Switches
Catalog data
CA008003EN

Effective September 2019
Supersedes December 2014

COOPER POWER SERIES

DAS three-phase, vacuum-break distribution automation switch and iDC control

Contents

Powering Business Worldwide

General

Eaton's Cooper Power series DAS three-phase, electronically controlled, vacuum-interrupting distribution automation switch provides reliable, economical switching, sectionalizing, advanced metering, and automation systems for distribution circuits rated through 38 kV.

The DAS switch combines solid cycloaliphatic-epoxy polymer-encapsulated vacuum interrupters with a reliable, lightweight operating mechanism that utilizes a magnetic actuator to provide a lifetime of trouble-free operation. The solid polymer system does not rely on a gaseous, liquid, or foam dielectric. The DAS switch is highly resistant to ozone, oxygen, moisture, contamination, and ultraviolet light.

Designed and tested to be compatible with Eaton's Cooper Power series three-phase controls, these distribution automation switches offer superior switching, sectionalizing, and application capabilities.

Switch operations are programmed in an electronic control with accurate characteristics and a host of advanced features. When system requirements change, program settings are easily altered with no sacrifice of accuracy or consistency.

Compact and lightweight, DAS switches are easily installed on poles or in substations. Mounting equipment is available for both pole and substation applications.

Switch and control accessories enable further tailoring of the switching program to achieve maximum system operating flexibility.

Eaton is strongly committed to improving the reliability of the electric power industry. Technological advances, including the newest microprocessor-based controls and solid insulation DAS distribution switchgear products, represent our investment in the future.

Part of the NOVA™ family, DAS switches are designed to eliminate or reduce many expenses through the combined use of advanced material technology, solid insulation, and low heat-transfer vacuum interrupters.

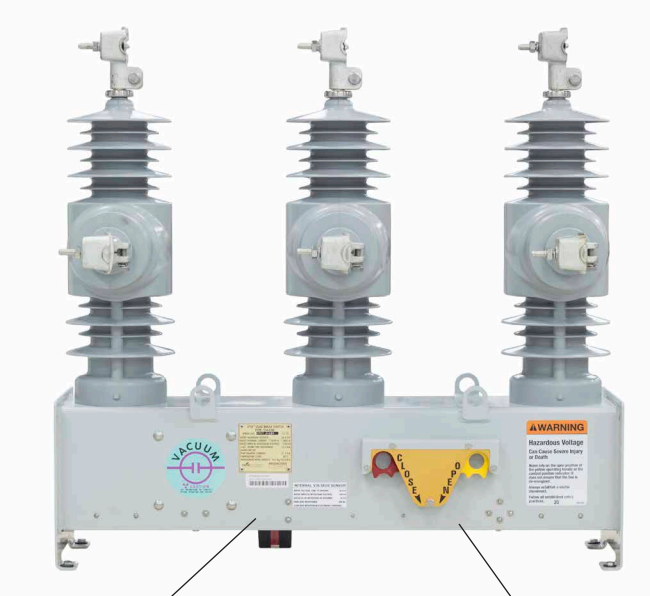


Figure 1. DAS switch.

This innovative approach yields operational savings.

- No regular maintenance
- Durability to withstand acts of man and nature
- Gas-, foam-, oil-, and regulation free
- Lightweight and installation friendly
- Advanced vacuum technology
- Standardization of switch/interrupter products used on utility distribution systems

When needed, application expertise, backed by world-wide systems engineering knowledge and experience, is available. Customer-focused design capability, based on more than 70 years of interrupter experience, has made Eaton the industry leader.

DAS switches are designed and manufactured in accordance with IEC 62271-103:2011, IEEE Std C37.63™-2013 standard, and ISO 9001 Certified Quality Management System.

Ordering information

DAS switches include an iDC microprocessor-based switch control. The iDC control includes full switching, sectionalizing, metering, and diagnostics for your application needs.

To order a basic DAS switch:

- See the **Constructing a Switch Catalog Number** section to construct a catalog number that describes the required switch.
- From Tables 1-5, specify the catalog numbers that describe the required switch accessories.

To order a basic iDC control:

- See the **Constructing a Control Catalog Number** section to construct a catalog number that describes the required control.
- From Table 6, specify the catalog number that describes the required control cable and optional input cable.
- From Tables 7-12, specify the catalog numbers that describe the required control accessories.

Constructing a switch catalog number

To order a basic DAS switch, 15 kV for an iDC control package, with eyebolt terminals, 48 Vdc interface with 120 Vac heaters, 630 amp continuous current, standard 110 kV BIL, in an aluminum housing with internal voltage sensing and English labeling, the catalog number would be constructed in this manner:

KDAS Basic letters for a DAS switch

15 Switch Type:
15 for 15 kV
27 for 27 kV
38 for 38 kV

B Usage reference
B for DAS with KiDC control package
C for replacement DAS switch only

1 Bushing Terminals:
1 for eyebolt terminal
1/0 to 500 MCM, when 630 A max. continuous current
4/0 to 1000 MCM, when 800 A max. continuous current
3 for 2-hole flat pad terminal, 630 A max.
4 for 4-hole flat pad terminal, 800 A max.
5 for stud-type terminal, 1.125 dia., 800 A max.
A for 2-hole flat pad top terminal and 4-hole flat pad side terminal

1 Interface and Heater:
1 for 48 Vdc interface with 120 Vac heaters
2 for 48 Vdc interface with 240 Vac heaters
3 for 48 Vdc interface with 48 Vdc heaters

6 Continuous Current:
6 for 630 amp continuous current
8 for 800 amp continuous current

S Rated impulse voltage (BIL) creepage
S for standard BIL (standard creepage)
15 kV = 110 kV BIL standard
27 kV = 125 kV BIL standard
38 kV = 150 kV BIL standard
H for high BIL (extra creepage)
15 kV = 125 kV BIL, extra creepage
27 kV = 150 kV BIL, extra creepage

A Housing option
A for aluminum (standard) housing
S for stainless steel housing

V Internal voltage sensing
N for no internal voltage sensing required
V for internal voltage sensing

E Language
E for English
X Other Language required*

KDAS 15 B 1 1 6 S A V E

KDAS15B116SAVE is the catalog number for the required basic DAS Switch.

* Contact factory for details.

Ordering information required

Note: The DAS package requires that the DAS switch be ordered with a KiDC control.

To order the DAS switch and KiDC control and control cable:

1. Use chart at right to construct a catalog number that describes the required automated switch.
2. From Tables 2-5, specify the catalog numbers that describe the required accessories.
3. Order the required KiDC control and mating control cable. (Base catalog number of the control must be included when ordering a DAS switch.)

Table 1. Internal Voltage Sensing Cable*

Description	Catalog Number
Internal voltage sensing cable	
Internal voltage sensing cable (bacis cable, no length)	KA97ME
Replace "X" with number of feet, 5-50 feet maximum. Price per foot.	KA97ME-X
Spanish internal voltage sensing cable (basic cable, no length)	KA134ME
Replace "X" with number of feet, 5-50 feet maximum. Price per foot.	KA134ME-X
Armored internal voltage sensing cable (basic cable, no length)	KA136ME
Replace "X" with number of feet, 10-50 feet maximum. Price per foot.	KA136ME-X
Internal voltage sensing cable with 90° female connector for "IN-A-BOX" (EAS) applications. (Basic cable, no length.)	KA138ME
Replace "X" with number of feet, 5-50 feet maximum. Price per foot.	KA138ME-X-X

* Required when internal voltage sensing is specified.

