

Westinghouse



Type DS Low-Voltage Metal-Enclosed Switchgear

Application

For the control and protection of power circuits for fans, pumps, lighting and machines at 208, 240, 480 or 600 volts ac. Available for secondary unit substations through 2000 kva at 480 or 600 volts or 1000 kva at 208 or 240 volts.

Ratings

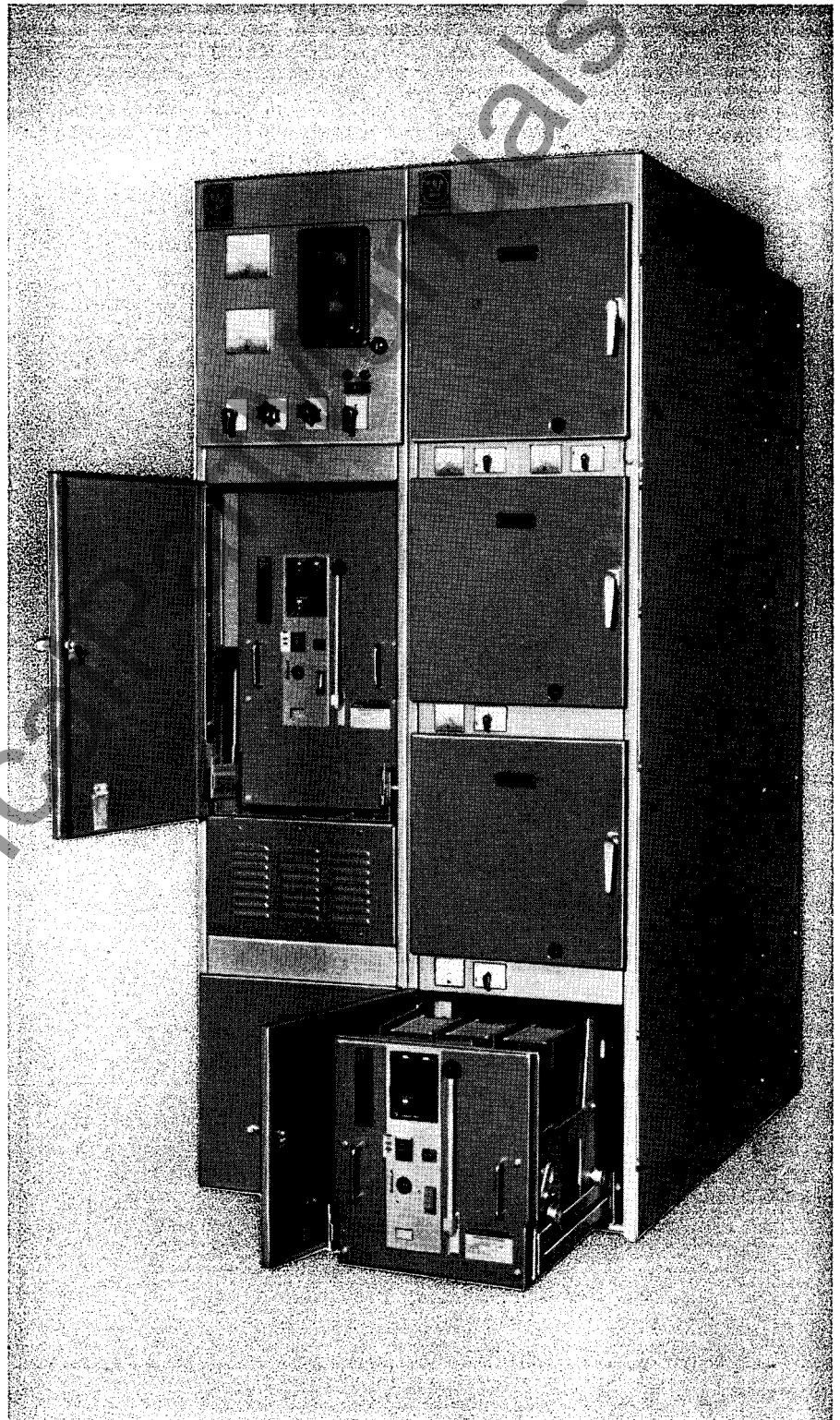
600 volts ac maximum. 50 to 3200 amperes. 22000 to 65000 symmetrical amperes interrupting capacity indoor and outdoor.

Central Stations

Auxiliary power circuits for fans, blowers, pumps, compressors and lightning.

Industrial Plants

Power and lighting networks, power feeders, lighting feeders, power generation and auxiliaries, power drives for machine tools and material handling equipment.



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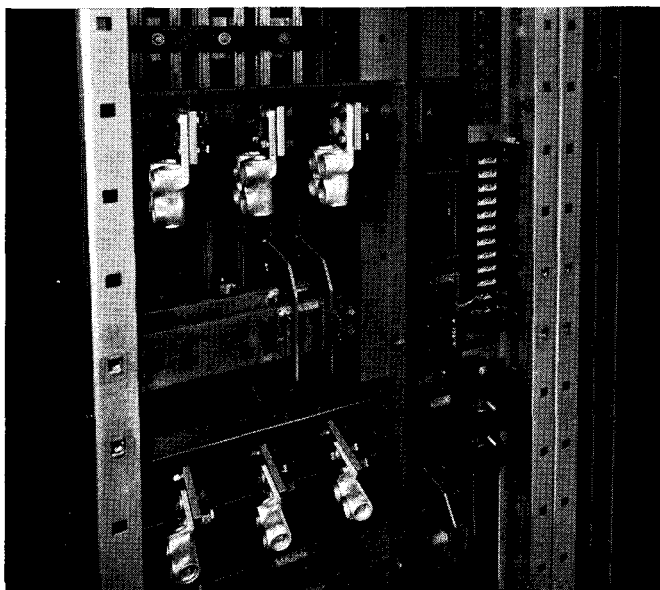


