

Altistart[®] 48 Soft Starts

Maintenance and Repair Guide

Instruction Bulletin
Retain for future use.



HAZARD CATEGORIES AND
SPECIAL SYMBOLS



Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER
DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING
WARNING indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.

⚠ CAUTION
CAUTION indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury.

CAUTION
CAUTION , used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, can result in property damage.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

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SECTION 1— OVERVIEW

INTRODUCTION

The Altistart® 48 (ATS48) soft start offers state-of-the-art acceleration and deceleration control of standard three-phase asynchronous induction (squirrel cage) motors. The ATS48 controller uses a patented technology to control the motor performance based on the motor torque rather than simple voltage- or current-based control. Advanced control algorithms are incorporated to ensure smooth rotation throughout the starting ramp without mechanical instability at the end of starting.

A microprocessor continuously monitors the motor and controller performance to provide maximum protection of the controller, motor, and driven machinery. A variety of starting and stopping modes are standard. A digital keypad display provides accurate controller setup and continuous display of motor performance.

Product Range

The ATS48 soft start is available in 21 current ratings from 17 to 1200 A. All models use a common control interface for consistent and simple set up. ATS48 controllers are rated for use with 208, 230, 380, 460, 575, and 690 volt motors, and are self-adjusting for a 50 or 60 Hz supply frequency.

The ATS48 soft start conforms to the strictest international standards and recommendations relating to electrical industrial control devices, in particular the standard IEC 60947-4-2.

ATS48 soft starts are CE marked on the basis of the European directives governing low voltage (72/73/EEC) and EMC (89/336/EEC).

The ATS48 soft start has the following product certifications: UL, CSA, NOM, CCC, C-Tick, DNV, and GOST.

Scope of Bulletin and Related Documentation

This instruction bulletin covers the maintenance, troubleshooting, and repair of all ATS48 soft start controllers. For additional information about ATS48 soft starts, refer to the *Altistart® 48 Soft Starts* instruction bulletin, 30072-450-61_, available online at www.us.schneider-electric.com. This is the main installation and programming guide for the ATS48 soft starts.

TECHNICAL SUPPORT

For support and assistance, contact the Product Support Group. The Product Support Group is staffed from 8:00 am until 6:00 pm Eastern time to assist with product selection, startup, and diagnosis of product or application problems. Emergency phone support is available 24 hours a day, 365 days a year.

For technical assistance, call, fax, or write:

Schneider Electric Technical Support
8001 Highway 64 East
Knightdale, NC 27545-9023

Telephone: 1-888-SQUARED (1-888-778-2733)
Fax Line: 919-217-6508
e-Mail: drive.products.support@us.schneider-electric.com

SECTION 2— PREVENTATIVE MAINTENANCE AND TROUBLESHOOTING

PREVENTATIVE MAINTENANCE

To avoid major repairs, follow these steps at regular intervals:

- Check the condition and tightness of all connections.
- Make sure that the ventilation is effective and that the temperature around the soft start remains at an acceptable level.
- Remove any dust or debris from the soft start, if necessary.

TROUBLESHOOTING

If the soft start faults, it allows the motor to coast to a stop by opening the shorting/bypass contactor control relay (R2) and turning off the silicon controlled rectifier (SCR) power modules.

The first fault that caused the soft start to stop operation displays on the keypad and is stored in the fault history. This fault and the previous 4 faults can be accessed through PowerSuite® software and the Modbus® network. The fault code display clears as soon as the soft start is reset.

The action of the fault/isolation contactor control relay (R1) follows these rules:

- The relay always opens with these faults: EEF, EtF, InF, LrF, OCF, OHF, OLC, OLF, OtF, PIF, StF, SLF, and ULF.
- The relay opens with CFF and CFI faults only if it is configured to control the isolation contactor.
- If automatic fault reset is enabled (ArS = ON, see page 17), R1 follows these rules:
 - If configured for isolation contactor control, it opens with the first fault.
 - If configured as a fault relay, it opens when automatic resetting of the fault has failed.

If a problem arises during setup or operation, make sure that all electrical and environmental specifications have been followed, and that the ATS48 soft start has been properly installed, mounted, and wired.

If the soft start will not start, and no fault is displayed:

- Determine whether the keypad is displaying a normal soft start status code. If so, the next action depends on the status code description.
- Verify that the soft start has a valid run command.

NOTE: To troubleshoot the controls of the soft start, refer to the recommended wiring diagrams in instruction bulletin 30072-450-61_.
- Verify that control power is present on soft start terminals CL1 and CL2. For more information, refer to instruction bulletin 30072-450-61_.

Record the soft start settings. Then restore the soft start to its factory defaults and reprogram the settings one by one.

Fault Codes and Troubleshooting Guidelines

If the soft start will not start and a fault displays on the keypad, follow the general guidelines described to troubleshoot the soft start based on the displayed fault code.

DANGER

HAZARDOUS VOLTAGE

- Read and understand this section before maintaining or servicing the Altistart 48 soft start.
- This equipment must be installed, programmed, and serviced by qualified personnel only.
- Confirm that the controller has been correctly selected, installed, and applied before performing any service or maintenance.
- Verify that all controller overcurrent protective devices, conductors, enclosures, and other circuit elements have been correctly selected for the application and that the controller is properly grounded in accordance with the applicable code requirements recommended in this bulletin.
- Many parts in this controller, including printed circuit boards, operate at line voltage. DO NOT TOUCH.
- Apply appropriate personal protective equipment (PPE), follow safe electrical practices, and follow the precautions and measurement procedures referenced in this bulletin when making any measurements on energized equipment.
- Use only properly rated and insulated tools.
- Install all covers before applying power or starting and stopping the controller.
- Turn off all power supplying this ATS48 soft start before working on or inside the equipment.

Failure to follow these instructions will result in death or serious injury.

CCF

Invalid Configuration on Power-up

Description

On power up, when the soft start checks its configuration, a CCF fault is triggered if an anomaly is detected.

This fault is stored in the fault history.

Probable Causes

- A control board was swapped from one soft start to another.
- There was excessive electrical interference that prevented the control board from properly reading its configuration.

Corrective Action

- Perform a factory reset on the soft start: parameter FCS.
- Cycle the power to the soft start and send a new RUN signal.
- If the fault persists, contact Schneider Electric product support.

CFI

Invalid Configuration

Description

A CFI fault appears if an invalid configuration is loaded into the soft start. Once a valid configuration is loaded into the soft start, this fault will clear itself.

This fault **is not** stored in the fault history.

Probable Causes

An invalid configuration would include the simultaneous activation of incompatible functions (for instance, soft stop and braking stop) or values entered outside the range of a parameter (for instance, 200 seconds for ACC).

Corrective Action

Recheck the programming and load a valid configuration.

CLF

Loss of Control Power

Description

The soft start continuously monitors the control power applied to terminals CL1 and CL2. If the control power is completely removed, the soft start shuts down and the display goes blank. If the control power drops below 44 V for more than 200 ms, but returns quickly enough for the soft start power supply to ride through the disturbance, a CLF fault displays.

This fault **is not** stored in the fault history.

Probable Causes

- The connections to CL1 and CL2 are poor.
- The green, left-most soft start plug-in control terminal is not properly seated or is defective.
- The control power fuses are defective.
- The control voltage is out of tolerance.
- The wiring from the control board to the power board is defective.
- The power board is defective.

Corrective Action

- Verify all of the control power connections to the soft start.
- Check the control power fuses and replace if defective.
- Supply rated control voltage to the soft start.
- Remove all power. Check the cabling from the control board to the power board. Reset or replace the cabling if necessary.
- Replace the power board.

EEF

Internal Memory Fault

Description

The EEF fault appears if there is a problem reading or writing information to EEPROM memory chips on either the control board or power board.

This fault **is not** stored in the fault history.

Probable Causes

- The control board is defective.
- The power board is defective.

Corrective Action

Remove all power before performing these steps.

- Replace the control board.
- Replace the power board.

E L F

External Fault

Description

Soft starts can be programmed to respond to an external fault condition (such as low oil pressure or a low tank level alarm signal) to LIE. A fault occurs if:

- the control input (LI3 or LI4) assigned to LIE is set to 1.
- A PLC sets bit 3 of Modbus word 402 to 1 (high).

This fault **is** stored in the fault history.

Probable Causes

An external fault condition has developed with a fault/stop signal sent to the soft start.

Corrective Action

Troubleshoot and correct the external fault condition. Reset the external fault signal to the soft start.

F r F

Line Frequency Out of Tolerance

Description

Line frequency is measured whenever the control power is applied to the soft start. If the frequency is within limits at that time, it is not checked again until control power is reapplied.

The acceptable range is limited if the soft start must automatically check for the base line frequency (50 or 60 Hz). The acceptable range is wider if the base line frequency is programmed into the soft start with parameter FrC in the drC menu.

This fault **is** stored in the fault history.

Probable Causes

- The FrC parameter is not set properly.
Acceptable frequency limits if FrC is set to AUT:
 - 47.5 to 52.5 Hz (50 Hz base frequency detected)
 - 57 to 63 Hz (60 Hz base frequency detected)
- 40 to 60 Hz if FrC is set to 50.
- 48 to 72 Hz if FrC is set to 60.
- The generator is undersized or poorly regulated.
- The Run command is sent at the same moment that control power is applied.

Corrective Action

- Check the frequency and fluctuations of the line, then verify that they match the FrC setting.
- Upgrade the generator, if necessary. The 50 or 60 Hz setting of FrC accommodates Class 1, 2, or 3 generators as defined by the Electrical Generating Systems Association.
- Delay the Run command until the nLP or rdy codes appear on the keypad display.

I n F

Internal Fault

Description

This fault appears if the control board cannot determine the soft start's power rating from information stored in the EEPROM memory chip on the power board.

This fault **is** stored in the fault history.

Probable Causes

- Faulty connections between the control board and power board
- Defective power board.

Corrective Action

- Replace the power board
- Remove all power before performing these steps.
- Check the three cables that connect the control board to the power board and make sure they are properly seated.
- If the fault persists, contact Schneider Electric product support.

L r F

Locked Rotor Fault

Description

This fault appears if the motor draws more than 5 times its rated current (the level set by the parameter *I_n*) in any one of the motor legs for more than 200 ms. This overcurrent detection is only active when the motor is up to speed and a bypass/shorting contactor is engaged.

This fault **is** stored in the fault history.

Probable Cause

The motor is experiencing a locked rotor condition due to excessive loading.

Corrective Action

Correct the locked rotor condition.

□ □ F

Overcurrent Fault

Description

This fault appears if too much current is instantaneously drawn through the soft start.

- When the soft start is running, the fault occurs if the measured current is greater than 10 times the soft start's current rating (*I_{cl}*) in at least one phase for at least 10 ms.
- When the soft start is not running, the fault occurs if the measured current is greater than 6% of the soft start's rated current (*I_{cl}*) in at least one phase for at least 200 ms.

An overcurrent fault can also occur if the soft start cannot synchronize its firing circuits with the AC line within 500 ms after commanding the shorting/bypass contactor to open.

This fault **is** stored in the fault history.

Probable Cause

- Short circuit on soft start output
- Internal soft start short circuit (such as a shorted SCR power module)
- The shorting/bypass contactor will not open (welded contacts or improper sequencing)
- The soft start is undersized for the load or application.

Corrective Action

Remove all power before performing these steps.

- Check the motor and motor cables for phase-to-phase and phase-to-ground insulation failures.
- Check for shorted SCR power modules by measuring the impedance across the soft start from line to load on each phase.
- Verify proper operation of the shorting/bypass contactor.
- Verify that the soft start is properly sized for the motor and the application.
- Verify that the boost level (parameter bSt) is not set too high.

OHF

Soft Start Overheating Fault

Description

The soft start protects itself against overheating by continuously measuring its heatsink temperature and calculating SCR power module temperature. The temperature rise calculation assumes a 40 °C ambient.

The heatsink temperature is measured by a PTC thermal probe mounted on the heatsink of models ATS48D17Y–ATS48C32Y (OHF trip level = 95 °C) or by three NTC thermal probes mounted on the SCR power module heatsinks of models ATS48C41Y–ATS48M12Y (OHF trip level = 105 °C).

The heatsink cooling fans turn on when the heatsink temperature exceeds 50 °C (they turn off when the temperature drops below 40 °C).

The soft start calculates the heat rise of the SCR power modules by monitoring motor current. The SCR power module temperature calculation considers the soft start duty cycle (whether the soft start is warm or cold when it starts the motor).

This fault **is** stored in the fault history.

Probable Cause

- The ambient temperature is too high or ventilation is insufficient.
- There has been an excessive number of starts per hour with insufficient cooling intervals.
- The soft start has experienced a short-term high-level overload.
- There have been a number of long, labored starts.
- The heatsink cooling fans are not working.
- The heatsink and/or fans are clogged with dust or other debris, limiting the cooling effectiveness.
- The bypass/shorting contactor is not used or is not working.
- The soft start has not been derated for a high-ambient application.
- The soft start is undersized for the application.
- The installation site exceeds the soft start's altitude rating.

Corrective Action

- Reduce the ambient temperature around the soft start and/or increase the ventilation.
- Follow the starts per hour recommendations described in bulletin 30072-450-61_.

- Rectify the cause of any additional soft start loading (overloaded motor and machine, blockages, mechanical wear and play, lubrication, etc.).
- Verify that the heatsink fans are working.
 - On models ATS48D17Y–ATS48C32Y, the fans receive 12 Vdc power directly from the power board.
 - On models ATS48C41Y–ATS48M12Y, the 12 V derived from the power board is passed to the fans through the firing board.
 - Verify the presence of 12 V and the integrity of the fans' supply wiring. Remove any debris that may be blocking the fans. Replace the fans as needed.
- Troubleshoot and repair the bypass/contactors circuit.
- Make sure that the soft start is properly sized for the load and application.
- Wait for the soft start to cool before restarting.

OLC

Current Overload Fault

Description

This is an optional, user-selected machine protection feature. This fault occurs if parameter OIL in the PRO menu has been set to dEF. Since motor current is continuously monitored, this fault can occur anytime that the motor is running: at starting, full speed, or stopping.

This fault **is** stored in the fault history.

Probable Cause

The motor and driven machinery are overloaded

- The current overload threshold (parameter LOC) is set too low, or the time period set for the current overload (parameter tOL) is too short.
- The nominal motor current, parameter In, is set too low
- The soft start is undersized.

Corrective Action

Rectify the cause of any additional motor loading: blockages, mechanical wear and play, lubrication, etc.

- Adjust the LOC and tOL parameters to match the application.
- Set In to match the current rating on the motor nameplate.
- Use a larger soft start.

OLF

Motor Overload - Ground Fault

Description

The ATS48 soft start uses a UL-listed electronic I2t thermal overload to protect the motor. The soft start also protects the motor against ground faults by monitoring current in all three motor phases.

The OLF / overload fault appears when the soft start estimates that the motor has been overloaded. This estimation is based on motor current measurements, the motor rated current value programmed into parameter In, and the overload class set with parameter tHP. Braking and preheating current are not included in the OLF fault algorithm. An OLF fault occurs when the motor thermal state reaches 125% as displayed through parameter tHr in the SUP menu. If power is removed from the soft start, the downtime is measured by the soft start and used to estimate the motor's thermal state once power is restored. An OLF fault can be reset once the motor thermal state (display parameter tHr) has dropped below 110%. The motor thermal state can be reset to zero only when the soft start is stopped. This clears an OLF fault.

The OLF / ground fault occurs when the measured motor current exceeds 125% of the motor rated current (parameter In) for more than 2 seconds during full speed operation

This fault **is** stored in the fault history.

Probable Cause

- The motor has experienced a prolonged low-level overload.
- The motor has experienced a short-term high-level overload.
- There have been a number of long, labored starts.
- There has been an excessive number of starts per hour.
- The motor is being jogged.
- Parameter In or ILt is set too low.
- Parameter tHP is set too low.
- The soft start is undersized for the application.
- There is a ground fault in the motor or motor cabling.
- The filter board is defective (on models ATS48D17Y–ATS48C32Y).

Corrective Action

- Verify and rectify the cause of any additional motor loading: overloaded machine, blockages, mechanical wear and play, lubrication, etc.
- Follow the starts per hour recommendations in bulletin 30072-450-61__.
- Verify that parameters In, ILt, and tHP are properly set for the motor and application.
- Make sure that the soft start and motor are properly sized for the load and application.
- Check for insulation failures and ground fault problems on the load-side of the soft start.
- Replace the filter board.
- Wait for the motor to cool before restarting.

d E F

Motor Thermal Fault Detected by PTC Probes

Description

This fault is only possible if parameter PtC is set to dEF.

Positive temperature coefficient probes, embedded in the windings of the motor, wired in series, and having a total resistance of 750 ohms at 25°C, should be connected to control board terminals PTC1 and PTC2.

An OtF fault can occur independent of an OLF fault, but both methods of motor protection can work in parallel.

This fault **is** stored in the fault history.

Probable Cause

- The motor is overloaded.
- The motor's ambient temperature is too high (greater than 40°C).
- The motor is not ventilated properly.
- The PTC probes are connected to the wrong control board terminals.
- The PTC probes are short circuited or open circuited.
- The PTC probes are of the wrong ohmic value.
- The motor is undersized for the application.

Corrective Action

Rectify the cause of any additional motor loading: overloaded machine, blockages, mechanical wear and play, lubrication, etc.

