

# Installation

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## Introduction

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### Qualified Persons

#### **WARNING**

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

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

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

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

### Read this Instruction Sheet

#### **NOTICE**

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

### Retain this Instruction Sheet

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

### Proper Application

#### **WARNING**

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

### Special Warranty Provisions

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

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

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

Warranty of the S&C IntelliCap Plus 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.

## Safety Information

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### Understanding Safety-Alert Messages

Several types of safety-alert messages may appear throughout this instruction sheet and on labels attached to the S&C IntelliCap Plus 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](http://sandc.com) Or call S&C Headquarters at (773) 338-1000; in Canada, call S&C Electric Canada Ltd. at (416) 249-9171.

#### **NOTICE**

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



### Replacement Instructions and Labels

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

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

**⚠ DANGER**



The S&C IntelliCap Plus 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 the IntelliCap Plus-Automatic Capacitor Control must be restricted only to Qualified Persons.

**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 AND TAGS.** Do not remove or obscure any of the "DANGER," "WARNING," "CAUTION," or "NOTICE" labels and tags. Remove tags ONLY if instructed to do so.

**5. MAINTAINING PROPER CLEARANCE.** Always maintain proper clearance from energized components.

## Pre-Installation Instructions

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### Applicable Software

This instruction sheet was prepared for use with IntelliCap Plus Software: **PCSD120S** and **PCVD120S**.

The software identification is available on the IntelliLink® Setup Software *Troubleshooting>Control & Switch Information* screen. For questions regarding the applicability of information in this instruction sheet to future product releases, please contact S&C Electric Company.

### Pre-Installation Checklist

Before installing the IntelliCap Plus control, carry out the following steps in the shop:

**STEP 1.** Inspect the control for visible damage.

Make sure there is no obvious damage to the control enclosure or any internal components.

**STEP 2.** Make sure you have the required sensor cable(s).

With var, neutral current, or neutral voltage sensing, the control may require a connection cable for the sensors. Be sure to have the correct sensor cables for this installation.

**STEP 3.** Make sure you have the required setup software and equipment.

Although it is possible to use the faceplate buttons and LCD display for initial setup of an IntelliCap Plus control, using IntelliLink software is easier and quicker. Use the faceplate buttons for later adjustments in the field.

**PC Computer**—Microsoft Windows® 7 operating system, and Internet Explorer 5.0 or higher, 32 MB of RAM, USB or Serial Port, and access to the S&C Automation Customer Support Portal.

**Serial Communication Cable**—Connects the computer to the LOCAL COMM PORT on the control. Use a straight-through cable, not a null-modem cable. The cable must be long enough to connect to an installed IntelliCap Plus control.

The serial connection is RS232 with a DB9-pin connector.

If your computer only has USB ports, use a Serial to USB cable adapter.

**STEP 4.** Make sure you have the communication equipment for this control.

Depending on the location of your installation, one or more repeater radios may be needed to enable communication between the control and the SCADA master station. For more details, see the manufacturer's documentation for your communication system.

**STEP 5.** Do one of the following:

- Go to the installation site and install the IntelliCap Plus control. Then, configure the control as described in Instruction Sheet 1023-530, S&C IntelliCap Plus Automatic Capacitor Control: *Setup*.”
- Complete the configuration steps while in the shop. Then, install the control at the site.

### Optional In-Shop Setup Steps

The following steps can be completed while still in the shop or later at the installation site:

**STEP 1.** Install the IntelliLink software on your computer.

For details, see the “Install the IntelliLink Software” in Instruction Sheet 1023-530, S&C IntelliCap Plus Automatic Capacitor Control: *Setup*.”

**STEP 2.** If this control is part of a SCADA system, configure the communication equipment.

**STEP 3.** Configure the control software.

Most of the software setup can be completed in the shop. For an explanation of how to configure the software, see the “Setting Up the Capacitor Control” section in Instruction Sheet 1023-530, S&C IntelliCap Plus Automatic Capacitor Control; *Setup*.”

## On-Site Installation

Follow these steps to install the capacitor control:

**STEP 1.** Read the following warnings before installing or operating this equipment:

### **WARNING**

This control is connected to capacitors operating at primary voltage levels. High voltage may be present in the wiring to the control or the control itself during certain malfunctions of the capacitor bank wiring or grounding system or because of a malfunction of the capacitor bank itself. For this reason, access to the control should be treated with the same safety precautions that would be applied when accessing other high-voltage lines and equipment. Follow all locally approved safety procedures when working on or around this control.

When open-circuited, current transformers can produce high voltages that can result in injury or death. Proper shorting hardware and operating procedures are required for safe operation. The current transformer must be shorted **before** installing or removing the control. **This control does NOT provide for shorting of the current transformer.**

### **WARNING**

Do not energize the 110-240 Vac power source entering the control enclosure until all wiring is complete.

Do not plug the sensor cable into the control until called for in the instructions.

Do not enable communications by connecting radios, fiber-optic cables, or dedicated phone lines until this is called for in the instructions.

Before attempting to access an existing installation, check carefully for visible or audible signs of electrical or physical malfunction—do this before touching or operating the control or any other part of the installation. These warning signs include such things as smoke, fire, open fuses, crackling noises, loud buzzing, etc. If a malfunction is suspected, treat all components of the installation, including the control and associated mounting hardware, as if they were elevated to primary (HIGH) voltage.

You must follow the sequence of installation steps outlined in this instruction sheet to insure a safe and successful control installation.

### **WARNING**

These instructions do **NOT** replace the need for utility operation standards. Any conflict between the information in this document and utility practices should be reviewed by appropriate utility personnel and a decision made as to the correct procedures to follow.

The S&C IntelliCap Plus Automatic Capacitor Control is connected to switchgear operating at primary voltage levels. High voltage may be present in the wiring to the switch control or the switch control itself during certain failures of the switchgear wiring or grounding system, or because of a failure of the switch itself. For this reason, access to the switch control should be treated with the same safety precautions that would be applied when accessing other high-voltage lines and equipment. Follow all locally approved safety procedures when working on or around this switch control.

Before attempting to access an existing switch installation, check carefully for visible or audible signs of electrical or physical malfunction (do this before touching or operating the switch control or any other part of the installation). These warning signs include such things as smoke, fire, open fuses, crackling noises, loud buzzing, etc. If a malfunction is suspected, treat all components of the installation, including the switch control and associated mounting hardware, as if they were elevated to primary (high) voltage.

**STEP 2.** Remove the load fuse.

Remove the 10-A fuse near the lower right corner of the faceplate. See Figure 1 on page 8.

## Installing the Capacitor Control

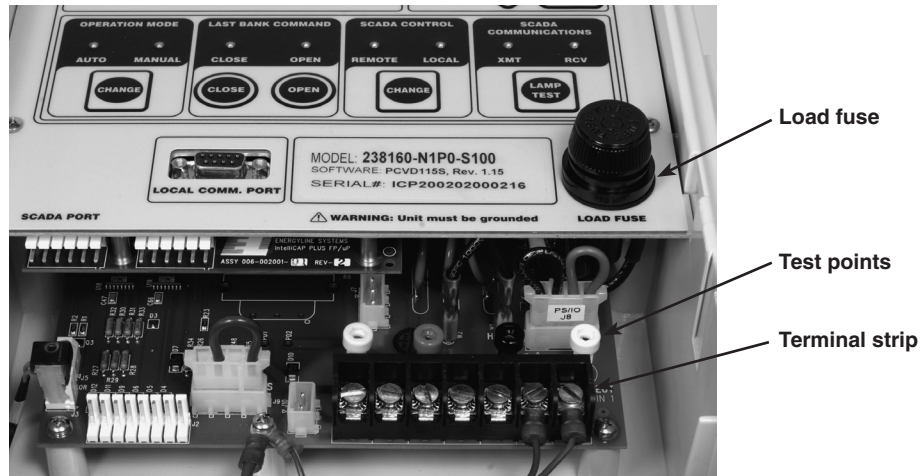


Figure 1. Load fuse on the faceplate.

### ⚠ WARNING

Leave the 10-A fuse out until instructed to replace it later in the installation process. If left installed, potentially lethal high voltage may be present.

**STEP 3.** Install the control on the meter base, pole, or panel in a location with minimum traffic exposure.

All IntelliCap Plus controls have an internal terminal strip; the terminal strip configuration is shown on a label inside the enclosure below the faceplate. The terminal strip wires connect to the meter base or cable connectors. A meter base with pole mounting bracket and meter ring assembly is available from S&C.

## Meter Base Mounting

Follow these steps to mount the control in the meter base:

**STEP 1.** Confirm that your meter base socket is wired correctly for this control.

The required socket wiring for a four-jaw plug is shown in Figures 2 and 3 on page 9. The wiring for each type of six-jaw meter base is shown in Figures 4 through 10 on pages 9 through 11. The correct configuration for the control is also indicated by a label on the back of the control enclosure. A meter base mount control may also have sensor cable connectors on the bottom of the enclosure. See Figure 11 on page 12 for connector locations.