Figure 9: Terminal Blocks and Main Cable Terminals

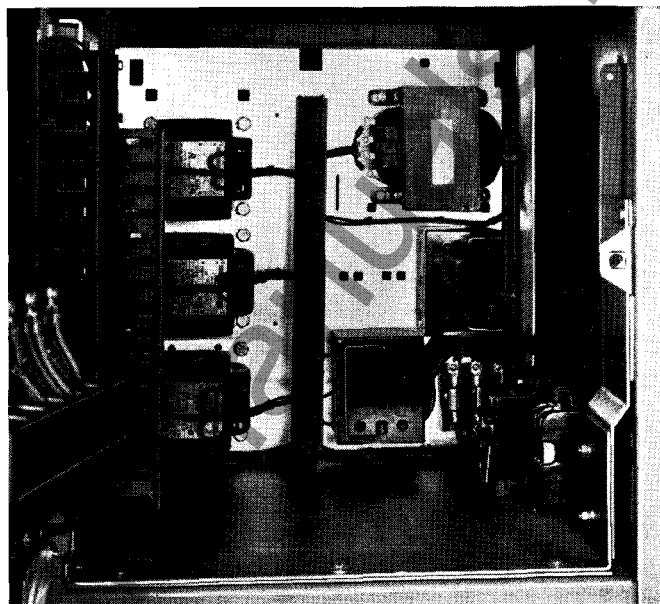


Figure 10: Potential Transformer and Control Power Transformer with Primary and Secondary Fuses

All insulation is Westinghouse glass polyester, which has been compounded to include the dielectric and mechanical strength necessary for the application. It is highly resistant to heat, flame and moisture, and has been designed with generous creepage distances.

The incoming line is isolated from the main bus to reduce the possibility of fault transmission between them. Bus sections are also isolated at a bus tie breaker.

Enclosed wiring troughs are used throughout the switchgear. Control circuit terminal blocks are mounted on the rear frame where they are readily accessible for purchaser's connections and inspection. Main circuit terminals may be oriented to suit cable entrance.

