S C IntelliCap 2000 Automatic Capacitor Control Instruction Manual

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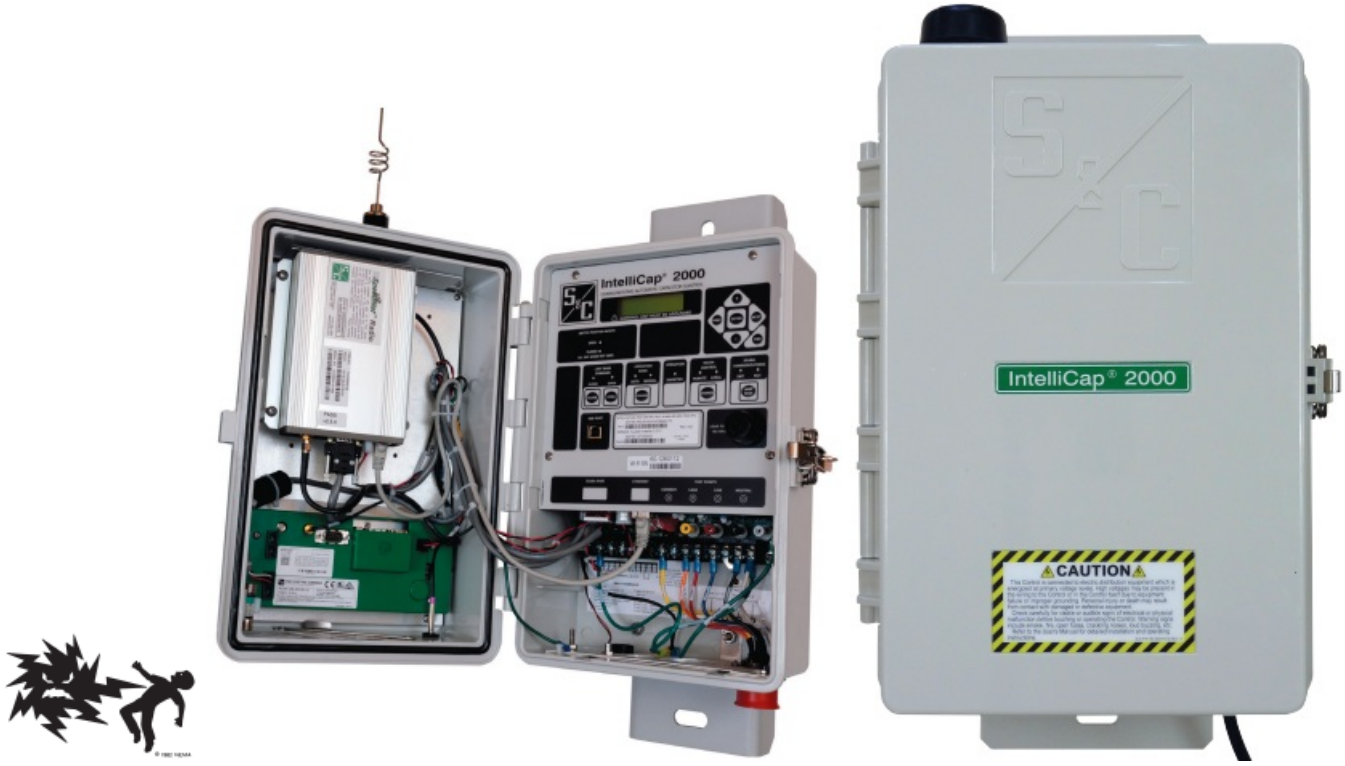
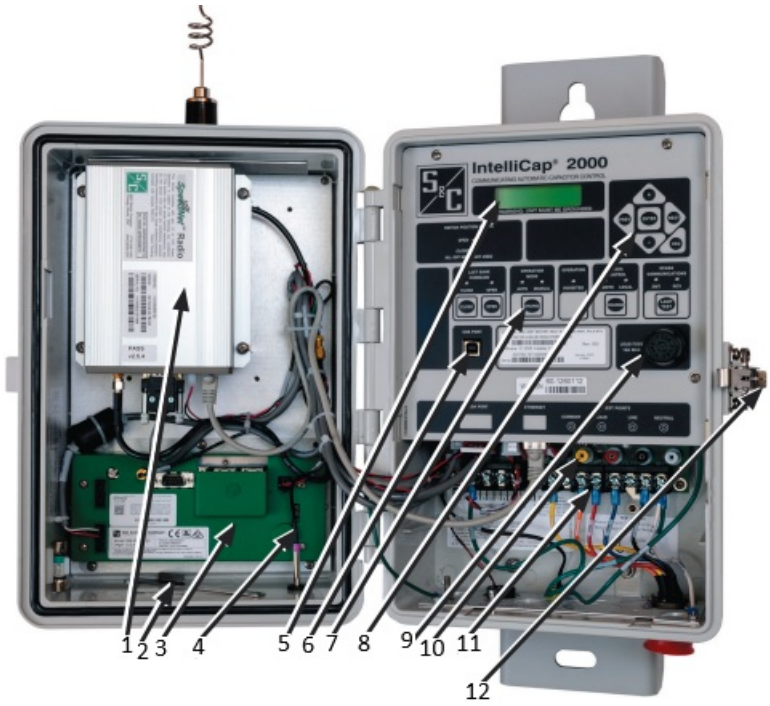
IntelliCap® 2000 Automatic Capacitor Control

