Setup

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Qualified Persons

⚠ WARNING

Only qualified persons who are knowledgeable in the installation, operation, and maintenance of overhead and underground electric distribution equipment, along with all associated hazards, may install, operate, and maintain the equipment covered by this publication. A qualified person is someone 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 special precautionary techniques, personal protective equipment, insulated 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

Thoroughly and carefully read this instruction sheet and all materials included in the product's instruction handbook before installing or operating the IntelliCap 2000 Automatic Capacitor Control Familiarize yourself with the Safety Information and Safety Precautions on pages 4 through 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 the IntelliCap 2000 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. See S&C Specification Bulletin 1024-31.

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 IntelliCap 2000 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 IntelliCap 2000 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, such as communication devices. 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.

Warranty Qualifications

Warranty of IntelliCap 2000 Automatic Capacitor Controls 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, such as batteries, communication devices, and remote terminal units. However, S&C will assign to the immediate purchaser or end user all manufacturers' warranties that apply to such major components.

Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels and tags attached to the IntelliCap 2000 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 the S&C Global Support and Monitoring Center at 1-888-762-1100.

NOTICE

Read this instruction sheet thoroughly and carefully before installing an IntelliCap 2000 Automatic Capacitor Control.

Replacement Instructions and Labels

If additional copies of this instruction sheet are required, contact the 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 the nearest S&C Sales Office, S&C Authorized Distributor, S&C Headquarters, or S&C Electric Canada Ltd.

⚠ DANGER

The IntelliCap 2000 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.

1. **QUALIFIED PERSONS.** Access to an IntelliCap 2000 Automatic Capacitor Control must be restricted only to qualified persons. See the "Qualified Persons" section on page 2.
2. **SAFETY PROCEDURES.** Always follow safe operating procedures and rules.
3. **PERSONAL PROTECTIVE EQUIPMENT.** Always use suitable protective equipment, such as rubber gloves, rubber mats, hard hats, safety glasses, and flash clothing, in accordance with safe operating procedures and rules.
4. **SAFETY LABELS.** Do not remove or obscure any of the "DANGER," "WARNING," "CAUTION," or "NOTICE" labels. Remove tags only if instructed to do so.
5. **MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized components.

Applicable Software

This instruction sheet was prepared for use with IntelliCap 2000 control software: **IC2000Installer-2.3.x** or later revision.

Software identification is located on the IntelliLink® Setup Software *Setup>General>Software Versions* screen. For questions regarding the applicability of information in this instruction sheet to future product releases, contact S&C Electric Company.

This section provides an introduction to IntelliLink software and how to install and use it on the computer. The IntelliCap 2000 control faceplate buttons and LCD screen can also be used for setup and configuration.

Computer Requirements

Installation of S&C control software on the computer requires:

- A portable personal computer with Microsoft® Windows® 10, an Intel® Core™ i7 processor with 8 GB of RAM (recommended) or a dual-core processor with 4 GB RAM (minimum), a wireless card when using the Wi-Fi configuration option (onboard or USB Wi-Fi adapter), an Internet browser, and access to **sandc.com**.

Note: Windows XP is no longer supported by S&C because Microsoft has discontinued the operating system.

- Administrative privileges
- Microsoft.Net Framework Version 4.5 (Verify it is installed on the computer by opening *C:\Windows\Microsoft.Net\Framework* with Windows Edge. If version 4.5 is not installed, download it from this link: **microsoft.com/net**.)

Note: Windows XP SP3 uses Microsoft .Net v4.0 and .Net v4.02. Install v4.0 first, then version 4.02. If the correct version of .Net is not detected by the S&C software installer, it will not install IntelliLink Setup Software.

- Windows WZC–Wireless Zero Configuration (recommended)

  To verify Windows Wireless Zero Configuration is installed:

STEP 1. Click on the Windows **Start** button and open the *Settings>Control Panel* screen.

STEP 2. Double click on the **Administrative Tools** button.

STEP 3. Double click on the **Services** button.

STEP 4. Scroll down the list and verify Wireless Zero Configuration is present.

- Windows PowerShell 2.0 set for an AllSigned execution policy (Execution policies of RemoteSigned and Unrestricted will also work. Policy selection should be based on security policy set by your IT department. The AllSigned execution policy will open a dialog box after the firmware upgrade starts. Click on the **Run once** or **Always run** button to perform the upgrade. Selection should be based on the security policy set by your IT department. Windows PowerShell 2.0 is preinstalled on Windows 7 and 8 but will need to be downloaded for Windows XP. Windows PowerShell 2.0 can be downloaded from this link: **support.microsoft.com/kb/968929**. To set and verify the execution policy, log in as an administrator.

Follow these steps to verify the Windows PowerShell execution policy:

STEP 1. Click on the Windows **Start** button and open the *All Programs>Accessories>Windows PowerShell>Windows PowerShell (x86)* screen to start the application.

STEP 2. In the PowerShell console, type "set-executionpolicy AllSigned" to set the policy.

STEP 3. In the PowerShell console, type "get-executionpolicy" to verify the policy setting.

IntelliCap 2000 Software Installer

The latest IntelliCap 2000 control software release is posted at the S&C Automation Customer Support Portal. This library of present and legacy software requires a password, and it gives users access to the software needed to configure S&C Automation Controls. A portal password can be requested at this link: **sandc.com/en/support/sc-customer-support/**.

Download the software installer from the "IntelliCap 2000" workspace on the portal. Administrative privilege is required to install software on a computer. Save the installer on the desktop, right click on the icon, and select the **Run as administrator** option.

IntelliLink offline software and IntelliLink Setup Software will be installed in the "S&C Electric" program folder. Click on the **IntelliLink Software** icon to connect to an IntelliCap 2000 control. Click on the **IntelliLink Offline** icon to open a memory snapshot ".vm" file. The .vm file can be used offline to transfer control-setting files to other controls.

NOTICE

With firmware version 2.3.x and later, the default passwords for all user accounts, including the admin account must, be changed before IntelliLink Setup Software can connect to and configure a control. See the "Password Management" section on page 92 for more information on how to change the default passwords when connecting to a control for the first time using IntelliLink Setup Software.

Operation Screen

When the computer has been configured and set up for IntelliLink Setup Software, the software automatically establishes a connection.

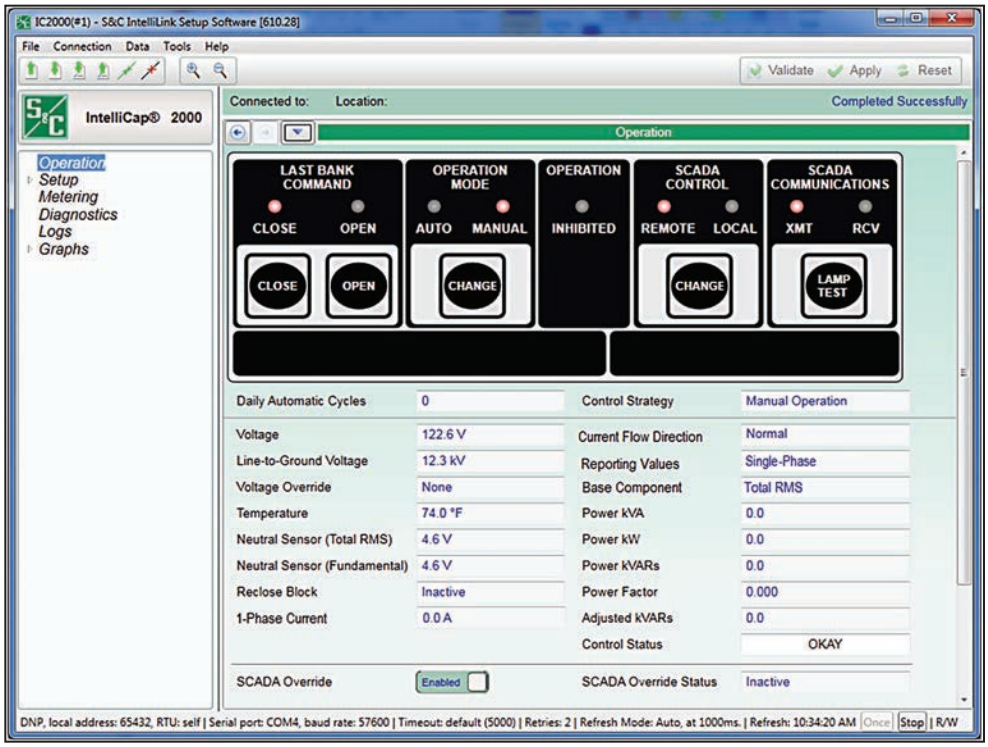


Figure 1. The IntelliCap 2000 Automatic Capacitor Control *Operation* screen.

The *Operation* screen represents the IntelliCap 2000 Automatic Capacitor Control front panel indications and controls and several key variables shown on the faceplate LCD screen. See Figure 1.

Last Bank Command: Close or Open

These indicators show the present position of the capacitor bank switch, unless a problem prevented bank operation. To initiate a **Close** or **Open** command, make sure the SCADA CONTROL LOCAL indicator is in the **On** state, and then click on the **Close** or **Open** button.

Operation Mode: Auto or Manual

These indicators show whether operation of the capacitor control is in the **Auto** or **Manual** state. To change the state, make sure the SCADA CONTROL LOCAL indicator is in the **On** state, then, click on the **Change** button.

Operation Inhibited

When the display is in the **On** state, automatic operation is blocked. Go to the *Diagnostics* screen to determine the cause.

SCADA Control: Remote or Local

These indicators show whether SCADA control is allowed (**Remote** operation) or only **Local** operation is allowed. Click on the **Change** button to change the state.

SCADA Communications: XMT and RCV

These indicators blink to show transmission activity generated by SCADA communications and IntelliLink software. The blink pattern is not identical to the LEDs on the faceplate.

Switch Position Inputs: OPEN or CLOSED

When the digital switch-position inputs are enabled and the physical inputs are connected to a dry position contact on the capacitor switch, these indicators show the state of the closed and open digital input terminals 3 and 4 on the input terminal block. Terminal 1 is the return contact. The switch-position inputs are configured on the *Setup>General>Site-Related* screen.

Daily Automatic Cycles

This field shows the total number of automatic switching cycles completed today. The count includes SCADA commands but excludes manual operations. The control increments the counter when it switches the bank out. When control software is reloaded and settings are preserved, the count is retained. When the control software is reloaded and the settings are not preserved, the counter is reset to zero.

Control Strategy

This is the control strategy configured for the present season.

Voltage

This is the present voltage at the control on the nominal voltage base (for example, 120 Vac). The control software uses this value for calculating kvars for the var control.

Line-to-Ground Voltage (Var Controls Only)

This is the present value of distribution line voltage (in kV), calculated based on the **Voltage Sensor Ratio** and **System Wiring** setpoints, shown on the *Setup>General>Sensor Configuration>Voltage and Current* screen.

Voltage Override

This field shows whether a **Voltage Override** condition is presently active.

Temperature

This is the present air temperature displayed in degrees Fahrenheit. The temperature sensor is located on the bottom of the enclosure.

Neutral Sensor (Total RMS)

This field displays “n/a” when neutral sensing is not installed. The **Neutral Sensing** alarm is based on the Total RMS value when the **Neutral Sensing Alarming** setpoint on the *Setup>General>Sensor Configuration>Neutral* screen is set to **Total RMS** mode.

***Neutral Sensor** (Fundamental)*

This is the fundamental (60 Hz) component of the neutral sensing value. Neutral sensing sets an alarm for the fundamental value when the **Neutral Sensing Alarming (Current or Voltage)** setpoint on the *Setup>General>Sensor Configuration>Neutral* screen is set to the **Fundamental** mode.

Reclose Block

After opening, the capacitor bank will not reclose for 5 minutes to allow the capacitors to discharge. When the reclose block is in effect, this field shows the time remaining before the bank can be switched in. The **Reclose Block** timer can be reset from the control LCD screen when the **Reclose Block Reset** feature is set to the **Enabled** mode. See the *Setup>General>Site-Related>Operations* screen for more details.

***1-Phase Current** (Var Controls Only)*

This is the current (in amperes) measured by the current sensor and scaled by the **Single-Phase Full-Scale Current** setpoint.

***Current Flow Direction** (Var Controls Only)*

When the control is properly set up and power is flowing through the circuit in the normal direction, this field displays "Normal." If unusual circuit-switching conditions cause the direction of power flow to reverse, the value changes to **Reverse**. When the phase angle is outside the +/-90-degree range, the control displays "Reverse" in the **Current Flow Direction** field and subtracts 180 degrees from the phase angle.

Reporting Values

The reporting values are **Single-Phase** (default) and **Three-Phase** mode, configured on the *Setup>General>Site-Related>Operation* screen.

Base Component

This is the component the control measures and compares. Only the 60-Hz (or 50-Hz) component is used in the **Fundamental RMS** mode. Options are **Fundamental RMS** and **Total RMS** (default) mode, configured on the *Setup>General>Sensor Configuration>Voltage and Current* screen.

***Power kVA** (Var Controls Only)*

This is the present kVA level measured at the current sensor.

***Power kW** (Var Controls Only)*

This is the present kW level measured at the current sensor.

***Power kvars** (Var Controls Only)*

This is the total kvar level measured at the current sensor, calculated as three times single-phase kvars. This assumes a balanced three-phase system.

Power Factor *(Var Controls Only)*

This is the power factor, a dimensionless value, calculated as the ratio of active power to apparent power and reported according to the configured **Power Factor Sign Convention** setpoint, either IEC or IEEE which is displayed following the value. The calculation is based on the cosine of the value in the **Corrected Phase Angle** field.

Adjusted kvars *(Var Controls Only)*

This is the 3-phase kvar level (assuming a balanced 3-phase system) used by the control when operating in **var** mode. This value is different from the **Measured 3-Phase kvars** value level when the bank is switched in and one of the following is true:

- The current sensor is on the source side of the bank and current flow is "Reversed."
- The current sensor is on the load side of the bank and current flow is "Normal."
- The control accounts for these conditions by subtracting the **3-Phase Bank Size** setpoint from the **Measured 3-Phase kvars** value.

Control Status

The **Control Status** field shows one of the following indications:

OKAY—when the control is functioning normally

ALARM—when an **Alarm** indication on the *Diagnostics>Alarm* screen is active

WARNING—when a **Warning** indication on the *Diagnostics>Warning* screen is active

ERROR—when an **Error** indication on the *Diagnostics>Error* screen is active

MAINT MODE—when the IntelliCap 2000 control cannot function properly and an application program needs to be reloaded

SCADA Override Enabled or Disabled

When the **SCADA Override** mode is in the **Enabled** state, the SCADA master station chooses the capacitor bank state and the voltage range in which the **SCADA Override** mode is active.

The master station communicates these parameters to the capacitor control. As long as the sensed voltage at the capacitor bank remains within the voltage range and the **SCADA Override Timer** is active, the bank remains in the **SCADA Override** mode. When voltage goes outside of the specified range, the **Regular Voltage Override** mode controls the bank.

Note: The capacitor bank may not enter **SCADA Override** mode, even though the master station sends a **SCADA Override** command. This occurs when the control is already in **Voltage Override** mode or if switching would put the control into **Voltage Override** mode. If the voltage later returns to a level where switching is allowed and the **SCADA Override** mode is still active, the control remembers the **SCADA Override** command and switches the bank.

Related settings are located at *Setup>Communications> SCADA Override* screen.

IntelliLink Software Workspace

The IntelliLink software user interface includes many standard features found in Windows-based products as well as some custom features designed to make navigating through the IntelliCap 2000 control settings easier. See Figure 2.

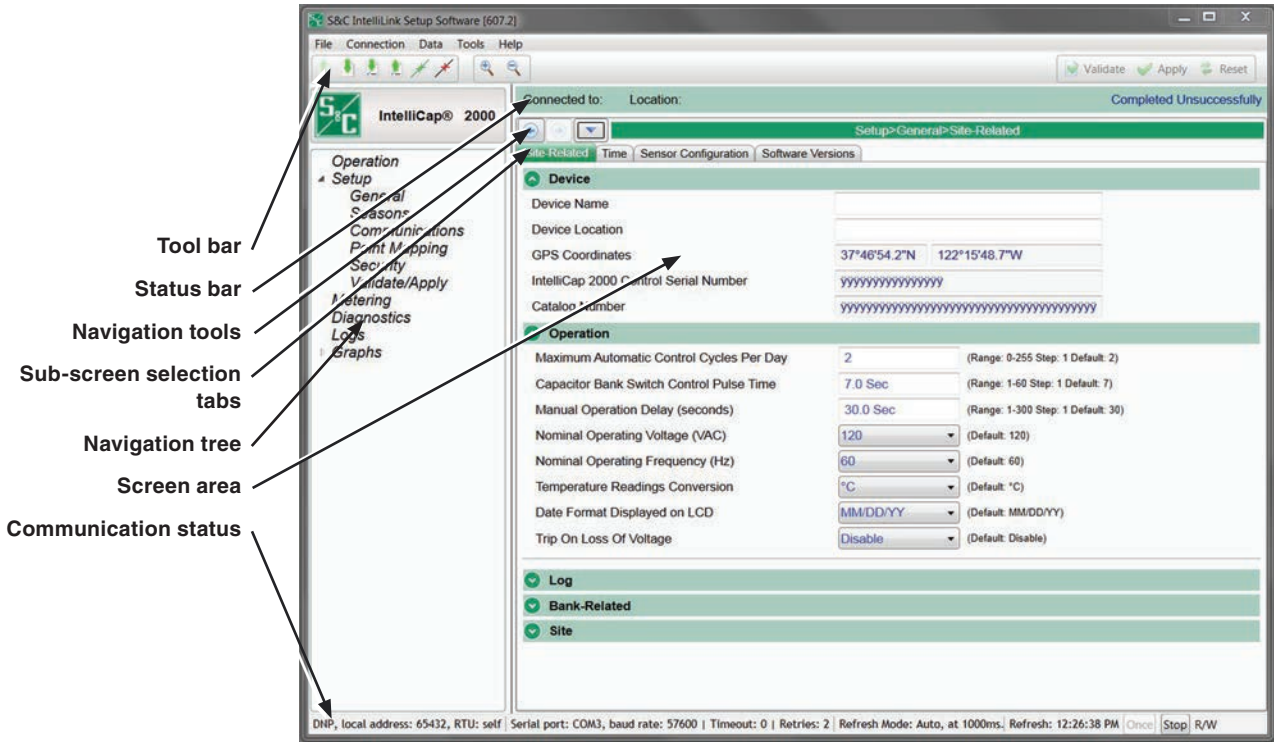
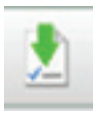
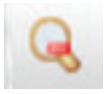
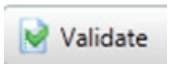
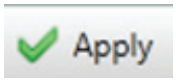


Figure 2. IntelliLink Setup Software features.

Tool Bar

	**Open Snapshot**	Same as the *Operation>File>Open Snapshot* screen—clicking on this icon opens a file browser to allow the selection of a snapshot file.
	**Save Data Snapshot**	Same as the *Operation>File>Save Data Snapshot* screen—clicking on this icon allows users to save a snapshot of the control data. It provides a picture of the controls memory content is a programing format.
	**Save Setpoints**	Same as the *Operation>File>Save Setpoints* screen—clicking on this icon opens the Save Setpoints dialog box.
	**Load Setpoints**	Same as the *Operation>File>Load Setpoints* screen—clicking on this icon opens the Load Setpoints dialog box.
	**Zoom In**	Clicking on this icon increases the size of objects and text in the screen area. See Figure 2 on page 12.
	**Zoom Out**	Clicking on this icon decreases the size of objects and text in the screen area. See Figure 2 on page 12.
	**Validate**	Same as the **Validate** button on the *Setup>Validate/Apply* screen, it checks the pending changes but does not apply them.
	**Apply**	Same as the **Apply** button on the *Setup>Validate/Apply* screen, it checks the pending changes and applies them if no errors are found.
	**Reset**	Same as the **Reset Buffer** button on the *Setup>Validate/Apply* screen, it removes pending changes and returns to settings in the memory.

Status Bar

Connected to:	**Connected to:**	This field shows the user-defined device name. The device name is entered on the *Setup>General Site-Related* screen.
Location:	**Location:**	This field shows the user-defined device location. The device location is entered on the *Setup>General Site-Related* screen.
Completed Successfully	**Validate Status**	This field shows the status for the **Validate** and **Apply** functions.

Navigation Tools

	**Navigation History**	Clicking on this icon opens a list of the last 10 screens visited. Selecting a screen from the list will automatically transition from the current screen to the selected screen.
	**Navigate Back**	Clicking on this icon selects the next screen in the history list.
	**Navigate Forward**	Clicking on this icon selects the previous screen in the history list.
Setup>	**Breadcrumb Field**	This icon displays the path of the present screen.

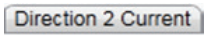
Navigation Tree

	Expand Arrow	This icon indicates the item to the right is collapsed with additional items underneath. Clicking on this icon expands the list to show the hidden sub-items.
	**Collapse Arrow**	This icon indicates the item to the right is expanded, showing additional items underneath. Clicking on this icon collapses the list to hide the displayed sub-items.

Sub-screen Selection Tabs

Active Tab

Green indicates the active screen tab.

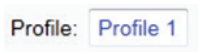


Inactive Tab

Grey indicates an inactive tab. Clicking on an inactive tab changes from the active screen to the screen associated with that tab.

Screen Area and Data Entry

The screen area contains various data objects used for configuring the control and some features that display and access the data objects. Basic data objects contain text boxes for direct text entry and list boxes for data selection.



Editable Text Boxes

Text boxes with a white background and light blue text indicate editable content. The cursor will change when hovering over an editable field.

Non-editable Text Boxes

Text boxes with a grey background and dark blue text indicate dynamic text that is populated by the control. This text cannot be changed.

List Boxes

List boxes indicated by a down arrow supply a list of choices when selected. The present selection will either be shown on the list box or in an adjacent text box.

Check Boxes

Check boxes are provided for enable/disable selections. Data fields for disabled items are automatically hidden or grey-shaded. Data fields for a disabled item cannot be changed.

Text Expanders

Expanders are provided to help manage a view. When the data below the expander are visible, the expander icon arrow points up. Clicking on the icon collapses or hides the data from view. When the data are hidden, the expander arrow points down. Clicking on the icon displays the hidden date.

Communication Status

The communication status bar at the bottom of the IntelliLink software screen displays the connection addresses, refresh mode, and the last refresh. The changing time entry after "Refresh:" indicates the control is communicating. Refresh defaults to the **Auto** mode, but it can be stopped by clicking on the **Stop** button and be manually refreshed by clicking on the **Once** button that comes into context when the refresh is stopped.

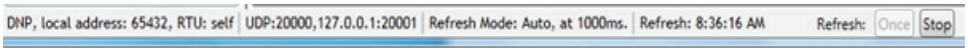


Figure 3. The communication status bar.

Site-Related

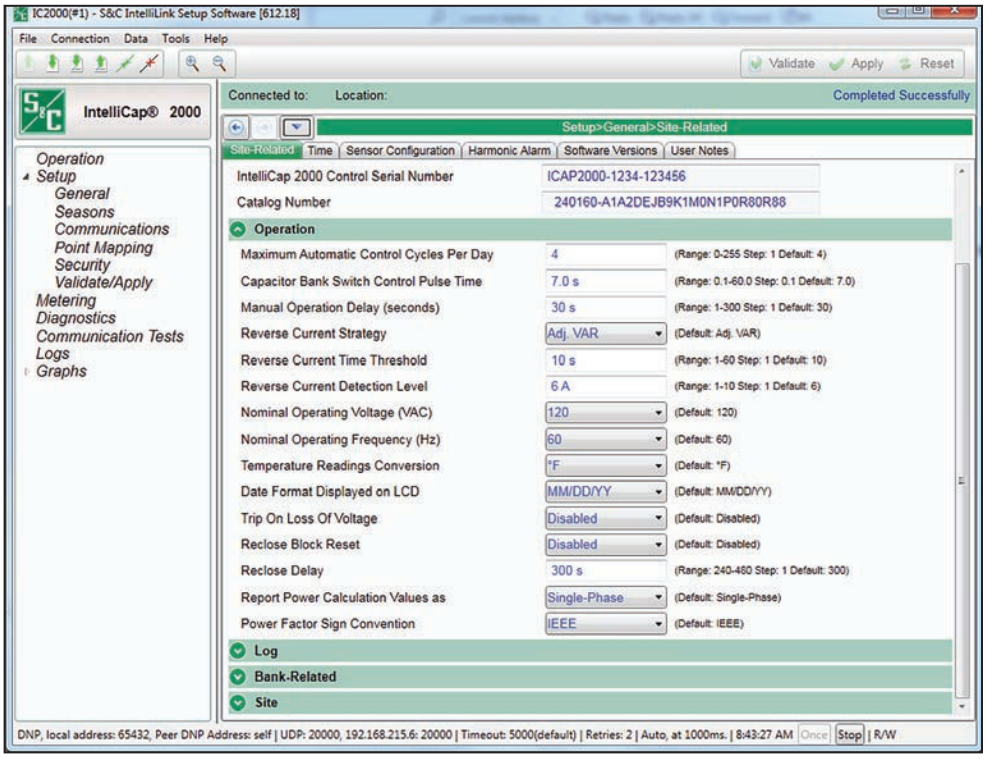


Figure 4. The *Setup>General>Site-Related* screen.

Device Section

Device Name

Enter a name for the IntelliCap 2000 control, up to 12 characters. This name is displayed at the top of the screen as "Connected to:"

Device Location

Enter a location for the IntelliCap 2000 control, up to 64 characters. This location is displayed at the top of the screen as "Location:"

GPS Coordinates

The optional integrated global positioning system automatically displays location data.

IntelliCap 2000 Control Serial Number

The serial number is automatically displayed.

Catalog Number

The catalog number is automatically displayed.

Operation Section

Maximum Automatic Control Cycles Per Day

In **Automatic** mode, the bank can switch out this number of times during a calendar day; further switching is inhibited until the next calendar day. (Range: 0-255; Step: 1; Default: 4) See Figure 4 on page 17.

Capacitor Bank Switch Control Pulse Time

This is the amount of time the control output is energized whenever the bank is switched by the control in **Automatic** mode or by a software **Manual** command. The pulse time is generally set to be equal to, or longer than, the switch manufacturer's recommendation. For motor-driven oil switches, a value of 7 seconds is typical. For vacuum-type switches, S&C recommends a value of 1 second (though the default value of 7 seconds will also work). For latching relays, select the **Latched** button to energize the control output continuously. (Range: 0.1-60.0; Step: 0.1; Default: 7.0)

Manual Operation Delay

This is the amount of time (in seconds) **Close** and **Open** operations from the faceplate are delayed. This allows the operator to step away from the bank. The operator can choose a delay from 1 to 300 seconds or disable the delay by clicking on the **Disabled** button. (Range: 1-300; Step: 1; Default: 30)

Reverse Current Strategy (Var Controls Only)

This setpoint configures how the control responds to a detected **Reverse-Current** condition. A **Reverse-Current** condition exists if the current remains continuously in the reverse direction for longer than the **Reverse Current Time Threshold** setting. When current flow returns to its normal direction, bank switching is based on the presently active control strategy. (Default: Adj. Var)

Possible options are:

Close & Inhibit—The control switches the bank to the **Online** state during a **Reverse-Current** condition and inhibits further switching until the condition clears.

Adj. Var—During a **Reverse Current** condition, if the current sensor is on the normal source side, the control calculates the **Adjusted 3-Phase kvars** value by subtracting the **3-Phase Bank Size** setting from the **Measured 3-Phase kvars** value. See the *Setup>Site-Related* screen. If the current sensor is on the normal load side, the control uses the measured kvars.

Trip & Inhibit—The control switches the bank offline during a **Reverse-Current** condition and inhibits further switching until the condition clears.

Voltage Only—During a **Reverse-Current** condition, the control switches the bank based only on the presently active **Normal Voltage Override** setting and the **Emergency Voltage Override** setting. If any **Neutral Sensor** strategies are enabled, they remain in effect.

When the control is in one of the **Current** or **Var** control modes when the current reverses, the **Volt Only** logic takes precedence over the **High-/Low-Voltage Band Error** logic; if applicable, the **Temperature Override** strategy is also discontinued. When current flow returns to normal, the control returns to switching the bank based on its regular control strategy and the present conditions.

When the control is not in one of the **Current** or **Var** control modes when the current reverses, it uses the **High-/Low-Voltage Band Error** logic in effect.

Reverse Current Time Threshold (Var Controls Only)

This is the amount of time the current must be continuously in the reverse direction for a **Reverse-Current** condition to exist. For the condition to clear, the current must be continuously in the normal direction for this amount of time. (Range: 0-60; Step: 1; Default: 10)

Reverse Current Detection Level (Var Controls Only)

This is the amount of current flow in the reverse direction required for the control to detect the **Reverse-Current** condition. The current must persist at or above this level continuously for the **Reverse Current Time Threshold** setting before the control applies the **Reverse Current Strategy** mode. (Range: 1-10 Amps; Step: 1; Default: 6)

Nominal Operating Voltage

This is the nominal operating voltage (in Vac) for the distribution system. The IntelliLink software automatically scales all voltage setpoints to the proper operating range. The voltages available are 110, 115, 120, 127, 220, 230, and 240 Volts. The **System Transformer Ratio** setting on the *Setup>General>Sensor Configuration>Voltage and Current* screen represents the ratio of the line-to-ground primary nominal voltage to the **Nominal Operating Voltage** setting. (Default: 120)

Note: Some season strategies hide the **High-Voltage Override** and **Low-Voltage Override** settings because they are not used for that strategy. When changing the **Nominal Operating Voltage** setting it may be necessary to expose those values and reset them to limits allowed by the validation process. The **Season Strategy** settings are on the *Setup>Seasons>Main* screen.

Nominal Operating Frequency

This is the nominal operating frequency (in Hertz) for the distribution system. (Default: 60)

Temperature Readings Conversion

Configure this setting for the unit of temperature the control operates on and displays as °F or °C. (Default: °F)

Date Format Displayed on LCD Screen

This setpoint changes the format of the date displayed on the LCD screen at the start of each scrolling sequence. The three options are MM/DD/YY, DD/MM/YY, and YY/MM/DD. (Default: MM/DD/YY)

Trip on Loss of Voltage

When invoked, this feature causes the control to trip the bank switches to the **Open** position whenever power is restored after a loss-of-voltage event. The minimum operation time is about 60 seconds. The feature has three settings: **Disabled** (default), **Trip Only**, and **Unconditional**. This feature is only active if the control is in the **Automatic Operation** mode and no higher-precedence operation or contingency condition exists to countermand its operation.

Operation of this feature results in the signal being sent to trip open the bank switches. The control will then initiate a 300-second **Reclose Block** function to prevent reclose operations until the capacitors discharge. After the **Reclose Block** function expires, the control will re-evaluate line conditions, strategy, and possible contingency conditions. It will operate the bank according to the configured settings. (Default: Disabled)

Three configuration settings available for this feature:

Disabled—This is the default setting. When the feature is disabled, upon power recovery after a loss-of-voltage event, the bank switch state is presumed to be in the same state it was in before the power loss. No action is taken upon power restoration unless indicated by strategy or other operation or contingency.

Trip Only—When the **Trip on Loss of Voltage** feature is configured to this setting, the control will automatically open the bank as soon as power is restored after a detected loss-of-voltage event. This operation will be superseded, inhibited, or countermanded by the following higher-precedence contingencies and operations, in order from highest to lowest:

- Voltage below the **Minimum Configured Bank Operation Voltage** condition
- **SCADA Override**, **Inhibit Automatic Operation** mode
- **Neutral Alarm Corrective Action** or **Automatic Operation Lockout** operations
- **Maximum Number of Daily Automatic Operations Reached or Exceeded** setting

The **Trip Only** operation will override the following lower precedence operations or conditions, in order from highest to lowest:

- **Voltage Override** operation or **Voltage Inhibit** condition
- **SCADA Override**, **Bank Operation** command
- **Automatic Season Strategy** operation

Unconditional—This setting is used when the bank switching device is equipped with an automatic mechanism to trip open the bank switch on loss-of-voltage. When power is recovered after a detected loss of voltage event and this setting is configured, the control will unconditionally issue the signal to trip open the bank switch to keep the bank state, as presumed by the control, consistent with the state of the physical switches. The only exception to this rule is the overriding condition where the control is operating at a voltage below the **Minimum Configured Voltage for Automatic Operation** setting and the **Maximum Number of Daily Automatic Operations Reached or Exceeded** setting.

Reclose Block Reset

Opening the capacitor bank switch activates the **Reclose Block** function; the capacitor bank switch will not be allowed to reclose for the configured **Reclose Delay** setting (Range: 240 – 480 seconds; default: 300). This allows the capacitors to discharge. If the **Reclose Block** feature is in effect and the **Reclose Block Reset** function is set to **Enabled** mode, the **Reclose Delay** function can be reset through the LCD screen using front panel keys. (Default: Disabled)

When the **Reclose Block Reset** setting is set to the **Enabled** mode, the LCD screen will display:

- Reclose Blk: nnn
- ENTER to Cancel
- NOTE: nnn = time remaining

To cancel the **Reclose Delay** function, press the ENTER key and use the +/- keys to change the number displayed to match the configured **Reclose Passcode** setting.