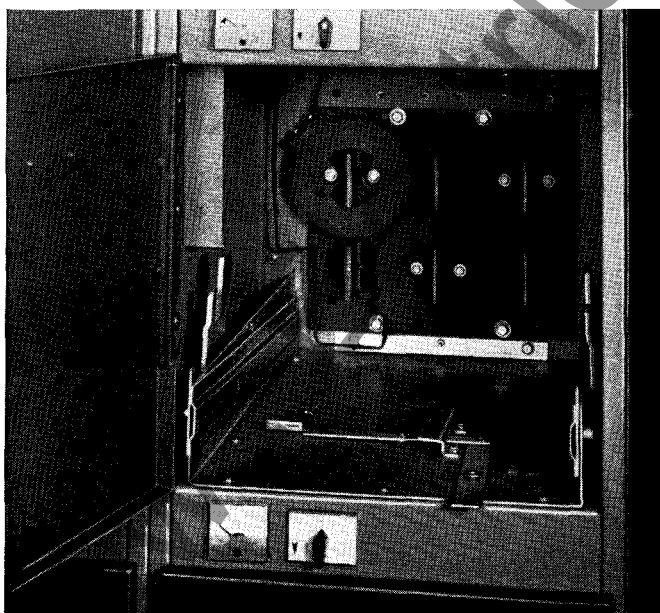


Figure 11: Current Transformers

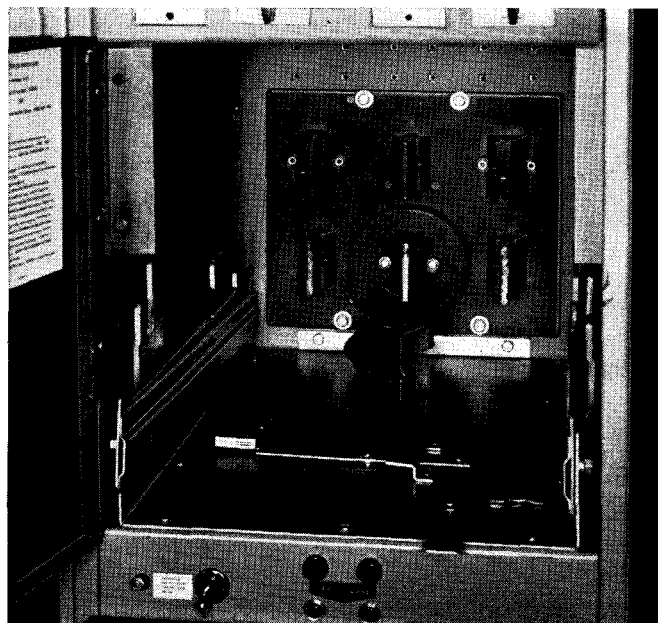


Figure 12: Insulating Boots

Type DS Low-Voltage Metal-Enclosed Switchgear

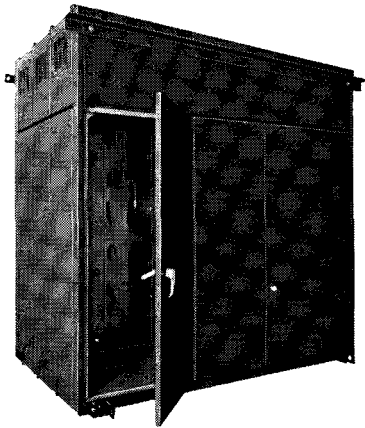


Figure 13: Outdoor Structure

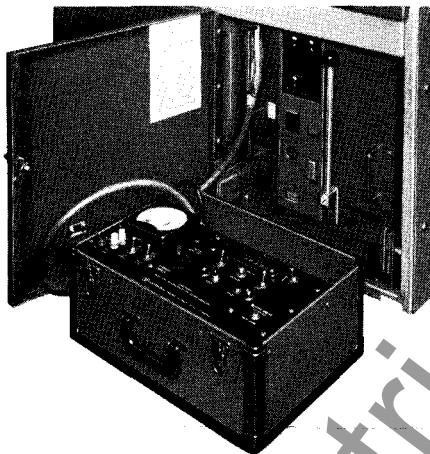


Figure 14: Test Kit

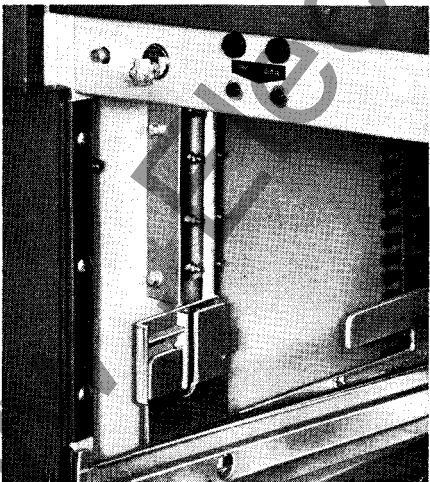


Figure 15: Key Interlock - Blocking Position

Potential transformers, control power transformers, primary and secondary fuses are mounted on a removable tray. The fuses for the control power circuits are also mounted on this tray.

Primary fuses are NEMA Class J pull-out type. The metering potential transformers are type EMP or EMPL depending on the burden. Instrument and control wiring is type SIS with insulated ring-tongue crimp type terminals.

Instrument current transformers are mounted

in the breaker compartment where they are accessible from the front of the switchgear assembly.

Insulating boots are furnished for protection from the energized stationary studs when maintenance is being performed in the breaker compartment.

A portable test set is available for test and field calibration of the Amptector at the low-voltage switchgear assembly. Operational, pick-up and time-delay tests are very easily performed.

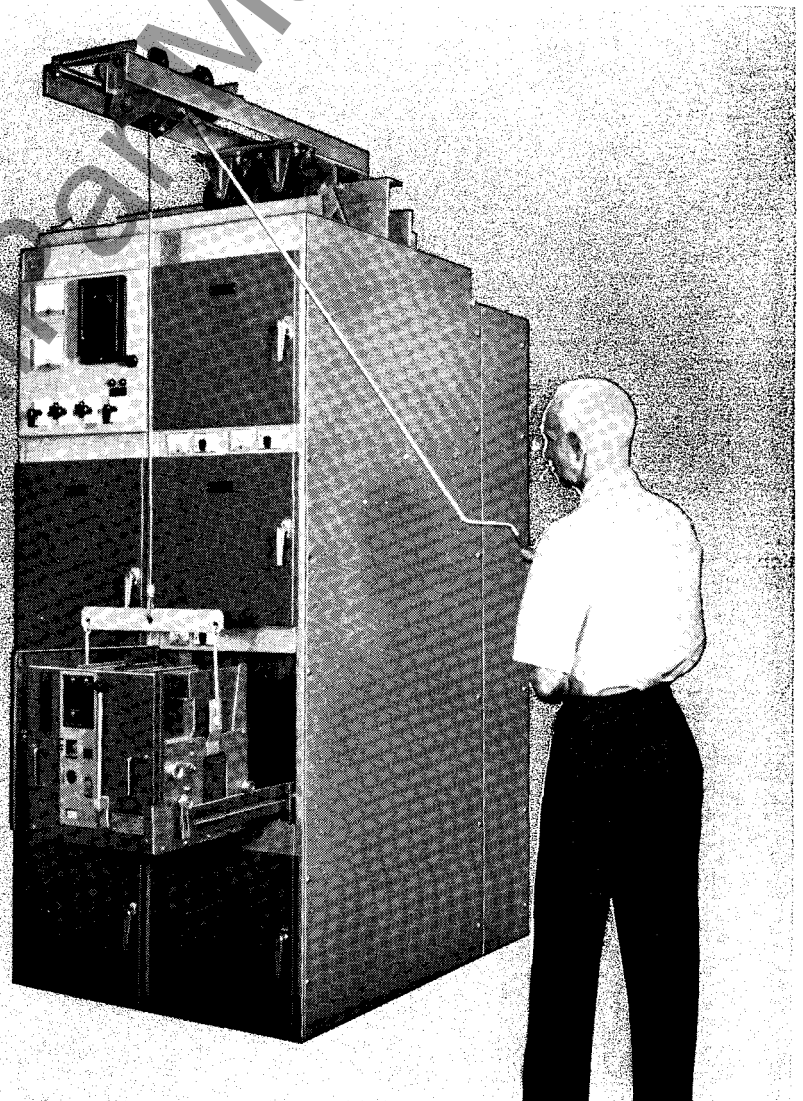


Figure 16: Traveling Lifter

Westinghouse



Westinghouse Amprector™ Trip

The Westinghouse Amprector is a solid-state device that provides adjustable over-current tripping for Westinghouse Type DS low-voltage a-c power circuit breakers. Only one Amprector is required per breaker, and it receives all its energy from a set of sensors – one mounted on each pole of the breaker. It develops an output for an associated trip actuator when preselected conditions of current magnitude and duration are exceeded.

The device can be supplied with any combination of four continuously adjustable over-current tripping functions: these are: 1. long delay, 2. short delay, 3. instantaneous, and 4. ground protection.

The particular breaker current rating for any breaker frame size is determined by the rating of the sensor used with the Amprector. Sensor ratings are available as shown in the chart.

The breaker current rating for any frame size can be changed by simply changing the sensors, which are easily removed from the breaker drawout element. The wide range of long-delay pickup on the Amprector makes one set of sensors suitable for a number of current ratings. The Amprector itself need not be changed when the associated sensors are changed.

Each Amprector includes terminal receptacles to permit easy field checking of operation and calibration with an external power supply. A specially designed portable test device with a plug to match the Amprector receptacle is available to provide the utmost in simplicity for checking Amprector operation.

