Alternating Circuit wiring diagram." The hook signal can come from a dispenser, isolation relay, or STP-DHI. For more information, refer to the "STP-DHI Installation and Owner's Manual" (part number 223844101).

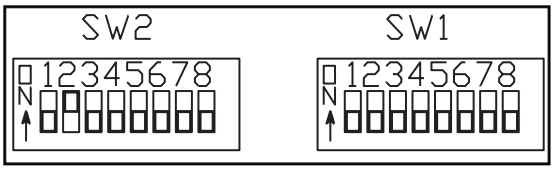
NOTE: Make sure L1, L2, M1, M2 and grounds are installed at each STP-SCI.

3. Configure Master-Slave and AC features by setting SW2 poles 3 and 4 according to the "Switch definitions" table.
4. Create a unique address for each controller by setting SW1, poles 1-5 according to the following table. Each controller must have its own unique address.

SW1					
Address	**Pole 1**	**Pole 2**	**Pole 3**	**Pole 4**	**Pole 5**
Master	Off	Off	Off	Off	Off
Slave - 1	On	Off	Off	Off	Off
Slave - 2	Off	On	Off	Off	Off
Slave - 3	On	On	Off	Off	Off
Slave - 4	Off	Off	On	Off	Off
Slave - 5	On	Off	On	Off	Off
Slave - 6	Off	On	On	Off	Off
Slave - 7	On	On	On	Off	Off
Slave - 8	Off	Off	Off	On	Off
Slave - 9	On	Off	Off	On	Off
Slave - 10	Off	On	Off	On	Off
Slave - 11	On	On	Off	On	Off
Slave - 12	Off	Off	On	On	Off
Slave - 13	On	Off	On	On	Off
Slave - 14	Off	On	On	On	Off
Slave - 15	On	On	On	On	Off
Slave - 16	Off	Off	Off	Off	On
Slave - 17	On	Off	Off	Off	On
Slave - 18	Off	On	Off	Off	On
Slave - 19	On	On	Off	Off	On
Slave - 20	Off	Off	On	Off	On
Slave - 21	On	Off	On	Off	On
Slave - 22	Off	On	On	Off	On
Slave - 23	On	On	On	Off	On
Slave - 24	Off	Off	Off	On	On
Slave - 25	On	Off	Off	On	On
Slave - 26	Off	On	Off	On	On
Slave - 27	On	On	Off	On	On
Slave - 28	Off	Off	On	On	On
Slave - 29	On	Off	On	On	On
Slave - 30	Off	On	On	On	On
Slave - 31	On	On	On	On	On

NOTE: There can be only one master in a system but up to 31 slaves. If you use Turbine Pump Interface (TPI) when you connect to a fuel management console, you cannot configure the STP-SCI control to address 31 (SW1 with poles 1-5 ON).

Factory default switch settings



NOTE: The default factory setting is the Stand Alone configuration with all selectable features off: Fault Read out, Bypass, Auto Restart, Fault Shutdown, and Extended Run Disable.

Switch definitions

SW 2			SW 1		
Pole	**Description**	**Function**	**Pole**	**Description**	**Function**
1	Fault Shutdown	When this is ON, an abnormal condition detected on any controller in a Master-Slave or AC configuration causes all connected controllers to shut down.	1	Address 0	Use poles 1-5 to set the addressing switches for Master-Slave or AC configurations. See step 4 of the "Master-Slave/AC" section.
2	Unused	The default position is ON.	2	Address 1	
3	Master-Slave*	ON designates the STP-SCI as the master controller. This switch must be set to OFF for Slave and Stand Alone configurations.	3	Address 2	
4	AC**	When the master controller is ON, the AC feature is active. OFF indicates a Slave or Stand Alone configuration.	4	Address 3	
5	Extended Run Disable***	ON disables the extended run feature. OFF activates the extended run feature.	5	Address 4	
6	Unused	Unused switches	6	**Fault Read out***	ON activates the fault readout function.
7	Unused		7	**Bypass***	ON bypasses diagnostics for 10 minutes.
8	Unused		8	**Auto Restart*****	When ON, the controller tries to restart the STP in an underload (1 flash) error when a hook signal is applied.

* See the "Troubleshooting" chapter for more information.
** See step 3 of the "Master-Slave/Alternating Circuit" section for configuration switch settings.
*** See the "Installation" chapter for details.

Selectable features

Auto Restart Mode (SW1, Pole 8)

When this mode is selected, with the switch in the ON position, if the controller detects an empty tank/under load condition, it shuts down the pump and it attempts to start the pump when a hook signal is removed and reintroduced to the controller. If the empty tank condition is

still present, the controller shuts down the pump. If the empty tank condition is corrected (i.e., the tank is refilled), the controller runs the STP and clears the abnormal condition. In Master-Slave configuration, if the master is in the under load condition, it waits until the slave controller calls for help before attempting to restart.

Fault Shutdown Mode (SW2, Pole 1)

This is for only Master-Slave and AC configurations. This mode needs to be selected only on the master controller. When you select this mode, with the switch in the ON position, the entire system shuts down if any of the controllers, master or slave, detect an abnormal condition. The system does not run until the abnormal condition is corrected and you push the reset button, or you turn off the fault shutdown mode switch and push the reset button. The fault shutdown is required if you are using a Veeder-Root™ PLLD in a Master-Slave configuration.

Extended Run Disable (SW2, Pole 5)

This switch, in the ON position, disables the extended run fault detection of the STP-SCI. The extended run fault shuts off the STP if it has been running for 60 minutes without a change in product flow. You might, for example, use this switch with an emergency generator where the STP runs at all times.

⚠ **CAUTION**: Do not disable the extended run if the system requires the pump to be off for line leak detection (i.e. mechanical leak detectors or electronic line leak detection). Disabling the extended run fault and running the STP continuously could mask a leak in the system.

Calibration

NOTE:

- All three indicator lights flash alternately during calibration.
- The STP-SCI calibrates only when the STP has no abnormalities and a dispenser handle is turned on within 10 minutes of calibration starting.
- If you have a blending dispenser system, you can select the mid-grade handle at the dispenser to calibrate all blended product STP-SCIs simultaneously.
- If the controller loses power, it retains the calibration data.

IMPORTANT:

- You must calibrate all STP-SCIs before you operate them.
- Make sure there is no flow during calibration, otherwise there may be false abnormal conditions.
- If you use electronic line leak detection, make sure the STP-SCI is in calibration mode before you turn on the dispenser handle. If the controller is not in calibration mode, the line leak detector senses a fault and does not provide a dispenser hook signal to the STP-SCI. This prevents the STP-SCI from calibrating until you reset the line leak detector.
- Make sure the fuel level in the tank is above the motor intake before you start calibration.

Calibration steps

1. Close either the STP clamp valve or a ball valve at the STP discharge, attach the cover of the controller to the base, and then turn on the power supply to the STP-SCI. The green indicator lights without flashing, the red indicator flashes eight times, and the audible alarm beeps eight times. This indicates the STP-SCI is not calibrated.
2. Press and hold the reset button until all three indicators blink alternately. This puts the controller in calibration mode. After approximately 10 seconds, release the reset button. For Master-Slave and AC configurations, put the master and all the slaves into calibration mode before you proceed to the next step.
3. Lift a handle on a dispenser to turn the pump on. After approximately 16 seconds, the controller records the voltage, current, and power. With the exception of the green light, the indicators stop flashing. This indicates the calibration is complete. Turn off the dispenser handle, and open the STP clamp valve or ball valve. If the controller does not calibrate, the red light flashes, and the audible alarm beeps to indicate an abnormal condition code. See the “Troubleshooting” chapter to identify and correct this condition.

Troubleshooting

The STP-SCI has a microprocessor that allows the unit to diagnose abnormal conditions and communicate them through an audible alarm and LEDs on the front panel. The following describes these indications:

- When the green indicator is lit, power (208-240V) to the STP-SCI is turned on.
- If the green indicator is flashing, the pump motor assembly (PMA) is running.

  NOTE: If the green indicator is lit (without flashing), even when a dispenser is activated, check the dispenser hook signal terminals on the STP-SCI. If 110–250 VAC is across the hook terminal, and the switch settings are correct, contact FFS Technical Support for assistance.

  ⚠ **CAUTION**: If the green light flashes, even when all the dispensers are turned off, there may still be power present at the STP-SCI hook terminal. If this is the case, contact FFS Technical Support for assistance.
- If the red indicator is flashing or the audible alarm is beeping, there is an abnormal condition. Note the number of flashes or beeps, and refer to the appropriate troubleshooting topic.

Disabling the audible alarm

Press the reset button briefly to silence the audible alarm without resetting the controller.

Reset

Before you correct an abnormal condition (red light flashing/alarm beeping), do the following:

1. Note the number of flashes and beeps.
2. Reset the controller by pressing the button on the side of the control box for three to ten seconds.
3. Release the button when all three indicator lights go out.
4. Check for proper operation.
5. If the controller operates correctly, stop servicing the unit.
   -or-
   If the abnormal condition continues, correct the condition according to the troubleshooting guide. Reset the controller, and then check for proper operation. Contact FFS Technical Support for assistance, if needed.