Reclose Passcode

This setting defines that numeric code that will allow the **Reclose Block** function to be reset from the front panel. (Range: 0-9; Step: 1; Default: 5)

Reclose Delay

This setting determines the duration a reclose will be blocked after the bank has been opened. (Range: 240-480; Step: 1; Default: 300)

Report Power Calculation Values As

This setting determines whether the **Power kVA**, **Power kV**, **Power kvars**, and **Adjusted kvars** values are reported as single-phase or three-phase measurements. This affects both IntelliLink software screens and DNP points. When reported as three-phase measurements, the reported value is 3 times the measured or calculated **Single-Phase** value.

Power Factor Sign Convention

This setting determines the sign convention applied to the power factor DNP analog input points and the power factor values displayed on the front panel LCD screen and on the *Operation* and *Metering* screens. The options are **IEEE** (default) and **IEC** modes. See Figure 5 on page 22.

When **IEEE** mode is selected, the power factor sign is solely dependent on the nature of the load being either capacitive or inductive.

- The power factor is negative for an inductive load (phase angle in quadrants I or III).
- The power factor is positive for a capacitive load (phase angle in quadrants II or IV).

When **IEC** mode is selected, the power factor sign is solely dependent on the direction of real power flow and is independent of the load being inductive or capacitive.

- The power factor is positive for normal (positive) real power flow (when real power flows into a load).
- The power factor is negative for reverse (negative) real power flow (when real power flows out of the load).

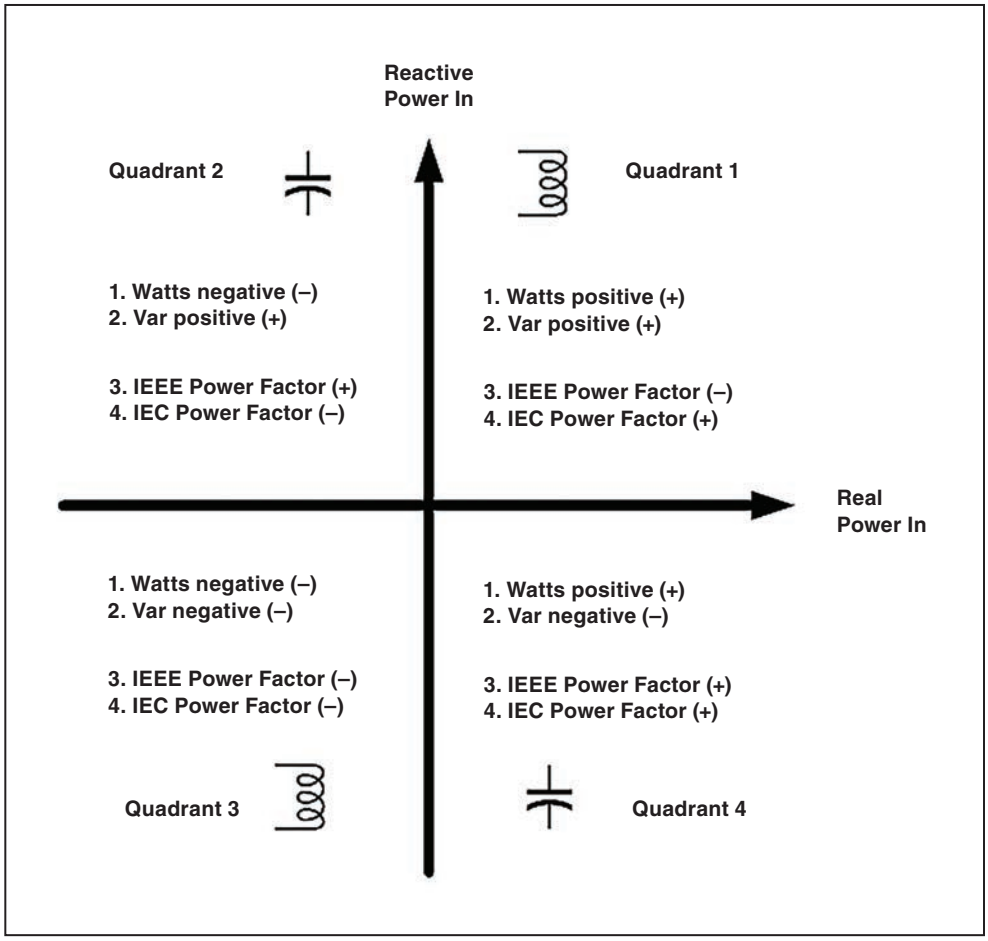


Figure 5. The power factor sign convention diagram.

Log Section

Logging Level

The logging level selected determines the type of data log messages captured in the base memory module and displayed on the *Logs>Historic Events* screen. Every data log message is assigned a specific log level, as follows:

Normal—User information

Extended—User information and internal status

All—User information, internal status, and internal trace/debugging information

Duplicate Event Margin (milliseconds)

The storage of identical events in a short time period can flood the internal memory and does not yield useful diagnostic information. For events to be considered duplicates, every element of their event records must match. This setpoint selects the data that will be stored in the internal memory and displayed on the *Logs>Historic Logs* screen. It determines the time between logging duplicate events. It has no effect on an alternating sequence of events.

For example, the setpoint can be set to 10 ms. for a sequence of events ABABAB (where A and B are different), assuming the next event occurs 1 ms after the previous one. Though identical events occur within 2 ms—well within the value of the setpoint—all events will be logged. (Range: 0-30; Step: 1; Default: 10)

Time Average for Metering

Interval (in minutes) over which a reported parameter will be averaged and stored in the control and in compact flash memory. A smaller interval will result in more log entries. (Range: 1-120; Step: 1; Default: 15)

Bank-Related Section

Voltage Override Operation

In **Automatic** mode, the control will override the selected control strategy (**Temperature**, **Timeclock**, etc.) when a **High-Voltage or Low-Voltage** condition (or an **Emergency High-Voltage** condition or **Emergency Low-Voltage** condition) is present. A **High-Voltage** or **Low-Voltage** condition is present if the voltage level remains outside the normal range for the user-specified period of time. Setpoints associated with each season's control strategy determine the range and period of time. The **Emergency High-Voltage** and **Emergency Low-Voltage** settings allow the bank to be switched more quickly during periods when the voltage is at a critical high or low level. For more information, see the *Setup>Seasons* screens.

Note: This logic does not apply when the **Automatic Offline** or the **Automatic Online** control strategy is in effect. Only the **Emergency High-Voltage** condition or the **Emergency Low-Voltage** condition will effect the bank when these strategies are in effect.

After a **High-Voltage** condition, the control will return to **Normal** operation mode when the voltage stays below a value equal to the present season's **High-Voltage Override Value** setting minus the **Bank Voltage Change + Margin** setting for the duration of the present season's configured **High-Voltage Override Time** value. After a **Low-Voltage** condition, the control will return to normal operation when the voltage stays above a value equal to the present season's **Low-Voltage Override Value** setting plus the **Bank Voltage Change + Margin** setting, (BVC+M) for the duration of the present season's configured **Low-Voltage Override Time** value.

The capacitor control also uses these override setpoints and the configured **Bank Voltage Change + Margin** setting to inhibit bank switching if it would cause a **Voltage Override** condition.

Emergency High-Voltage Override Value

This is the maximum voltage level before the capacitor control overrides the **Automatic Operation** mode and switches the bank out to avoid an extreme **High-Voltage** condition. The bank will be switched out if the following is true:

- The voltage stays above this level for the period of time specified by the configured **Emergency High-Voltage Override Time Threshold** setting.

Configure the **Emergency High-Voltage Override** setting to a value higher than the **High-Voltage Override Value** setting on the *Setup>Seasons* screen for the selected control strategies. (Range: 0.0-400.0; Step: 0.1; Default: 130.0)

Note: The control counts a switching cycle when the bank switches out.

Emergency Low-Voltage Override Value

This is the minimum voltage level before the capacitor control overrides the **Automatic Operation** mode and switches the bank in to avoid an extreme **Low-Voltage** condition. The bank will be switched in if the following is true:

- The voltage stays below this level for the period of time specified by the configured **Emergency Low-Voltage Override Time Threshold** setting.

Configure the **Emergency Low-Voltage Override** setting to a value less than the **Low Voltage Override Value** setting on the *Setup>Seasons* screen for the selected control strategies. (Range: 0.0-400.0; Step: 0.1; Default: 110.0)

Emergency High-Voltage Override Time Threshold

This is the amount of time the voltage must be continuously above the **Emergency High Voltage Override** setting before the bank switches out. Set this value to a time shorter than the **High-Voltage Override Time** setting on the *Setup>Seasons* screen for the selected control strategies. (Range: 0.1-30.0; Step: 0.1; Default: 5.0)

Emergency Low-Voltage Override Time Threshold

This is the amount of time the voltage must be continuously below the **Emergency Low-Voltage Override** setpoint before the bank switches in. Set this value to a time shorter than the **Low-Voltage Override Time** setting on the *Setup>Seasons* screen for the selected control strategies. (Range: 0.1-30.0; Step: 0.1; Default: 5.0)

High-/Low-Band Lockout Time Threshold

This is the number of days the **High-/Low-Voltage Band Error** state is allowed to continuously exist before the **High-/Low-Voltage Band Lockout** state is set and automatic operation of the bank switch is locked out. (Range: 1-30; Step: 1; Default: 5)

High-/Low-Voltage Band Lockout Reset (Lockout Override)

The **High-/Low-Voltage Band Error** condition is set when the Bank Voltage Change + Margin (BVC+M) voltage exceeds the voltage difference of the season strategy **High-/Low-Voltage Override** settings. The **Control Status** field on the *Operation* screen shows **Error** state. This error is reported on the *Diagnostics>Error* screen and the *Logs>Status Point Log* screen. The **Emergency High-/Low-Voltage Override** settings are used instead of the season overrides while the **High-/Low-Voltage Band Error** condition is active. When the condition persists continuously for the duration of the **High-/Low-Band Lockout Time Threshold** timer, the Voltage Band Lockout error is set.

When the **High-/Low -Voltage Band Lockout** setting is set, automatic operation of the bank switch is inhibited, except to allow the bank switch to open for a **High-Voltage** condition. This error is reported on the *Diagnostics>Error* screen and the *Logs>Status Point Log* screen. The High-/Low -Voltage Band Lockout is also set when either the **Emergency Voltage-Override Time Threshold** setting is in the **Disabled** state or the **BVC+M** value is greater than the difference of the **Emergency High-/Low-Voltage Override** setpoints during a **High-/Low-Voltage Band Error** condition.

The **High-/Low-Voltage Band Error** condition will automatically clear if the **BVC+M** value is being automatically calculated and subsequent switch operations result in the calculated **BVC+M** value becoming less than the difference of the season strategy **High-/Low-Voltage Override** settings. The High-/Low-Voltage Band Lockout cannot be automatically cleared.

The season High-/Low-Voltage Override difference used is based on one of the following, depending on current settings:

- Season **High-/Low-Voltage Override** settings
- **SCADA Override High-/Low-Voltage Override** settings
- **Time-Biased Voltage Season Strategy**, **Timeclock Active**, or **High-/Low-Voltage Override** settings
- **Time-Biased Voltage Season Strategy**, **Timeclock Inactive**, or **High-/Low-Voltage Override** settings

High-/Low-Voltage Band Lockout Reset Delay Time

This setting allows reset of the **BVC+M** value in use to the estimated value and resets the Automatic Calculation buffer so normal operation resumes control of the bank after a High-/Low-Voltage Band Lockout occurred. When set to the **None** mode the **BVC+M** value and the Automatic Calculation buffer will not be reset by this feature. (Range: None, 1-96; Step: 1; Default: None)

High-/Low-Voltage Band Lockout Reset Delay Time Units

This setting configures the time value. (Range: Minutes, Hours; Default: Hours)

Bank Voltage Change + Margin Operation

When the **Bank Voltage Change + Margin** setting is greater than the difference between the configured **High-Voltage Override Value** setting and the configured **Low-Voltage Override Value** setting for the present season, the control sets the **High-/Low-Voltage Band** error alarm. For more about configuring the **Bank Voltage Change + Margin** setting and the **Voltage Override** setting, see the “Voltage Override Operation” section on page 23.

When either of the **Emergency Voltage Override Time Threshold** settings is disabled, the control blocks further automatic operation of the capacitor bank except to open a closed bank during a **High-Voltage** condition.

When both of the **Emergency Voltage Override Time** thresholds are enabled, the control uses the **Emergency Voltage Override** setpoints to define **Voltage Override** conditions and inhibit bank switching. The strategy for the present season remains in effect. The control returns to the **Normal Voltage Override** setpoints when the cal-

culated Bank Voltage Change + Margin result is less than the difference between the **High-Voltage Override Value** setting and the **Low-Voltage Override Value** setting for the present season. However, if it becomes greater than the difference between the **Emergency Voltage Override** setpoints, the control blocks further automatic operation of the bank, except to open a closed bank during a **High-Voltage** condition.

For more information, see S&C Instruction Sheet 1024-540, "IntelliCap® 2000 Automatic Capacitor Control: *Operation*."

Bank Voltage Change + Margin: Present Value In Use

This field shows the **Bank Voltage Change + Margin** value the control is using, whether estimated or calculated.

Note: When the control is installed, it uses the **Bank Voltage Change + Margin: Estimated Value** setting until four open-close operations have taken place. Any time the estimated value is changed, the control uses that value until another four **Close-Open** operations have occurred. Therefore, make sure the correct **Bank Voltage Change + Margin: Estimated Value** setting is configured when the **Automatic Calculation** setting is used.

Bank Voltage Change + Margin: Estimated Value

This is an estimated average of the voltage change associated with the bank switching in or out, plus a small margin. Set this value to the average measured voltage change at the bank, plus 0.5 Volts or 25% (whichever is larger) for an operating margin. The control uses the **Bank Voltage Change + Margin** and the **Voltage Override** setpoints for the present season to inhibit bank switching if the voltage is close enough to a configured **Override Limit** setting that switching the bank would cause a **Voltage Override** condition. (Range: 0.5-25.4; Step: 0.1; Default: 1.5)

Bank Voltage Change + Margin: Automatic Calculation

When enabled, the control automatically calculates the **Voltage Change** and **Margin** values. The control uses the average change in voltage from the last four switching operations for the **Voltage Change** value and 25% of the average for the **Margin** value. The minimum for the **Margin** value is 0.5 Volts. (Default: Enabled)

When this feature is enabled, the control can account for any future feeder configuration changes that affect the **Voltage Change** value.

Capacitor Bank Switch Minimum Switching Voltage

The control will not operate the capacitor bank switch below this voltage. For motor-controlled switches, set this value as low as 100 Volts on a 120-Vac base. For vacuum switches, do not set this value below 110 Volts on a 120-Vac base or the minimum value specified by the switch manufacturer to prevent switch damage during a brownout condition. (Range: 0.0-400.0; Step: 0.1; Default: 101.0)

Minimum Percentage of Average Delta Voltage

This setpoint compares the most recent change in voltage (Delta V) with the average Delta V for the previous four switching operations. When the most recent Delta V is below this percentage of the average Delta V level, a bank switch malfunction may have occurred. This condition is logged on the *Logs>Historic Log* screen. See Instruction Sheet 1024-540, "IntelliCap 2000 Automatic Capacitor Control: *Operation*." (Range: 0-99; Step: 1; Default: 50)

This value may be decreased to allow a greater deviation in the **Delta V** value, or it may be increased when the **Delta V** value is very stable.

Minimum Percentage of Average Delta kvars (Var Controls Only)

This setpoint compares the most recent change in kvars (Delta kvars) with the average Delta kvars for the previous four switching operations. When the most recent Delta kvars value is below this percentage of the average level, a bank switch malfunction may have occurred. This condition is logged on the *Logs>Historic Log* screen. See Instruction Sheet 1024-540, "IntelliCap 2000 Automatic Capacitor Control: *Operation*." (Range: 0-99; Step: 1; Default: 70)

This value may be decreased to allow a greater deviation in the **Delta kvars** value, or it may be increased when the **Delta kvars** value is very stable.

3-Phase Bank Size (kvars) (Var Controls Only)

This is the size of the capacitor bank (in kvars) the control switches. Be sure to enter the correct value because this number may be used to calculate the **Adjusted Total kvars** value. (Range: 0-12,750; Step: 1; Default: 1,200)

Site Section

User Defined Input: Enable/Disable

The IntelliCap 2000 control has one **User Defined Input** setting. When enabled, the state of this input is displayed on the *Operation* screen and the **Automatic** operation will respond to the active state of the input as determined by the **User Defined Input Response** setting. (Default: Disabled)

Digital Input 3 is connected to Input Terminal 2, and Terminal 1 is the return.

User Defined Input Label

The label for the **User Defined Input** setting may be any combination of up to 20 alphanumeric characters, and the dash "-" and the underline "_" special characters. (Default: User Input)

User Defined Input Response

The **User Defined Input** setting can provide an alarm indication or it can affect control operation. The control will respond as follows to the selected response setting:

Do nothing—(Default) When this response is selected, only the DNP status point and the indication on the *Operation* screen will respond to the input state. The input state is on when connected to a closed contact; otherwise it's off. This is the default setting. This selection will also result in the User Defined status on the *Diagnostics>Warnings* screen becoming active.

Disable operation—When this response is selected, the DNP status point and the indication on the *Operation* screen will respond to the input state. The input state is on when connected to a closed contact; otherwise, it is off. When the input state is on, the bank will remain in whatever state—switched in or switched out—that it was in when the point became active. The control will enter an **Error** state that ceases all automatic/manual operations until the point becomes inactive. Issuing a **Clear Error** command on the *Diagnostics>Errors* screen or the DNP **Clear Errors** control point will not suspend this error. This selection will also result in the User Defined status on the *Diagnostics>Errors* screen becoming active.

Issue open and disable operation—When the **Operation** setting is set to **Auto** mode, if this response is selected the DNP status point and the indication on the *Operation* screen will respond to the input state. The input state is on when connected to a closed contact; otherwise, it's off. When the input is on, the control will issue an **Open** command and will enter an **Error** state that ceases all automatic/manual operations until the point becomes inactive. Issuing a **Clear Error** command on the *Diagnostics>Errors* screen or from the DNP **Clear Errors** control point will not suspend this error. This selection will also result in the User Defined status on the *Diagnostics>Errors* screen becoming active.

When the **Operation Mode** setting is set to **Manual** mode, if this response is selected the DNP status point and the indication on the *Operation* screen will respond to the input state. The input state is on when connected to a closed contact; otherwise, it is off. When the input is on, the control will not issue an **Open** command and will only enter an **Error** state that ceases all automatic/manual operations until the point becomes inactive. When the **User Defined Input** indication goes off, the error will automatically clear and automatic/manual operation will be allowed to resume. Issuing a **Clear Error** command on the *Diagnostics>Errors* screen or from the DNP **Clear Errors** control point will not suspend this error. This selection will also result in the User Defined status on the *Diagnostics>Errors* screen becoming active.

Issue close and disable operation—When the **Operation Mode** setting is set to **Auto** mode, if this response is selected, the DNP status point and the indication on the *Operation* screen will respond to the input state. The input state is on when connected to a closed contact; otherwise, it is off. When the input is on, the control will issue a **Close** command, and the control will enter an **Error** state that ceases all automatic or manual operations until the point becomes inactive. Issuing a **Clear Error** command on the *Diagnostics>Errors* screen or from the DNP **Clear Errors** control point will not suspend this error. This selection will also result in the User Defined status on the *Diagnostics>Errors* screen becoming active.

When the **Operation Mode** setting is set to **Manual** mode, if this response is selected the DNP status point and the indication on the *Operation* screen will respond to the input state. The input state is on when connected to a closed contact; otherwise, it is off. When the input is on, the control will not issue a **Close** command and the control will only enter an **Error** state that ceases all automatic/manual operations until the point becomes inactive. When the User Defined Input indication goes off, the error will automatically clear and automatic/manual operation will be allowed to resume. Issuing a **Clear Error** command on the *Diagnostics>Errors* screen or from the DNP **Clear Errors** control point will not suspend this error. This selection will also result in the User Defined status on the *Diagnostics>Errors* screen becoming active.

Manual Override of User Input Response

When set to **Disabled manual** mode, the IntelliLink software and SCADA commands will be blocked whenever automatic operation has been set to the **Disabled** state by the User Defined Input selection. When set to **Enabled manual** mode, the IntelliLink software and SCADA commands will be allowed, with no modification to operational criteria, when automatic operation has been set to the **Disabled** mode by the **User Defined Input** selection. (Default: Enabled)

Door Position Sensor

When the control has an optional door position sensor, set this to **Installed** mode. (Default: Not Installed)

Digital Switch Position Inputs

When the capacitor switch provides position indication, set this to **Enabled** mode. (Default: Disabled)

Digital Switch Inconsistent Position Response

When the switch position indicators report both a Close status and an Open status or they report neither a Close nor Open status—which can occur in the case of a damaged switch or incorrect input wiring—one of these automatic responses can be configured to determine the action of the control:

Disable all automatic operations—When this response is selected and an inconsistent position is detected, the bank will remain in whatever state—switched in or switched out—that it was in. The control will enter an **Error** state that ceases all automatic operations until the condition is corrected and the error is cleared. The Inconsistent Position status on the *Diagnostics>Errors* screen also becomes active.

Issue open and disable all automatic operations—When this response is selected and an inconsistent position is detected, the control will issue an **Open** command and will enter an **Error** state that ceases all automatic operations until the condition is corrected and the error is cleared. The Inconsistent Position status on the *Diagnostics>Errors* screen also becomes active. This condition does not block manual operation from the front panel, IntelliLink software commands, or SCADA commands.

Issue close and disable all automatic operations—When this response is selected and an inconsistent position is detected, the control will issue a **Close** command and will enter an **Error** state that ceases all automatic operations until the condition is corrected and the error is cleared. The Inconsistent Position status on the *Diagnostics>Errors* screen also becomes active. This condition does not block manual operation from the front panel, IntelliLink software commands, or SCADA commands.

Default to last bank command—(Default) When this response is selected, the control will disregard the position response and show the **Last Bank Command** indication as the bank position. Automatic operation will remain unchanged. The Inconsistent Position status on the *Diagnostics>Errors* screen also becomes active.

Digital Switch Contradictory Position Response

A contradictory position response occurs when the **Switch Position** indicators do not agree with the Last Bank Command selection. This can occur after a power cycle or when the capacitor bank can be manually operated independently of the control. One of the following automatic responses can be configured to determine the action of the control:

Do nothing—(Default) When this response is selected, the control operates based on the Last Bank Command selection. The Contradictory Position status on the *Diagnostics>Warnings* screen becomes active when a contradictory position is detected and resets when the condition is corrected.

Disable all automatic operations—When this response is selected, the bank will remain in whatever state—switched in or switched out—that it is in when the problem occurs. The control will enter an **Error** state that ceases all automatic operations until the condition is corrected and the error is cleared. Issuing a **Clear Error** command from the *Diagnostics>Errors* screen or from the DNP **Clear Errors** control point will suspend this error until the next bank operation. When the Last Bank Command selection and the digital switch positions do not agree, the **Error** state is issued and the Contradictory Position status on the *Diagnostics>Errors* screen becomes active. This condition does not block manual operation from the front panel by an IntelliLink software command or SCADA command.

Issue command to input state—When selected, the control automatically issues a command to the input state. If a **Close** command is required, the control starts the **Reclose Block Timer** function and delays the command until the timer expires. If there is an active **Emergency Override** condition, the control automatically meets the override requirements. After issuing the command, the control resumes **Automatic** operation and follows the active strategies or overrides. The Contradictory Position status on the *Diagnostics>Warnings* screen also becomes active when a contradictory position is detected and automatically resets when the condition is corrected.

Time

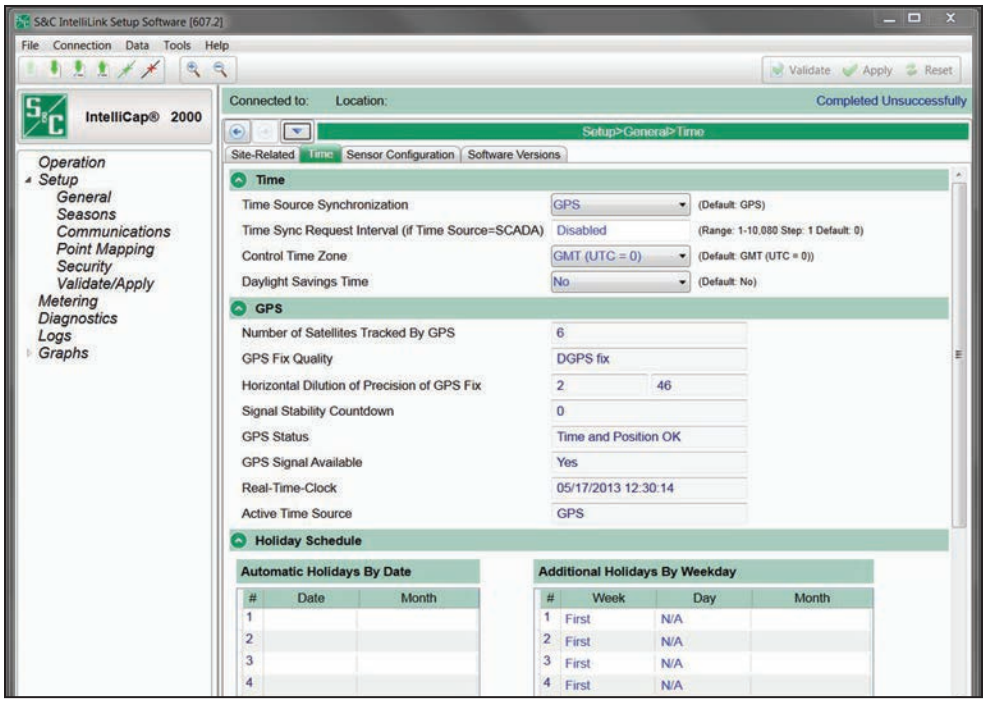


Figure 6. The *Setup>General>Time* screen.

The clock synchronization source and holidays are configured on this screen. See Figure 6.

Time Section

Time Source Synchronization

Select from the drop-down list: **GPS**, **SCADA**, **GPS and SCADA**, or **User Set** mode. (Default: GPS)

Time Sync Request Interval (if Time Source=SCADA)

This is the interval (in minutes) that SCADA will be polled for time synchronization. (Range: 1.0-10,080.0; Step: 1; Default=Disabled)

Control Time Zone

Select from the drop-down list. (Default: GMT (UTC=0))

Daylight Saving Time

Select from the drop-down list: Yes or No. (Default: No)

Note: Select the **Start Day**, **End Day**, and **Offset** settings for the **Daylight Saving Time** feature.

GPS Section

Number of Satellites Tracked by GPS

This is the number of satellites used in the calculation of the position and time displays. Triangulation of three satellites at a minimum is required to determine position, but three satellites in a straight line cannot determine position. Only one satellite is required to determine time.

GPS Fix Quality

This statement indicates the GPS Fix Quality:

Invalid

GPS fix (SPS)

DGPS fix

PPS fix

Real Time Kinematic

Float RTK

Estimated (dead reckoning)

Manual input mode

Simulation mode

Horizontal Dilution of Precision of GPS Fix

This statement indicates the relative estimate of GPS horizontal position fix accuracy:

1 = Ideal—This is the highest confidence level.

1-2 = Excellent—The position measurements are accurate for most applications.

2-5 = Good—This is the minimum information appropriate for making business decisions.

5-10 = Moderate—This information could be used for calculation, but a more open sky view is recommended.

10-20 = Fair—This indicates a low confidence level, producing a very rough estimate of the present location.

> 20 = Poor—This information can be inaccurate by as much as 300 meters with a 6-meter accurate device.

Signal Stability Countdown

This counter starts when a signal returns after it had been lost. It counts down from 300 seconds. If the timer reaches 0 (the signal has persisted for 300 seconds), the signal is considered stable.

GPS Status

This statement indicates the status of time, position, and reception conditions:

Time and Position OK

Time and Pos OK, Pending Stability

Time and Pos OK, No Pulse Signal

Time and Position Invalid

Data Invalid: Serial-Line Anomaly

Data Invalid: Serial-Line Error

Data Invalid: Serial-Line Silence

Disabled By User

Not Initialized

GPS Signal Available

A **Yes** display indicates the GPS signal is adequate to permit GPS time synchronization.

NOTICE

When using IntelliCap 2000 control in a test environment, GPS-only functions if the control is in a vertical position and the GPS antenna has line-of-sight to a GPS satellite or a GPS repeater.

Real-Time Clock Display

This is the date and 24-hour time display.

Active Time Source

This display indicates the time source as the processor clock, real-time clock, or GPS source.

Satellite Signal Noise Ratio

This displays the satellites in view by ID number and the signal-to-noise ratio in dB for each satellite. The number of satellites in the list can be higher than the number shown in the **Number of Satellites Tracked by GPS** field. 30dB+ is a good signal, 20dB to 30dB is an acceptable signal, 10dB to 20dB is a poor signal, and less than 10dB is unreliable.

Holiday Schedule Section

Automatic Holidays

When set to the **Enabled** state, this option allows the control to automatically recognize certain days of the year as a holiday. These are days when the bank should be switched to the **Off** state, except during a **Low-Voltage** condition. The default settings provide the dates for the following specific holidays:

- President's Day (third Monday in February)
- Memorial Day (last Monday in May)
- Labor Day (first Monday in September)
- Thanksgiving (fourth Thursday in November)

Any combination of these automatic holidays can be selected by checking the Active check box next to the holiday.

Holidays by Date

These are specific dates that are treated as a holiday. On the specified day, the bank will be switched to the **Off** state, except during a **Low-Voltage** condition. When the day falls on a Saturday, the previous Friday will also be considered a holiday. When the day falls on a Sunday, the following Monday will also be considered a holiday.

Holidays by Weekday

This schedule represents holidays that fall on the same day of the week in a specific month each year. They are entered in the format [First, Second, Third, Fourth, Last] [day of week] in [month] (for example, "Second Saturday in August"). When using this method to specify a holiday, the control calculates the correct date each year. On the calculated date, the bank will be switched to the **Off** state, except during a **Low-Voltage** condition. When the day is a Saturday, the previous Friday will also be considered a holiday. When the day is a Sunday, the following Monday will also be considered a holiday.

Sensor Configuration

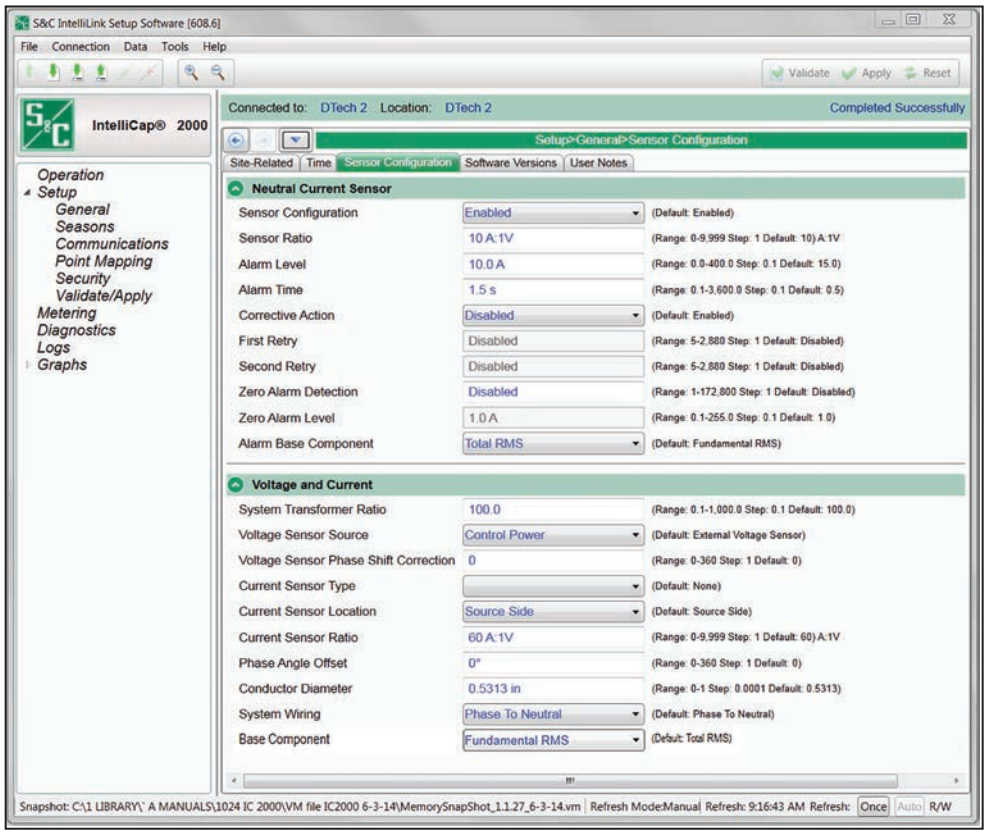


Figure 7. The *Setup>General>Sensor Configuration* screen.