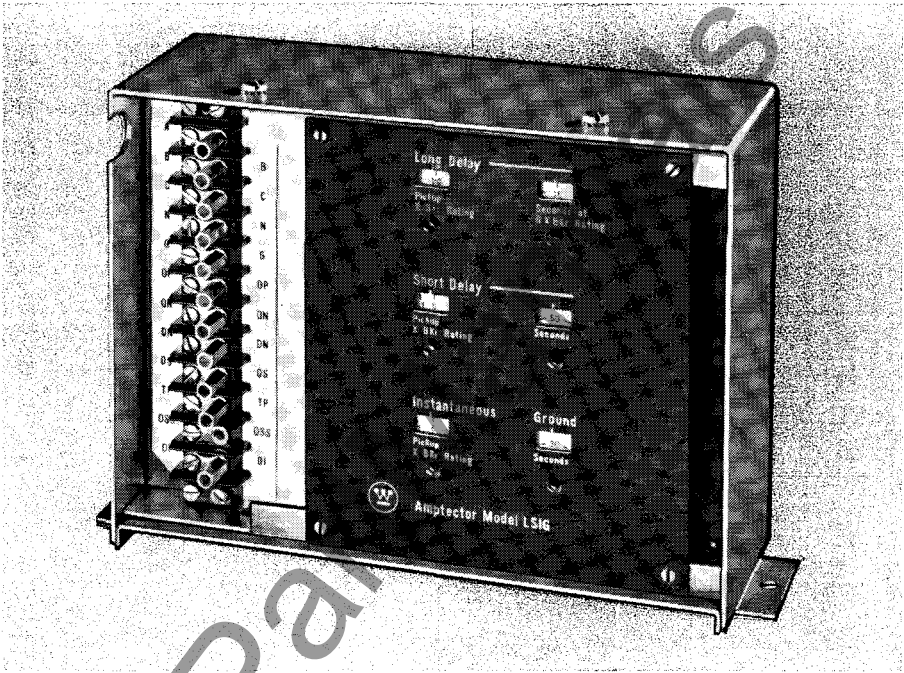


Figure 17: Amprector with Long, Short, Instantaneous and Ground Characteristics

Long delay pickup (multiples of sensor rating)	Long delay time seconds (6 times sensor rating)	Short delay pickup (multiples of sensor rating)	Short delay time seconds	Instantaneous pickup (multiples of sensor rating)	Ground pickup (multiples of sensor rating)	Ground time delay seconds
0.5	4	4	0.18	4	0.20	0.22
to	to	to	to	to		to
1.25	36	10	0.50	12		0.50

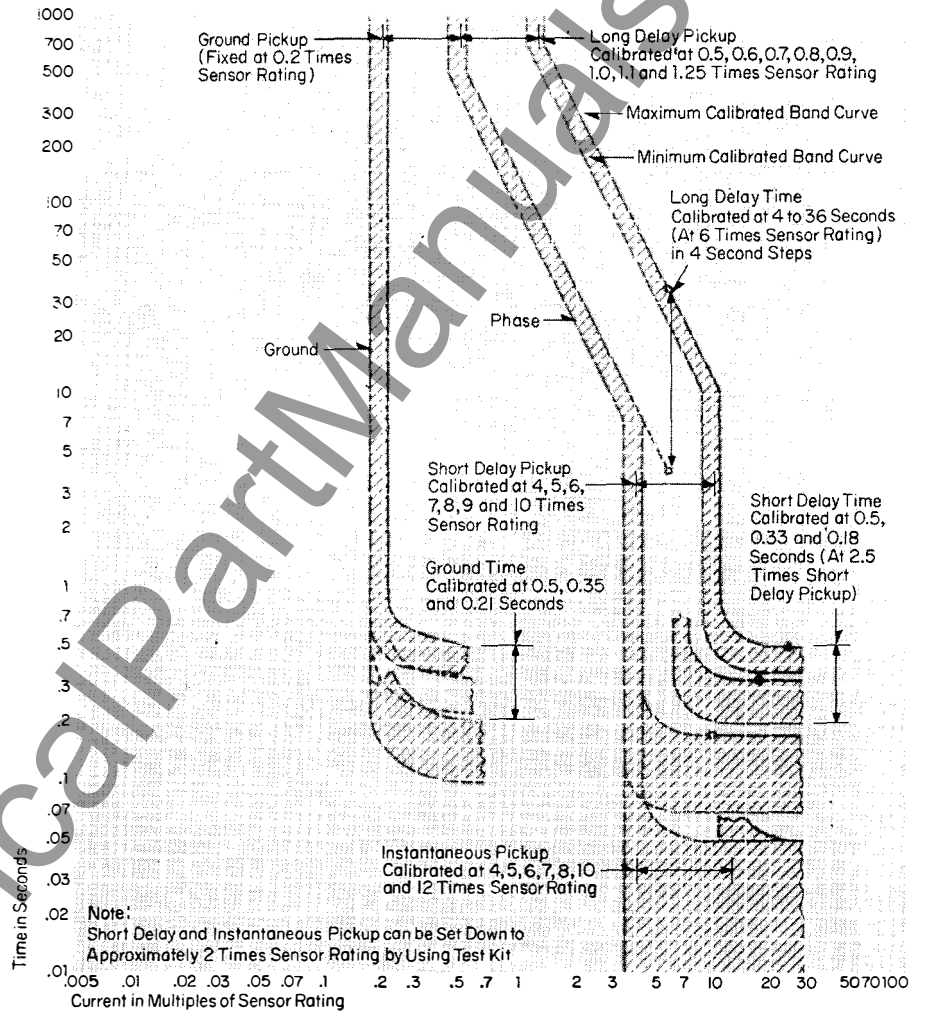
Figure 18: Amprector Trip Device Continuously Adjustable Ranges

Available Sensor Ratings

Breaker Type	Sensor Rating in Amperes
DS-206	100 150 200 300 400 600
DS-416	100 150 200 300 400 600 800 1,200 1,600
DS-532	2,400 3,200