Selectable features to aid troubleshooting

Fault Read Out Mode (SW1, Pole 6)

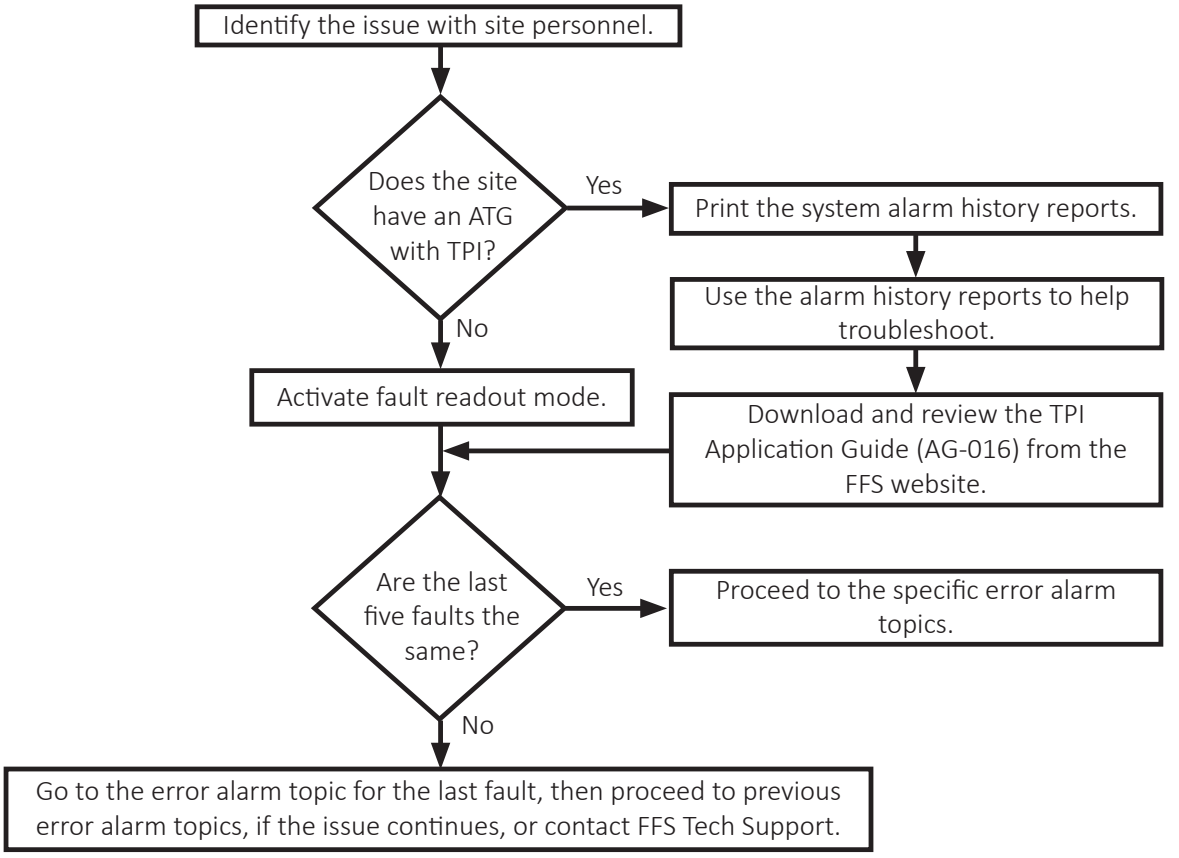
To enable this mode, turn off power to the STP-SCI, and remove the console cover. Turn ON SW1 pole 6, reinstall the cover, and then turn on power to the STP-SCI to see the fault readout. In this mode, the controller displays the last 5 abnormal conditions. The controller beeps once, and the red LED flashes the most recent abnormal condition. It then beeps twice, and the red LED flashes the next-to-last abnormal condition. The controller follows this sequence through 5 beeps and then repeats this pattern while in this mode. If there are less than 5 abnormal conditions, the controller still beeps but the red LED does not flash.

Bypass Mode (SW1, Pole 7)

When this mode selected, with the switch in the ON position, the controller operates as a standard relay control box. It will not indicate or shut down due to an abnormal condition, with the exception of an over current condition. The bypass mode is active for a maximum 10 minutes, after which, the controller reverts to its normal operation. Push the reset button to allow the controller to run in bypass mode for another 10 minutes.

Troubleshooting error alarms

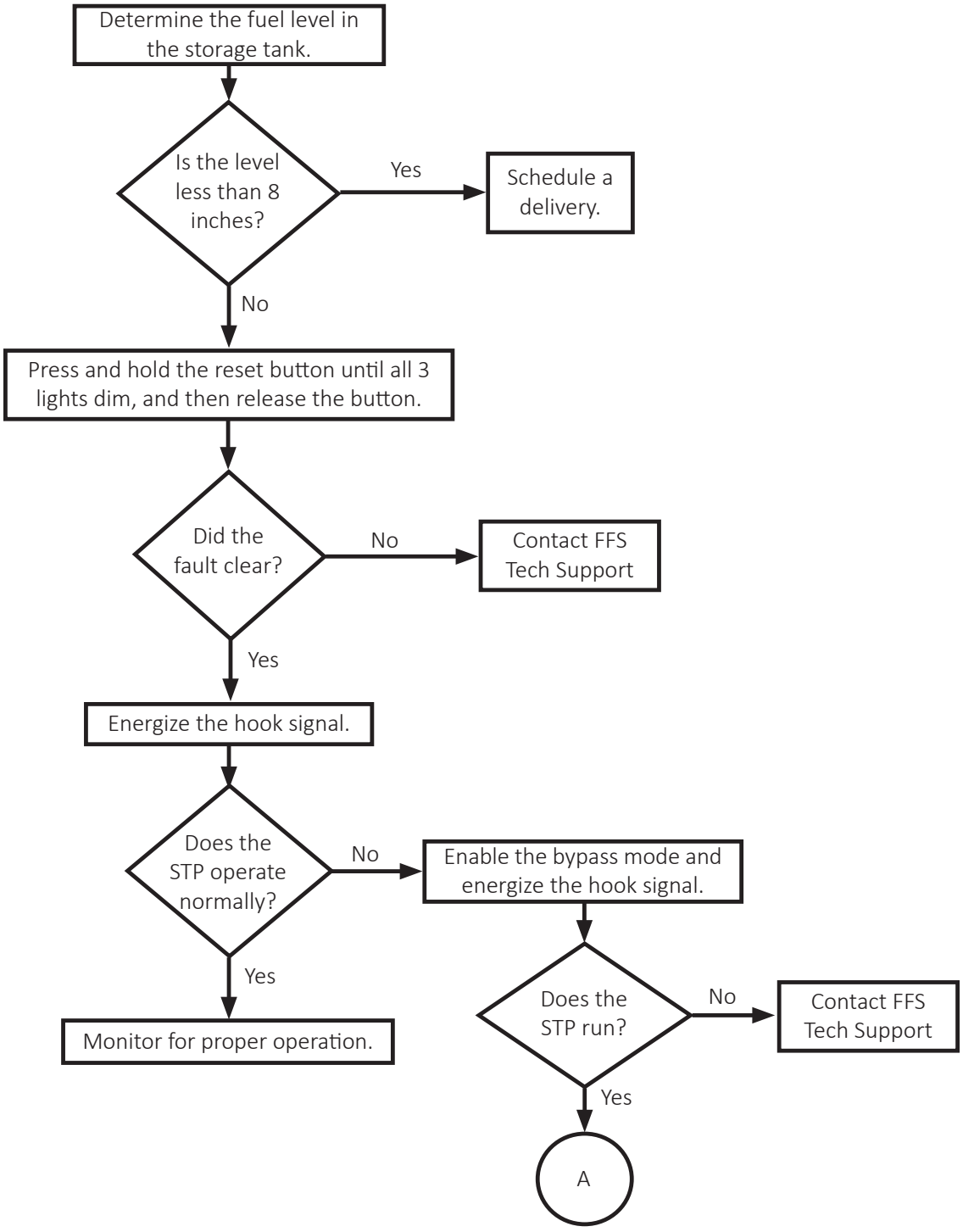
NOTE: Some ATGs include a Turbine Pump Interface (TPI) that can provide additional troubleshooting information. See the TPI Application Guide (AG-016), for more information.