Neutral Current Sensor or Neutral Voltage Sensor Section

Controls with Neutral Sensing option "-N1" will show "Neutral Current" in the screens where current is indicated.

Controls with Neutral Sensing options "-N2," "-N3," "-N4," or "-N5" will show "Neutral Voltage" in the screens where voltage is indicated. See Figure 7.

Sensor Configuration

When the **Sensor Configuration** mode is in the **Disabled** state, the neutral sensor inputs are ignored. This allows control operation without a neutral sensor connected. (Default: Enabled)

Sensor Ratio

This setting is the neutral sensor ratio, as specified by the manufacturer. The value corresponds to an output of 1 Volt RMS from the neutral sensor. The capacitor control uses this number to calculate the actual neutral current or voltage level. (Range: 0-9,999; Step: 1; Default: 10)

Alarm Level

This is the maximum neutral current or voltage (fundamental or total RMS) before the **Neutral Sensor** alarm is set. The neutral current or voltage must be above this value for the time period specified by the **Alarm Time** setpoint before the alarm is set. (Range: 0.0-400.0; Step: 0.1; Default: 15.0)

When the **Alarm Base Component** mode is in the **Fundamental RMS** state, set the alarm level to approximately 50% of the normal capacitor bank line current or voltage to detect blown fuses and defective capacitor switches.

For example: for a wye-grounded, 24.9-kV phase-to-phase distribution circuit with a 900-kvar three-phase capacitor bank, the line current is 900/(24.9 x square root of 3) = 21 amps. Set the alarm level to 10 amps.

To detect partial failure of individual capacitor units, set the alarm level to a lower value.

Alarm Time

This is the amount of time neutral current or voltage must be continuously above the **Alarm Level** setpoint before the **Neutral Sensor** alarm is set. (Range 0.1-3,600.0; Step: 0.1; Default: 0.5)

Corrective Action

When the **Corrective Action** mode is in the **Enabled** state and a **Neutral Sensor** alarm is triggered, the control attempts to reverse the last switching operation. The control also takes corrective action when the bank is in the **Closed** state and a **Neutral Sensor** alarm becomes active. Because the control assumes a fuse operation in this case, it opens the bank. When the bank is in the **Open** state and a **Neutral Sensor** alarm becomes active, the control assumes a condition that cannot be handled by closing the bank, such as when a shorted switch has occurred, and locks out further automatic operation. If a switch sticks when the bank opens, corrective action is taken after the **Reclose Block** timer expires. During the **Reclose Block** mode, line 1 of the LCD screen shows “Retry Pending” and Line 2 indicates the reclose block time remaining. The OPEN LED blinks while the **Reclose Block** timer is active. When the **Corrective Action** mode is in the **Disabled** state, the control goes to the **Lockout** state, blocks the **Automatic Operation** mode, and disables the **Corrective Action** and **Neutral Retry** modes. (Default: Enabled)

First Retry—Second Retry

When the **First Retry** setpoint is not in the **Disabled** state, the control operates the bank again after the configured **First Retry Time Delay** setpoint. If the **Second Retry** setpoint is also not in the **Disabled** state, the control operates the bank a second time after the configured **Second Retry Time Delay** setpoint. When the neutral current level is normal after either retry, the alarms clear and the control returns to normal operation. Otherwise, the control returns the bank to the **Corrective Action** mode and, if this is the second retry or if the **Second Retry** mode is in the **Disabled** state, the control blocks the **Automatic Operation** mode. When the **First Retry** mode is in the **Disabled** state, the control blocks the **Automatic Operation** mode after the corrective action is taken. (Range: 5-2,880; Step: 1; Default: Disabled)

To manually clear the **Neutral Sensor Trouble** condition during a retry-time delay:

STEP 1. Place the control in **Manual** mode.

STEP 2. Wait for the **Neutral Sensor Trouble** condition to clear.

STEP 3. Switch to the **Automatic Operation** mode.

When the **Reclose Block** timer expires (if active), the control returns to the local strategy and the correct bank state for that strategy. During a retry the LCD screen shows "Retry Pending" on line 1 and the time remaining on line 2.

When the **Corrective Action** mode is in the **Enabled** state, an **Emergency Voltage** condition will override a **Neutral Sensor Lockout** state. When voltage returns to the configured normal range, the **Neutral Sensor Lockout** state will be reapplied.

Zero Alarm Detection

A **Zero Neutral Current or Voltage** condition must persist for the duration of the **Zero Alarm Detection** timer setpoint to be considered active. (Range: 1-172,800; Step: 1; Default: Disabled)

When the control detects a total RMS neutral current or voltage that is less than the configured **Zero Alarm Level** setpoint for a period of time specified by the **Zero Alarm Detection** setpoint (if enabled), the control sets the **Zero Neutral** alarm. The control does not try corrective action or does not set the **Lockout** state. The alarm clears when the **Zero Neutral Current or Voltage** condition clears or when a lockout reset procedure is performed.

Zero Alarm Level

A **Zero Neutral Current or Voltage** condition must be lower than the **Zero Alarm Level** setpoint to be considered active. (Range: 0.1-255.0; Step: 0.1; Default: 1.0)

Alarm Base Component

This is the component of the neutral current or voltage the control measures and compares to the **Alarm Level** setpoint to trigger the **Neutral Sensor** alarm. When the **Fundamental RMS** state is selected, the control uses only the 60-Hz component. (Default: Fundamental RMS)

Voltage and Current Section

System Transformer Ratio

This is the step-down ratio of the voltage transformer (for example, primary to 120 volt). The control records, displays, and manipulates voltages normalized on the nominal voltage base set by this ratio and the **Nominal Operating Voltage** setpoint found on the *Setup>General>Site Related>Operation* screen. This parameter provides the conversion ratio from the nominal operating voltage base to the **Line-to-Ground Voltage** value. (Range: 0.1-1,000.0; Step: 0.1; Default: 100.0)

Be sure to enter the ratio for transformers that are wired the same way (phase to neutral or phase to phase) as the value entered for the **System Wiring** setpoint.

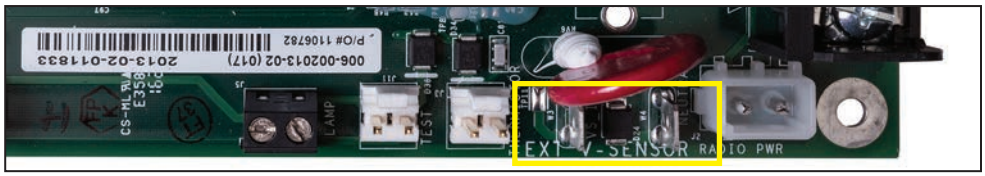


Figure 8. External voltage sensor input terminals.

Voltage Sensor Source

When equipped with option suffix "-K1," the control can derive voltage sensing from an external voltage sensor and is factory configured to use an external sensor. The available sensor input ranges are 0-5 V or 0-10 V. The external sensor positive input connects to the left spade terminal and neutral to the right terminal. See Figure 8.

A control with option suffix "-K1" can be configured to obtain its voltage-sensing signal from the control power, but it will require a hardware configuration change to match the software setting. Voltage is sensed on Pins 11 and 12 of the input terminal block. See Figures 9 and 10 on page 39, and the Notice below.

NOTICE

This setting requires a hardware jumper change to operate properly. Connecting control power to Terminal 11 will cause damage to the control if jumper H2 on the PSIO board is not in the proper position. To change a control from external sensing to control power sensing requires removal of the front panel, so the position of jumper H2 on the PSIO board can be changed.

The jumper positions are:

- Pins 1 and 2 = Control power
- Pins 2 and 3 = External sensor, maximum input voltage = 20 Vac

External Voltage Sensor Ratio

The setting is only valid when the control has been equipped with option suffix "-K1" and the **Voltage Sensor Source** mode is set to the **External Voltage Sensor** state. Enter the ratio of the external voltage sensor provided by the sensor manufacture. For example if a line-post sensor has a ratio of 10,000:1, enter 10000. (Range: 1-20,000; Step: 1; Default: 100)

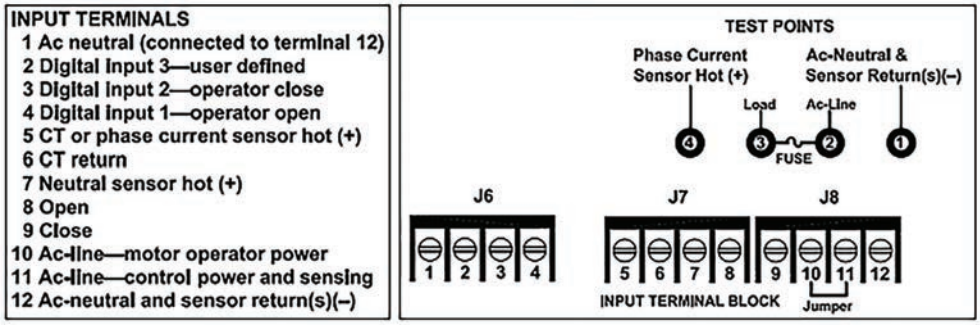


Figure 9. Input terminal functions.

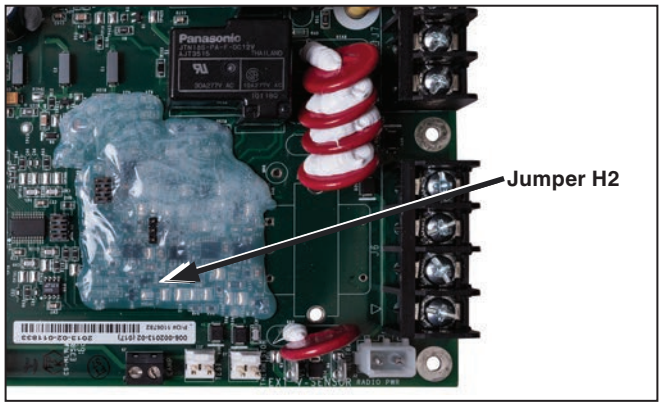


Figure 10. Jumper H2 location.

Voltage Sensor Phase Shift Correction:

The setting is only valid when the control is equipped with option suffix "-K1." This provides phase-angle correction for the voltage sensor input. When the actual phase-angle shift of the sensor has not been provided, use the nominal phase-angle shift for the chosen sensor. (Range: 0-360; Step: 1; Default: 0)

Current Sensor Type (Var Controls Only)

For controls with current sensors, this is the type of sensor installed for this control. (Default: None) The available selections are:

- S&C CS Current Sensor
- Lindsey CVMI-C (choke-equipped)
- Fisher Pierce low-accuracy sensors (1301-11A for 15-kV systems)
- 1301-21A for 35-kV systems (1301-41A for 25-kV systems)
- Fisher Pierce high-accuracy sensors (1301-17A for 15-kV systems)
- 1301-27A for 35-kV systems (1301-47A for 25-kV systems)
- Piedmont Electric current sensors

Note: A corrective +90-degree phase shift is added by the software when a Fisher Pierce sensor is selected.

Current Sensor Location (Var Controls Only)

This is the location of the current sensor or current transformer. If the sensor/transformer is on the normal source side of the bank, enter "Source Side." If the sensor/transformer is on the normal load side of the bank, enter "Load Side." (Default: Source Side)

For the var strategy, we recommend installing the sensor/transformer on the normal source side of the bank whenever possible.

For the current strategy, control setup is simplified if the sensor/transformer is on the load side of the bank.

Current Sensor Ratio (Var Controls Only)

For controls with current sensors, this is the ratio of sensed amps to 1 VRMS output, as specified by the manufacturer. The control uses this ratio to calculate the level of actual current flow. (Range: 0-9,999; Step: 1; Default: 60)

Phase Angle Offset (Degrees) (Var Controls Only)

This setpoint allows an installation-dependent phase-angle correction to be configured. The control uses these corrections and other site-related parameters to calculate power factor and kvars and to determine the normal or reverse current-flow direction. The phase-angle detection and display requires a minimum current of 0.5% of the full-scale value. Current magnitude continues to be detected and displayed below the 0.5% threshold. The correction assumes normal power flow with the capacitor bank offline. (Range: 0-360; Step: 1; Default: 0)

Refer to the "Calculating the Phase Angle Offset Value" section on page 42 for more information.

Conductor Diameter

For controls using Fisher-Pierce sensors, this is the diameter (in inches) of the monitored conductor. Correction factors are based on Fisher Pierce published data. See the Fisher Pierce data sheets for further information. (Range: 0-1; Step: 0.0001; Default: 0.5313)

System Wiring

This indicates how the voltage transformer that powers the control is connected (phase to ground or phase to phase). (Default: Phase to neutral)

Base Component

This is the component or components the control measures and compares. When the **Fundamental RMS** setpoint is selected, the control uses only the 60-Hz (or 50-Hz) component. Options are the **Total RMS** and **Fundamental RMS** settings. (Default: Fundamental RMS)

Real-Time Data for Calibration Purposes Section

This section of the screen displays real-time data values also shown on the *Metering* screen. The control creates these values from raw sensor data and the information entered on the setup screens.

Use the real-time data to immediately check the effect of any change made in the upper part of the screen. This data also may be used when setting the **Phase Angle Offset** setpoint.

Note: Data are not updated until the information has been applied. Be sure to click on the **Apply** button to complete the update.

Line Voltage (Volts Ac)

This is the present, measured voltage at the capacitor control on the nominal voltage base (for example, 120 Vac). The control software uses this value in calculating kvars.

Line-to-Ground Voltage (kV)

This is the present, calculated distribution-line voltage, based on the measured line voltage, and the specified **Voltage Transformer Ratio** and **Voltage Transformer Wiring** setpoints.

Uncorrected Phase Angle *(Var Controls Only)*

This is the phase angle (the offset of the current waveform referenced to the voltage waveform) before configured correction factors have been applied.

Measured Current (Amps) *(Var Controls Only)*

This is the current, measured by the current sensor and scaled by the **Single-Phase Current Sensor Ratio** setpoint.

Corrected Phase Angle *(Var Controls Only)*

This is the corrected phase angle (the offset of the current waveform referenced to the voltage waveform) after the configured correction factors have been applied. When the control is properly set up, these corrected phase angles will be 0 +/-89.9 degrees.

Lagging phase angles are represented as values between 0 and 90 degrees. Leading phase angles are represented as values between 0 and –90 degrees.

Measured Power Factor *(Var Controls Only)*

This is the power factor, calculated as the cosine of the value in the **Corrected Phase Angle** field. Leading power factors are represented by negative numbers.

Current Flow Direction *(Var Controls Only)*

When the control is properly set up and power is flowing through the circuit in the normal direction, this field displays “Normal.” When unusual circuit-switching conditions cause the direction of power flow to reverse, the field displays “Reverse.”

To compensate for a permanent change in power-flow direction, add 180 degrees to the **Installation Phase Offset** setpoint. This will eliminate the “Reverse” message.

Measured 3-Phase kvars *(Var Controls Only)*

This is the total kvar level measured at the current sensor location, calculated as 3 times single-phase kvars. This assumes a balanced 3-phase system.

Adjusted 3-Phase kvars *(Var Controls Only)*

This is the kvar level the control uses when operating in **Var** mode. This value is different from the Measured 3-Phase kvars reading when the bank is switched in and one of the following is true: 1. The current sensor is on the source side of the bank and current flow is in the reverse direction. 2. The current sensor is on the load side of the bank and current flow is in the normal direction. The control accounts for these conditions by subtracting the **3-Phase Bank Size** setting from the Measured 3-Phase kvars reading.

Calculating the Phase Angle Offset Value

The **Phase Angle Offset (Degrees)** setpoint allows installation-dependent phase-angle corrections to be made. The control software uses these corrections and other site-related parameters to calculate power factor and kvars and to determine the normal and reverse directions of current flow. Enter values which are multiples of 30°.

The paragraphs below, and the example on page 45, explain how to adjust the phase angle offset (correction) value for various system types.

As the adjustments are made, keep in mind that phase angle detection and display require a minimum current of 0.5% of full scale values. Current magnitudes continue to be detected and displayed below the 0.5% threshold.

The instructions below assume normal power flow at the time of installation, with the capacitor bank offline.

Note: The correct values must be entered for the other setpoints on this screen before entering the **Phase Angle Offset** value.

Capacitor Banks with a Phase-to-Neutral Connected Voltage Transformer (Connected to Phase Common with the Current Sensor)

Set the phase angle offset to 0 degrees. If the **Current Flow Direction** field displays a reverse message, set the offset to 180 degrees. The correct setting should eliminate any reverse messages and result in a reasonable real-time corrected phase angle (in the **Corrected Phase Angle** field) and power factor (in the **Measured Power Factor** field). For information about circuit power factors, see Table 1 on page 42. See Figure 11 on page 44.

Capacitor Banks with a Phase-to-Neutral Connected Voltage Transformer (Connected to Phases Not Common with the Current Sensor)

Go to Step 1 below and use Tables 1 and 2 on page 43.

Capacitor Banks with a Phase-to-Phase Connected Voltage Transformer (Connected to Phases Not Common with the Current Sensor)

Set the phase angle offset to 90 degrees. If the **Current Flow Direction** field displays a reverse message, set the offset to 270 degrees. The correct setting should eliminate any reverse messages and result in a reasonable real-time corrected phase angle in the **Corrected Phase Angle** field and power factor in the **Measured Power Factor** field. For information about circuit power factors, see Table 1 on page 43. See Figure 12 on page 44.

Capacitor Banks with a Phase-to-Phase Connected Voltage Transformer (Connected to Phase Common with the Current Sensor)

Follow these instructions to determine the correct phase angle offset from Tables 1, 2, and 3 on page 43.

STEP 1. Estimate the circuit power factor range. Use Table 1 on page 43 to find the Range # for the power factor range of the load current that is flowing through the current sensor.

Note: In general, circuit base power factors (power factors of load without power factor correction) vary from approximately 0.75 to 0.9 (lag). Adding capacitors usually does not result in power factors more leading than -0.966. In most cases, Range #2 is correct. Range #3 is second most likely.

Table 1. Distribution Ranges for Circuit Power Factors.

Range #	Power Factor Range	Description of Loads
#1	0 to 0.707 (More lag than 0.707)	Abnormally lagging circuit power factor, due to heavy inductive reactive loading
#2	0.707 to -0.966 (lag to lead)	Normal circuit loading, with or without connected capacitors
#3	-0.966 to -0.5 (lead)	Circuit loading with excessive capacitors
#4	-0.5 to 0 (More lead than -0.5)	Abnormally leading power factor, due to predominantly capacitive loading

STEP 2. Read the **Uncorrected Phase Angle** value from the real-time data in the lower part of the *Setup>General>Site-Related* screen.

STEP 3. Using the Range # of the estimated power factor (from Step 1) and the **Uncorrected Phase Angle** value (from Step 2), determine the **Phase Angle Offset** value from Table 2 (for phase-to-neutral connected voltage transformers) or from Table 3 (for phase-to-phase connected voltage transformers).

Table 2. Phase Angle Offset Values for Phase-to-Neutral Connected Potential Transformers.

Uncorrected Phase Angle				Installation Phase Offset
Range #1	Range #2	Range #3	Range #4	
45° to 90°	345° to 45°	300° to 345°	270° to 300°	0
105° to 150°	45° to 105°	0° to 45°	330° to 0°	300
165° to 210°	105° to 165°	60° to 105°	30° to 60°	240
225° to 270°	165° to 225°	120° to 165°	90° to 120°	180
285° to 330°	225° to 285°	180° to 225°	150° to 180°	120
345° to 30°	285° to 345°	240° to 285°	210° to 240°	60

Table 3. Phase Angle Offset Values for Phase-to-Phase Connected Potential Transformers.

Uncorrected Phase Angle				Installation Phase Offset
Range #1	Range #2	Range #3	Range #4	
75° to 120°	15° to 75°	330° to 15°	300° to 330°	330
135° to 180°	75° to 135°	30° to 75°	0° to 30°	270
195° to 240°	135° to 195°	90° to 135°	60° to 90°	210
255° to 300°	195° to 255°	150° to 195°	120° to 150°	150
315° to 0°	255° to 315°	210° to 255°	180° to 210°	90
15° to 60°	315° to 15°	270° to 315°	240° to 270°	30

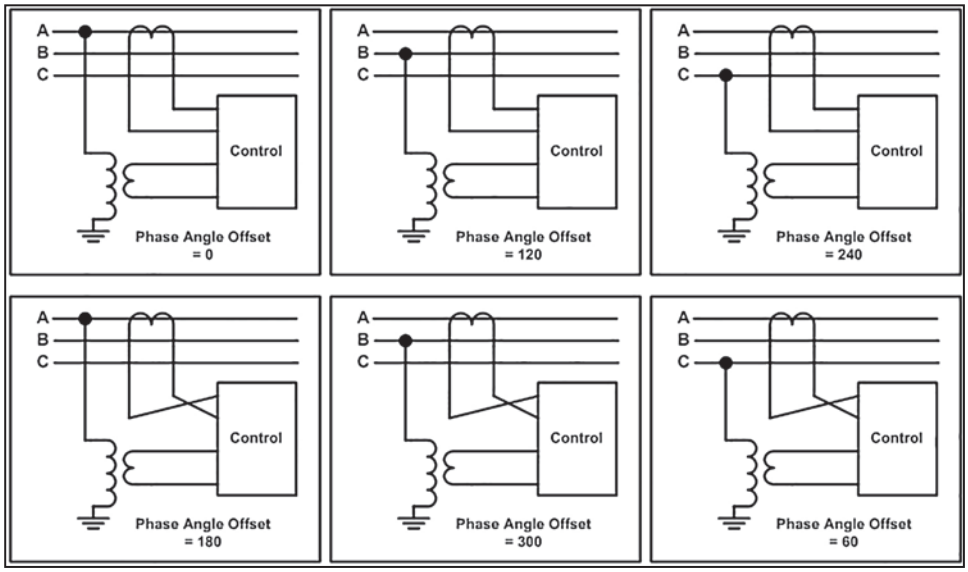


Figure 11. Line-to-neutral voltage transformer and current sensor wiring diagrams.

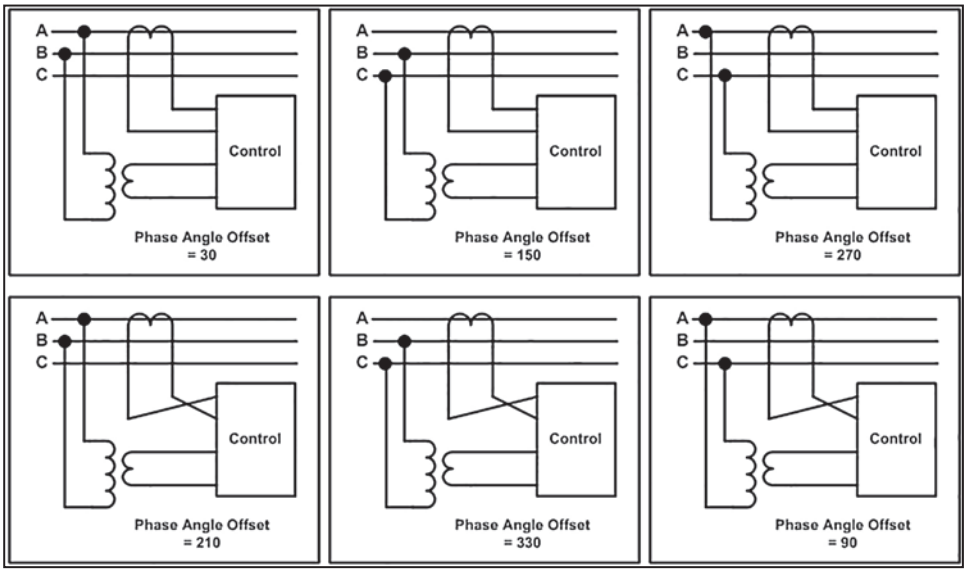


Figure 12. Line-to-line voltage transformer and current sensor wiring diagrams.

STEP 4. To confirm the correct offset was selected, check the **Measured Power Factor** value is within the range estimated in Step 1 on page 42 and the **Current Flow Direction** field shows "Normal." Also, the **Uncorrected Phase Angle** value should stay within the range used in Table 2 or 3 on page 43.

If any of these checks fail, make sure the values for the other setpoints on the *Setup>General>Site-Related* screen are correct. If necessary, estimate the power factor again, repeat Step 2 on page 43, and recheck the **Measured Power Factor** value.

When the Uncorrected Phase Angle is borderline

If the **Uncorrected Phase Angle** value is on the border between ranges shown in the tables, do one of the following to change the **Uncorrected Phase Angle** value to a non-borderline value:

- Change the status of any capacitor bank on the load side of the sensor. If a bank is online, switch it out. If a bank is offline, switch it in.
- Wait a few minutes for the phase angle to change from a borderline value. The circuit phase angle changes as industrial loads change in the morning (start-up), midday (lunch break), and afternoon (shutdown).

Then, begin again at Step 1 on page 42 to determine the correct **Phase Angle Offset** value.

Example

The potential transformer (PT) is connected line-to-neutral (A phase), the current sensor is connected to B phase, and current is flowing in the normal direction.

1. Based on the above facts, start at the instructions in the "Capacitor Banks with a Phase-to-Neutral Connected Voltage Transformer (Connected to Phases Not Common with the Current Sensor)" section on page 42.
2. Based on those instructions, use Tables 1 and 2 on page 43 to determine the correct value for the **Phase Angle Offset** setpoint.
3. With Table 1 on page 43, estimate the power factor range to be Range #2 (0.707 to -0.966) because an excessive number of capacitors are not presently online on the load side of the sensor.
4. At the *Setup>General>Site-Related* screen, determine the **Uncorrected Phase Angle** value is presently 157 degrees.
5. With Table 2 on page 43, look down the Range #2 column and find the line for 157 degrees. Look to the right and see that the **Phase Angle Offset** value for that line is 240.
6. At the *Setup>General>Site-Related* screen, enter "240" for the **Phase Angle Offset** setpoint and check how this change affects other values on the screen.
7. Because the correct phase offset value was selected, the **Measured Power Factor** value is reasonable and within the range estimated (Range #2 in Table 1 on page 43) and the **Current Flow Direction** field is now "Normal."

Harmonic Alarm

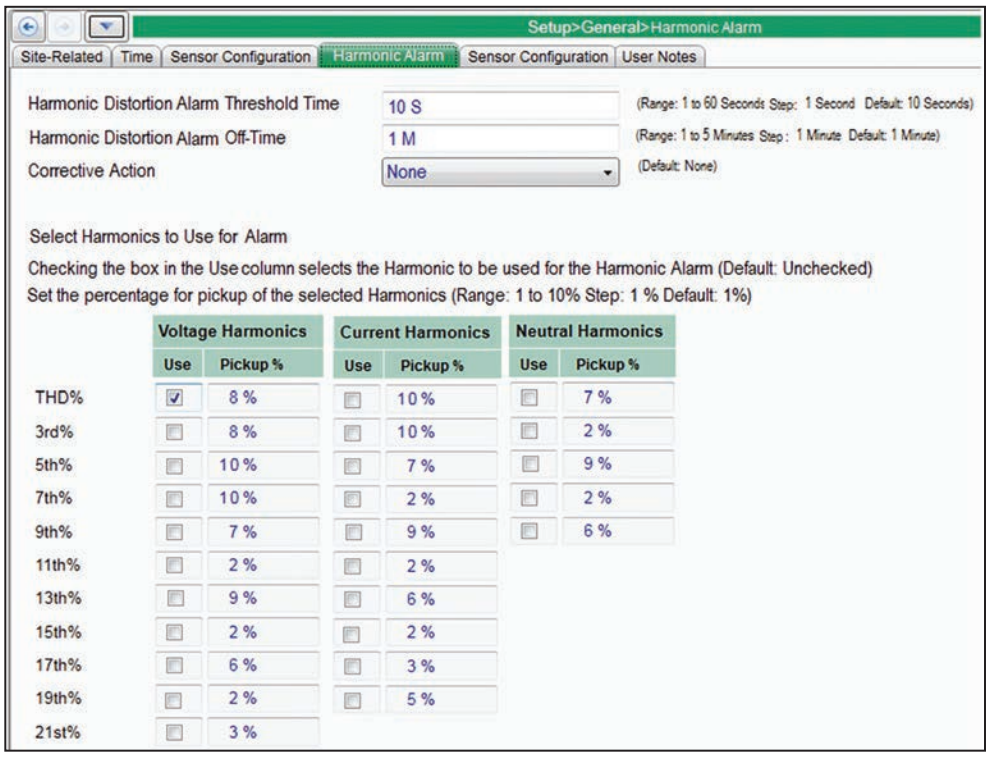


Figure 13. The *Setup>General>Harmonic Alarm* screen.

The **Harmonic Distortion** alarm will be active when any single harmonic selected for monitoring has reached or exceeded the configured **Pickup** setting (1 to 10%) for the duration of the **Harmonic Distortion Alarm Threshold Time** setting. The **Harmonic Distortion** alarm has the ability to inhibit switch operation based on the selected **Corrective Action** mode. See Figure 13.

When the **Harmonic Distortion** alarm is active, the OPERATION INHIBIT LED on the front panel is on, unless the **Corrective Action** feature is set to "None."

Harmonic Distortion Alarm Threshold Time

The **Harmonic Distortion** alarm is active when any selected harmonics level is continuously equal to or greater than its **Pickup** % setting for the duration of the **Harmonic Distortion Alarm Threshold Time** setting. (Range: 1-60 seconds; Step: 1; Default: 10)

Harmonic Distortion Alarm Off-Time

This is the time period the **Alarm** condition must continuously be below all selected **Pickup** settings before the alarm clears. (Range: 1-5 minutes; Step: 1; Default: 1)

Corrective Action

This setting determines the action taken when the **Harmonic Distortion** alarm becomes active. When set to "None," the alarm only provides an indication on the *Diagnostics>Harmonic Alarm* screen and the DNP status point and will not affect bank operation. When set to the **Inhibit Bank Switch Operation** mode, all automatic bank switch operations will be inhibited, if the bank switch is closed it will be left closed, the OPERATION INHIBIT LED on the front panel will be on, and there will be an indication on the *Diagnostics>Harmonic Alarm* screen and the DNP status point. When set to the **Open Bank Switch and Inhibit Automatic Operation** mode, the bank switch will be opened if closed, all automatic bank switch operations will be inhibited, the OPERATION INHIBIT LED on the front panel will be on, and there will be an indication on the *Diagnostics>Harmonic Alarm* screen and the DNP status point. (Default: none)

Select Harmonics to Use for Alarm

Check the Use check boxes to select the harmonics to be monitored. (Default: unchecked) Total harmonic distortion and individual harmonics distortion by voltage, current, and neutral harmonics can all be monitored. The **Pickup %** setting specifies the distortion level for the selected harmonic. (Range: None, 1-10%; Step: 1; Default: None)

Software Versions

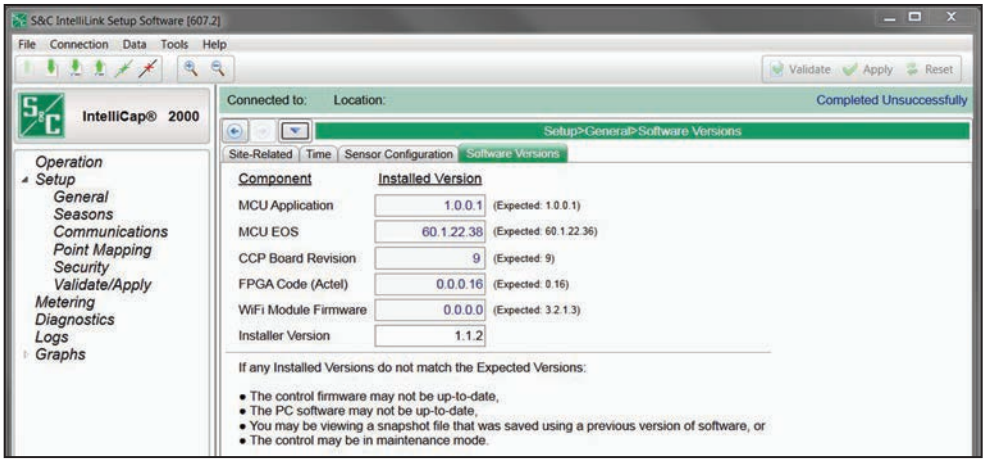


Figure 14. The *Setup>General>Software Versions* screen.

The *Software Versions* screen is updated whenever a software change occurs. The **Expected Value** field is stored in the IntelliLink software, and the **Revision Value** field is loaded from the connected IntelliCap 2000 Automatic Capacitor Control. See Figure 14.

The latest IntelliCap 2000 software revisions are available at the S&C Automation Customer Support Portal, which requires an assigned user name and password. Go to this link: **https://www.sandc.com/en/support/sc-customer-portal/**.

To obtain a password, S&C contact information is posted on the S&C Automation Customer Support Portal log-in page.