Type DS Low-Voltage Metal-Enclosed Switchgear

Ampetector Characteristics



Application Data Ratings

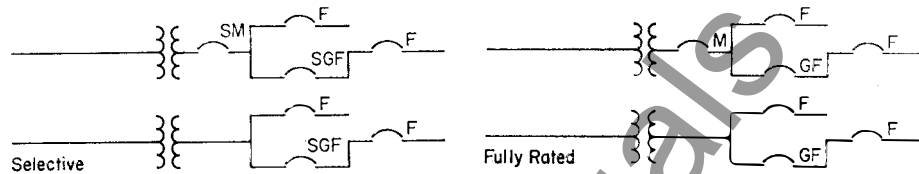
Ac voltage	Breaker type	Trip current range	Interrupting capacity symmetrical amperes	Maximum short-circuit current at which breaker can be applied when furnished with short-time delay
481 to 600	DS-206 DS-416 DS-532	50-600 50-1600 1200-3200	22,000 42,000 50,000	22,000 42,000 50,000
241 to 480	DS-206 DS-416 DS-532	50-600 50-1600 1200-3200	30,000 50,000 50,000	30,000 50,000 50,000
240 and below	DS-206 DS-416 DS-532	50-600 50-1600 1200-3200	42,000 65,000 65,000	30,000 50,000 50,000

Westinghouse



Recommended Type DS Air Circuit Breakers

For Application with Standard Westinghouse
Transformers (Liquid, Dry Ventilated and
Dry Sealed Type)



Transformer Rating 3 Phase Kva and Impedance Percent	Maximum Short Cir- cuit Kva Available from Primary System	Rated Load Continuous Current Amperes	Short-circuit Current ^① Rms Symmetrical Amperes			Selective Trip Systems			Fully-rated Non- selective Systems	
			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 Phase^②

300 5%	50000	834	14900	1700	16600	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		15700		17400		DS-206	DS-206		DS-206
	150000		16000		17700		DS-206	DS-206		DS-206
	250000		16300		18000		DS-206	DS-206		DS-206
	500000		16500		18200		DS-206	DS-206		DS-206
	Unlimited		16700		18400		DS-206	DS-206		DS-206
500 5%	50000	1388	23100	2800	25900	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		25200		28000		DS-206	DS-206		DS-206
	150000		26000		28800		DS-206	DS-206		DS-206
	250000		26700		29500		DS-206	DS-206		DS-206
	500000		27200		30000		DS-206	DS-206		DS-206
	Unlimited		27800		30600		DS-416	DS-206		DS-206
750 5.75%	50000	2080	28700	4200	32900	DS-532	DS-416	DS-206	DS-532	DS-206
	100000		32000		36200		DS-416	DS-206		DS-206
	150000		33300		37500		DS-416	DS-206		DS-206
	250000		34400		38600		DS-416	DS-206		DS-206
	500000		35200		39400		DS-416	DS-206		DS-206
	Unlimited		36200		40400		DS-416	DS-206		DS-206
1000 5.75%	50000	2780	35900	5600	41500	DS-532	DS-416	DS-206	DS-532	DS-206
	100000		41200		46800		DS-416	DS-416		DS-416
	150000		43300		48900		DS-416	DS-416		DS-416

Table B: 240 Volts – 3 Phase^②

300 5%	50000	722	12900	2900	15800	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		13600		16500		DS-206	DS-206		DS-206
	150000		13900		16800		DS-206	DS-206		DS-206
	250000		14100		17000		DS-206	DS-206		DS-206
	500000		14300		17200		DS-206	DS-206		DS-206
	Unlimited		14400		17300		DS-206	DS-206		DS-206
500 5%	50000	1203	20000	4800	24800	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		21900		26700		DS-206	DS-206		DS-206
	150000		22500		27300		DS-206	DS-206		DS-206
	250000		23100		27900		DS-206	DS-206		DS-206
	500000		23600		28400		DS-206	DS-206		DS-206
	Unlimited		24100		28900		DS-206	DS-206		DS-206
750 5.75%	50000	1804	24900	7200	32100	DS-532	DS-416	DS-206	DS-532	DS-206
	100000		27800		35000		DS-416	DS-206		DS-206
	150000		28900		36100		DS-416	DS-206		DS-206
	250000		29800		37000		DS-416	DS-206		DS-206
	500000		30600		37800		DS-416	DS-206		DS-206
	Unlimited		31400		38600		DS-416	DS-206		DS-206
1000 5.75%	50000	2406	31000	9600	40600	DS-532	DS-416	DS-206	DS-532	DS-206
	100000		35600		45200		DS-416	DS-416		DS-416
	150000		37500		47100		DS-416	DS-416		DS-416
	250000		39100		48700		DS-416	DS-416		DS-416
	500000		40400		50000		DS-416	DS-416		DS-416

M=Main breaker selected to have adequate interrupting and continuous ratings.

SM=Selective main breaker selected to have adequate interrupting, short-time and continuous current ratings and equipped with short time overcurrent tripping.

GF=Group feeder breaker selected to have adequate interrupting rating. The breaker is assumed to have adequate continuous current capacity.

SGF=Selective group feeder breaker selected to have adequate interrupting and short-time ratings, and equipped with short time overcurrent tripping. The breaker is assumed to have adequate continuous current capacity.

F=Feeder breaker selected to have adequate interrupting rating.

^① Short 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 assumed to be 4 times total motor load.

^② Standard sensor ratings are listed in a table on page 8.