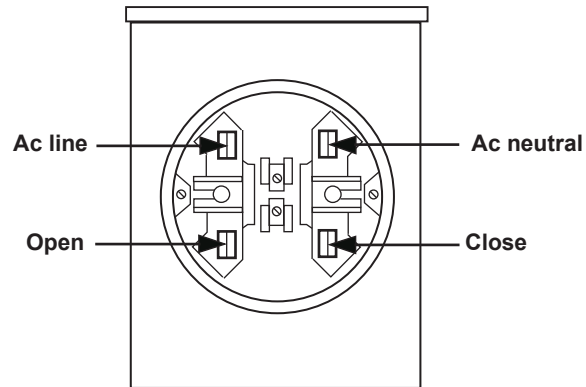


Figure 2. Four-jaw meter base socket configuration for capacitor controls with catalog number suffix -J40.

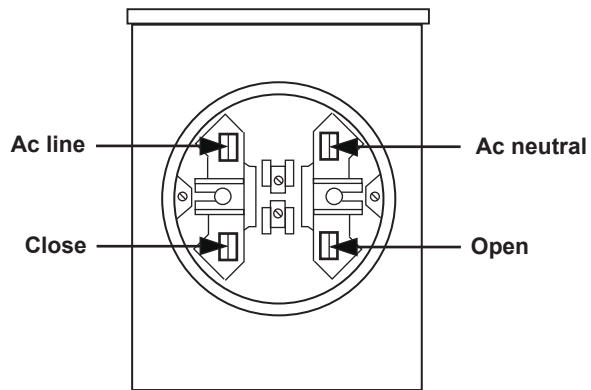


Figure 3. Four-jaw meter base socket configuration for capacitor controls with catalog number suffix -J41.

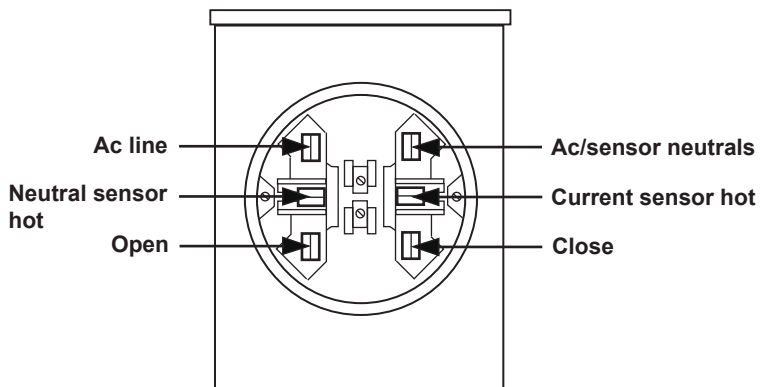


Figure 4. Six-jaw meter base socket configuration for capacitor controls with catalog number suffix -J60.

# Installing the Capacitor Control

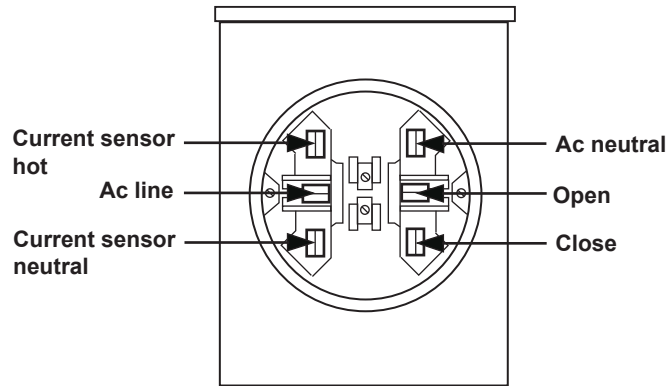


Figure 5. Six-jaw meter base socket configuration for capacitor controls with catalog number suffix -J61.

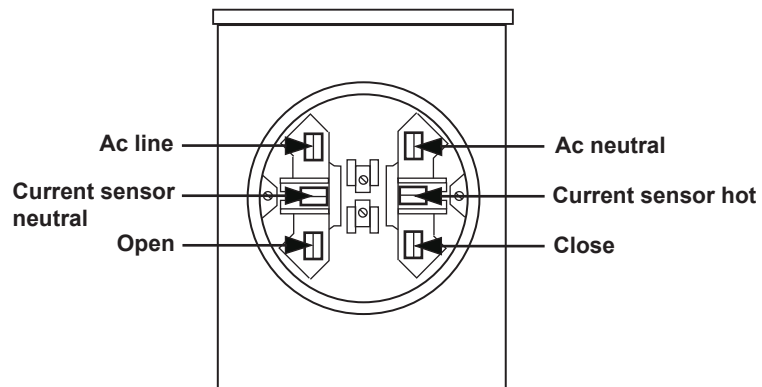


Figure 6. Six-jaw meter base socket configuration for capacitor controls with catalog number suffix -J62.

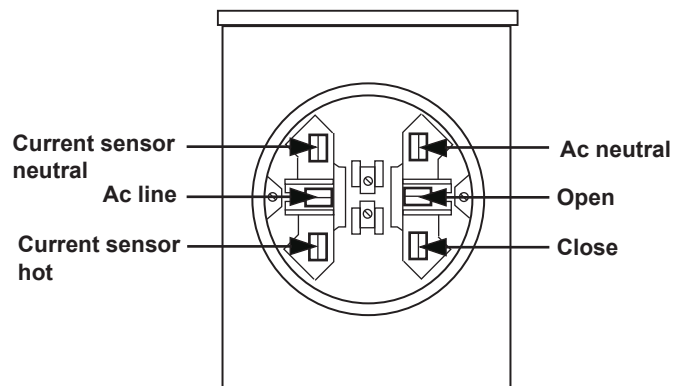


Figure 7. Six-jaw meter base socket configuration for capacitor controls with catalog number suffix -J63.

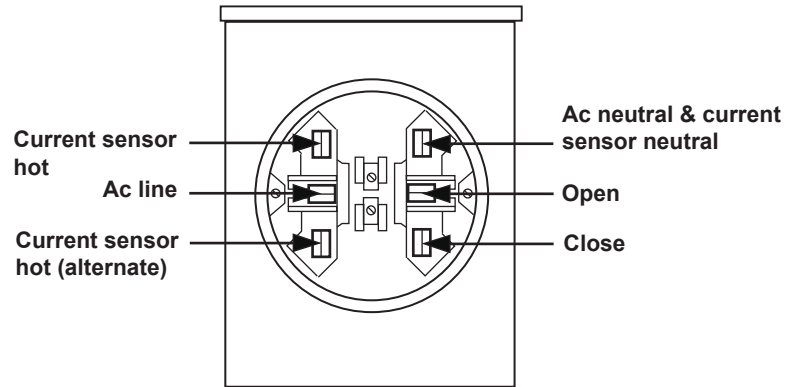


Figure 8. Six-jaw meter base socket configuration for capacitor controls with catalog number suffix -J64.

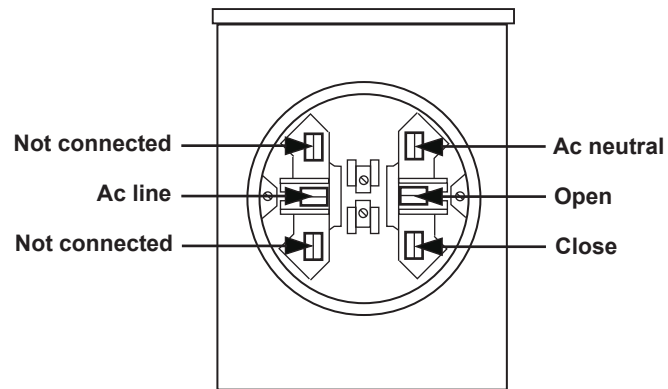


Figure 9. Six-jaw meter base socket configuration for capacitor controls with catalog number suffix -J65.

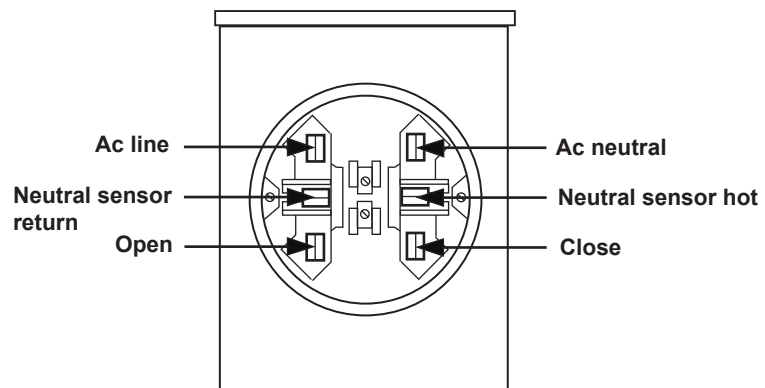


Figure 10. Six-jaw meter base socket configuration for capacitor controls with catalog number suffix -J68.

## Installing the Capacitor Control

### STEP 2. Connect ground lug on the bottom of the control.

Use the ground lug on the bottom of the control enclosure to ground the enclosure. See Figures 11 and 12. The ground lug will accommodate up to #2 copper or aluminum, solid or stranded wire. Ground impedance must be 25 ohms or less to properly protect the equipment.