User Notes

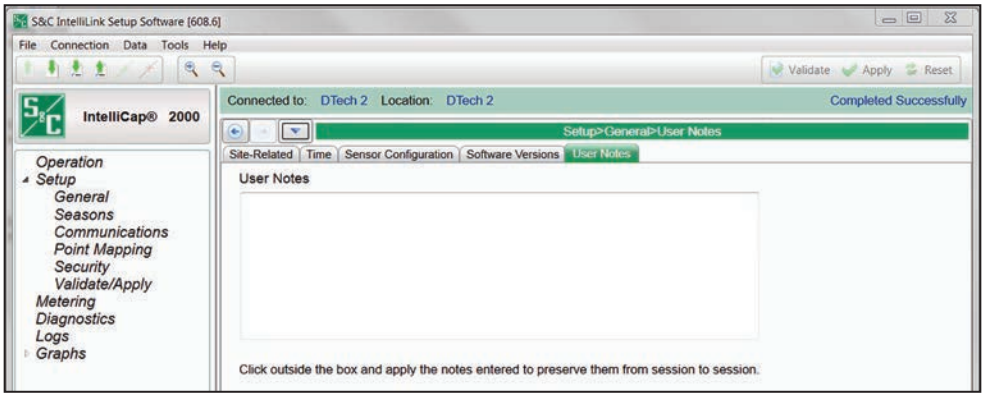


Figure 15. The *Setup>General>User Notes* screen.

Enter any character used in a standard text file. Field capacity is 1000 characters. See Figure 15.

Seasons

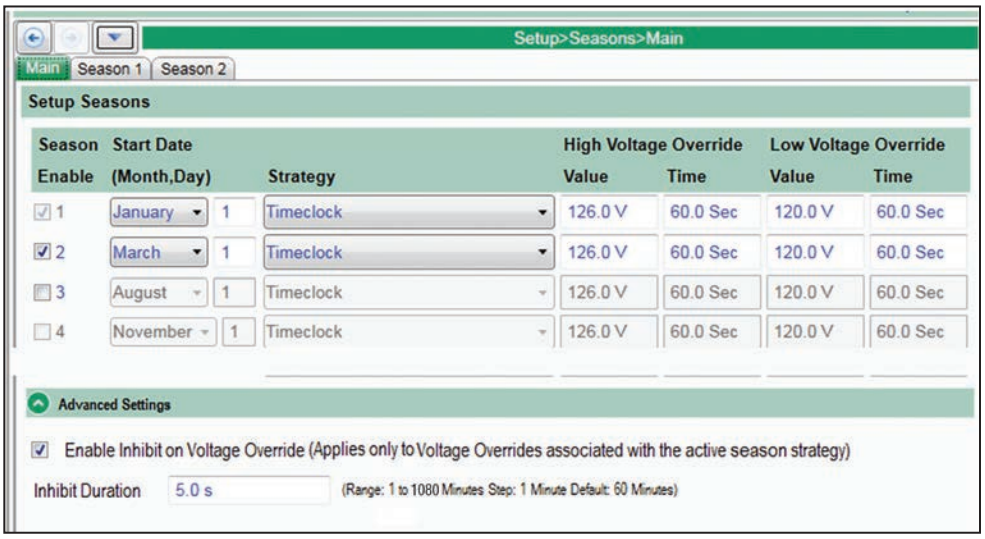


Figure 16. The *Setup>Seasons>Main* screen.

This screen allows setting the control strategy and dates for each season. It also allows setting the **High-Voltage Override** and **Low-Voltage Override** setpoints for each season. See Figure 16.

Note: Some season strategies hide the **High-Voltage Override** and **Low-Voltage Override** settings because they are not used for that strategy. When changing the **Nominal Operating Voltage** setpoint, it may be necessary to expose these values and reset them to limits allowed by the validation process. The **Nominal Operating Voltage** setting is found on the *Setup>General>Site-Related* screen.

Season Enable

This column shows the number for each season and provides a check box to enable and disable seasons sequentially. A season can only be checked if the previous season has already been checked. A season can only be unchecked if the season with a higher number is unchecked. When this control uses the same control strategy all year, check only the Season 1 check box, set the **Month** and **Day** setpoints to January 1, select a strategy, and enter the settings on the **Season 1** tab.

Start Date (Month, Day)

This column sets the month and day for the selected season to start. The end date of the season is the day before the start date of the next season. For correct operation the seasons MUST NOT overlap.

Strategy

This setpoint allows a choice of the control strategy to be used for the season when the capacitor control is in **Automatic** mode. After selecting a strategy, click the **Season** tab to make any adjustments to the default setpoint values for that season. **Season** tabs will only display for the checked seasons.

Possible control strategies are:

Temperature

The bank is switched to the **In** or **Out** state based on the **High Temperature** and **Low Temperature** setpoints.

Time-Biased Temperature

The bank is switched to the **In** or **Out** state based on **High Temperature** and **Low Temperature** setpoints during the scheduled **Timeclock** mode periods. During the unscheduled **Timeclock** mode periods, the bank is switched to the **Out** state.

Timeclock

The bank is switched to the **In** or **Out** state based on a time schedule.

Timeclock with Temperature Override

The bank is switched to the **In** or **Out** state by the scheduled **Timeclock** mode periods, but the **High Temperature** and **Low Temperature** setpoints have higher priority.

Voltage Only

The bank is switched to the **In** or **Out** state based on the **High-Voltage Override** and **Low-Voltage Override** setpoints and the preferred capacitor bank being in the switched **In** or switched **Out** state.

Time-Biased Voltage

The bank is switched to the **In** or **Out** state based on **High-Voltage** and **Low-Voltage** setpoints for two different timeclock schedules.

Automatic Offline

The bank is always switched to the **Out** state when operating in **Automatic** mode. The bank remains offline regardless of whether a **Low-Voltage Override** state or an **Emergency Low-Voltage Override** state is in effect.

Automatic Online

The bank is switched to the **In** state when operating in **Automatic** mode. The bank will switch offline when an **Emergency High-Voltage Override** state is in effect.

For var capacitor controls only, four additional control strategies are available:

Current

The bank is switched to the **In** or **Out** state based on measured single-phase current flow.

Current with Temperature Override

The bank is switched to the **In** or **Out** state based on measured single-phase current flow and changes to switching based on the **High Temperature** and **Low Temperature** setpoints.

Var

The bank is switched to the **In** or **Out** state based on the **Three-Phase kvars** setpoint (kilovolt-amperes, reactive, calculated as three times the **Single-Phase kvars** setpoint).

Var with Temperature Override

The bank is switched to the **In** or **Out** state based on the **Three-Phase kvars** setpoint (kilovolt-amperes, reactive, calculated as three times the **Single-Phase kvars** setpoint) and changes to switching based on the **High Temperature** and **Low Temperature** setpoints.

High-Voltage Override—Low-Voltage Override

These columns show the values of the **High-Voltage Override** setpoint and **Low-Voltage Override** setpoint for the season. These setpoints are entered here for the selected control strategy.

High-Voltage Override Value

This is the maximum voltage level before the capacitor control overrides the **Automatic** mode and switches the bank to the **Out** state to avoid a **High-Voltage** condition. The bank will switch to the **Out** state when both of the following are true:

- The capacitor control is in **Automatic** mode.
- The voltage stays above this level for the period of time specified by the **High-Voltage Override Time** setpoint.

Note: The capacitor control counts switching cycles when the bank switches to the **Out** state.

High-Voltage Override Time

This is the amount of time the voltage must be continuously above the **High-Voltage Override** setpoint before the bank switches to the **Out** state.

Low-Voltage Override Value

This is the minimum voltage level before the capacitor control overrides the **Automatic** mode and switches the bank to the **In** state to avoid a **Low-Voltage** condition. The bank will switch to the **In** state when both of the following are true:

- The capacitor control is in **Automatic** mode.
- The voltage stays below this level for the period of time specified by the **Low-Voltage Override Time** setpoint.

To avoid excess cycling, the bank will not switch to the **In** state when the daily number of automatic switching cycles would exceed the **Maximum Automatic Control Cycles Per Day** setpoint (on the *Setup>General>Site-Related>Operation* screen).

Low-Voltage Override Time

This is the amount of time that the voltage must be continuously below the **Low-Voltage Override** setpoint before the bank switches to the **In** state.

Advanced Settings Section

Inhibit on Voltage Override

The **High-Voltage Override** and **Low-Voltage Override** feature settings are provided for most of the season strategies on the *Setup>Seasons>Main* screen. They are on the *Setup>Seasons>Season x* screen for some strategies. The voltage sensor source voltage level is continuously monitored to detect specified **Over-Voltage** and **Under-Voltage** conditions and override the present-season strategy bank-switch position to correct the **Under-Voltage** or **Over-Voltage** condition.

When the capacitor bank is online (the bank switch is closed), it raises the system voltage level. Conversely, when the capacitor bank is offline (the bank switch is open), it lowers the system voltage.

When a **High-Voltage Override** condition is active, the **Voltage-Override** logic checks whether the bank switch is online. If it is, the bank switch is opened to take the bank offline and lower the voltage level. The season strategy bank-switch position is overridden until the **High-Voltage Override** condition clears. If the bank switch is already open, no further action is taken by the voltage-override logic.

When a **Low-Voltage Override** condition is active, the **Voltage-Override** logic checks whether the bank switch is offline. If it is the bank switch is closed to raise the voltage level. The season strategy bank-switch position is overridden until the **Low-Voltage Override** condition clears. If the bank switch is already closed, no further action is taken by the **Voltage-Override** logic.

There are two voltage-override categories, Emergency and Season. Specified Emergency voltage-override behavior applies to all seasons and all strategies, but each **Season** strategy specifies its own voltage-override behavior. For both categories, a **High-** and **Low-Voltage Override** value and threshold **Time** setting are provided for specifying the **Voltage-Override** conditions. A **Voltage-Override** condition is activated when the monitored voltage level is continuously outside the **High-/Low-Voltage Override** settings for the **Time** duration. The **Voltage-Override** condition is cleared (deactivated) when the monitored voltage level is continuously within the **High-/Low-Voltage Override** settings for the threshold **Time** setting.

Voltage-Override conditions are reported on the *Operation* screen and *Logs>Status Point Log* screen. On the *Operation* screen, the **Voltage Override** field reports conditions as **None**, **Under Voltage**, and **Over Voltage**. When a **Voltage-Override** condition results in a bank-switch operation, the **Voltage-Override** condition will continue to exist until the voltage level is outside the **BVC+M** (Bank Voltage Change + Margin) value, regardless of the threshold **Time** setting.

When the **High-/Low-Voltage Override** condition clears while the **Inhibit on Voltage Override** mode is active, the **Voltage Override** field on the *Operation* screen changes to show "None" and the INHIBIT LED remains on until the **Inhibit Duration** timer expires. Then, the bank is immediately returned to the state specified by the **Automatic** control strategy.

When the **Inhibit on Voltage Override** mode ends while the **High-/Low-Voltage Override** condition is still present, the **Voltage Override** field on the *Operation* screen continues to show "Over Voltage" or "Under Voltage" and the INHIBIT LED stays on. At this point the **Voltage-Override** condition follows the **Normal** logic.

Enable Inhibit on Voltage Override

This applies only to the **Voltage Override** strategies associated with the active **Season** strategy. When checked, the **Inhibit Duration** time setting specifies the minimum amount of time the active strategy is inhibited after a **Voltage-Override** condition is acted on. When the **Inhibit on Voltage Override** mode is active the OPERATION INHIBIT LED on the front panel is on. This setting only applies to the **Seasons** strategy overrides and requires authorization in the "Advanced Settings" section on the *Setup>Security* screen to change it. This feature does not apply to the **Time Biased Voltage**, **Automatic Offline**, **Automatic Online** strategies or **Emergency High-/Low-Voltage Override** conditions.

Inhibit Duration

This setting configures the minimum time automatic operation of the control will be inhibited after a **High-/Low-Voltage Override** operation occurs. (Range: 1-1,080 minutes; Step: 1; Default: 60)

Strategy

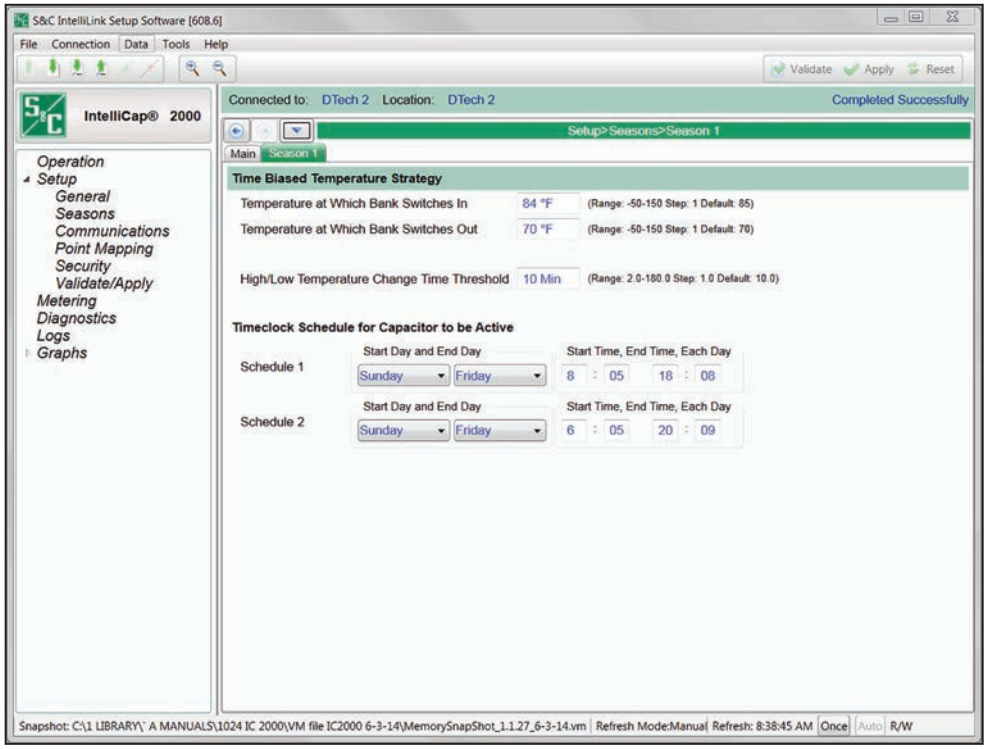


Figure 17. The *Setup>Seasons>Season 1* screen.

This screen shows the setpoints associated with the selected strategy for a given season. See Figure 17.

1—Temperature

2—Timeclock

3—Voltage only

4—Time-biased voltage

5—Time-biased temperature

6—Automatic offline

7—Automatic online

8—Current

9—Var

10—Timeclock with temperature override

11—Current with temperature override

12—Var with temperature override

1—Temperature Strategy

The difference between the **Switch-In Temperature** and the **Switch-Out Temperature** setpoints should be at least 8°F (5°C). To disable the **High Temperature** or **Low Temperature** mode, set the **Switch-In** and **Switch-Out** setpoints to the **N/A** mode.

High-Temperature Operation

Temperature at Which Bank Switches In

This is the temperature at which the bank switches to the **In** state during a **High-Temperature** condition. The temperature must be above this value for a period of time specified by the **In/Out Temperature Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 85)

Temperature at Which Bank Switches Out

This is the temperature at which the bank switches to the **Out** state during a **High-Temperature** condition. The temperature must be below this value for a period of time specified by the **In/Out Temperature Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 70)

Low-Temperature Operation

Temperature at Which Bank Switches Out

This is the temperature at which the bank switches to the **Out** state during a **Low-Temperature** condition. The temperature must be above this value for a period of time specified by the **In/Out Temperature Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 40)

Temperature at Which Bank Switches In

This is the temperature at which the bank switches to the **In** state during a **Low-Temperature** condition. The temperature must be below this value for a period of time specified by the **In/Out Temperature Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 30)

Temperature Time Threshold

This is the amount of time the temperature must be continuously outside the normal temperature range before a switching operation occurs. (Range: 2-180; Step: 1; Default: 10).

2—Timeclock Strategy

These setpoints determine which days of the week and which hours of the day the bank is active.

Timeclock Schedules

These schedules determine when the bank is active. Each schedule is specified as a day range and hour range. The day range must be specified as a starting day followed by an ending day. Sunday is the first day of the week.

For example, if a schedule is to be active on all seven days of the week, enter it as "Sunday—Saturday," NOT as "Saturday—Sunday."

The time is specified as a range between a starting and ending time on the same day. As with the day range, the chronologically first time must come first. The time is entered in military format (i.e., 5:00 p.m. is entered as "17:00").

Up to two schedules may be specified. The bank will be active if the present time falls within either of the schedules.

3—Voltage-Only Strategy

The capacitor control switches the capacitor bank based solely on voltage levels. A preferred capacitor bank position also may be chosen.

Preferred Capacitor Bank Position

When the voltage remains within the normal range, the capacitor control switches the bank according to the chosen setpoint. No action takes place when the **None** setting is selected or if switching the bank would cause a **Voltage Override** condition. (Range: Online, Offline, or None)

4—Time-Biased Voltage Strategy

The control switches the capacitor bank according to the schedule on this screen and uses two sets of **Voltage Override** setpoints.

Voltage Setpoints for Active (Timeclock Scheduled) Periods

Active Periods: High-Voltage setpoint

This is the voltage level above which the bank is switched to the **Out** state if the time is within the Timeclock Schedule for Capacitor to be Active period. The voltage must stay above this value for the period of time specified by the **Voltage Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: 101-259; Step: 1; Default: 126)

Active Periods: Low-Voltage setpoint

This is the voltage level below which the bank is switched to the **In** state if the time is within the Timeclock Schedule for Capacitor to be Active period. The voltage must stay below this value for the period of time specified by the **Voltage Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: 101-259; Step: 1; Default: 120)

Behavior for Inactive Periods

When the **Use Voltage Setpoints** mode (default) is selected, the voltage settings for the Inactive (Timeclock Unscheduled) Periods are followed. When the **Offline** mode is selected, the voltage setpoints are ignored and the bank switch is opened.

Voltage Setpoints for Inactive (Timeclock Unscheduled) Periods

Inactive Periods: High-Voltage setpoint

As above, but this setpoint applies during unscheduled periods. (Range: 101.0-259.0; Step: 1.0; Default: 124.0)

Inactive Periods: Low-Voltage setpoint

As above, but this setpoint applies during unscheduled periods. (Range: 101.0-259.0; Step: 1.0; Default: 118.0)

High-/Low-Voltage Time Threshold

This is the amount of time the voltage must be continuously outside the normal voltage range before a switching operation occurs. (Range: 0.1-900.0; Step: 0.1; Default: 180.0)

Timeclock Schedules

A time-biased voltage strategy uses these schedules to determine when the bank is to be active. Each schedule is specified as a day range and hour range. The day range must be specified as a starting day followed by an ending day. Sunday is the first day of the week.

For example, if a schedule is to be active on all seven days of the week, enter it as "Sunday—Saturday," NOT as "Saturday—Sunday."

The time is specified as a range between a starting and ending time on the same day. As with the day range, the chronologically first time must come first. The time is entered in military format (i.e., 5:00 p.m. is entered as "17:00").

Up to two schedules may be specified. The bank will be active if the present time falls within either of the schedules.

5—Time-Biased Temperature Strategy

The control switches the capacitor bank according to the schedule and temperature setpoints on this screen. The capacitor bank is offline during unscheduled periods.

Temperature at Which Bank Switches In

This is the temperature at which the bank switches to the **In** state during scheduled periods. The temperature must stay above this value for a period of time specified by the **In/Out Temperature Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 85)

Temperature at Which Bank Switches Out

This is the temperature at which the bank switches to the **Out** state during scheduled periods. The temperature must be below this value for a period of time specified by the **In/Out Temperature Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 70)

In/Out Temperature Change Time Threshold

This is the amount of time the temperature must be continuously outside the normal temperature range before a switching operation occurs. (Range: 2-180; Step: 1; Default: 10)

Timeclock Schedules

These schedules are used by **Time-Biased Temperature** mode to determine when the bank is to be active. Each schedule is specified as a day range and hour range. The day range must be specified as a starting day followed by an ending day. Sunday is the first day of the week.

For example, if a schedule is to be active on all seven days of the week, enter it as "Sunday—Saturday," NOT as "Saturday—Sunday."

The time is specified as a range between a starting and ending time on the same day. As with the day range, the chronologically first time must come first. The time is entered in military format (i.e., 5:00 p.m. is entered as "17:00").

Up to two schedules may be specified. The bank will be active if the present time falls within either of the schedules.

6—Automatic Offline

The control switches the capacitor bank offline for the season. This strategy does not include **High-Voltage Override** or **Low-Voltage Override** setpoints. Only the **Emergency Voltage Override** setpoints configured on the *Setup>General>Bank Related* screen are in effect with this strategy.

7—Automatic Online

The control switches the capacitor bank online for the season. This strategy does not include **High-Voltage Override** or **Low-Voltage Override** setpoints. Only the **Emergency Voltage Override** setpoints configured in the *Setup>General>Bank Related* screen are in effect with this strategy.

8—Current Strategy

This strategy is only available for the var controls, and the control uses the setpoints on this screen to switch the bank based on single-phase current level.

When the current sensor is on the source side of the capacitor bank, the line current changes because of a change in the power factor when the capacitor bank switches to the **In** or **Out** state. The difference between the **Switch-In Current** and **Switch-Out Current** setpoints should be larger than the effect of the bank. This prevents the capacitor control from continuously attempting to switch the bank to the **In** and **Out** state.

When the current sensor is on the load side of the capacitor bank, no change in current levels or power factor is sensed when the bank switches to the **In** and **Out** state.

Note: The number of automatic switching cycles can be limited using the **Maximum Automatic Switching Cycles Per Day** setpoint on the *Setup>General>Site-Related>Operation* screen.

Single-Phase Amps at Which Bank Switches In

This is the current level (in amps) at which the bank switches to the **In** state. The current must be above this value for a period of time specified by the **Current Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: 0.0-2,550.0; Step: 0.1; Default: 100.0)

Single-Phase Amps at Which Bank Switches Out

This is the current level (in amps) at which the bank switches to the **Out** state. The current must be below this value for a period of time specified by the **Current**

Change Time Threshold setpoint before the bank will switch to the **Out** state. (Range: 0.0-2,550.0; Step: 0.1; Default: 50.0)

Current Change Time Threshold

This is the amount of time that the current must be continuously outside the normal range before a switching operation occurs. (Range: 0.1-900.0; Step: 0.1; Default: 60.0)

Coordinate between capacitor controls most easily by changing this setpoint. Give source-side controls a longer time delay if capacitor banks at the end of the line should switch first.

9—Var Strategy

This strategy is only available for var controls, and the control uses the setpoints on this screen to switch the bank based on single-phase or three-phase kvar levels. The general approach to setting the **Bank Switches In** setpoint is to set it at approximately (67% of the nameplate rating of the capacitor bank). The **Bank Switches Out** setpoint can be set by subtracting 125% of the nameplate rating from the **Bank Switches In** setpoint. The kvar contribution of the bank may exceed the nameplate rating because of higher impressed voltages and manufacturing tolerances. If the kvar contribution of the bank is greater than the difference between the setpoint levels, the capacitor control will continuously attempt to switch the bank to the **In** and **Out** state.

Setting example with a 1200-kvar bank and the **Kvars** setpoint at **Single-Phase** mode:

Bank Switches In setpoint = (2/3 x 1200)/3 = 267

Bank Switches Out setpoint = 267 – ((1.25 x 1200)/3) = -233

Setting example with a 1200 kvar bank and the **Kvars** setpoint at **Three-Phase** mode:

Bank Switches In setpoint = (2/3 x 1200) = 800

Bank Switches Out setpoint = 800 – ((1.25 x 1200)/3) = -700

Note: The number of automatic switching cycles can be limited using the **Maximum Automatic Switching Cycles Per Day** setpoint on the *Setup>General>Site-Related>Operation* screen.

The control changes to switching based on temperature when the ambient temperature exceeds the **High-Temperature Operation: Temperature at Which Bank Switches In** setpoint or drops below the **Low-Temperature Operation: Temperature at Which Bank Switches In** setpoint. This strategy remains active until the ambient temperature is in the range specified for the bank to switch out.

Kvars

This setpoint scales the input for **Kvars at Which Bank Switches In** and **Kvars at Which Bank Switches Out** settings to either **Single-Phase** (default) or **Three-Phase** mode.

Kvars at Which Bank Switches In

This is the var level (in kvars) at which the bank switches to the **In** state. The vars must stay above this value for a period of time specified by the **Var Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -327,680-327,670; Step: 10; Default: 800)

Kvars at Which Bank Switches Out

This is the var level (in kvars) at which the bank switches to the **Out** state. The vars must stay below this value for a period of time specified by the **Var Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -327,680-327,670; Step: 10; Default: -700)

Var Change Time Threshold

This is the amount of time the var level must be continuously outside the normal range before a switching operation occurs. (Range: 0.1-900.0; Step: 0.1; Default: 60.0)

Coordinate between capacitor controls most easily by changing this setpoint. Give source-side controls a longer time delay if capacitor banks at the end of the line are desired to switch first.

10—Timeclock with Temperature Override Strategy

The setpoints on this screen determine which days of the week and which hours of the day the bank is intended to be active.

The control switches based on temperature if the ambient temperature exceeds the **High-Temperature Operation: Temperature at Which Bank Switches In** setpoint or drops below the **Low-Temperature Operation: Temperature at Which Bank Switches In** setpoint. This strategy remains active until the temperature is in the range specified for the bank to switch to the **Out** state. The difference between the **Bank Switches In** and the **Bank Switches Out** temperature setpoints should be at least 8°F (5°C). To disable High or **Low-Temperature Operation** mode, set the button to the **Disabled** state.

High-Temperature Operation

Temperature at Which Bank Switches In

This is the temperature at which the bank switches to the **In** state during **High-Temperature** condition. The temperature must be above this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 85)

Temperature at Which Bank Switches Out

This is the temperature at which the bank switches to the **Out** state during a **High-Temperature** condition. The temperature must be below this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 70).

Low-Temperature Operation

Temperature at Which Bank Switches Out

This is the temperature at which the bank switches to the **Out** state during a **Low-Temperature** condition. The temperature must be above this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 40)

Temperature at Which Bank Switches In

This is the temperature at which the bank switches to the **In** state during a **Low-Temperature** condition. The temperature must be below this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 30)

High-/Low-Temperature Time Threshold

This is the amount of time that the temperature must be continuously outside the normal temperature range before a switching operation occurs.

Timeclock Schedules

These schedules are used by **Timeclock with Temperature Override** mode to determine when the bank is to be active. Each schedule is specified as a day range and hour range. The day range must be specified as a starting day followed by an ending day. Sunday is the first day of the week.

For example, if a schedule is to be active on all seven days of the week, enter it as "Sunday—Saturday," NOT as "Saturday—Sunday."

The time is specified as a range between a starting and ending time on the same day. As with the day range, the chronologically first time must come first. The time is entered in military format (i.e., 5:00 p.m. is entered as "17:00").

Up to two schedules may be specified. The bank will be active if the present time falls within either of the schedules.

11—Current with Temperature Override Strategy

The control uses the setpoints on this screen to switch the bank based on single-phase current levels.

When the current sensor is on the source side of the capacitor bank, the line current changes because of a change in the power factor when the capacitor bank switches to the **In** or **Out** state. The difference between the **Switch-In Current** and **Switch-Out Current** setpoints should be larger than the effect of the bank. This prevents the capacitor control from continuously attempting to switch the bank to the **In** and **Out** state.

When the current sensor is on the load side of the capacitor bank, no change in current levels or power factor is sensed when the bank switches to the **In** and **Out** state.

Note: The number of automatic switching cycles can be limited using the **Maximum Automatic Switching Cycles Per Day** setpoint on the *Setup>General>Site-Related>Operation* screen.

The control changes to switching based on temperature when the ambient temperature exceeds the **High-Temperature Operation: Temperature at Which Bank Switches In** setpoint or drops below the **Low-Temperature Operation: Temperature at Which Bank Switches In** setpoint. This strategy remains active until the ambient temperature is in the range specified for the bank to switch to the **Out** state.

Single-Phase Amps at Which Bank Switches In

This is the current level (in amps) at which the bank switches to the **In** state. The current must be above this value for a period of time specified by the **Current Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: 0.0-2,550.0; Step: 0.1; Default: 100.0)

Single-Phase Amps at Which Bank Switches Out

This is the current level (in amps) at which the bank switches to the **Out** state. The current must be below this value for a period of time specified by the **Current Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: 0.0-2,550.0; Step: 0.1; Default: 50.0)

Current Change Time Threshold

This is the amount of time the current must be continuously outside the normal range before a switching operation occurs. (Range: 0.1-900.0; Step: 0.1; Default: 60.0)

Coordination between capacitor controls can be set most easily by changing this setpoint. Give source-side controls a longer time delay if capacitor banks at the end of the line are desired to switch first.

Note: The difference between the **Switch-In Temperature** and the **Switch-Out Temperature** setpoints should be at least 8°F (5°C). To disable the **High-Temperature** or the **Low-Temperature** mode, set the **Switch-In Temperature** and the **Switch-Out Temperature** setpoints to the **N/A** mode.

High-Temperature Operation

Temperature at Which Bank Switches In

This is the temperature at which the bank switches to the **In** state during a **High-Temperature** condition. The temperature must be above this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 85)

Temperature at Which Bank Switches Out

This is the temperature at which the bank switches to the **Out** state during a **High-Temperature** condition. The temperature must be below this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 70)

Low-Temperature Operation

Temperature at Which Bank Switches Out

This is the temperature at which the bank switches to the **Out** state during a **Low-Temperature** condition. The temperature must be above this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 40)

Temperature at Which Bank Switches In

This is the temperature at which the bank switches to the **In** state during a **Low-Temperature** condition. The temperature must be below this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setting before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 30)

High-/Low-Temperature Time Threshold

This is the amount of time the temperature must be continuously outside the normal temperature range before a switching operation occurs. (Range: 2-180; Step: 1; Default: 10)

12—Var with Temperature Override Strategy

This strategy is only available for var controls, and the control uses the setpoints on this screen to switch the bank based on single-phase or three-phase kvar levels. The general approach to setting the **Switch In Kvar** setpoint is to set it at approximately (67% of the nameplate rating of the capacitor bank). The **Switch Out Kvar** setpoint can be set by subtracting 125% of the nameplate rating from the **Switch In Kvar** setpoint. The kvar contribution of the bank may exceed the nameplate rating because of higher impressed voltages and manufacturing tolerances. If the kvar contribution of the bank is greater than the difference between the setpoint values, the capacitor control will continuously attempt to switch the bank to the **In** and **Out** state.

Setting example with a 1200 kvar bank and the **Kvars** setpoint at **Single-Phase** mode:

Bank Switches In setpoint = (2/3 x 1200)/3 = 267

Bank Switches Out setpoint = 267 – ((1.25 x 1200)/3) = -233

Setting example with a 1200 kvar bank and the **Kvars** setpoint at **Three-Phase** mode:

Bank Switches In setpoint = (2/3 x 1200) = 800

Bank Switches Out setpoint = 800 – ((1.25 x 1200)/3) = -700

Note: The number of automatic switching cycles can be limited using the **Maximum Automatic Switching Cycles Per Day** setpoint on the *Setup>General>Site-Relation>Operation* screen.

The control changes to switching based on temperature if the ambient temperature exceeds the **High-Temperature Operation: Temperature at Which Bank Switches In** setpoint or drops below the **Low-Temperature Operation: Temperature at Which Bank Switches In** setpoint. This strategy remains active until the ambient temperature is in the range specified for the bank to switch to the **Out** state.

Kvars

This setpoint scales the input for **Kvars at Which Bank Switches In** and **Kvars at Which Bank Switches Out** settings to either **Single-Phase** (default) or **Three-Phase** mode.

Kvars at Which Bank Switches In

This is the var level (in kvars) at which the bank switches to the **In** state. The vars must stay above this value for a period of time specified by the **Var Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -327,680-327,670; Step: 10; Default: 800)

Kvars at Which Bank Switches Out

This is the var level (in kvars) at which the bank switches to the **Out** state. The vars must stay below this value for a period of time specified by the **Var Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -327,680-327,670; Step: 10; Default: -700)

Var Change Time Threshold

This is the amount of time that the var level must be continuously outside the normal range before a switching operation occurs. (Range: 0.1-900.0; Step: 0.1; Default: 60.0)

Coordination between capacitor controls can be set most easily by changing this setpoint. Give source-side controls a longer time delay if capacitor banks at the end of the line are desired to switch first.

Note: The difference between the **Switch-In Temperature** and the **Switch-Out Temperature** setpoints should be at least 8°F (5°C). To disable **High Temperature** or **Low Temperature** mode, set the **Switch-In Temperature** and the **Switch-Out Temperature** setpoints to the **N/A** mode.