Product Description





Instruction Sheet 1024-500

Introduction

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 and 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 users can easily retrieve and refer to this publication.

Proper Application

WARNING

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

Special Warranty Provisions

The standard warranty contained in S&C's standard conditions of sale, as set forth in Price Sheets 150 and 181, applies to the 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.

Safety Information

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 the 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 needed, 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.

Safety Precautions

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 . Always maintain proper clearance from energized components.
3. **PERSONAL PROTECTIVE EQUIPMENT.** Always use suitable protective equipment, such as rubber gloves, rubber mats, hard hats, safety glasses, arc-flash clothing, and fall protection, 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.

Description

IntelliCap 2000 Control Overview

IntelliCap 2000 Automatic Capacitor Controls switch the bank based on voltage, time, temperature, time-biased voltage, and time-biased temperature strategies (with optional current, and kvar strategies) to regulate reactive power or line voltage. Neutral current/ voltage monitoring detects a bank problem. The control then generates an alarm and takes corrective action. With a radio or modem it can operate in response to switching commands from SCADA or another centralized control system, and a communication problem will not compromise var support. This versatile control is designed for maximum accuracy and reliability.

The IntelliCap 2000 control enclosure and parts are shown in Figure 1 and Figure 2 on page 7.

Figure 1. IntelliCap 2000 control enclosure.

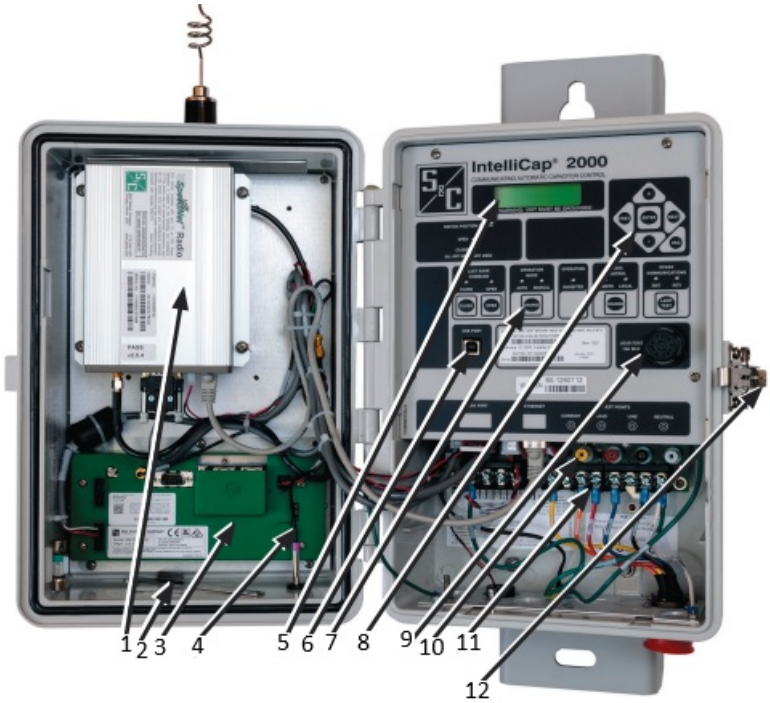


Figure 2. Interior of the IntelliCap 2000 control.