- Follow the listed starts per hour recommendations.
- Reduce the temperature around the motor.
- Improve the motor ventilation.
- Correct the PTC probe wiring.
- Use a larger motor.
- Wait for the motor to cool before restarting.

P H F

Loss of Line or Motor Phase

Description

This fault appears:

- if the soft start cannot determine the phase rotation of the AC supply.
- if it cannot synchronize the firing of the SCR power modules due to excessive distortion of the AC supply voltage or excessive voltage imbalance (> 20%)
- if all three phases are lost, or if current drawn by the motor is below the threshold set by the PHL parameter in the Protection Menu.

This fault **is** stored in the fault history.

Probable Cause

The soft start cannot determine the phase rotation upon receiving a RUN command.

- All three line supply phases are lost while the motor is running.
- The measured motor current is below the PHL threshold in one phase for more than 500 ms while the motor is running.
- The measured motor current is below the PHL threshold in three phases for more than 200 ms while the motor is running.
- Synchronization with the AC supply is lost.

Corrective Action

- Verify all power connections between the soft start and the AC supply, including all isolation devices: contactors, fuses, circuit breakers, etc.
- Verify all power connections between the soft start and the motor, including all isolation devices: contactors, overload relays, disconnects, etc.
- Verify the condition of the motor and motor wiring—look for open phases.
- Reduce the PHL setting if the motor is undersized for the soft start.
- Correct the excessive AC supply voltage imbalance.
- Supply the soft start through a 3% line reactor if the AC supply is affected with a high level of harmonics, line notching, or other electrical interference from nearby electronic equipment.
- With the motor up to speed, and with no shorting contactor connected, compare input and output voltages, and verify minimal voltage across SCRs (< 10 V typical). If problems are found, check SCRs and all internal connections. Other possible defective components include the power board and the firing board on the larger soft starts.
- Use a smaller soft start for the application.

P I F

Phase Reversal Fault

Description

The soft start checks the line supply phase rotation whenever it receives a new RUN command.

This fault appears if the measured phase rotation at the L1 - L2 - L3 power terminals does not match the setting of the PHr parameter.

This fault **is** stored in the fault history.

Probable Cause

- The phase rotation has been changed.
- The PHr parameter is improperly set.

Corrective Action

- If the motor rotation direction is correct, invert the setting of the PHr parameter.
- Cycle power to the soft start for the new PHr setting to take effect.
- If the motor is rotating backwards, rotate two of the line phases feeding the soft start.

S L F

Serial Link Fault

Description

The soft start's RJ45 Modbus port can communicate with the remote keypad option, a PC or a PDA running PowerSuite software, a Modbus PLC, or a Schneider network gateway. This fault appears if the time between two successful consecutive exchanges of information do not occur within the time-out period allowed. The time-out period is:

- Remote keypad: 2 seconds
- PC or PDA: 10 seconds
- PLC or gateway: time set by parameter tLP in the COP menu
Range: 0.1 to 60 seconds

This fault **is** stored in the fault history.

Probable Cause

- The cabling between the soft start's RJ45 port and the peripheral device is defective.
- The communications parameters (in the COP menu) are not correct for the peripheral device and the application.
- The cable used is too long or the wire gauge is too small.
- The RJ45 port on the control board is defective.
- The communication port on the PLC, PC, or gateway is not properly configured.
- A peripheral device is defective (for instance, remote keypad, gateway, PLC, PC, or PDA).

Corrective Action

- Replace the cable with the correct Schneider Electric cable.
- Review the COP parameters and revise as needed.
- Use a Schneider Electric cable.
- Replace the control board.
- Review and revise the PLC, PC, or gateway communication port settings.
- Replace the defective peripheral device.

S L F

Excessive Starting Time

Description

This fault appears if parameter tLS in the PRO menu is set to some value other than OFF, and the motor starting time exceeds the setting of tLS.

This protection is available to avoid excessive motor and soft start heating due to an increase in the load during motor starting.

The starting period begins the moment a RUN command is given and ends when full voltage is applied to the motor and the motor current drops below 130% of setting of the parameter In.

This fault **is** stored in the fault history.

Probable Cause

The motor is unusually overloaded, requiring more starting torque than the soft start settings allow or the soft start power rating will handle.

- The following parameters may be set too low for the motor or application:
 - In: motor rated current
 - ILt: current limit
 - t90: initial starting torque
 - tLS: excessive starting time
 - tLI: torque limit
 - LSC: stator loss compensation
- The input line voltage drops during starting, reducing the available motor starting torque.
- The soft start is undersized for the application.

Corrective Action

- Reduce the loading on the motor.
- Adjust the parameters to allow the motor to develop more starting torque.
- Adjustment the power distribution that feeds the soft start to provide the needed voltage.
- Select a larger soft start.

U L F

Motor Underload Fault

Description

This fault is only possible if parameter ULL (motor underload protection) is set to dEF. A ULF fault occurs if the motor torque level drops below the level set by the parameter LUL for a time period greater than that set by parameter tUL.

Motor underload monitoring only takes place while the motor is up to speed, not during starting or stopping.

This fault **is** stored in the fault history.

Probable Cause

- The motor is underloaded (perhaps the driven pump is running dry).
- The parameter LUL or tUL is not set correctly for the application.

Corrective Action

- Verify the loading on the motor.
- Verify that LUL and tUL are set properly for the application.

U 5 F

Lack of AC Line Power on a Run Command

Description

The soft start checks for three-phase AC power at the L1, L2, and L3 terminals as soon as a RUN command is received. This fault appears if the soft start has a RUN command and simultaneously loses line power in all three phases for more than 350 ms.

This fault **is** stored in the fault history.

Probable Cause

On a soft start with separately supplied control power:

- The line-supply circuit breaker, line fuses, or isolation contactor is open.
- The power board is defective.

Corrective Action

- Determine why the three-phase power is not present at the L1, L2, and L3 terminals of the soft start when it receives a RUN command. Rectify the power supply problem.
- Verify the soft start's line voltage detection circuit by supplying only control voltage and verifying that nLP displays. Then apply a three-phase line voltage and verify that RDY displays. If not, verify all internal soft start connections. If no problem is found, replace the power board.

FAULT RESET

Before the soft start can be restarted, the cause of the fault must be diagnosed and cleared. Resetting the fault on the soft start will not correct the cause of the fault.

Resetting the Fault on the Soft Start

CAUTION

IMPROPER OPERATION

Do not reset the soft start until it is safe to do so. If the soft start is wired for two-wire control, has a maintained RUN command, and is reset after a fault, the soft start will attempt to restart the motor.

Failure to follow these instructions can result in equipment damage.

Power-Cycle Fault Reset

All soft start faults can be reset by cycling the power.

1. Remove line and control power from the soft start long enough for the keypad display to go blank.
2. Reapply power.

The soft start is now ready to start the motor.

Self-Clearing Faults

Certain faults are self-clearing. No fault reset action is required. When the cause of the fault is removed, the soft start clears the fault code and returns to an operational mode awaiting a RUN command.

The following faults are self-clearing:

- **C C F** Invalid Configuration on Power-up
- **C F** Invalid Configuration

Manual Fault Reset

Certain faults can be reset by cycling a logic input (LI3 or LI4) assigned to Fault Reset or by cycling the RUN command. Once the fault has been reset, another RUN command is required to start the soft start.

The following faults can be cleared manually:

<i>C L F</i>	Loss of Control Power
<i>E L F</i>	External Fault
<i>F r F</i>	Line Frequency Out of Tolerance
<i>L r F</i>	Locked Rotor Fault
<i>Q H F</i>	Soft Start Overheating Fault
<i>Q L C</i>	Current Overload Fault
<i>Q L F</i>	Motor Overload / Ground Fault
<i>Q L F</i>	Motor Thermal Fault Detected by PTC Probes
<i>P H F</i>	Loss of Line or Motor Phase
<i>S L F</i>	Serial Link Fault
<i>S L F</i>	Excessive Starting Time
<i>U L F</i>	Motor Underload Fault
<i>U S F</i>	Lack of AC Line Power on a Run Command

Automatic Fault Reset

The soft start can be configured to clear certain faults automatically. For a description of the parameter ArS, refer to instruction bulletin 30072-450-61.

The following faults can be cleared automatically:

<i>C L F</i>	Loss of Control Power
<i>F r F</i>	Line Frequency Out of Tolerance
<i>P H F</i>	Loss of Line or Motor Phase
<i>U S F</i>	Lack of AC Line Power on a Run Command

SECTION 3— REPAIR

INTRODUCTION

For the protection of personnel and equipment, a qualified maintenance person must perform the procedures detailed in this manual. The maintenance person should:

- Read, interpret, and follow the instructions and precautions in this manual and other manuals referenced.
- Use the tools listed on page 21 of this manual in a safe and technically correct manner.
- Perform troubleshooting and parts replacement procedures while following the safety procedures recommended in ANSI/NFPA 70E.
- Be trained on the operation and fundamentals of AC controllers and systems and be familiar with the associated hazards.
- Review the sections below for personnel and equipment protection precautions before performing parts replacement procedures.

DANGER

HAZARDOUS VOLTAGE

- Read and understand this section before maintaining or servicing the Altistart 48 soft start.
- This equipment must be installed, programmed, and serviced by qualified personnel only.
- Confirm that the controller has been correctly selected, installed, and applied before performing any service or maintenance.
- Verify that all controller overcurrent protective devices, conductors, enclosures, and other circuit elements have been correctly selected for the application and that the controller is properly grounded in accordance with the applicable code requirements recommended in this bulletin.
- Many parts in this controller, including printed circuit boards, operate at line voltage. DO NOT TOUCH.
- Apply appropriate personal protective equipment (PPE), follow safe electrical practices, and follow the precautions and measurement procedures referenced in this bulletin when making any measurements on energized equipment.
- Use only properly rated and insulated tools.
- Install all covers before applying power or starting and stopping the controller.
- Turn off all power supplying this ATS48 soft start before working on or inside the equipment.

Failure to follow these instructions will result in death or serious injury.

Precautions

The ATS48 soft start contains components that can be potentially hazardous to maintenance personnel. The SCR power devices used in the ATS48 soft start do not provide complete isolation from the AC line. Due to leakage currents through the SCRs in their off state, hazardous voltages can be present on the soft start load-side power circuit whenever power is applied on the line-side of the soft start. Personnel performing parts replacement should be thoroughly familiar with ANSI/NFPA 70E.

Follow these safety measures:

1. Verify that the equipment has been installed and applied in a manner that is consistent with the information in the equipment instruction manual, applicable code requirements, and regulations.
2. Coordinate all parts replacement procedures with the operations manager of the facility.
3. Ensure that the controlled equipment is disconnected from the soft start or that access to it is prohibited.
4. Read all precautions in this manual that relate to the procedure being followed.
5. Make sure you are familiar with the tools and instruments required for the specific procedures described in this chapter.
6. Ensure that you have proper body protection: clothing, eye protection, helmet, and other safety gear.
7. Ensure that electrical equipment surrounding the soft start is either de-energized or isolated in such a way that maintenance personnel are not subject to electric shock.
8. Ensure that all power sources feeding the soft start are de-energized and locked/tagged out before opening the soft start door or performing parts replacement procedures. Never assume that power is off. Always check for voltage with a properly rated voltage sensing device.
9. Inspect the soft start bonding and ground system, and ensure that the controller is properly grounded according to the applicable codes and recommendations in this instruction bulletin.

ATS48 soft starts use some specialized components to achieve rated performance during operation. Some of the components in the soft start require special attention. For example, the SCRs require specific torque settings for proper operation. When replacing the parts, follow the replacement guidelines listed in this book.

- Be sure to install thermal grease when mounting components which use the heatsink for dissipating heat (for instance, SCR power devices).
- Always torque SCR power devices using the method described in the applicable parts replacement procedure.
- If the soft start is removed from its permanent mounting location while replacing parts, ensure that it is properly secured in an upright position before re-energizing.
- During maintenance, do not block, impede, or otherwise diminish the cooling air flow over or through the ATS48 soft start.
- When installing a new control board, the soft start may require programming if the factory default settings are not suitable for the specific application.
- Avoid touching exposed conductors and component leads with skin or clothing.

List of Tools and Instruments

The tools and instruments required to perform maintenance and to replace components on the ATS48 soft start are listed below:

- Set of magnetized flat-blade screwdrivers
- Set of magnetized Phillips screwdrivers
- Set of Torx® screw drivers
- 1/4" drive metric socket set, 5.5–14 mm
- 2" (1/4" drive) socket extension
- Metric hex key set, 2–14 mm
- Metric ball-end hex key set, 2–14 mm
- Torque wrench, 5–350 lb-in (0.4–40 N•m)
- Metric hex key sockets for torque wrench
- Metric drive sockets for torque wrench
- Thermal grease (Schneider #1LUB004010 or equivalent)
- Set of open and box end wrenches, 5.5–19 mm
- Multimeter, 0–1000 V (Fluke 87 or equivalent)
- Clamp-on current probe, 0–600 A (Fluke 80I-600 A or equivalent)
- Connector Extractor

Standards

This manual references the latest revision of the following standards:

- ANSI/NFPA 70B, Electrical Equipment Maintenance
- ANSI/NFPA 70E, Electrical Safety Requirements for Employee Workplaces
- NEMA ICS 1.1, Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control
- NEMA ICS 1.3, Preventative Maintenance of Industrial Control and Systems Equipment
- NEMA ICS 2 - Annex A, Maintenance of Motor Controllers After a Fault Condition
- OSHA 29 CFR Part 1910, Electrical Safety-Related Work Practices

REPLACEMENT PARTS

This section contains replacement parts information and procedures for repairing an ATS48 soft start.

Table 1: ATS48 Replacement Parts

Description	ATS48 Model	Catalog Number	Quantity*
Control Board	All models	VX4G481	1
	ATS48D17Y	VX5G48D17Y	1
	ATS48D22Y	VX5G48D22Y	1
	ATS48D32Y	VX5G48D32Y	1
	ATS48D38Y	VX5G48D38Y	1
	ATS48D47Y	VX5G48D47Y	1
	ATS48D62Y	VX5G48D62Y	1
	ATS48D75Y	VX5G48D75Y	1
	ATS48D88Y	VX5G48D88Y	1
	ATS48C11Y	VX5G48C11Y	1
	ATS48C14Y	VX5G48C14Y	1
Power Board	ATS48C17Y	VX5G48C17Y	1
	ATS48C21Y	VX5G48C21Y	1
	ATS48C25Y	VX5G48C25Y	1
	ATS48C32Y	VX5G48C32Y	1
	ATS48C41Y	VX5G48C41Y	1
	ATS48C48Y	VX5G48C48Y	1
	ATS48C59Y	VX5G48C59Y	1
	ATS48C66Y	VX5G48C66Y	1
	ATS48C79Y	VX5G48C79Y	1
	ATS48M10Y	VX5G48M10Y	1
	ATS48M12Y	VX5G48M12Y	1
Filter Board	ATS48D17Y	VX4G48161Y	1
	ATS48D22Y		
	ATS48D32Y		
	ATS48D38Y		
	ATS48D47Y		
	ATS48D62Y	VX4G48162Y	1
	ATS48D75Y		
	ATS48D88Y		
	ATS48C11Y	VX4G48163Y	1
	ATS48C14Y		
	ATS48C17Y	VX4G48164Y	1
	ATS48C21Y		
SCR Firing Board	ATS48C25Y	VX4G48165Y	6
	ATS48C32Y		
	ATS48C41Y		
	ATS48C48Y		
	ATS48C59Y	VX4G48165Y	12
	ATS48C66Y		
	ATS48C79Y		
	ATS48M10Y		
	ATS48M12Y		

* Total quantity to rebuild an entire ATS48 soft start.

Table 1: ATS48 Replacement Parts *(continued)*

Description	ATS48 Model	Catalog Number	Quantity*
SCR Power Module	ATS48D17Y	VZ3TM2056M18	3
	ATS48D22Y		
	ATS48D32Y		
	ATS48D38Y	VZ3TM2091M18	3
	ATS48D47Y		
	ATS48D62Y	VZ3TM2132M18	3
	ATS48D75Y		
	ATS48D88Y	VZ3TM2162M18	3
	ATS48C11Y		
	ATS48C14Y	VZ3TM2250M18	3
	ATS48C17Y		
	ATS48C21Y	VZ3TM2500M18	3
	ATS48C25Y		
	ATS48C32Y		
	ATS48C41Y	VZ3TP2600M18	3
	ATS48C79Y	VZ3TP2600M18	6
	ATS48C48Y	VZ3TP2M12M18	3
	ATS48C59Y		
	ATS48C66Y		
	ATS48M10Y	VZ3TP2M12M18	6
	ATS48M12Y		
Temperature Sensor	ATS48D17Y	VZ3G001	1
	ATS48D22Y		
	ATS48D32Y		
	ATS48D38Y		
	ATS48D47Y		
	ATS48D62Y		
	ATS48D75Y		
	ATS48D88Y		
	ATS48C11Y		
	ATS48C14Y		
	ATS48C17Y		
	ATS48C21Y		
	ATS48C25Y		
	ATS48C32Y		
	ATS48C41Y	VZ3G002	1
	ATS48C48Y		
	ATS48C59Y		
	ATS48C66Y		
	ATS48C79Y		
	ATS48M10Y		
	ATS48M12Y		

* Total quantity to rebuild an entire ATS48 soft start.