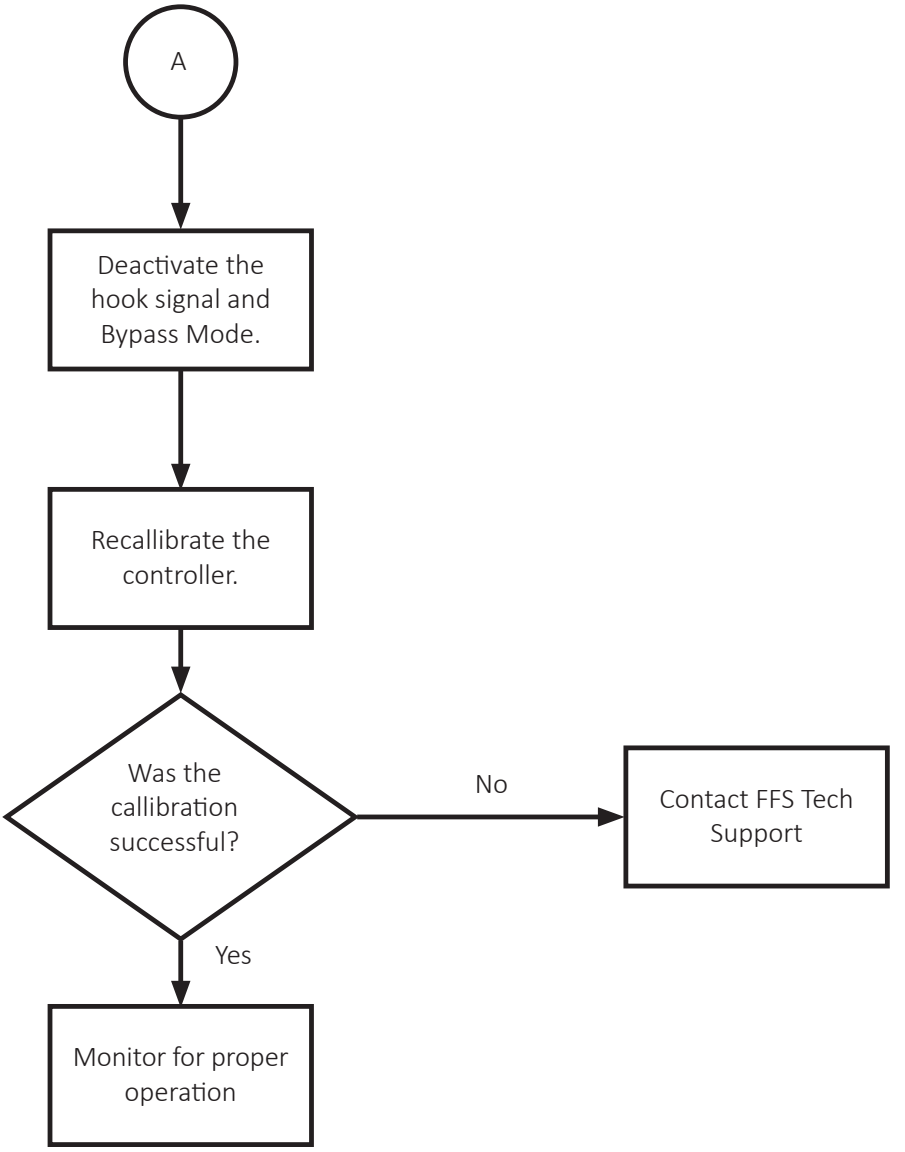
Underload Error alarm

Error code flashes: 1

The Underload Error alarm indicates that the controller has detected that the motor power consumption (in Watts) is below the acceptable range compared to the stored calibration value. This alarm is typically caused by dry running (due to a clogged intake) or improper calibration.



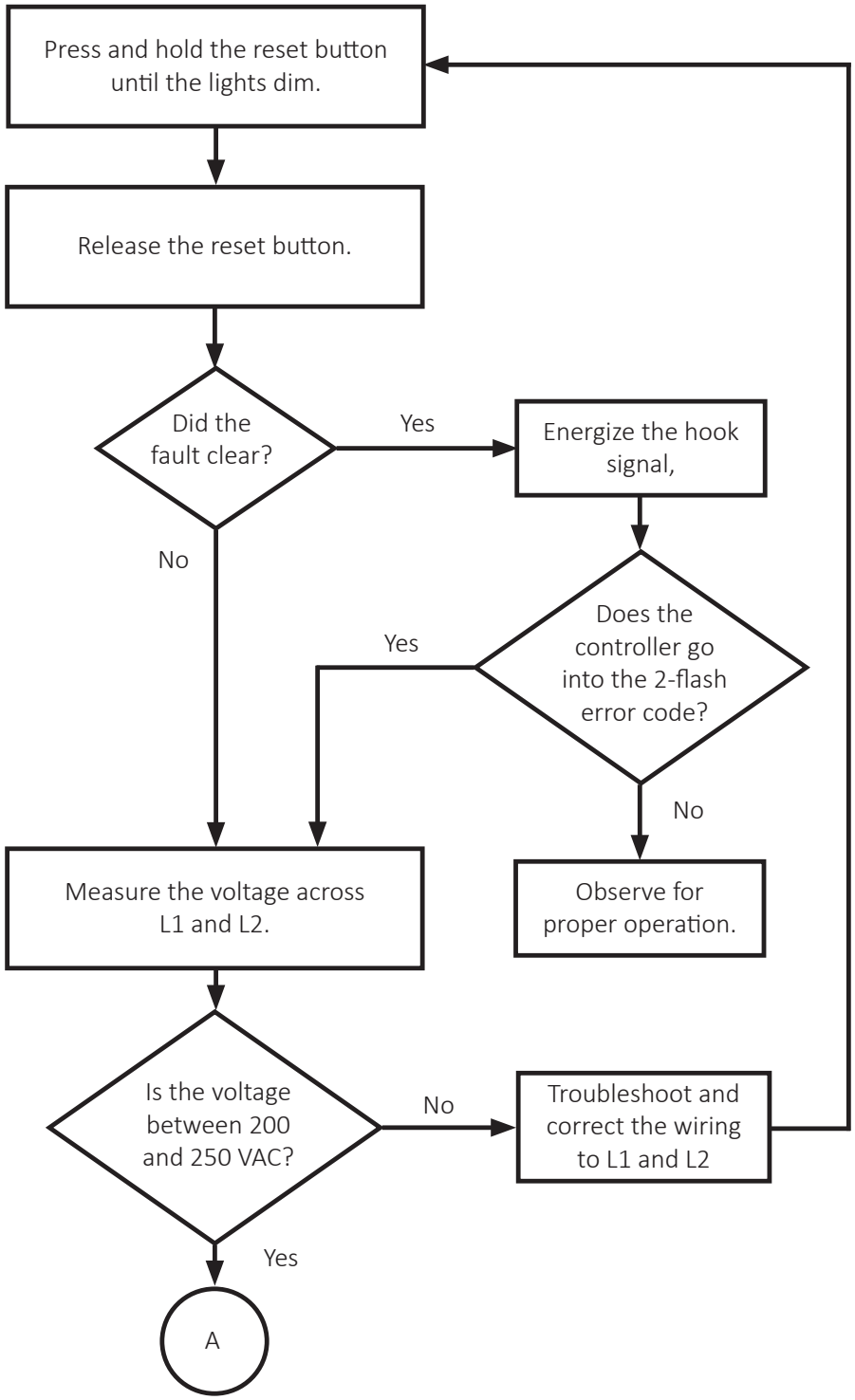
Underload Error alarm (continued)



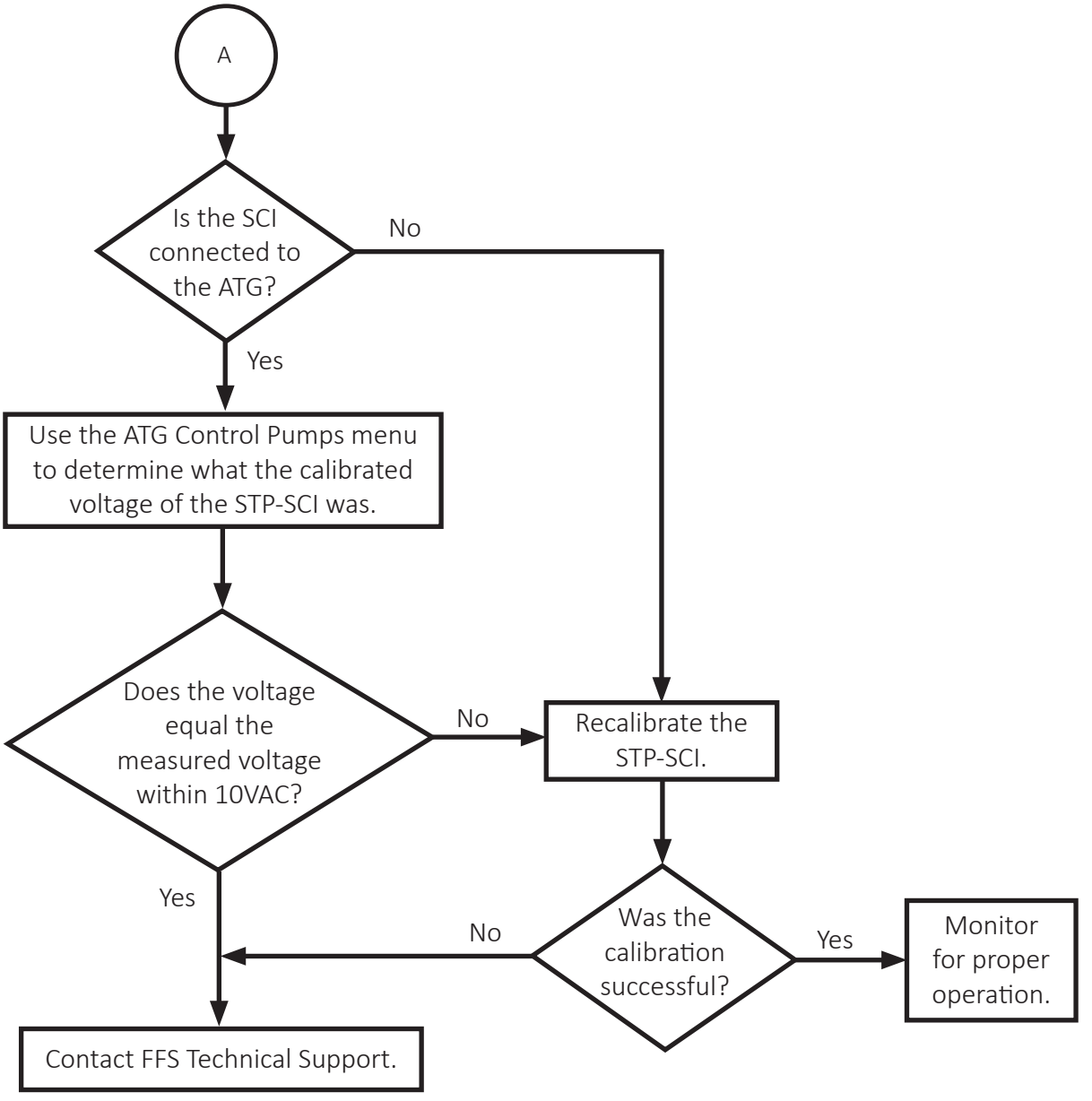
Under Voltage alarm

Error code flashes: 2

The Under Voltage alarm activates when the incoming voltage to the Smart Controller (L1 and L2) is below the acceptable range compared to the stored calibration value. STP-SCI automatically resets the Under Voltage alarm when the incoming voltage returns to the acceptable range.