1. Comm device
2. Door retainer
3. GPS Wi-Fi
4. Wi-Fi antenna
5. Faceplate LCD
6. USB port
7. Buttons with LEDs
8. Keypad

9. Load fuse
10. Test points
11. Terminal strip
12. Padlock latch

These are features of the IntelliCap 2000 control:

- **Enclosure–**A non-corrosive, impact resistant, Lexan enclosure provides weatherproof and tamper-resistant protection for the capacitor control.
- **Meter base or bracket mounting–**A four-jaw or six-jaw meter-base plug on the back of the enclosure provides easy mounting into existing capacitor control meter sockets. Bracket-mount and wall-mount options are available, with five-pin or sevenpin connectors and cabling.
- **Temperature sensor–**This sensor monitors ambient temperature and provides information needed to switch capacitor banks using any of the temperature-dependent automatic control strategies: **Temperature, Time-Biased Temperature, Timeclock with Temperature Override, Current with Temperature Override, and Var with Temperature Override.**
- **Door latch–**A stainless steel latch allows padlocking the enclosure for security.
- **Phase current and neutral current sensor cable connector (optional)–** This sensor provides a connection point for sensor signals from a phase current sensor and a neutral current or neutral voltage sensor. These are the sensor features:
  • Var controls are compatible with S&C or Lindsey current sensors, Fisher Pierce 1301 Line Post sensors, and Piedmont Electric current sensors. An input for 0- to 5-amp current transformers is optional. Sensor connections can be made with a six-jaw meter base or an optional mil-spec connector on the bottom of the control. A control with current transformer sensing may be supplied with optional 3-foot (91-cm) leads for connection to current transformer shorting, bank switches, and a separate capacitor bank switching device power source.
  • Neutral current controls can detect high current levels between the starpoint and ground of a grounded, wye-connected capacitor bank. The control generates an alarm and can switch the capacitor bank appropriately. This helps mitigate damage caused by a phase-voltage imbalance attributable to faulty capacitor units, faulty switches, or blown fuses.
  • Neutral voltage controls can detect high voltage levels between the starpoint and ground of an ungrounded, wye-connected capacitor bank. The control generates an alarm and can switch the capacitor bank appropriately. This helps mitigate damage caused by a phase-voltage imbalance attributable to faulty capacitor units, faulty switches, or blown fuses.
- **Faceplate LCD and keypad–**These provice local, easy viewing of real-time data, setpoint values, and historical data without using a portable computer.
- **Faceplate LEDs and buttons–**Clearly labeled LEDs display information about the present state of the capacitor control. Buttons permit local, manual commands.
- **Faceplate local communication port–**Connect a computer to the capacitor control with a USB cable, and use IntelliLink® Setup Software to view data, change setpoints, download logged data, and update control software.
- **Door retainer–**Holds the enclosure door open while accessing the faceplate.
- **Communication equipment (optional)–**IntelliCap 2000 controls support a variety of communication hardware

options and software protocols for two-way communication between the capacitor control and a SCADA master station. The communication device mounts inside the enclosure door.

- **Antenna surge suppressor (optional)–**A surge suppressor protects the communication device from transients picked up by the antenna.
- **Terminal strip–**This is the intermediate connection point for wires carrying signals to and from the capacitor bank. It is prewired at the factory for simple installation. Field wiring is required if the unit is ordered with only a terminal strip.
- **Test points–**These provide convenient access for troubleshooting the control or to measure voltage and signal inputs to the control.
- **Control software–**This software is stored in non-volatile memory and manages all control functions. Users can easily update control software using IntelliLink Setup Software and a personal computer.
- **IntelliLink Setup Software–**This software resides in the user's portable Microsoft® Windows® computer. It lets users verify and change all set-up and configuration parameters, monitor real-time operating data, perform troubleshooting, view data-logging results, create reports and graphs, and export data for use in spreadsheets.

IntelliCap 2000 Control Features

All IntelliCap 2000 controls include the following features:

· Dependable quality–Electronics are manufactured in an ISO 9001:2008-certified plant.
· Toughness and reliability–The control is designed to withstand the difficult environmental and electrical conditions found in an electric distribution application.
· Rugged, well-proven core electronics design–The microprocessor, memory, and all related components are based on technology developed for the IntelliTeam® SG Automatic Restoration System control products.
· Sophisticated automatic control logic–This ensures effective use and switching of the capacitor bank, improves var correction, and minimizes customer voltage complaints.
· Voltage, Temperature, and SCADA Override Strategies–When enabled, the control returns to its regular control strategy after receiving a SCADA command.
· Automatic calculation of voltage change (and kvar change if applicable)– This calculation occurs when there is capacitor bank switching.
· Automatic adjustment for daylight savings time and holidays · Daily limit on automatic switching operations · Undervoltage and overvoltage protection · Extensive data logging capabilities and online graphing–These are useful for
both stand-alone and communications-oriented applications. IntelliLink software lets users view graphs of logged data to get a quick overview of system trends. · Flexible communication capabilities–There's a USB port for local communication with a portable computer, a SCADA port, and an Ethernet port for remote communication applications. · Setpoint control of operating parameters–Automatic operation options, address information, and other operating parameters can be reviewed and changed as needed. · Non-volatile memory–Programming, setpoints, and data are stored in flash memory for maximum field functionality and reliability.