Table 1: ATS48 Replacement Parts *(continued)*

Description	ATS48 Model	Catalog Number	Quantity*
Fan Assembly	ATS48D32Y	VZ3V481	1
	ATS48D38Y		
	ATS48D47Y	VZ3V4811	1
	ATS48D62Y	VZ3V482	1
	ATS48D75Y		
	ATS48D88Y		
	ATS48C11Y		
	ATS48C14Y	VZ3V483	1
	ATS48C17Y		
	ATS48C21Y	VZ3V484	1
	ATS48C25Y		
	ATS48C32Y		
	ATS48C41Y	VZ3V485	1
	ATS48C48Y		
	ATS48C59Y		
	ATS48C66Y		
	ATS48C79Y	VZ3V485	2
	ATS48M10Y		
	ATS48M12Y		

* Total quantity to rebuild an entire ATS48 soft start.

CAUTION

EQUIPMENT DAMAGE

Do not substitute Society of Automotive Engineers (SAE) or alternate fasteners. Altistart 48 controllers use metric fasteners.

Failure to follow this instruction can result in equipment damage.

ATS48 soft starts use metric fasteners and require the use of metric tools. Do not substitute SAE or any alternate fasteners. Substitution may result in damage to threaded inserts, breakage of components and subassemblies, overheated electrical connections due to improper torque levels, and general structural failure.

⚠ DANGER

HAZARDOUS VOLTAGE

Turn off all power supplying this ATS48 soft start before working on or inside the equipment. This includes, but not is not limited to:

- Three-phase AC line power supplied to L1, L2, and L3 on the top of the soft start.
- Single-phase AC control power supplied to CL1 and CL2 on the control board.
- Control power supplied to relay terminals R1, R2, and R3 on the control board.

Failure to follow these instructions will result in death or serious injury.

ATS48 PRODUCT LINE FRAME SIZES

The ATS48 product line consists of six frame sizes—A, B, C, D, E, and F. The models within each frame size share a common power section design. The replacement process for the power components is similar for units within a frame size.

REPLACING THE ATS48 CONTROL BOARD (ALL MODELS)

The control board must be removed before any other parts can be replaced.

Removing the Control Board Assembly

Figure 1: Control Board

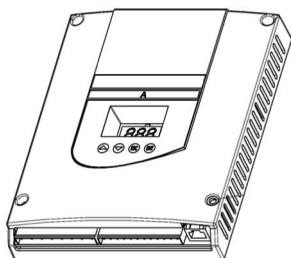
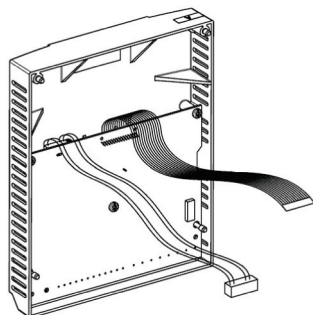


Figure 2: Control Board Cables



To remove the control board assembly:

1. For models ATS48C41Y, ATS48C48Y, ATS48C59Y, ATS48C66Y, ATS48C79Y, ATS48M10Y, and ATS48M12Y, remove the front cover to access the control board assembly.
2. Remove the two plug-in control terminal strips found on the bottom side of the control board. Do not remove any of the field wiring. These plug-in control terminal strips will be installed onto the new control board assembly.
3. Loosen, but do not remove, the screws securing the four corners of the control board assembly to the chassis of the soft start. See Figure 1.
4. Gently lift the control board assembly to access the three cables connecting the control board to the power board.

NOTE: The control board cables are not individually labeled. Note where the three cables are connected on both the control board and the power board before removing them. Only the two cables illustrated in Figure 2 are included with the replacement control board assembly. When removing the cables, pull on the cable connectors, not on the individual wires.

5. Gently pull up on each end of the long clamp that holds the flat ribbon cable to jack J5 on the power board to release the ribbon cable from the power board.
6. Disconnect the cable harness from jack J6 on the power board.
7. Disconnect the remaining cable from the control board (but not from the power board). This is the cable that connects to J4 on the power board and is not included with the replacement control board assembly.
8. Remove the old control board assembly.

Installing the Control Board Assembly

To install the control board assembly:

1. Reconnect the cables in the reverse order from Steps 5, 6, and 7. Take care not to twist the flat ribbon cable. Gently pull up on the cable clamp to ensure that it is in the unlocked position. After fully inserting the flat ribbon cable, push the cable clamp down to lock the cable into place.
2. Position the control board assembly over the chassis of the soft start and torque the four corner screws to 18 lb-in (2 N•m). See Figure 1.
3. On models ATS48C41Y, ATS48C48Y, ATS48C59Y, ATS48C66Y, ATS48C79Y, ATS48M10Y, and ATS48M12Y, reinstall the front cover and torque the screws to 18 lb-in (2 N•m).

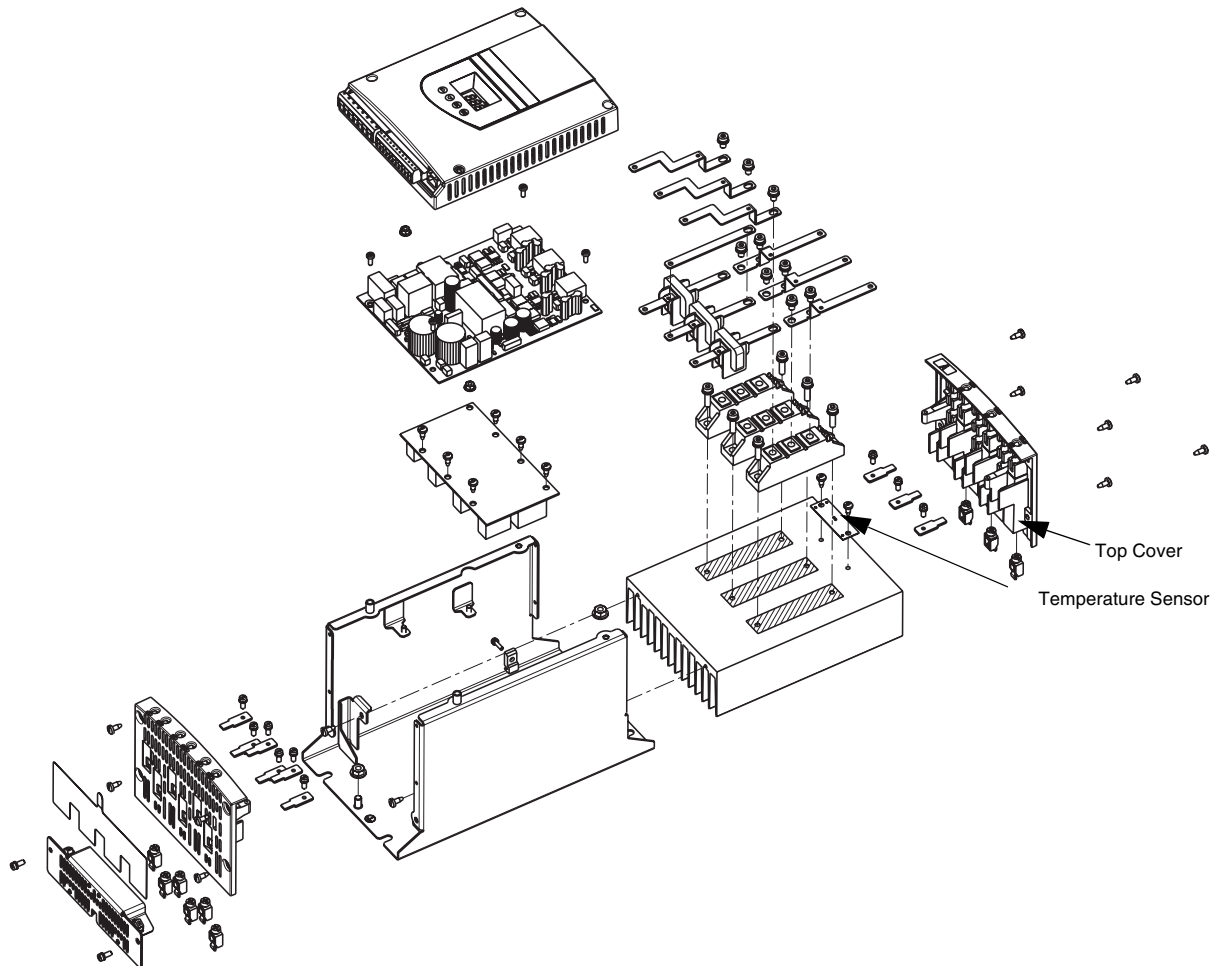
NOTE: When the control board is damaged, the entire assembly must be replaced. Any attempt to access, inspect, or repair the circuit boards within the control board assembly will void the product's warranty.

REPLACEMENT PROCEDURES FOR FRAME SIZE A

ATS48D17Y, ATS48D22Y, ATS48D32Y,
ATS48D38Y, AND ATS48D47Y

This section contains common parts replacement procedures for Frame Size A (ATS48D17Y, ATS48D22Y, ATS48D32Y, ATS48D38Y, and ATS48D47Y) ATS48 soft starts.

Figure 3: Exploded View of Frame Size A



Power Board Replacement

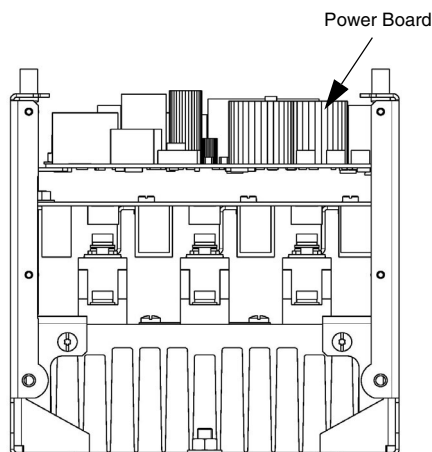
ATS48D17Y, ATS48D22Y, ATS48D32Y,
ATS48D38Y, and ATS48D47Y

Removing the Power Board

To remove the power board:

1. Remove the control board assembly. See the procedure on page 25.
NOTE: The cables are not individually labeled. Make a note of where the eleven cables are connected on the power board prior to disassembly. When removing the cables, pull on the cable connectors, not on the individual wires.
2. Disconnect the eleven cables from the power board.
3. Remove the screws and the nut securing the power board; then, remove the board from the soft start. See Figure 5.

Figure 4: Size A Power Board—Bottom



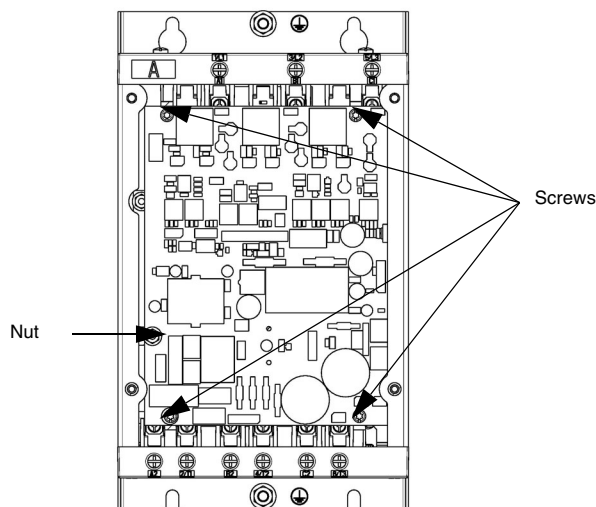
Installing the Power Board

To install the power board:

1. Place the power board in the correct position within the ATS48 soft start. Connectors J12 through J31 should be positioned nearest the L1/2/3 terminals of the soft start. The board slides into the black plastic holder on the right-hand panel of the soft start.
2. Secure the power board to the soft start with four screws and one nut. See Figure 5. Torque the screws to 9 lb-in (1 N•m). Torque the nut to 18 lb-in (2 N•m).
3. Reconnect the eleven cables to the power board.
4. Reinstall the control board assembly.

NOTE: When the power board is damaged, the entire assembly must be replaced. Any attempt to access, inspect, or repair the power board will void the product's warranty.

Figure 5: Size A Power Board—Top



Filter Board Replacement

ATS48D17Y, ATS48D22Y, ATS48D32Y,
ATS48D38Y, and ATS48D47Y

Removing the Filter Board

To remove the filter board:

1. Remove the control board assembly (see the procedure on page 25) and the power board.
2. Remove the six screws and one nut securing the filter board to the soft start. See Figure 7. Do not mix up these screws with those used for the power board.
3. Remove the filter board.

Figure 6: Size A Filter Board - Bottom

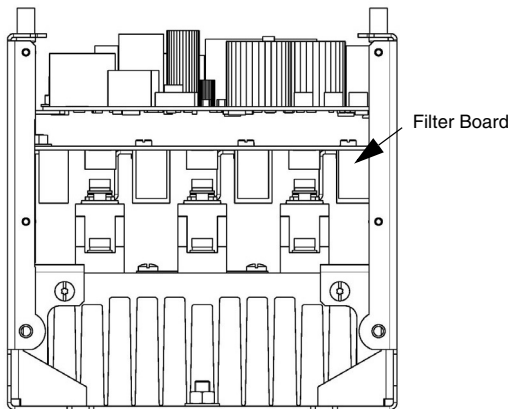
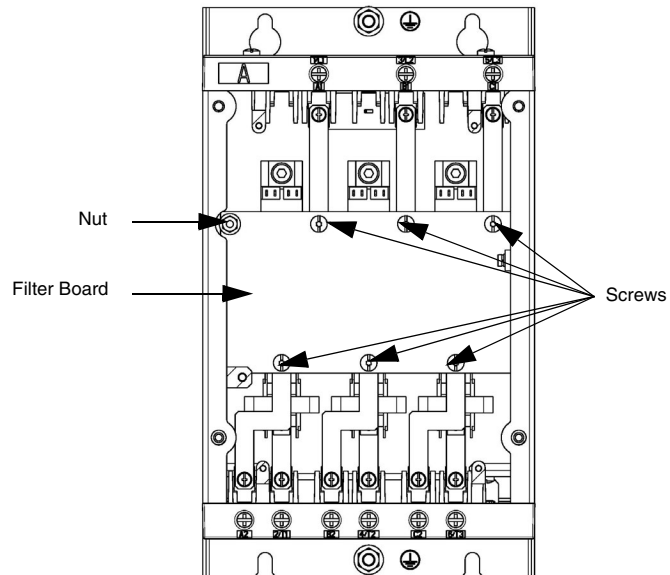


Figure 7: Size A Filter Board - Top



Installing the Filter Board

To install the filter board:

1. Place the filter board in the correct position within the soft start. The filter board must be installed with the circuit components facing the heatsink of the soft start and with the filter board's L1, L2, and L3 terminals oriented toward the top of the soft start.
2. Secure the filter board with six screws and one nut. See Figure 7. Torque the screws to 18 lb-in (2 N•m).
3. Reinstall the power board and the control board assembly.

NOTE: When the filter board is damaged, the entire assembly must be replaced. Any attempt to access, inspect, or repair the filter board will void the product's warranty.

SCR Power Module Replacement

ATS48D17Y, ATS48D22Y, ATS48D32Y,
ATS48D38Y, and ATS48D47Y

Removing the SCR Power Module

To remove the SCR power module:

1. Remove the control board assembly (see the procedure on page 25), the power board, and the filter board.
2. Make a note of how the upper and lower bus bars are connected to the SCR to be replaced, and what screws are used. Be sure to use the correct screws during reassembly.
3. Remove the six screws securing the bus bars (three to the SCR, one to the incoming power terminal, two to the lower output terminals). Do not mix up these screws with those already removed. Remove the bus bars.
4. Remove the two screws securing the SCR to the heatsink. Save these screws for reassembly. Remove the SCR from the heatsink.
5. Make a note of how the control wires are connected to the SCR module. Disconnect the cables and attach them to the new SCR module.

NOTE: When removing the cables, pull on the cable connectors, not on the individual wires. Improper connection will cause malfunction of the soft start.

Figure 8: SCR Power Module - Bottom

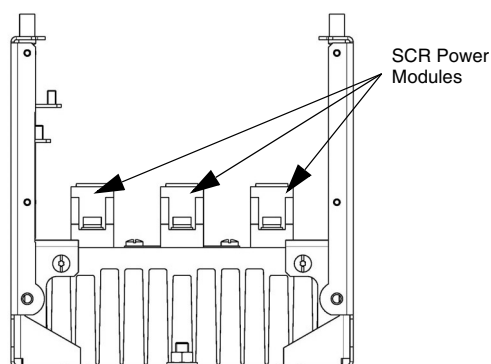
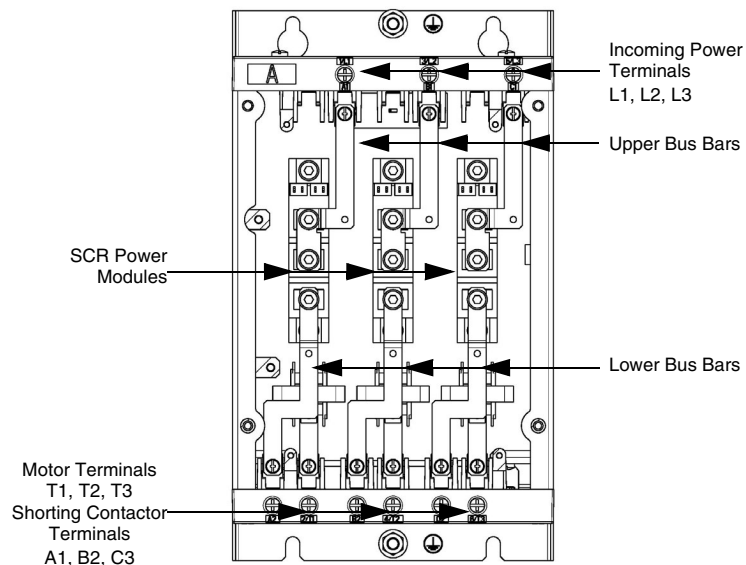


Figure 9: SCR Power Module - Top



Installing the SCR Power Module

To install the SCR power module:

1. Using rubbing alcohol and a cloth, clean the area of heatsink where the new SCR power module will be installed.
2. Apply a light film of silicone-free thermal grease (Schneider Electric part number 1LUB004010 or equivalent) to the back of the SCR.
3. Place the SCR on the heatsink aligned with the two mounting holes and with the control wire connections closest to the L1/2/3 power terminals.
4. Using the screws removed in Step 4 (from the disassembly procedure), secure the SCR to the heatsink. Set both screws finger tight first before torquing them to 22 lb-in (2.5 N•m).

