

Troubleshooting

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Introduction

Qualified Persons

WARNING

The equipment covered by this publication must be installed, operated, and maintained by qualified persons who are knowledgeable in the installation, operation, and maintenance of overhead electric power distribution equipment along with the associated hazards.

A qualified person is one who is trained and competent in:

- The skills and techniques necessary to distinguish exposed live parts from nonlive parts of electrical equipment
- The skills and techniques necessary to determine the proper approach distances corresponding to the voltages to which the qualified person will be exposed
- The proper use of the special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electrical equipment

These instructions are intended only for such qualified persons. They are *not* intended to be a substitute for adequate training and experience in safety procedures for this type of equipment.

Read this Instruction Sheet

NOTICE

Read this instruction sheet thoroughly and carefully before installing or operating your S&C IntelliCap Automatic Capacitor Control. Familiarize yourself with the Safety Information on page 4 and Safety Precautions on page 5. The latest version of this publication is available online in PDF format at sandc.com/en/support/product-literature/.

Retain this Instruction Sheet

This instruction sheet is a permanent part of your S&C IntelliCap Automatic Capacitor Control. Designate a location where you can easily retrieve and refer to this publication.

Proper Application

WARNING

The equipment in this publication must be selected for a specific application. The application must be within the ratings furnished for the selected equipment.

Special Warranty Provisions

The standard warranty contained in S&C's standard conditions of sale, as set forth in Price Sheets 150 and 181, applies to the S&C IntelliCap Automatic Capacitor Control, except that the first paragraph of the said warranty is replaced by the following:

(1) General: The seller warrants to the immediate purchaser or end user for a period of 10 years from the date of shipment that the equipment delivered will be of the kind and quality specified in the contract description and will be free of defects of workmanship and material. Should any failure to conform to this warranty appear under proper and normal use within 10 years after the date of shipment, the seller agrees, upon prompt notification thereof and confirmation that the equipment has been stored, installed, operated, inspected, and maintained in accordance with the recommendations of the seller and standard industry practice, to correct the nonconformity either by repairing any damaged or defective parts of the equipment or (at the seller's option) by shipment of necessary replacement parts. The seller's warranty does not apply to any equipment that has been disassembled, repaired, or altered by anyone other than the seller. This limited warranty is granted only to the immediate purchaser or, if the equipment is purchased by a third party for installation in third-party equipment, the end user of the equipment. The seller's duty to perform under any warranty may be delayed, at the seller's sole option, until the seller has been paid in full for all goods purchased by the immediate purchaser. No such delay shall extend the warranty period.

Replacement parts provided by the seller or repairs performed by the seller under the warranty for the original equipment will be covered by the above special warranty provision for its duration. Replacement parts purchased separately will be covered by the above special warranty provision.

Warranty of the S&C IntelliCap Automatic Capacitor Control is contingent upon the installation, configuration, and use of the control or software in accordance with S&C's applicable instruction sheets.

This warranty does not apply to major components not of S&C manufacture. However, S&C will assign to the immediate purchaser or end user all manufacturer's warranties that apply to such major components.

Warranty of equipment/services packages is contingent upon receipt of adequate information on the user's distribution system, sufficiently detailed to prepare a technical analysis. The seller is not liable if an act of nature or parties beyond S&C's control negatively impact performance of equipment/services packages; for example, new construction that impedes radio communication, or changes to the distribution system that impact protection systems, available fault currents, or system-loading characteristics.

Safety Information

Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels attached to the S&C IntelliCap Automatic Capacitor Control. Familiarize yourself with these types of messages and the importance of these various signal words:

DANGER

“DANGER” identifies the most serious and immediate hazards that *will likely* result in serious personal injury or death if instructions, including recommended precautions, are not followed.

WARNING

“WARNING” identifies hazards or unsafe practices that *can* result in serious personal injury or death if instructions, including recommended precautions, are not followed.

CAUTION

“CAUTION” identifies hazards or unsafe practices that *can* result in minor personal injury if instructions, including recommended precautions, are not followed.

NOTICE

“NOTICE” identifies important procedures or requirements that *can* result in product or property damage if instructions are not followed.

Following Safety Instructions

If you do not understand any portion of this instruction sheet and need assistance, contact your nearest S&C Sales Office or S&C Authorized Distributor. Their telephone numbers are listed on S&C’s website sandc.com, or call S&C Headquarters at (773) 338-1000; in Canada, call S&C Electric Canada Ltd. at (416) 249-9171.

NOTICE

Read this instruction sheet thoroughly and carefully before installing or operating your S&C IntelliCap Automatic Capacitor Control.



Replacement Instructions and Labels

If you need additional copies of this instruction sheet, contact your nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

It is important that any missing, damaged, or faded labels on the equipment be replaced immediately. Replacement labels are available by contacting your nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

⚠ DANGER



The S&C IntelliCap Automatic Capacitor Control line voltage input range is 93 to 276 Vac. Failure to observe the precautions below will result in serious personal injury or death.

Some of these precautions may differ from your company's operating procedures and rules. Where a discrepancy exists, follow your company's operating procedures and rules.

