

POWER-ZONE® II Low Voltage Metal-Enclosed Drawout Switchgear .0

Class

Description	
DESCRIPTIVE INFORMATION	

General Description	6030	2-3
Circuit Breakers	6030	4-5
Solid State Trip Devices	6030	6
Circuit Breaker Compartment	6030	7-8
Instrument Compartment	6030	9
Bus and Cable Compartments	6030	10
Outdoor Enclosures	6030	11
Accessories & Options	6030	12

CONTENTS

Pages

6

Description	Class	Pages
APPLICATION DATA		
Ratings	6030	13
Curves	6030	14-16

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Curves	6030	 14-16
Ground Fault Protection	6030	 17
Selection Tables	6030	 18-19
Dimensions	6030	 20-22
Suggested Specifications	6030	 23-24





FILE: Distribution Products Catalog



DESCRIPTIVE INFORMATION

GENERAL DESCRIPTION



RATINGS: Main Bus—4000 ampere maximum 120/208 to 600 Volts, AC, 10 3W., 30 3W. or 30 4W.

AVAILABLE BREAKERS:

DS, DSL-206, DS-2065	800A. Frame
DS, DSL-416, DS-4165	1600A. Frame
DS-420	2000A. Frame
DS, DSL-632	3200A. Frame
DS, DSL-840	4000A. Frame



TYPICAL INDOOR SWITCHGEAR ASSEMBLY USING DS-632 MAINS AND TIE AND DS-206, DS-416, AND DS-420 FEEDERS.

ENERAL

POWER-ZONE[®] II LOW VOLTAGE METAL-ENCLOSED DRAWOUT SWITCHGEAR is premium distribution equipment designed to offer the user many safety features, minimum down-time, system selectivity, ease of maintenance, and large functional capacity.

The types DS (not fusible) and DSL (fused) low voltage power circuit breakers are the primary components of POWER-ZONE II switchgean These circuit breakers employ a solid state tripping device offering the latest in circuit protection.

Functional and operational advantages are:

Safety Features—Compartmentalized and barriered constuction per ANSI C37.20 assures protection to operating personnel even under severe short circuit conditions.

Minimum Down-Time—Drawout construction allows quick and simple replacement of breaker elements. If an emergency occurs, breakers may be removed from low priority circuits and re-installed to serve high priority circuits.

System Selectivity—The solid state trip device provided on each DS and DSL low voltage power circuit breaker is field adjustable, enabling the user to attain optimum selectivity and coordination. Ease of Maintenance—Circuit breakers are simple to inspect, adjust, and replace. They can be withdrawn from their compartments for convenient and safe maintenance or inspection.

Functional Capacity—Large frame sizes and high interrupting ratings make the DS and DSL low voltage power circuit breakers ideal for application on today's high capacity distribution systems.

Applicable Standards—Structures: NEMA SG5 ANSI C37.20 ANSI C37.51

> Circuit Breakers: NEMA SG3 ANSI C37.13 ANSI C37.16

UL Listing—POWER-ZONE II switchgear can be designed and engineered to comply with UL requirements. All DS and DSL power circuit breakers are optionally available with a UL listing with the exception of the DS-206S, DS-416S, DSL-632, and DSL-840. Where UL Standards exist for all component materials, parts and devices in a switchgear section, a UL label can be affixed.

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COMPARTMENTALIZED CONSTRUCTION





Compartmentalized Construction: POWER-ZONE II LOW VOLTAGE METAL-ENCLOSED DRAWOUT SWITCHGEAR offers high reliability through compartmentalized construction.

- The three compartments are:1. Circuit breaker or instrument compartment.2. Bus compartment.

 - 3. Cable compartment.

Isolation between the bus and cable compartments and/or between adjacent bays is available through optional vertical bus barriers.

NOTE: If incoming conductors are considered to be "Service Conductors," then barriers per N.E.C. Article 384-3 must be specified.





DESCRIPTIVE INFORMATION

CIRCUIT BREAKERS



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POWER-ZONE II Switchgear utilizes the Type DS Low-Voltage Power Circuit Breaker. This circuit breaker is available in five basic frame sizes which are tabulated along with their respective interrupting capacities in Table A on Page 13. The breaker overcurrent protection consists of a modern solid-state trip device that requires no external power source. The complete tripping system has three basic components; the molded sensors, the trip device and the trip actuator.

Each pole of the circuit breaker is equipped with a molded sensor located on the bottom rear main disconnect contacts. These sensors produce an output proportional to the load current, that is fed into the trip device which has the intelligence and energy to operate the trip actuator when required. The trip actuator receives the tripping pulse from the solid-state trip unit and produces a mechanical force to trip the circuit breaker. Molded Sensor SCHEMATIC ISLUSTRATION OF TRIPPING SYSTEM

Type DS circuit breakers are equipped with the controls as shown below (Amptector I-A - optional). The circuit breaker is a fully stored energy device with a two-step operating mechanism. A spring charging handle charges the mechanism and the breaker contacts are closed by pushing the "Push To Close" button.