Type DS Low-Voltage Metal-Enclosed Switchgear

Transformer Rating 3 Phase Kva and Impedance Percent	Maximum Short Cir- cuit Kva Available from Primary System	Rated Load Continuous Current Amperes	Short-Circuit Current① Rms Symmetrical Amperes			Selective Trip Systems			Fully-rated Non- selective Systems	
			Transformer Alone	100% Motor Load	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 Phase

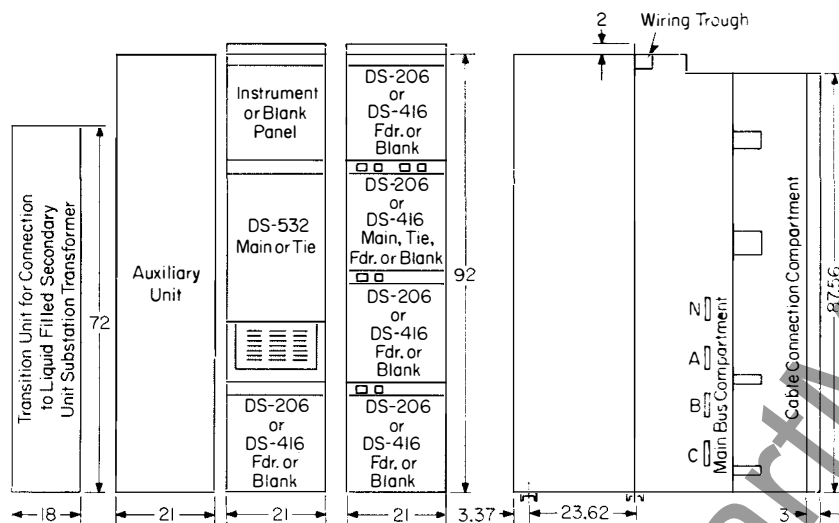
500 5%	50000	601	10000	2400	12400	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		10900		13300		DS-206	DS-206		DS-206
	150000		11300		13700		DS-206	DS-206		DS-206
	250000		11600		14000		DS-206	DS-206		DS-206
	500000		11800		14200		DS-206	DS-206		DS-206
	Unlimited		12000		14400		DS-206	DS-206		DS-206
750 5.75%	50000	902	12400	3600	16000	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		13900		17500		DS-206	DS-206		DS-206
	150000		14400		18000		DS-206	DS-206		DS-206
	250000		14900		18500		DS-206	DS-206		DS-206
	500000		15300		18900		DS-206	DS-206		DS-206
	Unlimited		15700		19300		DS-206	DS-206		DS-206
1000 5.75%	50000	1203	15500	4800	20300	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		17800		22600		DS-206	DS-206		DS-206
	150000		18700		23500		DS-206	DS-206		DS-206
	250000		19600		24400		DS-206	DS-206		DS-206
	500000		20200		25000		DS-206	DS-206		DS-206
	Unlimited		20900		25700		DS-206	DS-206		DS-206
1500 5.75%	50000	1804	20600	7200	27800	DS-532	DS-206	DS-206	DS-532	DS-206
	100000		24900		32100		DS-416	DS-416		DS-416
	150000		26700		33900		DS-416	DS-416		DS-416
	250000		28400		35600		DS-416	DS-416		DS-416
	500000		29800		37000		DS-416	DS-416		DS-416
	Unlimited		31400		38600		DS-416	DS-416		DS-416
2000 5.75%	50000	2406	24700	9600	34300	DS-532	DS-416	DS-416	DS-532	DS-416
	100000		31000		40600		DS-416	DS-416		DS-416
	150000		34000		43600		DS-416	DS-416		DS-416
	250000		36700		46300		DS-416	DS-416		DS-416
	500000		39100		48700		DS-416	DS-416		DS-416

Table D: 600 Volts – 3 Phase

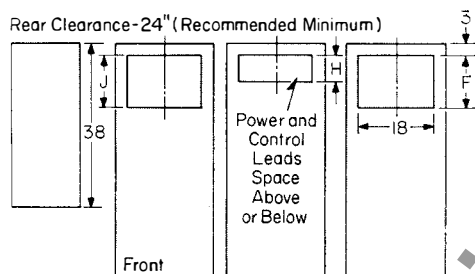
500 5%	50000	481	8000	1900	9900	DS-206	DS-206	DS-206	DS-206	DS-206
	100000		8700		10600		DS-206	DS-206		DS-206
	150000		9000		10900		DS-206	DS-206		DS-206
	250000		9300		11200		DS-206	DS-206		DS-206
	500000		9400		11300		DS-206	DS-206		DS-206
	Unlimited		9600		11500		DS-206	DS-206		DS-206
750 5.75%	50000	722	10000	2900	12900	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		11100		14000		DS-206	DS-206		DS-206
	150000		11600		14500		DS-206	DS-206		DS-206
	250000		11900		14800		DS-206	DS-206		DS-206
	500000		12200		15100		DS-206	DS-206		DS-206
	Unlimited		12600		15500		DS-206	DS-206		DS-206
1000 5.75%	50000	962	12400	3900	16300	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		14300		18200		DS-206	DS-206		DS-206
	150000		15000		18900		DS-206	DS-206		DS-206
	250000		15600		19500		DS-206	DS-206		DS-206
	500000		16200		20100		DS-206	DS-206		DS-206
	Unlimited		16700		20600		DS-206	DS-206		DS-206
1500 5.75%	50000	1444	16500	5800	22300	DS-416	DS-416	DS-416	DS-416	DS-416
	100000		20000		25800		DS-416	DS-416		DS-416
	150000		21400		27200		DS-416	DS-416		DS-416
	250000		22700		28500		DS-416	DS-416		DS-416
	500000		23900		29700		DS-416	DS-416		DS-416
	Unlimited		25100		30900		DS-416	DS-416		DS-416
2000 5.75%	50000	1924	19700	7800	27500	DS-532	DS-416	DS-416	DS-532	DS-416
	100000		24800		32600		DS-416	DS-416		DS-416
	150000		27200		35000		DS-416	DS-416		DS-416
	250000		29400		37200		DS-416	DS-416		DS-416
	500000		31300		39100		DS-416	DS-416		DS-416
	Unlimited		33500		41300		DS-416	DS-416		DS-416

Type DS Low-Voltage Metal-Enclosed Switchgear

Indoor Dimensions (Inches)



Rear Clearance-24" (Recommended Minimum)



Front Clearance for Breaker Removal-36" (Minimum)

Dimensions

Unit Depth D	Cable Space	
	Aux. Unit J	Breaker Unit ²
		1600A Main Bus F
		3200A Main Bus H
54"	①	8"
60"	①	14"
66"	①	20"
72"	①	26"
		N.A.
		9"
		15"
		21"

① F + 6" or H + 6,"
② Additional 6" available if bottom compartment is blank.