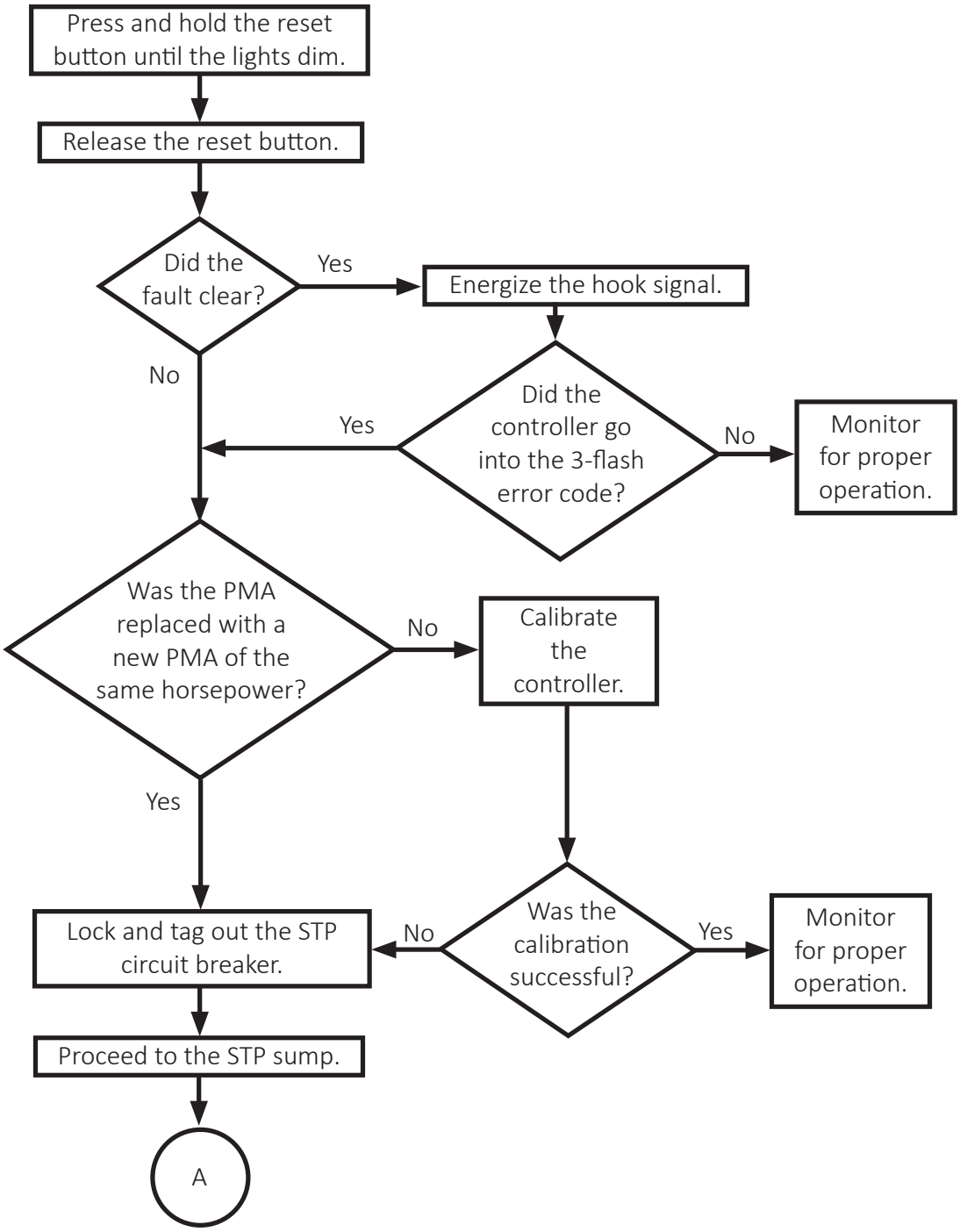
Under Voltage alarm (continued)



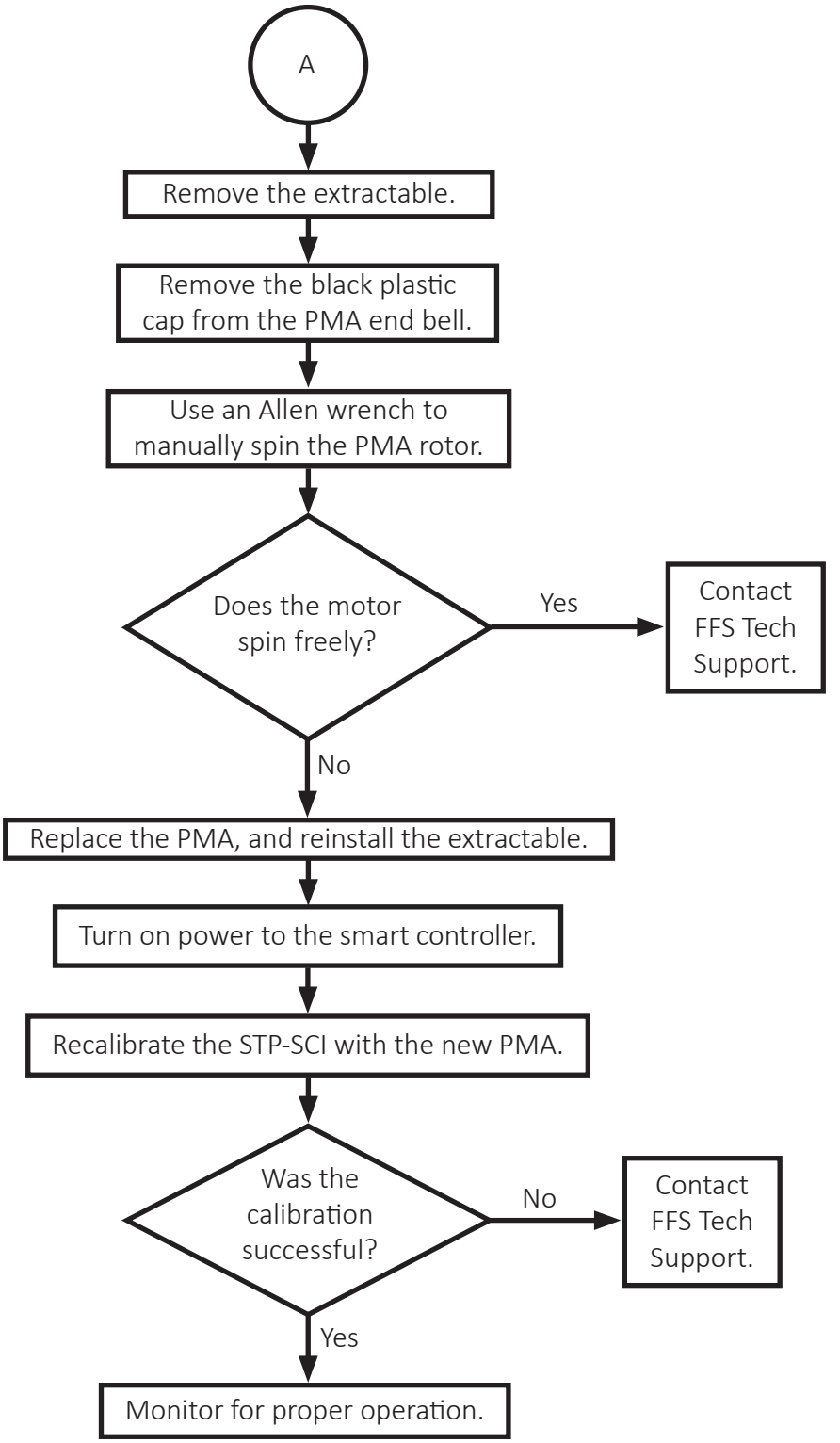
Overload alarm

Error code flashes: 3

The Overload alarm indicates that the controller has detected that the motor power consumption (in Watts) is above the acceptable range compared to the calibration value. The Overload Alarm is usually caused by a locked PMA rotor (due to debris or damage) or improper calibration.



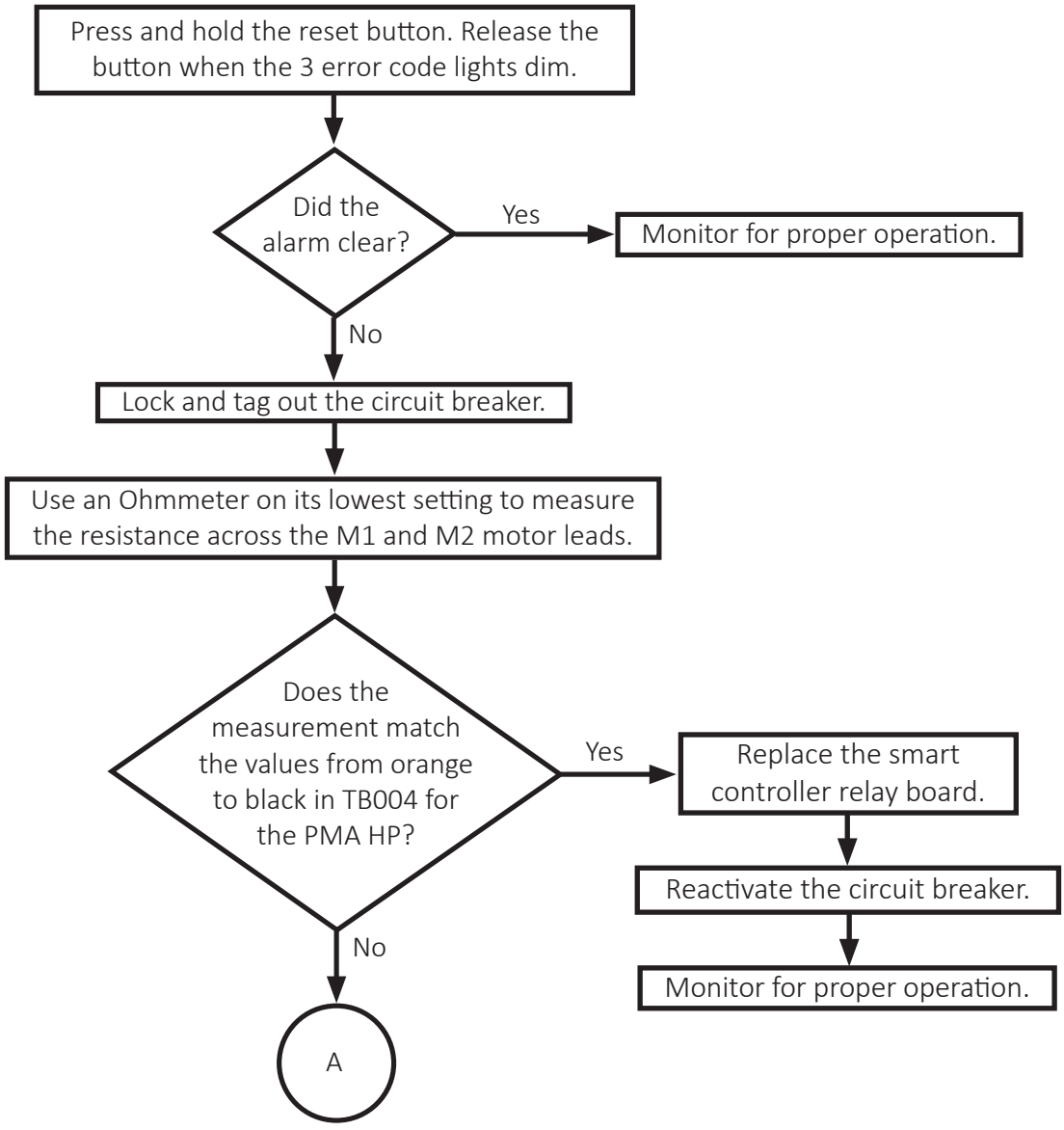
Overload alarm (continued)