- | | |
|--|---|
| <p>1. QUALIFIED PERSONS. Access to the IntelliCap Automatic Capacitor Control must be restricted only to Qualified Persons.</p> <p>2. SAFETY PROCEDURES. Always follow safe operating procedures and rules. Always maintain proper clearance from energized components.</p> <p>3. PERSONAL PROTECTIVE EQUIPMENT. Always use suitable protective equipment, such as rubber gloves, rubber mats, hard hats, safety glasses, arc-flash</p> | <p>clothing, and fall protection, in accordance with safe operating procedures and rules.</p> <p>4. SAFETY LABELS AND TAGS. Do not remove or obscure any of the "DANGER," "WARNING," "CAUTION," or "NOTICE" labels and tags. Remove tags ONLY if instructed to do so.</p> <p>5. MAINTAINING PROPER CLEARANCE. Always maintain proper clearance from energized components.</p> |
|--|---|

Troubleshooting Overview

IntelliLink® Setup Software

The following tools and IntelliCap control features are used to diagnose and correct problems. The setup software *Operation* and *Troubleshooting* screens display information about the control setup, control operations, and sensor data. For an explanation of these screens, see the “Locating Problems with IntelliLink Setup Software” section on page 13.

To view these screens, use a PC with Windows® 7 or newer Windows operation system, a serial cable or USB-to-serial cable, and the IntelliLink Setup Software.

Control Connection Diagrams

The electrical interconnect diagrams (Drawings: #110-001196-XX Rev. C and #110-001250-XX Rev. C) at the end of Instruction Sheet 1022-510, “S&C IntelliCap® Automatic Capacitor Control: *Installation*,” show the IntelliCap control wiring layout.

Test Points

Test points are accessible below the faceplate. See Figure 1.

Tools Required

To correct a problem, you may need one or more of the following tools:

- Multimeter
- 4-inch long #2 Phillips screwdriver
- 4-inch long ¼-inch blade screwdriver

NOTICE

If the suggested troubleshooting steps do not resolve the problem, call the S&C Electric Company Global Support Monitoring Center at (888) 762-1100.

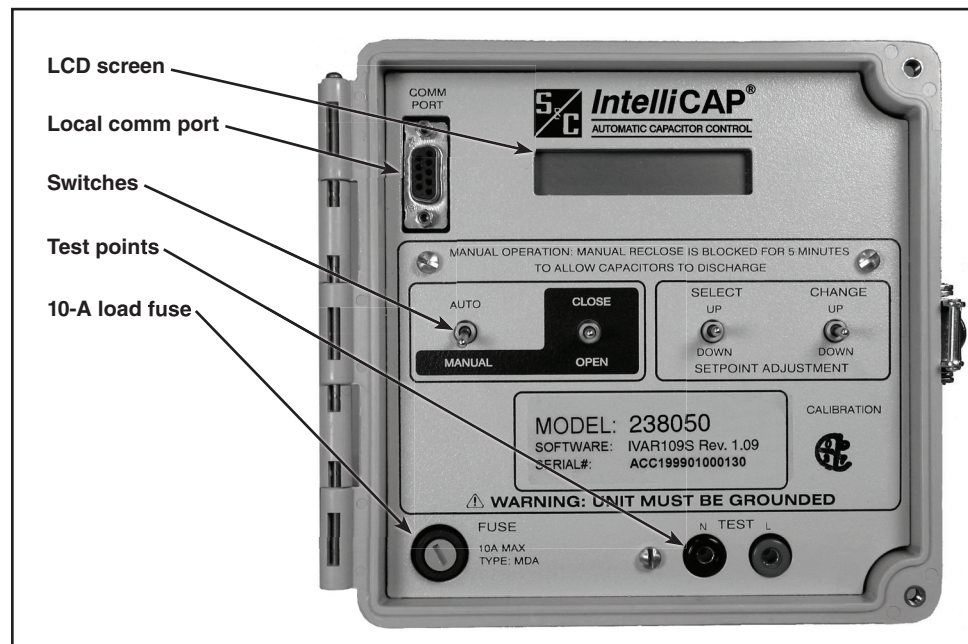


Figure 1. The IntelliCap Control faceplate.

Power Problems

10-A fuse is blown

Follow these steps to check this problem:

STEP 1. Remove the fuse holder from the faceplate and replace the fuse. See Figure 1.

STEP 2. Switch the bank in and out.

STEP 3. If the new fuse blows, check the wiring and peripheral equipment.

On power-up, the IntelliCap control operating system performs various checks. If the control software is working properly, the LCD screen displays ****READY**** for about 3 seconds, then begins scrolling through real-time and setpoint data.

If the ****READY**** message stays on, the control software may be corrupt. If the software was updated or reloaded recently, reload it again. Otherwise, call S&C Electric Company.

If the LCD reads ****RE****, ****REA****, or ****READ****, the operating system may be corrupt; call S&C Electric Company.

LCD is blank

Follow these steps to check why the LCD screen is blank:

- STEP 1.** Check for ac power to the control and for ac voltage between the test points on the faceplate. If there is no voltage:
- (a) Make sure the ac line and ac neutral wires are connected to the proper terminals in the meter base socket.
 - (b) Following utility-approved work procedures and safety practices, verify that there is 120 Vac in the line providing ac power for the control.
- STEP 2.** Check the 10-A faceplate fuse. Remove the fuse holder and check the fuse for continuity with a multimeter, then replace the fuse if necessary.
- STEP 3.** Replace the LCD screen. There may be a problem with the printed-circuit board, the LCD screen, or the operating system. Call S&C Electric Company.