### **⚠ WARNING**

The control must be properly grounded. You must read and understand all applicable grounding codes and requirements for your service area before installing this device. An ungrounded control may have potentially lethal voltage present.

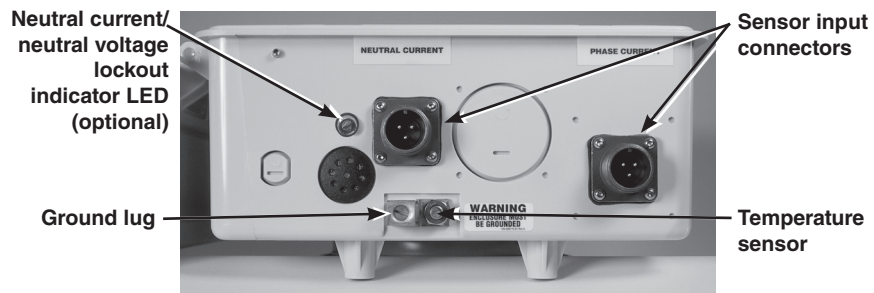


Figure 11. Ground lug on the bottom of the enclosure.

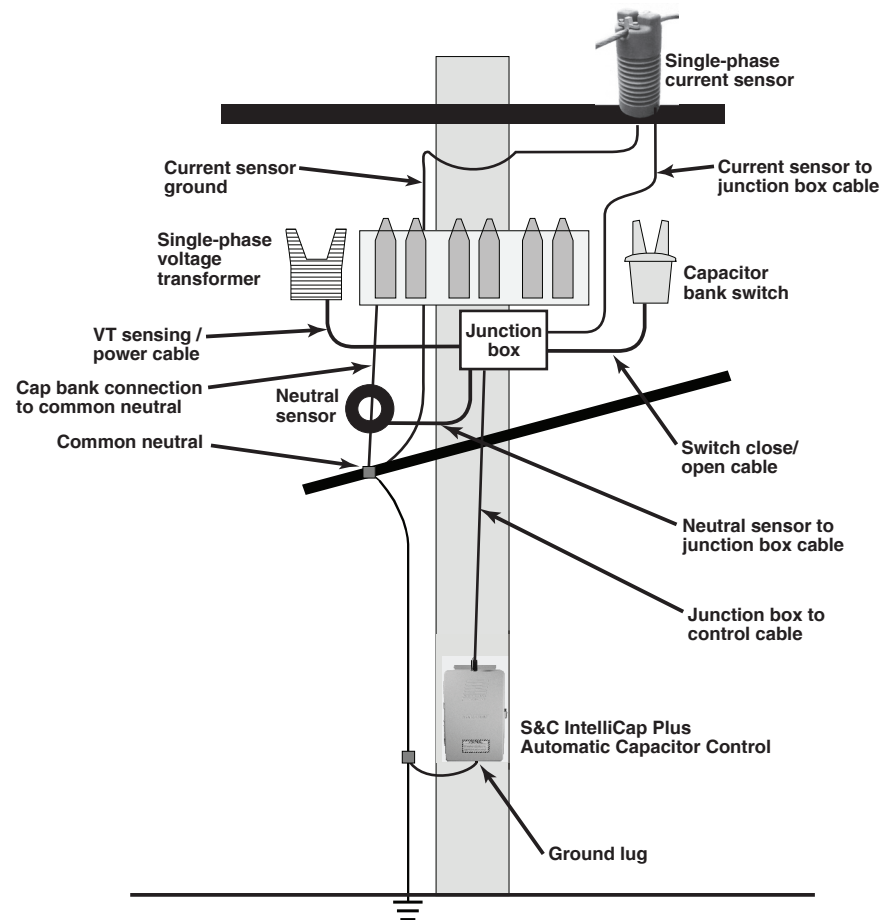


Figure 12. Grounding the IntelliCap Plus enclosure.

### **⚠ WARNING**

If lightning arresters are installed their ground path must not go through the neutral current sensor. Connect them to ground on the earth side of the sensor, to protect from potentially lethal voltages.

**STEP 3.** Plug control into the meter base socket. See Figure 13.

When the control is plugged into an energized meter base, all faceplate LED displays light momentarily. The LCD display will start to scroll after a few seconds.

Make sure that the OPERATION MODE MANUAL and SCADA CONTROL LOCAL LED displays are lit. If not, press the applicable CHANGE button.

### **⚠ WARNING**

The control must be set to **Manual** and **Local** modes to avoid unexpected operation of the capacitor bank during installation or setup operations. Note that if the control uses dial-up software, it may still be operated remotely, and could operate unexpectedly.

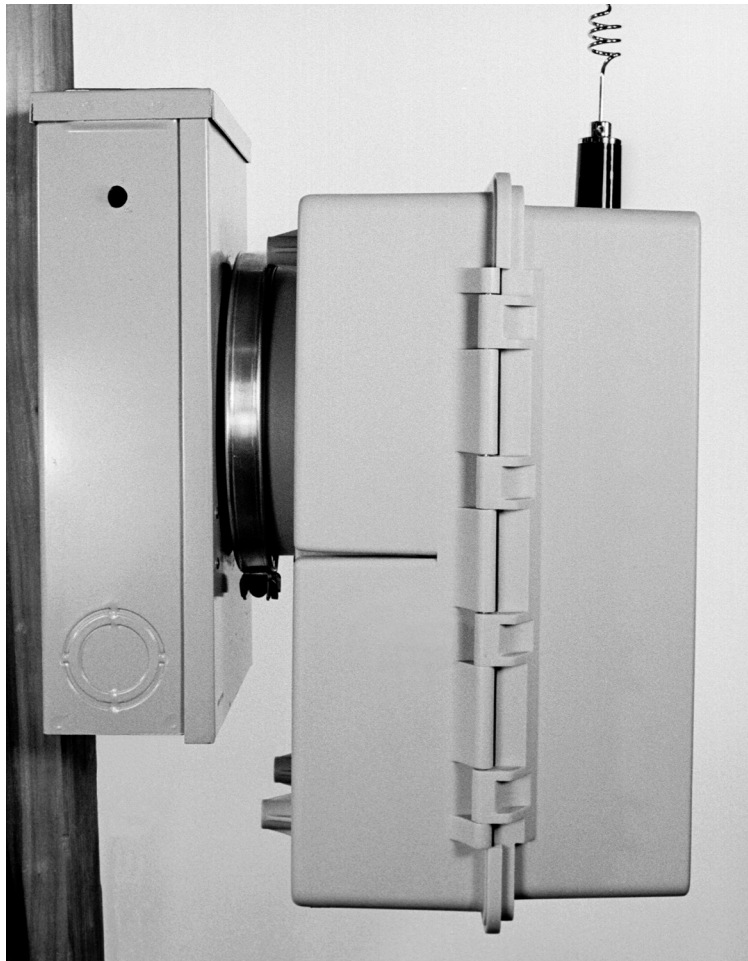


Figure 13. Side view of capacitor control enclosure and meter base, with a snap ring and crimp lock.

**STEP 4.** Lock control to meter base.

Use your standard procedure for a locking ring, snap ring, crimp lock, etc., and lock the control to the meter base.

**STEP 5.** Go to the “Connecting Sensors” section on page 20.

# Installing the Capacitor Control

## Bracket Mounting

Attach the control to the pole with either lag bolts for a wood pole, or metal straps for a concrete or metal pole. See Figures 14 and 15 on page 15. Then, connect the cable as described below.

Follow these steps to attach the control to a wood pole:

- STEP 1.** Use two 1/2-inch through-bolts or lag bolts and flat washers if necessary. Drill a hole for the top bolt or start the top lag screw.
- STEP 2.** Support the control and install the top bolt to hold the control on the pole, or hang the control on the top lag screw.
- STEP 3.** Vertically align the control on the pole and drill the bottom hole. Install the bottom bolt or lag screw.
- STEP 4.** Tighten the two bolts or lag screws.
- STEP 5.** Confirm that the cable from the switch and power source is wired correctly for the connector on your control.

The wiring options for the connector are shown in Figures 16 through 18 on page 16. The configuration used in this control is also shown on a label inside the enclosure. The bracket-mounted control has additional sensor cable connector(s) mounted on the bottom of the enclosure. See Figure 11 on page 12.

- STEP 6.** Connect the ground lug on the bottom of the control.

Use the ground lug on the bottom of the control enclosure to ground the enclosure. See Figures 11 and 12 on page 12. The ground lug will accommodate up to #2 copper or aluminum, solid or stranded wire.

### WARNING

The control must be properly grounded. You must read and understand all applicable grounding codes and requirements for your service area before installing this device. An ungrounded control may have potentially lethal voltages present.

- STEP 7.** Connect the cable from the junction box to the connector on the bottom of the capacitor control.

When an energized cable is connected to the control, all faceplate LED displays light momentarily. The LCD screen will start to scroll after a few seconds.

Make sure the OPERATION MODE MANUAL and SCADA CONTROL LOCAL LED displays are lit. If not, press the applicable CHANGE button.

### WARNING

The control must be set to **Manual** and **Local** mode to avoid unexpected operation of the capacitor bank during installation or setup operations. Note that, if the control uses dial-up software, it may still be operated remotely and may operate unexpectedly.