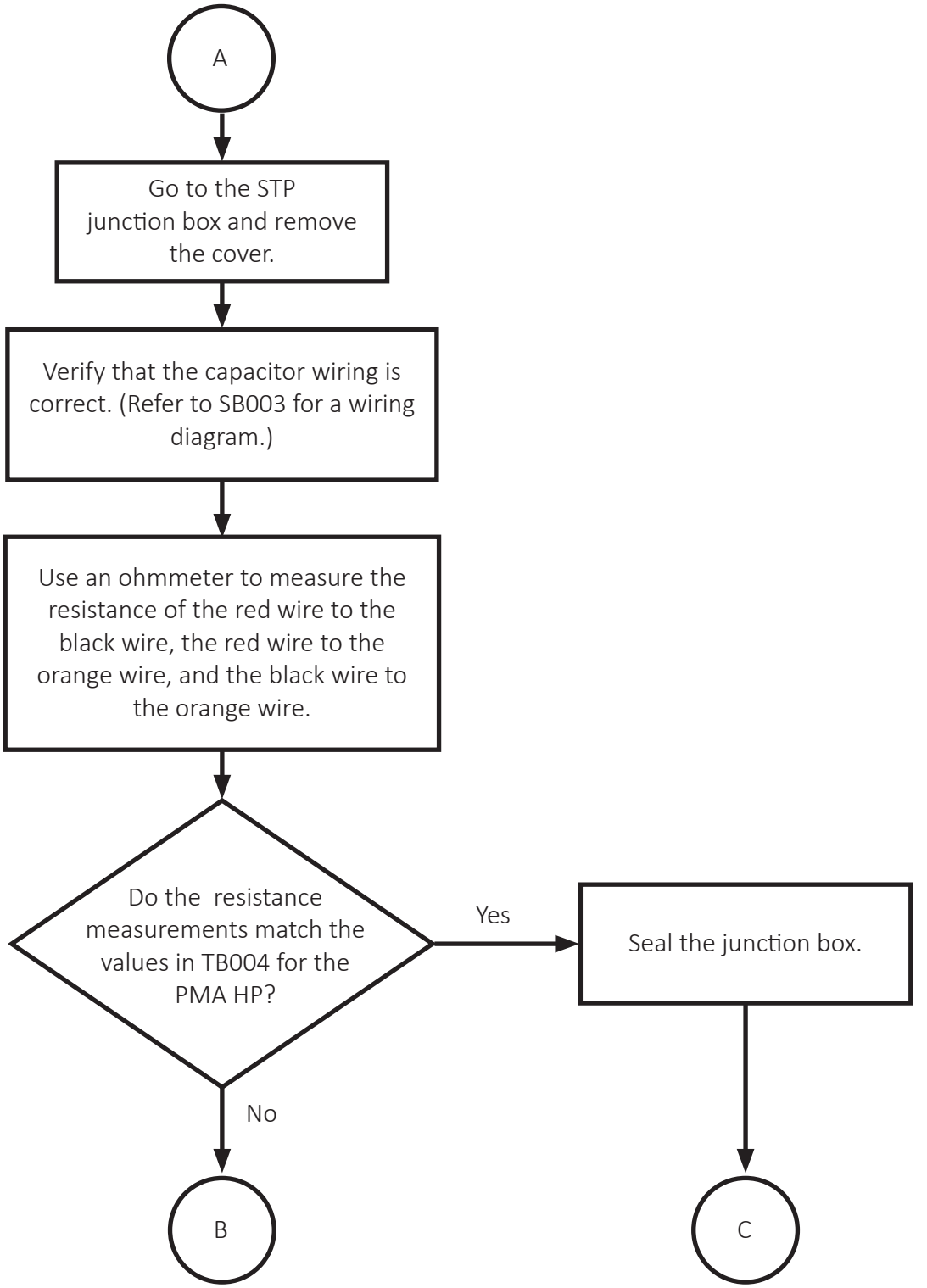
Open Circuit alarm

Error code flashes: 4

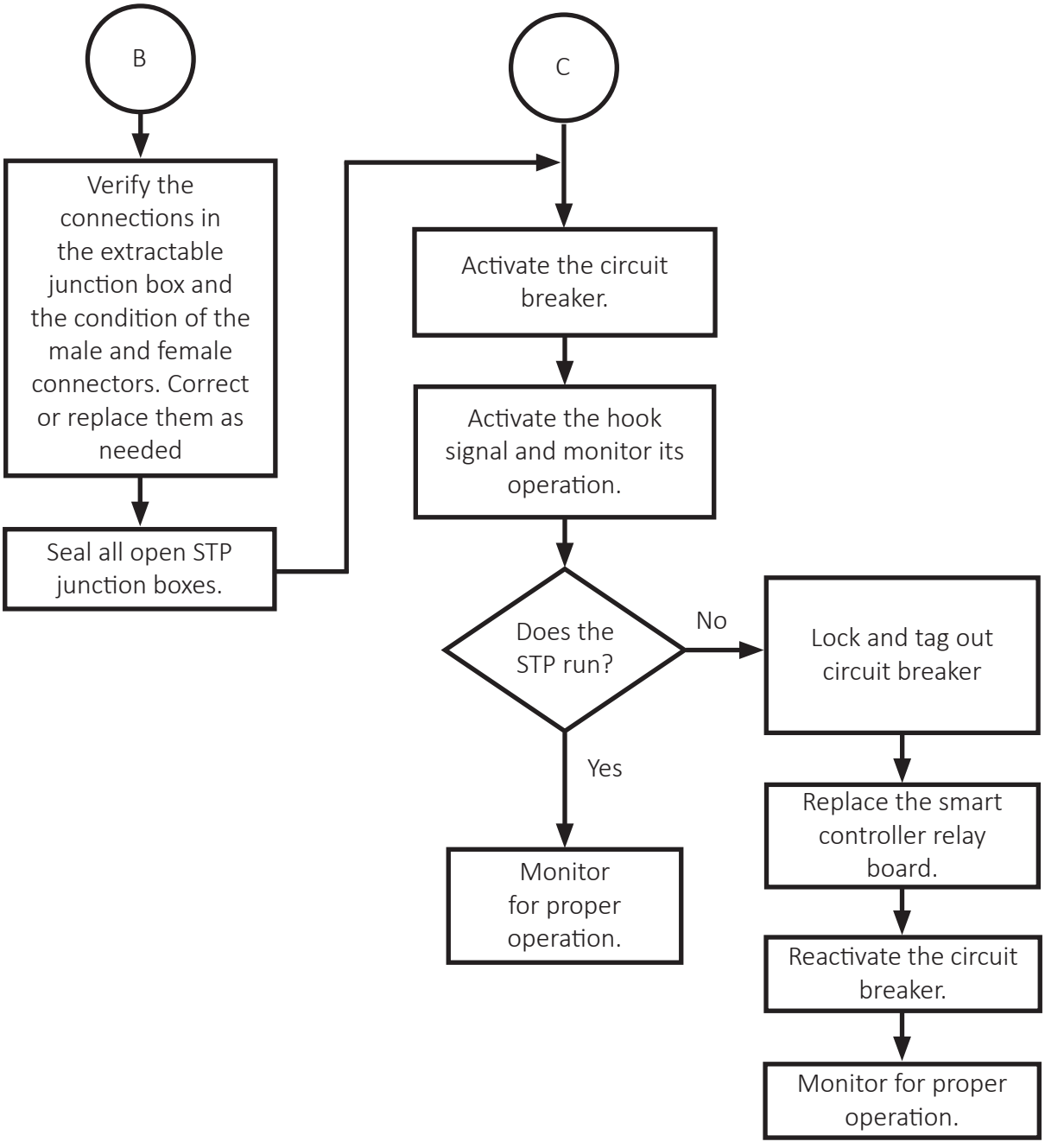
The Open Circuit alarm activates when there is a hook signal and the smart controller does not detect power consumption by the PMA. This alarm is typically caused by a broken output connection (wiring and/or relay) or a PMA thermal overload due to a locked rotor event.