5. Reinstall the upper and lower bus bars. Torque the three SCR screws to 22 lb-in (2.5 N•m). Torque the three screws securing the bus bars to the input and output terminals to 18 lb-in (2 N•m).
6. Reinstall the control board assembly, the power board, and the filter board.

Fan Assembly Replacement

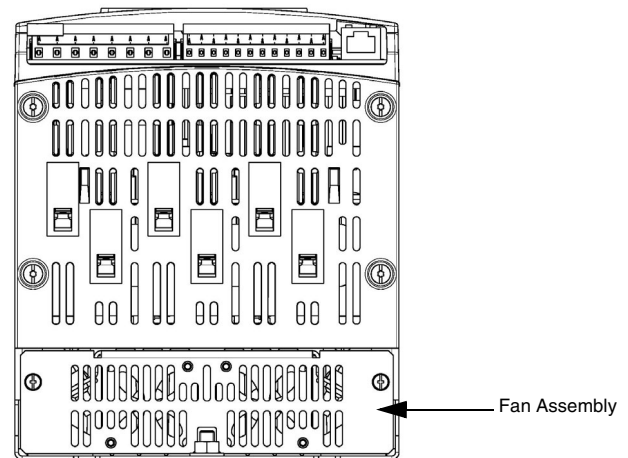
ATS48D32Y, ATS48D38Y, and
ATS48D47Y

Removing the Fan Assembly

To remove the fan assembly:

1. Remove the nut from the ground stud on the bottom of the soft start.
2. Loosen and remove the two screws securing the fan assembly to the bottom of the soft start. See Figure 10.
3. While removing the fan assembly from the soft start, disconnect the power supply cable.

Figure 10: Fan Assembly



Installing the Fan Assembly

To install the fan assembly:

1. Attach the power supply cable to the new fan assembly. Install the fan assembly onto the bottom of the soft start.
2. Secure the fan assembly with the two screws removed in Step 2 of the removal process and torque the screws to 18 lb-in (2 N•m).
3. Reinstall the nut on the ground stud and torque to 18 lb-in (2 N•m).

Temperature Sensor Replacement

ATS48D17Y, ATS48D22Y, ATS48D32Y,
ATS48D38Y, and ATS48D47Y

Removing the Temperature Sensor

To remove the temperature sensor:

1. Remove the control board assembly and the power board. See the procedure on page 25.
2. Loosen and remove the three screws securing the upper bus bars to the soft start's top cover.
3. Loosen six screws and remove the soft start's top cover. See Figure 3 on page 26.
4. Loosen two screws and remove the temperature sensor. See Figure 3 on page 26.

Installing the Temperature Sensor

To install the temperature sensor:

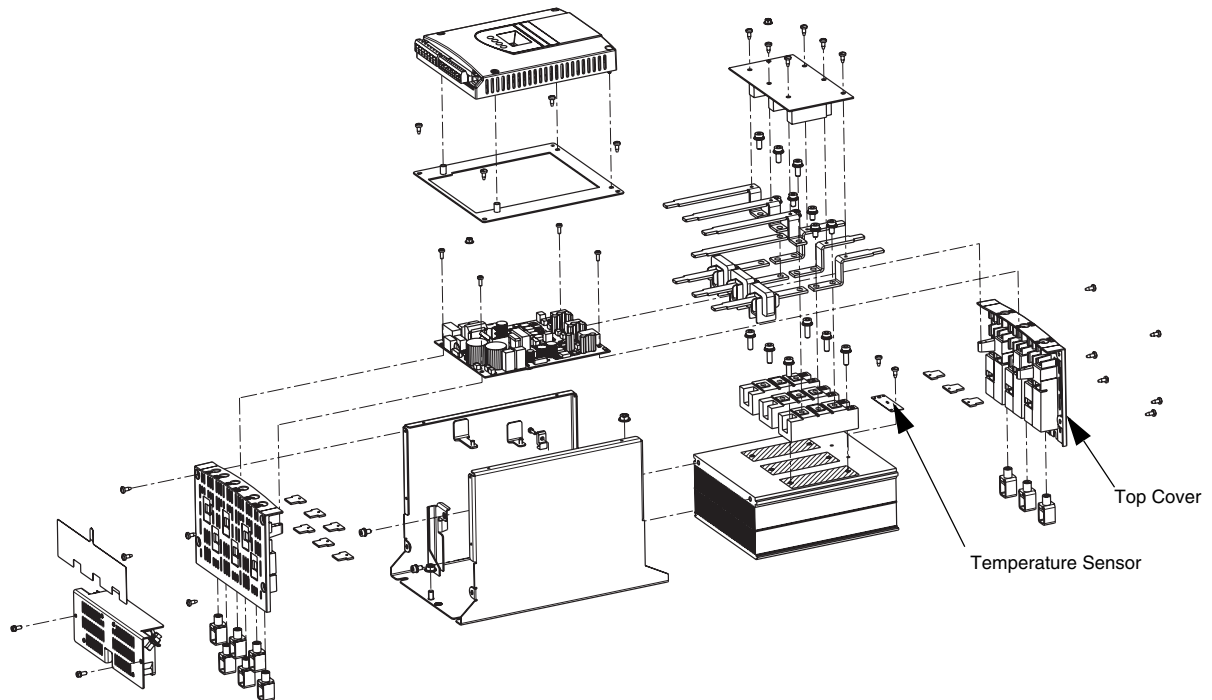
1. Using rubbing alcohol and a cloth, clean the area of heatsink where the new temperature sensor will be installed.
2. Apply a light film of silicone-free thermal grease (Schneider Electric's thermal grease part number 1LUB004010 or equivalent) to the heatsink where the temperature sensor will be attached.
3. Install the temperature sensor with the wires pointing toward the top of the soft start. Secure the temperature sensor with the screws removed in Step 4 above and torque the screws to 18 lb-in (2 N•m).
4. Reinstall the soft start's top cover. The cover's power connections should be below the upper bus bars. Secure the cover with the six screws removed in Step 3 of the removal process. Torque the screws to 18 lb-in (2 N•m).
5. Reinstall the three upper bus bar screws removed in Step 2 of the removal process. Torque the three screws to 18 lb-in (2 N•m).
6. Reinstall the control board assembly and the power board.

REPLACEMENT PROCEDURES FOR FRAME SIZE B

ATS48D62Y, ATS48D75Y, ATS48D88Y,
AND ATS48C11Y

This section contains common parts replacement procedures for Frame Size B (ATS48D62Y, ATS48D75Y, ATS48D88Y, and ATS48C11Y) ATS48 soft starts.

Figure 11: Exploded View of Frame Size B



Power Board Replacement

ATS48D62Y, ATS48D75Y, ATS48D88Y, and
ATS48C11Y

Removing the Power Board

To remove the power board:

1. Remove the control board assembly. See the procedure on page 25.
NOTE: The cables are not individually labeled. Make a note of where the eleven cables are connected on both the control board and the power board prior to disassembly. When removing the cables, pull on the cable connectors, not on the individual wires.
2. Remove the four screws securing the control board support frame to the soft start chassis. Remove the control board support frame.
3. Disconnect the eleven cables from the power board.
4. Remove the four screws and one nut securing the power board, and remove the board from the soft start. See Figure 13.

Figure 12: Power Board - Bottom

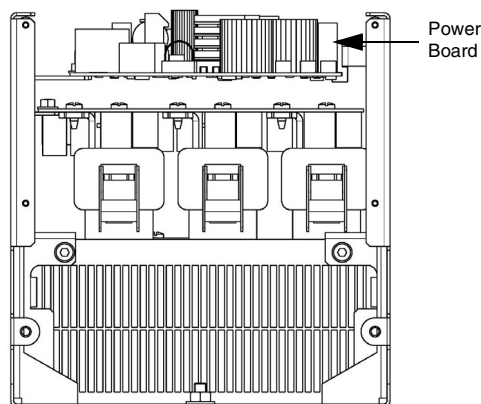
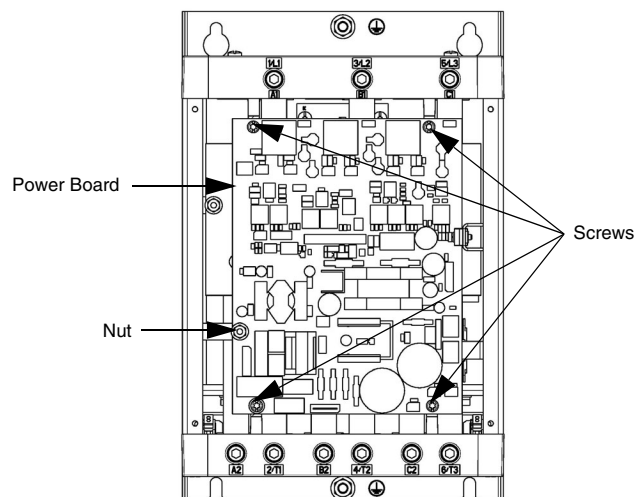


Figure 13: Power Board - Overview



Installing the Power Board

To install the power board:

1. Place the power board in the correct position within the soft start. Connectors J12 through J31 should be positioned nearest the L1/2/3 terminals of the soft start. The board slides into the black plastic holder on the right panel of the soft start.
2. Secure the power board to the soft start with the four screws and one nut removed in Step 4 of the removal procedure. See Figure 13. Torque the screws to 9 lb-in (1 N•m). Torque the nut to 18 lb-in (2 N•m).
3. Reconnect the eleven cables to the power board.
4. Reinstall the control board support frame onto the soft start chassis with the two control board support posts closest to the T1/2/3 terminals of the soft start. Secure the control board support frame with the four screws

removed in Step 2 of the removal procedure, and torque the screws to 18 lb-in (2 N•m).

5. Reinstall the control board assembly.

NOTE: When the power board is damaged, the entire assembly must be replaced. Any attempt to access, inspect, or repair the power board will void the product's warranty.

Filter Board Replacement

ATS48D62Y, ATS48D75Y, ATS48D88Y,
AND ATS48C11Y

Removing the Filter Board

To remove the filter board:

1. Remove the control board assembly (see the procedure on page 25) and the power board.
2. Remove the nut and six screws securing the filter board to the soft start. See Figure 15. Do not mix up these screws with those used for the power board.
3. Remove the filter board.

Figure 14: Filter Board - Bottom

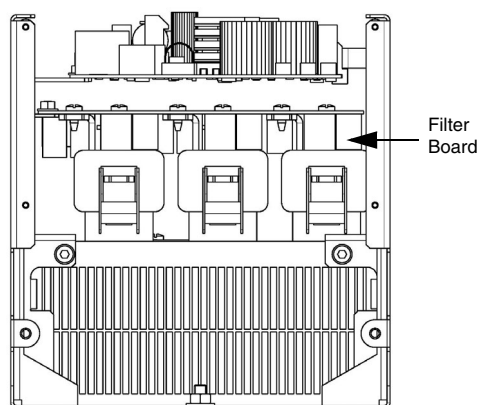
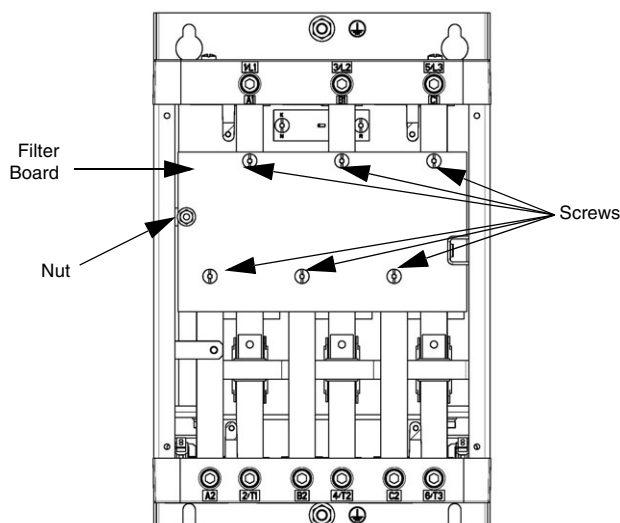


Figure 15: Filter Board - Overview



Installing the Filter Board

To install the filter board:

1. Place the filter board in the correct position within the soft start. The filter must be installed with the circuit components facing the heatsink of the soft start and with the L1, L2, and L3 terminals oriented toward the top of the soft start.
2. Secure the filter board with the six screws and one nut removed in Step 2 of the removal procedure. See Figure 15. Torque the screws to 18 lb-in (2 N•m).
3. Reinstall the power board and the control board assembly.

NOTE: When the filter board is damaged, the entire assembly must be replaced. Any attempt to access, inspect, or repair the filter board will void the product's warranty.

SCR Power Module Replacement

ATS48D62Y, ATS48D75Y, ATS48D88Y,
AND ATS48C11Y

Removing the SCR Power Module

To remove the SCR power module:

1. Remove the control board assembly (see the procedure on page 25), the power board, and the filter board.
2. Make a note of how the upper and lower bus bars are connected to the SCR to be replaced and what screws are used. Be sure to use the correct screws during re-assembly.
3. Remove the three screws securing the bus bars to the SCR. Do not mix up these screws with those already removed, and be sure to use the correct screws during reassembly. Remove the bus bars (loosen the input and output power terminal screws if not already done).
4. Remove the two screws securing the SCR to the heatsink. Save these screws for reassembly. Remove the SCR from the heatsink.
5. Make a note of how the control wires are connected to the SCR module. Disconnect the cables and attach them to the new SCR module.

NOTE: Pull on the connectors, not the cables. Improper connection will cause malfunction of the soft start.

Figure 16: SCR Power Module - Bottom

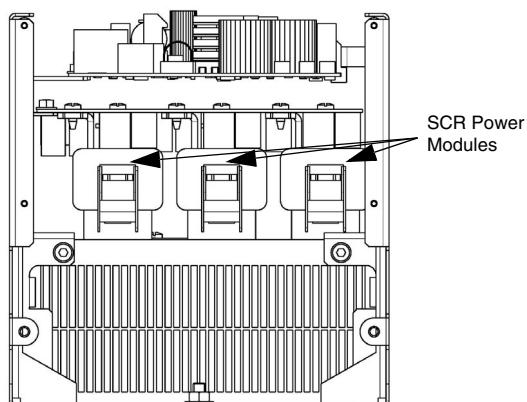
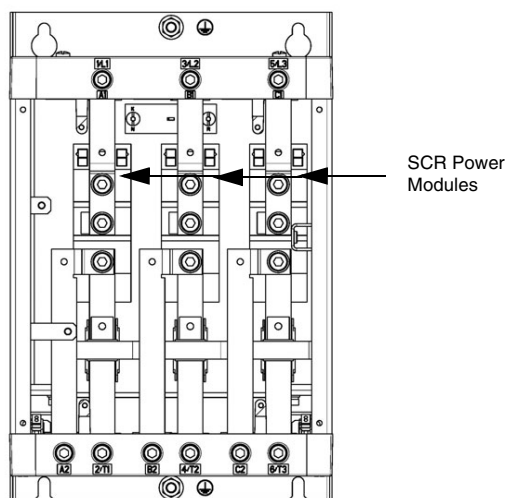


Figure 17: SCR Power Module - Overview



Installing the SCR Power Module

To install the SCR power module:

1. Using rubbing alcohol and a cloth, clean the area of heatsink where the new SCR power module will be installed.
2. Apply a light film of silicone-free thermal grease to the back of the SCR, *NOTE: Use Schneider Electric's thermal grease, part number 1LUB004010, or equivalent.*
3. Place the SCR on the heatsink aligned with two mounting holes and with the control wire connections closest to the incoming power terminals.
4. Using the screws removed in Step 4 (from the disassembly procedure), secure the SCR to the heatsink. Set both screws finger tight first before torquing them to 31 lb-in (3.5 N•m).

5. Reinstall the upper and lower bus bars. Torque the three SCR screws to 31 lb-in (3.5 N•m).
6. Reinstall the control board assembly, the power board, and the filter board.