- STEP 8.** Go to the “Connecting Sensors” section on page 20.

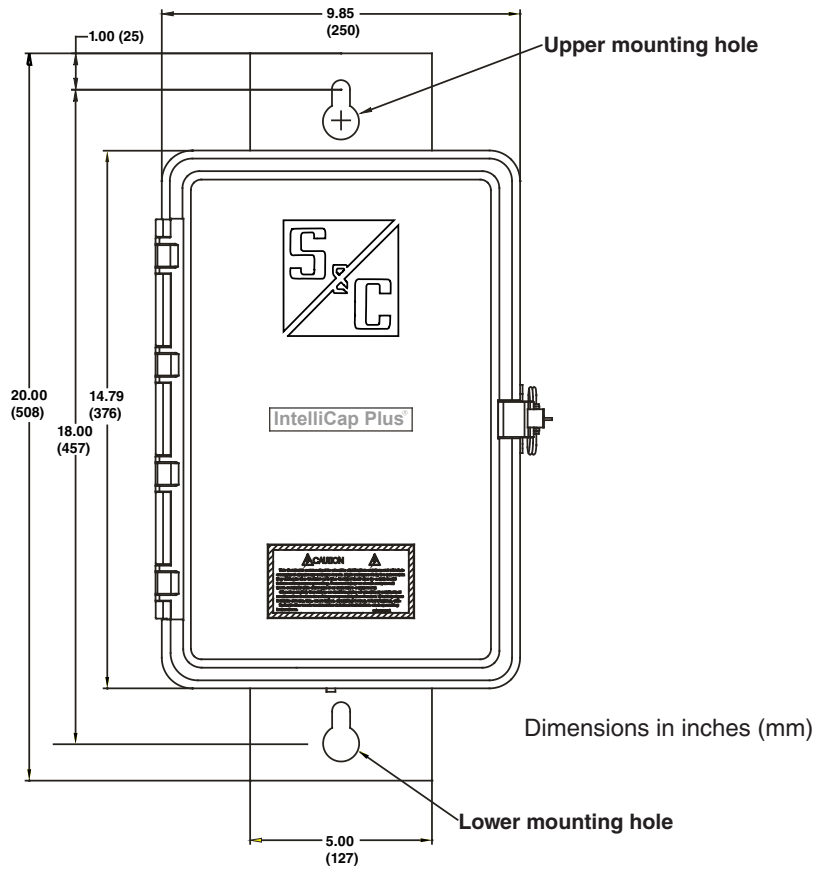


Figure 14. Front view of the capacitor control enclosure, showing the mounting holes.

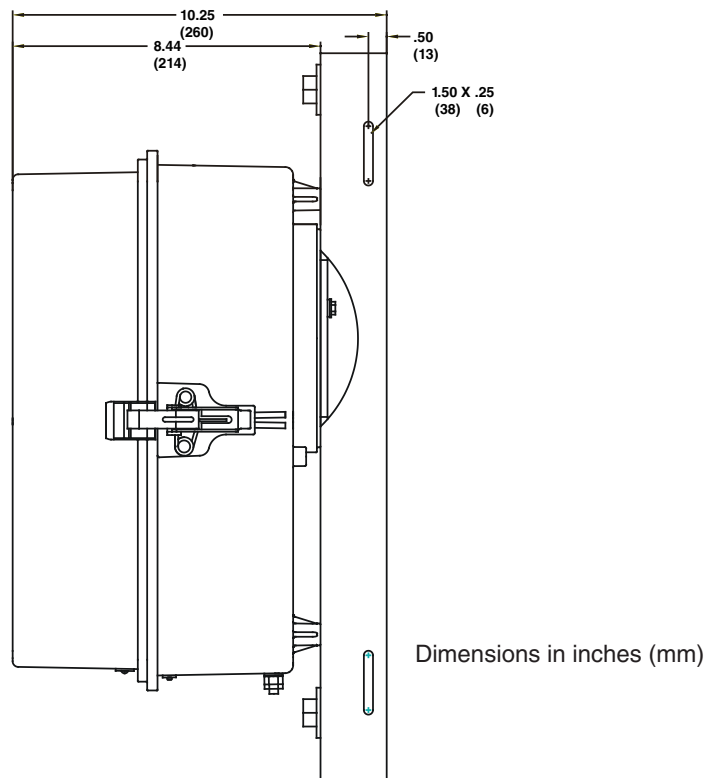


Figure 15. Side view of the capacitor control enclosure, showing the mounting slots.

# Installing the Capacitor Control

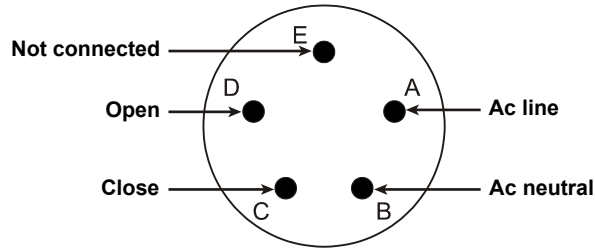


Figure 16. Bracket mount receptacle wiring configuration, five-pin for capacitor controls with catalog number suffix -M01, -D11, or -D12.

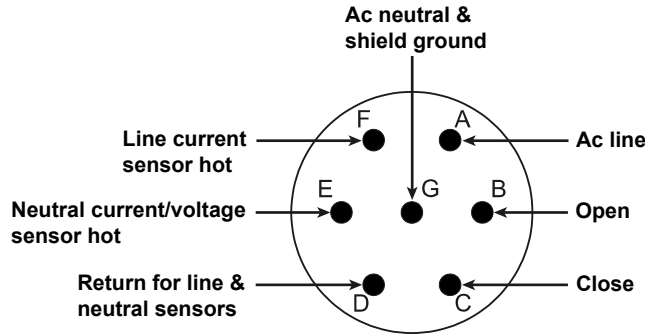


Figure 17. Bracket mount receptacle wiring configuration, seven-pin for capacitor controls with catalog number suffix -M03, or -D13.

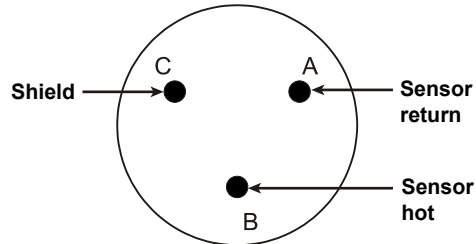
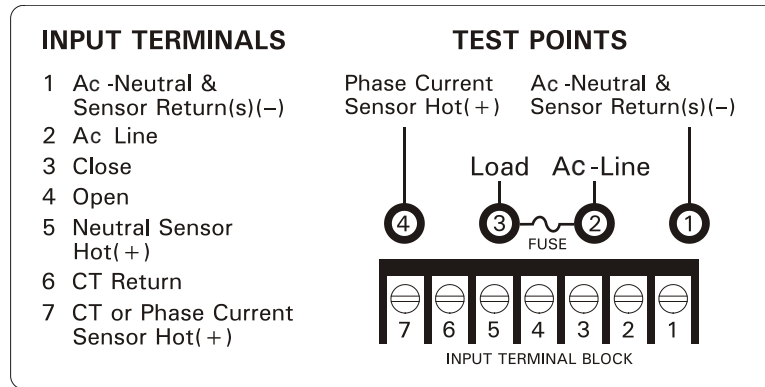


Figure 18. Bracket mount receptacle wiring configuration, three-pin for capacitor controls with catalog number suffix -M10, -D10, -D11, -D12, or -D13.





**Figure 19. Terminal Block wiring and test point configuration for catalog number suffix -JB1 or -JB2.**

Follow these steps to attach the control to a metal or concrete pole:

- STEP 1.** Pass a stainless-steel strap or clamp through the two upper mounting slots in the bracket. Pass a second strap through the two lower mounting slots. See Figure 15 on page 15.
- STEP 2.** Lift the control into position on the pole. Then, support the control while tightening the upper and lower straps around the pole.
- STEP 3.** Confirm that the cable from the switch and power source is wired correctly for the connector on this control. See Figure 19.

A bracket-mounted control may have additional sensor cable connectors installed on the bottom of the enclosure. The wiring options for bracket-mount connectors are shown in Figures 16 through 18 on page 16. The configuration used in the control is also shown on a label on the inside of the enclosure door.

- STEP 4.** Connect the ground lug on the bottom of the control.

Use the ground lug on the bottom of the control enclosure to ground the enclosure. See Figures 11 and 12 on page 12. The ground lug will accommodate up to #2 copper or aluminum, solid or stranded wire.

### **⚠ WARNING**

The control must be properly grounded. You must read and understand all applicable grounding codes and requirements for your service area before installing this device. An ungrounded control may have potentially lethal high voltage present.

- STEP 5.** Connect the cable from the junction box to the connector on the bottom of the capacitor control.

When an energized cable is connected to the control, all faceplate LED displays light momentarily. The LCD screen will start to scroll after a few seconds.

Make sure the OPERATION MODE MANUAL and SCADA CONTROL LOCAL LED displays are lit. If not, press the applicable CHANGE button.