Table 2. Auxiliary Switch

Description	Catalog Number
Three-state auxiliary switch with six independent contacts and receptacle	KNOVA66-1
Auxiliary switch output cable with plugs on both ends for KNOVA66-1 Auxiliary switch (basic cable, no length)	KNOVA178
Replace "X" with number of feet. Price per foot	KNOVA178-X

Table 3. Factory Assembly*

Description	Catalog Number
Factory installed in standard pole frame	KSRSPN3
Factory installed in alley (end-mounted) pole mounting hanger	(TBA)

* Covers factory assembly only; switch, control, and mounting equipment must be ordered separately.

Table 4. Mounting Equipment Options

Description	Catalog Number
Pole frame	KSR818-1
P.T. Mounting brackets for pole frame*	
Oil P.T. mounting; includes saddle extension plus hardware	
for 0.5 kVA Source-side	KSR837-1A
for 0.5 kVA Load-side	KSR837-1B
for 0.5 kVA load- and source-sides	KSR837-1C
for 1.0 kVA Source-side	KSR837-2A
for 1.0 kVA Load-side	KSR837-2B
for 1.0 kVA Load- and source-side	KSR837-2C
Dry (solid) P.T. mounting; with 8 x 10" pattern†	
Souce/outboard side	KAR956-4
Load/inboard side	KAR956-5
Arrester/voltage sensing mounting brackets for the pole frame**	
Source/outboard	KNOVA61-1
Load/inboard	KNOVA61-2
Fiberglass load/inboard	KNOVA61-3
Load/inboard; for use with oil P.T. mounting brackets	KSR836-1
Load/inboard; for use with dry (solid) P.T. mounting brackets	KAR956-3
Alley Mount frame	(TBA)
P.T. Mounting brackets for alley mount pole frame*	
Inboard P.T. mounting bracketr	(TBA)
Outboard P.T. mounting bracket	(TBA)
Arrester mounting brackets for alley mount pole frame**	
Inboard arrester mounting bracket	(TBA)
Outboard arrester mounting bracket	(TBA)

* P.T.s are not included.

† Integrated arrester bar reqjuired; ordered separately.

** Arresters and voltage sensors not included.

Table 5. Miscellaneous Accessories

Description	Catalog Number
Wildlife guards: set of 6, (applicable to all terminal types)	KNOVA56-6
Terminal shields for enhanced environmental protection:	
For 630 A eyebolt, 2-hole flat pad or stud terminals	KNOVA245-3
For 800 A eyebolt, or 4-hole flat pad terminals	KNOVA245-4
Weatherguard receptacle cap for Control input receptacles	KP2145A7-1
Weatherguard receptacle caps for Auxiliary or IS receptacles	
(Replace X with quantity, 1 or 2)	KP2145A3-X
Remove top terminals prior to shipment	K02-385-1
Made in U.S.A. label	K89-407-1

Constructing a control catalog number

To order a standard iDC Switch Control for use with the DAS Switch, 120 Vac power supply with 13 Amp-hour battery, 1 Amp sensing, Wye connected voltage inputs, mild steel cabinet, standard front panel without voltage sensing wiring, no extra I/O contacts, ethernet fiber optic communication with MTRJ/MTRJ connections and English labelling, the catalog number should be constructed in this manner:

KIDC Basic letters for an iDC, Pole-Mounted Switch Control

A Control usage option:
A for use with DAS switch package
B for control only

1 Control primary power supply code:
1 120 Vac, 2-wire/240 Vac 3-wire with extra capacity, 13 Amp-hour battery
2 120 Vac, 2-wire/240Vac 3-wire with standard 8 Amp-hour battery
3 120 Vac, 2-wire/240 Vac 3-wire with 8 Amp-hour high temperature battery
4 120 Vac, 2-wire/240 Vac 3-wire with mounting hardware only for the extra capacity, 13 Amp-hour battery (Battery not included)
5 120 Vac, 2-wire/240 Vac 3-wire with mounting hardware only for the standard 8 Amp-hour battery (Battery not included)

1 Current sensing option:
1 Standard, 1 Amp CT

1 Voltage connection scheme:
1 Wye connected voltage inputs
2 Delta connected voltage inputs

1 Cabinet code:
1 Mild steel cabinet
2 Stainless steel cabinet
3 Mild steel cabinet with 3-point door latch
4 Stainless steel cabinet with 3-point door latch
C Mild steel cabinet with 3-point door latch and door stop
D Stainless steel cabinet with 3-point door latch and door stop

3 Front panel code:
3 Domestic panel, standard
E Domestic panel with voltage sensing wiring

1 I/O options:
1 Standard contacts: 12-250 Vac, 12-250 Vdc
3 control inputs/5 status outputs (1-input and 4-ouputs are user configurable)
2 Additional contacts: 12-250 Vac, 12-250 Vdc
8 control inputs/8 status outputs

4 Communications:
1 RS-485 D.C. (Modbus/DNP only)
3 Serial fiber optic communications
4 Ethernet fiber optic/fiber optic communications MTRJ/MTRJ
5 Ethernet fiber optic/wire communications MRTJ/RJ45
6 Ethernet wire/wire communications RJ45/RJ45
7 Standard (No communications)
8 Ethernet single mode fiber optic/fiber optic communication

E Language
E for English
X Other Language required*

Ordering information required

To order a basic iDC micorprocessor-based switch control:

1. Use chart at left to construct a catalog number that describes the required control.
2. From Tables 6-12, specify the catalog numbers that describe the required accessories.

KIDC A1 1-1-1 3 1 4 E

KIDCA11-1-1314E is the catalog number for the control in the example above.

* Contact factory for details.

Accessories

Table 6. Control and Input Cables

Description	Catalog Number
Control Cables:*	
Control cable, 19 conductor, 16 AWG with 19-pin male and female connectors	
Standard cable: (Basic cable, no length	KA1119R6
Replace "X" with desire length, 10 to 80 feet. Price per foot.	KA1119R6-X
Armored cable with 10 ft. of armor: (Basic cable, no length)	KA135ME
Replace "X" with desired length, 15 to 80 feet. Price per foot.	KA135ME-X
AC input cables:	
Input cable, 120 or 240 Vac, two-wire for 2-pin input, for use with **KME6-1775-H** receptacles:	
Standard cable: (Basic cable, no length	KA11ME1
Replace "X" with desired length, 10 to 80 feet. Price per foot.	KA11ME1-X
Armored cable with 10 ft of armor; (Basic cable, no length)	KA124ME
Replace "X" with desired length, 10 to 80 feet. Price per foot	KA124ME-X
Input cable, 120 Vac, three-wire for 3-pin input, for use with **KME6-1775-J** receptacle. (Basic cable, no length)	KME4-67-3
Replace "X" with desired length. Select from 10 to 80 feet. Price per foot.	KME4-67-3-X

* If no control cable is specified, the KA1119R6S Plug Assembly Kit which contains both male and female plug ends will be included.

