Types DAS15, DAS27, and DAS38 three-phase vacuum-break distribution automation switch and iDC control installation and operation instructions

Applicable to switch serial numbers CP571353932 and above

Cooper
Power Systems
by EATON

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Contents

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Eaton's Cooper Power Systems products meet or exceed all applicable industry standards relating to product safety. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Eaton's Cooper Power Systems employees involved in product design, manufacture, marketing, and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high voltage lines and equipment, and support our "Safety For Life" mission.

Safety information

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians who are familiar with this equipment should install, operate, and service it.

A competent technician has these qualifications:

- Is thoroughly familiar with these instructions.
- Is trained in industry-accepted high and low-voltage safe operating practices and procedures.
- Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.
- Is trained in the care and use of protective equipment such as arc flash clothing, safety glasses, face shield, hard hat, rubber gloves, clampstick, hotstick, etc.

Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

Hazard Statement Definitions

This manual may contain four types of hazard statements:

DANGER

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

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

CAUTION: Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage only.

Safety instructions

Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.

DANGER

Hazardous voltage. Contact with hazardous voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high- and low-voltage lines and equipment. G103.3

WARNING

Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this manual. Improper operation, handling or maintenance can result in death, severe personal injury, and equipment damage. G101.0

WARNING

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury and equipment damage. G102.1

WARNING

Power distribution and transmission equipment must be properly selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install or maintain power distribution and transmission equipment can result in death, severe personal injury, and equipment damage. G122.3

Product information

Introduction

Service Information S260-60-3 provides installation, operation, and maintenance instructions for the Type DAS Distribution Automation Switch. Before installing and operating this switch, carefully read and understand the contents of this manual. Refer to *Service Information S165-275-1 Use and Operations Manual for the iDC Sectionalizer/Switch Control* for additional information regarding the iDC switch control.

Read this manual first

Read and understand the contents of this manual and follow all locally approved procedures and safety practices before installing or operating this equipment.

Additional information

These instructions cannot cover all details or variations in the equipment, procedures, or process described nor provide directions for meeting every possible contingency during installation, operation, or maintenance. When additional information is desired to satisfy a problem not covered sufficiently for the user's purpose, please contact your Eaton's Cooper Power Systems representative.

Acceptance and initial inspection

Each switch and control is completely assembled, tested, and inspected at the factory. It is in good condition when accepted by the carrier for shipment.

Upon receipt, inspect the shipping container for signs of damage. Unpack the switch and control and inspect it thoroughly for damage incurred during shipment. If damage is discovered, file a claim with the carrier immediately.

Handling and storage

Be careful during handling and storage of the switch to minimize the possibility of damage. If the switch is to be stored for any length of time prior to installation, provide a clean, dry storage area. Be careful during handling and storage of the control to minimize the possibility of damage. If the control is to be stored for any length of time prior to installation, provide a clean, dry storage area. If storage is in a humid atmosphere, make provisions to keep the control circuitry energized.

Note: To energize the control, apply ac power to the ac supply input terminal block located in the lower right hand corner of the back panel of the control. Refer to the **Customer Connections for AC Power Section** in this manual.

Standards

Type DAS switches and iDC controls are designed and tested in accordance with IEEE Std C37.63™-2013 standard and IEC standard 62271-103:2011.

Quality standards

ISO 9001 Certified Quality Management System

Control battery storage and charging

The 24 Vdc control battery in the iDC switch control is fully charged prior to shipment and is ready for use.

Temperature has an effect on battery life. Sealed lead acid batteries should be stored, fully charged, at room temperature. Never store lead acid batteries at temperatures exceeding 47 °C (117 °F), as damage can result in approximately one month.

IMPORTANT

To maintain sufficient charge to operate the control and prevent battery cell damage, the sealed lead-acid batteries should be charged after no more than three months of storage.

The batteries must be tested and charged for 24 hours following every three months of storage from the last test date. A separate portable charger accessory is available. Catalog Number KA43ME7001 provides a 120 Volt battery charger to power individual batteries.

Note: When shipped from the factory, the battery source is disconnected and its output plugs are taped to the cabinet. Connect the battery plugs into the mating connectors to complete the battery circuit.

IMPORTANT

Connect the control battery before ac power is connected to the control's ac supply Input Terminal Block. The battery must be disconnected prior to shipping or storing the control.

Control power

The control is powered from 120 or 240 Vac. The selector switch on the power supply board allows the user to select between 120 Vac or 240 Vac.

Note: The selector switch is factory-set for each control based upon the customer order requirement.

Battery replacement and disposal

The 24 Vdc control battery has a life expectancy of four years. It is recommended that the battery be replaced after four years or if the battery fails a battery test - whichever occurs first.

Note: Battery life is decreased at higher temperatures.

Dispose of expired batteries in an environmentally responsible manner. Consult local regulations for proper battery disposal.

Control operation

Operation upon loss of ac power

The control is equipped with either an 8 Amp-Hour or 13 Amp-Hour 24 Vdc lead acid battery for operation upon loss of ac power. The control maintains full operation from the battery for a period of time dependent upon the battery size:

- 8 Amp-Hour — 12 hour maximum (20°C)
- 13 Amp-Hour — 24 hour maximum (20°C)

In the event that the ac power has not returned within the times listed above, the control will disconnect the battery from the circuit.

Note: The control continuously monitors the battery voltage. To prevent battery damage, the control shuts down automatically upon detection of low battery voltage (below 22 Vdc) for 60 seconds.

Control programming settings and parameters—including event recorder—are stored in non-volatile memory and retained upon loss of control power. The time/date clock will continue to operate for approximately 30 days after loss of control power.

Phase B(Ø) is the factory default phase. Unless changed by the user, the B PHASE VOLTAGE red LED illuminates indicating ac is the operating power. If BØ (or the user-indicated phase) loses ac power, the ALARM red indicator LED will illuminate. The ALARM log on the LCD Display will indicate LOSS OF AC PWR and the CONTROL OK LED will not be illuminated.

The control clock may require resetting if the operating power has been disconnected for more than thirty days. Refer to *Service Information S165-275-1 Use and Operations Manual for the iDC Sectionalizer/Switch Control* for information on setting the control clock.

Note: When ac power is present, the control will operate regardless of back-up battery presence.

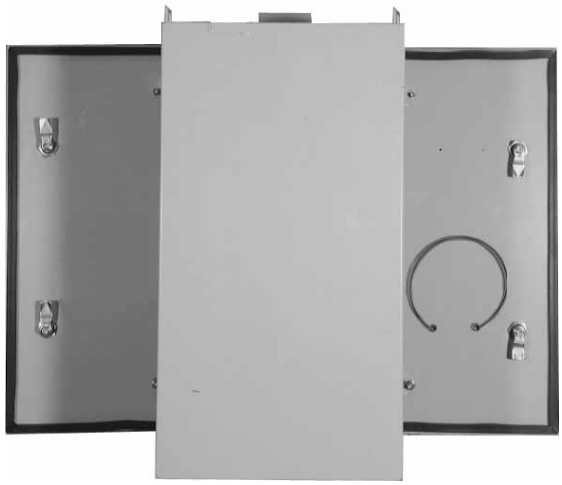


Figure 1. iDC switch control is accessible from both the front and back of the cabinet.

Switch description

The DAS Distribution Automation Switch is a three-phase, electronically controlled, vacuum switch with a mechanism that provides close and latch capability for electrical operation. The DAS Distribution Automation Switch comes standard with embedded CTs for current sensing.

The solid polymer insulation system does not rely on gaseous or liquid dielectric. The DAS switch is highly resistant to ozone, oxygen, moisture, contamination, and ultraviolet light. The DAS switch has three, solid-polymer interrupter modules and is suitable for operation through a temperature range of -40 °C to +65 °C. This results in an environmentally safe switch for general purpose, distribution automation, and distribution switching applications.

Fusing requirements

A 16 amp Wickman TCC 195-16.00A slow-blow fuse or equivalent is recommended for applications requiring fuse protection between the DAS switch and connected circuits.

Control description

The iDC switch control is designed to supervise the DAS switch. The control provides full switching and sectionalizing capabilities, including phase, ground, and negative sequence fault identification with inrush restraint for operation purposes. The iDC switch control does not provide fault current protection. Front panel pushbuttons provide simple control of the switch mechanism and access to other features such as battery test. The iDC control comes standard with SCADA protocols DNP 3.0 (both serial and TCP/IP), 2179 and Modbus for easy integration.

The iDC switch control provides full-featured metering including:

- Instantaneous Per Phase and Three Phase Metering (volts and amps)
- Instantaneous Power Factor and Power Metering (real, reactive and apparent)
- Demand Metering (amps, kw delivered/received, and kvar delivered/received)
- Harmonic Metering up to 15th Harmonic
- Four quadrant energy metering (kw-h delivered/received, kvar-h delivered/received)
- Symmetrical Component Magnitudes

The iDC switch control includes ProView™ software technology to provide advanced automated switch control functionality including custom configuration of user-selected inputs and outputs, events and alarm data, and selectable communication points for serial communication. Analysis tools include sequence of event recording, Idea Workbench™ software, Data Profiler, and oscillography functions, including oscillography replay.

The front panel LCD display is used to configure the operating settings for the control. It is also used to display metering, counter information, control parameters, reset alarms, and provide diagnostic information.

Control parameters can also be programmed via a personal computer connected to the control through the front panel RS-232 port. Control programming, interrogation, and operations are performed with ProView interface software on a personal computer.

The control operates on 50 and 60 Hz systems.

The control can be configured, by the factory or by the user, for a wide variety of applications. If user requirements change, the control functions can be modified to meet the new requirements.

Theory of operation

A functional block diagram of the control is shown in Figure 2. Current sensing is provided by three internally encapsulated current transformers located in the switch and interfaced to the control via the control cable. Voltages for metering are connected to the analog input module through terminal block TB8.

Data sampling occurs at a rate of 64 times per cycle. The CPU contains a data acquisition section that uses the acquired samples to compute the fundamental currents and voltage for use in sectionalizing, fault targets, and metering functions.

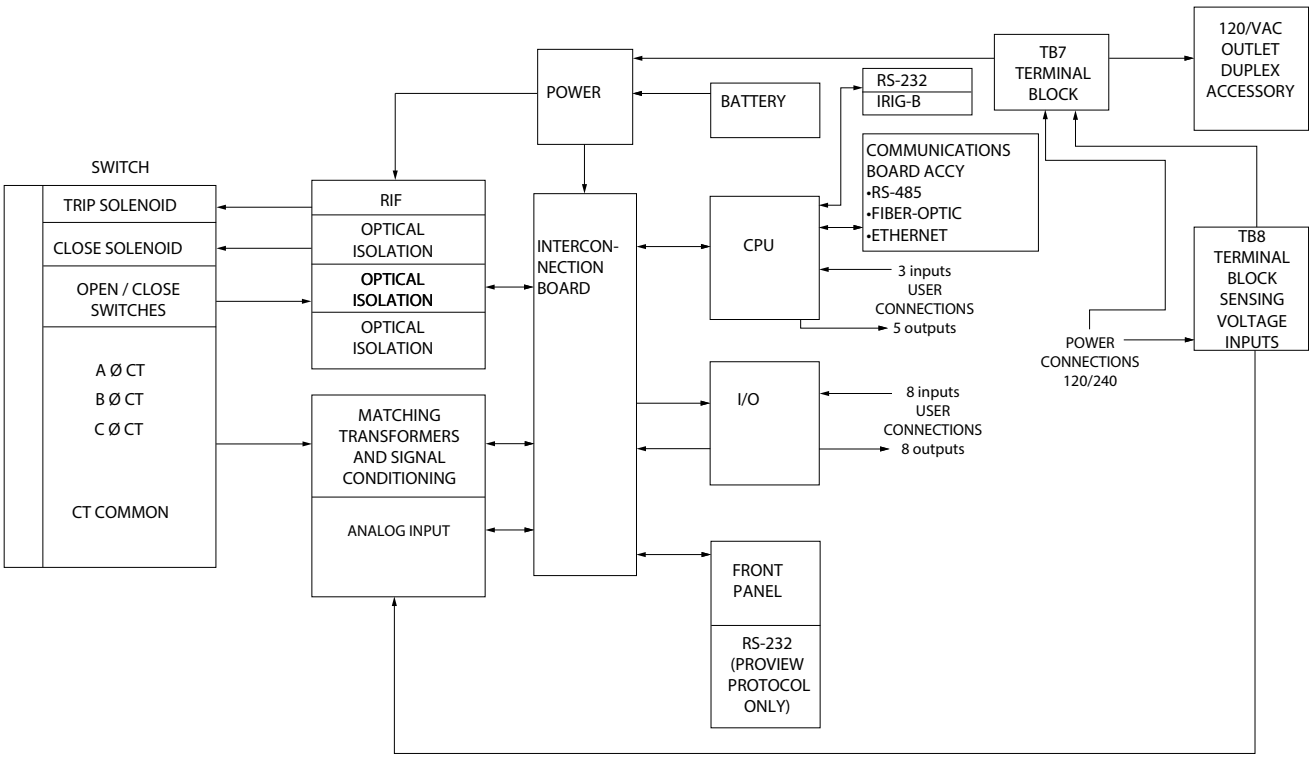


Figure 2. iDC switch control operational flow diagram.

Front panel descriptions

Control front panel

The iDC switch control front panel is illustrated in Figure 3.

The front panel consists of a interactive Programming panel, informative LCD display, and LED status indicator bank for quick verification of key operational parameters and functions.

The control includes a Power Save feature that will turn off the backlit LCD display and all LEDs if no front panel keypad is pressed within five minutes. Pressing the LAMP TEST key will re-activate the display and LEDs.

Note: The Power Save feature is a ProView interface software default setting. The timer duration can be changed or disabled via the ProView interface software.

The control includes a Reset Menu feature that will cause the LCD display to revert to the root menu after ten minutes of inactivity.

Note: The five minute timer and MMI Reset Menu is a ProView interface software default setting. The Reset menu selection and timer duration can be changed via the ProView interface software.

Front panel text messaging

The LCD messages are accessed from the front panel by following the Text Messages menu path. This menu displays any active user-configured text messages.

Up to fourteen user-configurable text messages can be programmed via the Idea Workbench software. These text messages appear on the front panel LCD and can be programmed to appear for alarm or other conditions.

Text messages displayed on the front panel are limited to four lines of 20 characters each (including spaces). Text messages can also be accessed by pressing the LAMP TEST one-touch analysis key on the front panel.

Programming panel

The Programming keypad has the following sections.

One-touch hot keys

There are eight hot keys (Figure 4) that allow one-button access to a variety of control and monitoring functions that appear in the LCD display. Pressing these buttons causes the following information to display or function to occur:

METERING: Causes a metering sub-menu to be displayed where the user can choose Primary Amps, kV, Degrees; Demand; Power/Energy, or Frequency.

RESET TARGETS: Resets the fault target indicators on the operator panel.

Asserted targets may be manually reset by depressing the RESET TARGETS hot key on the front panel or automatically reset by selecting the factory defaulted automatic mode check box found within the Sectionalizer/Switch dialog box of the Settings drop-down menu.

Automatic reset of this target, which can be enabled or disabled within the Sectionalizer/Switch drop-down menu, will reset the target when the current the current magnitude is below the actuating current setting for a settable period of time.

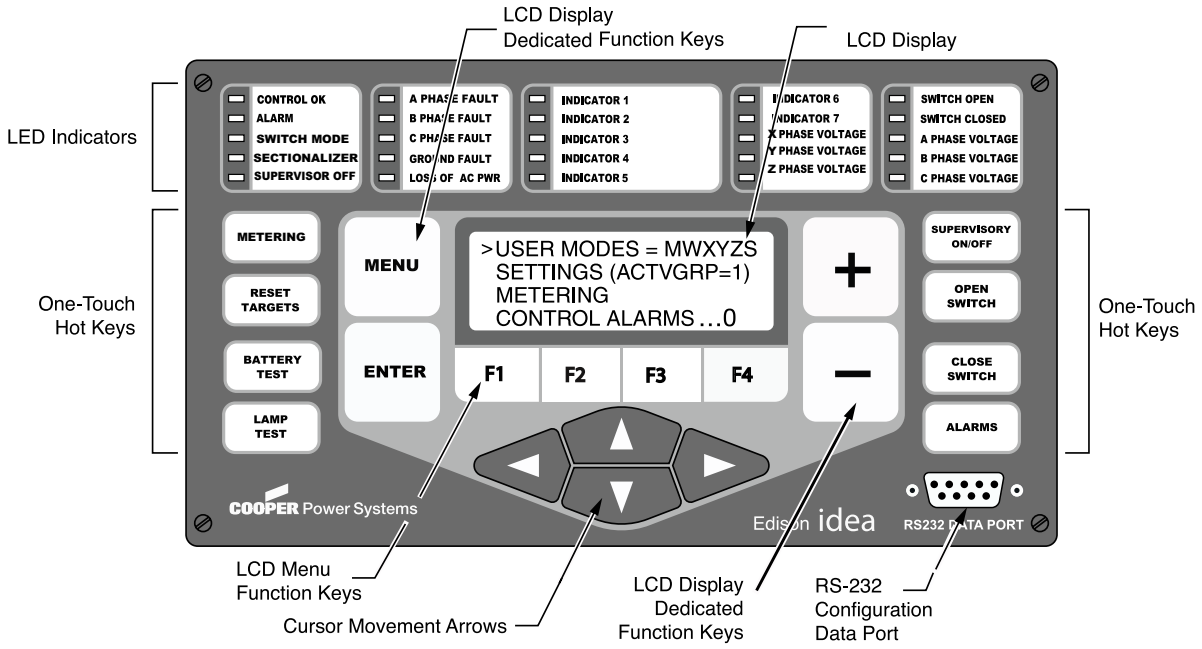


Figure 3. iDC switch control front panel.

BATTERY TEST: Causes Battery Test sub-menu to be displayed within the LCD information screen.

LAMP TEST: All operator panel LEDs are illuminated for verification of proper connection and operating status of all indicator lights. All status indicators will then return to their previous state. While in the LAMP TEST mode, the control response to operator panel keys is disabled, except for the OPEN and CLOSE switches.

SUPERVISORY ON/OFF: Pushing this button will toggle the control between Supervisory OFF and Supervisory ON modes. While in Supervisory OFF, all supervisory operations via SCADA will be blocked. All manual front panel operations may still be executed regardless of the status of the supervisory switch Hot Key.

OPEN SWITCH: Issues an OPEN signal to the DAS switch.

CLOSE SWITCH: Issues a CLOSE signal to the DAS switch. A manual close delay time setting is available.

ALARMS: Initiates display of the Alarms Menu within the LCD information display.

LCD Display

The LCD Display is a backlit 4-line, 20-character display that provides extensive distribution system, switch, and control status information accessed by using the control's interactive navigation keypads (Figure 4).

Note: The LCD display panel contrast is field-adjustable to allow for various mounting heights and applications. Press the MENU key and then press the (+) or (–) key to increase or decrease the contrast.

The four LCD navigation buttons are as follows:

MENU: Identifies the LCD Display menu options. Pressing this keypad will cause the display to step back one level in the menu hierarchy.

ENTER: Pressing this keypad will open the menu selection highlighted by the cursor within the LCD display and will confirm settings.

+: Increases the value of a setting by one increment.

–: Decreases the value of a setting by one increment.

The four LCD menu function keys activate specific menu commands. When a command appears in the LCD display directly above one of the four LCD menu function keys, the user can press the key to accept/select the command.

The four LCD menu function keys are as follows:

F1 F2 F3 F4

The four cursor movement arrows allow movement in the following directions:

- ◄ Moves the cursor left.
- ► Moves the cursor right.
- ▲ Moves the cursor up one line.
- ▼ Moves the cursor down one line.

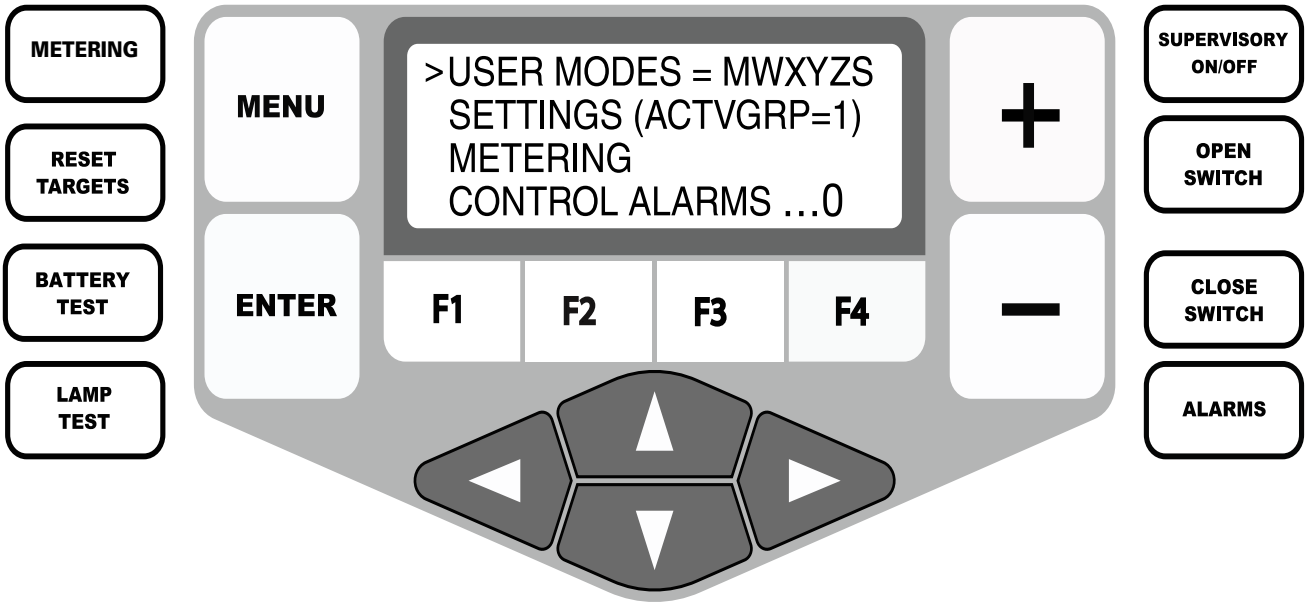


Figure 4. Analysis keys, LCD display, LCD menu function keys, and cursor movement arrows.