Open Circuit alarm (continued)



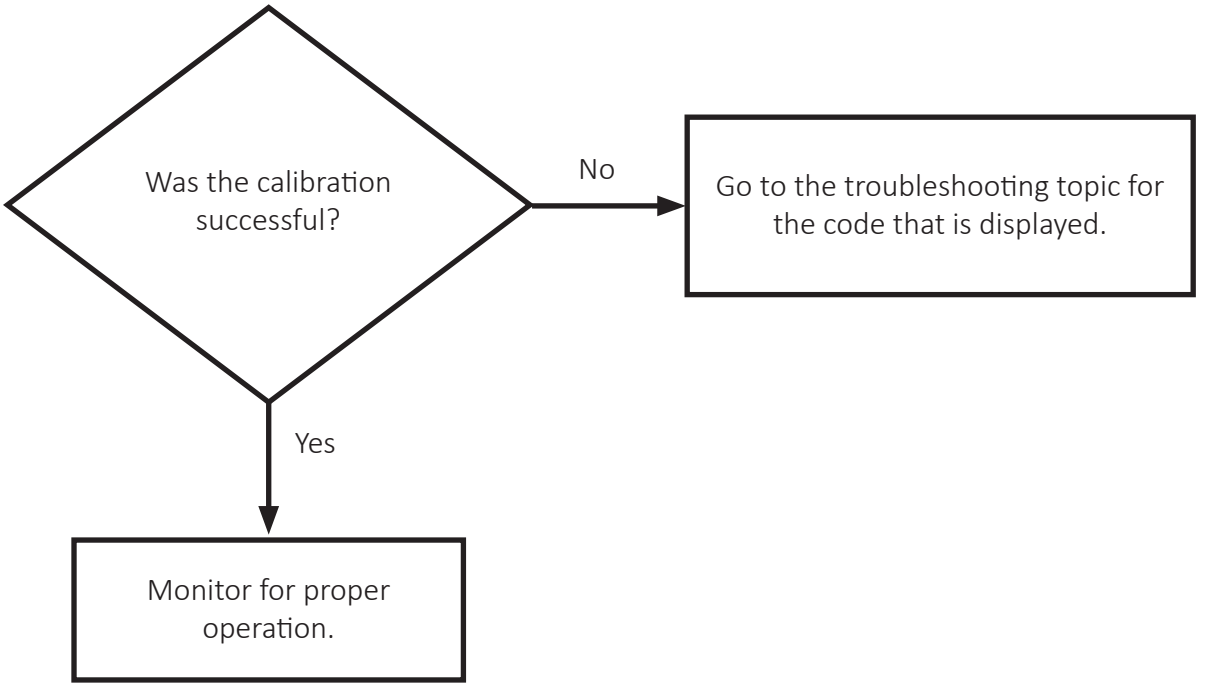
Open Circuit alarm (continued)



Uncalibrated alarm

Error code flashes: 8

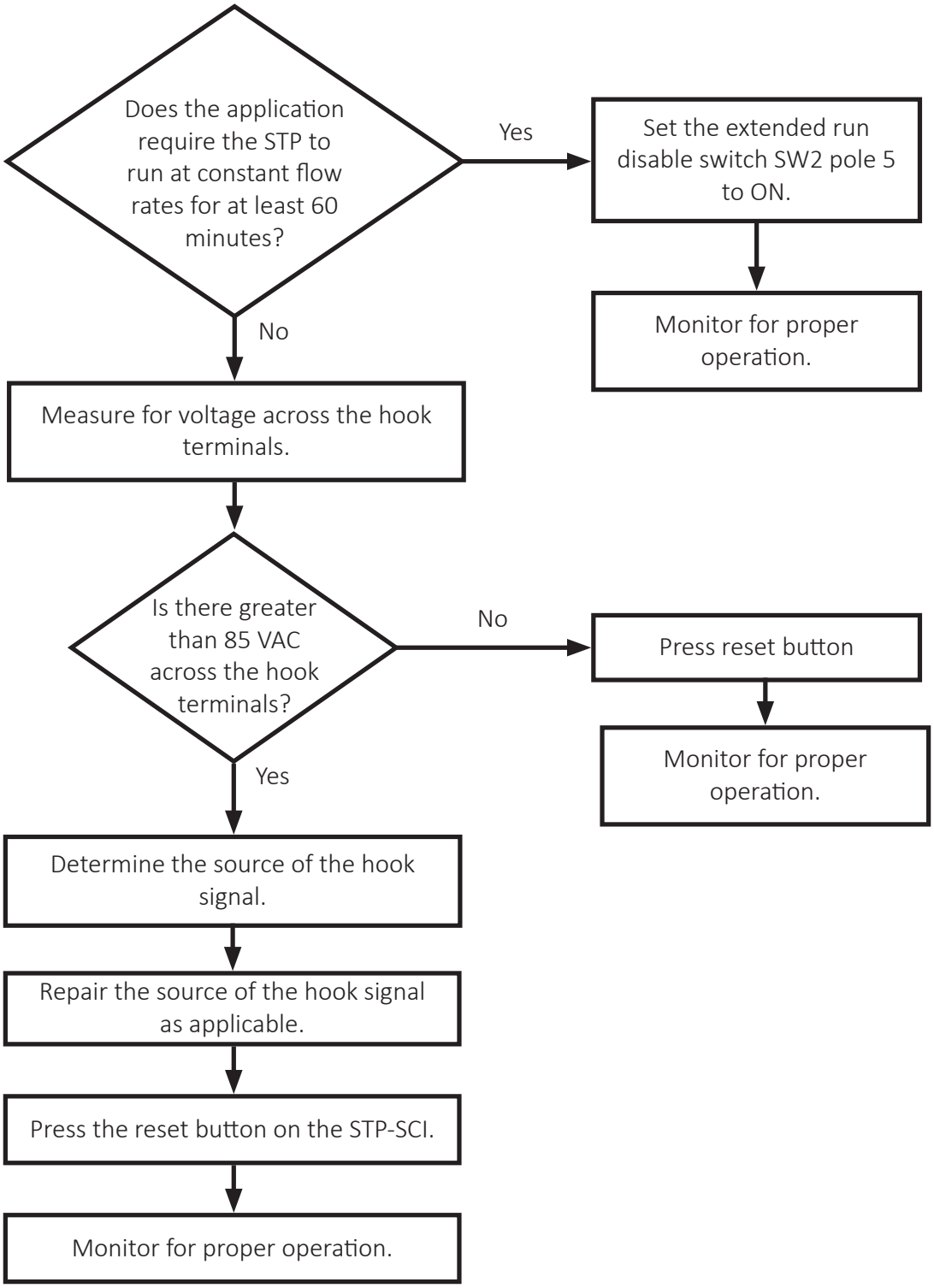
All smart controllers must be calibrated before they can be used. See "Calibration" in the "Installation" chapter of this manual for the calibration procedure.



Extended Run alarm

Error code flashes: 9

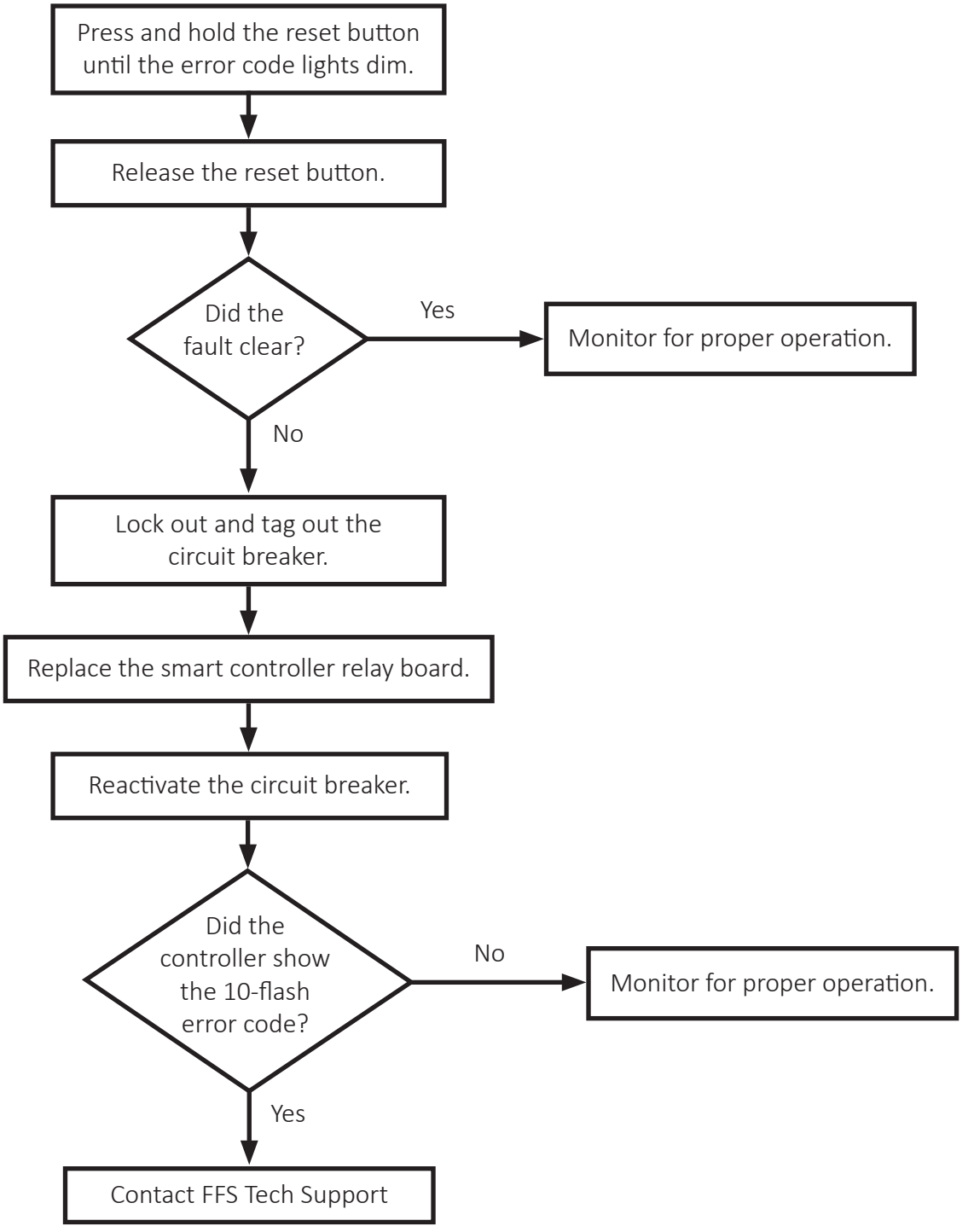
The Extended Run alarm indicates that the smart controller has run for 60 consecutive minutes with no change in power consumption.