High-Temperature Operation

Temperature at Which Bank Switches In

This is the temperature at which the bank switches to the **In** state during a **High-Temperature** condition. The temperature must be above this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 85)

Temperature at Which Bank Switches Out

This is the temperature at which the bank switches to the **Out** state during a **High-Temperature** condition. The temperature must be below this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 70)

Low-Temperature Operation

Temperature at Which Bank Switches Out

This is the temperature at which the bank switches to the **Out** state during a **Low-Temperature** condition. The temperature must be above this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setting before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 40)

Temperature at Which Bank Switches In

This is the temperature at which the bank switches to the **In** state during a **Low-Temperature** condition. The temperature must be below this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 30)

High-/Low-Temperature Time Threshold

This is the amount of time that the temperature must be continuously outside the normal temperature range before a switching operation occurs. (Range: 2-180; Step: 1; Default: 10)

DNP

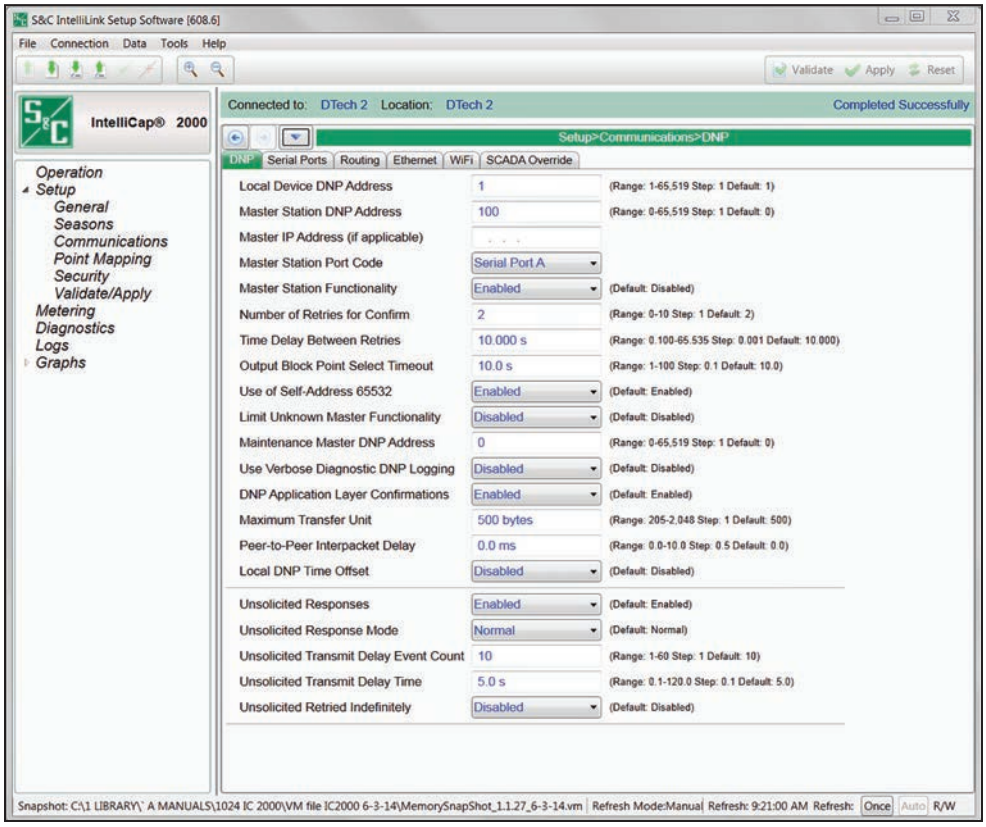


Figure 18. The *Setup>Communications>DNP* screen.

This screen contains communication settings related to the SCADA system and IntelliLink Setup Software. See Figure 18.

Local Device DNP Address

Enter the network address for the IntelliCap 2000 Automatic Capacitor Control. Be sure to enter an address even if the IntelliCap 2000 control will not be accessed via SCADA or IntelliLink software. The DNP address must be greater than 0, 1 is the default, and the maximum value is 65519. (Range: 1-65,519; Step: 1; Default: 1)

NOTICE

Changing the DNP address or other communication parameter can prevent the IntelliCap 2000 control from communicating via SCADA or IntelliLink software. If communication is lost with the IntelliCap 2000 control, you must go to the site, connect through IntelliLink software, and reset the communication parameter that had been changed.

NOTICE

If a configured IntelliCap 2000 control is relocated to a new site, be sure to enter its new DNP address. If the new address is not entered, the IntelliCap 2000 control may respond to commands intended for a different location.

Master Station DNP Address

This is the DNP address to which the IntelliCap 2000 control sends all unsolicited responses. The DNP address default is 0, and it can be set to any value between 0 and 65519. (Range: 0-65,519; Step: 1; Default: 0)

Master IP Address (if applicable)

This is the IP address used to route DNP frames to the master station. It applies to IP-based SCADA networks. Leave at the default "0.0.0.0" if using a serial communication device in the IntelliCap 2000 control.

Entering an IP Address

Follow these steps to enter the IP address:

STEP 1. Click and highlight the character in the first field.

STEP 2. Type one to three characters as needed.

STEP 3. Hit the space bar to advance to the next field. Advancing in this fashion automatically highlights the characters in the next field.

STEP 4. Repeat typing followed by the space bar until entry is complete.

STEP 5. To revert to the IP address value presently configured in the control memory, hit the <Esc> key or click on the **Reset** button in the tool bar.

Master Station Port Code

This is the serial port through which DNP frames are sent to the master station. Port A (serial) is the default; any port configured for DNP communication may be used. (Default: Serial Port A)

Master Station TCP Interface

Set this to the **Native** mode if the master port speaks the TCP language; otherwise, set it to the **Not TCP** mode.

Master Station TCP Port

Specify the master TCP port if the master speaks the TCP language. (Range: 1,024-65,535; Step: 1; Default: 20,000)

TCP Keep-Alive Timer

This specifies the time between keep-alive messages as defined in the DNP Specification. See S&C Instruction Sheet 1024-561, "IntelliCap® 2000 Automatic Capacitor Control: *DNP Points List and Implementation*." (Range: 5-65,535; Step: 1; Default: 300)

Master Station Functionality

When the **Enabled** mode is selected, functionality specific to exception reporting to the master station is activated. In the **Enabled** mode, a request from the master station for event data and the subsequent acknowledgement from the master station will allow the event data buffer to be cleared. The **Enabled** mode is also necessary to use the **Unsolicited Report by Exception** mode to send event data to the master station. (Default: Disabled)

Number of Retries for Confirm

This is the number of times the IntelliCap 2000 control will resend a message containing event data (unsolicited or requested) to the master station if a confirmation message is not received within the **Time Delay Between Retries** timer setting. The control will save the event data after this number of retries until it receives a confirmation. If there is no confirmation response after the number of retries is exceeded, the control will resend the saved event data along with any new event data when a new event occurs. Setting this parameter at 0 will prevent retries. (Range: 0-10; Step: 1; Default: 2)

Time Delay Between Retries

When the IntelliCap 2000 control does not receive a confirmation message within this setting (in seconds), it resends the message with a request for confirmation unless the **Number of Retries for Confirm** setting is reached. (Range: 0.100-65.535; Step: 0.001; Default: 10.000)

Output Block Point Select Timeout

This is the timeout duration of the **Select** function on control points. See S&C Instruction Sheet 1024-561, "IntelliCap® 2000 Automatic Capacitor Control: *DNP Points List and Implementation*." If the timeout duration between the **Select** and **Operate** functions during a **Select-Before-Operate** sequence exceeds this timeout value, the control will disable the point and return a timeout status code in the subsequent **Operate** request. (Range: 1.0-100.0; Step: 0.1; Default: 10.0)

Use of Self-Address 65532

NOTICE

Disabling the **Use of Self-Address** setting can prevent the control from communicating with IntelliLink software. If communication with the control is lost, the **Local Device DNP Address** setting must be known, connect through IntelliLink software, and re-enable the **Use of Self-Address** setting to connect locally. Wi-Fi will not work if the **Use of Self-Address** setting is disabled. If the local DNP address is not known and the **Use of Self-Address** setting is disabled, the control will require reprogramming at the factory to re-establish access to the control.

This setting is present to comply with the DNP standard. Care must be used when deciding to change the default. Options are the **Disable** setting, which blocks the use of DNP Address 65532, and the **Enabled** setting, which allows the use of DNP Address 65532. (Default: Enabled)

Limit Unknown Master Functionality

The default is the **Disabled** setting to allow master station addresses to be entered into the configuration. After those addresses have been entered, this parameter may be enabled and a configured master station address used to complete the configuration process.

When in the **Enabled** setting, a master/peer station that is not included in the configuration of this control is prevented from writing to or controlling it. Master/peer stations configured in this control include the configured **Master Station DNP Address** and **Maintenance Master DNP Address** setting.

NOTICE

Enabling this feature prevents unknown master stations from making any configuration changes. When the **Limit Unknown Master Functionality** setting is enabled, at least one master other than the SCADA master must be enabled. When this feature is enabled, the only way to connect with the control (to make any changes or to disable this feature) is with IntelliLink software and a computer set to the configured DNP address of the enabled master that is not the SCADA master. The control must be returned to the factory to be reset to the factory default when the DNP address of the master is unknown.

Maintenance Master DNP Address

This setting allows access by the maintenance master station for configuration changes and diagnostics. The maintenance master station has the same access to the IntelliCap 2000 control as the master station but does not receive unsolicited messages. The DNP address must be greater than 0. (Range: 0-65519; Step: 1; Default: 0)

NOTICE

The Maintenance Master DNP address should not be used to request event data from the IntelliCap 2000 control. Doing so will prevent the master station from receiving this data.

Use Verbose Diagnostic DNP Logging

When the **Enabled** mode is selected (for diagnosing a communication issue), a message is logged for every source and destination frame. Enabling this function for an extended period will cause historic logs to fill quickly and reduce the number of saved historical events. (Default: Disabled)

DNP Application Layer Confirmations

When the **Enabled** setting is selected, an application layer confirmation will be requested with every solicited response that includes event data. Event buffers will not be cleared until an application layer confirmation is received from the master station. When the **Disabled** mode is selected, the event buffers are cleared when events are reported. (Default: Enabled)

Maximum Transfer Unit

The **Maximum Transfer Unit** setting allows an IntelliCap 2000 control to make the most efficient use of communication bandwidth. For SpeedNet™ Radios, set it to 500. For an Ethernet connection, set it to 1500. For other communication devices, set it to the maximum packet size of that device. For most applications use 500, the default setting. (Range: 205-2,048; Step: 1; Default: 500)

Peer-to-Peer Interpacket Delay

Set this to zero. Interpacket delay improves communication reliability between peers by adjusting the delay between successive frames of a multi-frame P2P fragment. The **Maximum Transmission Unit** setting defined for that control determines frame size. When data traffic is heavy, a peer's receive buffer may overflow, and messages could be lost. This problem is usually noticed in a direct P2P/UDP system. The **Interpacket Delay** setting increases the time a peer will have to process received data. It is advisable to increase the receive buffers instead of increasing the **Interpacket Delay** setting, which will create artificial delays in the communication system. (Range: 0.0-10.0; Step: 0.5; Default: 0.0)

DNP Counter Type

This selects the counter that will be reported in static data for a Class 0 poll requested by the master station. Selections are **Frozen**, **Running**, and **Both Counters**. (Default: Running)

Local DNP Time Offset

When the **Disabled** setting is selected, UTC time is applied to the DNP timestamps. When a local time offset ranging from +14 hr. to -14 hr. in 15-minute increments has been selected, the offset is applied to the UTC time to allow the DNP time stamp to be adjusted to local time. (Default: Disabled)

Unsolicited Responses

When the **Enabled** (default) setting is selected, the control sends a message to the master station when new event data are available based on the **Unsolicited Transmit Delay Event Count** setting and the **Unsolicited Transmit Delay Time** setting. A master station DNP address and master station port code or master station IP address must be entered. Enabling this feature may add significant traffic to the communication network. (Default: Enabled)

Unsolicited Response Mode

Select the **Normal** (default) or **5800 V2 Mode** setting. The **Normal** mode requires that the master station acknowledge an initial empty unsolicited message and then send a SCADA command to enable unsolicited reporting. If acknowledgment of the initial empty unsolicited message is not received, the control continues to resend these messages at the configured retry interval until an acknowledgment is received. The **5800 V2 Mode** setting is a nonstandard mode that bypasses the initial empty unsolicited messages and the requirement for the master station to enable unsolicited reporting with a SCADA command. It simply starts sending unsolicited responses as events occur, provided that the Unsolicited Responses parameter is enabled. (Default: Normal)

The **5800 V2 Mode** setting may require restarting the control unless the control is presently sending unsolicited responses in the **Normal** mode or a remote command to enable unsolicited responses can be sent to the control. To restart the control after all configuration changes have been successfully applied, click on the **Tools>Device Maintenance...** option on the menu bar, select the **Reset Control** option, click on the **Yes** button in the dialog box, and then log in when the IntelliLink software dialog box opens.

Unsolicited Transmit Delay Event Count

This is the number of new events that will cause an unsolicited message to be transmitted, provided the **Unsolicited Transmit Delay Time** setting has not been reached. Setting this parameter to 1 results in an unsolicited message generated for every new event. (Range: 1-60; Step: 1; Default: 10)

Unsolicited Transmit Delay Time

This is the maximum time (in seconds) that may elapse after a new event before an unsolicited message is sent. During this delay, other new events may be added to the message. If the number of events reaches the **Unsolicited Transmit Delay Event Count** setting before the delay time elapses, the unsolicited message will be sent immediately. (Range: 0.1-120.0; Step: 0.1; Default: 5.0)

Unsolicited Retried Indefinitely

Enabling this setting allows unsolicited message retries to be performed until a confirmation is received, and the **Number of Retries for Confirm** setting will be ignored. Disabled is recommended for normal operation. (Default: Disabled)

Serial Ports

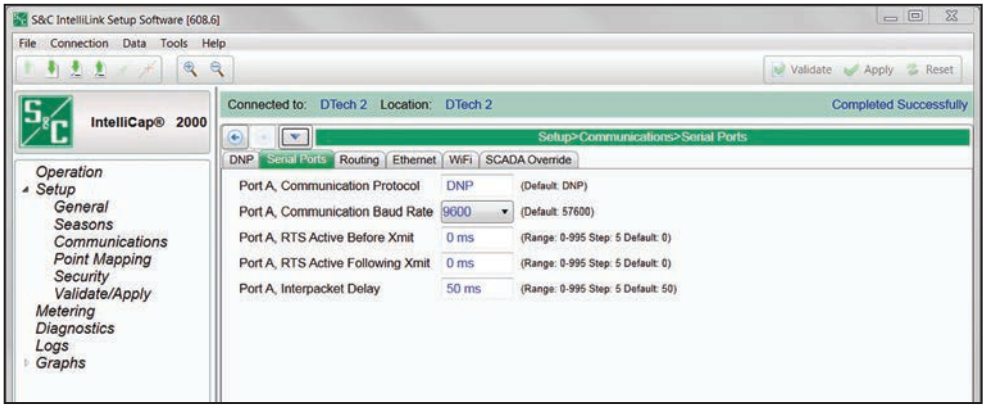


Figure 19. The *Setup>Communications>Serial Ports* screen.

This screen contains communication settings related to SCADA and IntelliLink Setup Software. Only Port A can be configured. See Figure 19.

Communication Protocol

The **DNP** setting is permanently configured because the IntelliCap 2000 Automatic Capacitor Control only uses the Distributed Network Protocol. (Default: DNP)

Communication Baud Rate

This is the baud rate between the communication module and radio. This setting must be configured to the baud rate of the radio. (Default: 57600)

RTS Active Before/Following Xmit

This is the time (in milliseconds) the RTS (request to send) is active for this port before/after a transmission takes place. The default value is usually suitable. (Range: 0-995; Step: 5; Default: 0)

Interpacket Delay

This is the time (in milliseconds) between individual message frames of a data stream. Set this parameter appropriately for the radio. (Range: 0-995; Step: 5; Default: 50)

Routing

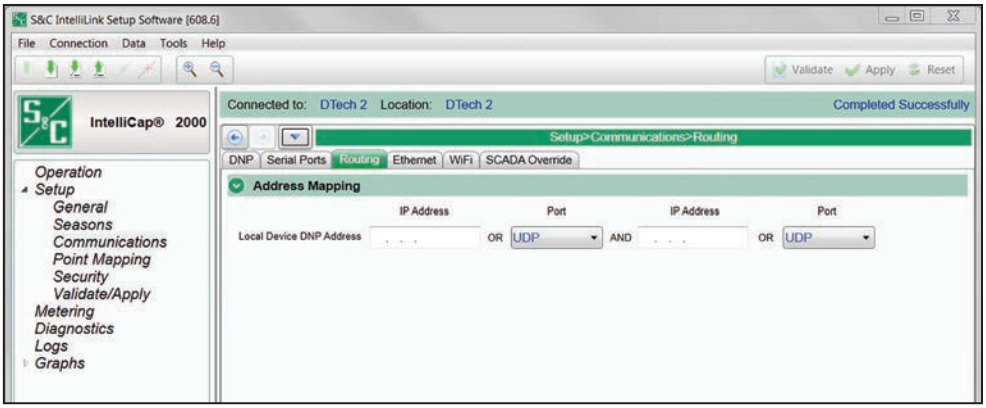


Figure 20. The *Setup>Communications>Routing* screen.

Address Mapping

Contains entries that define default routing for messages that are addressed to devices not found in the configured routing table and are not the local device. This default routing performs a simple pass-through functionality between the two interface points. If unknown traffic is not to be routed through this device, leave these entries unconfigured. See Figure 20.

IP Address

This parameter should be configured when a destination device may be found on an IP network. The received frame will be transmitted out through the local UDP port.

Port

This parameter should be configured when a destination device may be found through a serial communications port. The received frame will be transmitted out of Serial Port A.

Route Between

Entering the **Local Device DNP Address** setting and the second **IP Address** setting will define default routing for messages addressed to devices not found in the configured routing table and are not the local device. This default routing performs a simple pass-through functionality between the two interface points. If unknown traffic is not to be routed through this device, leave these entries unconfigured.

Ethernet

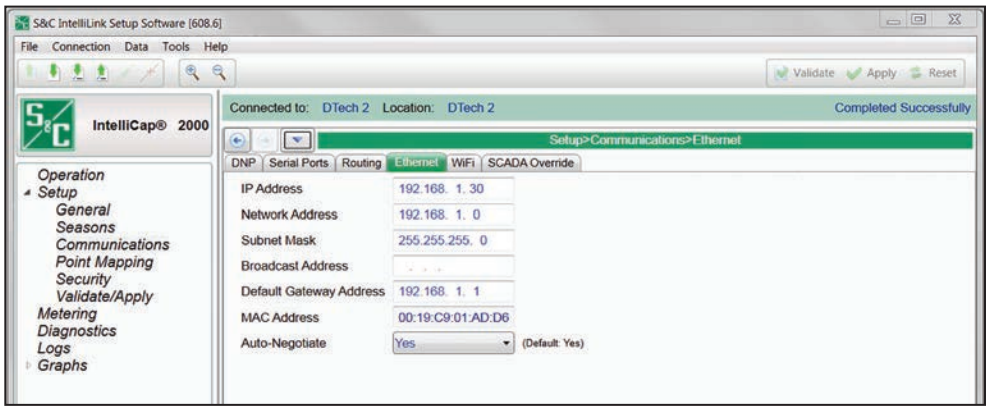


Figure 21. The *Setup>Communications>Ethernet* screen.

IP Address

This is the IP address of the IntelliCap 2000 Automatic Capacitor Control. See Figure 21.

Network Address

This is the IP address of the network. The IP address must be an address within the network. The relationship between the **IP Address** setpoint and the **Network Address** setpoint is defined by the **Subnet Mask** setpoint.

Subnet Mask

This is the 32-bit mask that divides an IP address into subnets and specifies the available hosts. Two bits are always automatically assigned. For example, in 255.255.255.0, "0" is the assigned network address; and in 255.255.255.255, "255" is the assigned broadcast address. The 0 and 255 are always assigned and cannot be used.

Broadcast Address

This is the address used to distribute a signal across a network. It is commonly used to declare that a new device has been connected, and it provides information about the device to existing devices on the network. The broadcast address commonly ends with "255."

Default Gateway Address

A gateway is a node (a router) on a computer network that serves as an access point to another network. A default gateway is the node on the computer network chosen when the IP address does not belong to any other entities in the routing table.

The IntelliCap 2000 control's default gateway address is the Ethernet IP address of the radio in the IntelliCap 2000 control.

MAC Address

This is the MAC address assigned to the IntelliCap 2000 control Ethernet port.

Auto-Negotiate

The **Auto-Negotiate** mode can be enabled for the Ethernet port. When the **Auto-Negotiate** mode is in the **Disabled** state, the **Duplex Mode** and **Data Rate** setpoints must be configured. (Default: Yes)

Duplex Mode

Full Duplex mode permits simultaneous communication in both directions. **Half Duplex** mode permits communication in one direction at a time. (Default: Half)

Data Rate

This can be set to **10 Mbit** mode or **100 Mbit** mode. (Default: 10 Mbit)

Wi-Fi

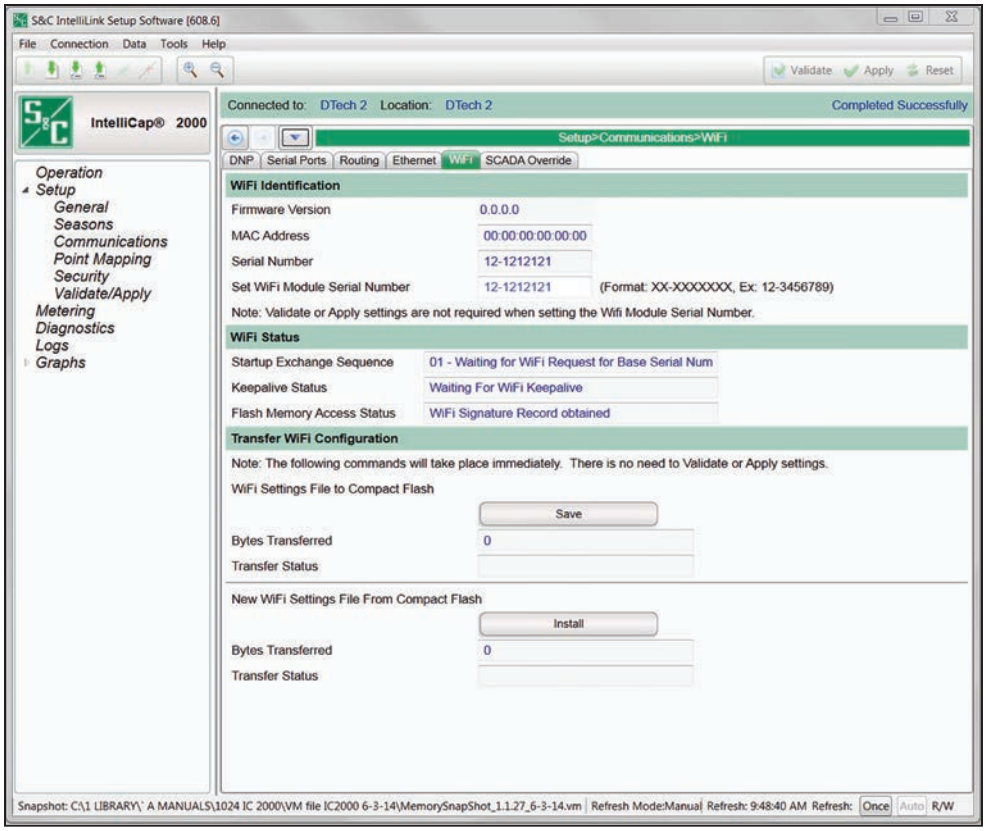


Figure 22. The *Setup>Communications>Wi-Fi* screen.

The Wi-Fi module is a separate computer that sends Wi-Fi communication information to the MCU computer in the IntelliCap 2000 Automatic Capacitor Control over a serial port. To initiate Wi-Fi communication with a personal computer, the Wi-Fi module must have a serial number. See Figure 22.

When the Wi-Fi module cannot obtain a serial number from the control, it uses the universal serial number, which is 00-0000000.

Wi-Fi Identification Section

Firmware Version

This is the firmware revision used by the Wi-Fi communication module.

MAC Address

This is the MAC address of the IntelliCap 2000 control.

Serial Number

This is the IntelliCap 2000 control serial number obtained by the Wi-Fi subsystem from flash memory. LinkStart uses this identifier to connect to this IntelliCap 2000 control.

Set Wi-Fi Module Serial Number

This is allows manual entry of a serial number. (Format: XX-XXXXXXX, Example: 12-3456789)

Wi-Fi Status Section

Startup Exchange Sequence

During the Wi-Fi module power-up sequence, it queries the IntelliCap 2000 control for specific information, such as the "Base Serial Number: and "Time of Day" entries. The status of that query is displayed here. The exchange sequence can finish at either: "04—Link to Wi-Fi Active" or "08—Link to Wi-Fi Active."

Keepalive Status

The Wi-Fi module exchanges a message with the control every 5 seconds. When the IntelliCap 2000 control responds, the Wi-Fi module maintains communication and reports the **Keepalive Status** state is "Active."

Flash Memory Access Status

When the Wi-Fi module has obtained the required configuration information, such as security passwords, from IntelliCap 2000 flash memory, this reports "Wi-Fi Signature Record obtained."

Transfer Wi-Fi Configuration Section

Clicking on the **Save** button transfers the present Wi-Fi configuration to flash memory in the control. The **Bytes Transferred** field indicates the file size transferred, and the **Transfer Status** field changes to "Done" when the process completes.

Clicking on the **Install** button loads the Wi-Fi Settings File from the control flash memory into the Wi-Fi module. The **Bytes Transferred** field indicates the file size transferred, and the **Transfer Status** field changes to "Done" when the process completes.

SCADA Override

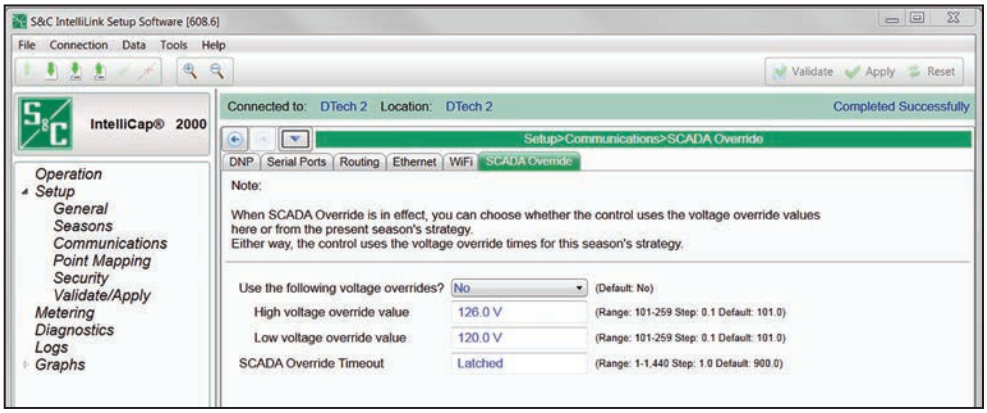


Figure 23. The *Setup>Communications>SCADA Override* screen.

In **SCADA Override** mode, the SCADA master station chooses the capacitor bank state and the voltage range in which **SCADA Override** mode is active. See Figure 23.

The master station sends these parameters to the capacitor control over the communication network. As long as the sensed voltage at the capacitor bank remains within the voltage range and the timer is active, the bank remains in **SCADA Override** mode. When the voltage falls outside of the specified range, the regular **Voltage Override** logic controls the bank.

Note: The capacitor bank may not switch to the **SCADA Override** mode, even though the master station has sent a command to switch. This may happen if the control is already in **Voltage Override** mode or if switching would put it into **Voltage Override** mode. If voltage later returns to a level where switching is allowed and **SCADA Override** mode is still active, the control remembers the SCADA command and switches the bank.

SCADA Override

Located on the *Operation* screen, this command enables or disables **SCADA Override** mode. The master station can also enable/disable it by sending a **Latch On/Off** request to the control point for this setpoint. **SCADA Override** mode only becomes active when the master station sends a **Close** or **Open** request.

Use the Following Voltage Overrides

When the **AsVoltageOverride** mode is selected, the SCADA Voltage Override setpoints are used and the **Season Override Voltage** settings are deactivated. When the bank is commanded offline or online as the result of a SCADA **Voltage Override** operation, the **SCADA Override** mode will transition from the **Active** to the **Inactive** state. When the override condition clears, the configured season strategy will become active.

When the **AsVoltageSetpoint** mode is selected, the **Season Override Voltage** settings are not deactivated. The **SCADA Override Voltage** setpoints are used to change the bank state and **SCADA Override** mode remains in the **Active** state.

High-Voltage Override Value

This is the maximum voltage level before the control overrides the **SCADA Override** mode bank state to avoid a **High-Voltage** condition. When the voltage exceeds this level for the duration of the **High-Voltage Override Time** setpoint (on the screen for this season's control strategy) the bank switches to the **Out** state. (Range: 101.0-259.0; Step: 0.1; Default: 126.0)

Low-Voltage Override Value

This is the minimum voltage level before the control overrides the **SCADA Override** mode bank state to avoid a **Low-Voltage** condition. When the voltage is below this level for the duration of the **Low-Voltage Override Time** setpoint (on the screen for this season's control strategy) the bank switches to the **In** state. (Range: 101.0-259.0; Step: 0.1; Default: 120.0)

High-Voltage Override Time Threshold

This is the amount of time the voltage must be continuously above the **High-Voltage Override** setpoint before the bank switches to the **Out** state. (Range: 0.1-900.0; Step: 0.1; Default: 180.0)

Low-Voltage Override Time Threshold

This is the amount of time the voltage must be continuously below the **Low-Voltage Override** setpoint before the bank switches to the **In** state. (Range: 0.1-900.0; Step: 0.1; Default: 180.0)

SCADA Override Timeout

This is the length of time for which the **SCADA Override** mode will be active after the control receives a starting **Close** or **Open** command from the master station. If the control does not receive a new **SCADA Override** command during this time period, the **SCADA Override** mode ends and the control returns to its **Regular Automatic Control** logic. To latch the bank at the **In** or **Out** state (with voltage overrides), click and hold the Up arrow until the value of this setpoint is in the **Latched** state. (Range: 1-1,440; Step: 1; Default:15)

SCADA Override Timer Refresh Mode

This setting determines how the **SCADA Override** timer will be refreshed. Setting options are the **Message Received** and **Operate–Inhibit** modes. When set for the **Message Received** mode, every message received from the configured master station will reset the **SCADA Override** timer. When set for the **Operate–Inhibit** mode, only the receipt of SCADA Bank Operation commands and **Automatic Operation Inhibit** commands will reset the **SCADA Override** timer. (Default: Operate - Inhibit)

SCADA Override State Diagram

1. **Manual Mode—**In **Manual** mode, the control will not perform any bank operations at all unless commanded by a user through the faceplate, an IntelliLink software command through a serial connection when the control is in **Local** mode, or a SCADA command when the control is in **Remote** mode. As long as the control has not been set to **Local Operation** mode, any SCADA bank operation command may be executed. Bank operation commands will not be inhibited by **Voltage Override** limits or **Neutral Current** or **Voltage Lock-out** conditions. See Figure 24 on page 79.

2. **Automatic Mode—**Unless inhibited or overridden the configured strategy for the active season will be in effect. User commands through the faceplate and IntelliLink software commands through a serial connection will not be ignored. SCADA control through DNP communication will also be ignored unless the **SCADA Override** strategy is enabled. The order of precedence for **Automatic Operation Overrides** and **Inhibit** commands is as follows:

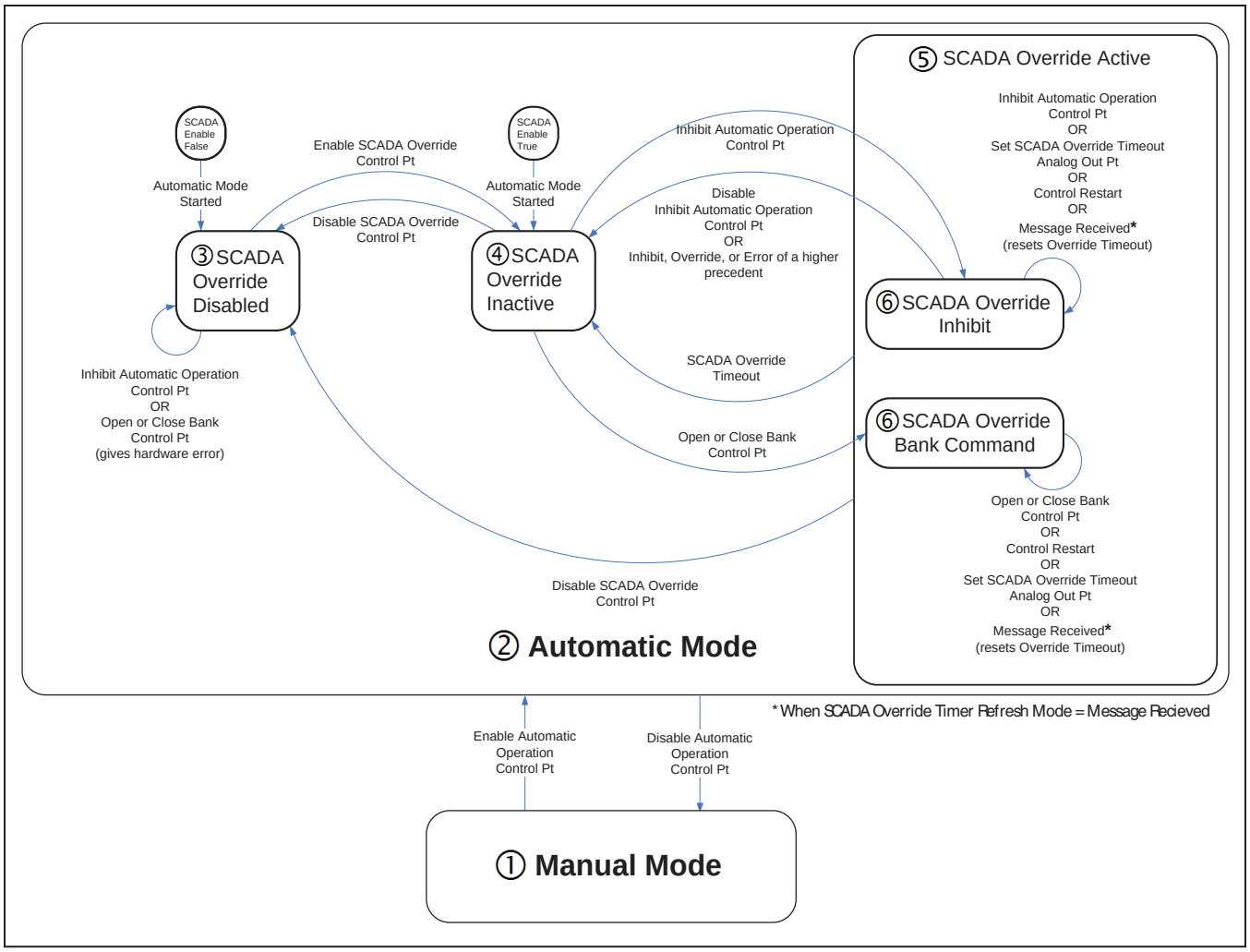


Figure 24. SCADA Override state diagram.