LCD displays error messages

Follow these steps to check the displayed error messages:

- STEP 1.** Check the LCD display for error messages. Table 1 shows the possible messages.
- STEP 2.** Check for IntelliLink software troubleshooting messages. Connect the PC to the control and start the software. Check for active messages on the *Troubleshooting Event* screens. Follow the troubleshooting suggestions for those messages in Table 1.

Table 1. LCD Screen Error Messages

Error Message	Definition
Faceplate Sw.Err	There is a problem with one of the faceplate switches.
Voltage Sen Err	The voltage sensor is reading outside its valid range or it is faulty.
Temperat Sen Err	The temperature sensor is reading outside its valid range or it is faulty.
HiLoVoltBand Err	The Bank Voltage Change + Margin setpoint is greater than the difference between the High-Voltage Override setpoint and the Low-Voltage Override setpoint. Eliminate the problem by increasing the bandwidth between the voltage-override setpoints.

Initializing connection ... Trying 38400 BAUD ... Connection failed

This message appears on the computer screen when the setup software in the computer cannot establish communication with the software in the control. Follow these steps to establish a connection:

- STEP 1.** Check that the control has power. If the LCD screen is blank, the control may have no power and cannot communicate with the computer.
- STEP 2.** Check the serial cable connections. Is it plugged into the COMM PORT on the faceplate? Is the cable plugged into the correct port on the PC? The correct port is usually COM1.
- STEP 3.** Try another communication port. The COM1 port on the PC may be broken or assigned to a different device. Connect the cable to another comm port. In the Connect dialog box, click on the **Change Setup** button. Select the desired comm port from the pull-down list, and click on the **Connect** button.

When running setup software in DOS, COM2 may also be selected by typing /2 after the applicable batch file name. For example, ACAP /2.
- STEP 4.** Use a different serial cable. The serial cable may have a broken wire or pin. The cable may be wired for use with a different computer type, or it may be a null-modem cable.
- STEP 5.** Check the serial port on the PC. If a 2-wire, ungrounded extension cord is used to power the PC (or the IntelliCap control during lab testing), the serial port on the PC may have been damaged. Test the serial port by trying to communicate with a modem or other serial device.

Program in the control: XXXX ... IntelliLink is not configured for this program

Reinstall the setup software on the computer. Make sure the software is correct for this type of IntelliCap control.

Software in control incompatible with open screenset ... Connection cannot be established

This message is displayed on the computer screen when a screenset is already open when trying to connect to a control. Normally, IntelliLink Setup Software automatically opens the correct screenset when connecting.

Use the correct screenset. The IntelliLink screenset presently open is not the same as the software in the connected control. Follow these instructions to connect to the correct screenset:

- STEP 1.** In the menu bar, click on **File** and click on the **Close Screenset** entry.
- STEP 2.** Choose the correct screenset for the control.
- STEP 3.** When the screenset opens, click on the **Connection** entry and click on the **Connect to Device** entry.

IntelliLink setup incorrect or incomplete

Reinstall the setup software on the computer. There may be a problem with one of the files. See Instruction Sheet 1022-510, "S&C IntelliCap® Automatic Capacitor Control: *Setup*."

Software in control is XXXX ... IntelliLink is not properly configured for this product

Reinstall the IntelliLink software on the computer. There may be a problem with one of the files. See Instruction Sheet 1022-510, "S&C IntelliCap® Automatic Capacitor Control: *Setup*."

Sensed current is zero on the *Operation* screen

Follow these steps to check the wiring:

- STEP 1.** Check the sensor cable. Is the cable securely connected to the sensors and to the IntelliCap control? Is the cable is damaged?
- STEP 2.** Check the power line. Following utility-approved work procedures and safety practices, verify current is flowing through the sensor and that the sensor is installed properly.

No current sensors are connected, but values are shown on the *Operation* screen

Install a jumper between the current sensor hot and current sensor neutral. When using the IntelliCap with Var control as a demonstration unit without a current sensor, this prevents displaying erroneous current and power factor values.

Real-time kvar values are wrong

Follow these steps to check the wiring:

- STEP 1.** Check the **Voltage Transformer Wiring** and **Voltage Transformer Ratio** setpoints on the *Setup: Site-Related* screen. The **Voltage Transformer Wiring** setpoint should reflect how the transformer powering the control is wired (phase to ground or phase to phase). The **Voltage Transformer Ratio** setpoint should be the ratio of the transformer's primary rated voltage to 120 Volts. For example, a 12000/120 Volt transformer would have a ratio of 12000/120, or 100:1.
- STEP 2.** Check the current level. Because of sensor-accuracy problems at low current levels, phase-angle detection and display require a minimum current of 0.5% of full-scale values. Below this threshold, the measured power factor reads 1.000, and the kvar values read 0. Current magnitude continues to be detected and displayed below the 0.5% threshold.

Example: For a control with a 600-A S&C EnergyLine or Lindsey sensor, phase-angle detection shuts down at approximately 3 amps. Below 3 amps, the power factor shows 1.000 and the kvars show 0.
- STEP 3.** Review the phase-angle offset. Check the **Installation Phase Offset** setpoint on the *Setup: Site-Related* screen.