Relay Fault alarm

Error code flashes: 10

The Relay Fault alarm indicates the smart controller is running the PMA without a proper hook signal. This alarm is typically caused by a smart controller relay contact failure.



Wiring diagrams

STP-SCI Stand Alone wiring diagram

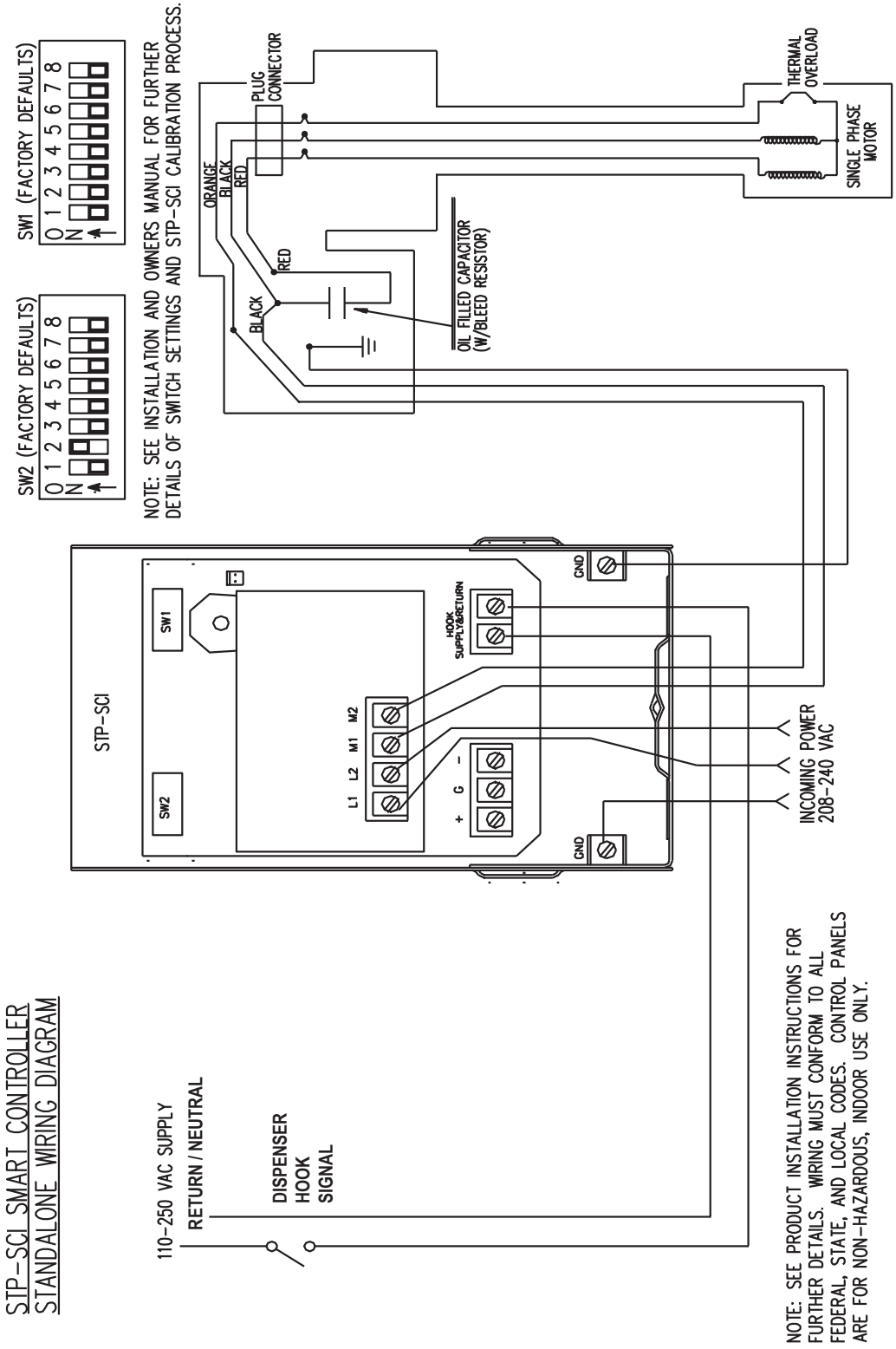


Figure 2

STP-SCI Master-Slave wiring diagram

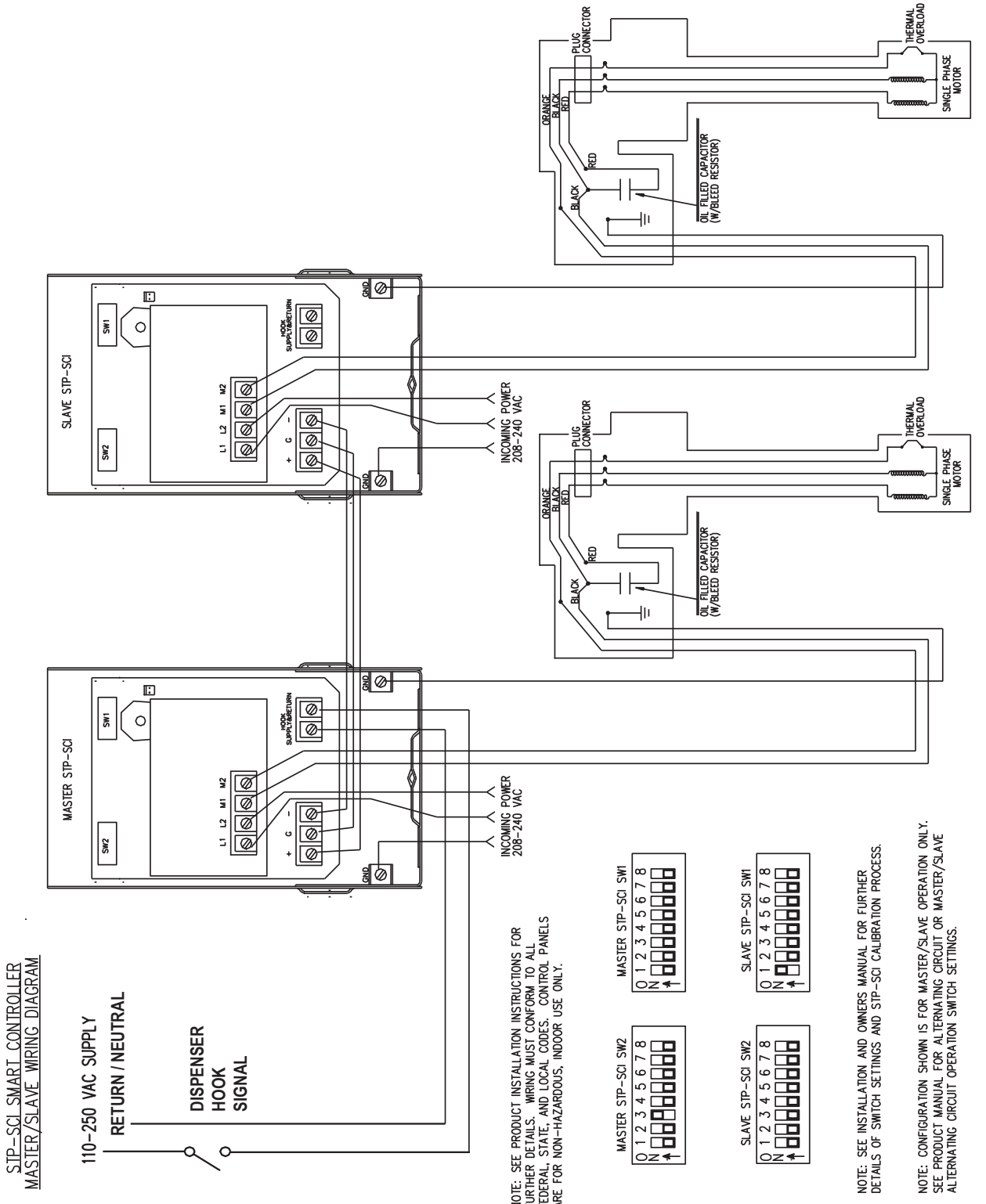
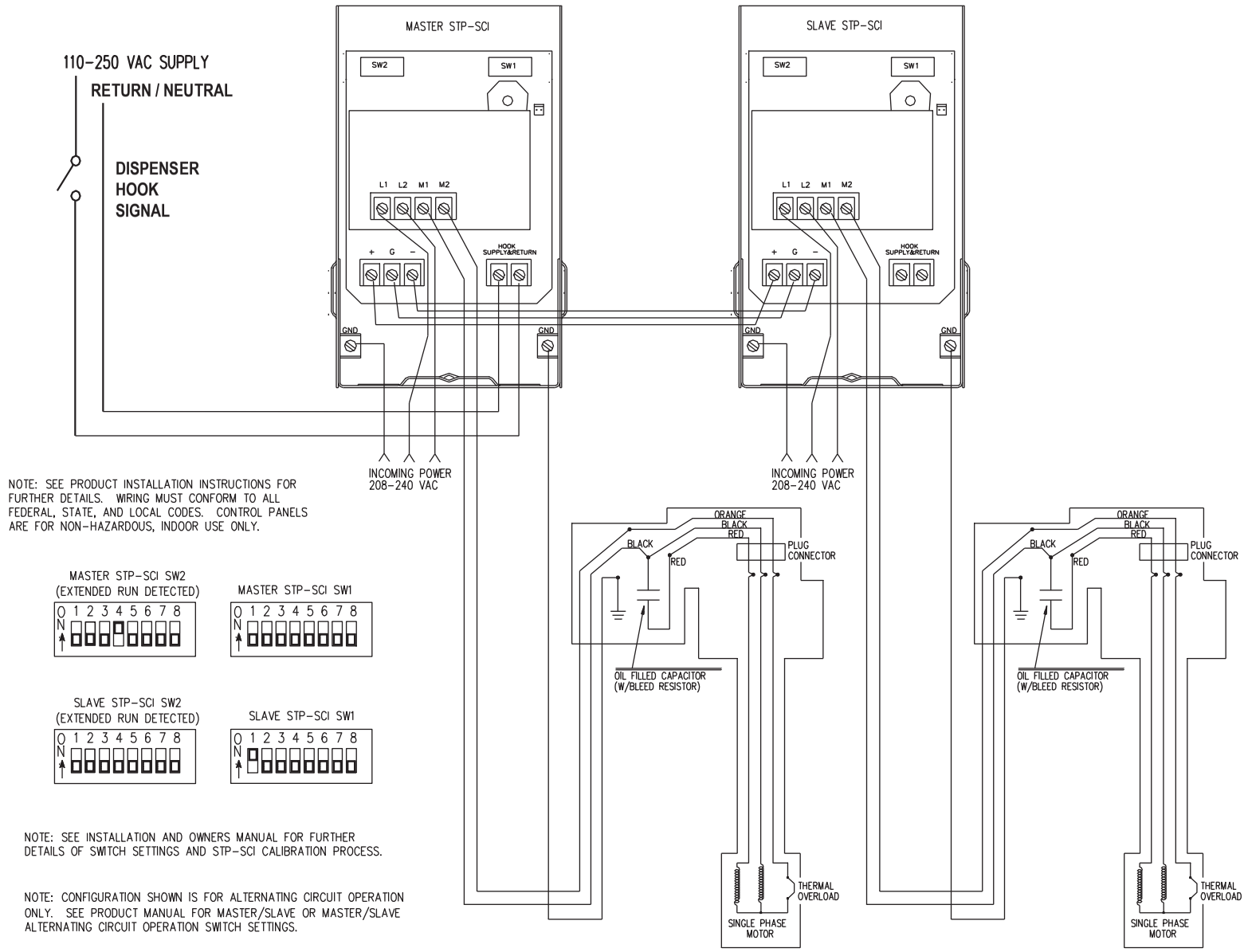