Status indicator LEDs

The status indicator LEDs (Figure 5) in the Programming section of the Operator Panel give instant information regarding the control and switch status.

All of the default status indicators LEDs (except for iDC CONTROL OK and ALARM) can be reconfigured via the Idea Workbench software.

The descriptive LED label inserts can be user-customized. Refer to **Using Removable Inserts** section of this manual for additional information.

CONTROL OK: The green LED indicates the control is operating normally and not in an alarm state. If the control detects an abnormal condition, the ALARM LED will illuminate and the CONTROL OK LED will blink.

ALARM: Factory assigned, blinking illumination indicates one of the following alarm conditions exist. If any alarms are logged, the LCD menu display will show "CONTROL ALARMS=1". To view the control alarms in more detail, place the cursor next to the ALARMS line and press the ENTER key. If there are no alarms logged, there will be a 0 next to the LCD menu display. By pressing the ENTER key all the control alarms will display as below and those that are logged will indicate a 1 next to that particular alarm.

- Reset Alarms – Access Reset Alarms screen to reset alarms.
- Battery Alarm – Indicates a battery alarm, view Sequence of Events for further details. This alarm asserts when battery voltage drops below 23.5 Vdc continuously for 60 seconds or when the battery voltage drops below 22.8 Vdc for one second during a control battery test.
- Fail to Open – Indicates the device failed to open.
- Fail to Close – Indicates the device failed to close.
- Status Disagreement – Indicates the switch is BOTH open and closed (both limit switches asserted).
- Loss of Status – Indicates the switch is NEITHER open nor closed (neither limit switch asserted).
- 50 DCB Alarm – Indicates the switch is open, however current (greater than what is considered noise) is being detected.
- Power Supplies – Indicates loss of the 5 Vdc CPU voltage for greater than 20 seconds.
- RAM Failure – Indicates a failed memory test.
- ROM Failure – Indicates a failed memory test
- RIF Communication Failure – Indicates a loss of communication between the Switch Interface circuit board to the main CPU circuit board. This alarm is self-resetting if communications is re-established.
- SWITCH MODE: Indicates that the DAS is operating in switch mode.
- SECTIONALIZER: Indicates that the DAS is operating in sectionalizer mode.

To reset Alarms, advance to the Alarms menu. Place the curser next to the Reset Alarms line and press the ENTER KEY. (This will provide a message that confirms the reset action.) Press the F4 function key "RESET" to reset Alarms.

SUPERVISORY OFF: When illuminated indicates that the control/switch will not respond to remote SCADA commands, allowing operation of the switch/control only at the pole. When the Supervisory OFF is not illuminated, the control/switch will respond to SCADA commands.

A PHASE FAULT: Indicates an A-phase fault target.

B PHASE FAULT: Indicates a B-phase fault target.

C PHASE FAULT: Indicates a C-phase fault target.

GROUND FAULT: Indicates an Ground fault target.

LOSS OF AC PWR: Will assert if ac power is lost for sixty (60) seconds. This LED is self-resetting upon return of ac power.

INDICATORS 1-7: Customizable LEDs that are used with functions programmed through the Idea Workbench software. The LED indicators do not have active default values. The LEDs are illuminated when the status configured via the Idea Workbench software is present.

X PHASE VOLTAGE, Y PHASE VOLTAGE, Z PHASE VOLTAGE: If external voltage sensors or PTs are present, indicates a presence of voltage on the respective phases.

SWITCH OPEN (green): Indicates the switch is in the open position.

SWITCH CLOSED: Indicates the switch is in the closed position.

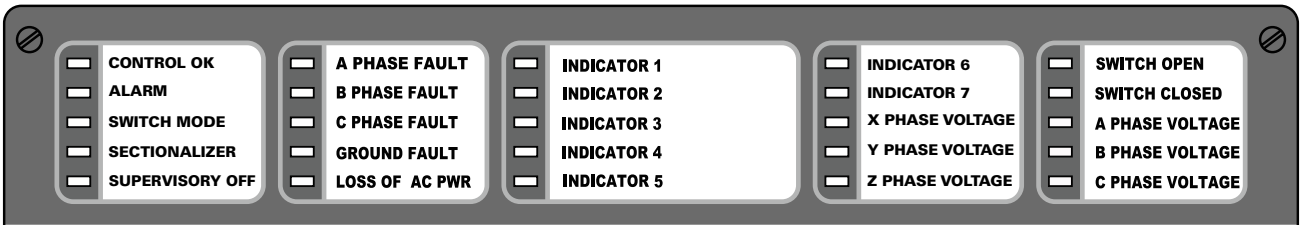


Figure 5. iDC switch control status indicator LEDs.

A PHASE VOLTAGE, B PHASE VOLTAGE, C PHASE VOLTAGE: If internal voltage sensors (IVS) or PTs are present, indicates a presence of voltage on the respective phases. (Refer to the section on the Internal Voltage Sensing option later in this document for a description.)

RS-232 configuration data port

The RS-232 connector (shown in Figure 4) on the front operating panel allows direct connection to a personal computer without any special cables or connectors.

All settings, metering, events, and oscillography data are available from this port. The port is Data Communication Equipment (DCE) wired for direct connection to a personal computer.

A 9-pin RS-232 cable (Catalog Number KME5-66) to connect from the PC to the RS-232 data port is available as an accessory.

IMPORTANT

This port is used only for configuring the control with ProView application software.

Control features

The iDC switch control offers numerous standard features and accessories that allow the user the utmost flexibility applying the switch control.

Control security

The iDC switch control has multiple customer-programmable security codes to limit control programming and viewing function access to authorized personnel. The front panel Man-Machine Interface (MMI) includes a user-selected security code to access the settings. Plus, the ProView interface software has its own security levels for multiple-user access.

Sectionalizer/switch settings

The Sectionalizer/Switch Setup menu, found within the Settings drop down, enables selection and specification of key operational control characteristics and applicable parameter ranges. The control and setting parameters include:

- Switch or Sectionalizer Mode Setting Group
- Phase and Ground Fault Targets
- Sectionalizer Reset Time and Counts to Open
- Phase Inrush Restraint
- Phase and Ground Inrush Restraint Duration
- Auto Fault Target Reset Enable and Delay
- Negative Sequence Fault Detection Enable
- Negative Sequence Actuating and Inrush Restraint

System configuration settings

The System Configuration menu, found within the Configure drop down, enables selection of parameters specific to the physical characteristics of the switch, its metering devices, and the distribution system. These settings include:

- CT/PT Ratios
- PT Correction Angles
- Expected Voltages
- System Zero Sequence Source Impedance
- Positive and Zero Sequence Line Impedances and Lengths for Fault Location
- Manual Close Delay
- PT Connection Type (Wye or Delta)
- Bushing Configuration
- System Rotation
- Available Connected PTs

A separate menu, also within the Configure drop down, is provided for configuring load side PT connections, ratios, and adjustment angles.

Thermostatically controlled heater

The control has a standard 15 Watt thermostatically controlled heater (ON 70 °F, OFF 85 °F) for humidity control. The heater is powered from the power supply board.

Metering

The control provides instantaneous and/or demand metering with programmable integration intervals for the following functions:

- Real and reactive power for each phase and total, including directional, on an individual phase basis.
- Demand currents on a per phase basis.
- Instantaneous currents, including ground current.
- Instantaneous voltage on a per phase basis.
- Instantaneous frequency.
- Positive, negative, and zero sequence voltages.
- Instantaneous power factor on a per phase basis.

Event recorder

The iDC switch control contains capabilities to perform Sequence of Events time-stamping for up to 18 event types. An additional 32 inputs can be user-defined through the Idea Workbench software.

Factory-defined event types include:

- Open/Close Operations
- Alarm Conditions
- Supervisory Status
- A, B, C and Ground Faults
- Failure to Open/Close
- Loss of ac Power
- Battery Tests
- Loss of Phase Voltage

The Event Recorder maintains a minimum of 90 event records. The last 25 events are viewable on the front panel LCD display.

Discrete SCADA communications

The control provides five output status contacts and three input control contacts as standard. Four of the output status contacts and one of the input control contacts are user configurable. The configurable status contacts use graphical interface software to combine status functionality along with Boolean algebra. One output status contact is dedicated to Alarms.

The control also provides a single configurable input control contact. This contact is configurable using a graphical interface software. The contact accepts a whetting voltage range of 12–250 Vdc, 120/240 Vac. The remaining two input control contacts are dedicated to the 52a and 52b Aux Switch positions in the DAS switch.

A Discrete Interface Board is also available as an accessory to provide an additional eight output status contacts and eight input control contacts. The expansion I/O board is completely user-configurable.

Oscillography

Oscillography is provided to present current and voltage waveforms, along with fault identification element and switch response status changes. Filtered and unfiltered data are provided for viewing.

The recorded values are superimposed on the control scheme, and the state or value at any point in the scheme is displayed. The user has the capability to move through the event and watch the response of every function. All analog signals, digital inputs, and contact outputs are monitored. Analog oscillography is displayed at 16 amples per cycle.

Oscillographic data is recorded to analyze multiple events during a permanent fault or other event type. The oscillographic data shows two cycles before the trigger point and eight cycles after the trigger point (default).

Note: The configuration settings are programmable.

Oscillography automatically initiates trigger points for the following functions:

- A-B-C Phase Fault Targets
- Loss of Phase Voltage
- Open Signal Issued
- Close Signal Issued

Removable inserts

Removable inserts are included with the control design for customization of specific control requirements. Inserts are available for the status indicator LEDs and one-touch Hot Keys. The removable inserts are designed for use without adhesives, label makers, or temporary labels. Refer to **Using Removable Inserts** for more information.

An electronic label template is included on the ProView application software CD and can be accessed through the following default address: C: /Program Files/Cooper/ ProviewXX/iDC/iDC English Inserts.doc.

Idea Workbench software

The Idea Workbench software provides access to various inputs, intermediate variables, and internal alarms, status, and targets to allow user-customization of the iDC switch control to meet specific and unique applications. The Idea Workbench software also gives the user the ability to perform logical functions with these variables by using a simple graphical user interface. Use of the Idea Workbench software is not a requirement for operation.

Data profiler

A fully-configurable data profiler is available which allows the user to collect analog information by sampling data at selectable intervals. These time-stamped values can then be viewed to determine information such as weekly load profiles, daily harmonic disturbances or hourly voltage fluctuations. The number of days of information the data profiler can provide depends upon configuration parameters.

Manual close delay

Manual Close Delay provides a delay from the time that the manual CLOSE SWITCH button is pushed to the time the manual close operation is performed.

The delay is programmable from 0 to 120 seconds in 1 second increments. A programmed delay value can be overridden for immediate closing by pressing the CLOSE SWITCH button a second time.

An active Manual Close Delay can be canceled by pressing the OPEN SWITCH button.

The default setting has the feature disabled (0 seconds). A countdown on the front panel LCD screen indicates Manual Close Delay is active.

Communications

Communication ports

The iDC switch control has two back panel communication ports and a front panel configuration data port.

The front panel configuration data port is described in the Control Front Panel section of this manual.

There is one standard 9-pin RS-232 and one optional communication port (RS-485, serial fiber, Ethernet wire or fiber or both) on the back operator panel, as well as a standard IRIG-B port for user time-syncing. See Figure 6.

Communication protocols

Four communication protocols are available for the iDC switch control:

- Modbus
- DNP3 TCP-IP
- DNP3 Serial
- 2179

One communication protocol can be selected for either the back panel RS-232 or the optional communication port.

All four protocols are selected and configured by the user with the ProView Communications Workbench application software.

Front port requires straight through cable.

Nameplate information

Control nameplate information can be displayed in the front panel LCD screen (Figure 4) by scrolling downward through the root menu to the NAMEPLATE DATA selection and pressing the ENTER function key. Scheme Number, Customer Engineering Number, Scheme Date, and ProView Release version will be displayed.

Control back panel

The back panel of the iDC switch control module is accessible from the backside of the hinged swing plate located within the control cabinet with readily identifiable serial ports and connections. See Figure 6.

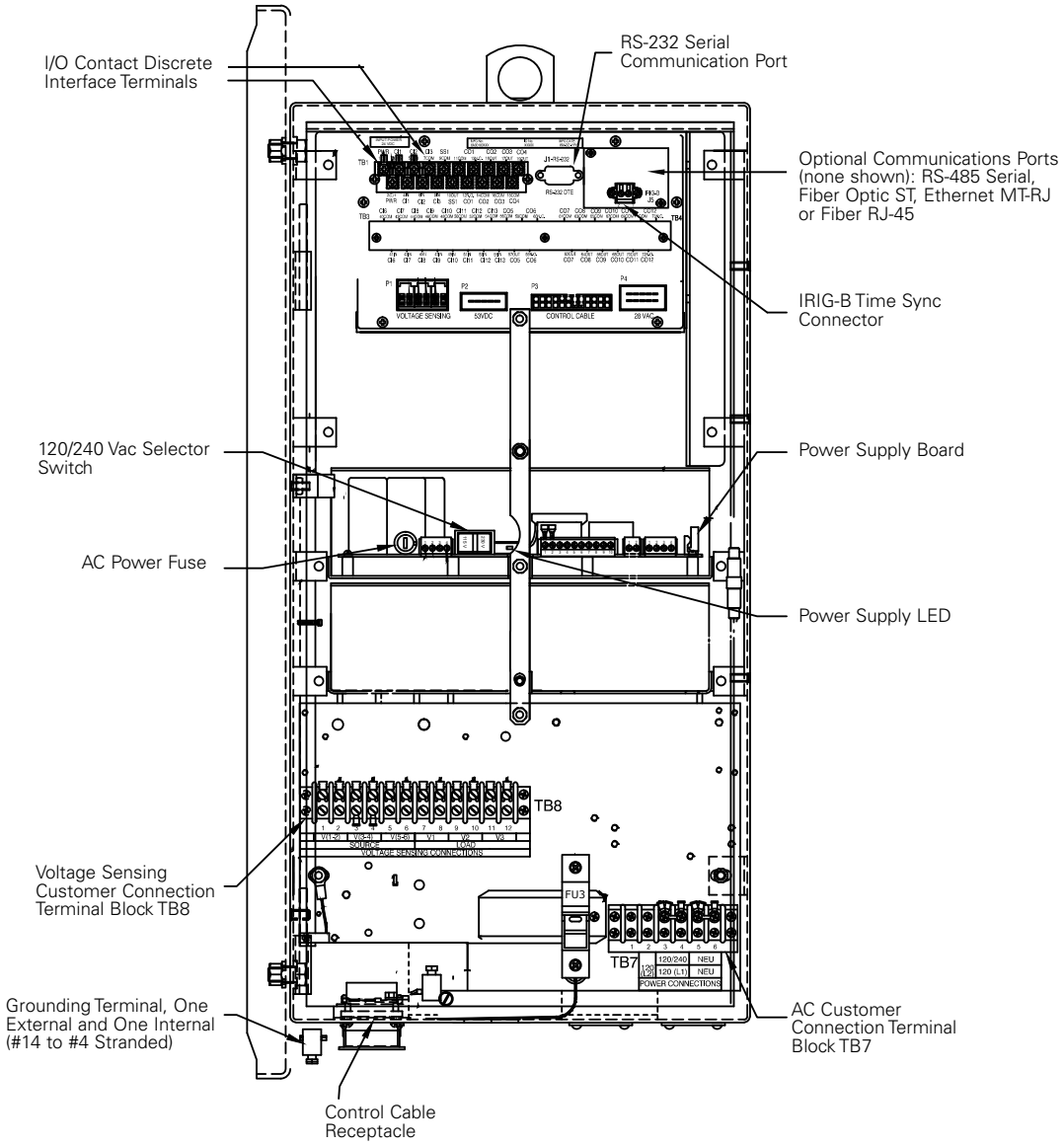


Figure 6. iDC switch control back panel terminal block and communication port identification.

Ratings and specifications

Check switch ratings prior to installation

The switch must be applied within its specified ratings. Check data plate ratings and compare with the system characteristics at the point of application prior to installation. Tables 1 through 4 list the ratings and specifications for the DAS switch.

Table 1. Voltage Ratings

Description	DAS15	DAS27	DAS38
Maximum Voltage	15.5 kV	27.0 kV	38.0 kV
Rated Basic Impulse Voltage	110/125* kV	125/150* kV	150.0 kV
Rated Basic Impulse Voltage (Open Contacts)	125.0 kV	145.0 kV	150.0 kV
Radio Noise Limit (microvolts)	100 @ 9.4 kV	100 @ 16.4 kV	100 @ 23.0 kV
Power Frequency Withstand, Dry	50.0 kV	60.0 kV	70.0 kV
Power Frequency Withstand, Wet	45.0 kV	50.0 kV	60.0 kV

*Available optional ratings with extra creepage.

Table 2 Current Ratings

Description	DAS15	DAS27	DAS38
Rated Continuous Current	630/800* A	630/800* A	630/800* A
Three-Hour Overload	950/1200* A	950/1200* A	950/1200* A
Rated Loadbreak Capability	630/800* A	630/800* A	630/800* A
Short Circuit Current, 1 Second Symmetrical.	12.5 kA	12.5 kA	12.5 kA
Making Current, Asymmetrical RMS	20.0 kA	20.0 kA	20.0 kA
Making Current, Asymmetrical Peak	31.0 kA	31.0 kA	31.0 kA
Cable Charging Current	10 kA	25.0 kA	40.0 kA

*Available optional ratings.

Table 3. Mechanical Ratings

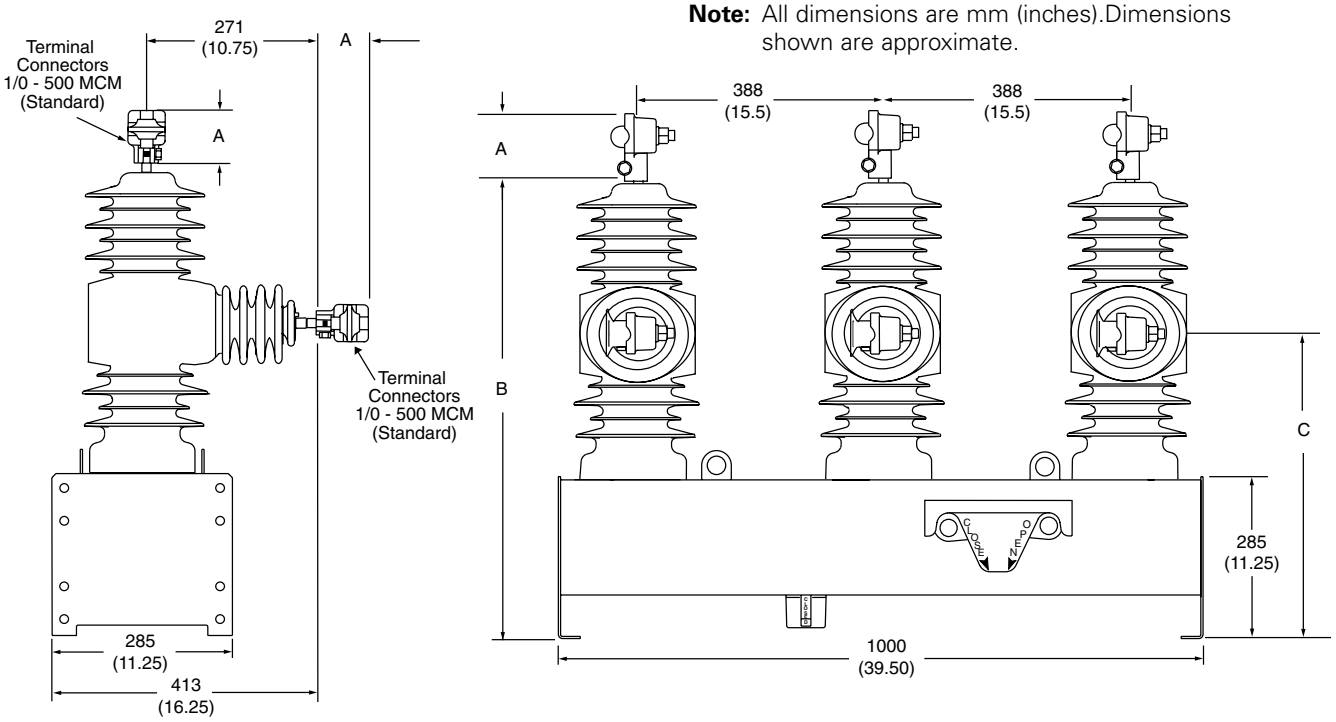
Description	DAS15	DAS27	DAS38
Mechanical Operations without Maintenance (opening/closing operations)	10,000	10,000	10,000

Table 4. Power Consumption

Description	DAS15	DAS27	DAS38
Operating Voltage	48 Vdc	48 Vdc	48 Vdc
Inrush Switching Current	250 A	250 A	250 A
Inrush Switching Current Duration	2 cycles	2 cycles	2 cycles
Quiescent Power Consumption	20 mA	20 mA	20 mA

Dimensions and weights

Note: All dimensions are mm (inches).Dimensions shown are approximate.



Terminal Options	A mm (in.)
Eyebolt, 1/0 - 500 mcm Cable Range (630 amps maximum)	80 (3.25)
Eyebolt, 4/0 - 1000 mcm Cable Range (800 amps maximum)	108 (4.25)
Flat Pad, 2-hole (630 amps)	114 (4.5)
Flat Pad, 4-hole (800 amps)	121 (4.75)
Stud Type, 1.125 - 12 threads (800 amps maximum)	82 (3.25)

	B mm (in.)	C mm (in.)
15 kV 110 kV BIL	791 (31.25)	508 (20.0)
15 kV 125 kV BIL	847 (33.25)	564 (22.25)
27 kV 125 kV BIL	847 (33.25)	564 (22.25)
27 kV 150 kV BIL	946 (37.25)	663 (26.0)
38 kV 150 kV BIL	946 (37.25)	663 (26.0)

Creepage Distances

Description	15 kV 110 kV BIL mm (in.)	15 kV 125 kV BIL mm (in.)	27 kV 125 kV BIL mm (in.)	27 kV 150 kV BIL mm (in.)	38 kV 150 kV BIL mm (in.)
Terminal to terminal, on the same phase	1054 (41.5)	1054 (41.5)	1054 (41.5)	1054 (41.5)	1054 (41.5)
Lower terminal to ground/earth	672 (26.5)	775 (30.5)	775 (30.5)	953 (37.5)	953 (37.5)

Figure 7. DAS switch dimensions (27 kV switch shown).