Table 7. Receptacles and Wiring

Description	Catalog Number
AC input receptacles:	
120 Vac or 240 Vac input receptacle, 2-pin	KME6-1775-H
120 Vac input receptacle, 3-pin	KME6-1775-J

Table 8. Communication Support Equipment

Description	Catalog Number
RS-232 cable, 6-ft, 9-pins on both ends, for direct connection between DATA PORT and PC	KME5-66
Fiber optic interface	KME6-1800-1
DB9 to DB25 Radio Cable, 6 ft length	KP2412A3
DB9 to DB9 Radio Cable, M/F connectors, 6-ft length	KP2412A1

Table 9. Cable Locking Sleeves

Description	Catalog Number
Cable locking sleeve, (quantity of 1)	KME6-1772-1
Cable locking sleeve, (quantity of 2)	KME6-1772-2
Cable locking sleeve, (quantity of 3)	KME6-1772-3
Cable locking sleeve, (quantity of 4)	KME6-1772-4
Cable locking sleeve, (quantity of 5)	KME6-1772-5
Cable locking sleeve, (quantity of 6)	KME6-1772-6

Table 10. Convenience Outlet

Description	Catalog Number
Fused 120 Vac, 3-wire polarized GFI convenience outlet	KME6-1776

Table 11. Automation Packages

Description	Catalog Number
Full automation accessory; 12 Vdc radio provision (Radio and fiber-optic/RS232 interface not included	KME6-1774-3
Automation accessory (bracket only) 12 Vdc provision	KME6-1774-2
Full automation accessory; 12 Vdc radio provision with top exit antennae	KME6-1774-7
Full automation accessory with DNP-RTM/GSM telemetric communication radio	KME6-1774-13

Table 12. Miscellaneous Accessories

Description	Catalog Number
120 Vac Battery Charger for spare batteries	KME5-60-1
Control mounting extension brackets	K04-257-4
Made in USA label	K89-407-1

Switch ratings and characteristic features

Three-phase switching on systems rated up to 15.5 kV is provided by DAS15 switches. DAS27 switches can be applied on systems rated through 27.0 kV. Higher-voltage system switching at 38.0 kV is provided by DAS38 switches. A ratings summary for DAS switches is shown in Tables 1–3.

Operation

The DAS switch is a three-phase, electronically controlled, vacuum switch with a mechanism that provides close and latch capability for electrical operation through a temperature range of -40 °C to +55 °C. Opening and closing signals from the control energize the operating circuits in the switch.

Vacuum interruption

A single break on each phase is accomplished by separating contacts inside the vacuum interrupter. All arcing is contained within the vacuum envelope. The patented vacuum interrupters, used in DAS switches, offer extended and increased duty cycles compared with oil switches.

Surge protection

Best operating results are achieved if switches are protected with surge arresters. On line applications, arrester protection is recommended on both sides of the switch. (If protection is on one side only, it should be on the source side.) Eaton's Cooper Power series distribution-class arresters provide excellent protection and are available with mounting brackets to fit DAS switches. For information about Eaton's Cooper Power series surge arresters for use with DAS, contact your Eaton representative.

Switch operation

The DAS switch is provided standard with internal sensing CTs, and is capable of switching, sectionalizing, and fault targeting. CTs are 1000:1 ratio, embedded in the DAS switch encapsulation. Voltage sensing is available as an option. When equipped with voltage sensing, the DAS switch is capable of more advanced metering and data recording functions. Current and voltage inputs are monitored by the electronic control.

Construction

Switch

Designed for long service life and no maintenance, the DAS switch has three solid-polymer interrupter modules with embedded current transformers and a standard aluminum mechanism housing; light gray is the standard color.

Cycloaliphatic-epoxy polymer encapsulation provides solid insulation and maintenance-free, environmentally safe operation. There is no monitoring or maintaining of gas pressure or oil levels. There are no toxic or environmentally unfriendly materials. There are no foam fillers or insulation seals, eliminating potential moisture ingress areas. The DAS switch module exhibits good absorption of elastic energy and resistance to cracking and crack propagation. Additionally, durable environmental properties make the solid polymer suitable for outdoor applications, including seacoasts, deserts, and areas of high pollution.

Surface tracking

The cycloaliphatic epoxy is highly resistant to contaminants and resists tracking and flashovers under extreme pollution levels to reduce both flashovers and the associated cost of repairs.

Hydrophobicity

The module maintains excellent hydrophobicity, a property characterized by water beading into isolated drops, and is highly resistant to moisture absorption. Hydrophobicity prevents continuous sheets of water from forming leakage current paths that deteriorate the creepage withstand level.

Ultraviolet resistance

The cycloaliphatic epoxy resists ultraviolet radiation damage even in harsh climates, maintaining a smooth, unblemished, self-cleansing surface with low-adhesion to contaminants.

Tensile strength

Outstanding tensile and flexural strength characteristics mean the DAS switch modules are tough and non-fragmenting, reducing shipment and handling charges.

Shed design

The shed design utilizes alternate-sized skirts. The major sheds shield and protect the minor sheds to enhance the hydrophobicity and ultraviolet resistance of the module, eliminate formation of microcracks, and ensure extra-protected creepage. Additionally, sharp edges direct water away from the unit. Water paths and ice formations are effectively eliminated.

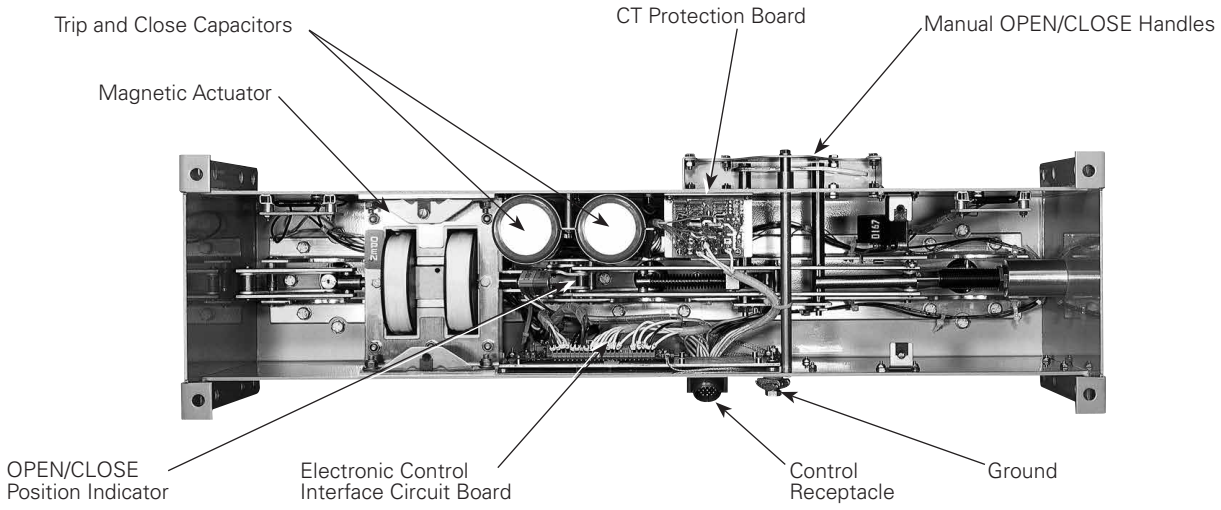


Figure 2. DAS distribution automation switch mechanism (view from bottom of switch with bottom cover removed).

Flashover recovery

Flashovers occur when an object, usually wildlife, contacts energized parts of the equipment. The DAS switch minimizes the effect of flashovers with remarkable physical resilience, arc-quenching properties, and a self-healing ability. DAS switches can withstand the enormous forces experienced during faults without wholesale damage and allows re-energizing after external flashover without cleaning.

Vacuum interrupters

DAS switches use vacuum as the interrupting medium. Vacuum interrupters (Figure 3) provide fast, low-energy arc interruption with long contact and interrupter life, low mechanical stress, and maximum operating safety. With arc interruption taking place in a vacuum, contact and interrupter life are several times greater than with interruption in oil, virtually eliminating interrupter maintenance.

Eaton's Cooper Power series vacuum interrupters are designed with a metal and ceramic housing for maximum strength and long-term vacuum integrity. Oxygen-free, high-conductivity copper, stainless steel, and a nickel-copper alloy are used in the vacuum interrupters. The high-alumina ceramic has more than five times the strength of glass, which permits a higher processing temperature to develop maximum purity of the assembly, and is impervious to helium penetration, maintaining the vacuum level. Additionally, it provides wear resistance, chemical resistance, and a high dielectric strength.