Electrically operated breakers have a motor to charge the stored energy mechanism, electric close feature and electric open feature.



DESCRIPTIVE INFORMATION

CIRCUIT BREAKERS

USED BREAKERS

Fuse

The main disconnecting contacts located on the rear of the breaker are spring loaded and self-aligning to insure positive electrical contact when the breaker is in the connected position. These contacts are designed so the pressure at the point of contact on the stationary stud becomes greater under short circuit conditions.

The secondary disconnecting contacts are also located on the rear of the circuit breaker element and are used for connecting the accessories to the control power source or other control circuits. These contacts are in the "make" position when the element is in the "Connected" and 'Test" positions.

> Main Disconnecting Contacts

6 A 3

terphase

Secondary Disconnecting Contacts

Levering

Arm

64

Barriers

REAR VIEW OF DS-632 CIRCUIT BREAKER ELEMENT

POWER-ZONE II Switchgear is also available with fused power circuit breakers. Fused circuit breakers have a short circuit interrupting capacity of 200,000 amperes symmetrical. The breaker element including the solid-state tripping system is identical to that of a not-fusible circuit breaker except for the addition of the fuses and other circuitry necessary for the proper functioning of the fuse protection system.

Current limiting fuses are available on the 800 A., 1600 A., 3200 A., and 4000 A. frame power circuit breakers. The current limiting fuses are mounted in-tegrally on the rear of the circuit breaker element for the 800 A. and 1600 A. frame sizes and are mounted on a separate drawout truck for the 3200 A. and 4000 A. frame sizes (see illustration, page 20). When fuses are mounted on a separate fuse truck the drawout mechanisms are mechanically key interlocked with the circuit breaker element.

ALL VERSIONS OF THE FUSED CIRCUIT **BREAKER ARE EQUIPPED WITH BLOWN FUSE** INDICATION AND ANTI-SINGLE PHASING AS STANDARD.



FRONT VIEW OF DSL-206 CIRCUIT BREAKER



REAR VIEW OF DSL-206 CIRCUIT BREAKER EQUIPPED WITH INTEGRAL CURRENT LIMITING FUSES

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5



DESCRIPTIVE INFORMATION

SOLID STATE TRIP DEVICES





AMPTECTOR II-A SOLID STATE TRIP DEVICE

The Amptector II-A[†] is the standard solid-state trip device supplied with DS power circuit breakers. It has adjustable settings for long delay time, long delay pickup, instantaneous pickup, and (as an option), short delay time and short delay pickup. When pre-set con-ditions of current magnitude and time delay are ex-ceeded, it supplies a signal to the trip actuator which trips the breaker. The energy required for this operation is derived from the breaker-mounted current sensors. An optionally available portable test kit may be plugged into the trip device for testing and calibration.

Three combinations of tripping functions are available: 1. Long delay and instantaneous (DU).

- 2. Long delay and short delay (SE).*
- 3. Long delay, short delay, and instantaneous (TR).*

For time current characteristics refer to the trip curve on page 14 and the breaker sensor rating table on page 13. table B.

The Amptector I-A[†] solid-state trip device is optionally available for DS power circuit breakers. In addition t the features offered with Amptector II-A, Amptector I-A is supplied with pop-out indicators to annunicate trips due to overload, short circuit or ground fault (equipped). Short delay is optional. Ground fault trip also optional; available with adjustable pickup and delay

Six combinations of tripping functions are available:

- 1. Long delay and instantaneous (LI).
- 2. Long delay and short delay (LS)
- 3. Long delay, short delay and instantaneous (LSI).*
- 4. Long delay, instantaneous and ground fault (LIG).*
- 5. Long delay, short delay, and ground fault (LSG).*
- 6. Long delay, short delay, instantaneous and ground fault (LSIG).*

For time current characteristics, refer to the trip curve on page 14 and the breaker sensor rating table on page 13, table B. Ground trip pickup values are listed on page 13, table D.

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OPTIONAL AMPTECTOR I-A SOLID STATE TRIP DEVICE

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CIRCUIT BREAKER COMPARTMENT



TYPE DS-206 CIRCUIT BREAKER

A steel barrier is installed on the front of each circuit breaker to protect operating personnel when the compartment door is open. This barrier offers full protection during closing, opening and racking operations. To offer maximum safety, live parts in the cell or on the breaker element are not accessible until the circuit breaker is fully withdrawn. When the breaker is in the full connected position and the compartment door is closed POWER-ZONE II construction offers double safety by providing two full steel barriers between energized parts and operating personnel.

Cell Switch

Secondary Contacts For Breaker Control

Cell Mounted Current Transformer

Each drawout low-voltage power circuit ker is mounted in its own individual barriered compartment. The steel barriers are in accordance with all NEMA and ANSI specifications for this class of equipment. The front door can be closed with the circuit breaker in the "Connected, Test or Disconnected" position. All cir-cuit breaker controls, except the external trip plate are located behind the compartment door so they are not readily accessible or obvious to unauthorized personnel.