Table 5. DAS Switch Weights

Description	DAS15 110 kV BIL mm (in.)	DAS15 125 kV BIL mm (in.)	DAS27 125 kV BIL mm (in.)	DAS27 150 kV BIL mm (in.)	DAS38 150 kV BIL mm (in.)
DAS switch - kilograms (pounds)	86 (190)	91 (200)	91 (200)	101 (223)	101 (223)

Testing operation

When installing the switch, refer to the applicable switch mounting frame instructions. Installation instructions are included with the mounting frame.

⚠ WARNING

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury and equipment damage. G102.1

⚠ WARNING

Hazardous voltage. Always use a hotstick when working with this equipment. Failure to do so could result in contact with high voltage, which will cause death or severe personal injury. G108.1

1. **Check the name plate ratings.** Make sure the ratings and settings on the switch name plate are correct for the planned installation. See Tables 1-4.
2. **Test electrical open and close operation.** Close and open the switch contacts using the microprocessor control. Confirm that the contacts have closed and opened by:
   - The OPEN/CLOSE contact position indicator, or
   - By a continuity check between the switch terminals.
3. **Test manual open and close.** Using a hotstick, pull the yellow manual OPEN handle down to open the switch contacts. Confirm that the contacts are open as follows:
   - By the OPEN/CLOSE position indicator, or
   - By a continuity check between the switch terminals.

   To close the switch contacts:

   A. Raise the yellow OPEN handle.
   B. Pull the red manual CLOSE handle.
4. **Verify that the yellow handle inhibits an electrical close.** Using a hotstick, pull the yellow manual OPEN handle down to open the switch contacts. Attempt to close the switch using the microprocessor control. Confirm that the contacts remain open by:
   - The OPEN/CLOSE contact position indicator, or
   - A continuity check between the switch terminals.

Switch installation procedure

⚠ WARNING

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury and equipment damage. G102.1

1. **Check the name plate ratings.** Make sure the ratings and settings on the switch name plate are correct for the planned installation. See Tables 1-4.

⚠ WARNING

Falling equipment. Use the lifting lugs provided and follow all locally approved safety practices when lifting and mounting the equipment. Lift the unit smoothly and do not allow the unit to shift. Improper lifting can result in severe personal injury, death, and/or equipment damage. G106.3

⚠ CAUTION

Personal injury. Bushings have sharp edges. Wear protective gloves when handling the unit. Failure to do so can result in cuts and abrasions. T258.0

2. **Install the switch.** Mounting frames from Eaton's Cooper Power Systems should always be used. See Figure 8 for lifting instructions.

⚠ WARNING

Hazardous voltage. Solidly ground all equipment. Failure to comply can result in death, severe personal injury, and equipment damage. T223.2

3. **Ground the switch.** Make the ground connection to the ground connector. The ground connector is located on the back of the mechanism housing. The ground clamp accepts #10 to #2 stranded cables.
4. Make all cable connections prior to energizing control device.

   Tighten the control cable by turning the coupling rings approximately 20 quarter turns by hand, while aligning and pushing the cable connector with the other hand until the connection is tight.

Moving the switch

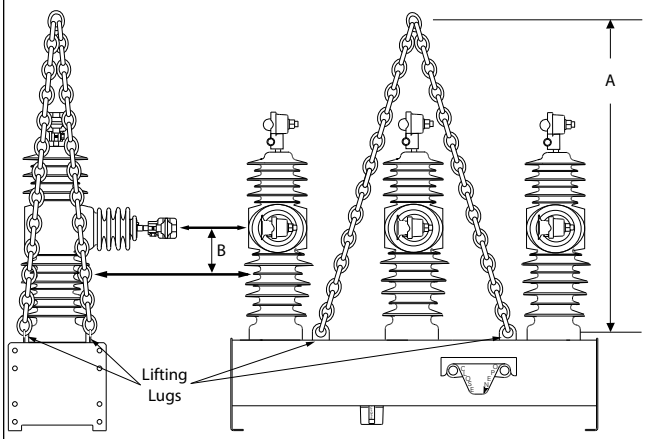
DAS switches are shipped palletized (bolted onto a pallet). When moving with a fork truck/lift, the switch must remain bolted to the pallet to avoid damage to the OPEN/CLOSE contact position indicator.

Lifting the switch

Follow all approved safety practices when making hitches and lifting the equipment. Lift the unit smoothly and do not allow the unit to shift.

⚠ CAUTION

Tip-over Hazard. High center of gravity. Use a 4-point hitch to prevent switchgear from overturning during lifting operations. Improper lifting can result in person injury or equipment damage. T297.0



A: Sling height for 15 kV and 27 kV with 125 BIL units: 914 mm (36 in)
Sling height for 27 kV with 150 BIL and 38 kV units: 1067 mm (42 in)

B: Center of gravity (Cg) is approximately 100 mm (4 in) below plane of lower terminals.

Figure 8. Moving and lifting instructions for the Type DAS switch.

5. **Make high-voltage line connections** (Figure 9).

Note: The six disconnect switches and bypass switches are not required, but they do facilitate switching and isolation.

CAUTION

Equipment Damage. Do not adjust or rotate bushing terminals without first removing power line leads and loosening pinch bolt to release clamp tension. Failure to remove tension between the clamp and the interrupter stud prior to rotating the terminal will damage the encapsulated interrupter assembly resulting in equipment damage. T347.0

CAUTION

Equipment damage may occur if torque values are exceeded. T370.0

6. Connect high-voltage lines to switch bushing terminals. The recommended torque value for bushing terminal-to-line connection is 35-37 ft•lbs.

   Refer to Figure 10 for terminal identification of the DAS switch.

   Terminal connection to copper conductors only are recommended.

   To rotate a flat-pad or eyebolt bushing terminal prior to connecting power line leads, loosen the pinch bolt on the terminals. After rotating the terminal, retighten the pinch bolt as follows: torque 3/8-16 pinch bolts to 20—23 Nm (15—17 ft•lbs); torque 1/2-13 pinch bolts to 39—42 Nm (29—31 ft•lbs).

   Provide surge arrester protection. Surge arrester protection should be provided on both sides.

   Refer to Figure 10 for terminal identification of the Type DAS switch.

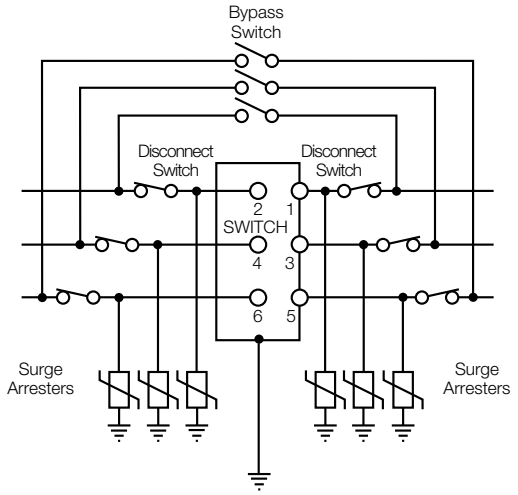


Figure 9. Connection diagram shows complete surge protection and illustrates Bypass and Disconnect switches to facilitate maintenance.

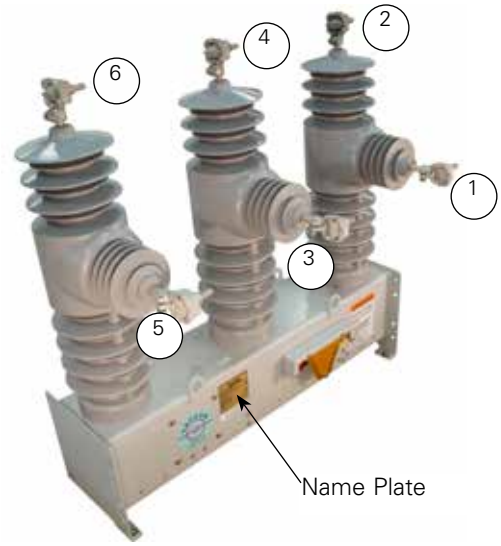


Figure 10. Terminal identification of DAS switch.

Remove switch from service

1. Close all three (3) bypass switches.
2. Pull down the yellow operating handle with a hotstick. The yellow operating handle is located under the switch sleet hood.

   The control will sense that the switch is open and provide OPEN indication on the front panel.
3. Open the source and load disconnect switches.
4. Disconnect the control battery.
5. Remove the control ac sensing and power connections from the control using a separate disconnect switch.

CAUTION

Equipment misoperation. Disconnect all control power sources prior to disconnecting or reconnecting the control cable from the control. Failure to comply can result in switch misoperation at the time of disconnection or reconnection of the control cable to the control. T311.1

IMPORTANT

Disconnect switches for ac sensing and power connections are necessary to isolate the control for testing and servicing.

6. Disconnect the control cable from the switch.

CAUTION

Hazardous voltage. Open CT secondaries can generate high voltages. Contact with CT pins of the disconnected cable can cause electric shock and may result in personal injury. Open recloser contacts and open disconnect switches before disconnecting control cable. T204.3

CAUTION

Hazardous voltage. Cable conductors attached to controls will remain at 53 Vdc and 120/240 Vac potential while connected to the control. Contact with any pins at the end of the cable directly or indirectly connected to a control can result in personal injury or equipment damage. Disconnect battery and external power sources in the control then remove control cable at control end before disconnecting from recloser end. T312.3

7. Follow standard utility procedures regarding removal of recloser from service.

   Eaton's Cooper Power Systems recommends transporting DAS switches in the closed position to maximize the operational performance of the unit.

Switch operation

WARNING

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury and equipment damage. G102.1

WARNING

Hazardous voltage. Do not rely on the open position of the yellow operating handle or the contact position indicator; it does not ensure that the line has been de-energized. Always establish a visible disconnect. Failure to follow proper safety practices can result in contact with high voltage, which will cause death or severe personal injury. G114.1

Electrical operation

The Type DAS switch utilizes an interface circuit located in the mechanism housing. The electronic interface circuit controls the opening and closing signals to the magnetic actuator. When 53 Vdc is applied to Pin T (positive) and Pin N (negative), the switch may be opened and closed electrically by making momentary contact between P-B or P-E. See Figure 35.

If the trip and close signals are maintained, the DAS will operate correctly without damage to the unit. If the trip signal is maintained, applying the close signal will not close the unit. The unit will not close if the trip signal is removed while the close signal is maintained. To close the unit, the close signal must be reapplied without an asserted trip signal. A momentary close signal of 100 milliseconds is required to properly close the DAS switch.

The switch has a 19-pin receptacle (see Figure 32), which provides current outputs (from the CT), position indication outputs, close input signal, open input signal, heater, and battery input power. Refer to Figure 35 for wiring configuration.

Heater

A heater is included for the switch mechanism housing. Available in either 120 Vac or 240 Vac, chosen at time of order, the heater minimizes humidity within the housing.

OPEN-CLOSE position indicator

The OPEN-CLOSE contact position indicator consists of a red CLOSED and a green OPEN indicator located on the bottom of the mechanism housing (see Figure 11).

Hotstick (manual) operation

WARNING

Hazardous voltage. Always use a hotstick when working with this equipment. Failure to do so could result in contact with high voltage, which will cause death or severe personal injury. G108.1

The switch may be opened manually by using a hotstick to pull down the yellow manual OPEN handle, located on the side of the switch (see Figure 12). To close the switch, first, push the yellow manual open handle up. Then, pull down the red manual CLOSE handle, located on the side of the switch (see Figure 12).

Figure 12. DAS switch manual open and close handles.

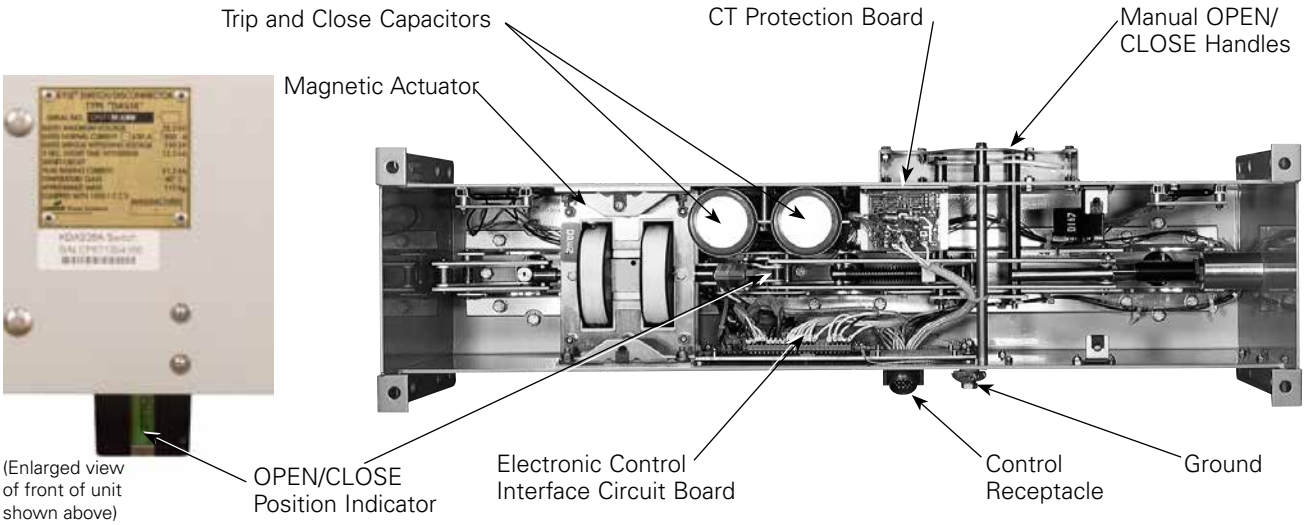


Figure 11. DAS Distribution Automation Switch mechanism (view from bottom of switch with bottom cover removed).

When the red manual CLOSE handle is pulled down after the switch has been opened manually (yellow handle still down), the handle linkage will first cause the yellow handle to return to the up position and will then complete the CLOSE. However, a CLOSE command from the control is blocked when the yellow manual OPEN handle is in the open (down) position. The yellow OPEN handle must be manually returned to the up position to allow an electronic CLOSE.

IMPORTANT

If the yellow manual open handle remains in the down position, the switch cannot be closed electrically.

Control installation procedure

⚠ WARNING

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury and equipment damage. G102.1

⚠ CAUTION

Equipment misoperation. Do not connect this control to a switch until all control settings have been properly programmed and verified. Refer to the programming information for this control. Failure to comply can result in control and switch misoperation, equipment damage, and personal injury. G147.0

Initial Programming Prior to Installation. The control must be programmed with all necessary operating settings, all alternate profiles, and parameters prior to operation with a DAS switch.

Note: Initial programming of the control is the responsibility of a qualified technician or engineer familiar with control functions and programming parameters required for the specific switch installation.

Mounting the iDC Control. Mount the iDC switch control in a convenient, accessible location. Mounting dimensions are provided in Figure 13.

A hole and keyway in the control mounting bracket accommodates a 16.0 mm (5/8") diameter bolt.

Control Cable. The control cable is fabricated with connectors which mate with the male receptacle of the switch on one end and the female receptacle of the control.

Note: The control cable must be supported along its length to prevent repeated movement due to wind or other outside forces which can damage the cable. Verify that no water is present in control cable connectors prior to making connections.

⚠ WARNING

Hazardous voltage. Switch and control must be solidly grounded. Follow all locally approved procedures and safety practices when grounding this equipment. Improper grounding can result in contact with high voltage, which will cause death or severe personal injury. G155.0

Grounding the Control. The control cabinet must be grounded. A grounding connector on the underside of the cabinet will accommodate No. 14 solid through No. 4 stranded conductors.

Figures 14 and 15 illustrate grounding methods for 4-wire multi-grounded systems: local and remote.

For effective surge protection, all control and power conductors for the iDC switch control must be routed parallel to a corresponding ground path. For example, the AC power supply for the control should be parallel to and equal in length to the transformer ground path. The control cable should be parallel to and routed close to the switch ground path.

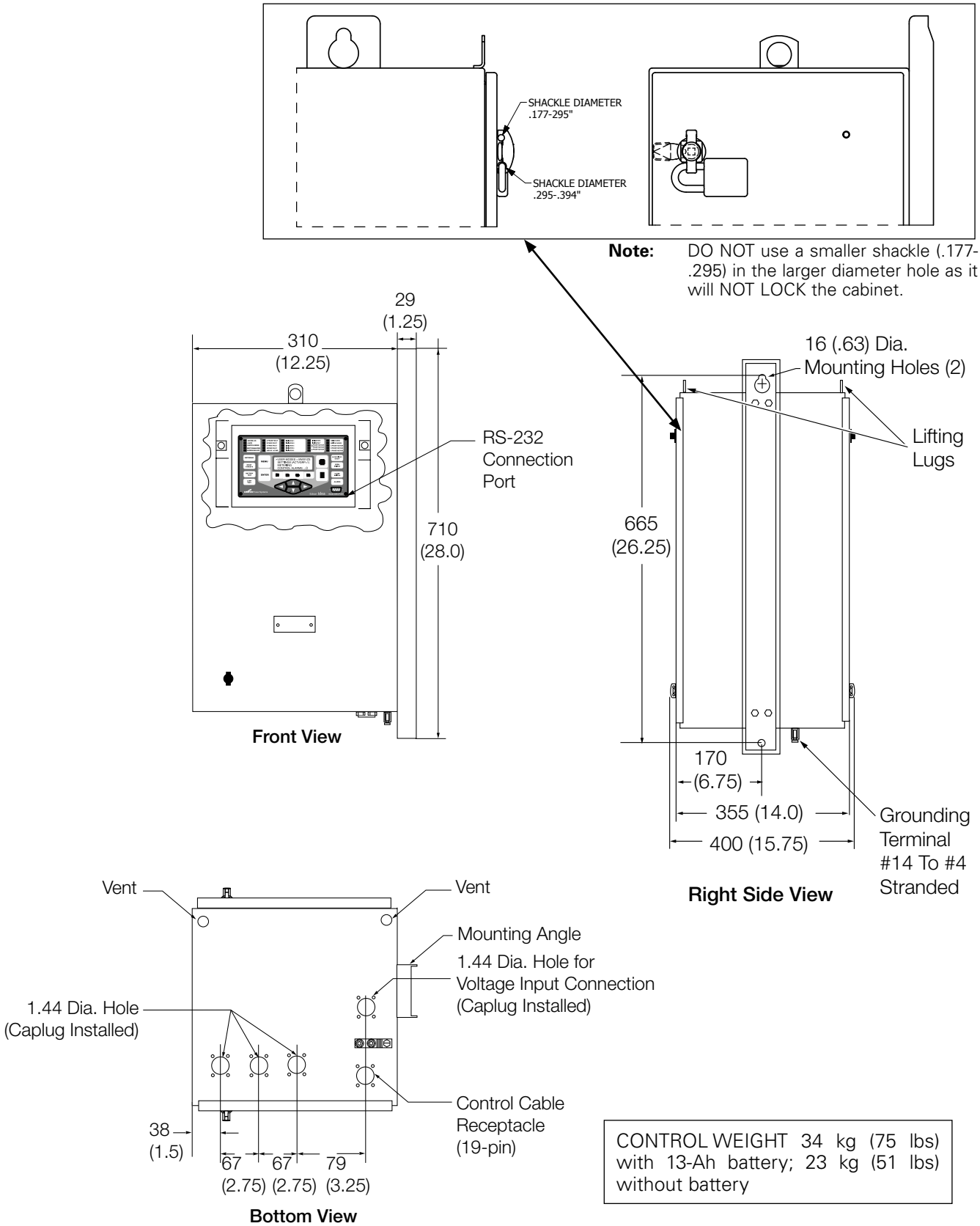


Figure 13. iDC control weight, dimensions, and pad-lock shackle diameters.

Grounding

Grounding with a local supply voltage transformer; 4-wire multi-grounded, 3-wire ungrounded, or impedance-grounded

Installation with a local supply voltage transformer must include the following (refer to Figure 14):

- Protection of the switch bushings and the supplying transformer with lightning arresters.
- Grounding of the switch housing.
- Grounding of the transformer tank.
- Grounding of the control cabinet.
- Grounding of the SCADA equipment.

IMPORTANT

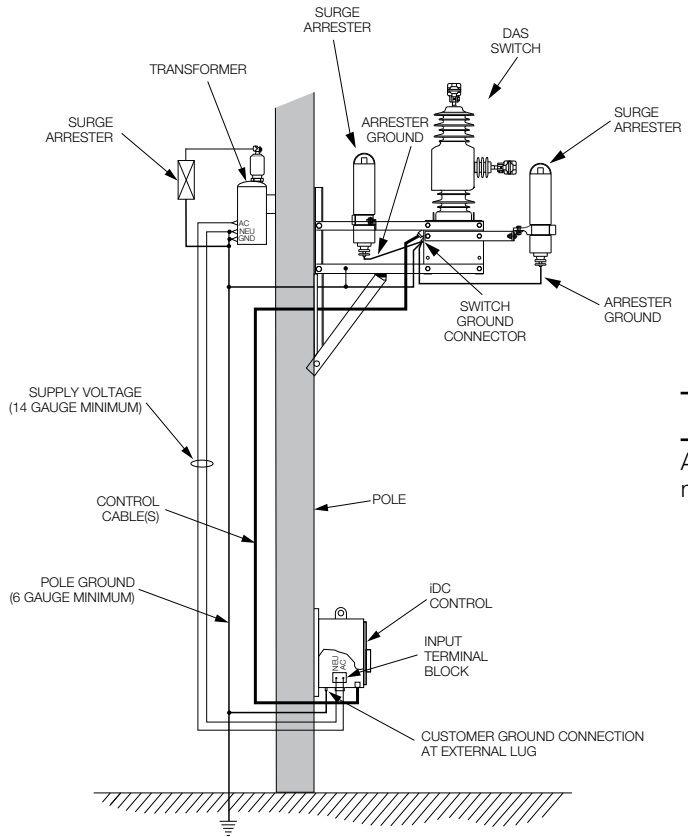
In pole-mounted applications, a ground connection must be made between the switch, transformer, switch control, and SCADA equipment for proper protection of the equipment. The pole ground must be sized per local utility practices to minimize the impedance between the switch and the control.