Enclosed in the interrupter are a stationary and a moving contact assembly. The moving contact has a travel of approximately one-half inch, its shaft passing through a flexible bellows that maintains vacuum integrity. Contacts consist of a high purity copper sintered with aluminathermic chromium.

Because the smallest amount of internal contamination can significantly shorten the life of a vacuum interrupter, special care is taken to avoid even minute contamination from any source, including dust particles, machining oils, or human body salts. No paraffinic oils are used in the machining process, all machined parts are put through a cleaning/degreasing process, and then all components are electro-polished in a positive-pressure, air-filtered area. A Class 100 clean room facility is used for the final interrupter production. The furnaces employ a custom-designed, three-stage pumping system to yield high levels of vacuum. Every vacuum interrupter is then tested and tracked with individual serial numbers.

Electronic control

DAS15, DAS27, and DAS38 switches are controlled by an Eaton's Cooper Power series three-phase electronic switch control.

Control-powered interface

The DAS switch mechanism (see Figure 4) uses a control-powered interface and is fully operational with iDC microprocessor-based controls equipped with the required dc-to-dc converter, interface circuit, and a fully shielded 19-pin cable. The control-powered interface includes a 19-pin receptacle on the switch and an internal heater (for humidity control) powered from the control input power supply (ac). The dc-to-dc converter board converts the control's 24 Vdc battery supply to 53 Vdc to charge the trip/close capacitors in the DAS switch mechanism. The dc-to-dc converter board also houses voltage monitoring and conditioning circuits that protect the battery from failure and provide open/close operations without ac power. In the absence of ac power to the electronic control, the control battery will provide the open and close operations. A complete open/close sequence is obtainable without ac power.

Figure 3. Cross section of a vacuum interrupter used in DAS switches.

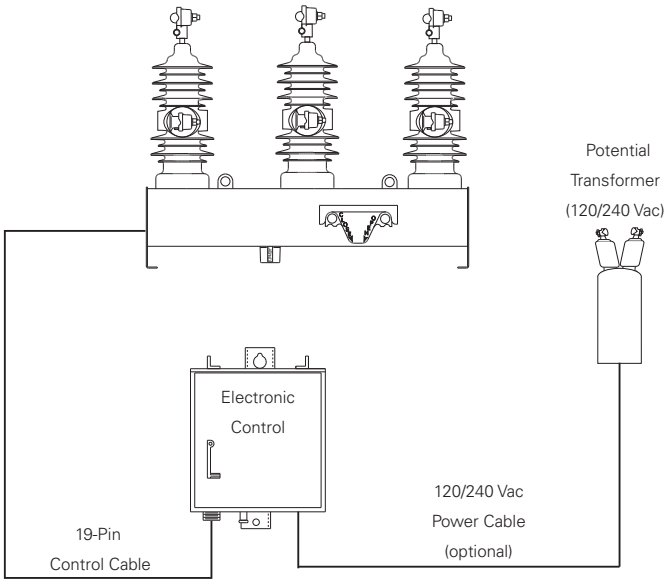


Figure 4. DAS switch configuration with potential transformer input power.

Manual operation

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. The switch is closed by first pushing the yellow manual open handle up, then pulling down the red manual CLOSE handle, located on the side of the switch. If the yellow manual OPEN handle is left in the down position and the red CLOSE handle is pulled, the yellow handle will return to the up position and the close will still be completed.

Similarly, the switch can be operated from the manual control button on the electronic control panel, provided the manual OPEN handle is in the up position. If the manual OPEN handle is in the down position, the switch cannot be closed electrically. A contact position indicator flag, adjacent to the manual operating handle, shows switch contact position.

The DAS switch is fully capable of OPEN/CLOSE operations with no electrical power to the control.

Internal voltage sensor option

The DAS switch is also available with internal voltage sensors at time of order. Using a high-voltage resistor within each interrupter module, the sensing option, cable, and control support a magnitude accuracy of 2% or better and a phase degree accuracy of ±1.5°. The internal voltage sensing option is compatible with a type iDC pole-mounted switch control.

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 contacts) and "b" (opposite switch 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 5.

Terminals

The standard terminal is an eyebolt, 1/0–500 mcm (630 A). Eyebolt 4/0– 1000 mcm (800 A), 2-hole and 4-hole, flat-pad terminals, and stud-type terminals are available as an accessory.

Pole-mounting hanger

A pole-mounting hanger, which bolts directly to the switch frame, is available for pole-mounting installation.

Arrestor-mounting brackets

The arrestor-mounting bracket accessory can be bolted to the switch frame and pole-mounting hanger for the addition of inboard and outboard arresters. The arresters are not included with the brackets.

Substation-mounting frame

A substation-mounting frame accessory is available for substation mounting applications.

Switch ratings and specifications

Table 13. 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	100 @ 23.0 kV
Power Frequency Withstand, Dry	38.0 kV	50.0 kV	70.0 kV
Power Frequency Withstand, (Open Interrupters)	45.0 kV	60.0 kV	60.0 kV

*Optional BIL ratings available with internal CT option.

Table 14. 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 Peak	31.0 kA	31.0 kA	31.0 kA
Making Current, Asymmetrical RMS	20.0 kA	20.0 kA	20.0 kA

*Available optional ratings.

Table 15. Mechanical Ratings

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

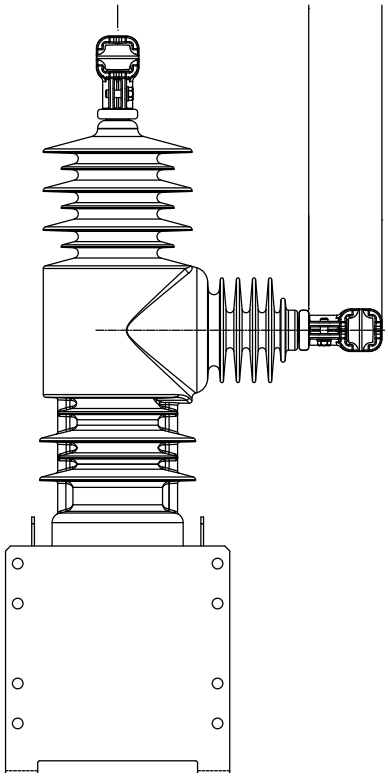
Table 16. Power Consumption

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

Table 17. 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

Dimensions and weights for DAS switch



Terminal Options	A
Eyebolt, 1/0 - 500 mcm Cable Range (630 amps maximum)	83 (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)	83 (3.25)

	B	C
15 kV 110 kV BIL	794 (31.25)	508 (20.0)
15 kV 125 kV BIL	845 (33.25)	565 (22.25)
27 kV 125 kV BIL	845 (33.25)	565 (22.25)
27 kV 150 kV BIL	946 (37.25)	660 (26.0)
38 kV 150 kV BIL	946 (37.25)	660 (26.0)