### **⚠ WARNING**

The control must be set to **Manual** and **Local** mode to avoid unexpected operation of the capacitor bank during installation or setup operations. When the control uses dial-up software, it may still be operated remotely and may operate unexpectedly.

- STEP 6.** Go to the “Connecting Sensors” section on page 20.

# Installing the Capacitor Control

## Harness Wiring

The IntelliCap Plus control with 0-5 A current/var option control, catalog number 238164-67, is designed for mounting on the surface of a control panel. It has a special wiring harness that has seven 3-foot (914mm) wires that exit from the bottom of the control. A shorting block should be connected to this harness and mounted nearby. The shorting block allows you to safely remove the control without leaving the CT circuits open. See Table 1 for the harness color code and the individual wires that are labeled on the harness.

Connected to a potential transformer, the PT wires provide voltage sensing and power to the control and internal relays. Average IntelliCap Plus power consumption is 0.5 watts. Control power is used to wet the Open and Close relay contacts to operate the capacitor bank switches or the interposing relays.

The IntelliCap Plus relay contacts are rated at 20 A at 250 Vac, 1 HP 120/250 Vac. In addition they have been tested to operate three Joslyn Vacuum Switches (36 A). If you need 125 Vdc to operate the capacitor switches, install interposing relays rated for 125 Vdc.

Control power used to wet the Open and Close relays is not fused in the IntelliCap Plus control, and an external fuse must be installed when necessary. Polarity and phase-angle corrections can be adjusted with the control software.

**Table 1. Catalog Number 238164-67 Var and Neutral Input Wiring.**

Catalog number 238164-67 Var and Neutral Input Wiring	
Black	Station power hot (+)
Blue	Close
Red	Open
Red	CT return (-)
Red	CT hot (+)
White	PT/ac - neutral
Black	PT/ac - line
Wiring for Neutral Input	
Orange	Neutral sensor hot (+)
White	Neutral Ssensor return (-)

## 220-Volt Wiring

The IntelliCap Plus neutral input is referenced to the control case ground. When the capacitor bank control power is supplied by a transformer with a center-tapped 220-volt or 240-volt output that has the center tap referenced to ground, connect the center tap to the Ac Neutral input and the high line to the Ac Line input of the IntelliCap Plus control. Use two auxiliary relays with 120-volt coils and 240-volt contacts rated to meet the requirements of the capacitor switch, and connect as indicated in Figure 20.

If the control power is supplied from a 220/240-Volt transformer that does not have a grounded center tap, the transformer can be connected directly across the Ac Line and Ac Neutral inputs. In this case, the auxiliary relays are not required.

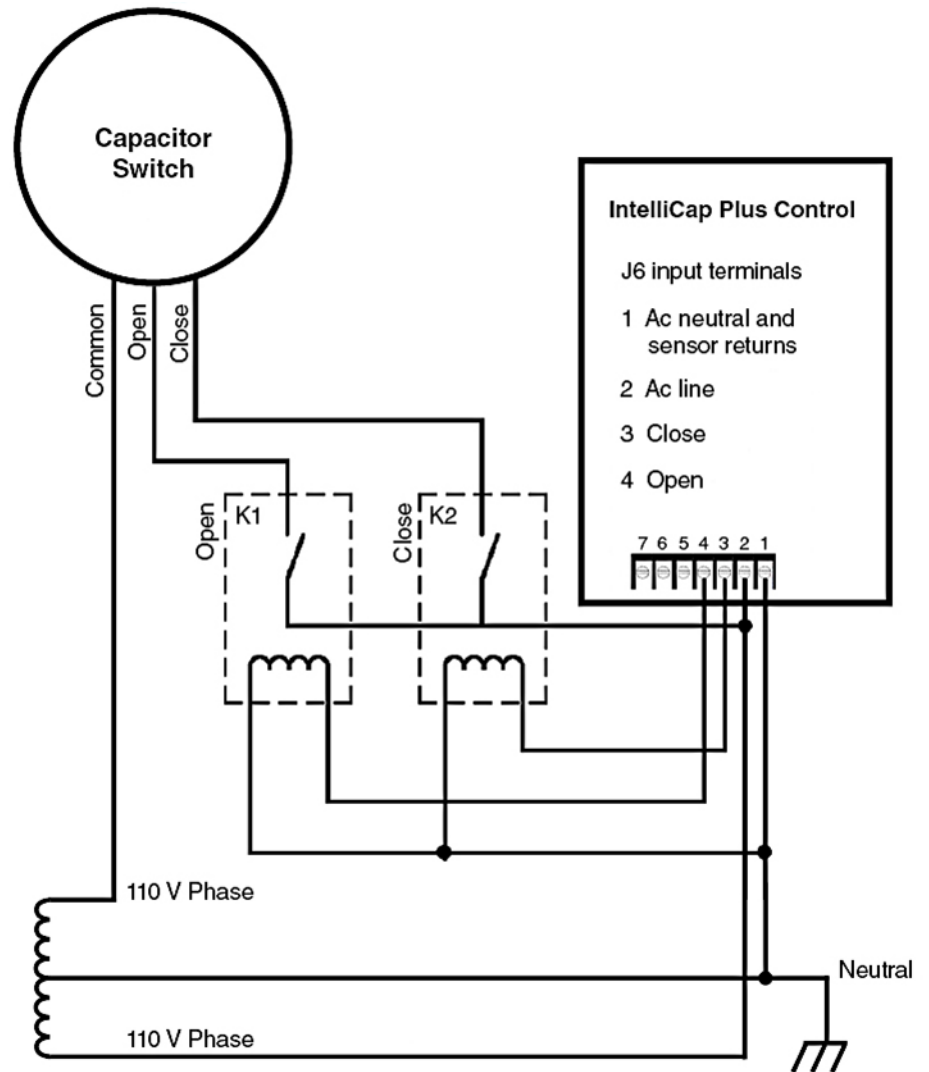


Figure 20. The 110-Volt IntelliCap Plus control can operate a 220-Volt bank switch.

# Installing the Capacitor Control

## Connecting Sensors

Some controls have var and/or neutral current or neutral voltage sensing connected in the meter socket. Other controls use connector(s) on the bottom of the control enclosure or terminal block J6. See Figure 11 on page 12 and Figure 19 on page 17, respectively.

### NOTICE

Do not ground sensor cable shields at the top of the pole. Sensor cable shields should be grounded only at the control end—to prevent extraneous ground current from flowing through the cable shields. This rule applies to all S&C connectorized cables.

### NOTICE

For neutral current sensing on 4-wire distribution systems, where the starpoint of the capacitor bank is tied to the neutral and/or ground, you must install the neutral current sensor between the starpoint and the system neutral and/or ground. See Figure 21.

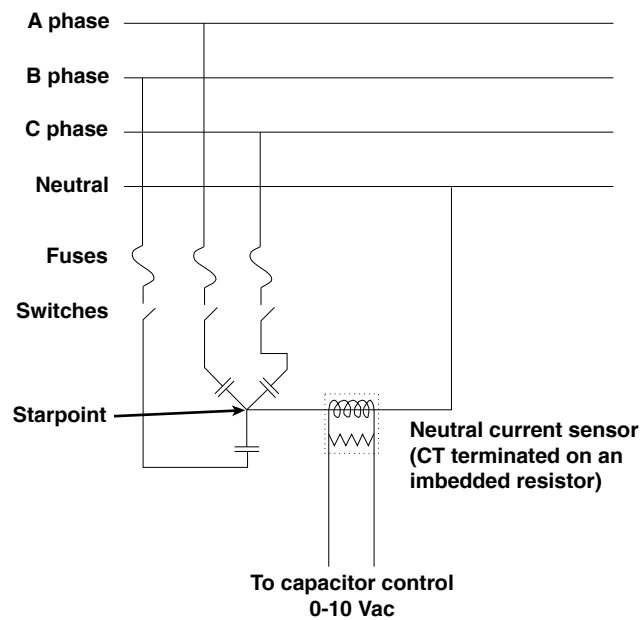


Figure 21. Neutral current sensor installation between the starpoint and the neutral.

The neutral voltage sensing option allows the capacitor control to monitor and take action if it detects abnormal levels of voltage on the starpoint of an ungrounded, wye-connected bank. Use the information provided by the neutral voltage sensor manufacturer to design your installation. See Figure 22 on page 21.