Capacitor bank switch does not operate

Follow these steps to investigate the operation problem:

- STEP 1.** Make sure the AUTO/MANUAL switch is in **Manual** mode. Toggle the AUTO/MANUAL switch to **Manual** mode, and then try the CLOSE/OPEN switch.
- STEP 2.** Check the faceplate LCD screen. If the LCD screen shows ****Reclose Block**** when attempting to operate the bank, the reclose block delay is in effect. Wait until the delay ends, and then try switching the bank again.
- STEP 3.** Check the line voltage level. Make sure the line voltage is not below the minimum required to switch the capacitor bank.
- STEP 4.** Check the **Capacitor Bank Switch Control Pulse Time** setpoint. Connect the PC to the control and start the IntelliLink software. Check that the **Capacitor Bank Switch Control Pulse Time** setpoint (configured on the *Setup: Miscellaneous* screen) is long enough. See Instruction Sheet 1022-530, "IntelliCap® Automatic Capacitor Control: *Setup*," for more information.
- STEP 5.** Check the wiring. The wiring between the control and the bank switch may be damaged or defective.
- STEP 6.** Check the capacitor bank primary switches. The bank switches may be malfunctioning.

Some (but not all) capacitor bank switches do not operate

Follow these steps to investigate the operation problem:

- STEP 1.** Check the line-voltage level. Make sure the line voltage is not below the minimum required to switch the capacitor bank.
- STEP 2.** Check the **Capacitor Bank Switch Control Pulse Time** setpoint. Connect the PC to the control and start the IntelliLink software. Check that the **Capacitor Bank Switch Control Pulse Time** setpoint (configured on the *Setup: Miscellaneous* screen) is long enough. See Instruction Sheet 1022-530, "IntelliCap® Automatic Capacitor Control: *Setup*," for more information.
- STEP 3.** Check the wiring. The wiring between the control and the bank switch may be damaged or defective.
- STEP 4.** Check the capacitor bank primary switches. A switch may be malfunctioning.

The control is not switching the bank automatically

Follow these instructions to check the automatic switching problem:

- STEP 1.** Make sure the control is in **Automatic** mode. Check the ****OperMode**** field on the LCD screen. If it shows ****MANUAL****, toggle the faceplate AUTO/MANUAL switch to **Auto** mode. If the screen shows ****SoftMAN****, connect the PC to the control and start the IntelliLink software. On the *Operation* screen, change the **Software Control Settings: Manual Operation** setpoint to **Disabled** mode.
Note: If the control was in **Manual** mode and is returned to **Automatic** mode, it waits 60 seconds before switching the bank.
- STEP 2.** Check the **Reclose Delay Block** field. If a number is shown in this field, the reclose block delay is in effect. When the timer expires, automatic switching should resume.
- STEP 3.** Check for a **Voltage-Override** condition. On the *Operation* screen or LCD screen, check for a voltage-override message. If a **Voltage-Override** condition is in effect, make sure the **Voltage-Override** setpoints are appropriate for this capacitor bank installation.

Check the LCD screen. If it shows ****Evt=InOvrMargin****, automatic bank switching is inhibited. The control will not switch the bank because doing so would cause a **Voltage-Override** condition. See Instruction Sheet 1022-530, "IntelliCap® Automatic Capacitor Control: *Setup*," for more information.
- STEP 4.** Check the number of automatic switching cycles, and check the LCD screen. If it shows ****Evt=MaxAutoOper****, the number of automatic switching cycles has reached the value of the **Maximum Automatic Control Cycles Per Day** setpoint. Further switching is inhibited in **Automatic** mode until the next calendar day.

- STEP 5.** Check whether the bank is scheduled to be active. On the *Setup: Control Strategy - Timeclock* screen, check whether today is a holiday. If the control is in **Timeclock**, **Time-Biased Voltage**, or **Time-Biased Temperature** mode, check the schedules.
- STEP 6.** Check for IntelliLink software troubleshooting messages. Check for active messages on the *Troubleshooting Event* screens. Follow the troubleshooting suggestions for those messages.
- STEP 7.** Check for **Manual** operation. Toggle the faceplate AUTO/MANUAL switch to **Manual** mode. Following your company’s procedures, use the faceplate CLOSE/OPEN switch to operate the capacitor bank. If the bank does not switch, see the “Capacitor bank switch does not operate” section on page 10.

High-/Low-Voltage Band Error Troubleshooting

A **High-/Low-Voltage Band** error indicates the control is inhibiting bank operations to avoid possible online and offline switching oscillations. When this error is active, the control displays ****HiLoVoltBand Err**** on the LCD screen.

The voltage of a circuit rises when a capacitor bank is switched online and decreases when it is switched offline. For example, Figure 2 illustrates the circuit’s voltage increasing from Level A to Level B as the bank is switched online. The difference in voltage between points A and B is the bank’s voltage change. The control measures and records the voltage change each time it switches the bank.