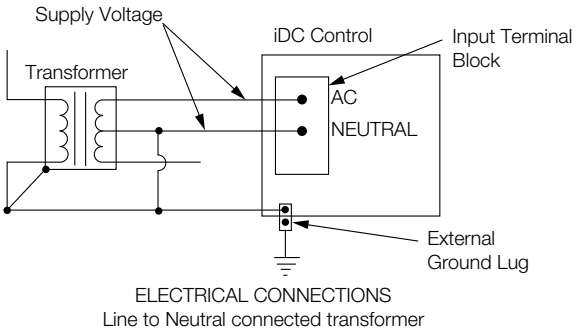
IMPORTANT

All external inputs to the iDC control must be routed within 8 inches of their corresponding ground. During a surge, a potential of approximately 1.5 kV per foot can develop in the conductors. Differences between conductor and ground path lengths can add additional stress to the control components in the event of a power surge.

3-wire ungrounded and impedance-grounded systems

The use of a grounding mat may be required depending upon the local safety regulations defining the permissible step and tough potential levels. Consult local regulations for proper grounding procedures.





IMPORTANT

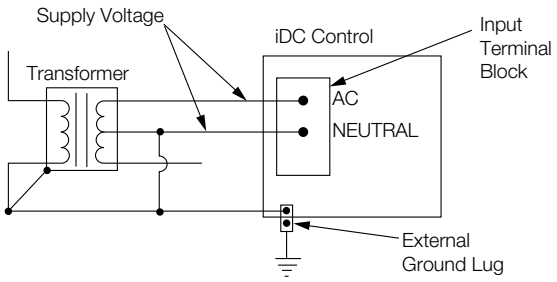
Any external voltage sensor installed with the DAS switch must have its ground referenced to the switch ground.

Figure 14. Recommended grounding method for the DAS switch with iDC control installed with local supply voltage transformer.

Grounding with a remote supply voltage transformer; 4-wire multi-grounded, 3-wire ungrounded, or impedence-grounded

Installation with a remote supply voltage transformer must include the following (refer to Figure 15):

- Protection of the switch bushings and the supplying transformer with lightning arresters.
- Grounding of the switch housing.
- Grounding of the transformer tank.
- Grounding of the control cabinet.
- Grounding of the SCADA equipment.



ELECTRICAL CONNECTIONS - Remote dedicated supply transformer

IMPORTANT

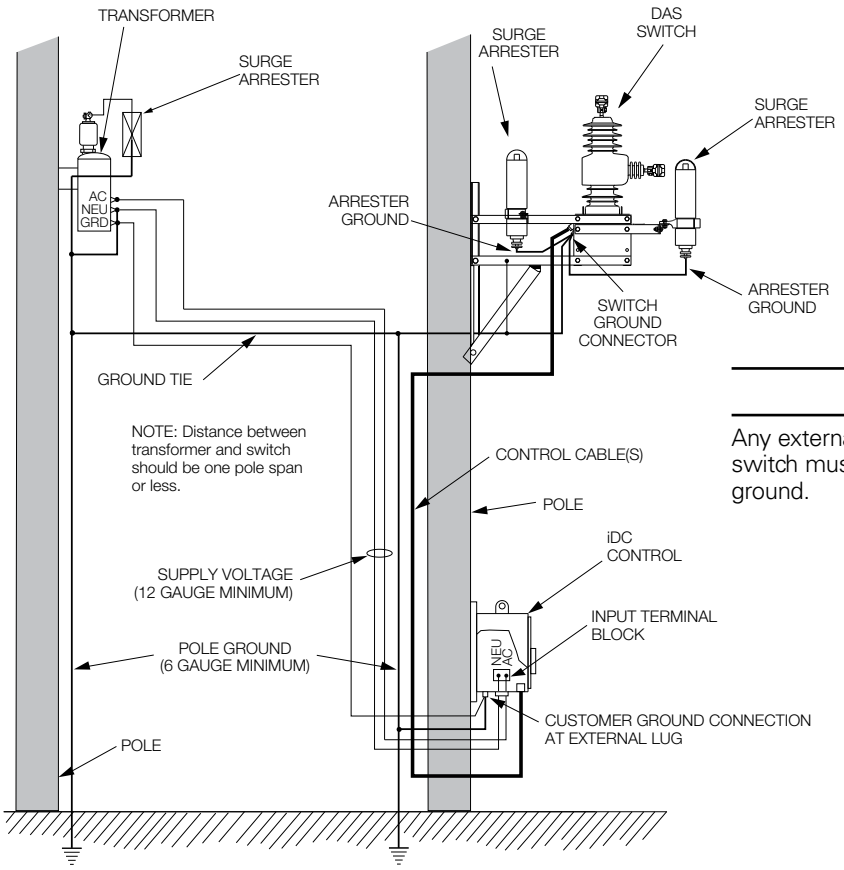
In pole-mounted applications, a ground connection must be made between the switch, transformer, switch control, and SCADA equipment for proper protection of the equipment. The pole ground must be sized per local utility practices to minimize the impedance between the switch and the control.

IMPORTANT

All external inputs to the iDC switch control must be routed within 8 inches of their corresponding ground. During a surge, a potential of approximately 1.5 kV per foot can develop in the conductors. Differences between conductor and ground path lengths can add additional stress to the control components in the event of a power surge.

3-wire ungrounded and impedance-grounded systems

The use of a grounding mat may be required depending upon the local safety regulations defining the permissible step and tough potential levels. Consult local regulations for proper grounding procedures.



IMPORTANT

Any external voltage sensor installed with the DAS switch must have its ground referenced to the switch ground.

Figure 15. Recommended grounding method for the DAS switch with iDC control installed with remote supply voltage transformer.

Grounding on a 3-wire uni-grounded system

Installation on a 3-wire uni-grounded system must include the following (refer to Figure 16):

- Protection of the switch bushings and the supplying transformer with lightning arresters.
- Grounding of the switch head and tank.
- Grounding of the transformer tank.
- Grounding of the control cabinet.
- Grounding of the SCADA equipment.

⚠ WARNING

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury and equipment damage. G102.1

⚠ WARNING

Hazardous Voltage. Use locally approved operator safety procedures for proper insulation when maintaining this equipment. High voltage step and touch potential is characteristic in uni-ground systems. Failure to comply can cause death or severe personal injury. T262.0

⚠ CAUTION

Exported Potential. Do not make direct electrical connections to remote devices. All SCADA equipment must be mounted locally or connected using the fiber-optic or radio communication accessory. Direct connections to remote devices can produce exported potential causing equipment damage or personal injury. T263.0

IMPORTANT

In pole-mounted applications, a ground connection must be made between the switch, transformer, switch control, and SCADA equipment for proper protection of the equipment. The pole ground must be sized per local utility practices to minimize the impedance between the recloser and the control.

IMPORTANT

All external inputs to the control must be routed within 8 inches of their corresponding ground. During a surge, a potential of approximately 1.5 kV per foot can develop in the conductors. Differences between conductor and ground path lengths can add additional stress to the control components in the event of a power surge.

IMPORTANT

Any external voltage sensor installed with the DAS switch must have its ground referenced to the switch ground.

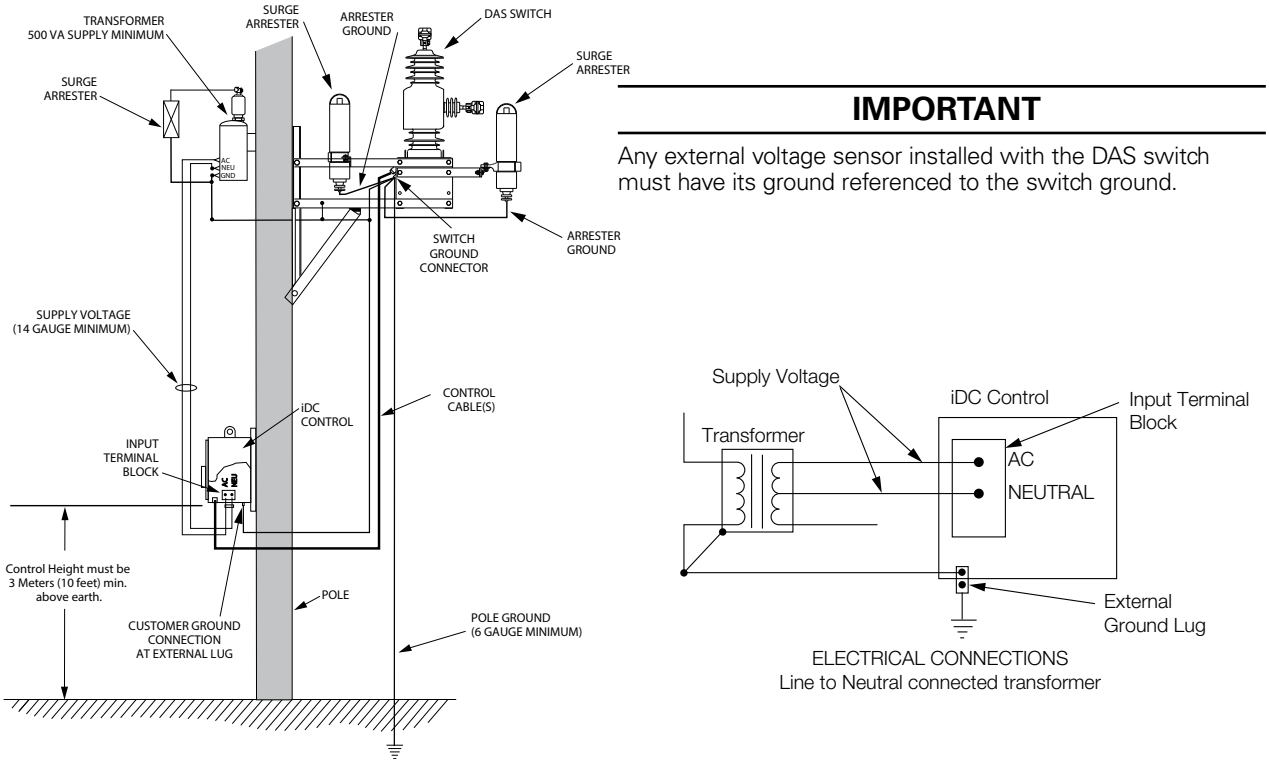


Figure 16. Recommended grounding method for DAS switch with iDC switch control installed on a 3-wire uni-grounded system.

DANGER

Hazardous voltage. Do not connect potential transformer low-voltage secondaries to the control through cables or other wiring until the unit is installed in the field. Transformer high-voltage primary windings will become live when 120/240 Vac is applied to the control from an alternate source if the transformer secondary is connected. Failure to comply may result in severe personal injury or death. T371.2

WARNING

Hazardous voltage. Before applying power to the control, confirm that male pins of the input power receptacle are electrically insulated to prevent unintentional contact with 120/240 Vac voltage. Failure to do so may result in severe personal injury or death. T372.1

CAUTION

Equipment damage. Do not drill connection holes into the top of the cabinet. Connection holes in the top of the cabinet will allow moisture to seep into the control and damage the components or cause control misoperation. Failure to comply will void the control's factory warranty. T249.0

1. **Customer Connections for AC Power.** Input power to the iDC control is connected to terminal block TB7 for single-phase power. Refer to Figure 18 for single-phase 120/240 Vac incoming supply voltage connections

   Input power is required:

   - To maintain battery charge
   - To power the thermostatically controlled heater

2. **Power Supply / Battery Charger Board.** Incoming ac power is routed to the Power Supply / Battery Charger Board designed to accept either 120 Vac or 240 Vac through a selector switch located directly on the board (Figure 17). The battery charger includes a temperature-compensated design to optimally charge the control battery. The power supply / battery charger board also includes an auxiliary power supply for connection to communication equipment (radios, modems, etc.). The auxiliary power supply is rated 28 Vdc, 65 Watts peak. A separate 28 Vdc to 13.8 Vdc power supply accessory is available for communication equipment rated for 13.8 Vdc. Some additional features are as follows:

   - Positive LED indicator for power supply presence.
   - Selectable 120/240 Vac switch for adapting to multiple transformer connections. The selector switch is factory-set based upon each customer order.
   - Self-protective fuse (5 amp, 250 Vac).

CAUTION

Equipment misoperation. Verify that the 120/240 Vac selector switch is correctly set for incoming voltage. Failure to comply may cause misoperation (unintentional operation) of the control and/or equipment damage resulting in personal injury. T278.0

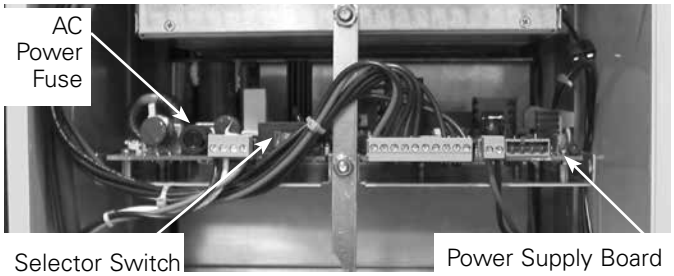


Figure 17. Power Supply / Battery Charger Board.

IMPORTANT

Prior to energizing the control, the selector switch must be set as follows:

- For 120 Vac incoming power, the selector switch must be set to the 115 V position.
- For 240 Vac incoming power, the selector switch must be set to the 230 V position.

3. **Power Connections.** Terminal block TB7 is used to bring ac power to the control. The terminal block is fit with #6 screws which allow for a maximum ring size for a #10 AWG wire. The transformer required for power should be a minimum of 1 kVA (Figure 18).

⚠ WARNING

Hazardous voltage. Before applying power to the control, confirm that male pins of the input power receptacle are electrically insulated to prevent unintentional contact with 120/240 Vac voltage. Failure to do so may result in severe personal injury or death.

T372.1

⚠ DANGER

Hazardous voltage. Do not connect potential transformer low-voltage secondaries to the control through cables or other wiring until the unit is installed in the field. Transformer high-voltage primary windings will become live when 120/240 Vac is applied to the control from an alternate source if the transformer secondary is connected. Failure to comply may result in severe personal injury or death.

T371.2

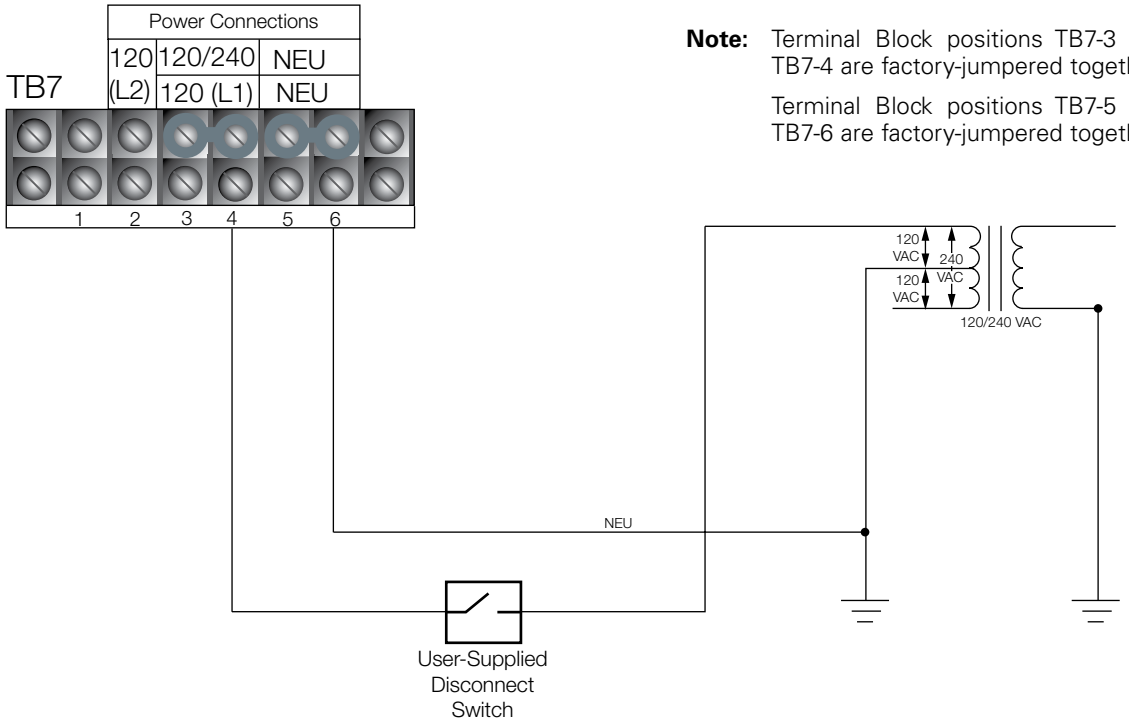
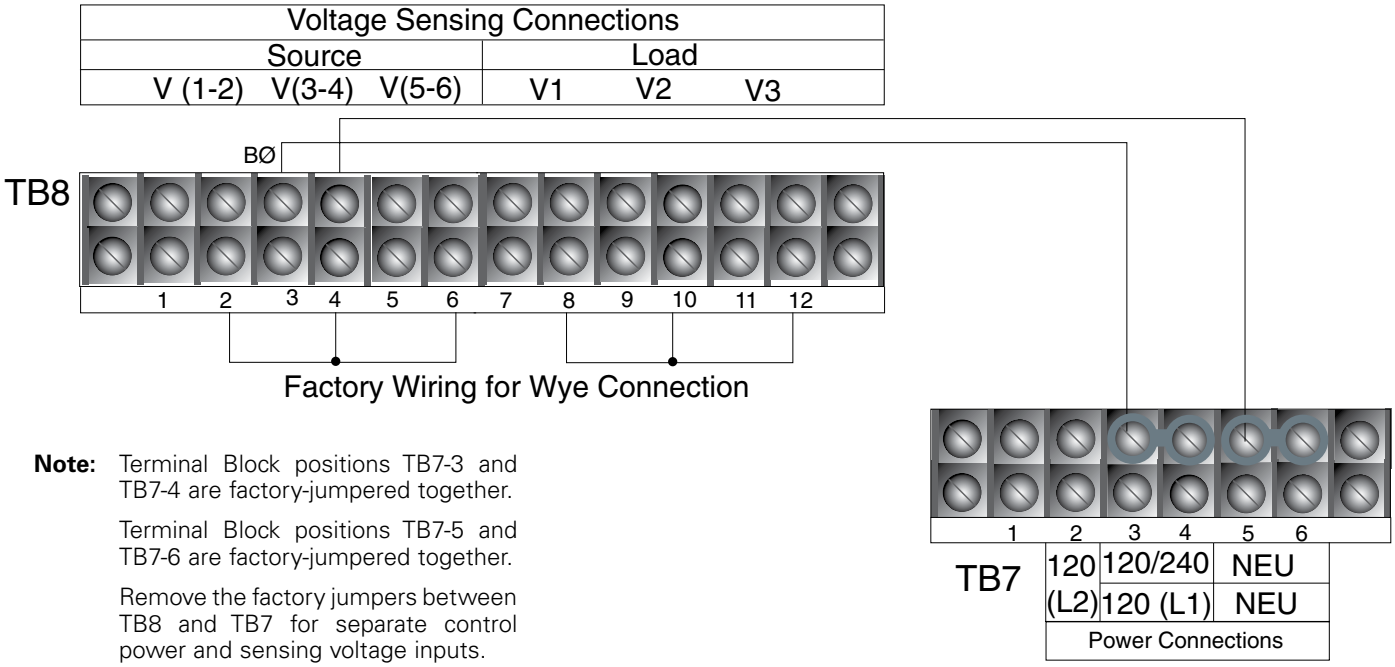


Figure 18. Single-phase 120 Vac transformer connections.



Note: Terminal Block positions TB7-3 and TB7-4 are factory-jumpered together.

Terminal Block positions TB7-5 and TB7-6 are factory-jumpered together.

Remove the factory jumpers between TB8 and TB7 for separate control power and sensing voltage inputs.

Figure 19. Default factory wiring connected to B-Phase voltage metering with B-Phase incoming supply.