An external trip plate is accessible from the front of the equipment, without opening the compartment door, for emergency tripping.



TYPE DS-632 CIRCUIT BREAKER

Circuit breaker compartments can be equipped with cell mounted current transformers for either main or feeder metering requirements.

The optional cell switch signals the circuit breaker's position.

DS-632 CIRCUIT BREAKER COMPARTMENT WITH BREAKER ELEMENT REMOVED

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CIRCUIT BREAKER COMPARTMENT

Each switchgear assembly is provided with a removable crank for levering the circuit breaker element between positions. Mechanical interlocking prevents levering a closed breaker and will not permit closing the breaker contacts while the element is between positions. The circuit breaker contacts can only be closed when the breaker is in the "connected" or "test" position.



BREAKER IN FULLY CONNECTED POSITION





BREAKER IN DISCONNECTED POSITION

In the withdraw position, retractable extension rails which are permanently attached to the drawout cradle enable the breaker element to be fully withdrawn from its cell. A mechanical interlock assures that the stored energy closing springs will be discharged when the breaker is withdrawn.



BREAKER LEVERING OPERATION

In the connected position the circuit breaker main contacts and the secondary control contacts are fully connected. The circuit breaker and its secondary control contacts are completely functional.

In the test position the circuit breaker main contacts are disconnected while the secondary control contacts are connected. The secondary control circuits are completely functional, enabling testing of the circuit breaker.

In the disconnected position, both the circuit breaker main contacts and the secondary control contacts are completely disconnected.



BREAKER IN FULLY WITHDRAWN POSITION

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DESCRIPTIVE INFORMATION

INSTRUMENT COMPARTMENT





METER COMPARTMENT DOOR

Terminal and fuse blocks are located near the front of the meter compartment for easy access. Where wires pass through steel barriers, neoprene grommets or other protective coverings are used to prevent damage of the wire insulation. All control or meter wiring used in POWER-ZONE II switchgear structures is stranded and of the 600 volt insulation class.



FEEDER AMMETER AND SWITCH

Metering for a main breaker or the main bus is generally located in the top compartment of the service entrance section. These meters are mounted on a hinged door equipped with a flush handle and key lock to prevent exposure of unauthorized personnel to energized live parts. Stranded flexible wiring between the meter compartment door and the stationary structure is neatly bundled and looped at the door hinge to allow a full 90 degree swing and easy access to all metering devices and components.



Ammeters and selector switches for feeder circuit breakers can be mounted on the stationary panel located between breaker cells.

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BUS AND CABLE COMPARTMENTS





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CROSS BUS WITH PROVISIONS FOR FUTURE EXTENSION

Main and riser busses are available in ratings of 1600 A 2000 A., 3000 A. and 4000 A. Welded aluminum bu is supplied as standard.

Optional Barriers



OAD SIDE BUS WITH OPTIONAL CABLE LUGS EXTENDED INTO CABLE COMPARTMENT

The main cross bus is connected to the extruded vertical riser bus by means of welded aluminum splice plates. The cross bus is stacked vertically in the bus compartment and has provisions for future extension on at least one end.

Copper bus with bolted connections is optionally avail-



TYPICAL SECTION RISER BUS FEEDING INDIVIDUAL BREAKER COMPARTMENTS

The cable compartment contains NEMA standard drillings for load side connections for outgoing feeder cables. These connections are located in the cable compartment in accordance with the National Electric Code, Article 384-3 (d) which requires, it be unnecessary to reach across the line and section riser bus to make load connections. All load side connectors extending from the breaker compartments are insulated with sleeving to physically isolate them from the line bussing in the center bus compartment. Phase bus extensions for customer connections are made of silver plated copper.

DESCRIPTIVE INFORMATION

OUTDOOR ENCLOSURES



POWER-ZONE II Low Voltage Drawout Switchgear is available in a non walk-in or walk-in front aisle enclosure for outdoor installations. Both enclosures are NEMA type 3R.

Non walk-in enclosures are equipped with:

- •Cell strip heaters.
- ANSI #49 paint inside and out.

Options available:

- Mobile floor crane to handle circuit breakers.
 Removable steel coverplates over conduit entrance area.
- Convenience outlets.

The walk-in enclosure is equipped with the following standard features:

- Full length front aisle with steel access doors on each end. Doors are provided with panic hardware.
- •Hinged coverplates held by tamper-resistant hardware on the rear of each equipment section.
- Incandescent lighting.
- Convenience outlets.
- Breaker cell strip heater.
- Breaker lifting device.
- Removable steel coverplates over conduit entrance area.
- ANSI #49 paint inside and out.

The enclosure dimensions are illustrated on page 22.

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CLASS

6030



APRIL, 1983

DESCRIPTIVE INFORMATION

ACCESSORIES

All type DS and DSL power circuit breakers equipped with Amptector solid-state trip devices have plug-in type test facilities which enable the user to test and calibrate all tripping functions. A portable test kit, specifically designed for this purpose, is optionally available as shown below.



stand provides mobility for moving circuit breakers to the test area, a convenient height for visual inspection of breakers, contacts for testing all secondary control functions, a test equipment shelf for mounting the Amptector test kit, and power contacts for high current testing and calibration.