Fan Assembly Replacement

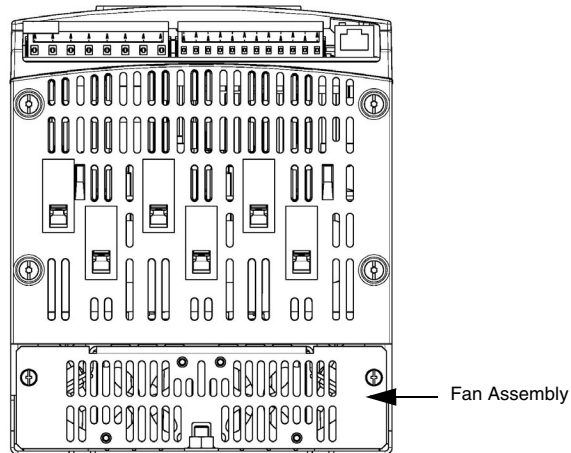
ATS48D62Y, ATS48D75Y, ATS48D88Y,
AND ATS48C11Y

Removing the Fan Assembly

To remove the fan assembly:

1. Loosen and remove the two screws securing the smaller of the two panels on the bottom of the soft start. See Figure 18.
The replacement fan assembly includes this smaller metal panel along with two fans.
2. While removing the fan assembly from the soft start, disconnect the two power supply cables.

Figure 18: Fan Assembly



Installing the Fan Assembly

To install the fan assembly:

1. Attach the two power supply cables to the new fan assembly and install them onto the bottom of the soft start.
2. Secure the fan assembly with the two screws removed in Step 1 of the removal procedure and torque the screws to 18 lb-in (2 N•m).

Temperature Sensor Replacement

ATS48D62Y, ATS48D75Y, ATS48D88Y,
AND ATS48C11Y

Removing the Temperature Sensor

To remove the temperature sensor:

1. Remove the control board assembly (see the procedure on page 25) and the power board.
2. Loosen six screws and remove the soft start's top cover. See Figure 11 on page 32.
3. Loosen two screws and remove the temperature sensor. See Figure 11 on page 32.

Installing the Temperature Sensor

To install the temperature sensor:

1. Using rubbing alcohol and a cloth, clean the area of heatsink where the new temperature sensor will be installed.
2. Apply a light film of silicone-free thermal grease to the heatsink where the temperature sensor will be attached

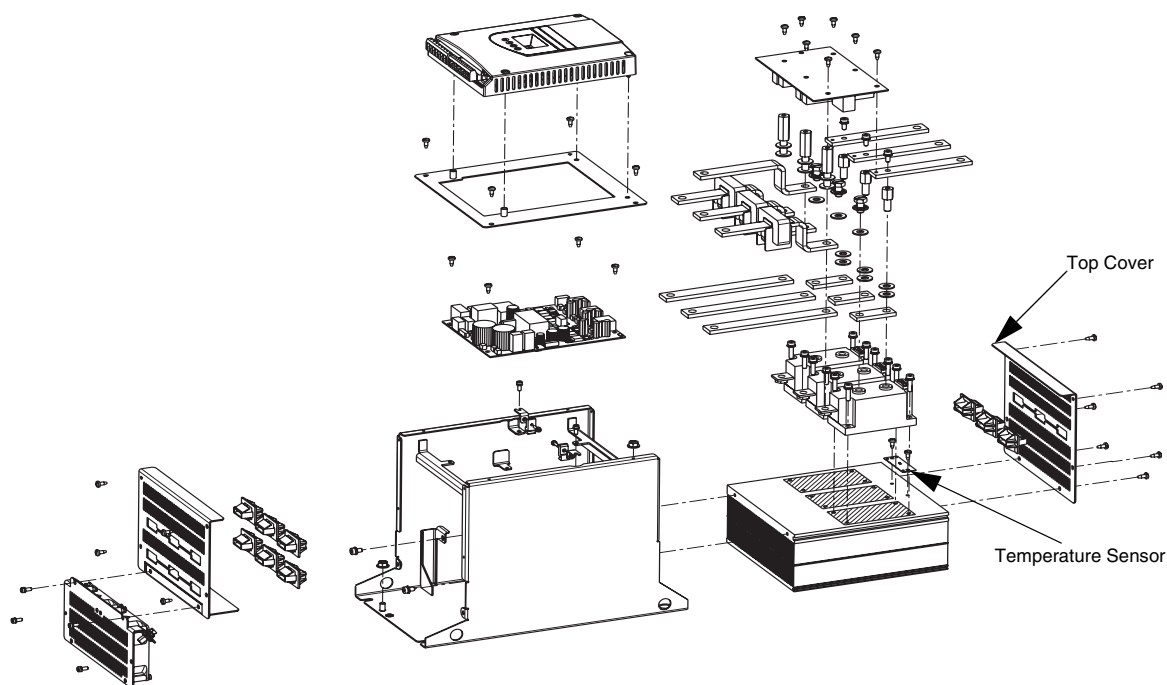
NOTE: Use Schneider Electric's thermal grease, part number 1LUB004010 or equivalent.

3. Install the temperature sensor with the wires pointing toward the top of the soft start. Secure it with the screws removed in Step 3 above. Torque the screws to 18 lb-in (2 N•m).
4. Reinstall the soft start's top cover. Secure the cover with the six screws removed in Step 2 of the removal process. Torque the screws to 18 lb-in (2 N•m).
5. Reinstall the control board assembly and the power board.

REPLACEMENT PROCEDURES FOR FRAME SIZE C ATS48C14Y AND ATS48C17Y

This section contains common parts replacement procedures for Frame Size C (ATS48C14Y and ATS48C17Y) ATS48 soft starts.

Figure 19: Exploded View of Frame Size C



Power Board Replacement ATS48C14Y and ATS48C17Y

Removing the Power Board

To remove the power board:

1. Remove the control board assembly. See the procedure on page 25.
2. Remove the four screws securing the control board support frame to the soft start chassis. Remove the frame.

NOTE: The cables are not individually labeled. Make a note of where the eleven cables are connected on both the control board and the power

board prior to disassembly. When removing the cables, pull on the cable connectors, not on the individual wires.

3. Disconnect the eleven cables from the power board.
4. Remove the four screws securing the power board. Loosen the screw securing the left-side power support bracket and remove the bracket.
5. Remove the board from the soft start. See Figure 21.

Figure 20: Power Board—Bottom

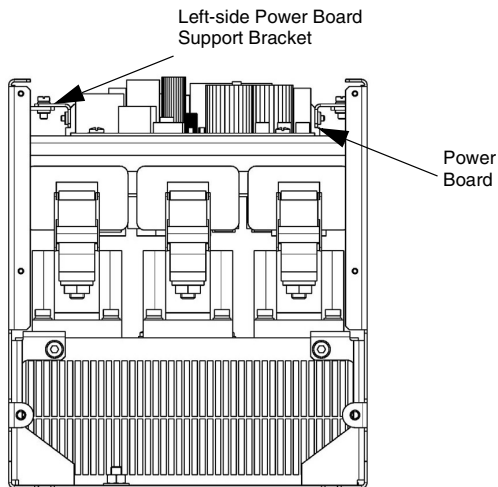
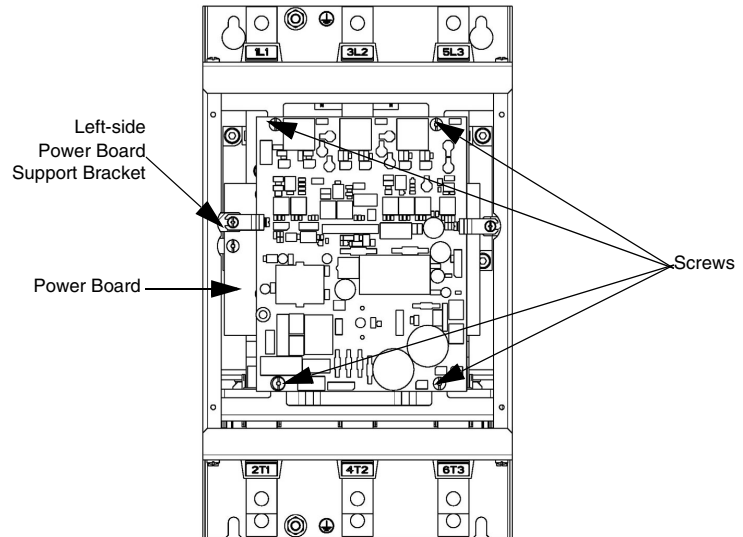


Figure 21: Power Board—Overview



Installing the Power Board

To install the power board:

1. Place the power board in the correct position within the soft start. Connectors J12 through J31 should be positioned nearest the L1/2/3 terminals of the soft start. The board slides into the black plastic holder on the right panel of the soft start.
2. Install the left-side power support bracket and secure it with the screw removed in Step 4 of the removal process. Torque the screw to 9 lb-in (1 N•m).
3. Secure the power board to the soft start with the four screws removed in Step 4 of the removal procedure. See Figure 21. Torque the screws to 13.5 lb-in (1.5 N•m).
4. Reconnect the eleven cables to the power board
5. Reinstall the control board support frame onto the soft start chassis on the two control board support posts closest to the T1/2/3 terminals of the soft start. Secure with the four screws removed in Step 2 of the removal procedure and torque the screws to 13.5 lb-in (1.5 N•m).
6. Reinstall the control board assembly.

NOTE: When the power board is damaged, the entire assembly must be replaced. Any attempt to access, inspect, or repair the power board will void the product's warranty.

Filter Board Replacement

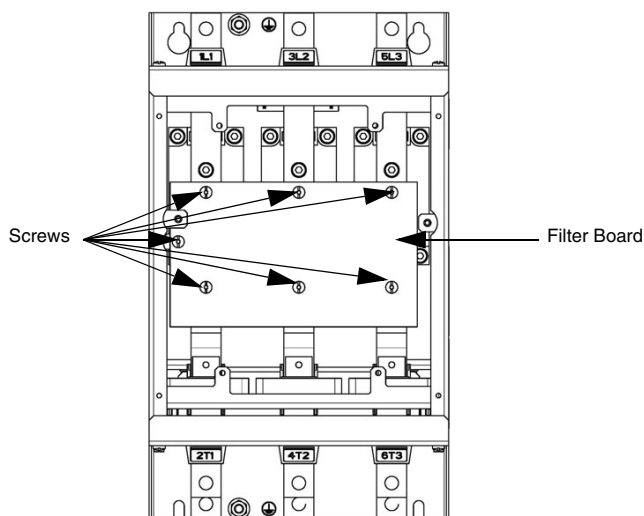
ATS48C14Y and ATS48C17Y

Removing the Filter Board

To remove the filter board:

1. Remove the control board assembly (see the procedure on page 25) and the power board.
2. Remove the seven screws securing the filter board to the soft start. See Figure 22. Do not mix up these screws with those used for the power board.
3. Remove the filter board.

Figure 22: Filter Board Replacement



Installing the Filter Board

To install the filter board:

1. Position the filter board correctly with the soft start. The filter board must be installed with the circuit components facing the heatsink of the soft start and with the L1, L2, and L3 terminals oriented toward the top of the soft start.
2. Secure the filter board with the seven screws removed in Step 2 of the removal procedure. See Figure 22. Torque the screws to 13.5 lb-in (1.5 N•m).
3. Reinstall the power board and the control board assembly.

NOTE: When the filter board is damaged, the entire assembly must be replaced. Any attempt to access, inspect, or repair the filter board will void the product's warranty.

SCR Power Module Replacement

ATS48C14Y and ATS48C17Y

Removing the SCR Power Module

To remove the SCR power module:

1. Remove the control board assembly (see the procedure on page 25), the power board, and the filter board.
2. Make a note of how the upper and lower bus bars are connected to the SCR to be replaced, and what screws and studs are used. Be sure to use the correct screws and studs during reassembly.

3. Remove the screw securing the line-side bus bar to the SCR being replaced. Remove the bus bar.
4. Remove the stud and bolt securing the link spanning two of the SCR power connections. Remove the link.
5. Remove the stud securing the two load-side bus bars to the SCR being replaced. Remove the two bus bars.
6. Remove the four screws securing the SCR to the heatsink. Save these screws for reassembly. Remove the SCR from the heatsink.
7. Make a note of how the four control wires are connected to the SCR module. Disconnect the cables and attach them to the new SCR module.

NOTE: When removing the cables, pull on the cable connectors, not on the individual wires. Improper connection will cause the soft start to malfunction.

Figure 23: SCR Power Module - bottom

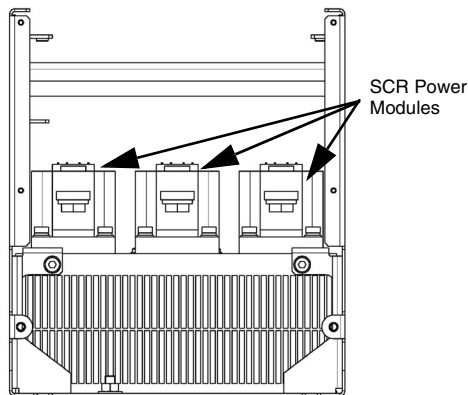
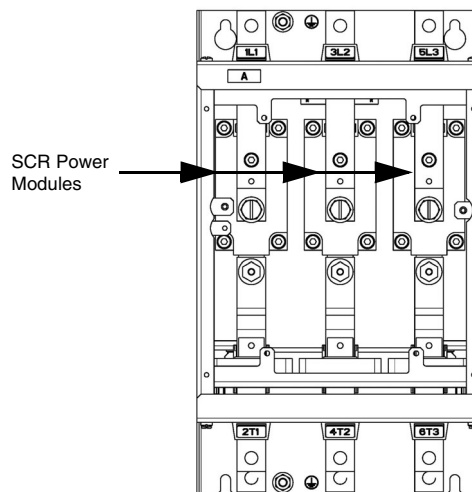


Figure 24: SCR Power Module - overview



Installing the SCR Power Module

To install the SCR power module:

1. Using rubbing alcohol and a cloth, clean the area of heatsink where the new SCR power module will be installed.
2. Apply a light film of silicone-free thermal grease (Schneider Electric's thermal grease part number 1LUB004010 or equivalent) to the back of the SCR.
3. Place the SCR on the heatsink aligned with four mounting holes and with the control wire connections closest to the incoming power terminals.
4. Using the four screws removed in Step 6 of the disassembly procedure, secure the SCR to the heatsink. Finger-tighten the screws before torquing them to 22 lb-in (2.5 N•m).
5. Reinstall the link removed in Step 4 of the disassembly procedure and secure it with a screw and stud. Torque the screw and stud to 89 lb-in (10 N•m).
6. Reinstall the line-side bus bar removed in Step 3 of the disassembly procedure and secure it with the corresponding screw. Torque the screw to 22 lb-in (2.5 N•m).

7. Reinstall the two load-side bus bars removed in Step 5 of disassembly procedure and secure with the corresponding stud. Torque the screw to 89 lb-in (10 N•m).
8. Reinstall the control board assembly, the power board, and the filter board.

Fan Assembly Replacement

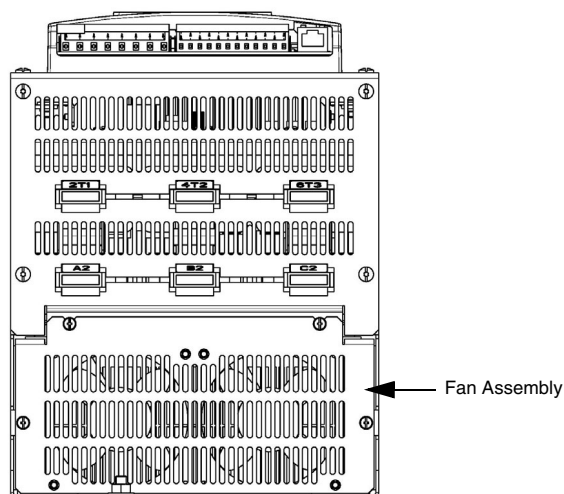
ATS48C14Y and ATS48C17Y

Removing the Fan Assembly

To remove the fan assembly:

1. Loosen and remove the four screws securing the smaller of the two panels on the bottom of the soft start. See Figure 25.
The replacement fan assembly includes this metal panel along with two fans.
2. While removing the fan assembly from the soft start, disconnect the two power supply cables.

Figure 25: Fan Assembly



Installing the Fan Assembly

To install the fan assembly:

1. Attach the two power supply cables to the new fan assembly. Install the fan assembly onto the bottom of the soft start.
2. Secure the fan assembly with the four screws removed in Step 1 of the removal procedure and torque the screws to 13.5 lb-in (1.5 N•m).

Temperature Sensor Replacement

ATS48C14Y and ATS48C17Y

Removing the Temperature Sensor

To remove the temperature sensor:

1. Remove the control board assembly. See the procedure on page 25.
2. Disconnect the temperature sensor wire from connector J7 on the power board.
3. Loosen six screws and remove the soft start's top cover. See Figure 19 on page 37.
4. Loosen two screws and remove the temperature sensor. See Figure 19.