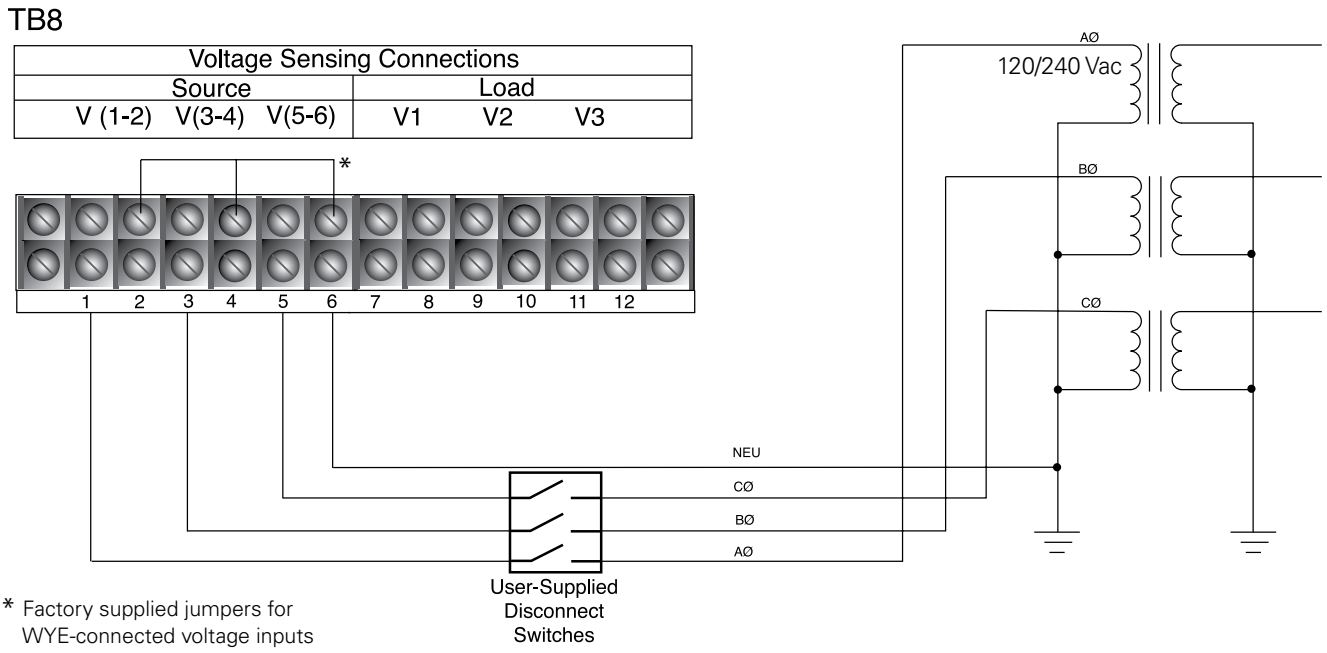
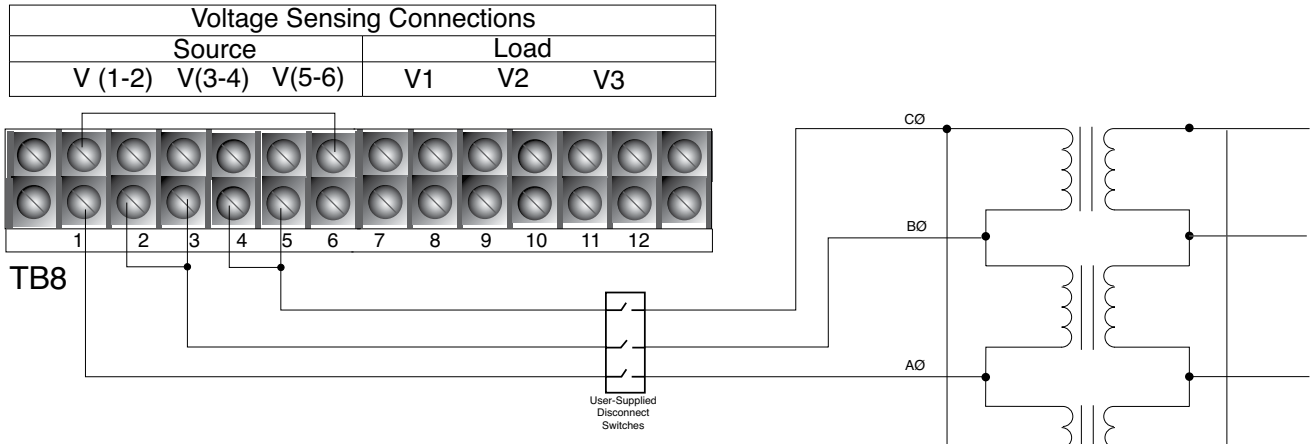


Figure 20. Three-phase transformer connection, Wye configuration for sensing only (TB8 terminal block connection).



Note: Terminal Block positions TB8-1 and TB8-6 are factory-jumpered together for Delta connection only.

Terminal Block positions TB8-2 and TB8-3 are factory-jumpered together for Delta connection only.

Terminal Block positions TB8-4 and TB8-5 are factory-jumpered together for Delta connection only.

Remove factory jumpers for Wye application.

Figure 21. Customer connections to TB8, 120 Vac Delta connection for sensing only.

Standard default supervisory input control and output status contacts

Standard customer connections TB1 and accessory customer connections are TB3 and TB4. Refer to Figures 22-24 and Tables 6, 7, and 8. The Idea Workbench software allows customization of all the control and status points.

IMPORTANT

All supervisory operation and control monitor leads must be protected within shielded cables. Refer to Figure 24.

NOTICE: External leads must be shielded and the shield must be grounded at both ends. Terminate each lead with a 320 Vac, 150 Joules metal oxide varistor (MOV), or equivalent, at the remote end. Attach MOVs between the leads and ground. Failure to properly shield and protect leads can result in equipment damage and/or unintentional operation.

Table 6. Operating Current Requirements for Standard and Optional Supervisory Inputs

Input Voltage	Nominal Current	Minimum Operating Time
12 Vdc – 250 Vdc, 120/240 Vac	2.5 mA	5 milliseconds

Table 7. Ratings Table for Output Status Contacts CO1 through CO12 (Resistive Load – Pickup Time 8 ms, Dropout 5 ms)

Input Voltage	Contact Rating
120 Vac	8 A
12 Vdc	8 A
24 Vdc	8 A
48 Vdc	1 A
125 Vdc	0.4 A

Table 8. Ratings Table for Output Status Contact SS1 (Resistive Load – Pickup Time 2 ms, Dropout 15 ms)

Input Voltage	Contact Rating
120 Vac	8 A
12 Vdc	8 A
24 Vdc	8 A
48 Vdc	8 A
125 Vdc	8 A

IMPORTANT

All supervisory operation and control monitor leads must be protected within shielded cables. Refer to Figure 24.

NOTICE: External leads must be shielded and the shield must be grounded at both ends. Terminate each lead with a 320 Vac, 150 Joules metal oxide varistor (MOV), or equivalent, at the remote end. Attach MOVs between the leads and ground. Failure to properly shield and protect leads can result in equipment damage and/or unintentional operation.

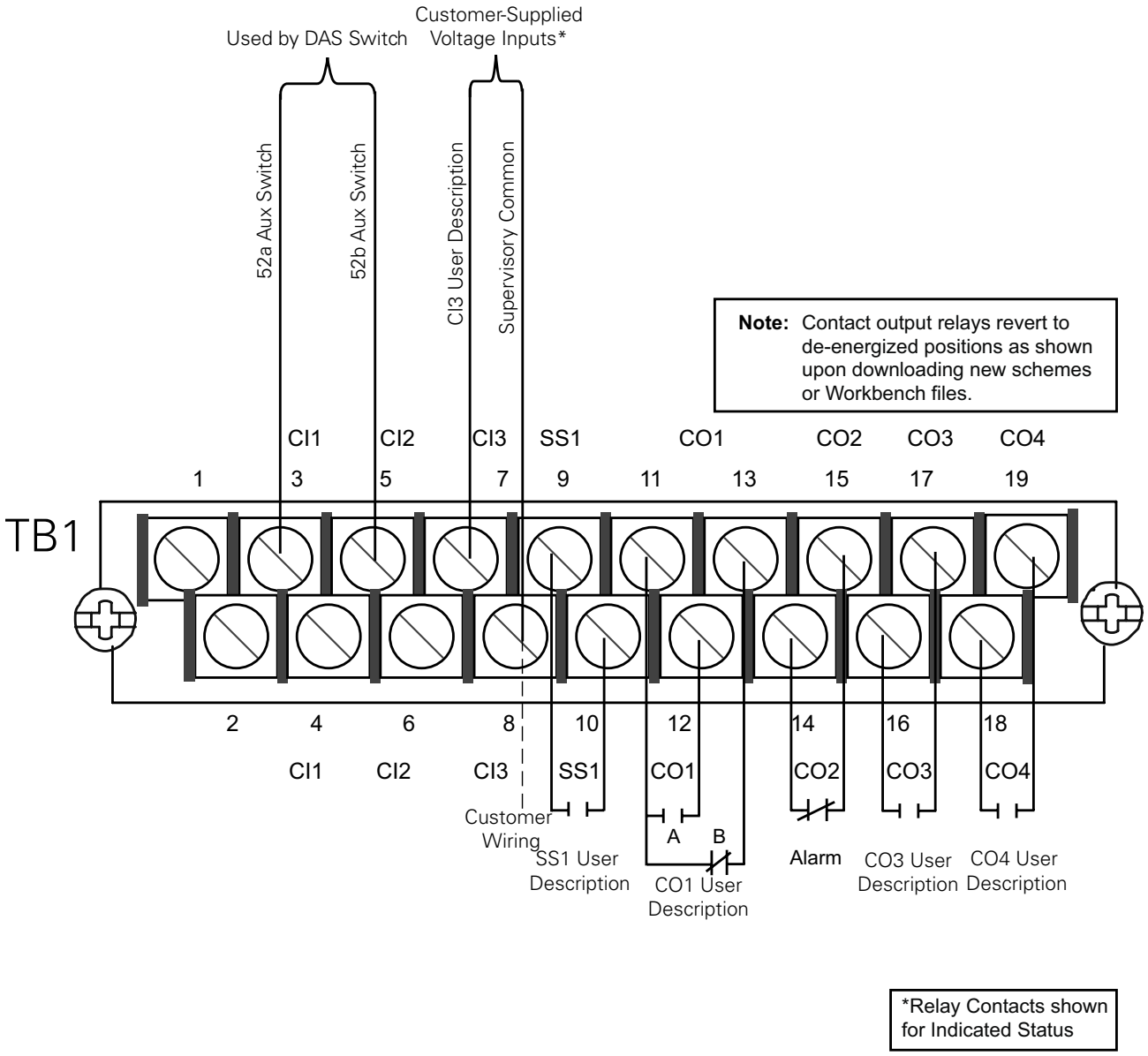


Figure 22. iDC switch control standard default supervisory input control and output status contacts.

IMPORTANT

All supervisory operation and control monitor leads must be protected within shielded cables. Refer to Figure 24.

NOTICE: External leads must be shielded and the shield must be grounded at both ends. Terminate each lead with a 320 Vac, 150 Joules metal oxide varistor (MOV), or equivalent, at the remote end. Attach MOVs between the leads and ground. Failure to properly shield and protect leads can result in equipment damage and/or unintentional operation.

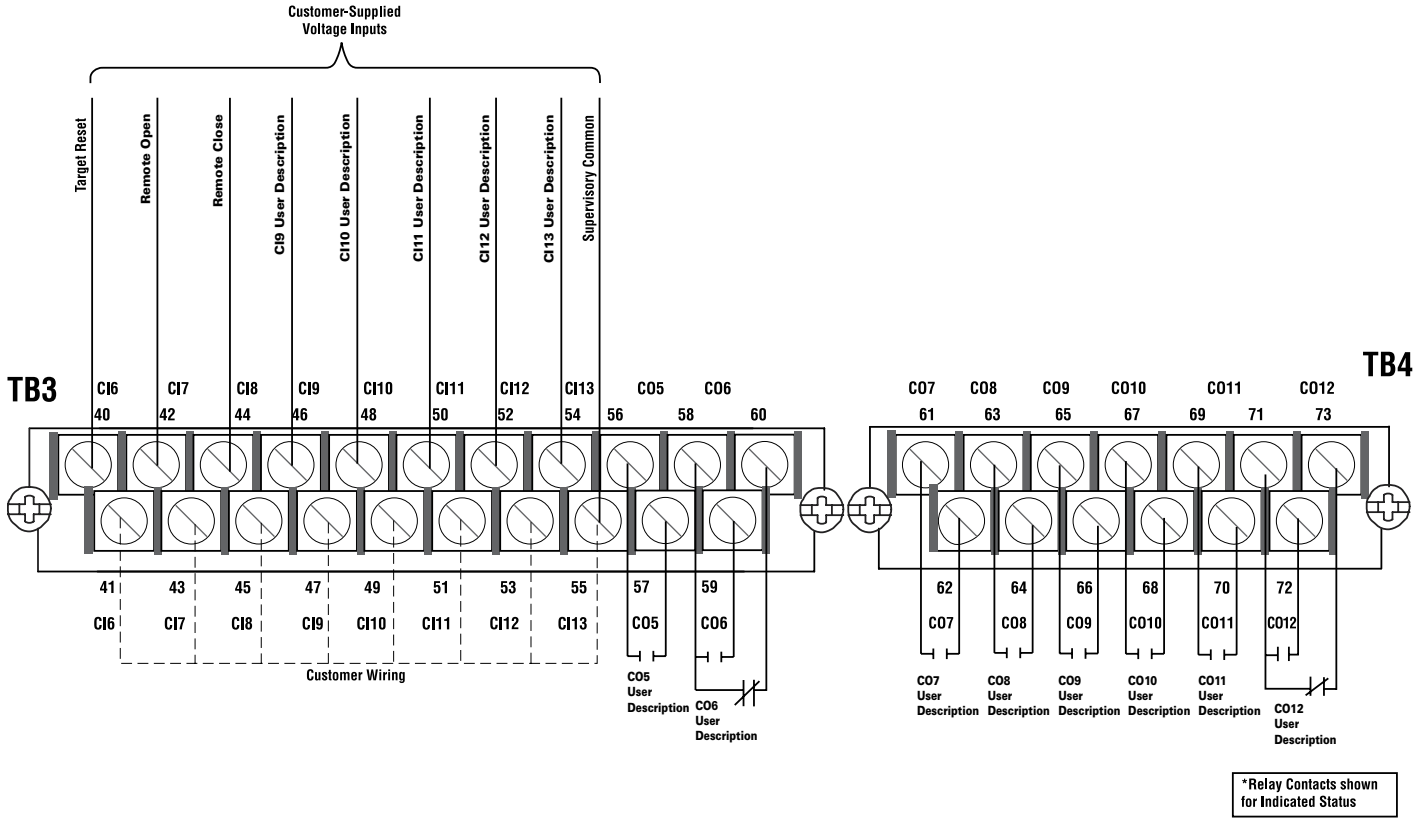
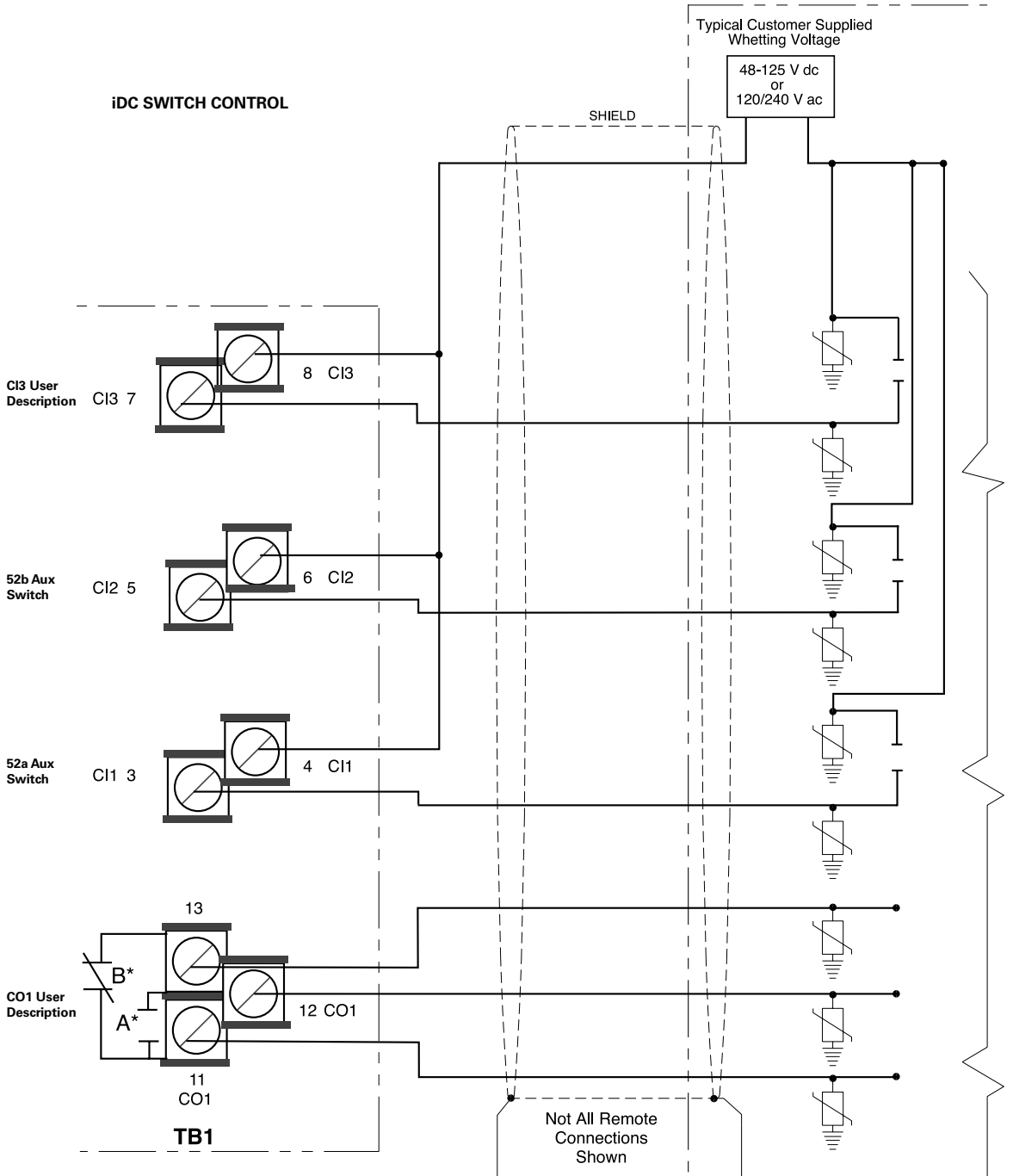


Figure 23. iDC switch control discrete interface board accessory default supervisory input control and output status contacts.



NOTES:

Arresters to be metal oxide varistors (MOVs) 320 Vac, 160 Joules or equivalent.

External lead resistance must not exceed 200 ohms.

A Single common wire can be used for multiple inputs if it is jumpered at the I/O board terminals.

Shielding for Supervisory Cables should follow the representative input control contacts and output status contacts as shown.

Supervisory and Remote Functions are default functions.

Figure 24. Shielding and surge protection for supervisory and remote cables.

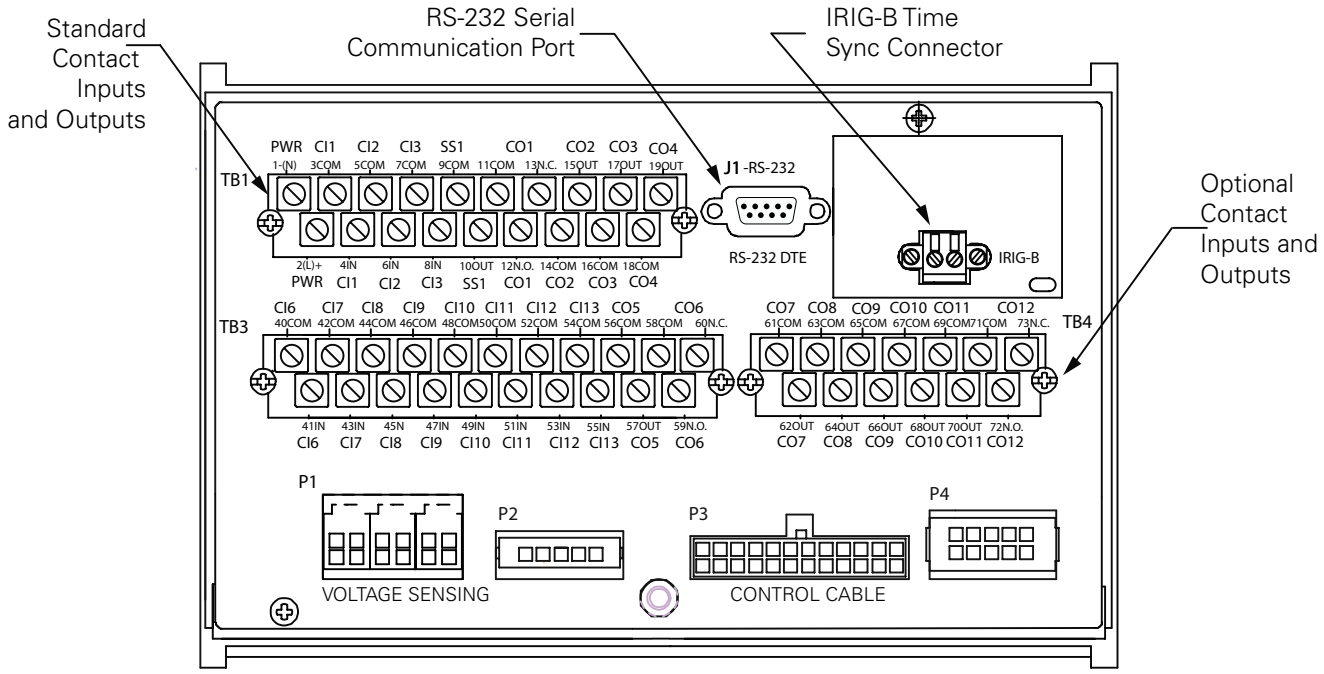


Figure 25. iDC switch control rear panel RS-232 communication ports (standard configuration).

Table 9. Rear Panel RS-232 Communication Port Pin Assignments

Pin Number	Signal Name
1 DCD	Carrier Detect
2 RXD	Receive Data
3 TXD	Transmit Data
4 DTR	Data Terminal Ready (Not Connected)
5 GND	Signal Ground
6 DSR	Data Set Ready (Not Connected)
7 RTS	Request to Send
8 CTS	Clear to Send
9 NC	Not Used
10 (Shroud)	Chassis Ground

Rear panel RS-232 communication port pin assignments

Table 9 indicates the pin assignments for the rear panel RS-232 communication port (Figure 25). Refer to Figure 26 for pin identification.

Refer to the **Accessories** section of this manual for additional communication options.

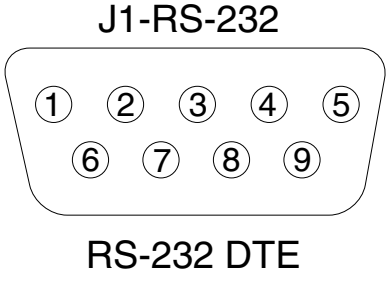


Figure 26. Rear panel RS-232 communication port pin identification.

⚠ CAUTION

Equipment misoperation. Do not connect this control to a switch until all control settings have been properly programmed and verified. Refer to the programming information for this control. Failure to comply can result in control and switch misoperation, equipment damage, and personal injury. G147.0

⚠ CAUTION

Equipment misoperation. Verify that the 120/240 Vac selector switch is correctly set for incoming voltage. Failure to comply may cause misoperation (unintentional operation) of the control and/or equipment damage resulting in personal injury. T278.0

Before Placing the Control and the Switch into Service. Prior to placing the control and switch into service, the following installation procedures must be properly completed and verified:

1. Control properly mounted for the installation.
2. Switch installed according to all locally approved standards and practices.
3. AC disconnect switches installed.
4. Control and switch properly grounded in accordance with guidelines in this manual.
5. Control and voltage sensing cable(s) properly connected and supported.
6. Verify the selector switch on the Power Supply/Battery Charger Board is set to the correct position based upon the incoming power supply:
   - For 120 Vac incoming power, the selector switch must be set to the 115 V position.
   - For 240 Vac incoming power, the selector switch must be set to the 230 V position.
7. Control battery connected and tested for proper operation.