Weights

Breaker	Pounds
DS-206	175
DS-416	180
DS-532	275
4 High Unit - without breakers	1300
Transition for connection to transformer	700
Auxiliary unit, without devices	500

Further Information:

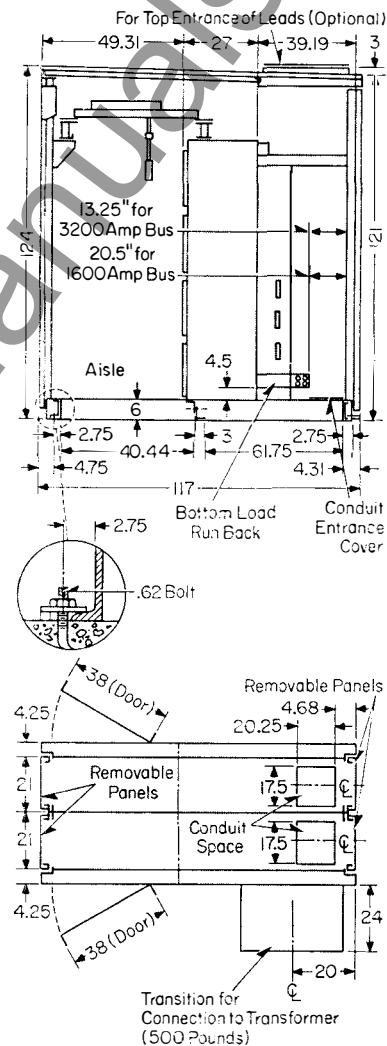
Prices: Price List 32-620

Standard Conditions of Sale:

Selling Policy 32-600

Application: Application Data 33-760-B

Outdoor Dimensions (Inches)



Weights

21" Housing, 1250 pounds

End Trims, 1550 pounds

These weights must be added to the weight of indoor switchgear for total weight of the assembly.

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**Type DS Low-Voltage
Metal-Enclosed Switchgear**
Application

For the control and protection of power circuits for fans, pumps, lighting and machines at 208, 240, 480 or 600 volts ac. Available for secondary unit substations through 2000 kva at 480 or 600 volts or 1000 kva at 208 or 240 volts.

Ratings

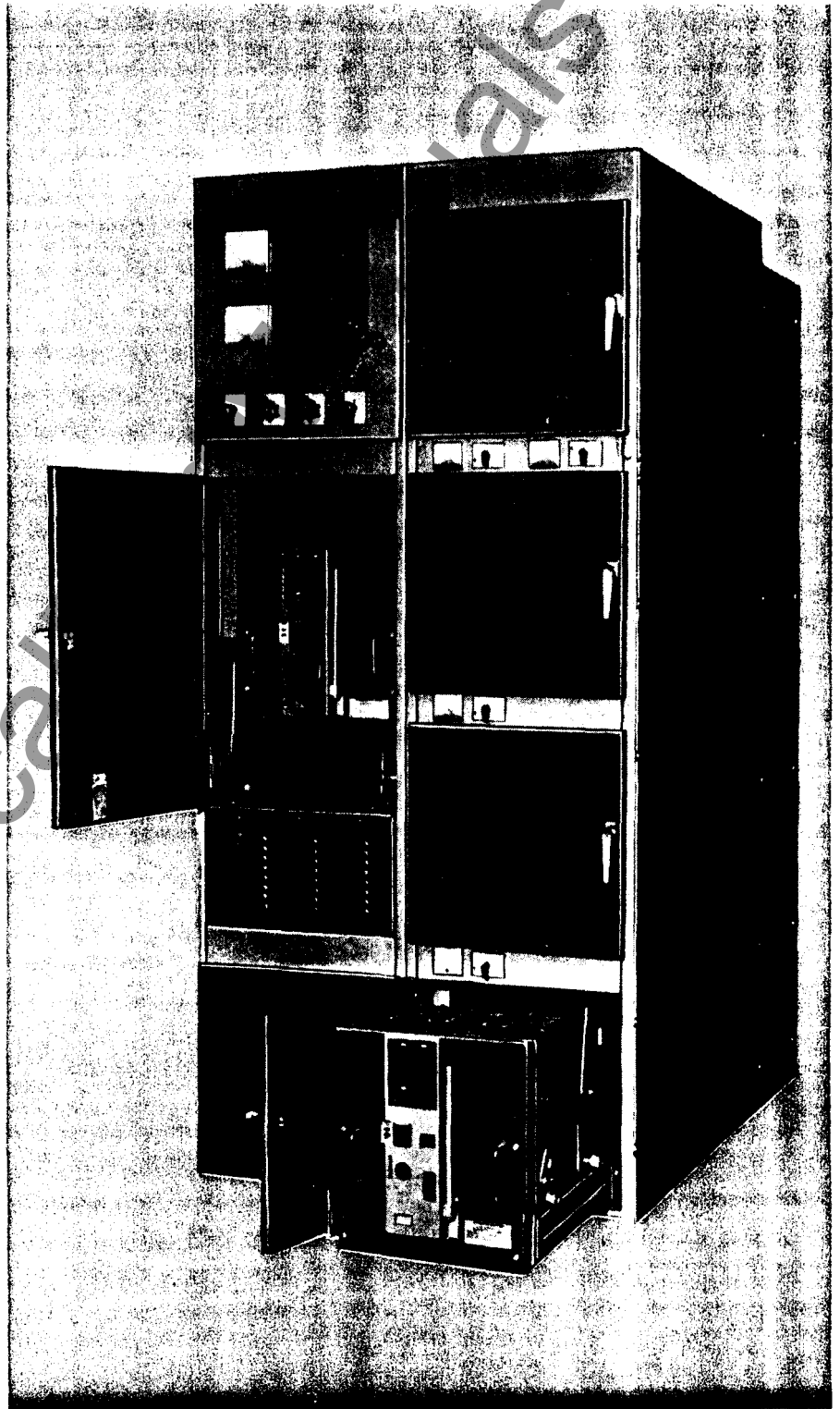
600 volts ac maximum. 50 to 3200 amperes. 22000 to 65000 symmetrical amperes interrupting capacity indoor and outdoor.