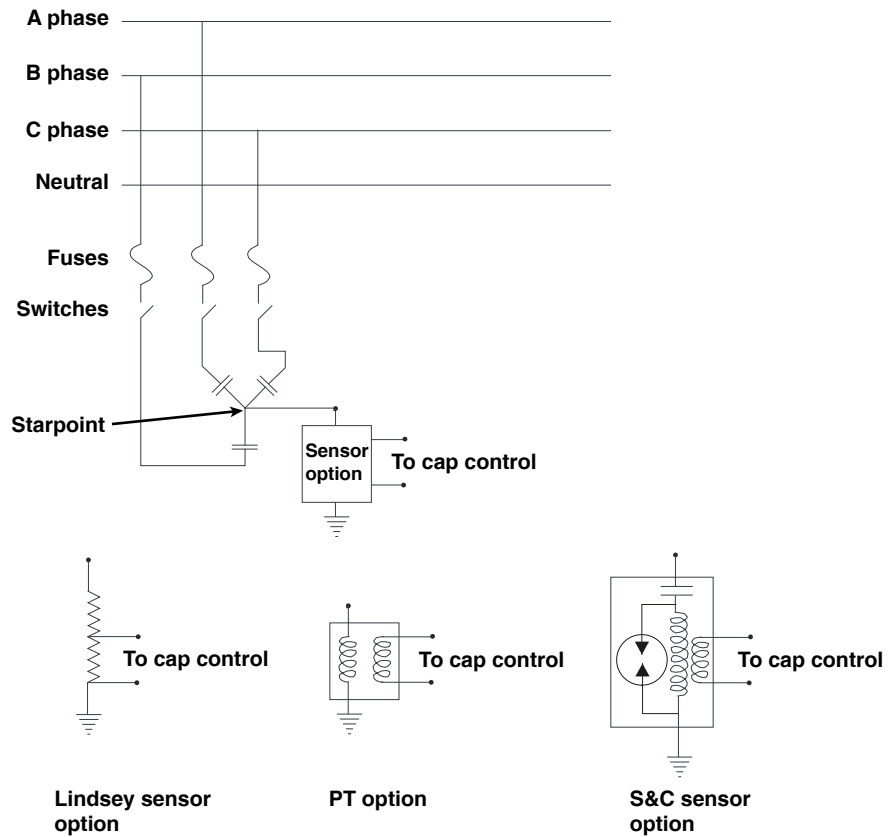


Figure 22. Neutral voltage sensor and wye-connected bank with starpoint.

## Installing the Capacitor Control

### Energize and Test the Control

Follow these steps to test the control:

#### STEP 1. Test the faceplate functions.

At this point, most of the faceplate LED displays and buttons can be tested. See Figure 23.

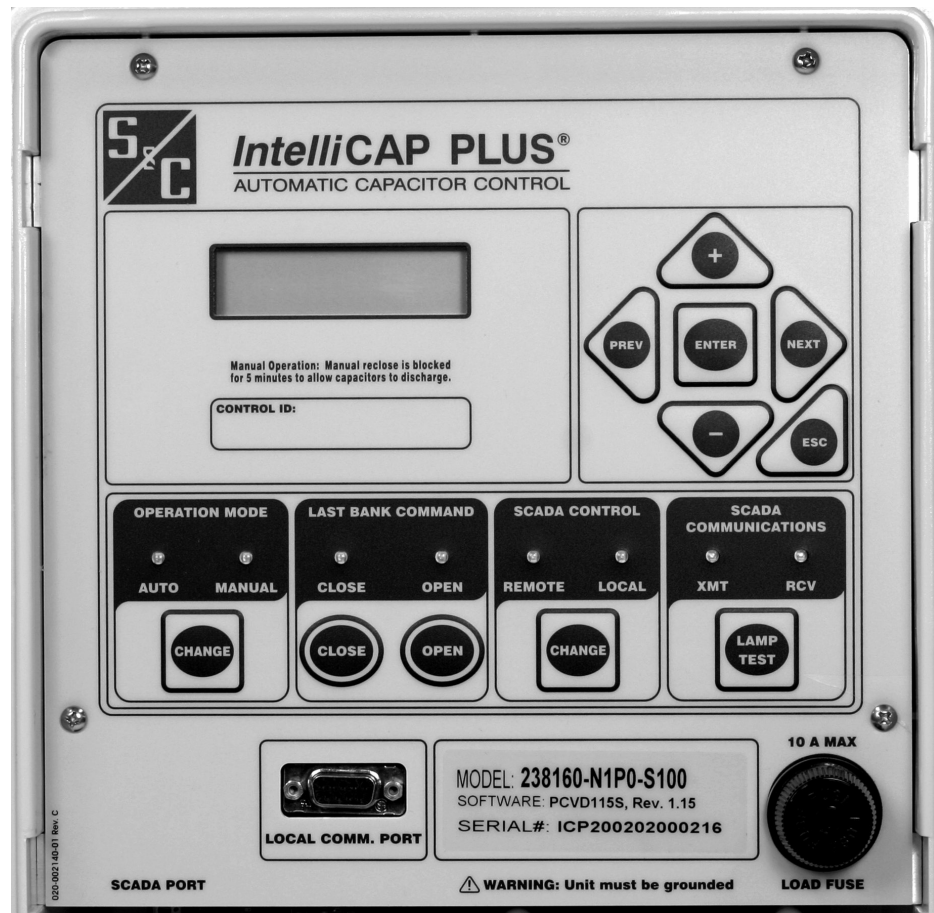


Figure 23. IntelliCap Plus faceplate.

- Observe that the LCD screen shows: **\*\*UnitOK\*\***. If it shows: **\*\*ACTIVE ALARMS\*\***, check the capacitor bank for a problem. The alarm condition must be corrected before the IntelliCap Plus control will operate correctly.
- Check that the LCD screen is scrolling through the real-time and setpoint data. If the display is blank or if there is an error message, see Instruction Sheet 1023-550, “S&C IntelliCap Plus Automatic Capacitor Control: *Troubleshooting*.”
- Press the LAMP TEST button and check that all the faceplate LED displays illuminate.

#### STEP 2. Replace the load fuse.

#### STEP 3. Check the Close/Open relays by operating the capacitor bank.

- Make sure the LOCAL and MANUAL LED displays are lit.
- Follow your company procedures. Press the CLOSE or OPEN button on the faceplate to operate the capacitor bank. Check visually to verify that the faceplate LED displays correctly indicate each capacitor bank switch position.
- Check visually to verify that the switch-position indicators on the capacitor bank switches for all three phases match the Close or Open indication of the faceplate LED displays.

The CLOSE and OPEN LED displays indicate the last requested operation. Neither LED display will be lit until the bank is switched for the first time.

## NOTICE

The capacitor bank **Close** command is blocked for a period of 5 minutes after an **Open** command. This delay provides time for the capacitor charge to bleed off. For more details, see the "Switching Capacitor Bank" section in Instruction Sheet 1023-540, "S&C IntelliCap Plus Automatic Capacitor Control: *Operation*."

**STEP 4.** Check Neutral Current/Voltage indication on the faceplate LCD screen.

- (a) If neutral sensing is installed, the LCD display shows: **\*\* UNIT OK\*\***.
- (b) Press the ENTER faceplate button twice. The LCD display will show: **\*\* DATA \*\***.
- (c) Use the NEXT faceplate button to scroll the data to: **NCAIrmLvl=**, and note the value displayed.
- (d) Use the NEXT faceplate button to scroll the data to: **NeutRmsAmps=**. If the displayed value is greater than the **NCAIrmLvl=** value, check the capacitor bank for a problem indicated by neutral voltage or neutral current. This condition must be corrected before the IntelliCap Plus control will operate correctly.

**STEP 5.** Set the control to **Local** and **Manual** mode.

At this stage the capacitor control is ready for **Local, Manual** operation mode.

## WARNING

Be sure to leave the control in **Local** (not **Remote**) and **Manual** (not **Automatic**) mode until the software in the capacitor control is set up for this installation. Otherwise unexpected operation may occur.

## Communication Equipment

If this capacitor control uses a radio, check that the radio has power.

A UtiliNet Radio should have a blinking pilot light. For most installations, the radio is installed in the enclosure door.

The IntelliCap Plus control has two remote communication ports. When used with suitable communication equipment and protocols, you can remotely monitor and control the capacitor control installation.

S&C supports the IntelliCap Plus control with a variety of communication hardware options and software protocols.

Supported manufacturers and hardware options include the following:

- SpeedNet™ Radio
- UtiliNet® Radio
- Cellnet® Radio
- Microwave Data Systems
- Hayes™ compatible modems
- Cellular transceivers
- Fiber-optic transceivers

For other options, contact S&C Electric Company.

DNP 3.0 is the standard protocol for the IntelliCap Plus control. Other protocol options are:

- PG&E SCADA (Cooper 2179)
- Landis & Gyr Telegyr 8979
- Other (contact S&C)

All 8-bit, asynchronous SCADA protocols (at up to 9600 BAUD) are handled directly by control software.

Most types of communication equipment can be mounted inside the capacitor control enclosure (in the door). This eliminates clutter and provides better reliability for the installation.

## Installing the Capacitor Control

Depending on the location of the capacitor bank site, one or more repeater radios may be necessary to enable communication between this control and the SCADA master station.

For more information, see the appropriate communication points list, or contact S&C Electric Company.

### Connecting Communication Hardware

All IntelliCap Plus controls are radio ready. This provides the flexibility to add communication hardware later.

The SCADA PORT connector provides a communication signal and power (12 Vdc) connection for the radio. Wiring for the six-pin IDC 0.156-inch header in the control is shown in Figure 24.

The cable from the radio is terminated with an ITW MAS-CON 0.156-inch centerline IDC connector (or equivalent).