Installing the Temperature Sensor

To install the temperature sensor:

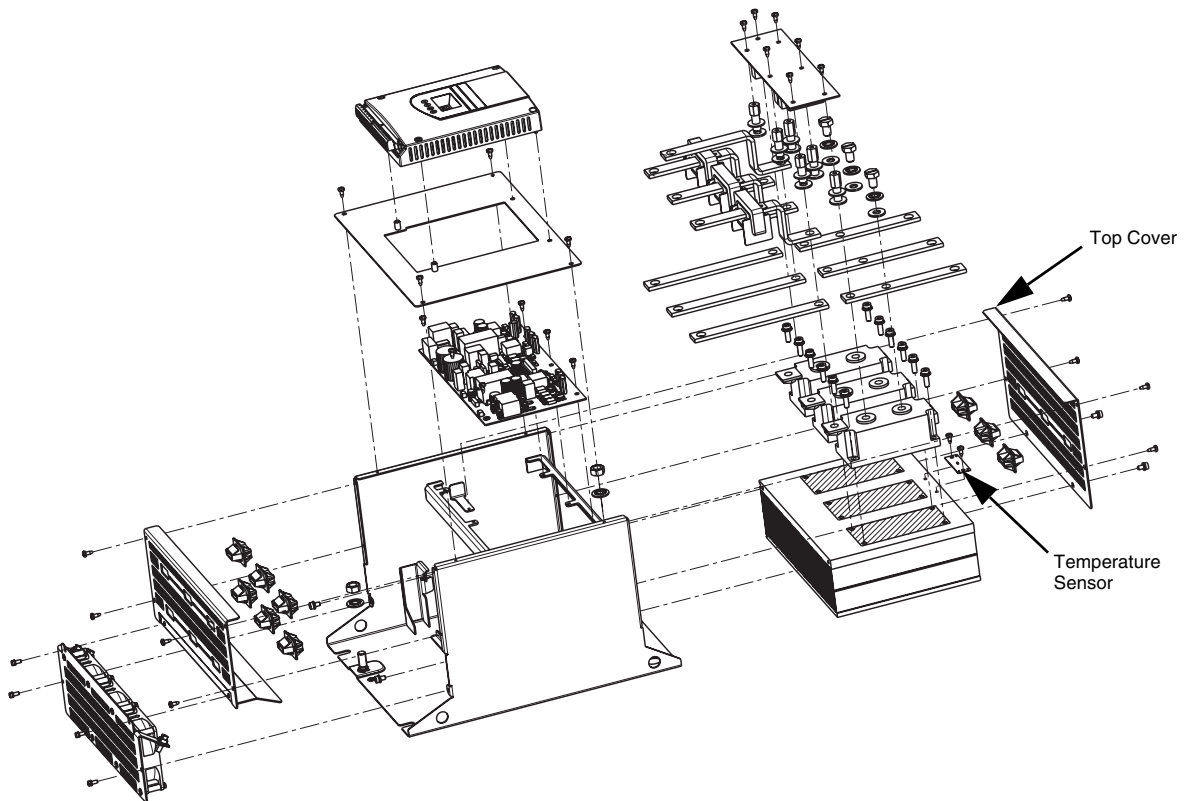
1. Using rubbing alcohol and a cloth, clean the area of heatsink where the new temperature sensor will be installed.
2. Apply a light film of silicone-free thermal grease (Schneider Electric's thermal grease part number 1LUB004010 or equivalent) to the heatsink where the temperature sensor will be attached.
3. Install the temperature sensor with the wires pointing toward the top of the soft start. Secure with the screws removed in Step 4 of the removal procedure. Torque to 13.5 lb-in (1.5 N•m).
4. Route the temperature sensor wire up to the power board and plug it into J7.
5. Reinstall the soft start's top cover. Make sure that the three bus bars are inserted through the black plastic guides in the cover. Secure the cover with the six screws removed in Step 3 of the removal process. Torque the screws to 13.5 lb-in (1.5 N•m).
6. Reinstall the control board assembly.

REPLACEMENT PROCEDURES FOR FRAME SIZE D

ATS48C21Y, ATS48C25Y, AND
ATS48C32Y

This section contains common parts replacement procedures for Frame Size D (ATS48C21Y, ATS48C25Y, and ATS48C32Y) ATS48 soft starts.

Figure 26: Exploded View of Frame Size D



Power Board Replacement

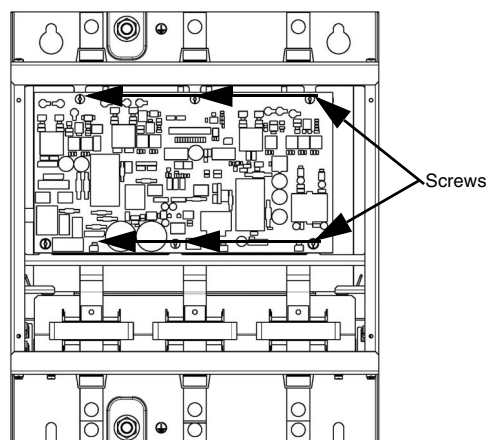
ATS48C21Y, ATS48C25Y, and
ATS48C32Y

Removing the Power Board

To remove the power board:

1. Remove the control board assembly. See the procedure on page 25.
NOTE: The cables are not individually labeled. Make a note of where the eleven cables are connected on both the control board and the power board prior to disassembly. When removing the cables, pull on the cable connectors, not on the individual wires.
2. Remove the four screws securing the control board support frame to the soft start chassis. Remove the frame.
3. Disconnect the eleven cables from the power board.
4. Remove the six screws securing the power board. Remove the board from the soft start. See Figure 27.

Figure 27: Power Board



Installing the Power Board

To install the power board:

1. Place the power board in the correct position within the soft start.
Connectors J12 through J31 should be positioned nearest the L1/2/3 terminals of the soft start.
2. Secure the power board to the soft start with six screws. See Figure 27.
Torque the screws to 18 lb-in (2 N•m).
3. Reconnect the eleven cables to the power board.
4. Reinstall the control board support frame onto the soft start chassis with the two control board support posts closest to the T1/2/3 terminals of the soft start. Secure with the four screws removed in Step 2 of the disassembly procedure and torque the screws to 18 lb-in (2 N•m).
5. Reinstall the control board assembly.

NOTE: When the power board is damaged, the entire assembly must be replaced. Any attempt to repair the power board will void the product's warranty.

Filter Board Replacement

ATS48C21Y, ATS48C25Y, and
ATS48C32Y

Removing the filter Board

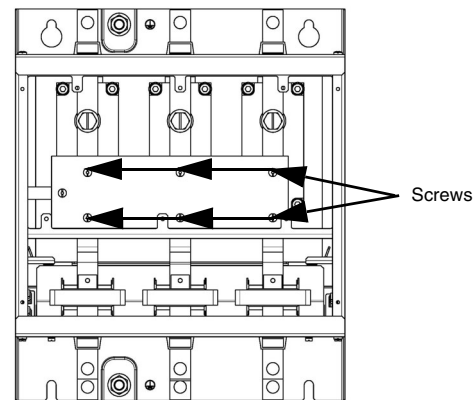
To remove the filter board:

1. Remove the control board assembly (see the procedure on page 25) and the power board.
2. Remove the seven screws securing the filter board to the soft start. See Figure 28.

NOTE: Do not mix up these screws with those used for the power board.

3. Remove the filter board.

Figure 28: Filter Board



Installing the Filter Board

To install the filter board:

1. Position the filter board correctly with the soft start. The filter board must be installed with the circuit components facing the heatsink of the soft start and with the L1, L2, and L3 terminals oriented toward the top of the soft start.
2. Secure the filter board with the seven screws removed in Step 1 of the removal procedure. See Figure 28. Torque the screws to 18 lb-in (2 N•m).
3. Reinstall the power board and the control board assembly.

NOTE: When the filter board is damaged, the entire assembly must be replaced. Any attempt to repair the filter board will void the product's warranty.

SCR Power Module Replacement

ATS48C21Y, ATS48C25Y, and
ATS48C32Y

Removing the SCR Power Module

To remove the SCR power module:

1. Remove the control board assembly (see the procedure on page 25), the power board, and the filter board.
2. Make a note of how the line-side and load-side bus bars are connected to the SCR to be replaced, and what screws and studs are used. Be sure to use the correct screws and studs during reassembly.
3. Remove the screw and stud securing the line-side bus bar to the SCR being replaced. Remove the bus bar.

4. Remove the stud securing the two load-side bus bars to the SCR being replaced. Remove the two bus bars.
5. Remove the four screws securing the SCR to the heatsink. Save these screws for reassembly. Remove the SCR from the heatsink.
6. Make a note of how the four control wires are connected to the SCR module. Disconnect the cables and attach to the new SCR module.

NOTE: When removing the cables, pull on the cable connectors, not on the individual wires. Improper connection will cause malfunction of the soft start.

Figure 29: SCR Power Module - Bottom

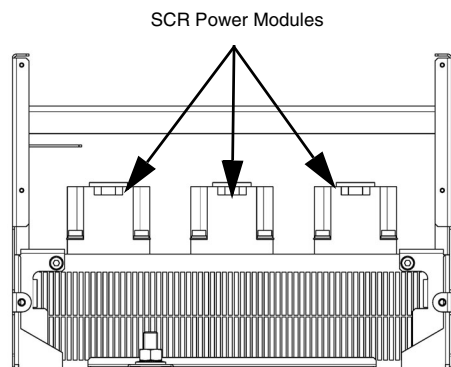
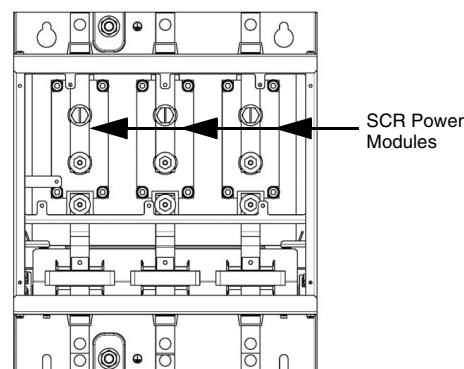


Figure 30: SCR Power Module - Overview



Installing the SCR Power Module

To install the SCR power module:

1. Using rubbing alcohol and a cloth, clean the area of heatsink where the new SCR power module will be installed.
2. Apply a light film of silicone-free thermal grease (Schneider Electric part number 1LUB004010 or equivalent) to the back of the SCR.
3. Place the SCR on the heatsink aligned with four mounting holes and with the control wire connections closest to the incoming power terminals.
4. Using the four screws removed in Step 5 of the disassembly procedure, secure the SCR to the heatsink. Set the screws finger tight before torquing them to 31 lb-in (3.5 N•m).
5. Reinstall the line-side bus bar removed in Step 3 of disassembly procedure and secure it with a screw and stud. Torque the screw and stud to 106 lb-in (12 N•m).
6. Reinstall the two-load side bus bars removed in Step 4 of the disassembly procedure and secure them with a stud. Torque the stud to 106 lb-in (12 N•m).
7. Reinstall the control board assembly, the power board, and the filter board.

Fan Assembly Replacement

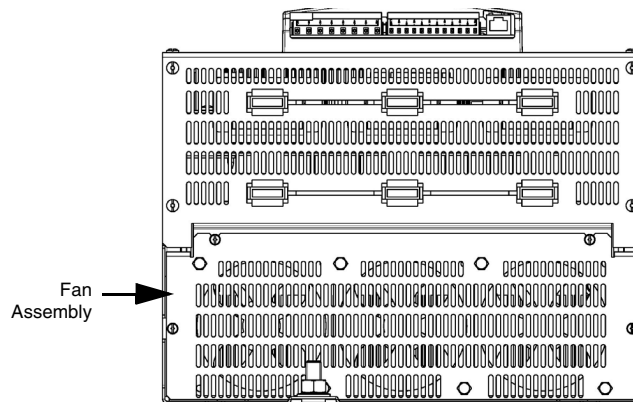
ATS48C21Y, ATS48C25Y, and
ATS48C32Y

Removing the Fan Assembly

To remove the fan assembly:

1. Loosen and remove the four screws securing the rear panel on the bottom of the soft start. See Figure 31.
The replacement fan assembly includes this metal panel along with three fans.
2. As the fan assembly is removed from the soft start, disconnect the three power supply cables.

Figure 31: Fan Assembly



Installing the Fan Assembly

To install the fan assembly:

1. Attach the three power supply cables to the new fan assembly. Install fan assembly onto the bottom of the soft start.
2. Secure the fan assembly with the four screws removed in Step 1 of the removal procedure and torque the screws to 18 lb-in (2 N•m).

Temperature Sensor Replacement

ATS48C21Y, ATS48C25Y, and
ATS48C32Y

Removing the Temperature Sensor

To remove the temperature sensor:

1. Loosen the six screws and remove the soft start's top cover. Make note of how it was positioned on the soft start. See Figure 26 page 42.
2. Disconnect the temperature sensor wire from connector J7 on the power board.
3. Loosen the two screws and remove the temperature sensor. Make a note of the routing of the temperature sensor wire from the heatsink to the power board. See Figure 26 on page 42.

Installing the Temperature Sensor

To install the temperature sensor:

1. Using rubbing alcohol and a cloth, clean the area of heatsink where the new temperature sensor will be installed.
2. Apply a light film of silicone-free thermal grease (Schneider Electric's part number 1LUB004010 or equivalent) to the heatsink where the temperature sensor will be attached.

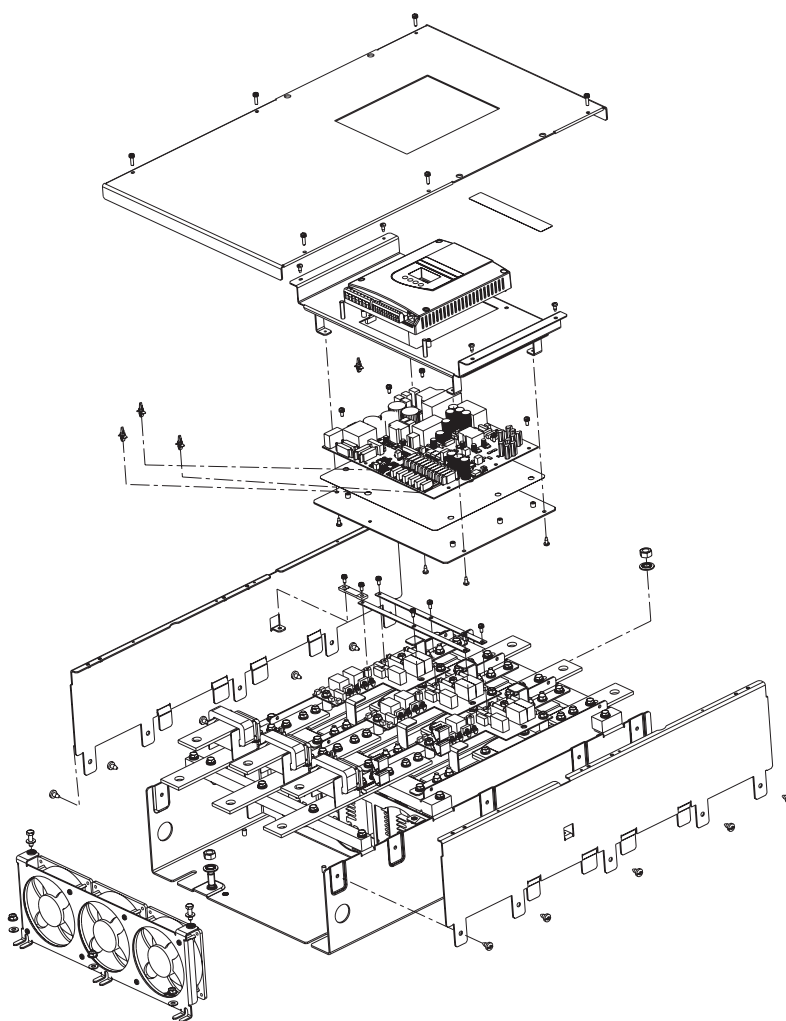
3. Install the temperature sensor with the wires pointing toward the top of the soft start. Secure it with the screws removed in Step 3 of the replacement instructions, and torque the screws to 18 lb-in (2 N•m).
4. Route the temperature sensor wire as noted in Step 3 of the replacement instructions, and plug it into J7 on the power board.
5. Reinstall the soft start's top cover aligned the same way as it was originally installed. Make sure the three bus bars are inserted through the black plastic guides in the cover. Secure the cover with the six screws removed in Step 1 of the disassembly process. Torque the screws to 22 lb-in (2.5 N•m).

REPLACEMENT PROCEDURES FOR FRAME SIZE E

ATS48C41Y, ATS48C48Y, ATS48C59Y,
AND ATS48C66Y

This section contains common parts replacement procedures for Frame Size E (ATS48C41Y, ATS48C48Y, ATS48C59Y, and ATS48C66Y) ATS48 soft starts.

Figure 32: Exploded View of Frame Size E



Power Board Replacement

ATS48C41Y, ATS48C48Y, ATS48C59Y,
and ATS48C66Y

Removing the Power Board

To remove the power board:

1. Remove the control board assembly. See the procedure on page 25.

NOTE: The cables are not individually labeled. Make a note of where the seven cables are connected on both the control board and the power board prior to disassembly. When removing the cables, pull on the cable connectors, not on the individual wires.

Frame Size E soft starts include three identical SCR power poles. As a result, there are three identical sets of cables that run from the power board to the firing boards on the SCR power modules.