Order of Precedence

(a) Load Fuse Blown error
(b) **Voltage Below Minimum Configured Bank Operation Voltage** condition
(c) **Trip On Loss of Voltage** mode (**Trip Unconditional** option)
(d) **Emergency High-Voltage Override** state
(e) User Defined error
(f) Inconsistent Bank Position error
(g) Contradictory Bank Position error
(h) **SCADA Override, Inhibit Automatic Operation** mode
(i) **Neutral Alarm Corrective Action** or **Automatic Operation Lockout** mode
(j) **Maximum Number of Daily Automatic Operations Reached or Exceeded** state
(k) **Trip On Loss of Voltage** mode (**Trip Only** option)
(l) Voltage Band Lockout error
(m) **Voltage Override Operation** or **Voltage Inhibit** condition
(n) **Harmonic Alarm Corrective Action** mode
(o) **SCADA Override, Bank Operation** command
(p) **Automatic Season Strategy** operation

3. **SCADA Override Disabled—**When the control is in **Automatic** mode and **SCADA Override** mode is disabled, the configured strategy for the active season will be in effect unless otherwise overridden or inhibited.

4. **SCADA Override Inactive—**When the control is in **Automatic** mode and **SCADA Override** mode is enabled but in the **Inactive** state, the configured strategy for the active season will be in effect unless otherwise overridden or inhibited.

   When the control is in **Automatic** mode and **SCADA Override** mode is enabled and in the **Inactive** state, the **SCADA Override** mode will remain in the **Inactive** state after there is a control restart from either a loss of power or a **Restart** command.

5. **SCADA Override Active—**When the control is in **Automatic** mode and **SCADA Override** mode is enabled and in the **Active** state from an **Open-** or **Close-Bank** command, the configured strategy for the active season will be inhibited and the bank will remain in the last state as commanded by SCADA unless otherwise overridden or inhibited. After the higher precedent condition has cleared, if the timer has not expired **SCADA Override** mode will return to the previously commanded bank position.

   When the control is in **Automatic** mode and **SCADA Override** mode is enabled and the **Active** state was entered from and **Open-** or **Close-Bank** command, the **SCADA Override** mode will return to the **Active** state after there is a control restart from either a loss of power or a **Restart** command. The **SCADA Override** counter will be reset to the full count-down setting regardless of where it was in the count down prior to the restart. If the counter goes to zero and the **Inactive** state is reached before the restart, the **SCADA Override** mode will be in the **Inactive** state after the restart.

When the control is in Automatic mode and SCADA Override mode is enabled and in the **Active** mode from an **Inhibit Automatic Operation** command, the configured strategy for the active season will be inhibited and the bank will remain in the last state it was in when the **Inhibit Automatic Operation** command was received unless otherwise overridden or inhibited. Only overrides with a precedence that is higher than **Inhibit Automatic Operation** mode can change the bank state. If the bank position is changed by a condition with a higher precedent, the bank position will not be changed by **SCADA Override** mode after that condition has cleared.

When the control is in **Automatic** mode and **SCADA Override** mode is enabled and the **Active** state was entered from a **Inhibit Automatic Operation** command, the **SCADA Override** mode will return to the **Active** state after there is a control restart from either a loss of power or a **Restart** command. The **SCADA Override** counter will be set to the full count-down setting regardless of where it was in the count down prior to the restart.

Status Points

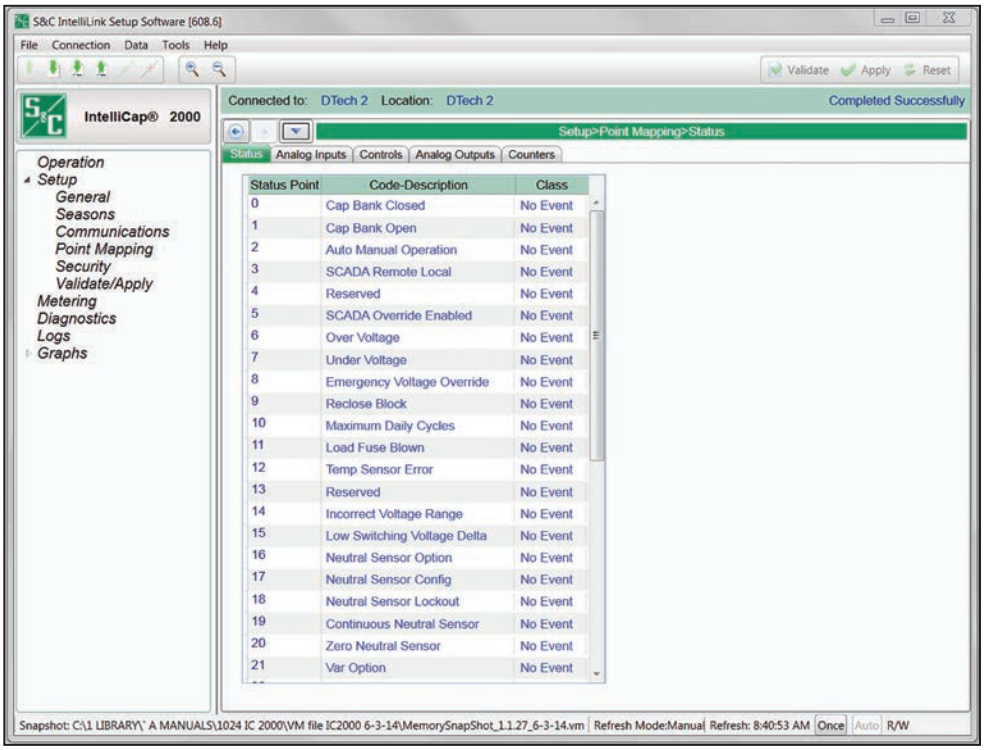


Figure 25. The *Setup>Point Mapping>Status Point* screen.

The screen shown in Figure 25 contains configuration parameters for the status points. Map these points to make them available through SCADA. Refer to Instruction Sheet 1024-560, "IntelliCap 2000 Automatic Capacitor Control: *DNP Points List and Implementation*."

Status Point

This is the point number the SCADA system will see in response to a static or event data request or an unsolicited event response.

Code-Description

This is the description of the point. Configure "End" in the **Code-Description** field to define the end of this point list and the maximum number of analog input points that can be returned.

All internal binary points that can be mapped to individual SCADA points are also displayed on the *Log/Status Point Log* screen.

Class

This is DNP event class in which this point can be placed. Specify Class 1, Class 2, Class 3, or No Event if event data reporting is turned off for this point.

Analog Input Points

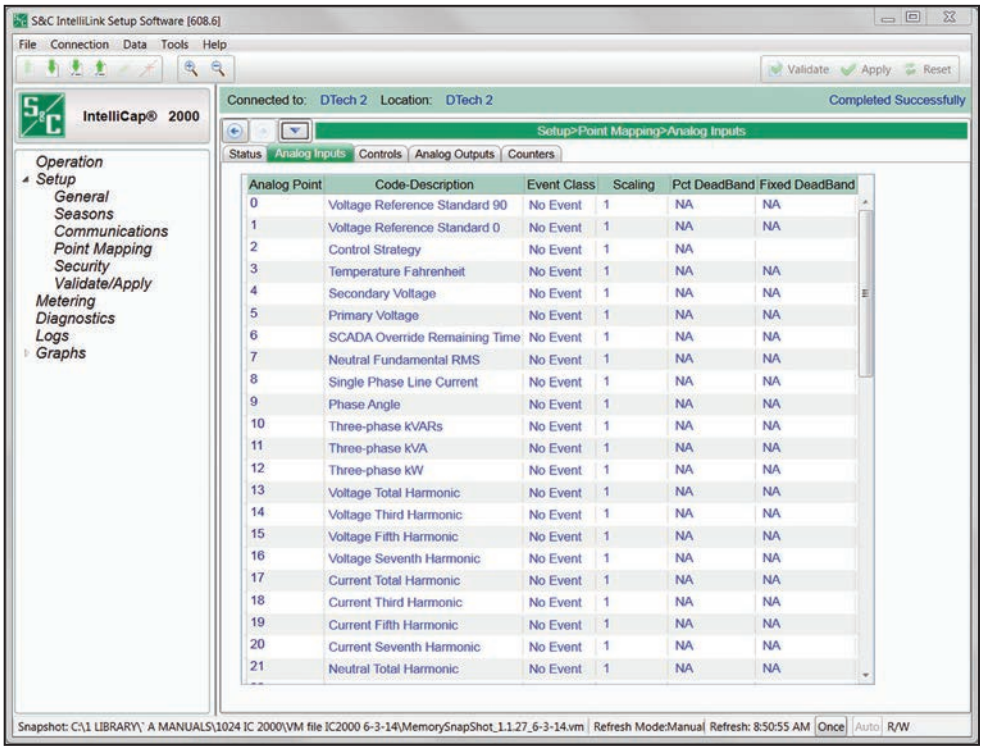


Figure 26. The *Setup>Point Mapping>Analog Input Point* screen.

The screen shown in Figure 26 contains configuration parameters for the analog input points. Map these points to make them available through SCADA. Refer to Instruction Sheet 1024-560, "IntelliCap 2000 Automatic Capacitor Control: *DNP Points List and Implementation*."

Analog Point

This is the assignable point number the SCADA system will see in response to a static or event data request or an unsolicited event response.

Code-Description

This is the description of the point. Configure "End" in the **Code-Description** field to define the end of this point list and the maximum number of analog input points that can be returned.

Event Class

Each point can be assigned to a specific event class. Specify Class 1, Class 2, Class 3, or No Event (which turns off event data reporting for the point).

Scaling

This is the scaling factor for the analog input data to match the analog input requirements of the SCADA system.

Percent Deadband

This is the deadband range expressed as a percentage of the previously reported analog input data. When the analog input data associated with this point exceeds the range in either a positive or negative direction, it will be included in the next event report. Specify the **N/A** option to turn off deadband reporting as a percentage of the previously reported analog input data.

Fixed Deadband

This is the deadband range expressed as a fixed value relative to the previously reported analog input data. When the analog input data associated with this point exceeds the range in either a positive or negative direction, it will be included in the next event report. Specify the **N/A** option to turn off deadband reporting as a fixed value relative to the previously reported analog input data.

Control Points

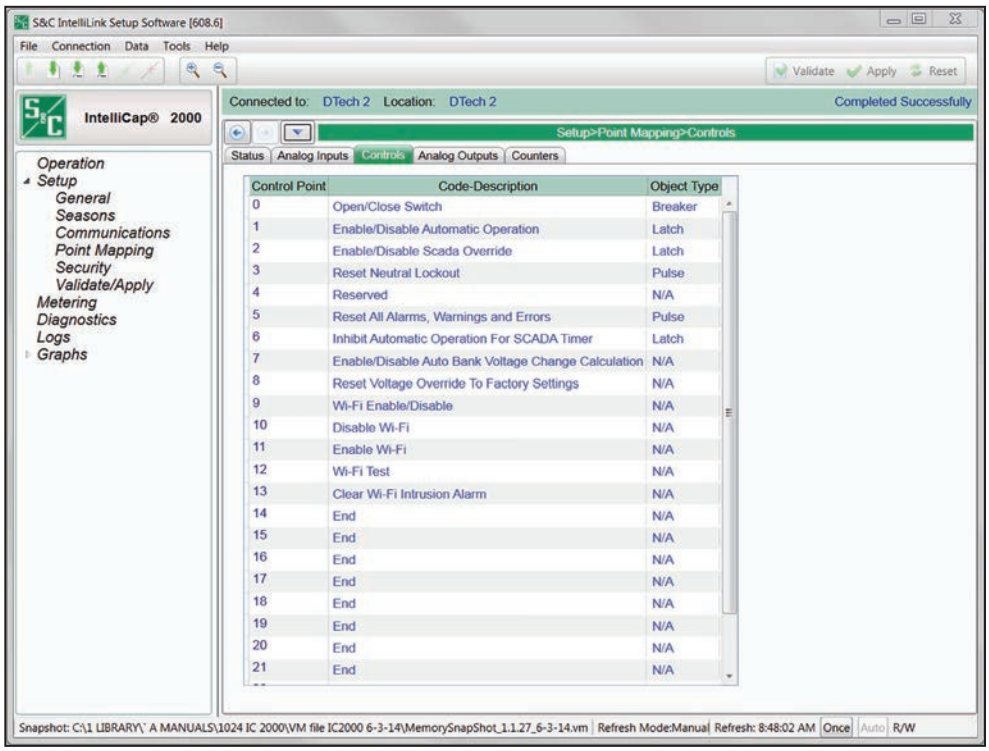


Figure 27. The *Setup>Point Mapping>Control Point* screen.

The screen shown in Figure 27 contains configuration parameters for the control points. Map these points to make them available through SCADA. Refer to Instruction Sheet 1024-560, "IntelliCap 2000 Automatic Capacitor Control: *DNP Points List and Implementation*."

Control Point

This is the assignable point number the SCADA system will use when operating control points.

Code-Description

This is the description of the point. Configure “End” in the **Code-Description** field to define the end of this point list and the maximum number of analog input points that can be returned.

Object Type

This is the type of control operation the SCADA master will issue. Specify the **Breaker** option for a **Trip/Close** operation, the **Latch** option for a latched **On/Off** operation, the **Pulse** option for a momentary control output, or the **N/A** option when the control point will not be used. The Object Type configuration must be valid for the selected object. If the object type received in a control command does not match this setting, the control operation will be rejected.

Analog Output Points

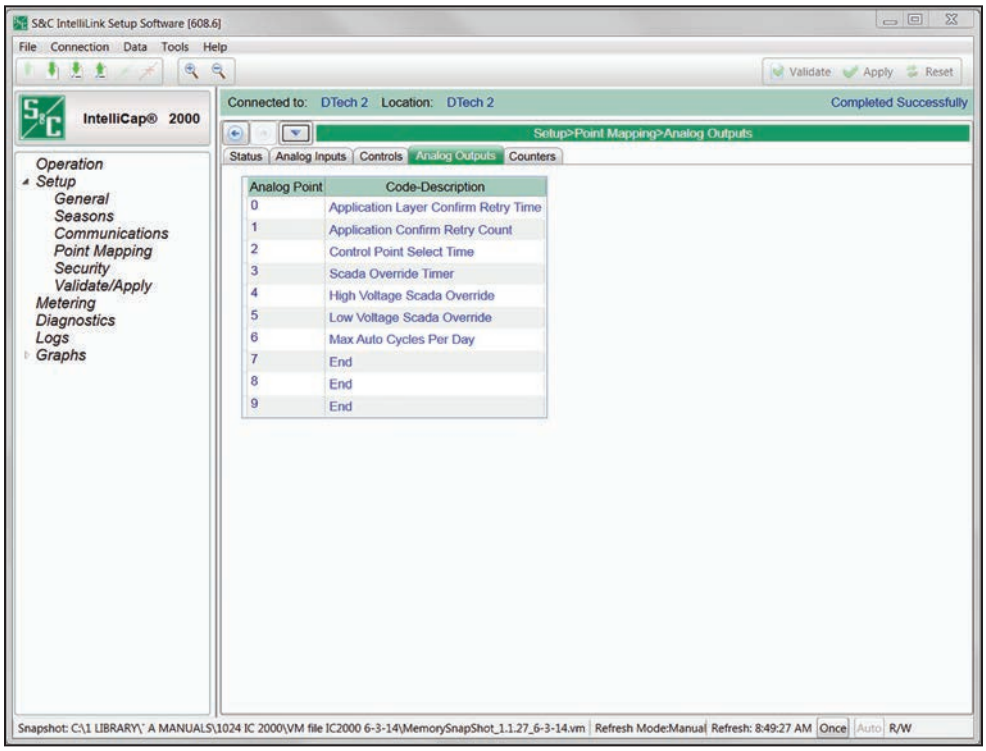


Figure 28. The *Setup>Point Mapping>Analog Output Point* screen.

The screen shown in Figure 28 contains configuration parameters for analog output points. Map these points to make them available through SCADA. Refer to Instruction Sheet 1024-560, "IntelliCap 2000 Automatic Capacitor Control: *DNP Points List and Implementation*."

Analog Point

This is the assignable point number the SCADA system will use when operating analog output.

Code-Description

This is the description of the point. Configure "End" in the **Code-Description** field to define the end of this point list and the maximum number of analog output points.

Counter Points

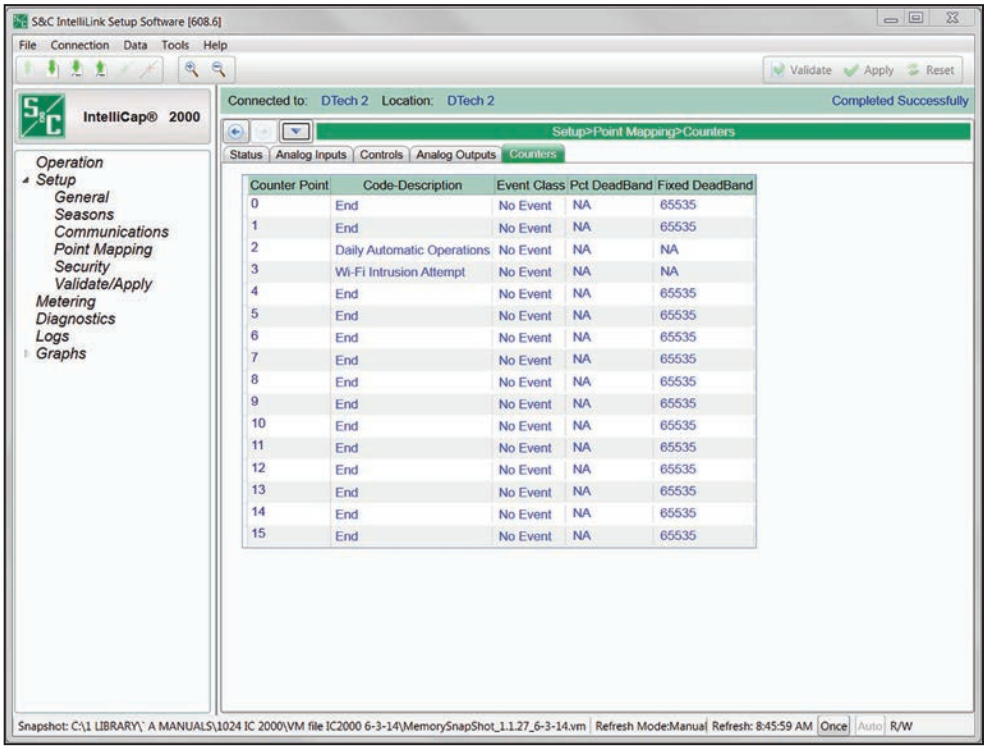


Figure 29. The *Setup>Point Mapping>Counter Point* screen.

The screen shown in Figure 29 contains configuration parameters for counter points. Map these points to make them available through SCADA. Refer to Instruction Sheet 1024-560, "IntelliCap 2000 Automatic Capacitor Control: *DNP Points List and Implementation*."

Counter Point

These are the point number the SCADA system will see in response to a static or event data request or an unsolicited event response.

Code-Description

This is the description of the point. Configure "End" in the **Code-Description** field to define the end of this point list and the maximum number of analog input points that can be returned.

All internal counter points that can be mapped to individual SCADA points are also displayed on the *Logs/Special Events* screen.

Event Class

Each point can be assigned to a specific event class. Specify Class 1, Class 2, Class 3, or No Event (which turns off event data reporting for the point).

Percent Deadband

This is the deadband range expressed as a percentage of the previously reported counter point data. When the counter point data associated with this point exceeds the range in either a positive or negative direction, it will be included in the next event report. Specify the **N/A** option to turn off deadband reporting as a percentage of the previously reported counter point data.

Fixed Deadband

This is the deadband range expressed as a fixed value relative to the previously reported counter point data. When the counter point data associated with this point exceeds the range in either a positive or negative direction, it will be included in the next event report. Specify the **N/A** option to turn off deadband reporting as a fixed value relative to the previously reported counter point data.

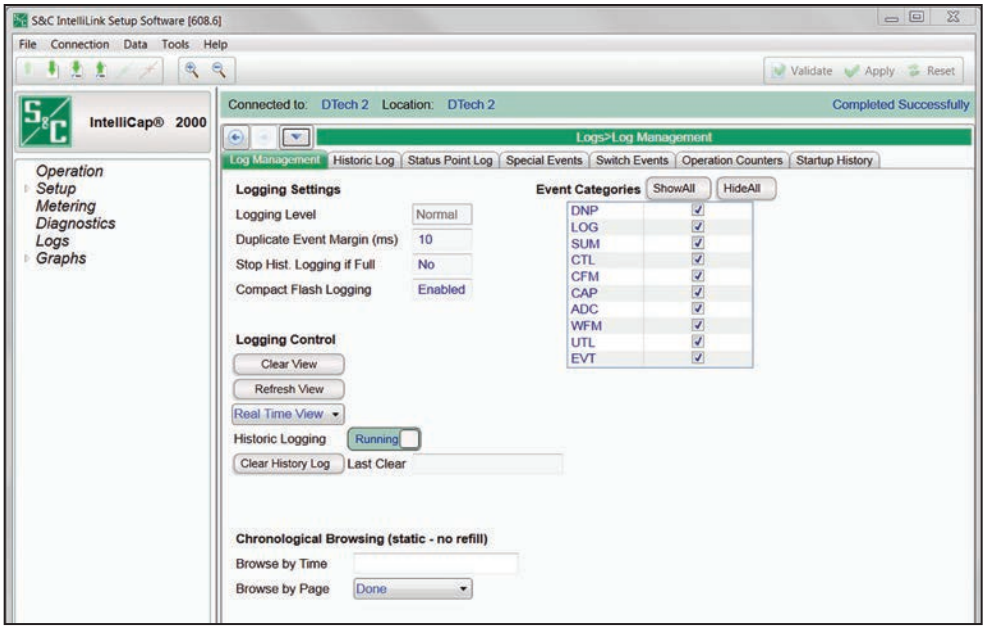


Figure 30. The *Logs>Log Management* screen.

The screen shown in Figure 30 allows the filters to be set for viewing the *Logs>Historic Log* screen.

Logging Settings

Logging Level

The selected logging level determines the type of data log messages displayed on the *Logs>Historic Log* screen. Every data log message is assigned to a specific log level:

Normal—User information

Extended—User information and internal status

All—User information, internal status, and internal trace/debugging information

Duplicate Event Margin (milliseconds)

Storing identical events in a short time period can flood internal memory and does not provide useful diagnostic information. By configuring the time between duplicate-event log entries, this setpoint determines which data will be stored in the internal memory and be displayed on the *Logs>Historic Log* screen. It has no effect on an alternating sequence of events. Two events are considered duplicates when every element of their event records match, such as when the **Duplicate Event Margin** setting is 10 ms and the sequence of events ABABAB (where A and B are different) has every event occur 1 ms after the previous one. The identical events occur within 2 ms, well within the value of the setpoint, but all events will be logged because events are alternating. (Range = 0-30, increment = 1)

Stop Historic Logging If Full

This setting stops logging events when the Historic log is full and subsequent events are discarded without overwriting the contents of the log. Flash memory logging, the Status Point log, and **Special Events** counter logging are not affected by this setpoint. This setting is factory set to the **No** setting to ensure continued event logging.

Compact Flash Logging

When enabled, every historic event generated is written to flash memory. **Logging Level** and **Duplicate Event Margin** setpoints do not prevent an event from being written to flash memory. Flash memory logging preserves as much data as possible. Flash memory data can be retrieved with IntelliLink Setup Software. Open the **Tools** option on the menu bar and click on the **Compact Flash Access** option. Select and save any files needed.

Event Categories

Select the categories that will be displayed on the *Logs>Historic Log* screen. To display only the most important operation information, select the EVT category and click the **Refresh View** button. Utility operation data will be displayed and log information for software troubleshooting and debugging will be omitted.

Logging Control

Complete data are stored in the Historic Event log in flash memory. Flash memory files can be downloaded by opening the **File** option on the menu bar and clicking on the **Flash Memory Files** option. The complete Historic Event log (up to 1 million events) cannot be viewed through IntelliLink software, but a small subset of the Historic Event log (160 events) is displayed on the *Logs>Historic Log* screen. Event filters can be applied to the **Logs>Historic Log** screen, but these filters do not affect entry of events in the Historic Event log.

Clear View

This button clears all data on the *Logs>Historic Log* screen. In **Real-Time View** mode, the next qualifying event will be placed at the top of the *Logs>Historic Log* screen. In **Static View** mode, the *Logs>Historic Log* screen will remain empty until it is completely refilled.

Refresh View

This button clears the present contents of the *Logs>Historic Log* screen and loads up 160 events from the Historic Event log in ascending chronological order. Only events satisfying the checked **Event Categories** options are displayed on the *Logs>Historic Log* screen.

Real Time View or Static View

Use this drop-down menu to select the view mode. **Real Time View** mode loads the latest data on the screen, and **Static View** mode freezes data on the *Logs>Historic Log* screen.

Historic Logging

Running—Starts the Historic log but does not affect flash memory logging, Status Point log entries, or Special Events logging

Stopped—Stops the Historic log but does not affect flash memory logging, Status Point log entries, or Special Events logging. (Subsequent events will not be put into the Historic log, preventing newer events from overwriting older events. Be sure to return the **Historic Logging** mode to the **Running** setting so future events will be logged.)

Clear History Log

This button clears all data in the Historic log. It does not affect flash memory logging, Status Point log entries, or Special Events logging. The date and time of the last **Clear History Log** command are displayed. Clearing the Historic log permanently deletes all event data. To preserve event data, generate an HTML report of logged data before clearing the log.

Chronological Browsing (static – no refill)

Chronological browsing is only available in the **Static View** mode. It is not available in the **Real Time View** mode. Because the size of the *Logs>Historic Log* screen is only a fraction of that of the Historic Event log, the Historic Event log must be navigated chronologically, either by **Browse By Time** mode or **Browse By Page** mode.

Browse By Time

This loads up to 160 events that occurred at or after the specific time entered. Only events that satisfy the Event Categories criterion are placed in the *Logs>Historic Log* screen. If all events in the Historic Event log occurred before the specified time, the oldest-available events are placed in the *Logs>Historic Log* screen. The *Logs>Historic Log* screen is refilled as soon as the specific time is entered; the specified time is cleared when the refill is complete.

Browse By Page

Historic log pages can be browsed four ways:

Oldest 8 Pages: Loads up to 160 of the oldest qualifying events from the Historic Event log

Newest 8 Pages: Loads up to 160 of the newest qualifying events from the Historic Event log

Previous 8 Pages: Loads up to 160 previous events relative to the events currently in the *Logs>Historic Log* screen

Next 8 Pages: Loads up to 160 next events relative to the events currently in the *Logs>Historic Log* screen

When the selection is entered, the *Logs>Historic Log* screen is refilled immediately. Because the Historic Event log is circular, selecting the **Previous 8 Pages** option may cause the newest events to be displayed (if the *Logs>Historic Log* screen presently holds the oldest). Similarly, selecting the **Next 8 Pages** option may cause the oldest events to be displayed (if the *Logs>Historic Log* screen presently holds the newest).

Password Management

Admin User Default Password Change

With software version 2.3.x and later, a user is required to change the default user passwords in the IntelliLink Setup Software before it will allow the user to access the control and read or modify settings on the control using IntelliLink Setup Software. This is required for all user accounts, including the Admin account, which must be changed first before any user can access a control. See Figure 31.

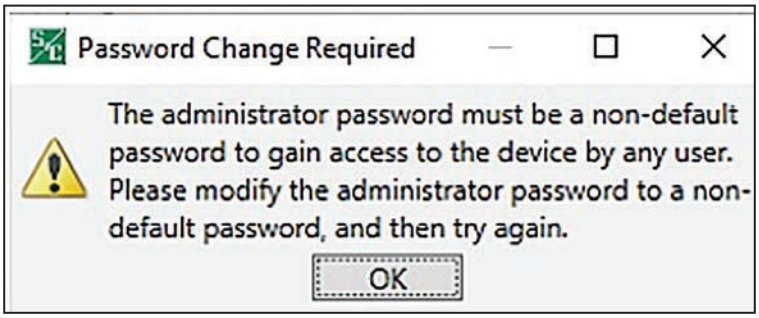


Figure 31. The Password Change Required dialog box if the user tries to set a default setting.

Non-Admin User Default Password Change

If users attempt to log in with one of the non-admin accounts before the default password is changed, they will be notified via the following message that the admin user must change the default user account password before being allowed to connect to a control. See Figure 32.

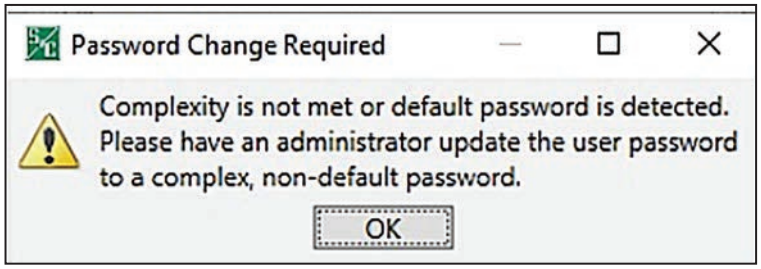


Figure 32. The Password Change Required dialog box when complexity requirements are not met.

Password Complexity Rules

When changing a user password using IntelliLink Setup Software, complexity rules are enforced for the new password. See Table 4.

Table 4. Password Complexity Rules

Rule	Description
Password Length	Must be between 8-12 characters long
Alpha Characters	Must have at least one uppercase and one lowercase character
Special Characters	May contain special characters with the exception of the “Space,” “Tab,” and “&,” characters, which are not allowed
Numbers	May contain numbers

When the password entered does not meet the complexity requirements, the error message shown in Figure 32 will open. The admin user will be required to enter a password that meets the complexity requirements before being allowed to proceed.

Change Admin User Password

With software version 2.3.x and later, the admin user account default password must be changed before IntelliLink Setup Software can connect to a control.

Follow these steps to change the admin user password:

STEP 1. After IntelliLink Setup Software is launched and the default admin password is used to connect to a control, a prompt opens instructing the user to change the admin user account password. See Figure 33.

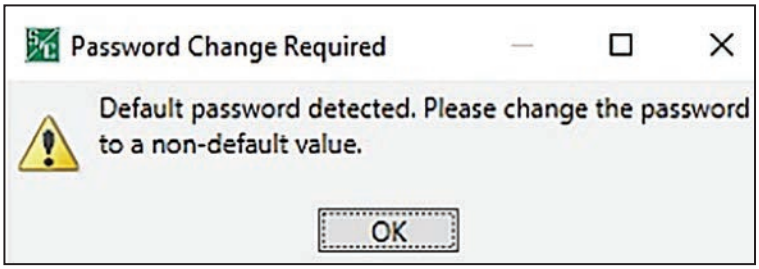


Figure 33. The Password Change Required dialog box.

STEP 2. Enter a new non-default password that meets the complexity requirements into the **Enter Password** and **Confirm Password** fields. Then, click on the **OK** button. See Figure 34.

Figure 34. The Change Password dialog box.

STEP 3. When the password is changed successfully, the Successfully Changed dialog box opens. See Figure 35. Click on the **OK** button to finish the change-password process. If the password was not changed successfully, go to Step 4.

Figure 35. The Change Password Required dialog box after the password is successfully changed.