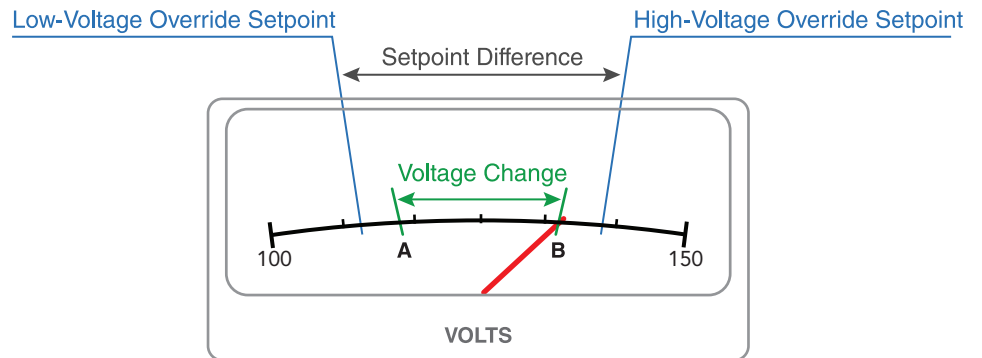


Figure 2. The normal voltage change for the bank.

Also illustrated is the difference between the **High-Voltage Override** setpoint and the **Low-Voltage Override** setpoint, the “Setpoint Difference.” These setpoints regulate the **Voltage-Override** feature. If the circuit voltage increases above the **High-Voltage Override** setpoint when the bank is online, the control will switch the bank offline to reduce the voltage. If the circuit voltage drops below the **Low-Voltage Override** setpoint and the bank is offline, the control will switch the bank online to increase the voltage. The **Voltage-Override** feature is always active and will override the present control strategy in use.

The bank voltage change is proportional to the circuit inductance between the bank and its source. Circuit rearrangements will change the inductance. If a circuit rearrangement lengthens the distance, the inductance usually increases and a larger bank voltage change is the result. If the bank voltage change increases enough, it will be greater than the setpoint difference. See Figure 3 on page 12.

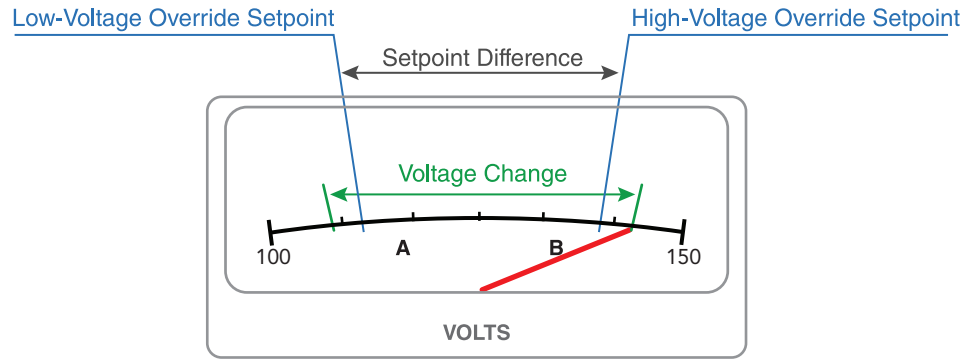


Figure 3. The voltage change is larger than the setpoint difference.

Without the **Voltage-Override** feature, this condition would cause oscillations. With the bank offline, the control recognizes that the voltage is too low and switches the bank online. Then, the voltage would be too high and the control switches the bank offline. The bank would continue to oscillate until the voltage change of the bank is reduced, or the difference between the **High-Voltage Override** and the **Low-Voltage Override** setpoints is increased. To avoid this condition, the control checks whether the bank voltage change is greater than the setpoint difference after each bank operation. If the voltage change is larger, the **High-/Low-Voltage Band Error** becomes active.

Figure 4 shows that the Setpoint Difference is set smaller than the bank’s normal voltage change. This can also cause a **High-/Low-Voltage Band Error** condition.

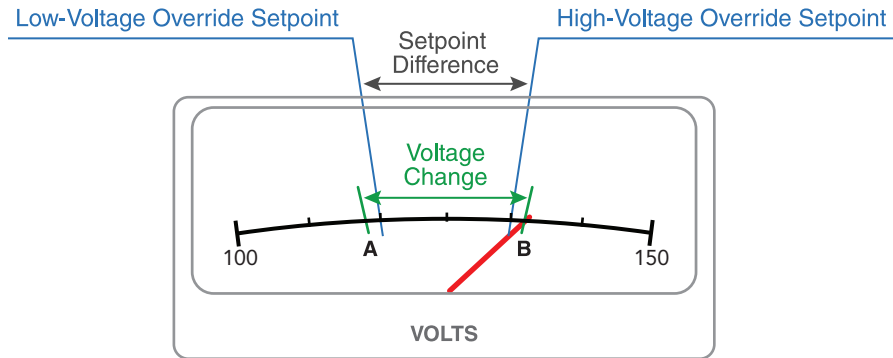


Figure 4. The Setpoint Difference is smaller than the voltage change.

Voltage variations caused by loads switching online and offline as the control measures the bank voltage change can cause measurement error. Therefore, the control averages the voltage change for the last four switching operations and adds a 25 percent margin to calculate the **Bank Voltage Change + Margin** value.

The control also prevents a **Voltage-Override** condition. For example, when the control strategy determines the bank should be offline, the control checks to see that the resulting voltage will be above the **Low-Voltage Override** setpoint. It subtracts the **Bank Voltage Change + Margin** value from the present voltage. If the resulting voltage would be below the low limit, it will not switch the bank offline until the voltage increases sufficiently so that the resulting voltage is above the low limit.