BREAKER LIFTING DEVICE

A rail-mounted travelling type breaker lifting device is optionally available with indoor type switchgear. It is supplied as standard with outdoor walk-in enclosures.

MISCELLANEOUS BREAKER OPTIONS & ACCESSORIES

Miscellaneous Breaker Options and Accessories:

- Shunt trip for manually operated breakers.
- Auxiliary switch with four 10 ampere contacts. A maximum of three auxiliary switches can be supplied per breaker.
- •Cell switch with 12 Form "C" contacts. Operates when breaker is drawn from connected to test position.
- Undervoltage trip-instantaneous or time delay type. Trips the breaker on 30-60% undervoltage.
- Overcurrent trip switch-operates and latches when breaker is automatically tripped on overload or fault conditions.

• High load switch-operates on overload of lower value

than the long time pickup setting for advanced warning of overload condition.

- Electric lockout for manually operated breakers.
- Electric close release for manually operated breakers.
- Square D Key Interlocks or other recognized key interlock systems.
- Operations counter.
- AC capacitor trip.
- Integral ground fault sensing (see page 17).
- Insulated bussing.
- •UL Label.
- Two breaker mechanical interlocks.

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APPLICATION DATA

RATINGS



TABLE A INTERRUPTING RATINGS OF TYPE DS CIRCUIT BREAKER (RMS SYMMETRICAL AMPERES) w/Short Delay Trip w/Instantaneous Trip Trip Current Range Breaker Type 208-240V 208-240V 480 600V 480V 600V 30,000 42,000 50,000 30.000 25-800 DS-206 42.000 30.000 30.000 30.000 30,000 42,000 42,000 50,000 50,000 65,000 DS-206S DS-416 DS-416S 25-800 50-1600 50,000 65,000 42,000 42,000 42,000 50,000 50-1600 65,000 65,000 65,000 65,000 50,000 65,00 65,00 65 000 DS-420 DS-632 50,000 50,000 65,000 65,000 65,000 50-2000 65,000 85,000 1200-3200 85.000 65,000 2000-4000 DS-840 130,000 85 000 85,000 85 000 85 000 DSL-206 DSL-416 DSL-632 DSL-840 25-800 50-1600 All Ranges: 200,000 (DSL-840, 6000A LIMITER 1200-3200 2000-4000 50.000) TABLE B AVAILABLE SENSOR RATINGS 50, 100, 150, 200, 300, 400, 600 & 800 100, 150, 200, 300, 400, 600, 800, 1200 & 1600 100, 150, 200, 300, 400, 600, 800, 1200, 1600 & 2000 2400 & 3200 4000 Breaker Type Sensor Rating (Amperes) DS-206, DSL-206, DS-206S DS-410, DSL-410, DS-416S DS-420 DS-632 DS-840 **TABLE C** AMPTECTOR II-A AND AMPTECTOR I-A SOLID-STATE TRIP DEVICE CONTINUOUSLY ADJUSTABLE RANGES Long delay time seconds (6 times Ground † Long delay pickup Short Instantaneous pickup (multiples of sensor rating) pickup (multipi of sens Short Ground † pickup (multiples (multiples delay time time seconds of sensor rating) dela of sensor rating seconds rating) rating) 0.5 4* đ, 0.18 4 See Table D 0.22 to 0.50 to 12 to to to to 0.50 1.25 36 *Amptector II-A is calibrated 8 to 36 seconds. †Available on Amptector I-A trip only. TABLE D AMPTECTOR I-A GROUND PICK-UP VALUE-AMPERES Sensor Rating Dial Secondary Setting 100 150 200 300 400 600 800 1200 1600 2000 2400 3200 4000 Current(1) 50 57 65 80 110 180 260 640 60 145 330 400 530 800 Α 1.0

All pick-up values	may vary $\pm 10\%$.

22

33

6

100

85

100

145

75

85

120

110

130

200

150

185

270

205

250

385

в

С

D

CAUTION-ONLY THOSE PICK-UP VALUES ABOVE AND TO THE LEFT OF THE LINE MEET REQUIREMENTS OF N.E.C. SECTION 230-95. PICK-UP VALUES MARKED * DO NOT MEET REQUIREMENT.

260

325

500

385

480

730

505

625

970

600

760

1200

770

960

*1465

1000

1200

*1920

1200

*1520

*2400

1.5

19

3.0

Current of this value from the secondary of an external ground transformer will cause the ground element to function. Ground element pick-up can also be tested using this value. All sensors must be disconnected during test.



CLASS

6030

APRIL, 1983

APPLICATION DATA

AMPTECTOR I-A & II-A TIME CURRENT CHARACTERISTICS



APPLICATION DATA

DSL FUSE LIMITERS



DSL circuit breakers are equipped with limiters having characteristics as illustrated in curves A through F. Fuse limiters are used where fault currents exceed the interrupting capacity of the circuit breaker alone. The let-thru and I²T characteristics of the limiters are coordinated with the circuit breaker elements to allow safe application on circuits which have available fault currents up to 200,000 RMS symmetrical amperes.