STEP 4. If the password was not successfully changed, the Password Change Required dialog box opens. See Figure 36. Click on the **Yes** button to change the password again and go back to Step 2 on page 93.

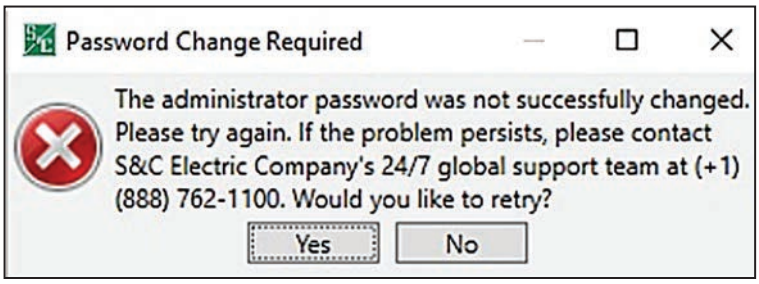


Figure 36. The Password Change Required dialog box.

Change Non-Admin User Password

With software 2.3.x and later, the non-admin user accounts (i.e. Engineer1/2, Technician1/2/3, Operator, and Viewer) must have their passwords changed by an admin user before a control can be connected using IntelliLink Setup Software.

Note: The admin user password must have been changed to a non-default password before a non-admin user can access a control. If this has not been done, go to the "Admin User Default Password Change" section on page 92 for instructions about changing the admin password before proceeding with the next instructions.

Follow these steps to change a non-admin user password:

STEP 1. Launch the IntelliLink Setup Software and log in using the admin account and the non-default admin password.

STEP 2. Go to the *Setup>Security* screen in IntelliLink Setup Software. See Figure 37.

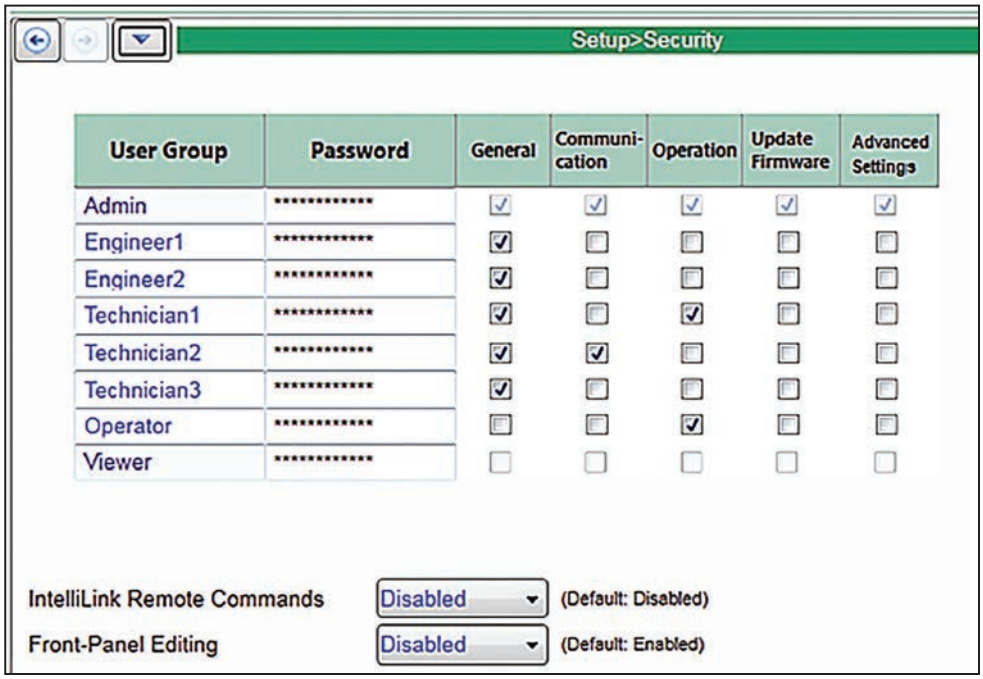


Figure 37. The *Setup>Security* screen.

STEP 3. Click on the **Password** field for a given user and enter a new non-default password that meets the complexity requirements into the **Enter Password** field and the **Confirm Password** field. Then, click the **OK** button. See Figure 38.

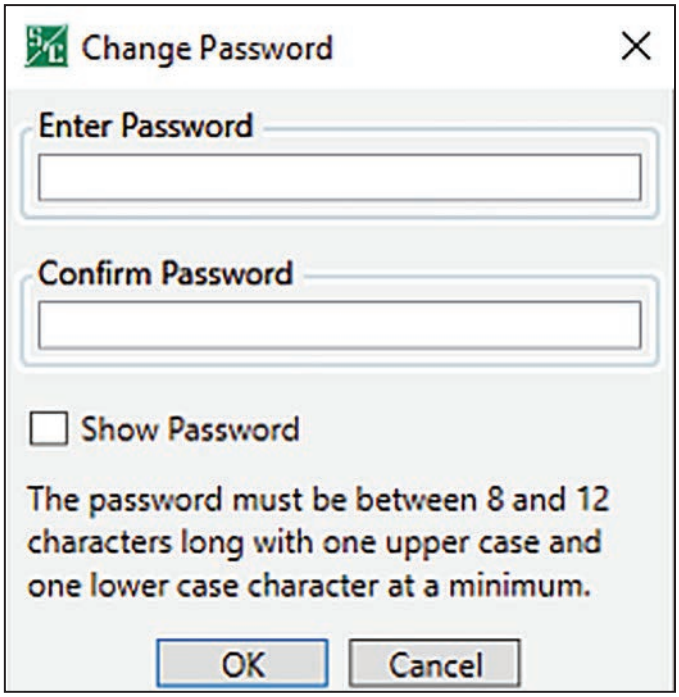


Figure 38. The Change Password dialog box.

STEP 4. When the password has been entered, click on the **Validate** button in the top right corner of the *IntelliLink* screen. See Figure 39.

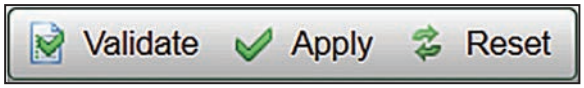


Figure 39. The Validate button.

STEP 5. If the password change validates successfully, click on the **Apply** button to finish the password change process and configure the new password on the control. See Figure 39. Go to Step 6 if the password change was not validated successfully.

STEP 6. If the password was not successfully validated, the Validation Error dialog box will open. See Figure 40. Click on the **OK** button to attempt to change the password again. Go to Step 3 on page 95.

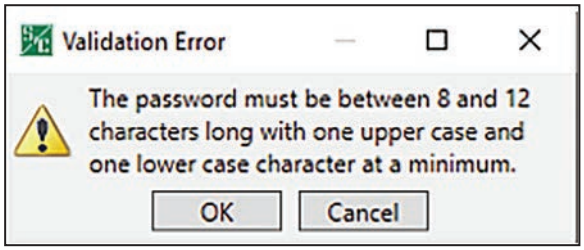


Figure 40. The Validation Error dialog box.

Security Screen

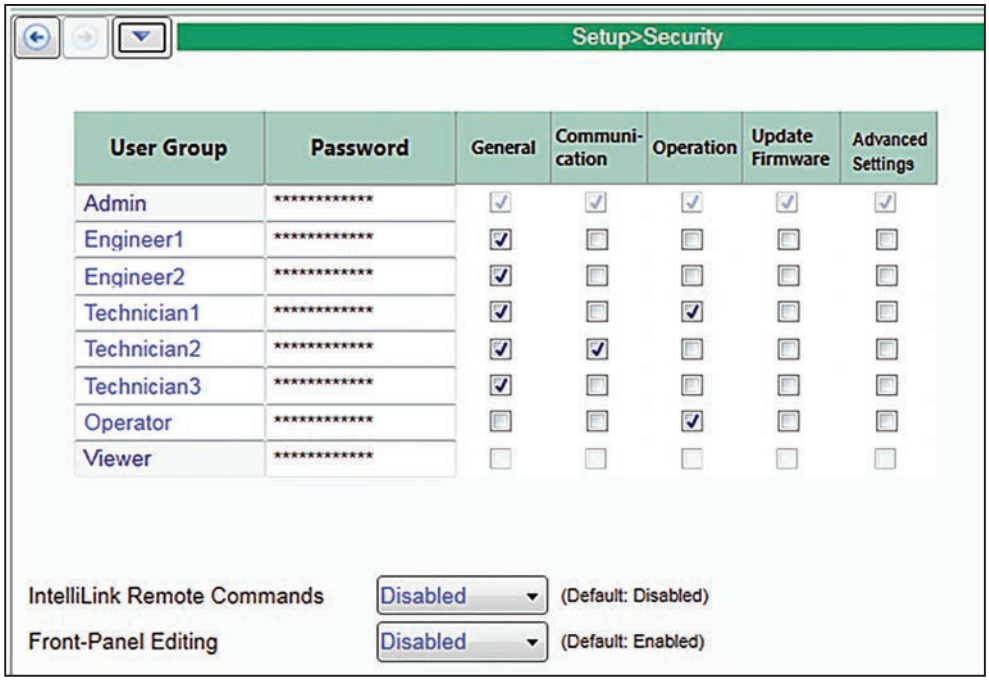


Figure 41. The *Setup>Security* screen.

Only a user logged in as an admin (administrator) can make changes to this screen. The User Group name can be changed for all groups except admin and viewer. All passwords can be changed by the admin user and all default passwords must be changed by the admin user to allow access to the other user accounts. Passwords must be between eight and 12 characters in length with a minimum of one upper case and one lower case character. Numbers and special characters are also allowed for passwords, with the exception of the "Space," "Tab," and "&" characters.

A dialog box will open when the value to be changed is clicked on. Changes will not take effect until the **Apply** command is selected on the *Setup>Validate/Apply* screen or with the **Apply** button on the tool bar.

Advanced Settings

When checked, special control features will operate, such as the **Enable Inhibit on Voltage Override** mode on the *Setup>Seasons>Main* screen.

IntelliLink Remote Software Commands

When set to the **Enabled** state, IntelliLink Setup Software can be used to access the IntelliCap 2000 control operation commands. (Default: Disabled)

Front Panel Editing

When set to the **Enabled** state, front panel controls can be used with the LCD screen to revise the control configuration. (Default: Enabled)

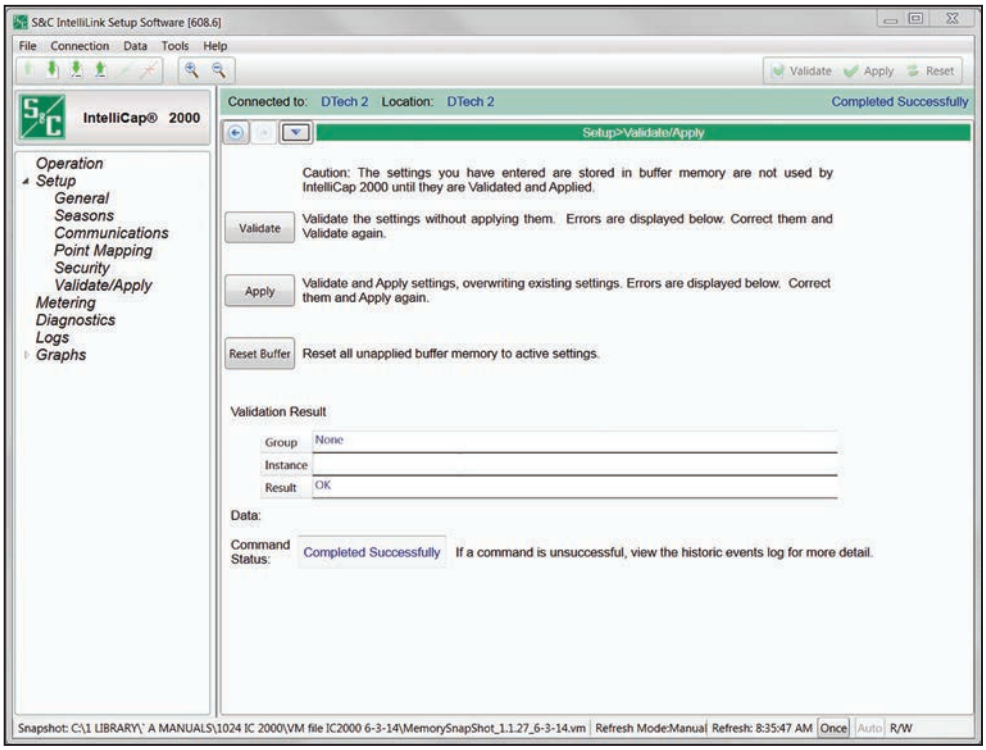


Figure 42. The *Setup>Validate/Apply* screen.

Settings are stored in the buffer memory of the control and are not active until they have been applied. This screen provides commands for managing settings between the buffer memory and the active settings area of the control. The **Validate**, **Apply**, and **Reset Buffer** commands on this screen perform the same functions as the **Validate**, **Apply**, and **Reset** buttons on the right hand side of the main tool bar. See Figure 42.

Validate

This command validates settings in the buffer memory without applying them. If the validation procedure detects an error or inconsistency, it will be displayed in the **Validation Result** field.

Apply

This command validates settings in the buffer memory and applies them. If the settings are validated, they will take effect immediately. The previously active settings will be overwritten and cannot be restored.

Reset Buffer

This command resets settings in the buffer memory to the presently active values. It will not undo an **Apply** command.

Validation Results

This field shows the status of the **Validate** or **Apply** command. If unsuccessful, this field will provide additional information to help lead to a resolution of the issue preventing proper execution.

The two-line LCD screen on the faceplate displays information about the control and the capacitor bank. When the control is operating normally and no alarms are active, the top line shows ****UNIT OK****; the bottom line scrolls through real-time data and setpoint values for the present season. When an alarm is active, the top line shows ****ACTIVE ALARMS****; scroll through information on the bottom line to find the active alarm(s). See the "Faceplate LCD" section in Instruction Sheet 1024-540, "IntelliCap® 2000 Automatic Capacitor Control: *Operation*," for more information.

Table 5 summarizes the functions of the faceplate keypad buttons. If any of the buttons are pressed when the LCD screen reads ****UNIT OK**** or ****ACTIVE ALARMS****, the top line displays ****MENU****. Scroll through and select any of these menu options on the bottom line:

****DATA**—**Use this entry to scroll through real-time data and present setpoint values.

****ALARMS**—**Use this entry to scroll through the alarm list to determine whether any alarms are active.

****SETUP**—**Use this entry to change the control's setpoint values. The **Front Panel Editing** setpoint on the *Setup>Security* screen must be in the **Enabled** state to perform control configuration with the faceplate buttons.

Table 5. Faceplate Keypad Button Functions

Button	Function
NEXT	Scrolls forward through data, menu, and setpoint choices
PREV	Scrolls backward through data, menu, and setpoint choices
ENTER	Selects menu choice or setpoint value, and accepts value change
ESC	Cancels a setpoint change or returns the LCD screen to the previous menu level
+	Increases a blinking setpoint value
–	Decreases a blinking setpoint value

Follow these steps to enter **Setup** mode:

STEP 1. Press the ENTER button while the LCD screen displays ****SETUP****. The LCD screen's display then shows **Season 1**.

STEP 2. Press the NEXT button to scroll through the setup choices: ****Season 1****, ****Season 2****, ****Season 3****, ****Season 4****, ****General****, ****Site-Related****, ****Neutral Sensor****, and ****SCADA Override****.

STEP 3. Press the ENTER button to display the first setpoint for that selection.

Follow these steps to change a setpoint value:

STEP 1. Press the ENTER button; the value will blink.

STEP 2. Use the **+** or **–** button to increase or decrease the value.

STEP 3. Press the ENTER button to accept the new value or the ESC button to cancel the change.

STEP 4. To display the next setpoint, press the NEXT button.

STEP 5. Repeat the process for each setpoint value to be changed.

When the **Season 1**, **Season 2**, **Season 3**, or **Season 4** option is selected, the first setpoint shown on the LCD screen is ****Start Month****. If a season has not been set up already, setting the **Start Month**, **Start Day**, and **Auto** (automatic control strategy) value is required before changing any other setpoints for the season. The control automatically calculates the **End Month** and **End Day** values. It is not necessary to enter all season setpoints before changing the **General**, **Site-Related**, **Neutral Sensor**, or **SCADA Override** setpoint values.

Table 6 shows the LCD screen displays, setting descriptions, and the setting ranges.

Table 6. Configuration with the Faceplate LCD Screen Entries

Display	Description (range)
****Unit OK****	When the control is operating normally and no alarms are active, the top line shows ****UNIT OK****; the bottom line scrolls through real-time data and setpoint values for the present season.
****Menu**** **Data**	Scroll through and select any of the data entries on the bottom line.
****Menu**** **Alarm**	Scroll through and select any of the alarm entries on the bottom line.
****Setup**** **Site Related**	Configure the options displayed on the *Setup>Site-Related* screen.
Setup: Operation **Max Cyc/D: 004**	**Maximum Automatic Control Cycles Per Day—**In **Automatic** mode, the bank can switch out this number of times during a calendar day; any additional switching is inhibited until the next calendar day. (Range: 0-255; Step: 1; Default: 4)
Setup: Operation **Pulse Tim: 07.0**	**Capacitor Bank Switch Control Pulse Time—**This is the amount of time the control output is energized whenever the bank is switched by the control in **Automatic** mode or by a software **Manual** command. The pulse time is generally set to be equal to or longer than the switch manufacturer's recommendation. For motor-driven oil switches, a value of 7 seconds is typical. For vacuum-type switches, S&C recommends a value of 1 second (though the default value of 7 seconds will also work). (Range: 0.1-60.0; Step: 0.1; Default: 7.0)
Setup: Operation **Man Op Dly: 030**	**Manual Operation Delay—**This is the amount of time (in seconds) **Close** and **Open** operations from the faceplate are delayed. This allows the operator to step away from the bank. The operator can choose a delay from 1 to 300 seconds. (Range: 1-300; Step: 1; Default: 30)
Setup: Operation **R Cur Str: AdjVAR**	**Reverse Current Strategy** (Var Controls Only)**—**This setpoint configures how the control responds to a detected **Reverse-Current** condition. A **Reverse-Current** condition exists if the current remains continuously in the reverse direction for longer than the **Reverse Current Time Threshold** setting. When current flow returns to its normal direction, bank switching is based on the presently active control strategy. (Default: Adj. Var) See page 18.
Setup: Operation **R Cur Time: 10**	**Reverse Current Time Threshold** (Var Controls Only)**—**This is the amount of time the current must be continuously in the reverse direction for a **Reverse-Current** condition to exist. For the condition to clear, the current must be continuously in the normal direction for this amount of time. (Range: 0-60; Step: 1; Default: 10)
Setup: Operation **Nom VAC: 000**	**Nominal Operating Voltage—**This is the nominal operating voltage (in Vac) for the distribution system. The IntelliLink software automatically scales all voltage setpoints to the proper operating range. The voltages available are 110, 115, 120, 127, 220, 230, and 240 Volts. The **System Transformer Ratio** setting on the *Setup>General>Sensor Configuration>Voltage and Current* screen represents the ratio of the line-to-ground primary nominal voltage to the **Nominal Operating Voltage** setting. (Default: 120)

TABLE CONTINUED ►

Table 6. Configuration with the Faceplate LCD Screen Entries—Continued

Display	Description (range)
Setup: Operation **Nom Freq: 00**	**Nominal Operating Frequency—**This is the nominal operating frequency (in Hertz) for the distribution system. (Default: 60)
Setup: Operation **Tmp Conv: Fahrenh**	**Temperature Readings Conversion—**Configure this setting for the unit of temperature the control operates on and displays as °F or °C. (Default: °F)
Setup: Operation **Date: MM/DD/YY**	**Date Format Displayed on LCD Screen—**This setpoint changes the format of the date on the LCD screen at the start of each scrolling sequence. The three options are MM/DD/YY, DD/MM/YY, and YY/MM/DD. (Default: MM/DD/YY)
Setup: Operation **TrpOnLOV:Disabld**	**Trip on Loss of Voltage—**When invoked, this feature causes the control to trip the bank switches to the **Open** position whenever power is restored after a loss-of-voltage event. The minimum operation time is about 60 seconds. The feature has three settings: **Disabled** (default), **Trip Only**, and **Unconditional**. This feature is only active if the control is in the **Automatic Operation** mode and no higher-precedence operation or contingency condition exists to countermand its operation. (Default: Disabled)
Setup: Log **Log Lvl: Normal**	**Logging Level—**The logging level selected determines the type of data log messages captured in the base memory module and displayed on the *Logs>Historic Events* screen. Every data log message is assigned a specific log level, as follows: **Normal—**User information **Extended—**User information and internal status **All—**User information, internal status, and internal trace/debugging information
Setup: Log **Dup Evt Mg: 10**	**Duplicate Event Margin (milliseconds)—**The storage of identical events in a short time period can flood the internal memory and does not yield useful diagnostic information. For events to be considered duplicates, every element of their event records must match. This setpoint selects the data to be stored in the internal memory and is displayed on the *Logs>Historic Logs* screen. It determines the time between logging duplicate events. It has no effect on an alternating sequence of events. (Range: 0-30; Step: 1; Default: 10)
Setup: Log **Time Meter: 015**	**Time Average for Metering—**Interval (in minutes) over which a reported parameter will be averaged and stored in the control and in compact flash memory. A smaller interval will result in more log entries. (Range: 1-120; Step: 1; Default: 15)
Setup: Bank **Em Hi V: 130.0**	**Emergency High-Voltage Override Value—**This is the maximum voltage level before the capacitor control overrides the **Automatic Operation** mode and switches the bank out to avoid an extreme **High-Voltage** condition. The bank will be switched out if the voltage stays above this level for the period of time specified by the configured **Emergency High-Voltage Override Time Threshold** setting. Configure the **Emergency High-Voltage Override** setting to a value higher than the **High-Voltage Override Value** setting on the *Setup>Seasons* screen for the selected control strategies. (Range: 0.0-400.0; Step: 0.1; Default: 130.0)
Setup: Bank **Em Lo V: 110.0**	**Emergency Low-Voltage Override Value—**This is the minimum voltage level before the capacitor control overrides the **Automatic Operation** mode and switches the bank in to avoid an extreme **Low-Voltage** condition. The bank will be switched in if the voltage stays below this level for the period of time specified by the configured **Emergency Low-Voltage Override Time Threshold** setting. Configure the **Emergency Low-Voltage Override** setting to a value less than the **Low-Voltage Override Value** setting on the *Setup>Seasons* screen for the selected control strategies. (Range: 0.0-400.0; Step: 0.1; Default: 110.0)
Setup: Bank **Em HiV T0: 05.0**	**Emergency High-Voltage Override Time Threshold—**This is the amount of time the voltage must be continuously above the **Emergency High-Voltage Override** setting before the bank switches out. Set this value to a time shorter than the **High-Voltage Override Time** setting on the *Setup>Seasons* screen for the selected control strategies. (Range: 0.1-30.0; Step: 0.1; Default: 5.0)

TABLE CONTINUED ►

Table 6. Configuration with the Faceplate LCD Screen Entries—Continued

Display	Description (range)
Setup: Bank **Em LoV T0: 05.0**	**Emergency Low-Voltage Override Time Threshold—**This is the amount of time the voltage must be continuously below the **Emergency Low-Voltage Override** setpoint before the bank switches in. Set this value to a time shorter than the **Low-Voltage Override Time** setting on the *Setup>Seasons* screen for the selected control strategies. (Range: 0.1-30.0; Step: 0.1; Default: 5.0)
Setup: Bank **Band Lck T: 05**	**High-/Low-Voltage Band Lockout Time Threshold—**This is the number of days the **High-/Low-Voltage Band Error** state is allowed to continuously exist before the **High-/Low-Voltage Band Lockout** state is set and **Automatic Operation** mode of the bank switch is locked out. (Range: 1-30; Step: 1; Default: 5)
Setup: Bank **BVC+M Est: 01.5**	**Bank Voltage Change + Margin: Estimated Value—**This is an estimated average of the voltage change associated with the bank switching in or out, plus a small margin. Set this value to the average measured voltage change at the bank, plus 0.5 Volts or 25% (whichever is larger) for an operating margin. The control uses the **Bank Voltage Change + Margin** and the **Voltage Override** setpoints for the present season to inhibit bank switching if the voltage is close enough to a configured **Override Limit** setting that switching the bank would cause a **Voltage Override** condition. (Range: 0.5-25.4; Step: 0.1; Default: 1.5)
Setup: Bank **BVC+M Cal: Enbld**	**Bank Voltage Change + Margin: Automatic Calculation—**When enabled, the control automatically calculates the **Voltage Change** and **Margin** values. The control uses the average change in voltage from the last four switching operations for the **Voltage Change** value and 25% of the average for the **Margin** value. The minimum for the **Margin** value is 0.5 Volts. (Default: Enabled) When this feature is enabled, the control can account for any future feeder configuration changes that affect the **Voltage Change** value.
Setup: Bank **Min SW V: 101.0**	**Capacitor Bank Switch Minimum Switching Voltage—**The control will not operate the capacitor bank switch below this voltage. For motor-controlled switches, set this value as low as 100 Volts on a 120-Vac base. For vacuum switches, do not set this value below 110 Volts on a 120-Vac base or the minimum value specified by the switch manufacturer to prevent switch damage during a brownout condition. (Range: 0.0-400.0; Step: 0.1; Default: 101.0)
Setup: Bank **Min Pct V: 50**	**Minimum Percentage of Average Delta Voltage—**This setpoint compares the most recent change in voltage (Delta V) with the average Delta V for the previous four switching operations. When the most recent Delta V is below this percentage of the average Delta V level, a bank switch malfunction may have occurred. This condition is logged on the *Logs>Historic Log* screen. See Instruction Sheet 1024-540, "IntelliCap 2000 Automatic Capacitor Control: *Operation*." (Range: 0-99; Step: 1; Default: 50) This value may be decreased to allow a greater deviation in the Delta V value, or it may be increased when the Delta V value is very stable.
Setup: Bank **Min Pct kVar: 70**	**Minimum Percentage of Average Delta kvars** (Var Controls Only)**—**This setpoint compares the most recent change in kvars (Delta kvars) with the average Delta kvars for the previous four switching operations. When the most recent Delta kvars value is below this percentage of the average level, a bank switch malfunction may have occurred. This condition is logged on the *Logs>Historic Log* screen. See Instruction Sheet 1024-540, "IntelliCap 2000 Automatic Capacitor Control: *Operation*." (Range: 0-99; Step: 1; Default: 70) This value may be decreased to allow a greater deviation in the Delta kvars value, or it may be increased when the Delta kvars value is very stable.
Setup: Bank **Bank Sz: 00000**	**3-Phase Bank Size (kvars)** (Var Controls Only)**—**This is the size of the capacitor bank (in kvars) the control switches. Be sure to enter the correct value because this number may be used to calculate the **Adjusted Total** kvars value. (Range: 0-12,750; Step: 1; Default: 1,200)
****Setup**** **Sensor Config**	When the **Sensor Configuration** mode is in the **Disabled** state, the neutral sensor inputs are ignored. This allows control operation without a neutral sensor connected. (Default: Enabled)

TABLE CONTINUED ►

Table 6. Configuration with the Faceplate LCD Screen Entries—Continued

Display	Description (range)
Setup:Vlt&Cur Sn Sys TR Ro:0000.0	**System Transformer Ratio—**This is the step-down ratio of the voltage transformer (for example, primary to 120 Volt). The control records, displays, and manipulates voltages normalized on the nominal voltage base set by this ratio and the **Nominal Operating Voltage** setpoint found on the *Setup>General>Site Related>Operation* screen. This parameter provides the conversion ratio from the **Nominal Operating Voltage** base setpoint to the **Line-to-Ground Voltage** value. (Range: 0.1-1,000.0; Step: 0.1; Default: 100.0)
Setup:Vlt&Cur Sn V Sn Scr: CtlPwr	**Voltage Sensor Source—**When equipped with option suffix "-K1," the control can derive voltage sensing from an external voltage sensor and is factory configured to use an external sensor. The available sensor input ranges are 0-5 V or 0-10 V. The external sensor positive input connects to the left spade terminal and neutral to the right terminal. A control with option suffix "-K1" can be configured to obtain its voltage-sensing signal from the control power, but it will require a hardware configuration change to match the software setting. Voltage is sensed on Pins 11 and 12 of the input terminal block.
Setup:Vlt&Cur Sn Ex V Sn R: 00000	**External Voltage Sensor Ratio—**The setting is only valid when the control has been equipped with option suffix "-K1" and the **Voltage Sensor Source** mode is set to the **External Voltage Sensor** state. Enter the ratio of the external voltage sensor provided by the sensor manufacturer. For example if a line-post sensor has a ratio of 10,000:1, enter 10000. (Range: 1-20,000; Step: 1; Default: 100)
Setup:Vlt&Cur Sn V Ph Sh Cor: 000	**Voltage Sensor Phase Shift Correction—**The setting is only valid when the control is equipped with option suffix "-K1." This provides phase-angle correction for the voltage sensor input. When the actual phase angle shift of the sensor has not been provided, use the nominal phase-angle shift for the chosen sensor. (Range: 0-360; Step: 1; Default: 0)
Setup:Vlt&Cur Sn Sys Wrng: PH - N	**System Wiring—**This indicates how the voltage transformer that powers the control is connected (phase to ground or phase to phase). (Default: Phase to neutral)
****Setup** SCADA Override**	In **SCADA Override** mode, the SCADA master station chooses the capacitor bank state and the voltage range in which **SCADA Override** mode is active. **Note:** The capacitor bank may not switch to the **SCADA Override** mode, even though the master station has sent a command to switch. This may happen if the control is already in **Voltage Override** mode or if switching would put it into **Voltage Override** mode. If voltage later returns to a level where switching is allowed and **SCADA Override** mode is still active, the control remembers the SCADA command and switches the bank.
Setup: SCADA Ovr Enbled: No	**SCADA Override Enabled—**This command enables or disables **SCADA Override** mode. The master station can also enable/disable it by sending a **Latch On/Off** request to the control point for this setpoint.
Setup: SCADA Ovr Mode: No	**SCADA Override Mode—SCADA Override** mode only becomes active when the master station sends a **Close** or **Open** request.
Setup: SCADA Ovr Hi Vlt Ov: 126.0	**High-Voltage Override Value—**This is the maximum voltage level before the control overrides the **SCADA Override** mode bank state to avoid a **High-Voltage** condition. When the voltage exceeds this level for the duration of the **High-Voltage Override Time** setpoint (in this season's control strategy) the bank switches to the **Out** state. (Range: 101.0-259.0; Step: 0.1; Default: 126.0)
Setup: SCADA Ovr Lo Vlt Ov: 120.0	**Low-Voltage Override Value—**This is the minimum voltage level before the control overrides the **SCADA Override** mode bank state to avoid a **Low-Voltage** condition. When the voltage is below this level for the duration of the **Low-Voltage Override Time** setpoint (in this season's control strategy) the bank switches to the **In** state. (Range: 101.0-259.0; Step: 0.1; Default: 120.0)
Setup: SCADA Ovr HiTimeThld: 01800	**High-Voltage Override Time Threshold—**This is the amount of time the voltage must be continuously above the **High-Voltage Override** setpoint before the bank switches to the **Out** state. (Range: 0.1-900.0; Step: 0.1; Default: 180.0)

TABLE CONTINUED ►

Table 6. Configuration with the Faceplate LCD Screen Entries—Continued

Display	Description (range)
Setup: SCADA Ovr LoTimeThld: 01800	**Low-Voltage Override Time Threshold—**This is the amount of time the voltage must be continuously below the **Low-Voltage Override** setpoint before the bank switches to the **In** state. (Range: 0.1-900.0; Step: 0.1; Default: 180.0)
Setup: SCADA Ovr Time Thld: 00015	**SCADA Override Timeout—**This is the length of time for which the **SCADA Override** mode will be active after the control receives a starting **Close** or **Open** command from the master station. If the control does not receive a new **SCADA Override** command during this time period, the **SCADA Override** mode ends and the control returns to its **Regular Automatic Control** logic. To latch the bank at the **In** or **Out** state (with voltage overrides), click and hold the Up arrow until the value of this setpoint is in the **Latched** state. (Range: 1-1,440 and Latched; Step: 1; Default:15)
Setup: SCADA Ovr Refresh: Op-Inhbt	**SCADA Override Timer Refresh Mode—**This setting determines how the **SCADA Override** timer will be refreshed. Setting options are the **Message Received** and **Operate–Inhibit** modes. When set for the **Message Received** mode, every message received from the configured master station will reset the **SCADA Override** timer. When set for the **Operate–Inhibit** mode, only the receipt of **SCADA Bank Operation** commands and **Automatic Operation Inhibit** commands will reset the **SCADA Override** timer. (Default: Operate - Inhibit)
****Setup** Seasons**	These setpoints configure the control strategy and dates for each season. They also set the **High-Voltage Override** and **Low-Voltage Override** setpoints for the specific configured season.
Setup: Season 1 Enable: Yes	**Season Enable—**A season can only be enabled if the previous season has already been checked. A season can only be disabled if the season with a higher number is unchecked. When this control uses the same control strategy all year, check only the Season 1 check box, set the **Month** and **Day** setpoints to January 1, select a strategy, and enter the settings.
Setup: Season 1 Start Mnth: Jan	**Start Date (Month)—**Set the start month for the selected season. For correct operation the seasons MUST NOT overlap.
Setup: Season 1 Start Day: 01	**Start Date (Day)—**Set the start day for the selected season. The end date of the season is the day before the start date of the next season. For correct operation the seasons MUST NOT overlap.
Setup: Season 1 Strt: Timeclock	**Strategy—**This setpoint allows a choice of the control strategy to be used for the season when the capacitor control is in **Automatic** mode.
Setup: Season 1 Hi Vlt Ov: 126.0	**High-Voltage Override Value—**This is the maximum voltage level before the control overrides the **SCADA Override** mode bank state to avoid a **High-Voltage** condition. When the voltage exceeds this level for the duration of the **High-Voltage Override Time** setpoint the bank switches to the **Out** state. (Range: 101.0-259.0; Step: 0.1; Default: 126.0)
Setup: Season 1 Hi V Time: 060.0	**High-Voltage Override Time Threshold—**This is the amount of time the voltage must be continuously above the **High-Voltage Override** setpoint before the bank switches to the **Out** state. (Range: 0.1-900.0; Step: 0.1; Default: 180.0)
Setup: Season 1 Lo Vlt Ov: 120.0	**Low-Voltage Override Value—**This is the minimum voltage level before the control overrides the **SCADA Override** mode bank state to avoid a **Low-Voltage** condition. When the voltage is below this level for the duration of the **Low-Voltage Override Time** setpoint the bank switches to the **In** state. (Range: 101.0-259.0; Step: 0.1; Default: 120.0)
Setup: Season 1 Lo V Time: 060.0	**Low-Voltage Override Time Threshold—**This is the amount of time the voltage must be continuously below the **Low-Voltage Override** setpoint before the bank switches to the **In** state. (Range: 0.1-900.0; Step: 0.1; Default: 180.0)
Setup: Seasons 2, 3, and 4	The setpoints for Season 1 are duplicated for Seasons 2, 3, and 4.
****Ssn 1 Strat** Data**	Configure the following setpoints to set a specific strategy for each season.