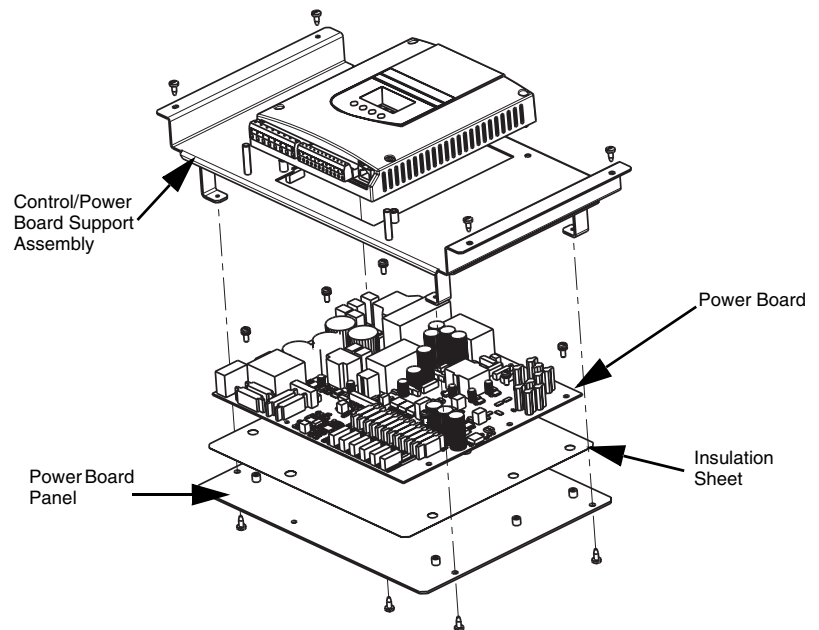
- The cables plugged into power board connectors J1 and J13 go the SCR firing board associated with the SCR power module in the 1L1 and 2T1 leg.
- The cables plugged into power board connectors J2 and J14 go the SCR firing board associated with the SCR power module in the 3L2 and 4T2 leg.
- The cables plugged into power board connectors J3 and J15 go the SCR firing board associated with the SCR power module in the 5L3 and 6T3 leg.

In addition, the cable plugged into J10 breaks out into three separate wire sets and are routed to the individual SCR firing board connectors.

2. Disconnect the seven cables from the power board.
3. Remove the four screws securing the control/power board support assembly to the soft start chassis. See Figure 33 on page 49.

4. Remove the four screws securing the power board panel to the control/power board support assembly. See Figure 33.

Figure 33: Control Board, Power Board, and Control/Power Board Support Assembly



5. Remove the six screws securing the power board to the power board panel. Using a pair of needle-nose pliers, release the three plastic board supports on the power board side. Remove the power board. Make sure that the insulation sheet remains secured to the power board panel by the plastic board supports. See Figure 33.

Installing the Power Board

To install the power board:

1. Make sure that the insulation sheet is in place on the power board panel and secured by the three plastic board supports. Snap the power board onto the three plastic board supports. Secure the power board to the power board panel with the six screws removed in Step 5 of the disassembly procedure. Torque the screws to 18 lb-in (2 N•m).
2. Attach the power board panel to the control/power board support assembly and secure with the four screws removed in Step 4 of the removal process. The component side of the power board should be inside the assembly with connectors J1 to J3 oriented nearest the control board support posts. Torque the screws to 18 lb-in (2 N•m). See Figure 33.
3. Assemble the control/power board support assembly back onto the soft start chassis with connectors J1 to J3 oriented nearest the load-side power terminals. See Figure 33. Secure with the four screws removed in Step 3 of the disassembly procedure. Torque the screws to 18 lb-in (2 N•m).
4. Reconnect the seven cables to the power board.
5. Reinstall the control board assembly.

NOTE: When the power board is damaged, the entire assembly must be replaced. Any attempt to repair the power board will void the product's warranty.

SCR Firing Board Replacement

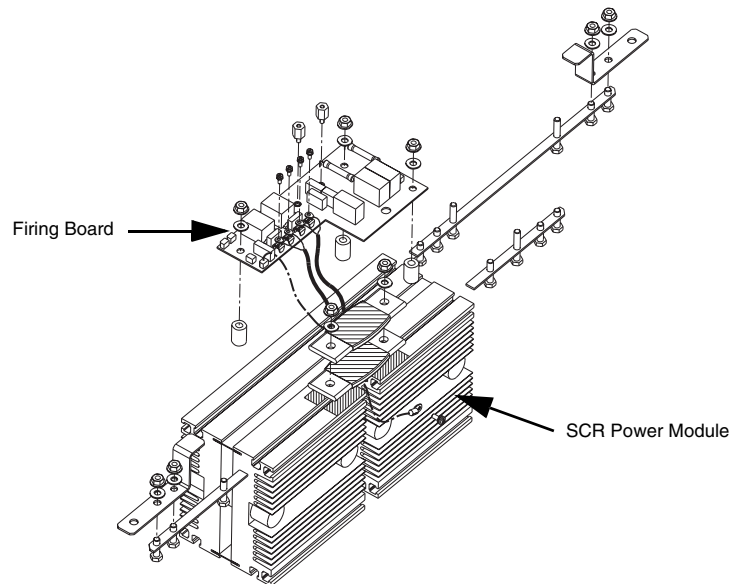
ATS48C41Y, ATS48C48Y, ATS48C59Y,
and ATS48C66Y

Removing the SCR Firing Board

To remove the SCR firing board:

1. Remove the control board assembly (see the procedure on page 25) and the power board.
2. Remove the six screws securing the two bus bars linking the three SCR firing boards. Remove the two bus bars.
3. Remove the following ten cables/wires from the SCR firing board.
NOTE: The cables are not individually labeled. Make a note of where the ten cables are connected on both the SCR firing board and the power board prior to disassembly. When removing the cables, pull on the cable connectors, not on the individual wires.
 - The J1 cable goes to either J1, J2, or J3 on the power board.
 - The J2 cable goes to the temperature sensor on the SCR power module.
 - The J3 cable goes to current sensor on the load-side bus bar.
 - The J4 cable joins the J4 cables from the other two SCR firing boards and plugs into J10 on the power board.
 - The J5 cable goes to the SCR power module fan.
 - The J6 cable goes to either J13, J14, or J15 on the power board.
 - Cables J7, J8, J9, and J10 are SCR gating leads. Make a clear note of how these are connected. Improper connection will cause malfunction of the soft start.
4. Remove the 3 nuts and washers that secure the SCR firing board to the SCR power module. See Figure 34. Remove the SCR firing board.

Figure 34: SCR Power Module and Firing Board



Installing the SCR Firing Board

To install the SCR firing board:

1. Install the SCR firing board onto the three bolts projecting up from the SCR power module. See Figure 34. Make sure that there is a spacer on

each bolt. Secure the SCR firing board with three nuts and washers and torque them to 31 lb-in (3.5 N•m).

2. Reconnect the four SCR gating wires to screw terminals J7, J8, J9, and J10. Torque the four screws to 9 lb-in (1 N•m).

NOTE: The gating wire connected to J8 is electrically connected directly to the line-side power terminal. The gating wire connected to J7 is associated with the same SCR as J8. The gating wire connected to J10 is electrically connected directly to the load-side power terminal. The gating wire connected to J9 is associated with the same SCR as J10. Verify these connections with an ohmmeter. Improper connection will cause the soft start to malfunction.

3. Make the following cable connections onto the SCR firing board:
 - J1 - eight conductor cable harness that plugs into either J1, J2, or J3 on the power board
 - J2 - two conductor cable for the SCR temperature sensor
 - J3 - two conductor cable for current sensor
 - J4 - two conductor cable that joins cable harness that plugs into J10 on the power board
 - J5 - two conductor cable for the SCR power module fan.
 - J6 - two conductor cable that plugs into either J13, J14, or J15 on the power board
4. Install the two bus bars to link the three SCR firing boards. Make sure that the braided grounding strap from the left side panel is attached to the bus bar at the SCR firing board on the L1/T1 phase. Secure with the six screws removed in Step 2 of the disassembly procedure. Torque the screws to 18 lb-in (2 N•m).
5. Reinstall the control board assembly and the power board.

NOTE: When the SCR firing board is damaged, the entire assembly must be replaced. Any attempt to repair the SCR firing board will void the product's warranty.

SCR Power Module Replacement

ATS48C41Y, ATS48C48Y, ATS48C59Y,
and ATS48C66Y

The SCR power module is supplied as a pre-torqued assembly including the two back-to-back SCR hockey pucks, the heatsink assemblies, the gating wires, and a temperature sensor. Overhaul of the SCR power module requires tools and instructions not available for field repair.

CAUTION

EQUIPMENT DAMAGE

Do not disassemble the SCR power module.

Failure to follow this instruction can result in equipment damage.

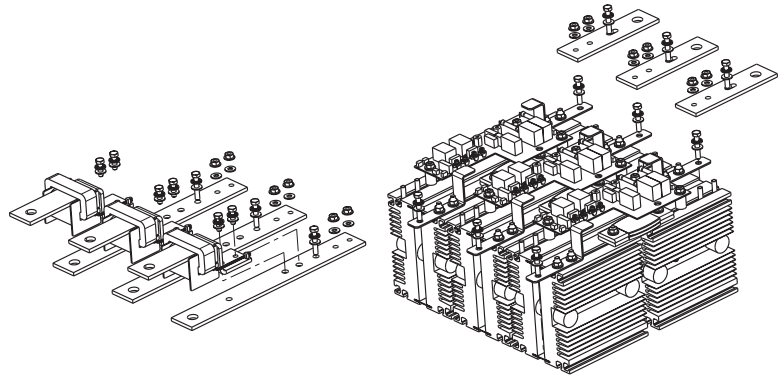
Removing the SCR Power Module

To remove the SCR power module:

1. Remove the control board assembly (see the procedure on page 25), the power board, and the SCR firing board in the motor phase that is being repaired.
2. Remove the cable tie securing the wires from the current sensor and the fan.

3. Remove the five screws that secure the SCR power module to the soft start chassis. Using the two lift handles, remove the SCR power module from the soft start.
4. Loosen and remove the nuts and washers securing the line-side bus bar and the load-side bus bar assembly (including current transformer) to the SCR power module. See Figure 35. Remove the bus bars.

Figure 35: SCR Power Modules and Bus Bars



Installing the SCR Power Module

To install the SCR power module:

1. Install the load-side bus bar assembly (including the current sensor) to the two bolts protruding from the top of the side of the SCR power module with one large heatsink. See Figure 35. Secure the bus bar assembly with the nuts and washers removed in Step 4 of the disassembly procedure. Torque the screws to 80 lb-in (9 N•m).
2. Install the line-side bus bar to the two bolts protruding from the top of the side of the SCR power module with two smaller heatsinks. See Figure 35. Secure the bus bar with the nuts and washers removed in Step 4 of the disassembly procedure. Torque the screws to 80 lb-in (9 N•m).
3. Using the two lift handles provided, install the SCR power module back into the soft start chassis. Secure the SCR power module with the five screws removed in Step 3 of the disassembly procedure. See Figure 35. Torque them to 80 lb-in (9 N•m).
4. Reinstall the SCR firing board. Wire-tie the current sensor and fan wire harnesses to the barrier panel.
5. Reinstall the control board assembly and the power board.

Temperature Sensor Replacement

ATS48C41Y, ATS48C48Y, ATS48C59Y,
and ATS48C66Y

Removing the Temperature Sensor

To remove the temperature sensor:

1. Remove the control board assembly (see the procedure on page 25), the power board, and the SCR firing board and SCR power module in the motor phase that is being repaired.
2. Remove the screw that secures the temperature sensor to the side of the SCR power module. Pull the temperature sensor out of the SCR power module.

Installing the Temperature Sensor

To install the temperature sensor:

1. Route the temperature sensor through the same channel occupied by the SCR gating wires. Secure the ring connector on the end of the temperature sensor to the SCR power module with the screw removed in Step 2 above. Torque the screw to 18 lb-in (2 N•m).
2. Reinstall the control board assembly, the power board, the SCR firing board, and the SCR power module.

Fan Assembly Replacement

ATS48C41Y, ATS48C48Y, ATS48C59Y,
and ATS48C79Y

Removing the Fan Assembly

To remove the fan assembly:

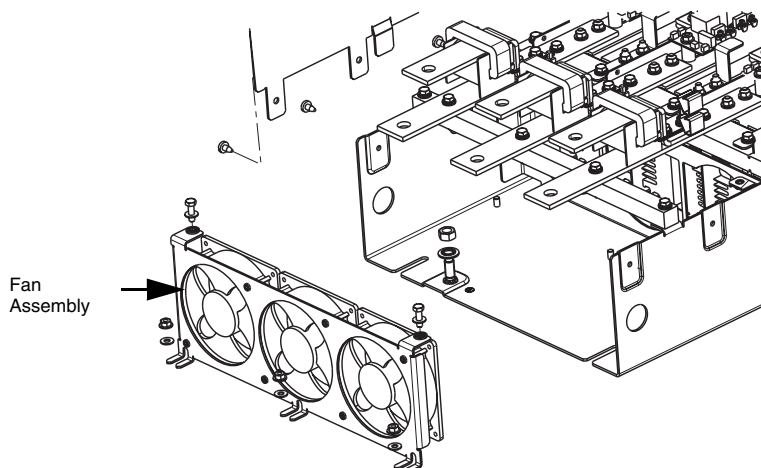
1. Remove the front cover of the soft start.
2. Remove the wire ties that secure the fan wire harnesses to the three barrier panel. Disconnect the fan wire harnesses from J5 on the three SCR firing boards.

NOTE: Pull on the connectors, not the cables.

3. Loosen and remove the 2 bolts and the 3 nuts that secure the fan assembly to the soft start. Remove the fan assembly.

NOTE: The replacement fan assembly includes a metal panel and three fans.

Figure 36: Fan Assembly



Installing the Fan Assembly

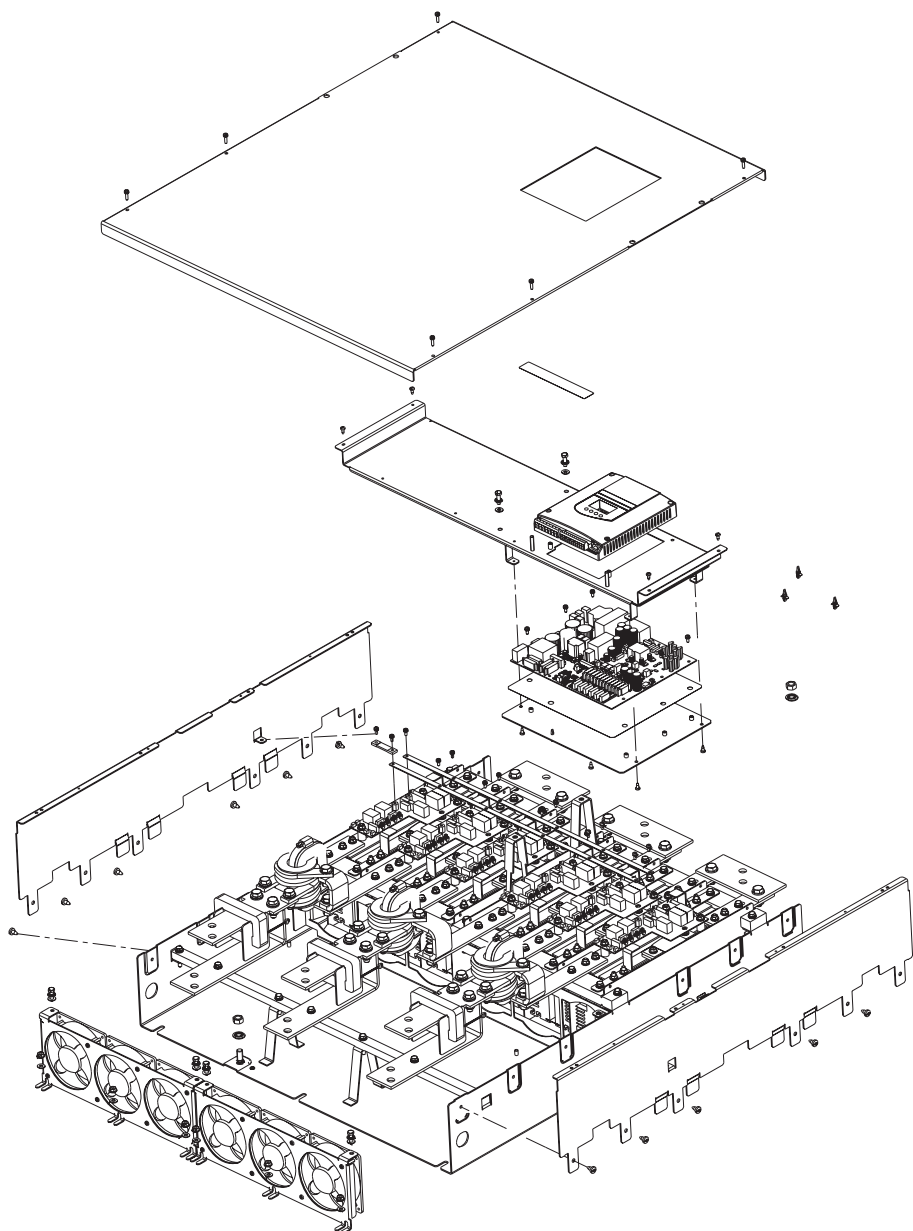
To install the fan assembly:

1. Install the replacement fan assembly into the soft start. Secure the fan assembly to the soft start with 2 bolts/washers and 3 nuts/washer. Torque the screws to 31 lb-in (3.5 N•m).
2. Connect the fan wire harnesses to J5 on the three SCR firing boards.
3. Wire-tie the current sensor and fan wire harnesses to the barrier panel.
4. Reinstall the front cover and torque the screws to 18 lb-in (2 N•m).

**REPLACEMENT PROCEDURES
FOR FRAME SIZE F**
ATS48C79Y, ATS48M10Y, AND
ATS48M12Y

This section contains common parts replacement procedures for Frame Size F (ATS48C79Y, ATS48M10Y, and ATS48M12Y) ATS48 soft starts.