Selection of the proper limiter size depends upon whether the limiter's function is to protect downstream equipment or to protect circuit breaker. If downstream equipment protection is the main criterion, the smallest available limiter should be selected. Due to coordination problems, selection of certain small limiters may cause nuisance blowing on overloads or low level short circuits. For protection of the circuit breaker only, the largest available limiter should be selected.

Table E lists available limiter ratings for DSL-206 and DSL-416 breakers.



Minimum, recommended, and maximum limiter sizes for Type DSL-206 and DSL-416 breakers are given in the following table:

Breaker Type	Sensor Rating Amperes	Lim Minimum 1	iter Rating, Amp Recommended	Maximum 3
DSL-206 DSL-206 DSL-206 DSL-206 DSL-206 DSL-206 DSL-206 DSL-416 DSL-416 DSL-416	50 or 100 150 200 300 400 600 800 800 800 800 1200 1600	150 200 250 600 800 200 800 1000 2000 3000	1200 1200 1200 1200 1200 1200 1200 1200	2000 2000 2000 2000 2000 2000 2000 3000 3000 3000 3000

 ①For use only when protection of downstream equipment is required. Not completely co-ordinated with breaker to avoid nuisance blowing.
 ●Lowest rating which can be co-ordinated with breaker to minimize nuisance blowing.

nuisance blawing. OHighest avaitable ratings, for protection of breaker only. Limiters are mounted in separate trucks for the DSL-632 and DSL-840 breakers. Three sizes, 2500, 3000 and 4000 amps. capacity, are available (on DSL-632, five sizes, 2500, 3000, 4000, 5000 and 6000 amps. capacity, are available for DSL-840.





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APPLICATION DATA





APPLICATION DATA

GROUND FAULT PROTECTION



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All type DS and type DSL low voltage power circuit breakers equipped with the Amptector I-A solid-state tripping unit can be provided with optional ground fault protection. Ground fault protection is not available on circuit breakers equipped with the Amptector II-A solid-state tripping unit. Multiple levels of ground fault protection can be selectively set by time-current coordination which meets all present codes and standards.

The ground element of the Amptector I-A provides two adjustable parameters: ground fault pick-up and ground fault time delay. The actual pick-up current is a function of the pick-up dial setting and the rating of the current sensors supplied with the circuit breakers as shown in Table D page 13. One of four dial settings (A, B, C or D) may be selected. Each setting results in a different pick-up value for a particular sensor rating. The pick-up point is that value of ground fault current which initiates the time delay cycle. The ground element time delay setting is continuously adjustable with calibrated points at 0.22, 0.35, and 0.5 seconds. (For zone selective interlocking with restraint signals, consult Square D Headquarters.)

Two types of sensing circuits are available. The applica-tion of a particular sensing circuit depends on the func-tion of the circuit breaker involved. These two circuits are illustrated in figures A and B.

Figure A: Residual Main and Feeder Breaker This configuration applies to main breakers of 3 wire systems or feeder breakers on 3 wire or 4 wire systems. The external sensor must be added when applied on feeder breakers of 4 wire systems.

Figure B: Source Neutral Main Breaker

This configuration applied to main breakers of 4 wire systems. The external sensor is placed on the neutral to ground link and is connected to the ground element terminals.

(For zero sequence ground fault protection or high resistance grounding, consult Square D Headquarters.)



* Apply in 3 Wire Systems for Main Breaker and in 3 or 4 Wire Systems for Feeder Breakers.

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APPLICATION DATA

SELECTION TABLES

Recommended Type DS All Circuit Breakers For Application with Transformers with impedances listed (Liquid, Dry Ventilated and Dry Sealed Type)