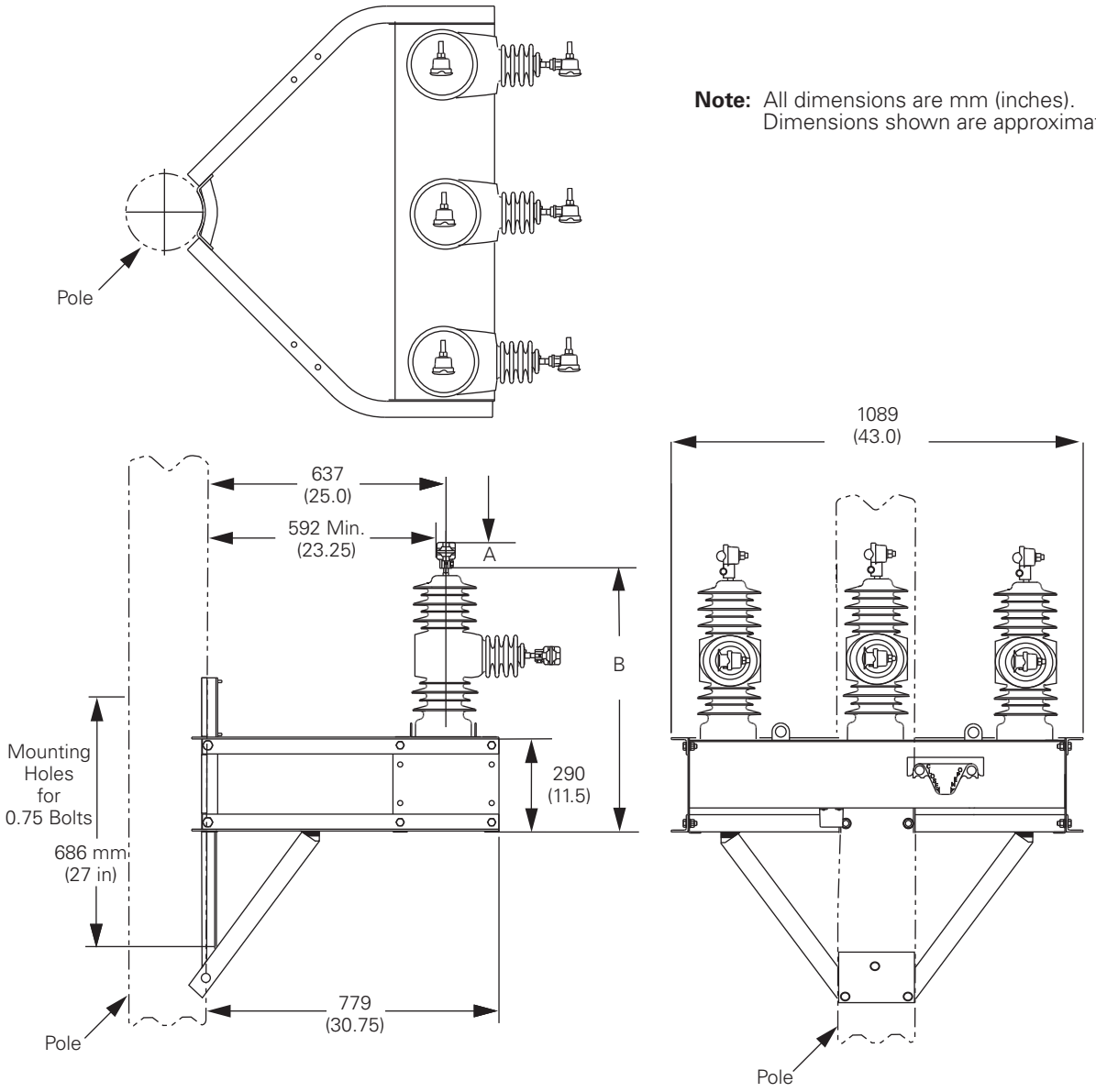
Creepage Distances

Description	15 kV 110 kV BIL	15 kV 125 kV BIL	27 kV 125 kV BIL	27 kV 150 kV BIL	38 kV 150 kV BIL
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	673 (26.5)	775 (30.5)	775 (30.5)	953 (37.5)	953 (37.5)

Figure 5. DAS switch dimensions (27 kV switch.)

Table 18. DAS Switch Weights

Description	DAS15 110 kV BIL	DAS15 125 kV BIL	DAS27 125 kV BIL	DAS27 150 kV BIL	DAS38 150 kV BIL
DAS switch kilograms (pounds)	100 (220)	104 (230)	104 (230)	115 (253)	115 (253)



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

Terminal Options	A
Eyebolt, 1/0 - 500 mcm Cable Range (630 A maximum)	83 (3.25)
Eyebolt, 4/0 - 1000 mcm Cable Range (800 A maximum)	108 (4.25)
Flat Pad, 2-hole (630 A maximum)	114 (4.5)
Flat Pad, 4-hole (800 A maximum)	121 (4.75)
Stud Type, 1.125 - 12 threads (800 A maximum)	83 (3.25)

	Dimension B
DAS15 110 kV BIL	791 (31.25)
DAS15 125 kV BIL	847 (33.25)
DAS27 125 kV BIL	847 (33.25)
DAS27 150 kV BIL	946 (37.25)
DAS38 150 kV BIL	946 (37.25)

Figure 6. Dimensions of DAS switch with pole-mounting hanger accessory.