Two methods may be used to clear the **High-/Low-Voltage Band Error** condition. If an abnormal voltage change caused the error, several bank operations will cause the control to recalculate a lower **Bank Voltage Change + Margin** average and automatically clear the alarm. If the error was caused by the **Voltage-Override** setpoints set too close together, the setpoints may be changed to increase the setpoint difference. The **High-Voltage Override** and **Low-Voltage Override** setpoints can be changed with the faceplate switches.

If this feature is not wanted, configure the **Bank Voltage Change + Margin Automatic Calculation** setpoint to **Disabled** mode on the *Setup: General* screen.

Operation Screen Information

The *Operation* and *Troubleshooting* screens display the control status and can help locate the cause of several problem types. The *Operation* screen displays the present status of the control and capacitor bank along with real-time data about the feeder.

This screen opens when starting the IntelliLink software. See Figure 5.

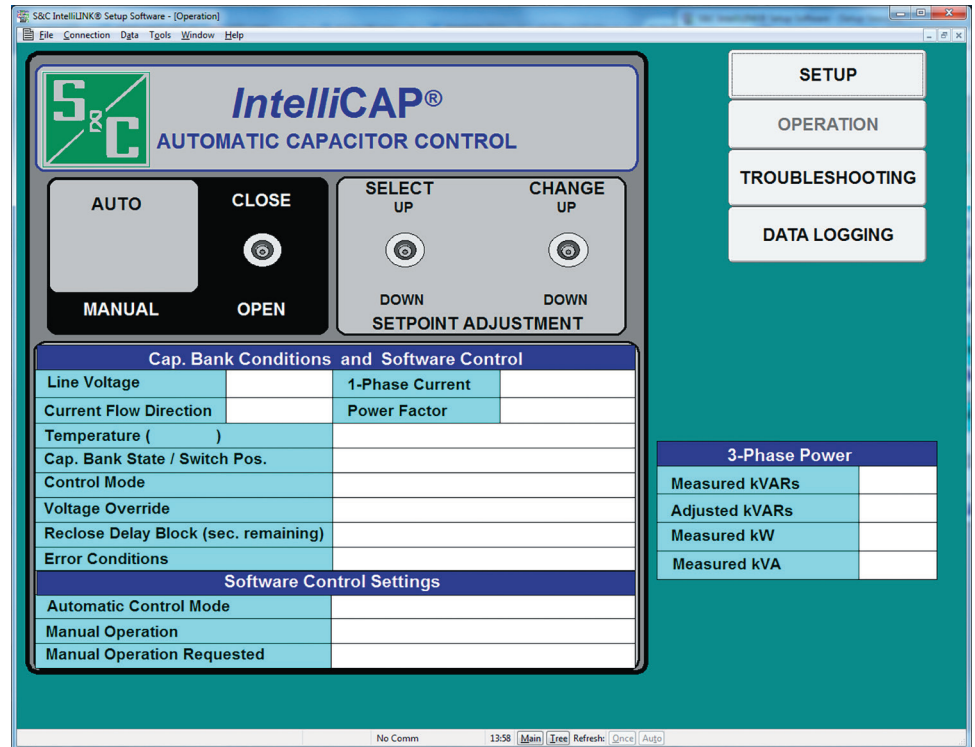


Figure 5. The *Operation* screen for an IntelliCap control with Var.

This screen includes the following fields:

Present capacitor bank conditions: **Line Voltage**, **Temperature**, **Voltage Override**; **Current Flow Direction**, **3-Phase kW**, **3-phase kVA**, **Measured 1-Phase Current**, **Measured Power Factor**, **Measured 3-Phase kvars**, and **Adjusted 3-Phase kvars**.

Except during Temperature, Voltage Override, and Current Flow Direction (if applicable) conditions, these fields are true RMS amplitude measurements. The control takes a measurement every 0.2 seconds. It then averages eight measurements and displays the 1.6-second averaged value.

The **Temperature** condition measurement is the present ambient air temperature. The sensor is located on the bottom of the enclosure.

If a **Voltage-Override** condition is in effect, the control displays the message “Over” or “Under” in the **Voltage-Override** field. Otherwise, this field shows “None.”

The IntelliCap with Var control measures the phase angle between the voltage and current waveforms. The angle is displayed as a value between +90 degrees and -90 degrees.

A negative value indicates a leading phase angle.

When the phase angle is outside the ± 90 degree range, the control displays a “Reverse” message in the **Current Flow Direction** field and subtracts 180 degrees from the phase angle.

For a more detailed explanation of these fields, see Instruction Sheet 1022-530, “S&C IntelliCap® Automatic Capacitor Control: *Setup*.”

Capacitor Bank State/Sw. Pos.

This is the present position of the capacitor bank:

“Out of Circuit/Switch Open” means the capacitor bank switch is open.

“In Circuit/Switch Closed” means the capacitor bank switch is closed.

Control Mode

This field shows whether **Automatic** operation mode is in the **Enabled** or **Disabled** state.

Reclose Delay Block (Seconds Remaining)

After opening, the capacitor bank will not reclose for 5 minutes. This allows the capacitors to discharge. This field shows the time remaining before the bank can be switched in.

Error Conditions

When the control detects an **Error** or **Trouble** condition, this field displays the message “Problems Present - See Troubleshooting Screen.” When this message is present, see the *Troubleshooting* screens for more information.

Automatic Control Mode

This field shows the control strategy in effect when **Automatic** mode is enabled. For example, “Timeclock w. Voltage Override.” The control strategy is configured on the *Setup: General* screen.