   Note: The battery test is blocked for 30 seconds upon power-up of the control.

   Note: AC power can be either connected or disconnected for a battery test.

   Test the battery as follows:

   a. Press the BATTERY TEST button on the front panel.

   b. Press the F4 LCD function key for one second to test the battery.

      Note: This message will appear on the programming panel LCD display: ---TESTING---

      The battery test results will display in the battery metering menu.

      Note: With ac disconnected and the battery supplying the load, current will read -400 to -600 mA depending on accessories connected.
8. AC power connected to the control. (Control OK LED indicator is illuminated.)

   Note: The control Power Save feature will turn off the backlit LCD display and all LEDs if no front panel keypad is pressed within ten minutes.
9. All control programming entered and verified by appropriate personnel.

   Note: Refer to *Service Information S165-275-1 Use and Operations Manual for the iDC Sectionalizer/Switch Control* for additional information.
10. Control clock set to the correct time.

NOTICE: External leads must be shielded and the shield must be grounded at both ends. Terminate each lead with a 320 Vac, 150 Joules metal oxide varistor (MOV), or equivalent, at the remote end. Attach MOVs between the leads and ground. Failure to properly shield and protect leads can result in equipment damage and/or unintentional operation.

Using removable inserts

CAUTION

Control damage. De-energize both ac and dc power prior to removing or installing any internal connections or circuit boards in the control. Failure to comply can result in damage to the control. T241.1

CAUTION

Equipment damage. Always wear a grounding wrist strap to control static electricity before handling circuit boards. Failure to use this strap may result in circuit board damage. T253.1

The descriptive front panel inserts can be changed to accommodate assignment of new LED indicator and hot key functionalities.

1. De-energize both ac and dc power.
2. Use a screwdriver to unscrew the four front panel screws.
3. Carefully swing the keypad assembly away from the control bezel (Figure 27).

Note: Various connecting wires will keep the keypad attached to the control. Do not disconnect any of wires.

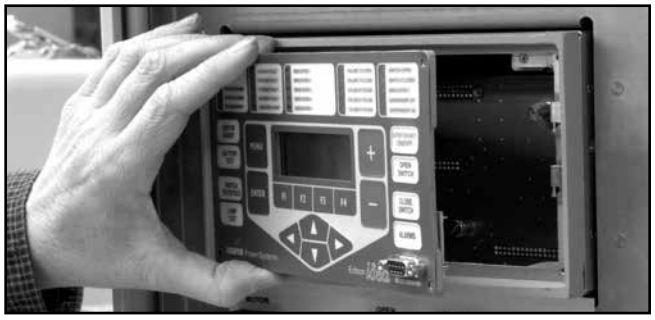


Figure 27. Opening of front panel in preparation of inserting new inserts.

4. Locate the insert to be replaced and gently pull the removable insert toward the outer edge of the front panel and away from the control (Figure 28).
5. Change the existing label or slide in a new label with the name of the new programmed option.

   An electronic label template is included on the ProView application software CD and can be accessed through the following default address: C:/ProgramFiles/Cooper/ProViewXX/iDC/iDC English Inserts.doc.

IMPORTANT

Laminate the removable inserts prior to installing. This will seal the ink/toner and avoid damage to the front panel.

6. Gently push the removable insert into the programming panel LED indicator section.

   Place the front cover panel back onto the control. Using a flathead screwdriver screw the screws into the control and tighten all hardware completely.

Figure 28. Removal of inserts from front operation panel of iDC switch control.

Control accessories

iDC switch controls are available with the following listed accessories for varying application requirements. Contact your Eaton's Cooper Power Systems representative for additional information regarding these accessories.

Incoming power receptacles

The incoming power receptacle allows the user to conveniently plug the power cable into the control, eliminating the need for hardwiring to the control. Various options are available based upon the input power voltage, and phase sensing requirements. Table 10 includes the available input receptacles and cables for the iDC switch control.

Cable locking sleeves

To prevent detachment of the cables from the control cabinet by unauthorized personnel, a cable-locking sleeve (Catalog Number KME6-1772-1) is available to enclose the cable plugs of incoming control, power and sensing cables. The plug is passed through the sleeve and the sleeve is then fastened from inside the control cabinet. There is no access to the cable receptacle without opening the locked cabinet door and detaching the sleeve.

120 Vac GFI duplex outlet

The GFI Duplex Outlet (Catalog Number KME6-1776) is available for controls powered by 120 Vac or 240 Vac three-wire supply power. This convenience outlet is rated for 15 Amperes and is accessible through the front door in the control cabinet. The 120 Vac GFI Duplex Outlet is used for many applications such as power for the auxiliary measurement equipment, supplemental lighting, and notebook computers.

Cabinet ordering accessories

- ANSI® 304 stainless steel cabinet construction
- Three point door latch

Table 10. Receptacles and Cables

Description	Catalog Number
Receptacle, 120 Vac or 240 Vac input, 2-pin	KME6-1775-H
Receptacle, 120 Vac input, 3-pin	KME6-1775-J
Input Cable, 120 or 240 Vac, 2-wire for 2-pin input, for use with KME6-1775-H receptacles Replace X with desired length. Select from 10 to 80 feet.	KA11ME1-X
Input Cable, 120 Vac, 3-wire for 3-pin, input for use with KME6-1775-J receptacles. Replace X with desired length. Select from 10 to 80 feet.	KME4-67-3-X

Discrete interface board (DIF) option accessory

A Discrete Interface Board Option accessory provides eight configurable input control contacts and eight configurable output status contacts (Figure 29). The ordering options include: Standard 3 inputs / 5 outputs (1 input / 4 outputs are user configurable), or an additional 8 inputs / 8 outputs for a total of 11 inputs / 13 outputs (9 inputs / 12 outputs are user configurable).

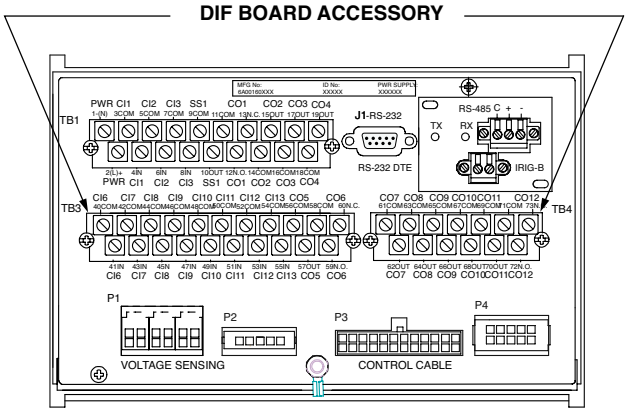


Figure 29. iDC switch control discrete interface board accessory.

Radio mounting accessory

The radio mounting accessory (Figure 29) is powered from a voltage regulated power supply factory-calibrated with an output of 13.8 Vdc.

Note: This output cannot be field-calibrated.

The radio will continue to operate during the loss of ac power as long as power is supplied from the battery. The power supply is designed to provide up to 40 Watts (peak) and is fused to isolate any potential radio problems without disturbing the operational features in the iDC switch control. Refer to Table 11.

Contact your Eaton's Cooper Power Systems representative for any additional voltage requirements.

Table 11. Radio Mounting Accessories

Description	Catalog Number
Full Automation accessory 12 Vdc radio provision (Radio and fiber-optic/RS-232 interface not included)	KME6-1774-3
Automation accessory (bracket only) 12 Vdc provision	KME6-1774-2

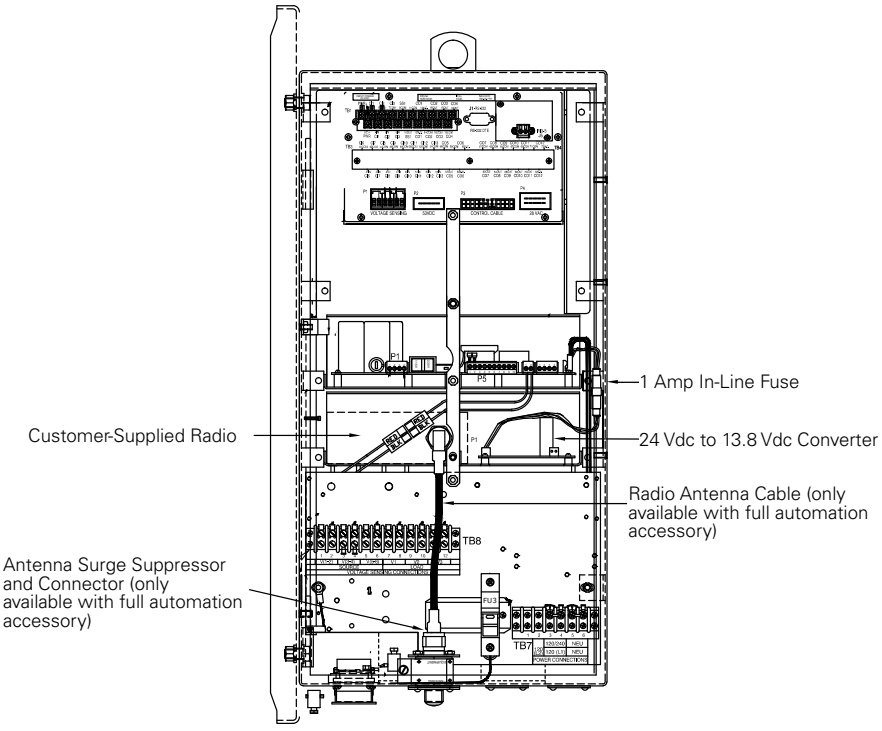


Figure 30. iDC switch control radio mounting accessory.

Communication board accessories

The iDC switch control is equipped with a Communication Board Accessory (expansion bay) offering versatile support for modern communication media. Seven distinct communication options (Figure 31) are available, providing two-way, real time digital communications with a remote terminal unit (RTU), wireless, telephone modem, Ethernet network, or other communication devices. The following options are available:

- No auxiliary communication card installed standard)
- RS-485 (isolated) Serial communication card
- Fiber-optic-based Serial Communication Card (ST)
- 10/100 Base-T dual Ethernet communication card (2 * RJ-45)
- 100 Base-FX dual Ethernet communication card (2 * MT-RJ)
- 10/100 Base-T, 100 Base-FX Ethernet communication card (RJ-45 + MT-RJ)
- 100 Base-FX dual Ethernet communication card (2 * LC)

The expansion bay based Communication Board Accessory concept offers high versatility with respect to communication medium and protocol support. Additional accessories are being continuously developed. Contact your Eaton's Cooper Power Systems representative for the latest information regarding particular media and communication protocol support.

RS-485 serial communication card

The RS-485 serial communication card accessory provides means for establishing asynchronous link-based digital communications with the iDC switch control. The Galvanic isolated (1000 Vdc) RS-485 port uses a single shielded twisted pair connection and can support 16 devices in multi-drop configuration. Communication speed is controlled through software and can be set at: 1200, 2400, 4800, 9600, 19.2 k, 38.4 k, 57.6 k, and 115 kBPS.

Digital communications must be programmed through the Communications Workbench to ensure proper operation of the RS-485 communication card accessory. Refer to *Service Information S165-275-1 Use and Operations Manual for the iDC Sectionalizer / Switch Control* for additional protocol support information.

Fiber-optic based serial communication card

The Fiber-Optic based Serial Communication Card offers means of establishing asynchronous (RS-232 like) digital communications through multi-mode fiber media. The use of the fiber-optic based serial communication card accessory can enhance communication reliability, and provides excellent electrical isolation thus protecting transmitted data from extraneous electrical interference.

A pair of industry standard ST type fiber-optic connectors are mounted on the back of the board enabling customer connection to a digital communication system using fiber-optic cables (customer-supplied).

The fiber-optic link has separate receive (RX) and transmit (TX) ports operating at 820 nm. Typical transmission distance is 2000 m with 62.5/125 µm multi-mode fiber. Consult your Eaton's Cooper Power Systems representative for availability of long haul and single mode fiber solutions. Link communication speed is controlled through software and can be set at: 1200, 2400, 4800, 9600, 19.2 k, 38.4 k, 57.6 k, and 115 kBPS.

The fiber-optic accessory must be programmed through the Communications Workbench for the appropriate protocol. Refer to *Service Information S165-275-1 Use and Operations Manual for the iDC Sectionalizer / Switch Control* for additional information.

The fiber-optic based serial accessory includes TX and RX indicating LEDs for verifying communications along with an echo / non-echo switch for supporting ring / star fiber topologies.

When operated in a ring configuration, the toggle switch must be set in the ECHO position. In this mode, the fiber-optic card will repeat (pass through) all messages received on the RX fiber, and will respond to the Master station by first echoing the incoming command and then sending the response. This arrangement is best suited for creation of low cost multi device fiber loops. For reliable communications, the fiber loop system requires that all devices in the loop remain powered at all times, thus enabling unobstructed flow of information throughout the loop.

A more resilient system can be designed by using the fiber-optic ports in a point-to-point or multiple point-to-point (star) configuration. For this mode, the toggle switch must be set in the NON-ECHO mode. The iDC switch control will respond to the Master station by sending a response only (total separation of Receive and Transmit fibers). Additional hardware (fiber-optic star coupler) is required to support the multiple point-to-point device configurations.

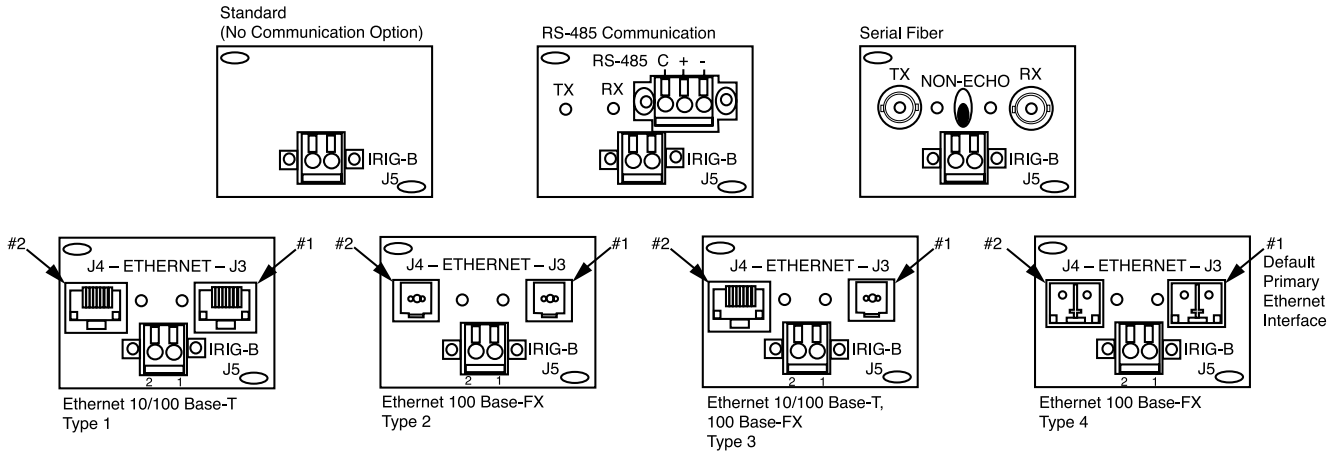


Figure 31. Back panel Ethernet and communication options.

Ethernet communication cards

The Ethernet communication card accessory brings the Ethernet network connectivity to the iDC switch control platform. It is highly flexible, offering simultaneous support for multiple sessions, device management (ProView over TCP/IP) and SCADA communications (DNP3 over TCP/IP).

By natively supporting a set of widely accepted industry standards (TCP/IP, UDP/IP, OSI) the Ethernet communication accessory ensures seamless interoperability with other network devices.

The Ethernet communication card accessory is offered in 3 physical layer configurations (twisted pair and optical-fiber options) as shown in Table 12.

Maximum link length is determined by the use of the particular physical layer implementation, and can be further constrained by the actual network configuration. In case of the 100 Base-FX MT-RJ connector based implementation, maximum link length in excess of 2000 m can be achieved with 62.5/125 µm multi-mode fiber. The fiber-optic link uses 1300 nm wavelength, and can easily be interfaced to other 100 Base-FX solutions (ST connector patch cord solution).

The Ethernet communication accessory card (Figure 31) is equipped with two physical ports configured to act as primary and standby LAN connections. Availability of the backup communication port enables creation of highly redundant Ethernet networks thus increasing the overall system reliability.

Note: Under normal network conditions, all communications will be channelled through the primary port (#1, Figure 31), with the standby port either logically disabled, or configured for fast automatic throw-over in case of the primary Ethernet link failure. Refer to *Service Information S165-275-1 Use and Operations Manual for the iDC Sectionalizer / Switch Control* for additional Ethernet accessory configuration information.

Table 12. Ethernet Communication Card Configurations

Type	Card Configurations	Output Connectors	Communication Speed
1	10/100 Base-T	2 * RJ-45	10/100 MBps (auto switching)
2	100 Base-FX (multi-mode fiber)	2 * MT-RJ	100 MBps (full duplex)
3	10/100 Base-T, 100 Base-FX	RJ-45 + MT-RJ	10/100 MBps and 100 MBps
4	100 Base-FX (single-mode fiber)	2 * LC	100 MBps (full duplex)

Switch options and accessories

Internal voltage sensing option

Installation

⚠ WARNING

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury, and equipment damage. G102.1

⚠ WARNING

Hazardous voltage. Always use a hotstick when working with this equipment. Failure to do so could result in contact with high voltage, which will cause death or severe personal injury. G108.1

⚠ WARNING

Hazardous voltage. Solidly ground all equipment. Failure to comply can result in death, severe personal injury, and equipment damage. T223.2

IMPORTANT

Disconnect switches for ac control power are necessary to isolate the control for testing and servicing.

⚠ WARNING

Hazardous voltage. If terminal connections are reversed, the internal voltage sensing option may indicate zero voltage with the contacts open. Do not rely on internal voltage sensing to ensure that the voltage is zero and the line has been de-energized. Always follow proper safety practices and use a separate detection method to verify a de-energized condition. Failure to do so can result in contact with high voltage, which will cause death or severe personal injury. T365.0

CAUTION

Equipment damage may occur if torque values are exceeded. T370.0

The internal voltage sensors use a resistive voltage divider to provide a low-voltage input to the DAS switch control.

Refer to the **Switch Installation Procedure** section of this manual for information on the DAS switch installation procedure.

- Refer to *Service Information S165-275-1 Use and Operations Manual for the iDC Sectionalizer / Switch Control* for further information on installing the iDC control.

Make voltage-sensing-option connections when installing the control as indicated in these Service Information manuals.

Verify correct grounding of the DAS switch and control prior to making any high-voltage connections and before high-potential testing. A proper ground connection consists of a good electrical ground connection to the surge ground connector located on the mechanism housing. Provide a good electrical ground connection to the control cabinet ground.

Note: Painted surfaces of the mechanism housing may prevent a ground connection to the switch housing. Always provide a good electrical connection to the mechanism surge ground connector.

Poor grounding of the mechanism housing may result in the presence of high voltage on the mechanism housing associated with the high-voltage resistor connections used with internal voltage sensing.

To ensure proper installation of this cable, securely fasten the aluminum cable coupler ring.

The switch is equipped with a 4-pin female receptacle (Figure 32) that connects to the control with a shielded, 4-conductor cable. The control accessory includes a 4-pin male receptacle on the control and appropriate circuitry; refer to Figure 33.

⚠ CAUTION

Hazardous voltage. Do not touch the receptacle connections of the control/voltage-sensing cable. If the switch is energized and the control/voltage-sensing cable is disconnected from the recloser or the control, a voltage clamped at 250 Vac will be present at the receptacle. Contact with this voltage can result in personal injury. T379.0

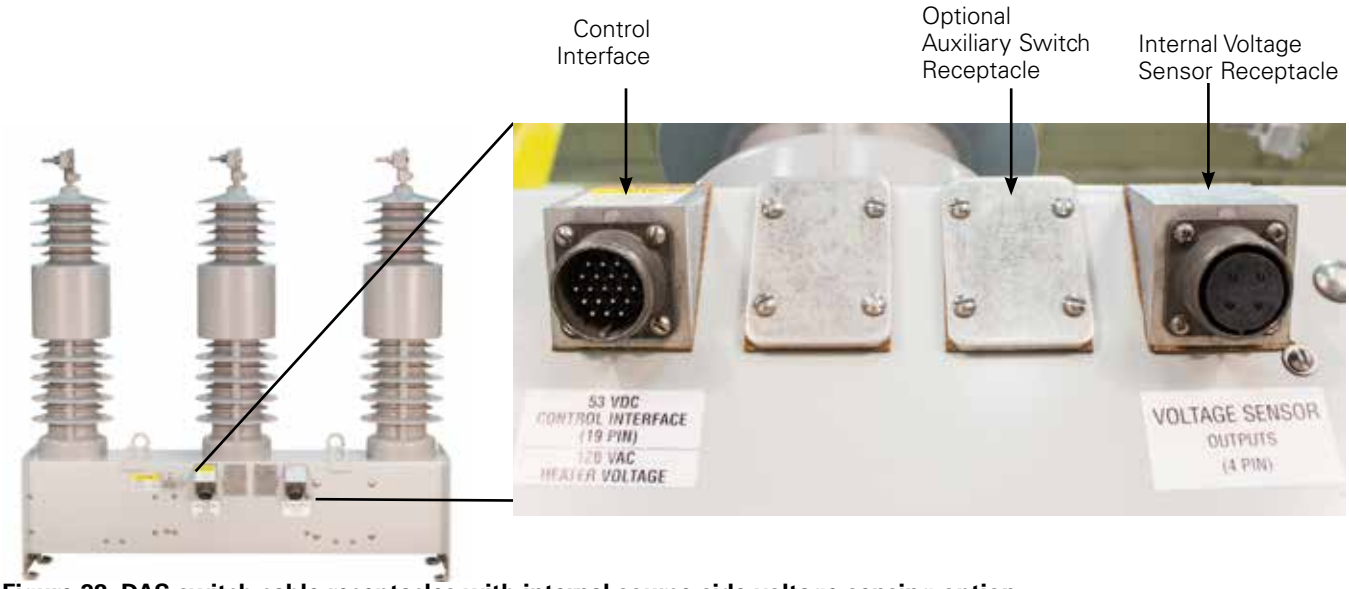


Figure 32. DAS switch cable receptacles with internal source-side voltage sensing option.