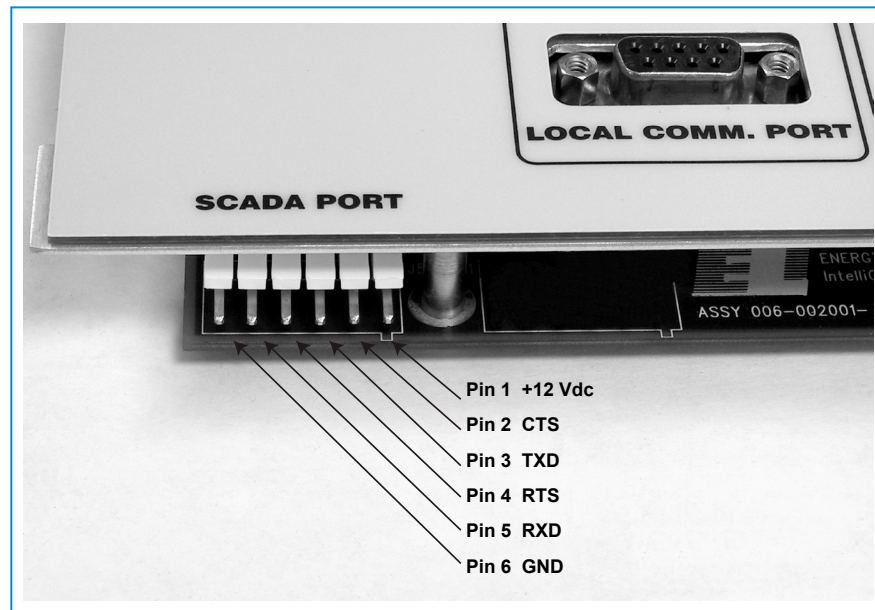
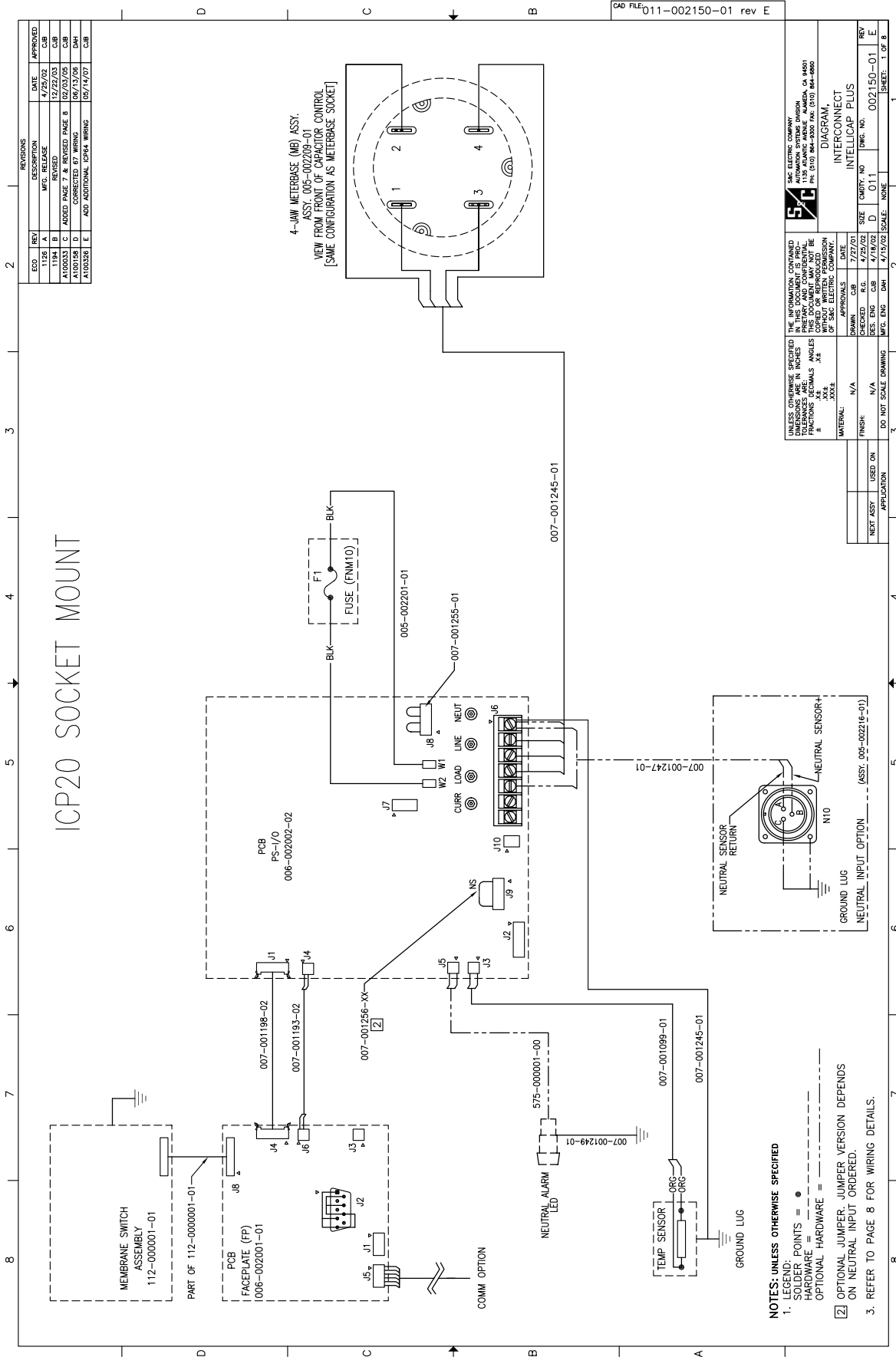


Figure 24. Pinout for the SCADA PORT.

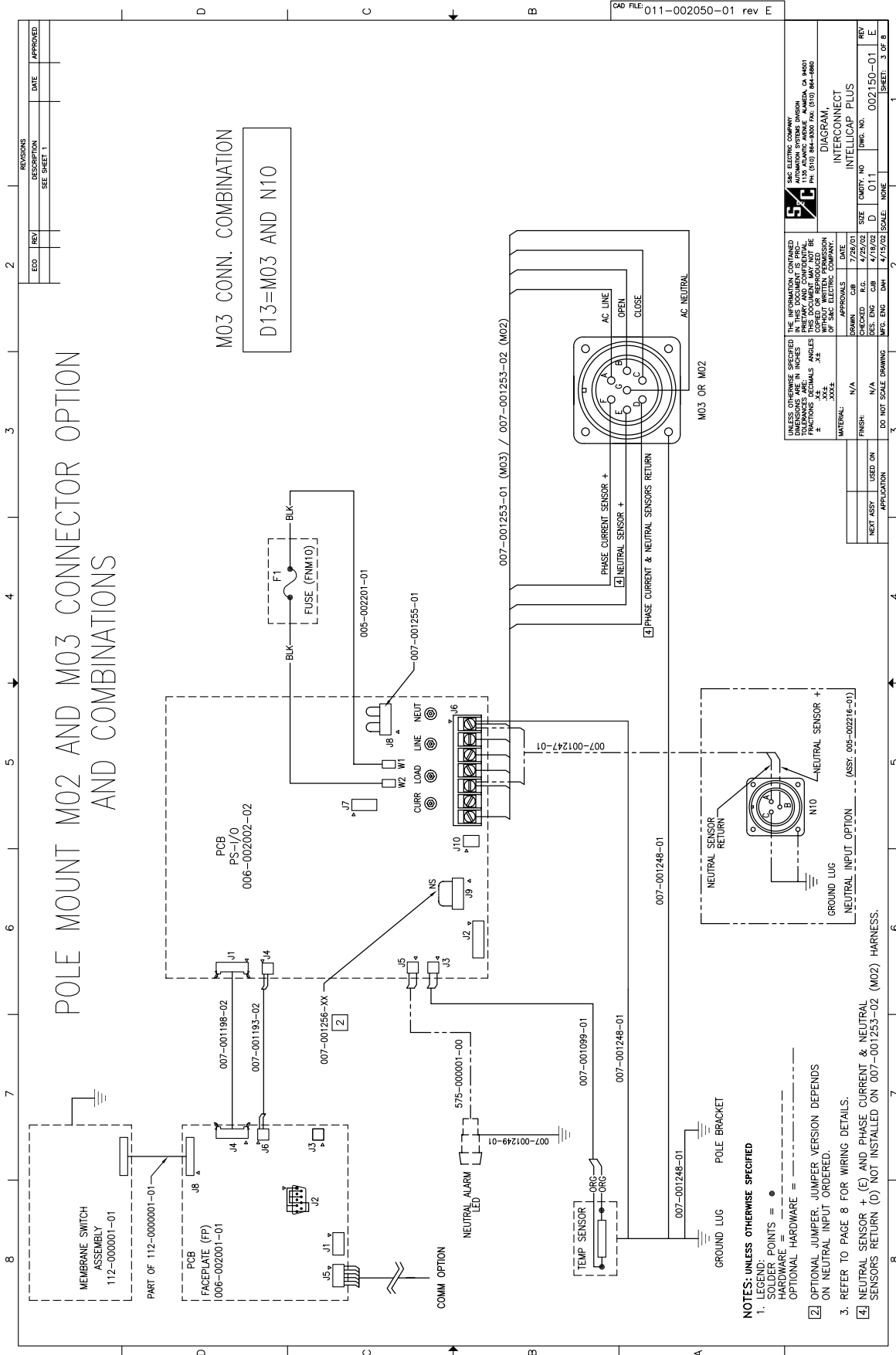
This completes hardware installation and testing. Continue with S&C Instruction Sheet 1023-530, “IntelliCap Plus Automatic Capacitor Control: *Setup*.”