Manual Operation

The AUTO/MANUAL switch on the faceplate overrides all other settings and is mechanically set. When set to **Manual** mode, the bank switch can only be operated with the OPEN/CLOSE switch on the faceplate. When set to **Auto** mode, the bank switch can be operated automatically by the control and can also be operated by IntelliLink Setup Software when this setpoint is in the **Enabled** state.

When in **Enabled** mode, bank operation using IntelliLink software is possible.

When in **Disabled** mode, bank operation using IntelliLink software is disabled.

NOTICE

The IntelliCap control will only resume **Automatic Operation** mode when the **Manual Operation** setpoint is in the **Disabled** state.

Manual Operation Requested

This field enables use of the setup software to switch the capacitor bank. The faceplate AUTO/MANUAL switch must be set to **Auto** mode, and the **SOFTWARE CONTROL SETTINGS: Manual Operation** setpoint must be set to **Enabled** mode. If the **Manual Operation Delay** setpoint on the *Setup: Miscellaneous* screen is enabled, the bank operates when the delay ends. When a reclose-block delay is in effect, the control ignores all manual commands until after that delay ends. If no request is made, this field shows the last switching operation “Automatic” or “Manual.”

Auto/Manual Switch

This is the present position of the faceplate AUTO/MANUAL switch:

“Auto” = **Automatic** mode is enabled.

“Manual” = **Automatic** mode is disabled.

Software Control Settings

Hardware Switch States

The *Troubleshooting: Control & Switch Information* screen shows miscellaneous software information and switch and sensor problems.

To display the *Troubleshooting: Control & Switch Information* screen, on any screen click on the **Troubleshooting** button and click on the **Control and Switch** button.

This screen includes the following fields:

Most Recent Volt. Override

This field shows the date and time of the most recent **Over-** or **Under-Voltage** condition.

Voltage

This is the voltage during the most recent **Voltage-Override** condition.

Cleared

This is the date and time when the most recent **Voltage-Override** condition was cleared. If the override is still active, this field shows “Active.”

Last Power-Up

This is the date and time the control was last powered up.

Setup Disk Revision, Control Software Revision

Please have this information available when you call S&C Electric Company about a problem. These fields include:

- The name of the control software version present in this control (for example, ICAP105S)
- The name and revision date of the IntelliLink Setup Software presently loaded in the PC used to access the control

If the IntelliLink software is older than the control software, this field includes the message “Setup Disk/Control Software Version Mismatch.” If the IntelliLink software is newer than the control software, this field includes the control software date and the message “Not Current Release.”

Note: When trying to start the IntelliLink software for a different S&C product (for example, an IntelliCap® Plus Automatic Capacitor Control) while the PC is connected to the IntelliCap control, the IntelliLink software terminates during startup and displays an error message.

Encoded

This is a six-digit hexadecimal encoding of the name/version information for the software in the control. S&C engineers use this code for software troubleshooting.

Trouble Conditions

The control records the date and time when certain trouble conditions last occurred and were cleared. These conditions indicate there may be a problem with the bank or the configured setpoint values. A **Trouble** condition is not a critical problem.

The “Low Switching Volt Delta” message is displayed when the actual change in voltage levels during switching is below the minimum percentage of the expected change, which is the **Minimum Percentage of Average Delta Voltage** setpoint configured on the *Setup: Miscellaneous* screen. See Instruction Sheet 1022-540, “S&C IntelliCap® Automatic Capacitor Control: *Operations*,” for more information.

The “Maximum Daily Cycles” message indicates the control reached the **Maximum Automatic Control Cycles Per Day** setpoint value. Further automatic switching is inhibited until the next calendar day. If the control reaches this limit frequently, make sure the setpoints are set appropriately for this capacitor bank.

The “Incorrect Voltage Range” message appears when the voltage is not within $\pm 15\%$ of the nominal voltage. Make sure the **Nominal Operating Voltage** setpoint (configured on the *Setup: Miscellaneous* screen) is set correctly.

For the IntelliCap with Var controls, the “Low Switching Var Delta” message appears when the actual change in kvar levels during switching is below the minimum percentage of the expected change. The **Minimum Percentage of Average Delta Vars** setpoint is configured on the *Setup: Miscellaneous* screen. See Instruction Sheet 1022-540, “S&C IntelliCap® Automatic Capacitor Control: *Operations*,” for more information.

Error Conditions

The control records the date and time when switch and sensor malfunctions last occurred and were cleared. The control also records sensor readings that are outside valid operating ranges (45 to 300 Volts and -40°F to 150°F). The screen lists problems for the voltage sensor, temperature sensor, faceplate AUTO/MANUAL and CLOSE/OPEN switches, and faceplate SETPOINT ADJUSTMENT switches. An error condition requires prompt attention.

The **High-/Low-Voltage Band** error indicates that the **Bank Voltage Change + Margin** setpoint is greater than the difference between the **High-Voltage Override** setpoint and the **Low-Voltage Override** setpoint. The control logs it as an error and disables further automatic operation. See Instruction Sheet 1022-530, “S&C IntelliCap® Automatic Capacitor Control: *Setup*,” for more information about setting the **Voltage-Override** setpoints.

The *Troubleshooting: Chronological Log* screen shows the log of various troubleshooting-related events. This information may help you identify problem causes.