Figure 37: Exploded View of Frame Size F



Power Board Replacement

ATS48C79Y, ATS48M10Y, and
ATS48M12Y

Removing the Power Board

To remove the power board:

1. Remove the control board assembly. See the procedure on page 25.
NOTE: Cables from the power board to other components inside the soft start are not individually labeled. Make a note of where the cables are connected to the power board prior to disassembly.

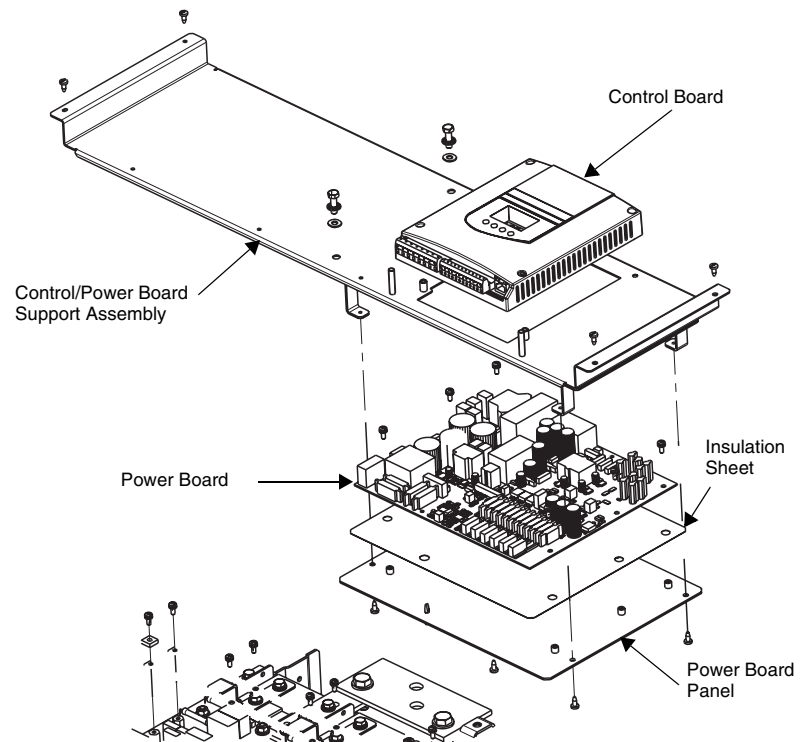
Frame size E soft starts include six identical SCR power poles (two power poles are paralleled for each motor phase). As a result, there are six sets of cables that run from the power board to the firing boards on the SCR power modules.

2. Use this table to determine the proper cable connections. In this table, the SCR firing boards are numbers 1–6 from left (L1/T1) to right (L3/T3):

From	To
Power Board, plug J7	Firing board 1: plug J1
Power Board, plug J1	Firing board 2: plug J1
Power Board, plug J8	Firing board 3: plug J1
Power Board, plug J2	Firing board 4: plug J1
Power Board, plug J9	Firing board 5: plug J1
Power Board, plug J3	Firing board 6: plug J1
Power Board, plug J13	Firing board 2: plug J6
Power Board, plug J14	Firing board 4: plug J6
Power Board, plug J15	Firing board 6: plug J6
Power Board, plug J10	Firing boards 1, 2, and 3: plug J4 (Prior to disassembly, note how cable is routed and connected to the SCR firing boards.)
Power Board, plug J11	Firing boards 4, 5, and 6: plug J4 (Prior to disassembly, note how cable is routed and connected to the SCR firing boards)

3. Disconnect the eleven cables from the power board.
NOTE: Pull on the cable connectors, not on the individual wires.
4. Remove the six screws securing the control/power board support assembly to the soft start chassis. Two of the screws are just to the left of the control board, and the other four are at the outer edges of the support panel. See Figure 37 on page 54.
5. Remove the four screws securing the power board panel to the control/power board support assembly. See Figure 37.

Figure 38: Control board, power board, and control/power board support assembly



6. Remove the six screws securing the power board to the power board panel, then:
 - a. Using a pair of needle-nose pliers, release the three plastic board supports on the power board side.
 - b. Remove the power board.
 - c. Make sure that the insulation sheet remains secured to the power board panel by the plastic board supports.

Installing the Power Board

To install the power board:

1. Make sure that the insulation sheet is in place on the power board panel and secured by the three plastic board supports, then:
 - a. Snap the power board onto the three plastic board supports.
 - b. Secure the power board to the power board panel with the six screws removed in Step 5 of the disassembly procedure.
 - c. Torque screws to 18 lb-in (2 N•m).
2. Attach the power board panel to the control/power board support assembly and secure with the four screws removed in Step 5 of the disassembly process on page 55. The component side of the power board should be inside the assembly with connectors J1 to J7 oriented nearest the control board support posts. See Figure 38. Torque the screws to 18 lb-in (2 N•m).

3. Assemble the control/power board support assembly back onto the soft start chassis with connectors J1 to J7 oriented nearest the load-side power terminals, then:
 - a. Secure with the six screws removed in Step 6 of the disassembly procedure page 55.
 - b. Torque the four outer screws to 18 lb-in (2 N•m).
 - c. Torque the two screws just to the left of the control board to 31 lb-in (3.5 N•m).
4. Reconnect the eleven cables to the power board.
5. Reinstall the control board assembly.

NOTE: When the power board is damaged, the entire assembly must be replaced. Any attempt to repair the power board will void the product's warranty.

SCR Firing Board Replacement

ATS48C79Y, ATS48M10Y, and
ATS48M12Y

Removing the SCR Firing Board

To remove the SCR firing board:

1. Remove the control board assembly (see the procedure on page 25) and the power board.
2. Remove the twelve screws securing the two bus bars linking the six SCR firing boards. Remove the two bus bars.
3. Remove the 8 to 10 cables/wires from the SCR firing board.

NOTE: Cables from the SCR firing board to other components inside the soft start are not individually labeled. Make a note of where the cables are connected to the SCR firing board prior to disassembly.

The SCR firing boards are numbered 1–6 from left (L1/T1) to right (L3/T3):

NOTE: Pull on the connectors, not the cables.

- a. The J1 cable goes to either J1, J2, J3, J7, J8 or J9 on the power board.
 - b. The J2 cable goes to the temperature sensor on the SCR power module.
 - c. The J3 cable on SCR firing boards 1, 3, and 5 go to the current sensor on their respective load-side bus bars. SCR firing boards 2, 4, and 6 do not have a cable plugged into J3.
 - d. The J4 cable joins J4 cables from two other SCR firing boards and plugs into J10 or J11 on the power board.
 - e. The J5 cable goes to the SCR power module fan.
 - f. If there is a J6 cable, it goes to either J13, J14, or J15 on the power board.
 - g. Cables J7, J8, J9, and J10 are SCR gating leads. Make a clear note of how these are connected. Improper connection will cause malfunction of the soft start.
4. Remove the 3 nuts and washers that secure the SCR firing board to the SCR power module, then remove the SCR firing board. See Figure 34 on page 50.

Installing the SCR Firing Board

To install the SCR firing board:

1. Install the SCR firing board onto the three bolts projecting up from the SCR power module. See Figure 34 on page 50. Make sure that there is a spacer on each bolt. Secure the SCR firing board with three nuts and washers and torque them to 31 lb-in (3.5 N•m).
2. Reconnect the four SCR gating wires to screw terminals J7, J8, J9, and J10. Torque the four screws to 9 lb-in (1 N•m).

NOTE: The gating wire connected to J8 is electrically connected directly to the line-side power terminal. The gating wire connected to J7 is associated with the same SCR as J8. The gating wire connected to J10 is electrically connected directly to the load-side power terminal. The gating wire connected to J9 is associated with the same SCR as J10. Verify these connections with an ohmmeter. Improper connection will cause malfunction of the soft start.

3. Make the following cable connections onto the SCR firing board:
 - J1 - eight conductor cable harness that plugs into either J1, J2, J3, J7, J8 or J9 on the power board
 - J2 - two conductor cable for the SCR temperature sensor
 - J3 (on SCR firing boards 1, 3, and 5) - two conductor cable for current sensor
 - J4 - two conductor cable that joins cable harness that plugs into either J10 or J11 on the power board
 - J5 - two conductor cable for the SCR power module fan.
 - J6 (on SCR firing boards 1, 3, and 5) - two conductor cable that plugs into either J13, J14, or J15 on the power board
4. Install the two bus bars linking the six SCR firing boards, then:
 - a. Make sure that the braided grounding strap from the left side panel is attached to the bus bar at the SCR firing board on the L1/T1 phase.
 - b. Secure with the twelve screws removed in the disassembly procedure.
 - c. Torque screws to 18 lb-in (2 N•m).
5. Reinstall the control board assembly and the power board.

NOTE: When the SCR firing board is damaged, the entire assembly must be replaced. Any attempt to repair the SCR firing board will void the product's warranty.

SCR Power Module Replacement ATS48C79Y, ATS48M10Y, and ATS48M12Y

The SCR power module is supplied as a pre-torqued assembly including the two back-to-back SCR hockey pucks, the heatsink assemblies, the gating wires, and a temperature sensor. Overhaul of the SCR power module requires tools and instructions not available for field repair.

NOTE: Do not disassemble the SCR power module.

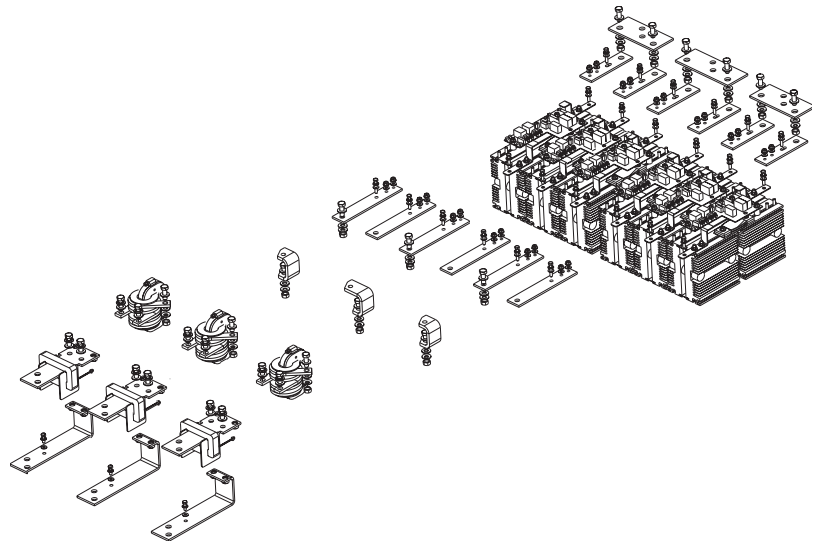
Removing the SCR Power Module

To remove the SCR power module:

1. Remove the control board assembly (see the procedure on page 25), and the power board, and the SCR firing board from the SCR power module that is being replaced.
2. Remove the cable tie securing the wires from the current sensor and the fan.
3. Loosen and remove the two bolts securing the balancing choke assembly to the load-side of the SCR power modules in the phase being repaired. See Figure 38 on page 56.

4. Loosen and remove the one bolt that secures the A2, B2, or C2 shorting contactor bus bar to the chassis of the soft start. See Figure 38.
5. Remove the assembly that includes the current transformer, the shorting contactor bus bar, the motor output bus bar and the balancing choke. See Figure 38.
6. Loosen and remove the two screws, nuts, and washers that secure the tie bar that joins the two line-side bus bars of the SCR power modules in the phase being repaired. Remove this tie bar. See Figure 38 on page 56.
7. Remove the four screws securing the SCR power module to the soft start chassis. See Figure 38 on page 56. Using the two lift handles provided, remove the SCR power module from the soft start.
8. Loosen and remove the nuts and washers securing the line-side and load-side bus bars to the SCR power module. See Figure 38 on page 56. Remove the bus bars.

Figure 39: SCR power module and bus bars



Installing the SCR Power Module

To install the SCR power module:

1. Install the load-side bus bar assembly to the two bolts protruding from the top of the side of the SCR power module with one large heatsink. See Figure 38 on page 56. Secure the bus bar assembly with the nuts and washers removed in Step 8 of the disassembly procedure. Torque to 80 lb-in (9 N•m).
2. Install the line-side bus bar to the two bolts protruding from the top of the side of the SCR power module with two smaller heatsinks. See Figure 38 on page 56. Secure the bus bar with the nuts and washers removed in Step 8 of the disassembly procedure. Torque to 80 lb-in (9 N•m).
3. Using the two lift handles provided, install the SCR power module back into the soft start chassis. Secure the SCR power module with the four (4) screws removed in Step 7 of the disassembly procedure. See Figure 38 on page 56. Torque them to 80 lb-in (9 N•m).
4. Reinstall the tie bar onto the two line-side bus bars of the SCR power modules in the phase being repaired. Use the screws, nuts and washers removed in Step 6 of the removal procedure. See Figure 38 on page 56. Torque them to 354 lb-in (40 N•m).

5. Reinstall the assembly that includes the current transformer, the shorting contactor bus bar, the motor output bus bar and the balancing choke. Install it onto the load-side of the SCR power modules in the phase being repaired. See Figure 38 on page 56. Using the two bolts removed in Step 3 of the removal procedure, secure the balancing choke assembly to the SCR power module load-side bus bars. Torque them to 354 lb-in (40 N•m).
6. Secure the shorting contactor bus bar to the soft start chassis using the bolt removed in Step 4 of the removal procedure. Torque it to 31 lb-in (3.5 N•m).
7. Reinstall the SCR firing board. Wire-tie the current sensor and fan wire harnesses to the barrier panel.
8. Reinstall the control board assembly and the power board.

Temperature Sensor Replacement

ATS48C79Y, ATS48M10Y, and
ATS48M12Y

Removing the Temperature Sensor

To remove the temperature sensor:

1. Remove the control board assembly (see the procedure on page 25), the power board, and the SCR firing board and SCR power module in the motor phase that is being repaired.
2. Remove the screw that secures the temperature sensor to the side of the SCR power module. Pull the temperature sensor out of the SCR power module.

Installing the Temperature Sensor

To install the temperature sensor:

1. Route the temperature sensor through the same channel occupied by the SCR gating wires. Secure the ring connector on the end of the temperature sensor to the SCR power module with the screw removed in Step 2 above. Torque the screw to 18 lb-in (2 N•m).
2. Reinstall the control board assembly, the power board, the SCR firing board, and the SCR power module.

Fan Assembly Replacement

ATS48C79Y, ATS48M10Y, and
ATS48M12Y

Removing the Fan Assembly

To remove fan assembly:

1. Remove the front cover of the soft start.
2. If you are removing the left-side fan assembly, follow these Steps:
 - a. Disconnect the fan wires and the current transformer wires from the four SCR firing boards in the L1-T1 and the L2-T2 phases. Remove the wire ties that secure these wire harnesses.
 - b. Loosen and remove the two bolts that secure the A2 and B2 shorting contactor bus bar to the chassis of the soft start. See Figure 38 on page 56.
 - c. Loosen and remove the four bolts and eight nuts that secure the four bus bars connecting the left-most SCR power modules to the balancing choke assemblies in the L1-T1 and L2-T2 phases. See Figure 38.

- d. Remove the two left-side load-side bus bar assemblies, assemblies that include the current transformer, the shorting contactor bus bar, the motor output bus bar and the balancing choke. See Figure 38 on page 56.
 - e. Loosen and remove the two bolts and three nuts that secure the fan assembly. Remove the fan assembly.
3. If you are removing the right-side fan assembly, follow these steps:
- a. Disconnect the fan wires and the current transformer wires from the four SCR firing boards in the L2-T2 and the L3-T3 phases. Remove the wire ties that secure these wire harnesses.
 - b. Loosen and remove the two bolts that secure the B2 and C2 shorting contactor bus bar to the chassis of the soft start. See Figure 38 on page 56.
 - c. Loosen and remove the four bolts and eight nuts that secure the four bus bars connecting the right-most SCR power modules to the balancing choke assemblies in the L2-T2 and L3-T3 phases. See Figure 38.
 - d. Remove the two right-side load-side bus bar assemblies, assemblies that include the current transformer, the shorting contactor bus bar, the motor output bus bar and the balancing choke. See Figure 38 on page 56.
 - e. Loosen and remove the two bolts and three nuts that secure the fan assembly. Remove the fan assembly.

Installing the Fan Assembly

To install the fan assembly:

1. Install the replacement fan assembly into the soft start. Secure the fan assembly to the soft start with 2 bolts/washers and 3 nuts/washer removed in Step 2.3 or 3.e of the disassembly procedure. Torque to 31 lb-in (3.5 N•m).
2. Reinstall the load-side bar assemblies. See Figure 38 on page 56.
3. Secure the load-side bus assemblies to the four SCR power modules using the four bolts/washers and 8 nuts/washers removed in Step C of the removal procedure. See Figure 38 on page 56. Torque to 80 lb-in (9 N•m).
4. Reinstall the two bolts that secure the shorting contactor bus bars to the soft start chassis. Torque to 31 lb-in (3.5 N•m).
5. Reconnect the fan wires and the current transformer wires to the four SCR firing boards. Secure the wires with wire ties.
6. Reinstall the front cover of the soft start.

Altistart® 48 Soft Starts Maintenance and Repair Guide
Instruction Bulletin

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