The following pages show IntelliCap Plus control wiring diagrams.



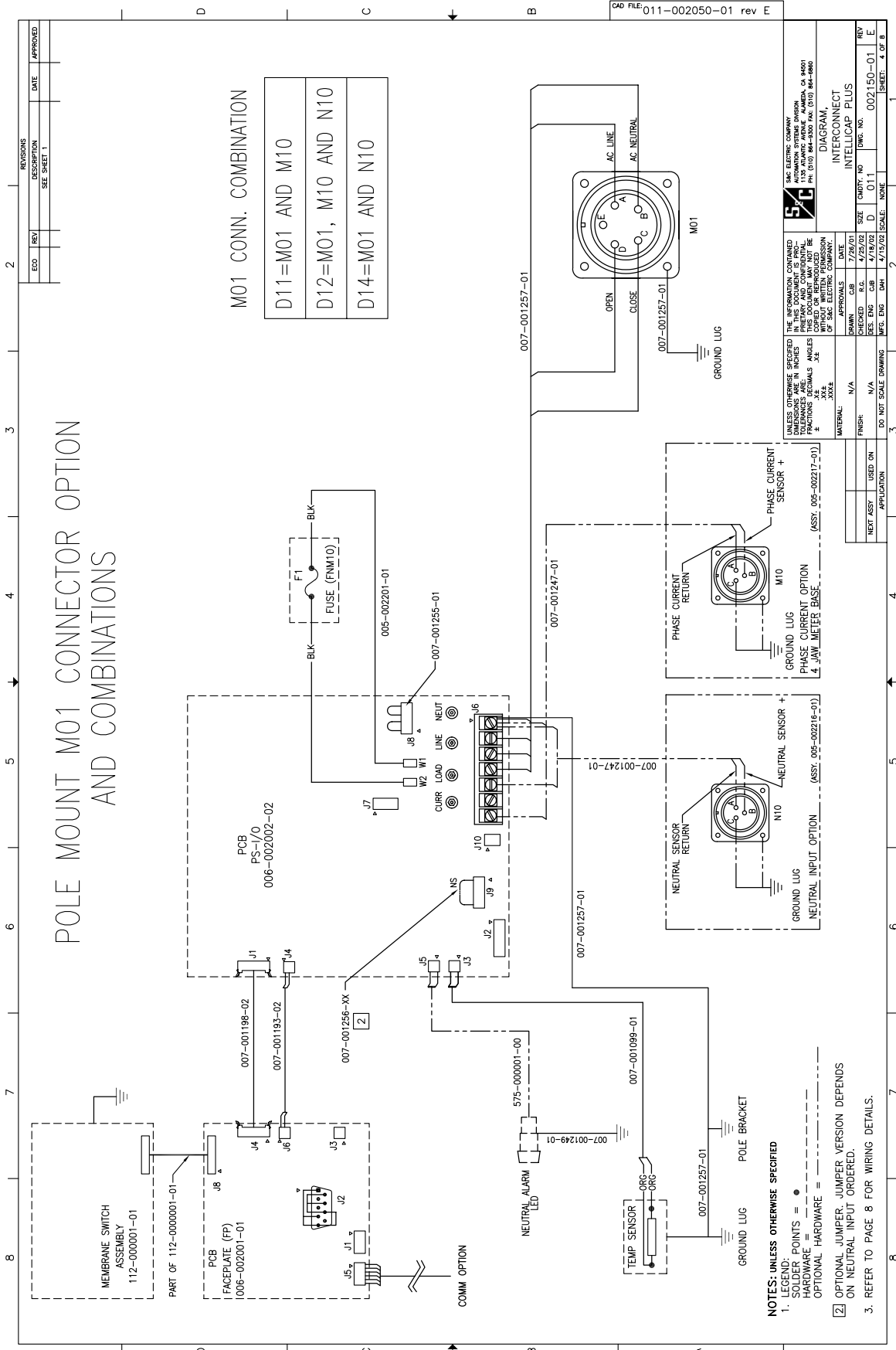






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# Installation and Connection Drawings

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WIRING TABLE		WIRING TABLE CONT.		METERBASE (MB) WIRING TABLE		METERBASE (MB) WIRING TABLE CONT.	
ASSY. NO. (BOM)	ORIENTATION	DESTINATION	COLOR	WIRING OPTION	ORIGIN	DESTINATION	COLOR
005-00201-01	F1	PS-1/0	BLK 14	40	MB	J6-1	BRN
007-001099-01	TEMP. SENSOR	PS-1/0	GRN 14			J6-2	ORG
007-001193-02	PS-1/0	PS-1/0	GRN 14			J6-3	GRY
007-001198-02	PS-1/0	PS-1/0	GRN 14			J6-4	GRY
007-001240-01	(6 JMB)	PS-1/0	GRN 14			J6-5	GRN
007-001245-01	(4 JMB)	PS-1/0	GRN 14			J6-6	GRN
007-001255-01		PS-1/0	GRN 14			J6-7	GRN
007-001256-01		PS-1/0	GRN 14			J6-8	GRN
007-001256-02		PS-1/0	GRN 14			J6-9	GRN
007-001256-03		PS-1/0	GRN 14			J6-10	GRN
007-001257-01		PS-1/0	GRN 14			J6-11	GRN
007-001299-01		PS-1/0	GRN 14			J6-12	GRN

ASSY. NO. (BOM)	ORIENTATION	DESTINATION	COLOR	WIRING OPTION	ORIGIN	DESTINATION	COLOR
005-00201-01	F1	PS-1/0	BLK 14	40	MB	J6-1	BRN
007-001099-01	TEMP. SENSOR	PS-1/0	GRN 14			J6-2	ORG
007-001193-02	PS-1/0	PS-1/0	GRN 14			J6-3	GRY
007-001198-02	PS-1/0	PS-1/0	GRN 14			J6-4	GRY
007-001240-01	(6 JMB)	PS-1/0	GRN 14			J6-5	GRN
007-001245-01	(4 JMB)	PS-1/0	GRN 14			J6-6	GRN
007-001255-01		PS-1/0	GRN 14			J6-7	GRN
007-001256-01		PS-1/0	GRN 14			J6-8	GRN
007-001256-02		PS-1/0	GRN 14			J6-9	GRN
007-001256-03		PS-1/0	GRN 14			J6-10	GRN
007-001257-01		PS-1/0	GRN 14			J6-11	GRN
007-001299-01		PS-1/0	GRN 14			J6-12	GRN

ASSY. NO. (BOM)	ORIENTATION	DESTINATION	COLOR	WIRING OPTION	ORIGIN	DESTINATION	COLOR
005-00201-01	F1	PS-1/0	BLK 14	40	MB	J6-1	BRN
007-001099-01	TEMP. SENSOR	PS-1/0	GRN 14			J6-2	ORG
007-001193-02	PS-1/0	PS-1/0	GRN 14			J6-3	GRY
007-001198-02	PS-1/0	PS-1/0	GRN 14			J6-4	GRY
007-001240-01	(6 JMB)	PS-1/0	GRN 14			J6-5	GRN
007-001245-01	(4 JMB)	PS-1/0	GRN 14			J6-6	GRN
007-001255-01		PS-1/0	GRN 14			J6-7	GRN
007-001256-01		PS-1/0	GRN 14			J6-8	GRN
007-001256-02		PS-1/0	GRN 14			J6-9	GRN
007-001256-03		PS-1/0	GRN 14			J6-10	GRN
007-001257-01		PS-1/0	GRN 14			J6-11	GRN
007-001299-01		PS-1/0	GRN 14			J6-12	GRN

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6-WAY METERBASE (MB) ASSY.  
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[SAME CONFIGURATION AS METERBASE SOCKET]

4-WAY METERBASE (MB) ASSY.  
ASSY. 005-002029-01  
[SAME CONFIGURATION AS METERBASE SOCKET]

PP J5 (SCADA PORT) PINOUT

POSITION	DEFINITION
1	+12 VDC
2	CTS(INPUT)
3	TXD(OUTPUT)
4	RTS(OUTPUT)
5	RXD(INPUT)
6	GND

PP J2 (LOCAL COMM. PORT) PINOUT ILLUSTRATION

PS-1/0 INPUT TERMINAL BLOCK J6 AND TEST POINTS CONFIGURATION

1 AC NEUTRAL & SENSOR RETURN  
2 AC LINE  
3 CLOSE  
4 OPEN  
5 NEUTRAL SENSOR +  
6 CT & PHASE CURRENT SENSOR +

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**NOTES: UNLESS OTHERWISE SPECIFIED**

1 CONNECT WIRE HARNESS PER WIRE TABLE. TIE WRAP ANY UNUSED WIRE(S) TO PART OF WIRE HARNESS THAT IS SECURED.

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DO NOT SCALE DRAWING

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