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

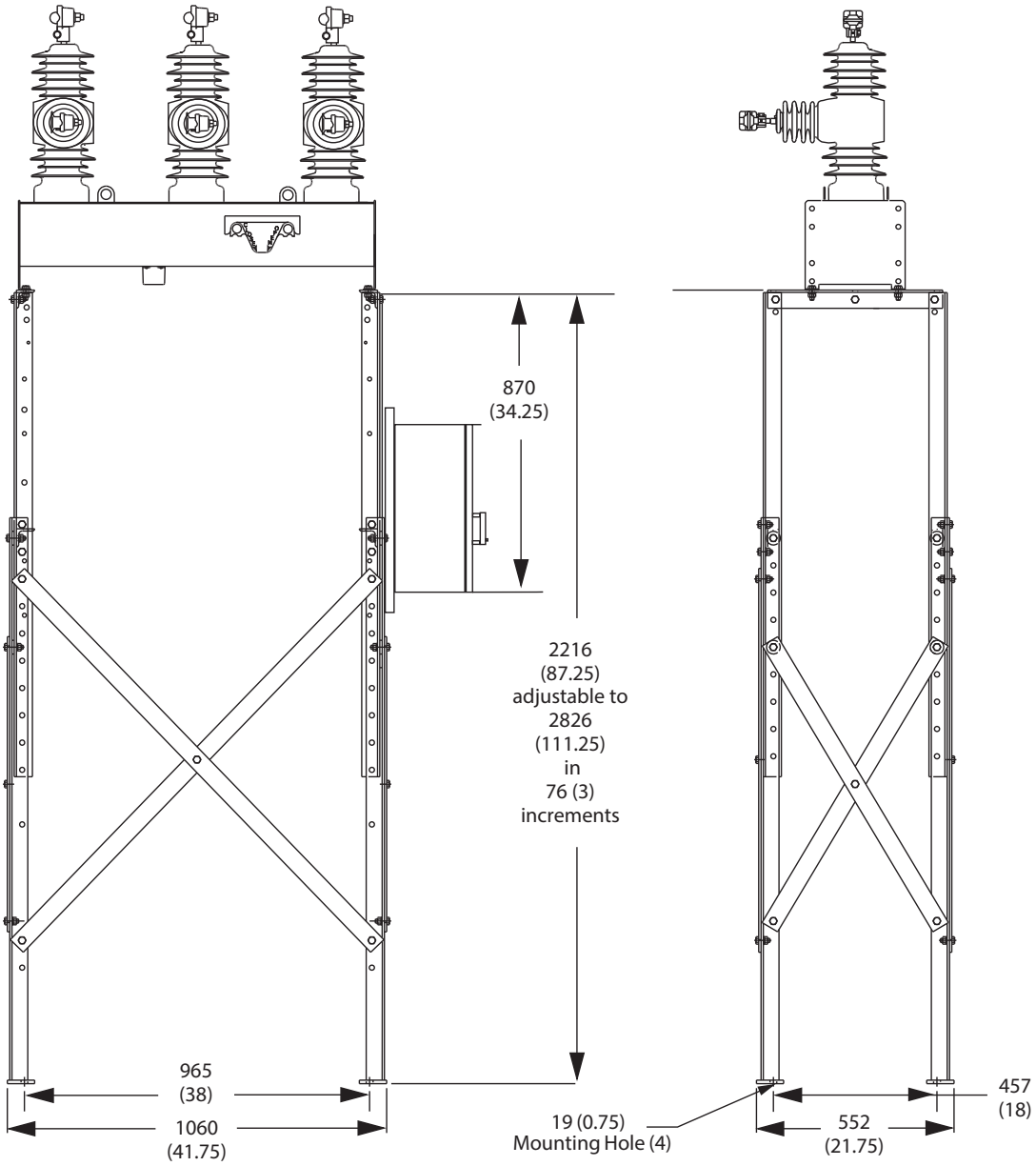


Figure 7. Dimensions of DAS switch with substation-mounting frame accessory.

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 iDC switch control provides two settings groups for operating in either switch or sectionalizer mode. The settings groups are selectable through the ProView interface software, or through the font-panel pushbutton interface on the control. Each setting group contains parameters relevant to the selected mode or for both, including fault targeting and inrush restraint.

System configuration settings

A System Configuration menu enables selection of parameters specific to the physical characteristics of the switch, its metering devices, and the distribution system. These settings include but are not limited to instrument transformer ratios, adjustment angles and connection parameters; sequence impedances for fault location, bushing configurations, and system rotation.

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

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

A Sequence of Events (SOE) Recorder is capable of capturing discrete events such as Open/Close operations, faults, alarms, mechanism failures, etc. The SOE provides time-stamping for up to 18 event types. An additional 32 inputs can be user-defined through the Idea Workbench software.

The SOE 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. Configurable contacts use graphical interface software to combine status or control functionality along with Boolean algebra. The remaining single output contact and two input contacts are dedicated and are not user configurable.

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 samples per cycle.

Note: The configuration settings are programmable.

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.

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 time programmable.

Communications

Communication ports

The iDC switch control has two back panel communication ports and a front panel configuration data port. The control can be programmed via a personal computer connected through the front panel RS-232 port. Control programming, interrogation, and operations are performed with ProView interface software on a personal computer.

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 8.

Communication protocols

Four communication protocols are available for the iDC switch control:

- Modbus
- DNP3 Serial
- IEC101/104
- DNP3 TCP-IP
- 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.

Contact input/output

The iDC control comes standard with three (3) input and five (5) output contacts; one (1) input and four (4) outputs are user configurable. These allow connection of contact type input devices (switches, relays) and discrete indicating devices (relays, LEDs, lamps) to the iDC control to affect local input/output. An optional discrete interface board (DIF) is available with eight (8) additional inputs/outputs, all of which are user configurable. See Figure 8.

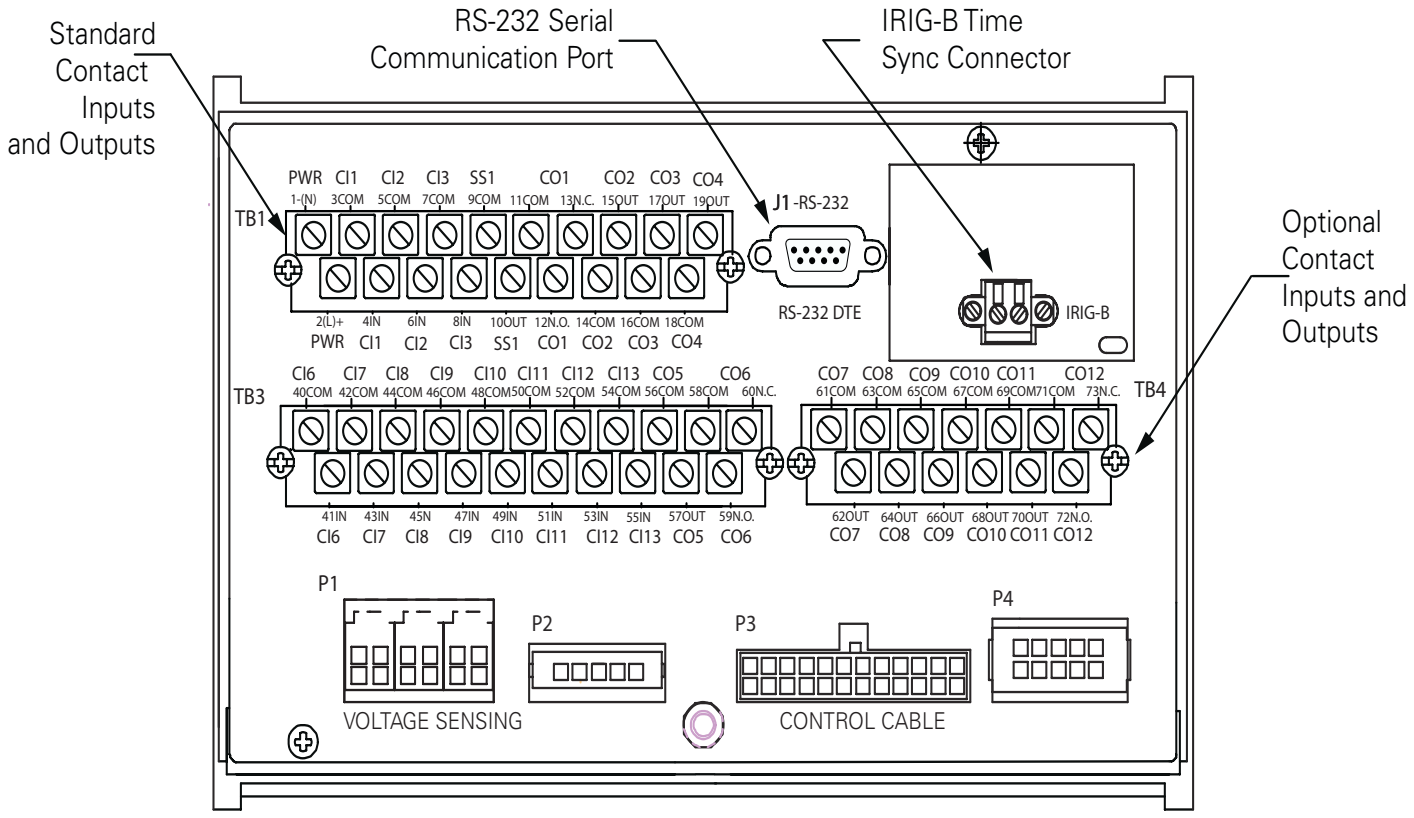


Figure 8. iDC switch control rear panel. Shown with standard communications option and optional additional I/O contacts.

Front panel human-machine interface (HMI)

Control front panel

The iDC switch control front panel is illustrated in Figure 9.

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

Other features include:

- PowerSave - turns off LCD backlight after a user specified period of inactivity
- Reset Menu - reverts the LCD to the main menu after a user specified period of inactivity
- Front panel text messaging - displays active user-configured text messages

Programming panel

The Programming keypad has the following sections.

One-touch hot keys

There are eight hot keys (Figure 9) 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 this 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.

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.

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.

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.