Transformer Rating	Maximum Short Cir-	Rated Load Continuous	Shor RMS S	t-Circuit Currer Symmetrical Arr	nt() Iperes		Selective Trip Systems		Fully Non-Select	-rated ive Systems
Kva and Impedance Percent	Available from Primary System	Amperes	Transformer Alone	50% Motor Load (208V) 100% Motor Load (240V)	Combined	SM Selective Main Breaker	SGF Selective Group Feeder Breaker	F Feeder Breaker	M Main Breaker	F or GF Feeder or Group Feeder Breakers
TABLE A: 208	VOLTS-3 PH	IASE (2)								
300 5%	50000 100000 150000 250000 500000 Unlimited	834	14900 15700 16000 16300 16500 16700	1700	16600 17400 17700 18000 18200 18400	DS-416	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	DS-416	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206 DS-206
500 5%	50000 100000 150000 250000 500000 Unlimited	1388	23100 25200 26000 26700 27200 27800	2800	25900 28000 28800 29500 30000 30600	DS-416	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206S	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	DS-416	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206 DS-206
750 5.75%	50000 100000 150000 250000 500000 Unlimited	2080	28700 32000 33300 34400 35200 36200	4200	32900 36200 37500 38600 39400 40400	DS-632	DS-206S DS-206S DS-206S DS-206S DS-206S DS-206S DS-206S	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	DS-632	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206 DS-206
1000 5.75%	50000 100000 150000 250000 500000 Unlimited	2780	35900 41200 43300 45200 46700 48300	5600	41500 46800 48900 50800 52300 53900	DS-632	DS-206S DS-416 DS-416 DS-416S DS-416S DS-416S DS-416S	DS-206 DS-206S DS-206S DS-416S DS-416S DS-416S	DS-632	DS-206 DS-206S DS-206S DS-416 DS-416 DS-416 DS-416
TABLE B: 240	VOLTS-3 PH	IASE 2								
300 5%	50000 100000 150000 250000 500000 Unlimited	722	12900 13600 13900 14100 14300 14400	2900	15800 16500 16800 17000 17200 17300	DS-206	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	DS-206	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206 DS-206
500 5%	50000 100000 150000 250000 500000 Unlimited	1203	20000 21000 22500 23100 23600 24100	4800	24800 26700 27300 27900 28400 28900	DS-416	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	DS-416	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206 DS-206
750 5.75%	50000 100000 150000 250000 500000 Unlimited	1804	24900 27800 28900 29800 30600 31400	7200	32100 35000 36100 37000 37800 38600	DS-420	DS-206S DS-206S DS-206S DS-206S DS-206S DS-206S DS-206S	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	DS-420	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206
1000 5.75%	50000 100000 150000 250000 500000 Unlimited	2406	31000 35600 37500 39100 40400 41800	9600	40600 45200 47100 48700 50000 51400	DS-632	DS-206S DS-416 DS-416 DS-416 DS-416 DS-416 DS-416S	DS-206 DS-206S DS-206S DS-206S DS-206S DS-206S DS-416	DS-632	DS-206 DS-206S DS-206S DS-206S DS-206S DS-206S DS-416

M = Main breaker selected to have adequate interrupting and continuous

Oshort circuit currents are calculated by dividing transformer full-load current by the sum of transformer and system impedance expressed in per unit. Motor contribution is assured to be 4 times total motor load.
 Ostandard sensor ratings are listed in a table on page 13. Recommended Type DS Air Circuit Breakers For Application with Transformers with impedances listed (Liquid, Dry Ventilated and Dry Sealed Type)

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POWER-ZONE® II LOW VOLTAGE METAL-ENCLOSED DRAWOUT SWITCHGEAR

APPLICATION DATA

SELECTION TABLES

Transformer Rating	Maximum Short Cir-	Rated Load Continuous	Shor RMS S	t-Circuit Currer Symmetrical Arr	nt(1) Inperes		Selective Trip Systems		Fully-rated Non-Selective Systems		
3 Phase Kva and Impedance Percent	cuit Kva Available from Primary System	Current Amperes	Transformer Alone	50% Motor Load (208V) 100% Motor Load (240V)	Combined	SM Selective Main Breaker	SGF Selective Group Feeder Breaker	F Feeder Breaker	M Main Breaker	F or GF Feeder or Group Feeder Breakers	
TABLE C: 480	VOLTS-3 PH	IASE @	1			1				I	
500 5%	50000 100000 150000 250000 500000 Unlimited	601	10000 10900 11300 11600 11800 12000	2400	12400 13300 13700 14000 14200 14400	DS-206	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	OS-206 DS-206 DS-206 DS-206 DS-206 DS-206	DS-206	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	
750 5.75%	50000 100000 150000 250000 500000 Unlimited	902	12400 13900 14400 14900 15300 15700	3600	16000 17500 18000 18500 18900 19300	DS-416	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	DS-416	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	
1000 5.75%	50000 100000 150000 250000 500000 Unlimited	1203	15500 17800 18700 19600 20200 20900	4800	20300 22600 23500 24400 25000 25700	DS-416	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	DS-416	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	
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1000 5.75%	50000 100000 250000 500000 Unlimited	962	12400 14300 15000 15600 16200 16700	3900	16300 18200 18900 19500 20100 20600	DS-416	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	DS-416	DS-206 DS-206 DS-206 DS-206 DS-206 DS-206	
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2000 5.75%	50000 100000 150000 250000 500000 Unlimited	1924	19700 24800 27200 29400 31300 33500	7800	27400 32500 34900 37100 39000 41200	DS-420	DS-416 DS-206S DS-206S DS-206S DS-206S DS-206S DS-206S	DS-416 DS-206S DS-206S DS-206S DS-206S DS-206S DS-206S	DS-420	DS-416 DS-206S DS-206S DS-206S DS-206S DS-206S	
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PRINTEO -19

CLASS 6030



SQUARE D COMPANY

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3.26 82.8

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803

FOR

_for DSL and DS-840

SEISMIC MOUNTING: CONSULT SQUARE D HEADQUARTERS OFFSET DS (EXCEPT DS-840)