CAUTION

Equipment misoperation. Verify all connector pins and both mating interface surfaces are clean and dry before connecting cables. Voltage sensing errors can result from contamination. Failure to comply can result in control and recloser misoperation. G142.0

The electrical connectors of the switch, control, and cable must be clean and dry. Contaminated surfaces may be cleaned with denatured alcohol and wet connector surfaces may be dried with a heat gun. Dry surfaces are particularly important for the internal voltage sensor cable connections. The accuracy of the sensors can be influenced by moisture contamination.

⚠ CAUTION

Equipment misoperation. Do not connect this control to an energized switch until all control settings have been properly programmed and verified. Refer to the programming information for this control. Failure to comply can result in control and switch misoperation, equipment damage, and personal injury. G147.0

Connect control cables, power cables, and sensor cables to the control. Verify that the proper cable/receptacle connections are made. Improper cable connections can result in damage to the recloser and/or control.

Complete the control programming before making the high-voltage line connections. Refer to the **Control Operation** section of this manual. Verify the correct voltage rating of the equipment. Verify the correct control programming for ratio and phase angle correction for the voltage rating of the equipment.

Make appropriate electrical connections to the terminals of the switch. Verify the correct load-side (vertical bushings) and source-side (horizontal bushings) terminal connections. This is required for correct operation of the internal voltage sensor. Energize switch and confirm the voltage outputs in the control.

When the switch is energized, the voltage sensing output signal to the control is approximately 6 V (depending on the primary voltage). If the sensor cable is disconnected at either the control or the recloser, the voltage sensing output signal is 250 Vac. The receptacles on both the DAS switch and the voltage sensing cable (control end) are female connectors to minimize accidental contact with the voltage sensor outputs. The switch control input impedance to the voltage sensors lowers the voltage to 6 V during normal operation.

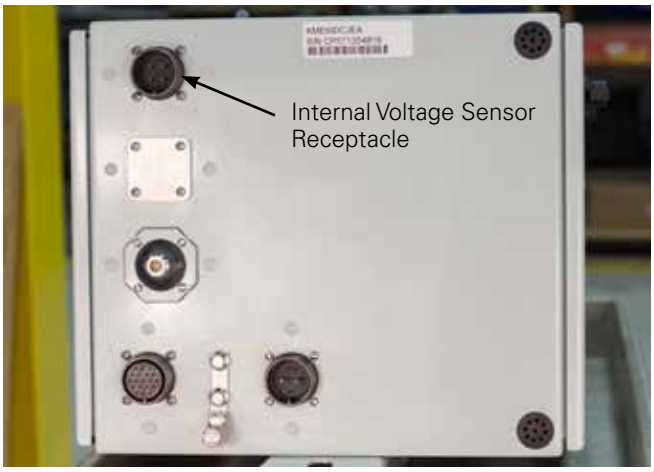


Figure 33. iDC control internal voltage sensor receptacle.

Table 13. Adjusted Voltage Sensor Ratio/PT Ratio

Switch	iDC PT Ratio
DAS15	1100:1
DAS27	2200:1
DAS38	2200:1

Table 14. Phase Angle Adjustment

	Phase Shift, iDC Control		
Voltage Sensor Cable Length*	DAS15	DAS27 and DAS15 with Extended BIL	DAS38 and DAS27 with Extended BIL
3.05 m (10 ft.)	-177.8°	-176.0°	-174.2°
6.10 m (20 ft.)	-177.0°	-175.2°	-173.4°
9.15 m (30 ft.)	-176.2°	-174.4°	-172.6°
12.2 m (40 ft.)	-175.4°	-173.6°	-171.8°
15.25 m (50 ft.)	-174.6°	-172.8°	-171.0°

* Maximum cable length is 15.25 m (50 ft.).

Note: For iDC controls, the phase shift is adjusted +0.8° for each additional 3.05 m (10 ft.) of cable.

iDC control settings

The iDC control must be programmed with a PT ratio and a phase angle adjustment; refer to Tables 13 and 14. These are entered in the System Configuration screen (Figure 34).

When programming the iDC control, the PT connection must be set for a Wye connection. Also, the Phantom Phase feature must be disabled.

- Refer to *Service Information S165-275-1 Use and Operations Manual for the iDC Sectionalizer / Switch Control* for more information on programming the iDC control.

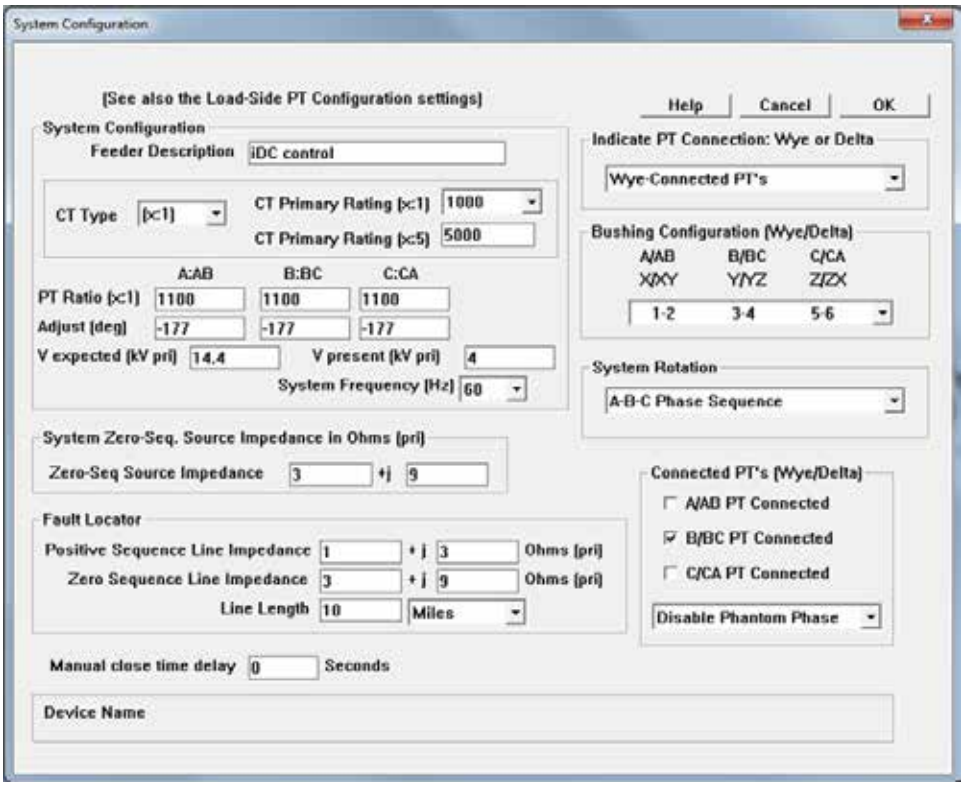


Figure 34. iDC control System Configuration screen.

Wiring for control status

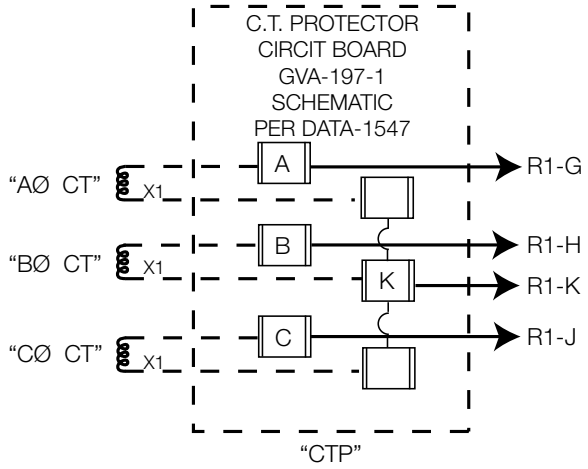
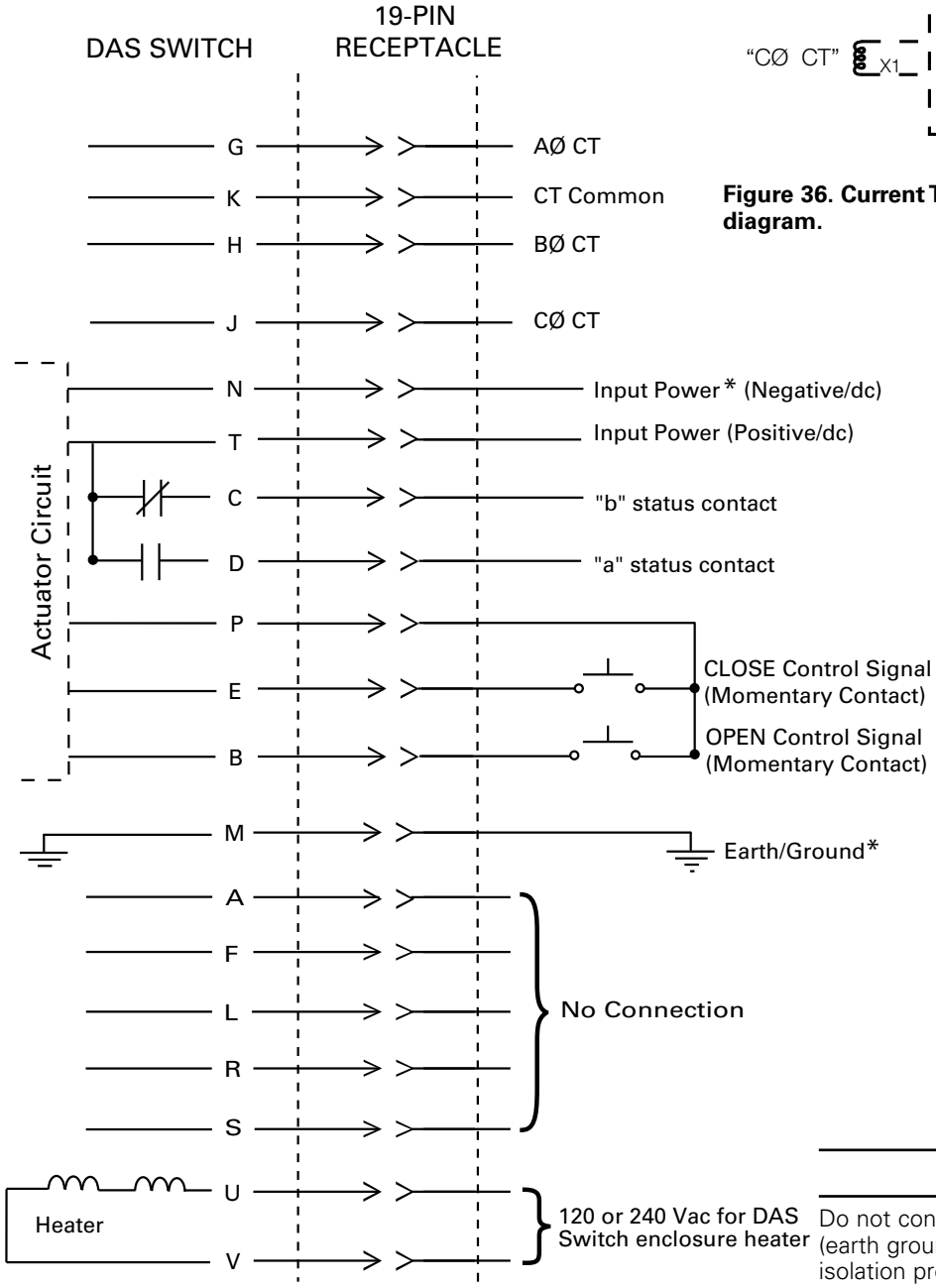
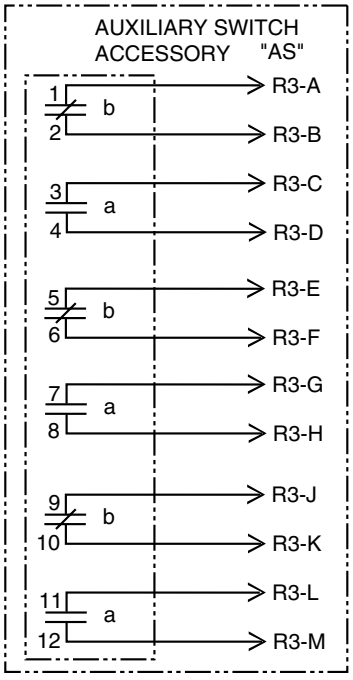


Figure 36. Current Transformer Protector Board diagram.





IMPORTANT

Do not connect pin N (negative/dc) to pin M (earth ground). Doing so will disable surge isolation protection.

Figure 35. DAS Switch 19-pin receptacle and auxiliary switch accessory diagram.

Switch accessories

Auxiliary switch

A three-stage auxiliary switch can be provided as an accessory. Each stage has two independent contacts that permit any desired combination of "a" (follow state of switch main contacts) and "b" (opposite switch main contacts) positions. The switch contacts are insulated for 600 V and have a continuous current rating of 10 A. Their interrupting ratings are shown in Table 15. Refer to *Service Information S165-275-1 Use and Operations Manual for the iDC Sectionalizer / Switch Control* for other available status output contacts.

Pole-mounting hanger

A simple pole-mounting hanger (see Figure 37), that bolts directly to the switch frame, provides a strong, clean, and uncluttered pole-mounting installation.

Table 15. Auxiliary Switch Interrupting Ratings

Volts	Inductive ac (amps)	Non-Inductive ac (amps)	Inductive dc (amps)	Non-Inductive dc (amps)
24	–	–	15.0	20.0
48	–	–	7.5	10.0
120	60	80	–	–
125	–	–	1.5	2.0
240	30	60	–	–
250	–	–	0.45	0.5

Terminals

The standard terminal is an eyebolt, 1/0–500 mcm (630 A). Eyebolt 4/0–1000 mcm (800 A), 2-hole (630 A) and 4-hole (800 A) flat pad and stud type (800 A) terminals are available as an accessory. Recommended torque value for bushing terminal-to-line connection is 35-37 ft•lbs.

CAUTION

Equipment damage may occur if torque values are exceeded. T370.0

Terminal Options	A mm (in.)
Eyebolt, 1/0 - 500 mcm Cable Range (630 A maximum)	80 (3.25)
Eyebolt, 4/0 - 1000 mcm Cable Range (800 A maximum)	108 (4.25)
Flat Pad, 2-hole (630 A)	114 (4.5)
Flat Pad, 4-hole (800 A)	121 (4.75)
Stud Type, 1.125 - 12 threads (800 A maximum)	82 (3.25)

Note: All dimensions are mm (inches).Dimensions shown are approximate.

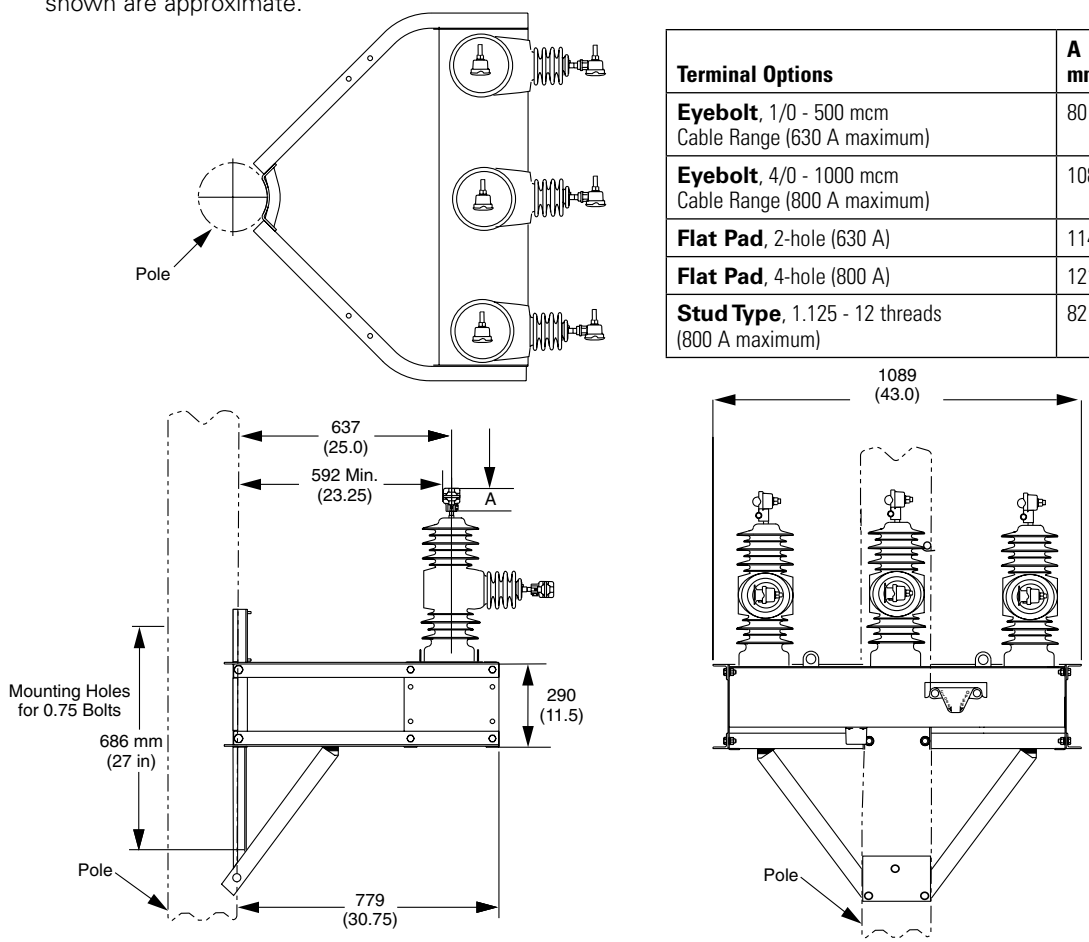
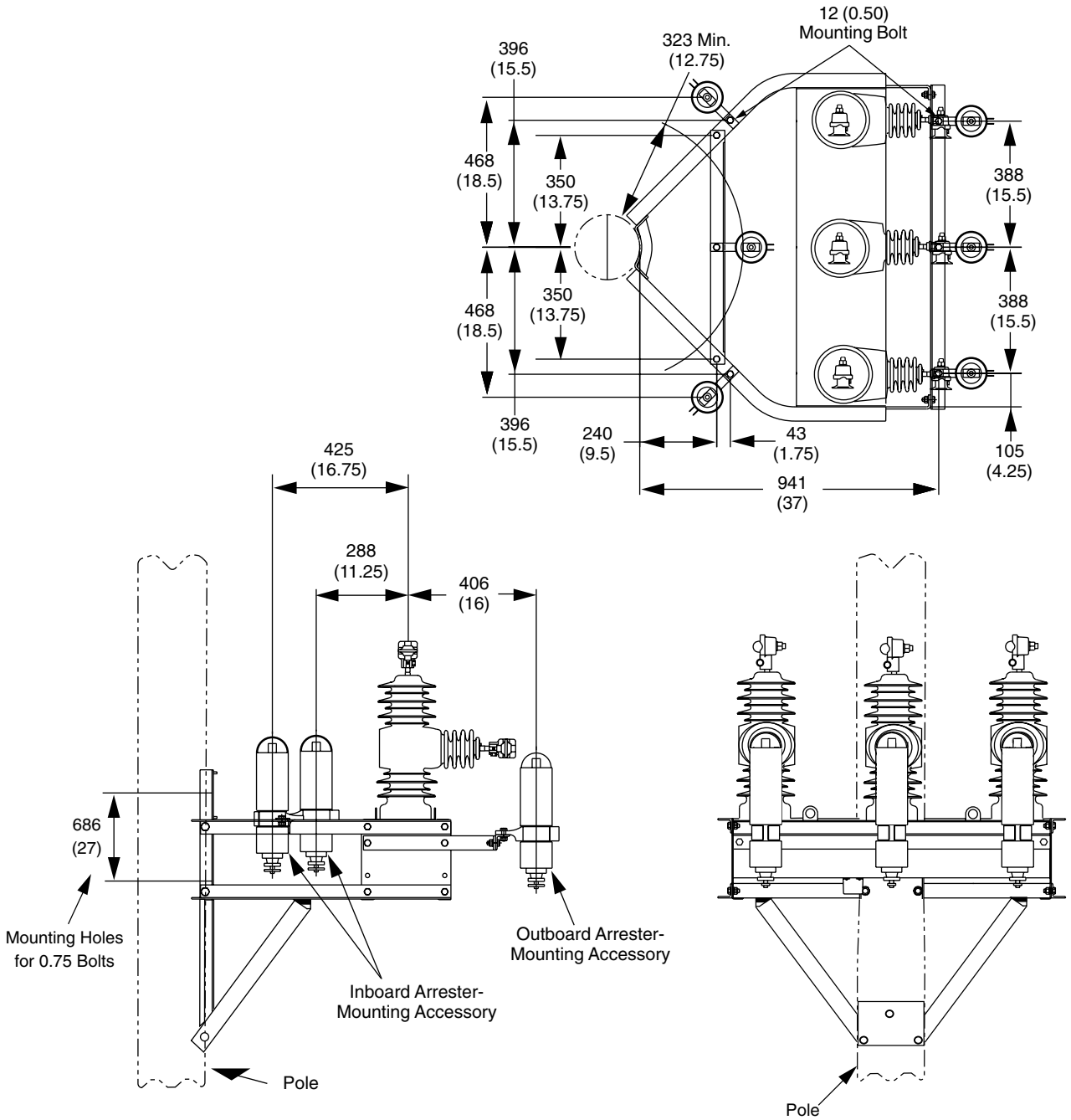


Figure 37. Dimensions of DAS switch with pole-mounting hanger accessory.

Arrester mounting frame

The arrester mounting bracket accessory (Figure 38) can be bolted to the switch frame and pole-mounted hanger for the addition of inboard and outboard arresters. The arresters are not included with the brackets.