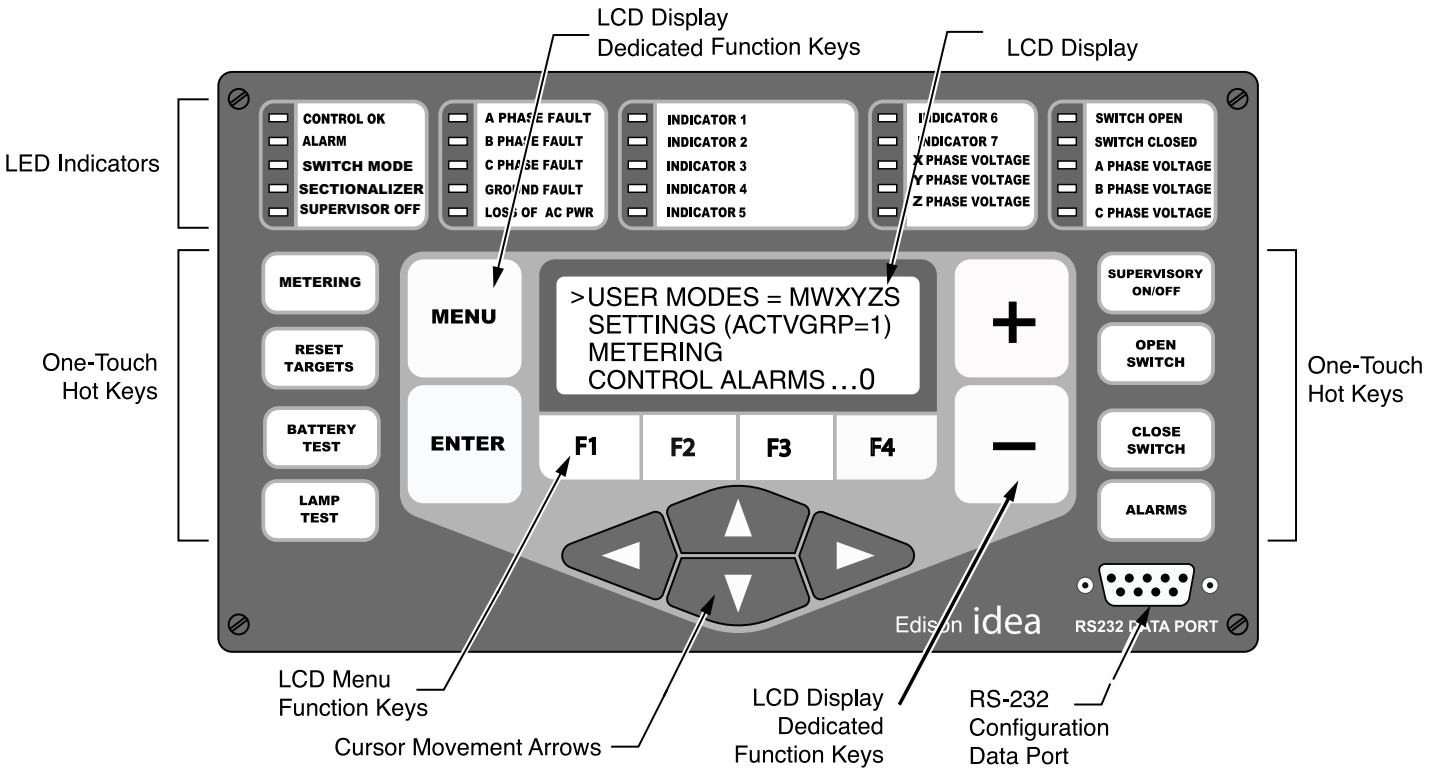


Figure 9. iDC switch control front panel.

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 10).

The LCD display panel contrast is field-adjustable to allow for various mounting heights and applications.

Four (4) LCD navigation buttons allow the user to step into and out of levels in the menu hierarchy, and increment/decrement values. Four (4) LCD menu function keys (F1-F4) are used to activate specific menu commands. Four (4) arrow keys provide cursor movement in the left, right, up, and down directions.

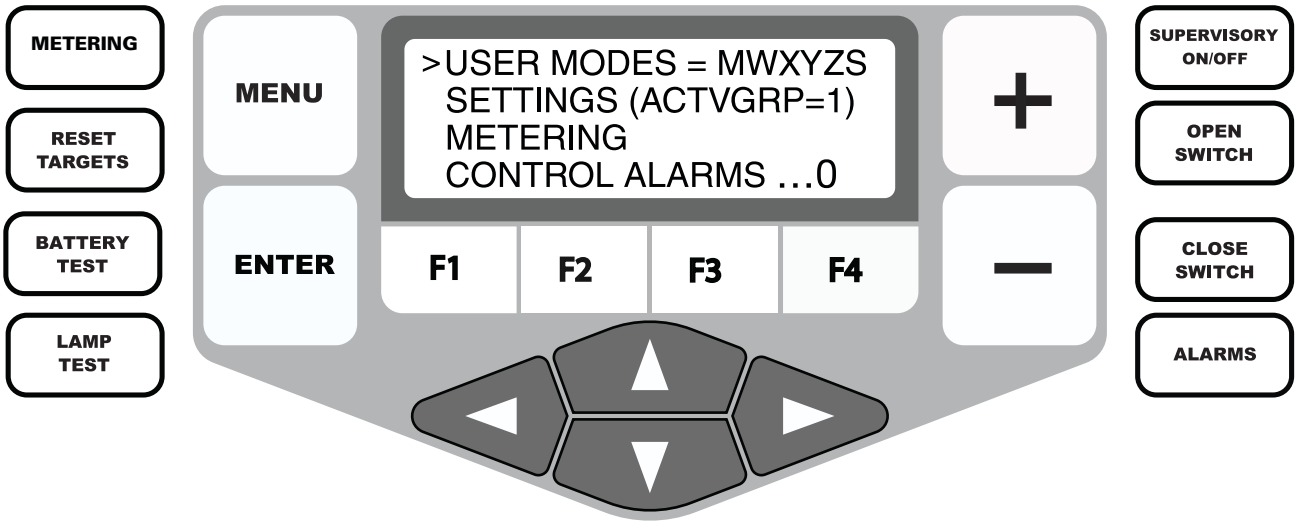


Figure 10. Analysis keys, LCD display, LCD menu function keys, and cursor movement arrows.

Status indicator LEDs

The status indicator LEDs (Figure 11) 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.

CONTROL OK: The green LED indicates the control is operating normally and not in an alarm state. A blinking LED indicates an abnormal condition.

ALARM: Factory assigned, blinking illumination indicates one of the following alarm conditions exist. Alarm conditions may also be viewed in more detail on the LCD menu.

- Reset Alarms – Access Reset Alarms screen to reset alarms.
- Battery Alarm – Indicates a battery alarm when battery voltage drops below a specified level.
- 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.

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.

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.

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.

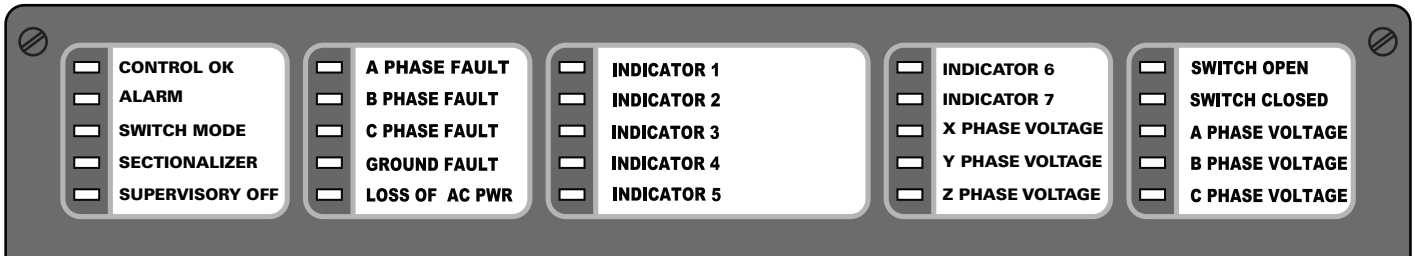


Figure 11. iDC switch control status indicator LEDs.