· Real-time clock–A crystal-controlled clock provides accurate time for control purposes and for timestamping of real-time data.

· Flexible DNP point mapping

· Remote firmware upgrades

· User-defined digital input–This input can be used as a low-pressure sensor for gas-insulated switches and can block operation if desired.

· Digital input for switch operator position

· Reclose block–A user-definable delay after switching the bank out allows the capacitors to discharge fully before reclosing, minimizing both switch damage and transient overvoltages caused by charge trapped in capacitor units. If desired, technicians can use a password to circumvent the block during programming and testing, when the capacitor bank switching device is inoperative.

· Harmonics data–The IntelliCap 2000 control calculates the first (fundamental), and all odd harmonics from the first to the 31st, as well as the total harmonic distortion (THD). Total harmonic distortion and individual harmonic percentages can be calculated using one of two methods. See the THD Formula setpoint below.

The user-configured logging interval can be set from one minute to 120 minutes. The last 96 records are preserved in compact flash, and the total time represented by these records is therefore a function of the logging interval. For voltage, neutral current or voltage, and current, all present harmonics from first through 31st are displayed on the Metering screen. The harmonic data are logged as follows:

Voltage: Odd harmonics first through 23rd harmonic
Neutral Current / Voltage: Odd harmonics first through 9th harmonic
Phase Current: Odd harmonics first through 19th harmonic

· Capacitor control shipped ready to install–The control is modular and connectorized, so it requires no discrete field wiring other than 93-135 Vac control power. Default setpoint values are industry averages, and many users can install the controls without needing to change the default settings. Users can readjust settings after having observed control performance over time in the field.

· Historic Log–The log stores up to 10,000 entries, including switching events and the date and time of power cycles.

· Adjustable data logging–The logging interval for voltage and temperature information (as well as current, power factor, kvar, kW, and neutral current/neutral voltage information, if applicable) can range from one to 60 minutes for two to 120 days of data.

· Daily minimum and maximum values–These include voltage, temperature, current, kW, kvar, power factor, neutral current/voltage (if applicable), and the number of switching cycles in the last month and since installation.

· Data available for use in spreadsheets–Logged data and set-up information may be downloaded to a CSV (comma-separated value) file and imported into a spreadsheet or a word processing software for analysis.

· Snapshots–Snapshot files let users view data, generate reports, and save or change setpoint configuration files, even when the user is not connected to a capacitor control.

Optional Features

With additional sensing options, the IntelliCap 2000 control is also available with the following features:

· Compensates for load-side current sensors on controls using a current or varstrategy–While the preferred current-sensor location for a var control is the source side of the bank, controls function correctly with current sensors on the source or load side with normal or reverse current.
· Intelligent handling of reverse power conditions–Users can select how the var control operates during reverse power conditions.
· Custom current signal conditioning–This feature is specifically designed and tested for the specific current sensor installed.
· Neutral current or neutral voltage detection–This feature monitors, alarms, and, if desired, takes corrective action on abnormal levels of neutral current or neutral voltage. The Neutral Sensing feature must be specified when ordering the control. The control monitors and alarms on the fundamental component, or Total RMS of the neutral current and neutral voltage.

· Wi-Fi communication–This allows a user, through a password-enabled computer, to access local operation and configuration through IntelliLink Setup Software without the need to connect to the IntelliCap 2000 control with a cable. A user can connect from the vehicle without ever having to open the enclosure door.
· GPS–This provides one-millisecond accurate time synchronization of system data.
· Door position indication–This generates an intrusion alarm when the door is opened.
· Dual voltage inputs–These inputs are for power and sensing.

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Documents / Resources

	S C IntelliCap 2000 Automatic Capacitor Control [pdf] Instruction Manual IntelliCap 2000 Automatic Capacitor Control, IntelliCap, 2000 Automatic Capacitor Control, Automatic Capacitor Control, Capacitor Control, Control

References

- S&C Electric Company
- Product Literature | S&C Electric