FRONT

SQUARE D — SORGEL VENTILATED DRY OR POWER- AST® CAST RESIN TRANSFORMER LINE-UP FLOOR PLAN

9.5 241

OFFSET DSL, DS-840, AND DSL-840

D

FRONT

POWER-ZONE® II LOW VOLTAGE METAL-ENCLOSED DRAWOUT SWITCHGEAR

APPLICATION DATA DIMENSIONS **INDOOR CONSTRUCTION**



APPROXIMATE DIMENSIONS—NOT FOR CONSTRUCTION

DIMENSIONS

Bue Sizo	Bracker	Sec De	ction epth	Conduit Area Depths							
Dus Size	Type		D	F	+	н	+	к	+	0	J
		IN	mm	IN	mm	IN	mm	IN	mm	IN	mm
1600A or 2000A	DS	55 60 66 72	1397 1524 1677 1829	8 14 20 26	203 355 508 660			Ē	Ţ	14 20 26 32	355 508 660 813
1600A or 2000A	DSL	63 68 74 80	1600 1728 1880 2032	8 14 20 26	203 355 508 660		=	E		14 20 26 32	355 508 660 813
3000A or 4000A	DS (Except DS-840)	60 66 72	1524 1677 1829	=	Ξ	9 15 21	228 381 533	<u>-</u>	=	15 21 27	381 533 685
3000A or 4000A	DSL (Except DSL-840)	68 74 80	1728 1880 2032	Ξ		9 15 21	228 381 533	=	=	15 21 27	381 533 685
4000A	DS-840 D SL-840	68 74 80	1728 1880 2032	Ξ		-	E	14 20 26	355 508 66 0	20 26 32	508 660 812

+Additional 6 (152mm) available if bottom compartment is blank.

METHOD FOR DETERMINING SECTION DEPTH AND CONDUIT AREA

- 1. Determine size of main bus from main breaker size and/or
- Select section depth acceptable use deepest section possible. Note: All DSL and DS-840 sections are 8 (203mm) deeper than standard DS. Use of DSL and/or DS-840 determines minimum depth of entire line-up.
 Find conduit area available CAUTION! Conduit area should be as large as possible. Much consideration must be given to area available when all conduits enter from top or bottom only.

For bus duct connections to sections, consult Square D Hea dquarters. Recommended Minimum Clearance: Front — 42 (1067mm) Rear — 42 (1067mm) Ref. See NEC Article 110-16

APPROXIMATE WEIGHTS

Type of Device	Lbs.	Kg.
DS-206 Breaker	175	79
DS-416 Breaker	180	82
DS-420 Breaker	192	87
DS-632 Breaker	300	136
DSL-206 Breaker	405	184
DSL-206 Breaker	205	93
DSL-632 Limiter Truck	255	116
DSL-632 Limiter Truck	325	147
DSL-640 Limiter Truck	430	195
4-High Unit w/o Breakers	1208	548
Auxiliary Unit w/o Devices	500	227

INCHES

Dual Dimensions:





APPLICATION DATA DIMENSIONS OUTDOOR ENCLOSURES



APRIL, 1983



APPLICATION DATA

SUGGESTED SPECIFICATIONS



General

The specifications and associated drawings describe the indoor Low Voltage Metal-Enclosed Drawout Switchgear Assembly. The assembly is to be designed for use on a ______ volt, (single) (3) phase, ______ wire, (50) (60) Hz. system, with ______ amperes symmetrical fault current available. Equipment is to be complete from the incoming line connections to the outgoing feeder connections. Any items not specifically mentioned but obviously necessary for proper operation are implied in this description.

The switchgear shall be POWER-ZONE II[®] Low Voltage Metal-Enclosed Drawout Switchgear, as manufactured by the Square D Company, or approved equal, designed, manufactured and tested in accordance with applicable NEMA, ANSI and IEEE Standards for power circuit breakers and metal-enclosed switchgear. The enclosure shall be finished with medium gray ANSI-49 enamel applied over a rust inhibiting phosphate primer. (Equipment shall be equipped with (UL) (service entrance) label where qualified.)

Enclosure

The enclosure and internal barriers shall be fabricated of steel members in accordance with NEMA and ANSI Standards. A lifting bar is to be provided with each shipping group for lifting the structure from the top with a crane. Supply a wooden skid to permit the use of pipe rollers for noving the switchgear to its final location inside the building.

The enclosure construction shall prevent the entry of rodents into the switchgear interior. Ventilation openings on the front of the switchgear breaker compartments are to be located in such a way as to preclude the possibility of metal objects being inserted through them and easily contacting energized parts.

The equipment shall be assembled, adjusted and tested at the factory and shall be sectionalized, if required, for shipment as requested or approved. The largest section is not to exceed ______ inches wide, ______ inches deep, and ______ inches high to enable installation at the job site

The structure is to consist of three basic compartments from front to rear: the Front Breaker Compartment, the Center Bus Compartment, and the Rear Cable Compartment.