Figure 3

Figure 4

STP-SCI SMART CONTROLLER
ALTERNATING CIRCUIT WIRING DIAGRAM



NOTE: SEE PRODUCT INSTALLATION INSTRUCTIONS FOR FURTHER DETAILS. WIRING MUST CONFORM TO ALL FEDERAL, STATE, AND LOCAL CODES. CONTROL PANELS ARE FOR NON-HAZARDOUS, INDOOR USE ONLY.

MASTER STP-SCI SW2
(EXTENDED RUN DETECTED)

MASTER STP-SCI SW1

SLAVE STP-SCI SW2
(EXTENDED RUN DETECTED)

SLAVE STP-SCI SW1

NOTE: SEE INSTALLATION AND OWNERS MANUAL FOR FURTHER DETAILS OF SWITCH SETTINGS AND STP-SCI CALIBRATION PROCESS.

NOTE: CONFIGURATION SHOWN IS FOR ALTERNATING CIRCUIT OPERATION ONLY. SEE PRODUCT MANUAL FOR MASTER/SLAVE OR MASTER/SLAVE ALTERNATING CIRCUIT OPERATION SWITCH SETTINGS.

STP-SCI Master-Slave/Alternating Circuit wiring diagram

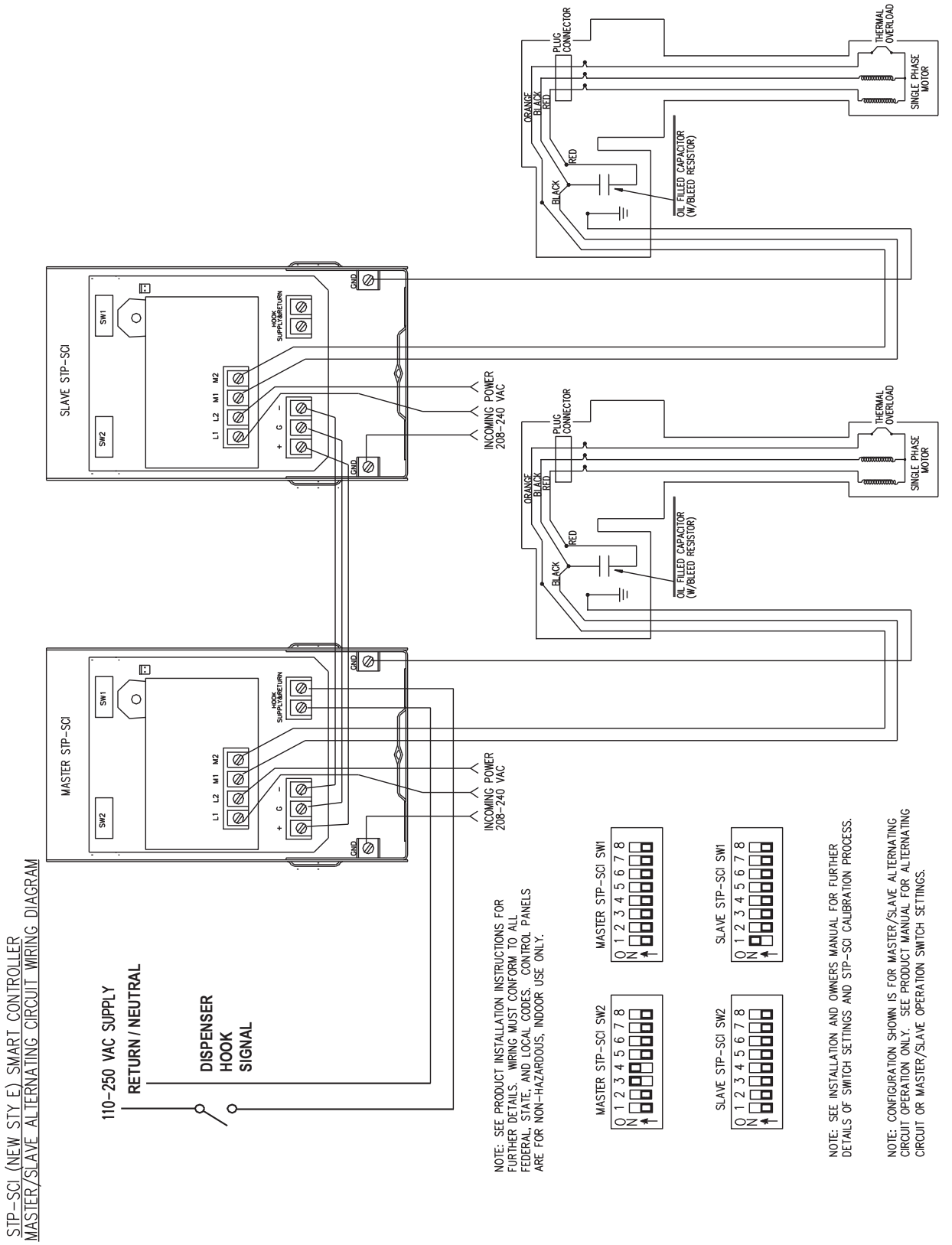
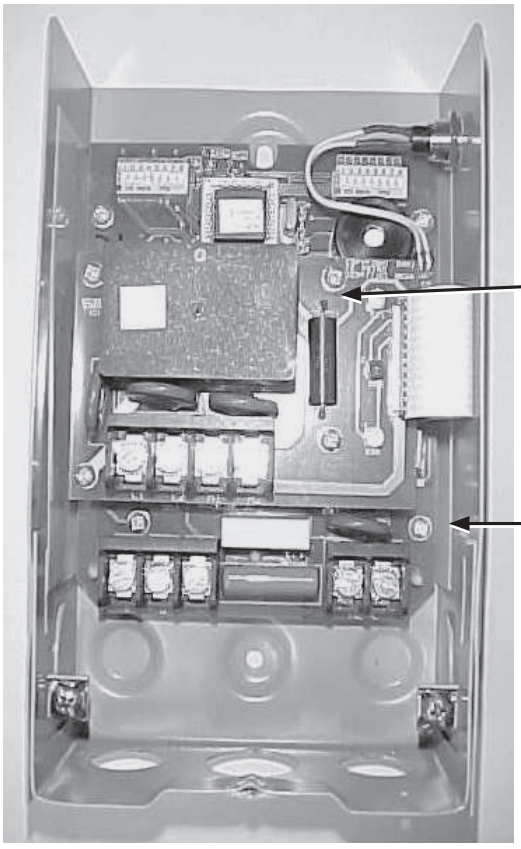


Figure 5

Replacement parts



Upper (Relay) Board Pt. # 225005930

Lower (Control) Board Pt. # 2250005930

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