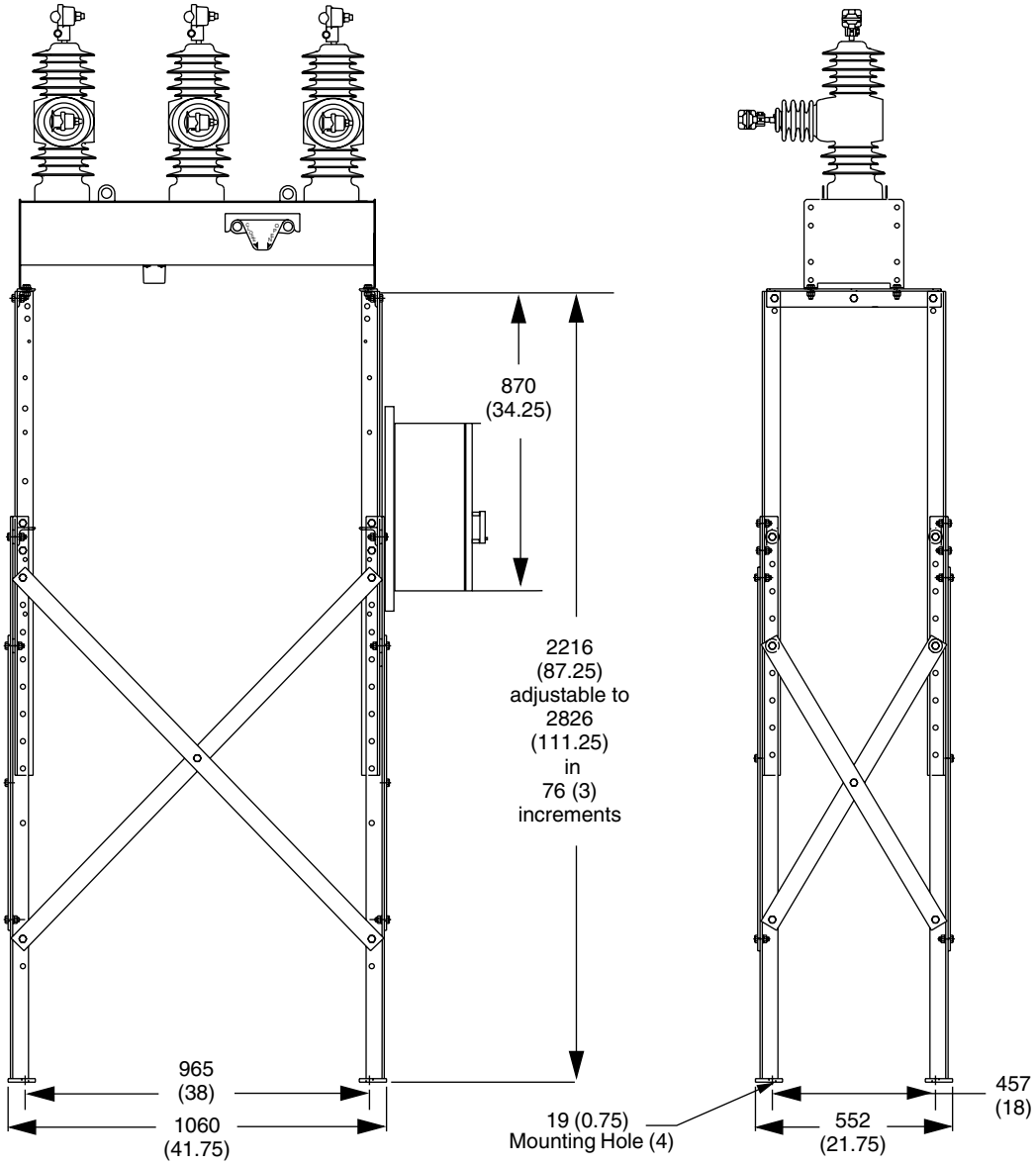


NOTE: All dimensions are mm (inches).
Dimensions shown are approximate.

Figure 38. Dimensions of DAS switch with pole-mounting hanger and arrester mounting bracket accessories.

Substation mounting frame

A substation mounting frame accessory (Figure 39) is available for substation mounting applications.



NOTE: All dimensions are mm (inches).

Dimensions shown are approximate.

Figure 39. Dimensions of DAS switch with substation mounting frame accessory.

Service information

Service requirements

The DAS switch has been designed with a minimum mechanical life of 10,000 operations. The DAS switch requires routine inspection to check for physical damage and verify proper operation.

Frequency of inspection

Because these switches are applied under widely varying operating and climatic conditions, service intervals are best determined by the user based on actual operating experience. However, solid-insulated, vacuum interrupting switches should be inspected every ten years.

The switch control 24 Vdc battery has a life expectancy of four years. It is recommended that the battery be replaced after four years or if the battery fails a battery test (after sufficient recharge time) - whichever occurs first.

High-potential withstand testing

⚠ WARNING

Hazardous voltage. The switchgear (apparatus and control) and high-voltage transformer must be in a test cage or similar protected area to prevent accidental contact with the high-voltage parts.

Solidly ground all equipment. Failure to comply can result in death, severe personal injury, and equipment damage. T221.5

⚠ CAUTION

Radiation. At voltages up to the specified test voltages, the radiation emitted by the vacuum interrupter is negligible. However, above these voltages, radiation injurious to personnel can be emitted. See *Service Information S280-90-1, Vacuum Interrupter Withstand Test Voltage Rating Information* for further information. G109.2

Use the following procedures to perform high-potential withstand tests at 75% of the rated low-frequency withstand voltage for 60 seconds. See Table 16 for test voltages.

Table 16. DAS Switch Vacuum Interrupter Withstand Test Voltage Ratings Information

Description	75% of Rated Low-Frequency Withstand Voltage (1 minute dry) (kV rms)
DAS15	37.5
DAS27	45.0
DAS38	52.5

Test 1

1. Close the switch contacts.
2. Ground the switch.
3. Connect terminals 2, 4, and 6 (see Figure 10) together.
4. Apply proper test voltage (see Table 16) to terminals 2, 4, and 6.
5. The switch should withstand the test voltage for 60 seconds.

Test 2

1. Close the switch contacts.
2. Ground the switch.
3. Ground Phase A (terminal 2) and Phase C (terminal 6).
4. Apply proper test voltage to Phase B (terminal 3).
5. The switch should withstand the test voltage for 60 seconds.

Test 3

1. Open the switch contacts.
2. Ground the switch.
3. Connect and ground terminals 1, 3, and 5 (see Figure 10).
4. Connect terminals 2, 4, and 6.
5. Apply proper test voltage to terminals 2, 4, and 6.
6. The switch should withstand the test voltage for 60 seconds.
7. Reverse the connections: ground terminals 2, 4, and 6.
8. Apply test voltage to terminals 1, 3, and 5 for 60 seconds.
9. The switch should withstand the test voltage for 60 seconds.

Withstand test results

The high-potential withstand tests provide information on the dielectric condition of the switch and the vacuum integrity of the interrupters.

If the switch passes the closed-contacts tests (Tests 1 and 2), but fails the open-contacts test (Test 3), the cause is likely to be in the interrupter assembly. Retest each phase individually to determine the failed phase or phases.

If the switch fails the closed-contacts tests (Tests 1 or 2), the cause is likely to be a diminished electrical clearance or failed insulation. Retest each phase individually to determine the failed phase or phases.

Module flashover service

If the DAS module was exposed to an external flashover, an inspection process is recommended to assure proper operation of the switch. Should the DAS module exhibit external flashover attributes (carbon tracking or discoloration), the following procedure is recommended to restore the encapsulation back to its original condition:

1. Remove device from service.
2. Inspect module for damage to the terminals. Remove any damaged terminals and replace.
3. Inspect module for damage to the module rods. If there is damage to the module rods, the module must be replaced.
4. Verify through careful inspection that there is no damage to the housing that could inhibit proper operation. Check the integrity of the lifting lugs.
5. Clean the damaged module with isopropyl alcohol and a scratch-free, nylon scouring pad to remove any carbon deposit.
6. With a clean rag, apply a thin coat of dielectric silicone grease to the cleaned areas.
7. Confirm the dielectric strength of the module by performing high-potential withstand testing. Confirm both phase-to-ground and phase-to-phase conditions. See the **High-Potential Withstand Testing** section of this manual.

Troubleshooting

If the DAS switch does not perform as described in the OPERATION section of this manual, the following information may assist in troubleshooting:

Unit will not close

- Make sure the yellow manual open handle is completely up
- Check all cables for proper connection
- Verify that the control has power
- Upon loss of ac power, check switch control battery level
- Check the fusing on the dc-to-dc converter board located in the control cabinet.

Unit will not open electrically

- Check all cables for proper connection
- Verify that the control has power
- Check the fusing on the dc-to-dc converter board located in the control cabinet.

Control testing

⚠ CAUTION

Equipment misoperation. Do not connect this control to a switch until all control settings have been properly programmed and verified. Refer to the programming information for this control. Failure to comply can result in control and switch misoperation, equipment damage, and personal injury. G147.0

IMPORTANT

The iDC switch control can be taken out of service for testing and placed back into service without de-energizing its switch and interrupting the system. However, during the time the control is out of service, the switch can not be electrically operated.

Testing an installed control

The following test to verify correct operation of the iDC switch control can be performed while connected to an operating switch.

1. Verify operating status of all indicator lights by pressing and holding the LAMP TEST key for two seconds on the programming panel (Figure 40).
2. Check the operational values for currents, voltages, and other metering information.

Note: Scroll through the LCD display messages by pressing the ▲ and ▼ cursor movement arrows underneath the LCD display on the programming panel (Figure 40).

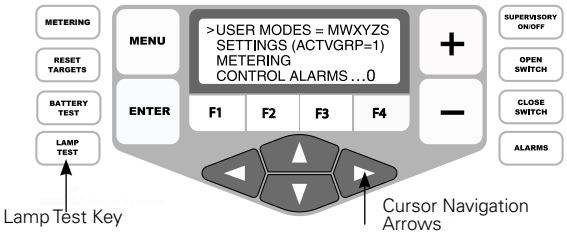


Figure 40. Lamp Test button, LCD display, and cursor movement arrows.

3. Test control battery operation as follows:

Note: The battery test is blocked for 30 seconds upon power up of the control.

Note: AC power can be either connected or disconnected for battery test.

A. Press BATTERY TEST hot key on front panel.

B. Using the navigational arrows keypad, navigate down to the CONTROL BATTERY TEST menu displayed in the LCD screen and press ENTER.

C. Press the F4 LCD Menu Function Key for 1 second to test the battery. The battery test results will display in the battery metering menu.

Note: This message will appear on the programming panel LCD display: - - - -TESTING- - - -

The battery test results will display in the battery metering menu.

Note: Voltage should be between 25–31 Vdc – with the higher voltage at colder temperatures.

Under normal conditions, with ac connected and a fully charged battery, the charging current should be less than 20 mA.

With ac connected and a discharged battery, the current range should be 20–450 mA.

With ac disconnected and the battery supplying the load, current will read -400 to -600 mA depending on accessories connected.

4. Verify the iDC Control OK LED is illuminated on the control operator panel (Figure 41). This indicates the presence of ac power.

Note: The control includes a Power Save feature that will turn off the backlit LCD display and all LEDs if no front panel keypad is pressed within five minutes. Pressing the LAMP TEST key will reactivate the display and active LEDs.

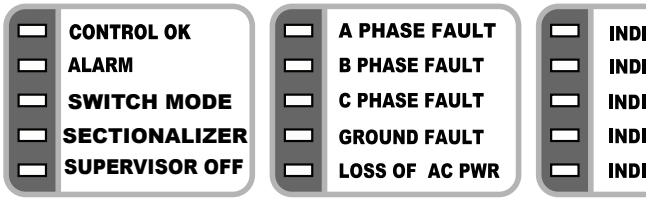


Figure 41. iDC Control OK LED.

5. Verify the electrical switching functionality of the control.

A. Press the CLOSE SWITCH hot key located on the front panel.

B. Verify the SWITCH CLOSE LED located on the front panel illuminates.

C. Press the OPEN SWITCH hot key located on the front panel.

D. Verify the SWITCH OPEN LED located on the front panel illuminates.

Remove the control from service

IMPORTANT

Disconnect switches for ac sensing and power connections are necessary to isolate the iDC control for testing and servicing.

⚠ CAUTION

Hazardous voltage. Open CT secondaries can generate high voltages. Contact with CT pins of the disconnected cable can cause electric shock and may result in personal injury. Open switch contacts and open disconnect switches before disconnecting control cable. T204.3

CAUTION

Equipment misoperation. Disconnect all control power sources prior to disconnecting or reconnecting the control cable from the control. Failure to comply can result in switch misoperation at the time of disconnection or reconnection of the control cable to the control. T378.0

1. Disconnect the 24 V control battery.
2. Disconnect control cable from control.
3. Remove control ac sensing and power connections from the control.

⚠ CAUTION

Hazardous voltage. Cable conductors attached to controls will remain at 53 Vdc and 120/240 Vac potential while connected to the control. Contact with any pins at the end of the cable directly or indirectly connected to a control can result in personal injury or equipment damage. Disconnect battery and external power sources in the control then remove control cable at control end before disconnecting from recloser end. T312.3

4. Remove any control input and status output wiring from TB1, TB3, and TB4 (Figure 42).
5. Disconnect any serial communications ports and IRIG-B timing connections (Figure 42).
6. Disconnect the ground from the control.
7. Carefully transport the control to a suitable service facility.

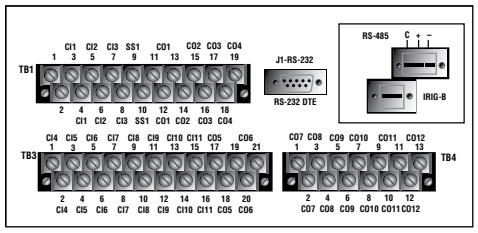


Figure 42. Back view of top half of iDC switch control.

Preliminary testing with no ac available

If the iDC control is not in service and requires energization for preliminary testing, it can be powered up with battery power only.

Note: Controls with expanded memory require battery voltage to be 23 Vdc minimum.

1. Open the rear door of the iDC control cabinet and locate terminals TM1 and TM2 on the power supply circuit board (Figure 43).

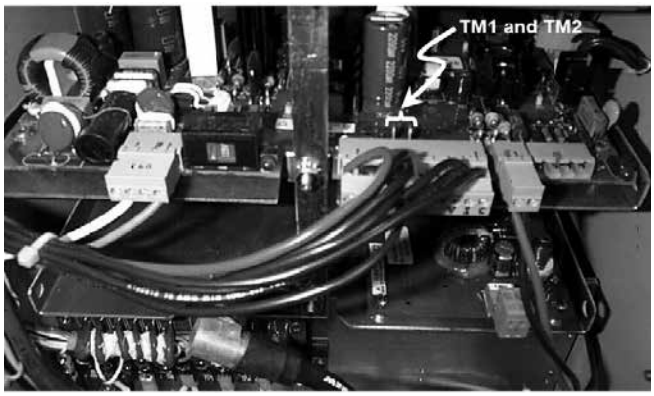


Figure 43. Location of terminals TM1 and TM2 on the power supply circuit board

2. Momentarily jumper terminals TM1 and TM2 together. (The control will power up.)
3. To power down the iDC control, unplug the battery (disconnect the black/red battery connector).
4. Perform a battery charging cycle. Refer to Battery Charging in the Battery Test and Charging Procedures section of these instructions.

IMPORTANT

While the iDC control is powered in this manner, the control battery is being continuously discharged. When the battery voltage drops to 22 Vdc, the control will automatically power down.

If the battery is left in a discharged condition, the battery(s) will sustain permanent irreversible damage. Therefore, a battery charging cycle should always be performed after this procedure to bring the battery(s) back up to full charge.

Battery test and charging procedures

Test procedure for installed battery

Follow the procedure below to perform a battery test in the iDC switch control. The values in the test procedures are based on testing at 25 °C (77 °F).

The condition of the iDC switch control batteries can be determined by using the Battery Test Analysis button on the front of the iDC switch control or using the Battery Test function in the BATTERY MENU.

Note: The battery test functionality is blocked for 60 seconds upon power up of the control.

Note: AC power can be either connected or disconnected for battery testing.

Alarm conditions

During a control battery test a 5Ω, 55 watt resistor is placed across the battery terminals for approximately five seconds. The iDC switch control measures the battery voltage, if the voltage drops below 22.8 Vdc for one full second, the ALARM LED (battery alarm) is illuminated. When the iDC control is disconnected from ac power and the control battery drops below 23.5 Vdc for 60 seconds, the ALARM LED will illuminate. If the battery voltage continues to decay and drops below 22 Vdc, the iDC control will shut down.

Note: The battery test is blocked for 30 seconds upon power up of the control.

Note: AC power can be either connected or disconnected for battery test.

Note: If the battery voltage drops below 19 V, the battery must be charged by the external battery charger KME5-60-1.

1. Press BATTERY TEST hot key on front panel.
2. Using the navigational arrows keypad, navigate down to the CONTROL BATTERY TEST menu displayed in the LCD screen and press ENTER.
3. Press the F4 LCD Menu Function Key for 1 second to test the battery.

Note: This message will appear on the programming panel LCD display: - - - - TESTING- - - -

The battery test results will display in the battery metering menu.

Note: Voltage should be between 25–31 Vdc – with the higher voltage at colder temperatures.

Under normal conditions, with ac connected and a fully charged battery, the charging current should be less than 20 mA.

With ac connected and a discharged battery, the current range should be 20–450 mA.

With ac disconnected and the battery supplying the load, current will read -400 to -600 mA depending on accessories connected.

Table 17. Control Battery Bench Testing and Replacement Information

Control Type	Battery Catalog Part #	Voltage	Type	Amp/ Hour	Bench Test Load Condition for 5 sec.	Acceptable Voltage Drop at End of Test Load
iDC switch control (standard capacity)	KME4-215	24 V	Lead Acid	8	5Ω 55 watt	3 V or less
iDC switch control (high capacity)	KME5-134-1	24 V (two 12 V batteries)	Lead Acid	13	5Ω 55 watt	2 V or less

Test procedure for uninstalled battery

The entire process should be conducted in a clean environment, such as a repair shop.

The following procedure should be used to perform a bench test on a control batteries in a service shop:

1. Remove the control from service. Refer to the Removing Control from Service section within this manual.
2. Remove the battery from the control and carefully transport it to a suitable service facility.
3. Measure battery voltage.
4. Apply test load and measure battery voltage after five (5) seconds of load to determine voltage drop. Refer to Table 17 for Bench Test Load Condition.
5. Remove test load.

If the battery fails the test or is a least four (4) years old, it should be replaced. Refer to Table 17 for battery catalog part numbers.

Battery charging

If it is not possible to charge the battery with the control's built-in charger, a KME5-60-1 (120 Vac) portable bench-type battery charger kit is available, which includes the KA43ME7001 Battery Charger (Figure 44) and the KME5-325-1 Adapter Cable. Refer to *Service Information S280-79-14 KA43ME7001 Portable Lead Acid Battery Charger Instructions* for additional information.

IMPORTANT

Do not attempt to charge a lead acid batteries below 2 Vdc with the KA43ME7001 charger. The charger requires a minimal voltage to sense a battery is connected.

If the lead acid battery is below 19 Vdc for over two (2) days, replace the battery. The expired battery should be disposed of in an environmentally responsible manner. Consult local regulations for proper battery disposal.

Table 18. Battery Charging Accessories

Description	Catalog Number
120 Vac Battery Charger Accessory	KME5-60-1

Note: A yellow LED indicator on the body of the charger illuminates when charging. The yellow LED flickers to indicate the battery has reached an 80% charge level (or more). A green LED indicator illuminates when the charge is complete.

Charge the battery with a KA43ME7001 (120 Vac) portable charger as applicable.

- iDC Switch Control (Standard Capacity) - Connect the battery directly to the KA43ME7001 charger. The charger continuously monitors the battery voltage.
- iDC Switch Control (High Capacity) - Use adapter KME5-325-1 to connect the two 12-volt batteries to the KA54ME7001 charger.

The charger senses when the battery voltage reaches 2.27 volts per cell, then the charge rate reduces to maintain a trickle charge.

The battery charging process can take up to 24 hours.

Refer to Table 18 for additional battery charging accessories.

Figure 44. KA43ME7001 Battery Charger.

Return the control to service

CAUTION

Equipment misoperation. Do not connect this control to an energized recloser until all control settings have been properly programmed and verified. Refer to the programming information for this control. Failure to comply can result in control and recloser misoperation, equipment damage, and personal injury. G110.3

The following procedure must be followed to return the control to service upon completion of in-shop service or maintenance operations.

1. While still in service shop, appropriate personnel must verify that all control settings are correct.
2. Reconnect the ground cable to the control.
3. Connect applicable serial communications and IRIG-B timing connections.
4. Connect applicable control input and status output wiring to terminals TB1, TB3, and TB4 (Figures 22-24).
5. Assure the control cable is properly connected and supported.
6. Plug in the control battery.

Note: The iDC switch control will not power up until ac power is applied.

CAUTION

Equipment misoperation. Verify that the 120/240 Vac selector switch is correctly set for incoming voltage. Failure to comply may cause misoperation (unintentional operation) of the control and/or equipment damage resulting in personal injury. T278.0

7. Verify the selector switch on the Power Supply/Battery Charger Board is set to the correct position based upon the incoming power supply:

- For 120 Vac incoming power, the selector switch must be set to the 115 V position.
- For 240 Vac incoming power, the selector switch must be set to the 230 V position.

8. Reconnect control ac sensing and power connections to the control.
9. Verify the control clock is set to the current time after ac power has been reapplied.

Note: The control clock may require resetting if the operating power has been disconnected for more than thirty days.

Additional information

Replacement kits

Replacement kits for the iDC switch control are available through the factory Service Department. To order these kits, refer to *Distribution Switchgear S260-01 through S280-01 Parts Guide* for catalog numbers. Contact your Eaton's Cooper Power Systems representative for additional information and order procedures.

Factory-authorized service centers

Factory-authorized service centers are located throughout the continental United States to provide maintenance, repair and testing services for Eaton's Cooper Power Systems controls and switches. For further information, contact your Eaton's Cooper Power Systems representative.

Factory maintenance classes

The factory service department offers a basic testing and troubleshooting course for the electronic recloser control. This course, taught by experienced service technicians, is held at the factory in-house training facility. For additional information, contact your Eaton's Cooper Power Systems representative.

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For Eaton's Cooper Power Systems DAS switch with iDC control product information call 1-877-277-4636 or visit: www.cooperpower.com.

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