TABLE CONTINUED ►

Table 6. Configuration with the Faceplate LCD Screen Entries—Continued

Display	Description (range)
Temp Strategy Hi Tmp Op: Enbld	The bank is switched when a **High-Temperature Threshold** setting is reached.
Tmp Strat: Hi Tmp SW In Temp: 84 F	**Temperature at Which Bank Switches In—**This is the temperature at which the bank switches to the **In** state during a **High-Temperature** condition. The temperature must be above this value for a period of time specified by the **In/Out Temperature Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 85)
Tmp Strat: Hi Tmp SW Out Temp: 70 F	**Temperature at Which Bank Switches Out—**This is the temperature at which the bank switches to the **Out** state during a **High-Temperature** condition. The temperature must be below this value for a period of time specified by the **In/Out Temperature Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 70)
Temp Strategy Lo Tmp Op: Enbld	The bank is switched when the **Low-Temperature Threshold** setting is reached.
Tmp Strat: Lo Tmp SW Out Tmp: 39 F	**Temperature at Which Bank Switches Out—**This is the temperature at which the bank switches to the **Out** state during a **Low-Temperature** condition. The temperature must be above this value for a period of time specified by the **In/Out Temperature Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 40)
Tmp Strat: Lo Tmp SW In Temp: 30 F	**Temperature at Which Bank Switches In—**This is the temperature at which the bank switches to the **In** state during a **Low-Temperature** condition. The temperature must be below this value for a period of time specified by the **In/Out Temperature Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 30)
Tmp Strat: Hi/Lo Time Thld: 10 Mn	**Temperature Time Threshold—**This is the amount of time the temperature must be continuously outside the normal temperature range before a switching operation occurs. (Range: 2-180; Step: 1; Default: 10).
TimeClk Strategy	**Timeclock Strategy—**These schedules determine when the bank is active. Each schedule is specified as a day range and hour range. The day range must be specified as a starting day followed by an ending day. Sunday is the first day of the week. For example, if a schedule is to be active on all seven days of the week, enter it as “Sunday—Saturday,” NOT as “Saturday—Sunday.” The time is specified as a range between a starting and ending time on the same day. As with the day range, the chronologically first time must come first. The time is entered in military format (i.e., 5:00 p.m. is entered as “17:00”). Up to two schedules may be specified. The bank will be active if the present time falls within either of the schedules.
TClk Strat: Sch1 Start Day: Mon	**Schedule 1 Start Day**
TClk Strat: Sch1 End Day: Fri	**Schedule 1 End Day**
TClk Strat: Sch1 Start Time: 8 :0	**Schedule 1 Start Time**
TClk Strat: Sch1 End Time: 17:0	**Schedule 1 End Time**
TClk Strat: Sch2 Start Day: N/A	**Schedule 2 Start Day**
TClk Strat: Sch2 End Day: Fri	**Schedule 2 End Day**
TClk Strat: Sch2 Start Time: 8 :0	**Schedule 2 Start Time**

TABLE CONTINUED ►

Table 6. Configuration with the Faceplate LCD Screen Entries—Continued

Display	Description (range)
TClk Strat: Sch2 End Time: 17:0	**Schedule 2 End Time**
Volt Only Strat	**Voltage Only Strategy—**The capacitor control switches the capacitor bank based solely on voltage levels. A preferred capacitor bank position also may be chosen.
VO Strt: Cap Bnk Pref Pos: None	**Preferred Capacitor Bank Position—**When the voltage remains within the normal range, the capacitor control switches the bank according to the chosen setpoint. No action takes place when the **None** setting is selected or if switching the bank would cause a **Voltage Override** condition. (Range: Online, Offline, or None)
Time Biased Voltage Strategy	**Voltage Setpoints for Active (Timeclock Scheduled) Periods—**The control switches the capacitor bank according to both time and voltage and uses two sets of **Voltage Override** setpoints.
TB V Strat:Active Hi V SP: 126.0	**Active Periods: High-Voltage setpoint—**This is the voltage level above which the bank is switched to the **Out** state if the time is within the Timeclock Schedule for Capacitor to be Active period. The voltage must stay above this value for the period of time specified by the **Voltage Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: 101-259; Step: 1; Default: 126)
TB V Strat:Active Lo V SP: 120.0	**Active Periods: Low-Voltage setpoint—**This is the voltage level below which the bank is switched to the **In** state if the time is within the Timeclock Schedule for Capacitor to be Active period. The voltage must stay below this value for the period of time specified by the **Voltage Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: 101-259; Step: 1; Default: 120)
TB V Strt:Inactv Hi V SP: 124.0	**Inactive Periods: High-Voltage setpoint—**As above, but this setpoint applies during unscheduled periods. (Range: 101.0-259.0; Step: 1.0; Default: 124.0)
TB V Strt:Inactv Lo V SP: 118.0	**Inactive Periods: Low-Voltage setpoint—**As above, but this setpoint applies during unscheduled periods. (Range: 101.0-259.0; Step: 1.0; Default: 118.0)
TB V Strt: Hi/Lo Tim Thld: 180.0s	**High-/Low-Voltage Time Threshold—**This is the amount of time the voltage must be continuously outside the normal voltage range before a switching operation occurs. (Range: 0.1-900.0; Step: 0.1; Default: 180.0)
TB V Strt: Sch1 Start Day: Mon	**Schedule 1 Start Day**
TB V Strt: Sch1 End Day: Fri	**Schedule 1 End Day**
TB V Strt: Sch1 Start Time: 8 :0	**Schedule 1 Start Time**
TB V Strt: Sch1 End Time: 17:0	**Schedule 1 End Time**
TB V Strt: Sch2 Start Day: N/A	**Schedule 2 Start Day**
TB V Strt: Sch2 End Day: Fri	**Schedule 2 End Day**
TB V Strt: Sch2 Start Time: 8 :0	**Schedule 2 Start Time**
TB V Strt: Sch2 End Time: 17:0	**Schedule 2 End Time**
Time Biased Temp Strategy	**Time Biased Temperature Strategy—**The control switches the capacitor bank according to the configured schedule and temperature setpoints. The capacitor bank is offline during unscheduled periods.

TABLE CONTINUED ►

Table 6. Configuration with the Faceplate LCD Screen Entries—Continued

Display	Description (range)
TB Temp Strt: SW In Temp: 84 F	**Temperature at Which Bank Switches In—**This is the temperature at which the bank switches to the **In** state during scheduled periods. The temperature must stay above this value for a period of time specified by the **In/Out Temperature Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 85)
TB Temp Strt: SW Out Temp: 70 F	**Temperature at Which Bank Switches Out—**This is the temperature at which the bank switches to the **Out** state during scheduled periods. The temperature must be below this value for a period of time specified by the **In/Out Temperature Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 70)
TB Temp Strt: SW Out Temp: 70 F	**Temperature at Which Bank Switches Out—**This is the temperature at which the bank switches to the **Out** state during scheduled periods. The temperature must be below this value for a period of time specified by the **In/Out Temperature Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 70)
TB Tmp St: Sch1 Start Day: Mon	**Schedule 1 Start Day**
TB Tmp St: Sch1 End Day: Fri	**Schedule 1 End Day**
TB Tmp St: Sch1 Start Time: 8 :0	**Schedule 1 Start Time**
TB Tmp St: Sch1 End Time: 17:0	**Schedule 1 End Time**
TB Tmp St: Sch2 Start Day: N/A	**Schedule 2 Start Day**
TB Tmp St: Sch2 End Day: Fri	**Schedule 2 End Day**
TB Tmp St: Sch2 Start Time: 8 :0	**Schedule 2 Start Time**
TB Tmp St: Sch2 End Time: 17:0	**Schedule 2 End Time**
Auto Offline Str No Setup Data	**Automatic Offline—**The control switches the capacitor bank offline for the season. This strategy does not include **High-Voltage Override** or **Low-Voltage Override** setpoints. Only the **Emergency Voltage Override** setpoints configured on the *Setup>General>Bank Related* screen are in effect with this strategy.
Auto Online Strt No Setup Data	**Automatic Online—**The control switches the capacitor bank online for the season. This strategy does not include **High-Voltage Override** or **Low-Voltage Override** setpoints. Only the **Emergency Voltage Override** setpoints configured in the *Setup>General>Bank Related* screen are in effect with this strategy.
Current Strategy	**Current Strategy—**Current strategy is only available for var controls and the control uses these setpoints to switch the bank based on single-phase current level. When the current sensor is on the source side of the capacitor bank, the line current changes because of a change in the power factor when the capacitor bank switches to the **In** or **Out** state. The difference between the **Switch-In Current** and **Switch-Out Current** setpoints should be larger than the effect of the bank. This prevents the capacitor control from continuously attempting to switch the bank to the **In** and **Out** state. When the current sensor is on the load side of the capacitor bank, no change in current levels or power factor is sensed when the bank switches to the **In** and **Out** state. **Note:** The number of automatic switching cycles can be limited using the **Maximum Automatic Switching Cycles Per Day** setpoint on the *Setup>General>Site-Related>Operation* screen.

TABLE CONTINUED ►

Table 6. Configuration with the Faceplate LCD Screen Entries—Continued

Display	Description (range)
Curr Strat: 1-Ph SWIn Amps: 100.0	**Single-Phase Amps at Which Bank Switches In—**This is the current level (in amps) at which the bank switches to the **In** state. The current must be above this value for a period of time specified by the **Current Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: 0.0-2,550.0; Step: 0.1; Default: 100.0)
Curr Strat: 1-Ph SWOt Amps: 50.0	**Single-Phase Amps at Which Bank Switches Out—**This is the current level (in amps) at which the bank switches to the **Out** state. The current must be below this value for a period of time specified by the **Current Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: 0.0-2,550.0; Step: 0.1; Default: 50.0)
Curr Strat: Time Thld: 60.0	**Current Change Time Threshold—**This is the amount of time that the current must be continuously outside the normal range before a switching operation occurs. (Range: 0.1-900.0; Step: 0.1; Default: 60.0) Change this setpoint to easily coordinate between capacitor controls. Give source-side controls a longer time delay if capacitor banks at the end of the line should switch first.
VAR Strategy	**Var Strategy—**Only available for var controls, the control uses these setpoints to switch the bank based on single-phase or three-phase kvar levels. The general approach to setting the **Bank Switches In** setpoint is to set it at approximately 67% of the nameplate rating of the capacitor bank. The **Bank Switches Out** setpoint can be set by subtracting 125% of the nameplate rating from the **Bank Switches In** setpoint. The kvar contribution of the bank may exceed the nameplate rating because of higher impressed voltages and manufacturing tolerances. If the kvar contribution of the bank is greater than the difference between the setpoint levels, the capacitor control will continuously attempt to switch the bank to the **In** and **Out** state.
VAR Strat: 1-Ph SWInkVAR: 800	**Kvars at Which Bank Switches In—**This is the var level (in kvars) at which the bank switches to the **In** state. The vars must stay above this value for a period of time specified by the **Var Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -327,680-327,670; Step: 10; Default: 800)
VAR Strat: 1-Ph SWOtkVAR: -700	**Kvars at Which Bank Switches Out—**This is the var level (in kvars) at which the bank switches to the **Out** state. The vars must stay below this value for a period of time specified by the **Var Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -327,680-327,670; Step: 10; Default: -700)
VAR Strat: Time Thld: 60.0	**Var Change Time Threshold—**This is the amount of time the var level must be continuously outside the normal range before a switching operation occurs. (Range: 0.1-900.0; Step: 0.1; Default: 60.0) Change this setpoint to easily coordinate between capacitor controls. Give source-side controls a longer time delay if capacitor banks at the end of the line are desired to switch first.
Timeclock Temp Strategy	**Timeclock Temperature Strategy—**These setpoints determine which days of the week and which hours of the day the bank is intended to be active. The control switches based on temperature if the ambient temperature exceeds the **High-Temperature Operation: Temperature at Which Bank Switches In** setpoint or drops below the **Low-Temperature Operation: Temperature at Which Bank Switches In** setpoint. This strategy remains active until the temperature is in the range specified for the bank to switch to the **Out** state. The difference between the **Bank Switches In** and the **Bank Switches Out Temperature** setpoints should be at least 8°F (5°C).
Tclk Tmp St:Sch1 Start Day: Mon	**Schedule 1 Start Day**
Tclk Tmp St:Sch1 End Day: Fri	**Schedule 1 End Day**

TABLE CONTINUED ►

Table 6. Configuration with the Faceplate LCD Screen Entries—Continued

Display	Description (range)
Tclk Tmp St:Sch1 Start Time: 8 :0	**Schedule 1 Start Time**
Tclk Tmp St:Sch1 End Time: 17:0	**Schedule 1 End Time**
Tclk Tmp St:Sch2 Start Day: N/A	**Schedule 2 Start Day**
Tclk Tmp St:Sch2 End Day: Fri	**Schedule 2 End Day**
Tclk Tmp St:Sch2 Start Time: 8 :0	**Schedule 2 Start Time**
Tclk Tmp St:Sch2 End Time: 17:0	**Schedule 2 End Time**
Tclk Tmp St: Hi Tmp Op: Enbld	To enable **High-Temperature Operation** mode, set the **Enabled** state.
Tclk Tmp St:High SW In Temp: 84 F	**Temperature at Which Bank Switches In—**This is the temperature at which the bank switches to the **In** state during **High-Temperature** condition. The temperature must be above this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 85)
Tclk Tmp St:High SW Out Temp: 70 F	**Temperature at Which Bank Switches Out—**This is the temperature at which the bank switches to the **Out** state during a **High-Temperature** condition. The temperature must be below this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 70).
Tclk Tmp St: Lo Tmp Op: Enbld	To enable the **Low-Temperature Operation** mode, set the **Enabled** state.
Tclk Tmp St: Low SW Out Temp: 39 F	**Temperature at Which Bank Switches Out—**This is the temperature at which the bank switches to the **Out** state during a **Low-Temperature** condition. The temperature must be above this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 40)
Tclk Tmp St:Low SW In Temp: 30 F	**Temperature at Which Bank Switches In—**This is the temperature at which the bank switches to the **In** state during a **Low-Temperature** condition. The temperature must be below this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 30)
Tclk Tmp St:HiLo Time Thld: 10 Mn	**High-/Low-Temperature Time Threshold—**This is the amount of time the temperature must be continuously outside the normal temperature range before a switching operation occurs.
Current Temp Strategy	**Current with Temperature Override Strategy—**The control uses the setpoints on this screen to switch the bank based on single-phase current levels. When the current sensor is on the source side of the capacitor bank, the line current changes because of a change in the power factor when the capacitor bank switches to the **In** or **Out** state. The difference between the **Switch-In Current** and **Switch-Out Current** setpoints should be larger than the effect of the bank. This prevents the capacitor control from continuously attempting to switch the bank to the **In** and **Out** state. When the current sensor is on the load side of the capacitor bank, no change in current levels or power factor is sensed when the bank switches to the **In** and **Out** state. **Note:** The number of automatic switching cycles can be limited using the **Maximum Automatic Switching Cycles Per Day** setpoint on the *Setup>General>Site-Related>Operation* screen. The control changes to switching based on temperature when the ambient temperature exceeds the **High-Temperature Operation: Temperature at Which Bank Switches In** setpoint or drops below the **Low-Temperature Operation: Temperature at Which Bank Switches In** setpoint. This strategy remains active until the ambient temperature is in the range specified for the bank to switch to the **Out** state.

TABLE CONTINUED ►

Table 6. Configuration with the Faceplate LCD Screen Entries—Continued

Display	Description (range)
Cur Tmp St: 1-Ph SWIn Amps: 100.0	**Single-Phase Amps at Which Bank Switches In—**This is the current level (in amps) at which the bank switches to the **In** state. The current must be above this value for a period of time specified by the **Current Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: 0.0-2,550.0; Step: 0.1; Default: 100.0)
Cur Tmp St: 1-Ph SWOt Amps: 50.0	**Single-Phase Amps at Which Bank Switches Out—**This is the current level (in amps) at which the bank switches to the **Out** state. The current must be below this value for a period of time specified by the **Current Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: 0.0-2,550.0; Step: 0.1; Default: 50.0)
Cur Tmp St: Curr Time Thld: 60.0	**Current Change Time Threshold—**This is the amount of time the current must be continuously outside the normal range before a switching operation occurs. (Range: 0.1-900.0; Step: 0.1; Default: 60.0) Changing this setpoint can easily set coordination between controls. Give source-side controls a longer time delay if capacitor banks at the end of the line are desired to switch first. **Note:** The difference between the **Switch-In Temperature** and the **Switch-Out Temperature** setpoints should be at least 8°F (5°C). To disable the **High-Temperature** or the **Low-Temperature** mode, set the **Switch-In Temperature** and the **Switch-Out Temperature** setpoints to the **N/A** mode.
Cur Tmp St: Hi Tmp Op: Enbld	To enable the **Current Temperature Strategy High-Temperature Operation** mode, set the **Enabled** state.
Cur Tmp St: High SW In Temp: 84 F	**Temperature at Which Bank Switches In—**This is the temperature at which the bank switches to the **In** state during a **High-Temperature** condition. The temperature must be above this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 85)
Cur Tmp St: High SW Out Temp: 70 F	**Temperature at Which Bank Switches Out—**This is the temperature at which the bank switches to the **Out** state during a **High-Temperature** condition. The temperature must be below this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 70)
Cur Tmp St: Lo Tmp Op: Enbld	To enable the **Current Temperature Strategy Low-Temperature Operation** mode, set the **Enabled** state.
Cur Tmp St: Low SW Out Temp: 39 F	**Temperature at Which Bank Switches Out—**This is the temperature at which the bank switches to the **Out** state during a **Low-Temperature** condition. The temperature must be above this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 40)
Cur Tmp St: Low SW In Temp: 30 F	**Temperature at Which Bank Switches In—**This is the temperature at which the bank switches to the **In** state during a **Low-Temperature** condition. The temperature must be below this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setting before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 30)
Cur Tmp St: Hi/Lo Time Thld: 10 Mn	**High-/Low-Temperature Time Threshold—**This is the amount of time the temperature must be continuously outside the normal temperature range before a switching operation occurs. (Range: 2-180; Step: 1; Default: 10)

TABLE CONTINUED ►

Table 6. Configuration with the Faceplate LCD Screen Entries—Continued

Display	Description (range)
VAR Temp Strategy	**Var with Temperature Override Strategy—**This strategy is only available for var controls, and the control uses these setpoints to switch the bank based on single-phase or three-phase kvar levels. The general approach to setting the **Switch In Kvar** setpoint is to set it at approximately (67% of the nameplate rating of the capacitor bank). The **Switch Out Kvar** setpoint can be set by subtracting 125% of the nameplate rating from the **Switch In Kvar** setpoint. The kvar contribution of the bank may exceed the nameplate rating because of higher impressed voltages and manufacturing tolerances. If the kvar contribution of the bank is greater than the difference between the setpoint values, the capacitor control will continuously attempt to switch the bank to the **In** and **Out** state. **Note:** The number of automatic switching cycles can be limited using the **Maximum Automatic Switching Cycles Per Day** setpoint on the *Setup>General>Site-Related>Operation* screen. The control changes to switching based on temperature if the ambient temperature exceeds the **High-Temperature Operation: Temperature at Which Bank Switches In** setpoint or drops below the **Low-Temperature Operation: Temperature at Which Bank Switches In** setpoint. This strategy remains active until the ambient temperature is in the range specified for the bank to switch to the **Out** state. This setpoint scales the input for **Kvars at Which Bank Switches In** and **Kvars at Which Bank Switches Out** settings to either **Single-Phase** (default) or **Three-Phase** mode.
VAR Tmp St 1-Ph SWInkVAR: 800	**Kvars at Which Bank Switches In—**This is the var level (in kvars) at which the bank switches to the **In** state. The vars must stay above this value for a period of time specified by the **Var Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -327,680-327,670; Step: 10; Default: 800)
VAR Tmp St 1-Ph SWOtkVAR: -700	**Kvars at Which Bank Switches Out—**This is the var level (in kvars) at which the bank switches to the **Out** state. The vars must stay below this value for a period of time specified by the **Var Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -327,680-327,670; Step: 10; Default: -700)
VAR Tmp St: VAR Time Thld: 60.0	**Var Change Time Threshold—**This is the amount of time the var level must be continuously outside the normal range before a switching operation occurs. (Range: 0.1-900.0; Step: 0.1; Default: 60.0) Changing this setpoint can easily set coordination between capacitor controls. Give source-side controls a longer time delay if capacitor banks at the end of the line are desired to switch first. **Note:** The difference between the **Switch-In Temperature** and the **Switch-Out Temperature** setpoints should be at least 8°F (5°C). To disable **High-Temperature** or **Low-Temperature** mode, set the **Switch-In Temperature** and the **Switch-Out Temperature** setpoints to the **N/A** mode.
VAR Tmp St: Hi Tmp Op: Enbld	To enable the **Var Temperature Strategy High-Temperature Operation** mode, set the **Enabled** state.
VAR Tmp St: High SW In Temp: 84 F	**Temperature at Which Bank Switches In—**This is the temperature at which the bank switches to the **In** state during a **High-Temperature** condition. The temperature must be above this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 85)
VAR Tmp St: High SW Out Tmp: 70 F	**Temperature at Which Bank Switches Out—**This is the temperature at which the bank switches to the **Out** state during a **High-Temperature** condition. The temperature must be below this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 70)

TABLE CONTINUED ►

Table 6. Configuration with the Faceplate LCD Screen Entries—Continued

Display	Description (range)
VAR Tmp St: Lo Tmp Op: Enbld	To enable the **Var Temperature Strategy Low-Temperature Operation** mode, set the **Enabled** state.
VAR Tmp St: Low SW Out Tmp: 39 F	**Temperature at Which Bank Switches Out—**This is the temperature at which the bank switches to the **Out** state during a **Low-Temperature** condition. The temperature must be above this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setting before the bank will switch to the **Out** state. (Range: -49-151; Step: 1; Default: 40)
VAR Tmp St: Low SW In Tmp: 30 F	**Temperature at Which Bank Switches In—**This is the temperature at which the bank switches to the **In** state during a **Low-Temperature** condition. The temperature must be below this value for a period of time specified by the **High-/Low-Temperature Change Time Threshold** setpoint before the bank will switch to the **In** state. (Range: -49-151; Step: 1; Default: 30)
VAR Tmp St: Hi/Lo Time Thld: 10 Mn	**High-/Low-Temperature Time Threshold—**This is the amount of time the temperature must be continuously outside the normal temperature range before a switching operation occurs. (Range: 2-180; Step: 1; Default: 10)
****Ssn 2 Strat** Data**	**Season 2 Strategy—**Use this LCD screen to scroll through real-time data and present setpoint values for Season 2.
****Ssn 3 Strat** Data**	**Season 3 Strategy—**Use this LCD screen to scroll through real-time data and present setpoint values for Season 3.
****Ssn 4 Strat** Data**	**Season 4 Strategy—**Use this LCD screen to scroll through real-time data and present setpoint values for Season 4.
****Validate Cfg** No Config Change**	**Validate—**This command validates settings in the buffer memory without applying them. If the validation procedure detects an error or inconsistency, it is displayed on the second line.
****Apply Config** No Config Change**	**Apply—**This command validates settings in the buffer memory and applies them. If the settings are validated, they will take effect immediately. The previously active settings will be overwritten and cannot be restored.
****Reset Config** No Config Change**	**Reset Configuration—**This command resets settings in the buffer memory to the presently active values. It will not undo an **Apply** command.
****Validation** Cmpltd Unscsfly**	**Validation Results—**This field shows the status of the **Validate** or **Apply** command. If unsuccessful, the second line displays additional information to help lead to a resolution of the issue preventing proper execution.

TABLE CONTINUED ►

When a new IntelliCap 2000 control is installed in a system that uses IntelliCap® Plus Automatic Capacitor Controls, it may be convenient to apply configuration settings from an existing control in the new IntelliCap 2000 control. IntelliCap 2000 controls have a newer version of the IntelliLink software screenset, so the existing configuration settings must be upgraded.

STEP 1. From the **Start** menu click on the "Accessories" entry and run Windows PowerShell ISE (x86). If the 64-bit version is accidentally chosen, "Windows PowerShell ISE," the script will end with a message about that selection. See Figure 43.

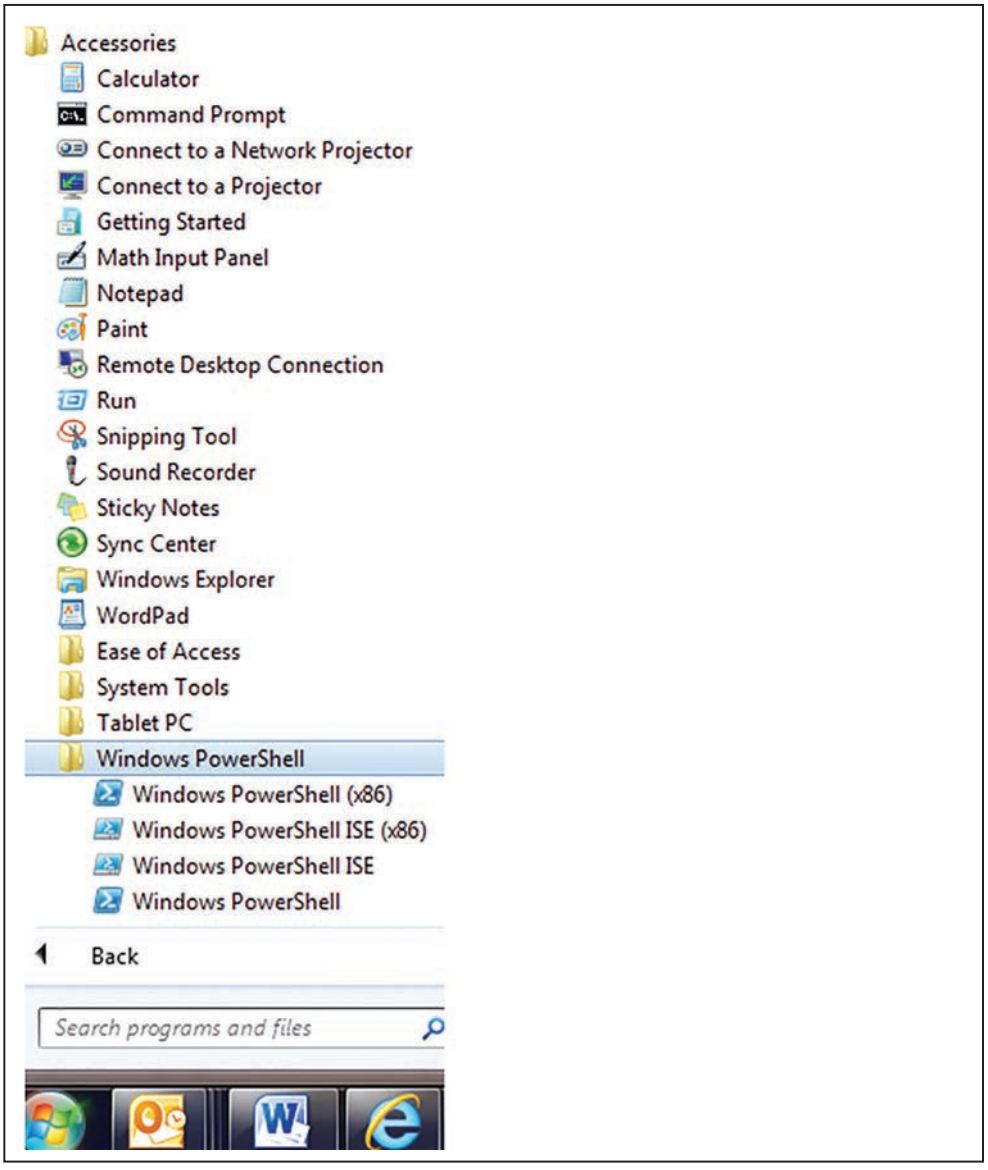


Figure 43. Selecting Windows PowerShell ISE (x86).

STEP 2. Use Windows Edge to locate this file, and then double click to open it: *C:\Program Files (x86)\S&C Electric\Products\IC2000\Firmware\Upgrades\Upgrade ICPlustoIC2000.ps1*.

STEP 3. Press the <F5> key to run the upgrade script. A file selection dialog will open. Select the IntelliCap Plus Control settings files to be upgraded. These files have the extension .cfg, and are saved by default at C:\ELINE\PCVD---S. However, they may be anywhere they were saved. More than one file may be chosen to upgrade. When ready to upgrade, click on the **Open** button.

As the script runs, the progress will be shown in a blue window. When the script finishes, a log file will open. It shows which files were converted, what the resulting **IntelliCap 2000 XSPT** settings files are named, and where they are located. The files are time-stamped.

STEP 4. Use the converted settings file to configure an IntelliCap 2000 control. To upgrade an IntelliCap 2000 control with a converted settings file, connect to the device with IntelliLink software, and select the **Load Setpoints** option. Choose the converted file to load, and select which group of settings to load. See Figure 44. Click on the **Load** button.

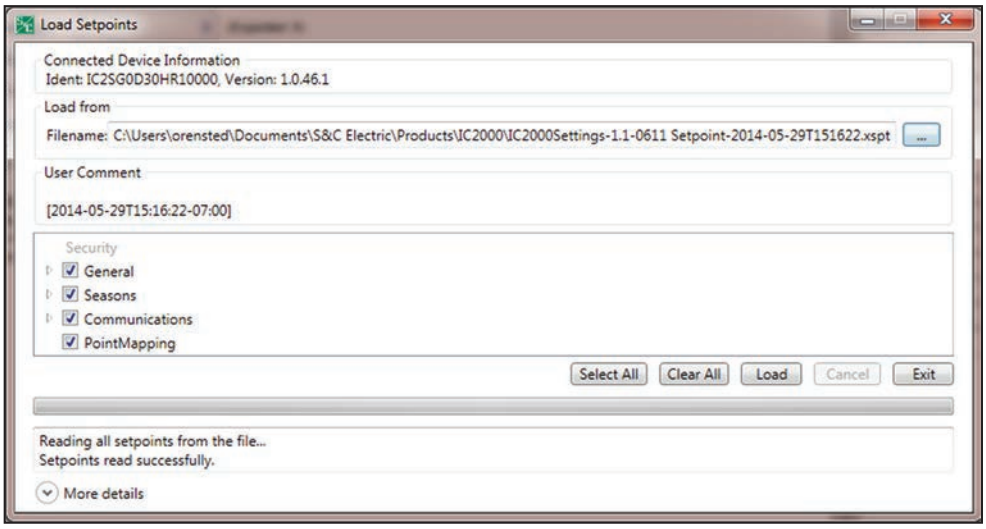


Figure 44. Load Setpoints dialog box.

NOTICE

With firmware 2.3.x and later, the security settings cannot be saved offline and reloaded onto another control. During a firmware upgrade, users are asked whether they want to retain the existing passwords or revert them to the default values. When users elect to revert them to default values, they must be changed from the default values at the initial login before connection to the control is allowed. See the "Security" section on page 92 for more information.