Front Breaker Compartment

The front compartment is to contain the drawout circuit breaker elements, each mounted in its own barriered cell. Circuit breaker cells to have dual steel front parriers. One barrier to be the full cell door covering circuit breaker manual operating controls. The second barrier to be the front of the circuit breaker element covering the circuit breaker mechanism. Cell doors to be equipped with external trip buttons. Active or future use cells equipped to accept circuit breakers are to be complete with the circuit breaker drawout mechanism and all current-carrying parts.

Center Bus Compartment

The bus compartment is to contain the section riser and main cross bus which is to be rated for a 65 degree Centigrade temperature rise. The main cross bus shall be rated for ______ continuous amperes. All main and riser bus is to be (welded aluminum) (bolted copper) and be adequately braced to withstand the short circuit of ______ symmetrical amperes. When the cross bus is split for shipping purposes, all contact surfaces at the joint shall be plated and the joint bolts are to be of high strength grade 5 steel equipped with Belleville type spring washers. All electrical clearances are to be for 500 volts ac. (An isolated neutral bus is to be supplied rated at (50) (100) percent of the phase current.)

Rear Cable Compartment

Size the cable compartment to accommodate all incoming and outgoing cables required within each vertical switchgear section. Cable lugs are to be mounted on the load side (or line side as applicable) run-back bus which is extended into this compartment from the bus compartment. Run-back bus for main or feeder breakers is to be insulated from the section riser and cross bus. This compartment shall also contain a plated (aluminum) (copper) ground bus bolted directly to the switchgear frame. (Extend a neutral stud into the cable compartment in each vertical section for connection of neutral conductors. A bus connection shall be provided for connecting the neutral to the ground bus with a removable isolating link). Clamp type cable lugs suitable for use with aluminum or copper cable are to be supplied as shown on the plans.

(OPTION 1) As a safety precaution to prevent accidental contact with live parts during maintenance procedures, the center bus compartment containing the section riser bus and main cross bus shall be segregated from the rear cable compartment by means of metal barriers.

() indicates a selection is to be made for quantity or applicability.



APPLICATION DATA

SUGGESTED SPECIFICATIONS



Circuit Breakers

The circuit breakers shall be of the drawout type, manually or electrically operated type DS (DSL) as shown on the associated drawings or as listed in the equipment tabulation. The breakers are to mount on a rigid, self-aligning drawout mechanism with "connected", "test", "disconnected", and "remove" positions. The front door shall be capable of being closed in the "connected", "test", or "disconnected" positions. Provide interlocks to insure the breaker is open before it can be moved from any position or when it is between positions. Include an interlock to discharge the stored energy spring before the breaker element can be withdrawn from its cell. In the "test" and "connected" positions, provide a positive ground contact between the breaker element and the structure. The circuit breaker trip device is to be of a solid-state design which requires no external power connections and is provided with an adjustable long-time delay, instantaneous and (short-time delay) over-current/short circuit protection. (Include ground fault tripping as an integral part of the solid-state trip device where shown.) Settings are to be continuous between calibrated points. Provisions for testing and calibrating shall be provided. (Indicators for overload, short circuit, or ground trip shall be provided.) (Breakers are to have U. L. label.)

The breaker operating mechanism is to be of the two-step stored energy quick-make, quick-break type. One stroke of the operating handle or one operation cycle of the breaker motor is to charge the closing springs and operation of a local "close" button is to close the breaker contacts. Closing of the breaker contacts shall automatically charge the opening springs to insure quick-break operation.

Padlocking provisions shall be furnished to receive up to three padlocks when the breaker is in the open position, positively preventing unauthorized closing of the breaker contacts A manual trip button and position indicator shall be furnished.

Include the following only when type DSL breakers are specified: (Circuit breakers shall be equipped with current limiters. Current limiters shall be integrally mounted on 800A, and 1600A. frame sizes and separately mounted on 3200A. and 4000A. frame sizes. Equip each breaker with a blown limiter indicator visible from the front of the breaker, and with an anti-single phase device which will trip the breaker when any limiter blows, and which will prevent reclosing the breaker on a single phase condition resulting from blown or missing limiters.)

The following equipment shall be provided:

- ampere frame 3-pole, (manually) (electrically) operated. (1) (2) — Type DS-____ main breaker(s), Tripping sensors rated _ _ amperes.
 - Type DS-___ ampere frame, 3-pole, (manually) (electrically) operated. Trip-<u>tie breaker</u>, _ amperes. ping sensors rated _
 - _ feeder breaker(s). Type DS-_ ampere frame, 3-pole, (manually) (electrically) operated. Tripping sensors rated _ amperes.
 - Type DS-_ feeder breaker(s), ampere frame, 3-pole, (manually) (electrically) operated. Tripping sensors rated _ amperes.

Metering Components

Main Bus

- - Potential transformer, suitable ratio.

Feeder Circuits

- 2% ammeter and 3-phase selector switch with OFF position.
 - — Current transformer, suitable ratio.

(OPTION 2) A portable testing and calibration device shall be provided.

indicates a selection is to be made for quantity or applicability.



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