To display the *Troubleshooting: Chronological Log* screen, on any screen click on the **Troubleshooting** button and click on the **Trouble Log** button.

The log holds 16 events. When it is full, each new event overwrites the oldest, even in the log. The most recent event is indicated with an arrow on the left.

This screen includes the following fields:

Date/Time of Occurrence

This is the date and time the event occurred.

Event

This message describes the event. Events are defined below, showing the equivalent LCD screen displays where applicable.

System Power-Up

Power was restored to the control.

Request Cap. Bank Out of Circuit

The control sent a command to switch out the capacitor bank.

Request Cap. Bank In Circuit

The control sent a command to switch in the capacitor bank.

Software Manual Control Mode

The **SOFTWARE CONTROL SETTINGS: Manual Operation** setpoint on the *Operation* screen was set to the **Enabled** state.

Software Auto Control Mode

The **SOFTWARE CONTROL SETTINGS: Manual Operation** setpoint on the *Operation* screen was set to the **Disabled** state.

Hardware Manual Override Enabled

The faceplate AUTO/MANUAL switch was toggled to **Manual** mode.

Hardware Manual Override Disabled

The faceplate AUTO/MANUAL switch was toggled to **Auto** mode.

Cap. Bank Out of Circuit

****BankOffline****

The control switched the bank out.

Cap. Bank In Circuit

****Bank Online****

The control switched the bank in.

Voltage Override Active

****Ovr=Y****

An **Over-Voltage** or **Under-Voltage** condition occurred and has not cleared. See Instruction Sheet 1022-530, "S&C IntelliCap® Automatic Capacitor Control: *Setup*," for more information.

Voltage Override Cleared

****Ovr=N****

An **Over-Voltage** or **Under-Voltage** condition occurred and has cleared.

Before/After Switching Delta Bad

****LowSwDelta****

The change in voltage caused by switching was unusually low. See Instruction Sheet 1022-530, “S&C IntelliCap® Automatic Capacitor Control: *Setup*,” for more information.

Before/After Switching Delta OK

The change in voltage because of switching returned to its normal level.

Max Daily Auto Cycles Reached

****MaxAutoOper****

The number of automatic switching cycles has reached the value of the **Maximum Automatic Control Cycles Per Day** setpoint configured on the *Setup: Miscellaneous* screen.

Max Daily Auto Cycles Cleared

The **Max Daily Auto Cycles Reached** condition has cleared. The condition is cleared at the beginning of each calendar day and when all cycle counters are reset on the *Data Logging: Daily Switching Cycles* screen.

Line Voltage Outside Operating Range

****VoltRangBad****

The line voltage is outside the range of the **Nominal Operating Voltage** setpoint configured on the *Setup: Miscellaneous* screen.

Line Voltage Within Operating Range

The line voltage is within the range of the **Nominal Operating Voltage** setpoint configured on the *Setup: Miscellaneous* screen.

Voltage Sensor Error

****VoltSen Err****

The voltage sensor is reading outside of its range or may be faulty.

Voltage Sensor OK

The problem with the voltage sensor has cleared.

Temperature Sensor Error

****TempSen Err****

The temperature sensor is reading outside of its range or may be faulty.

Temperature Sensor OK

The problem with the temperature sensor has cleared.

Auto/Close/Open Switches Error

****Face Sw Err****

The faceplate AUTO/MANUAL or CLOSE/OPEN switch(es) may be faulty.

Auto/Close/Open Switches OK

The problem with the faceplate AUTO/MANUAL or CLOSE/OPEN switch(es) has cleared.

Select/Change Switches Error

****Face Sw Err****

The faceplate SELECT SETPOINT or CHANGE SETPOINT switch(es) may be faulty.

Select/Change Switches OK

The problem with the faceplate SELECT SETPOINT or CHANGE SETPOINT switch(es) has cleared.

High/Low Voltage Band Error

****VoltBandErr****

The **Bank Voltage Change + Margin** setpoint is greater than the difference between the **High-Voltage Override** setpoint and the **Low-Voltage Override** setpoint.

High/Low Voltage Band OK

The **Bank Voltage Change + Margin**, **High-Voltage Override** setpoint, and the **Low-Voltage Override** setpoint are compatible.

The LCD screen has four other possible events:

****BankUnknown****

The control does not know the present status of the bank.

****RecloseBlok****

The reclose delay block is in effect.

****Face Sw Err****

One of the faceplate switches may be faulty.

****InOvrMargin****

Automatic switching is inhibited; switching the bank would cause a **Voltage-Override** condition.

For the IntelliCap with Var control, there are two additional event messages:

Before/After Switching Var Delta Bad

****LowSwDelta****

The change in kvars because of switching was unusually low. See Instruction Sheet 1022-530, "S&C IntelliCap® Automatic Capacitor Control: *Setup*," for more information.

Before/After Switching Var Delta OK

The change in kvars because of switching returned to its normal level.

Troubleshooting Faceplate Change Log

The *Troubleshooting: Faceplate Change Log* screen shows the date and time when the setpoints were last changed from the faceplate. Between changes, the control scrolls automatically through at least 20 lines of data before it records a separate log entry.

To display the *Troubleshooting: Faceplate Change Log* screen, from any screen click the **Troubleshooting** button and click on the **Faceplate Changes** button.