Control 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. Tables 10 and 11 include 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. Refer to Table 9 for the correct catalog number based on quantity.

120 Vac GFI duplex outlet

The GFI Duplex Outlet (Catalog Number KME6-1776) is rated for 15 Amperes and is accessible through the front door in the control cabinet. The outlet is used for many applications such as power for the auxiliary measurement equipment, supplemental lighting, and notebook computers.

Automation packages

Basic and full automation accessories are available to accommodate SCADA equipment such as radios, etc. Refer to Table 11 for additional information on these accessories.

Cabinet ordering accessories

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

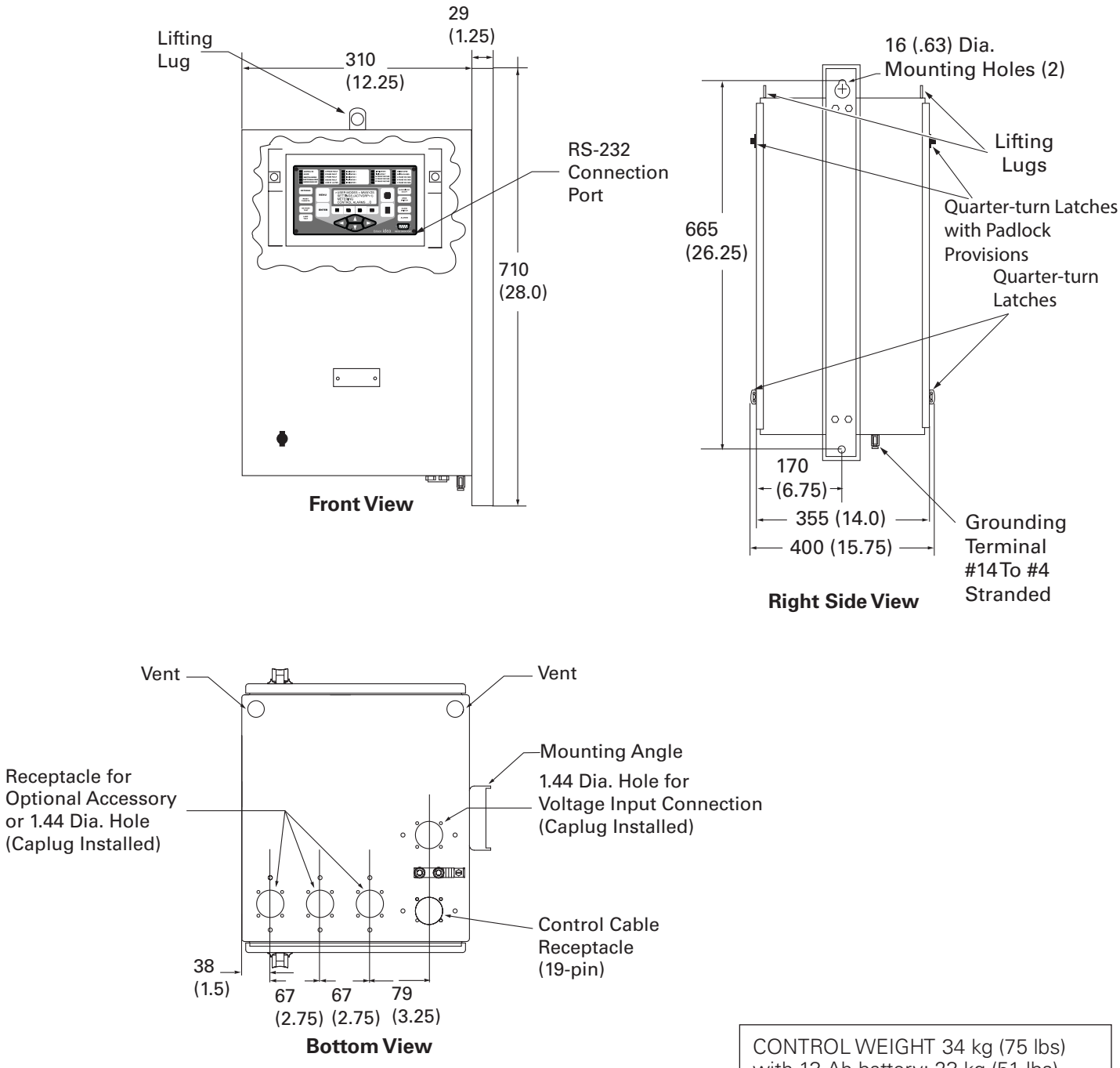


Figure 12. iDC control weight and dimensions.

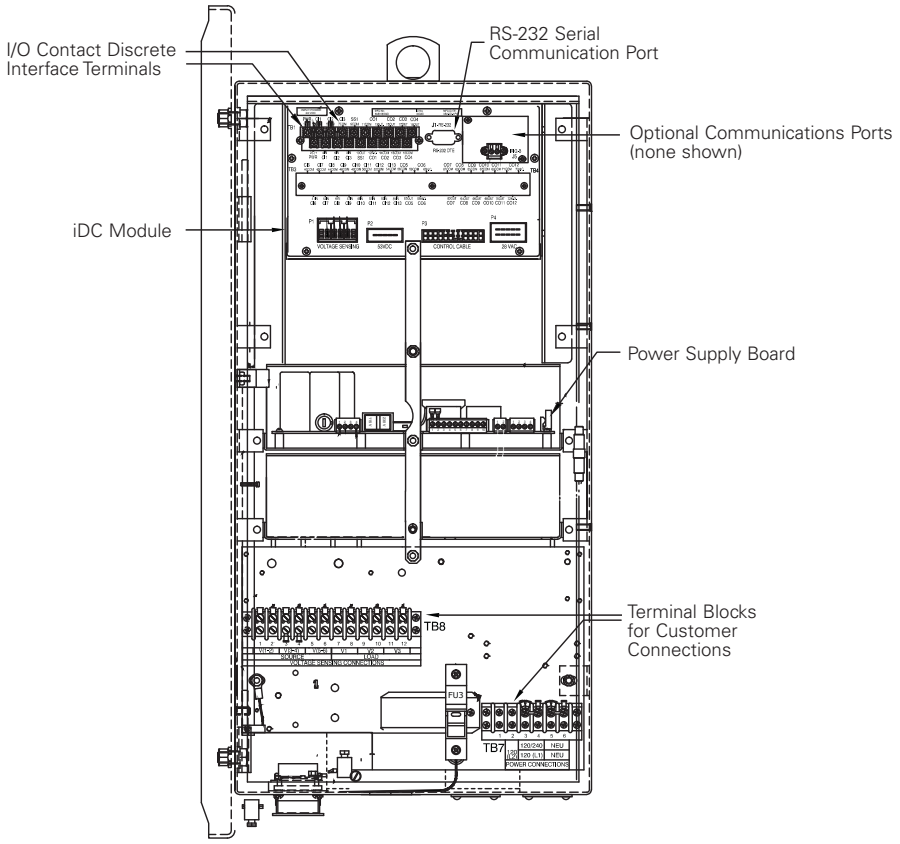


Figure 13. iDC switch control back panel terminal block and communication port identification.

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Printed in USA
Publication No. CA008003EN
September 2019

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