Central Stations

Auxiliary power circuits for fans, blowers, pumps, compressors and lightning.

Industrial Plants

Power and lighting networks, power feeders, lighting feeders, power generation and auxiliaries, power drives for machine tools and material handling equipment.



Westinghouse



Features

Two-tone finish

Light gray (A.S.A. #61) base with dark gray breaker compartment doors.

Three position

Breakers have Connected-Test-Disconnect positions with front door closed.

Welded aluminum bus and connections reduce maintenance. Purchaser's connections and shipping-break connections are silver-plated copper.

Enclosed wiring trough

Affords protection to the secondary control wiring and prevents accidental contacts by the operator.

Isolated incoming line

Reduces possibility of fault transmission between incoming line and main bus.

Protection During Levering Operation

During the operation of levering the breaker between the Connected-Test-Disconnected positions, there is a steel safety barrier between the operator and live parts.

Manual Charge of Stored-energy Mechanism

The stored-energy mechanism is charged by one downward stroke of the lever. No pumping required.

Stored-energy Closing Mechanism

A two-step closing mechanism with a charging motion and a "release to close" motion gives positive control of the closing instant.

Motor-operated Stored-energy Mechanism

Electrically operated breakers have motor charging devices operating at 125 v, dc or 115 v, ac, 3 amps.

Closing-spring Automatic Discharge

Interlocking assures that the closing springs are discharged when the breaker is removed from its compartment.

Remote Close and Trip

After local manual charging of the mechanism, the breaker can be closed or tripped from a remote location by means of small solenoids operating at conventional control voltages. This feature is available at a modest price addition.

Breaker Inspection

When withdrawn on integral rails, the breakers are completely accessible for visual inspection; tilting of breaker is not necessary.

Current Transformers

Instrument current transformers are mounted in the circuit-breaker compartment; therefore, they are accessible from the front.

These are for metering application only, and meet accuracies of ANSI Standard C37.20, Section 20-4.6.3 for Low Voltage Metal Enclosed Switchgear.

Amptector™ Trip

A modern reliable solid-state trip device with excellent repeatability; requires a minimum of maintenance. No external power source needed.

Ground-fault Tripping

Ground-fault tripping can be included as part of Amptector.

Amptector Trip Adjustment

Adjustment of trip rating is made by sealed potentiometer. This permits a continuous adjustment between the specified limits. No confining fixed bands. Simplified coordination. No corrosion of contact surfaces.

Trip-rating Change

The tripping current range of a breaker is established by the sensor rating. The Amptector provides a continuous long time adjustment from 50% to 125% of the sensor rating. A tripping current range change is easily accomplished by a change of the breaker mounted sensors.

Glass Polyester Insulation

Westinghouse-produced glass polyester, with excellent mechanical and dielectric properties, is utilized as the insulation system. Current transformers, sensors and the operating links are insulated with epoxy, which has dielectric characteristics similar to glass polyester.

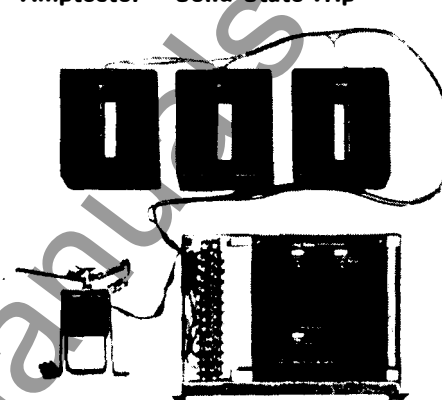
Double Steel Safety Barrier

Two layers of steel between the circuit breakers and the operator during normal operation.

Interphase Barriers

Maximum breaker insulation security is obtained by the use of interphase barriers, which are easily removed for breaker inspection.

Amptector™ Solid-State Trip



Provides continuous wide-range adjustability. Step-type adjustment is eliminated. Energy and signal provided by current sensors; no potential connections. Long delay, short delay, instantaneous and ground-fault protection in any combination. Test on standard 120-volt, 20-amp single-phase circuit.

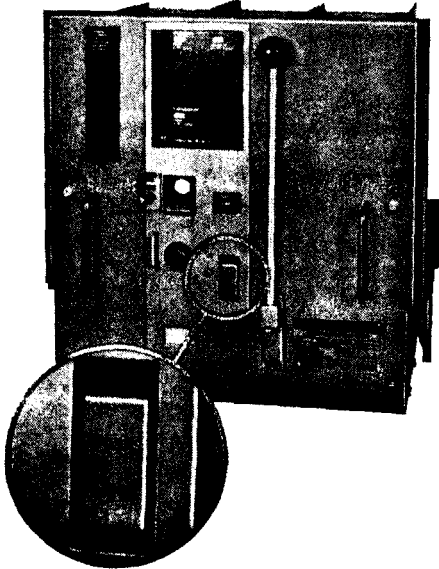
Metal-clad Safety Features



Solid door closes compartment completely with breaker in or out. All controls are protected from unauthorized or accidental operation. Full-sized metal shield on breaker face protects operator from live parts while operating, racking or checking Amptector settings. Double interlocked device prevents racking until contacts are open; contacts can't be closed until racking is complete. Separate cable entrance and bus compartments can be provided; removable barriers give access to bus compartment for inspection or cleaning.

Type DS Low-Voltage Metal-Enclosed Switchgear

Two-step Stored-energy Closing



Gives operator positive control of closing after spring mechanism is charged. Breaker can't close while you're still charging. Operation is optional—full manual, full electric, or manual charge and remote electric release.

Interlock discharges springs as breaker is removed from compartment. System patterned after 5-kv and 15-kv metal-clad switchgear.

There are three basic means of extinguishing an arc: lengthening the arc path; cooling by gas blast or contraction; deionizing or physically removing the conduction particles from the arc path. It was the discovery by Westinghouse of this last method which made the first large power air circuit breaker possible.

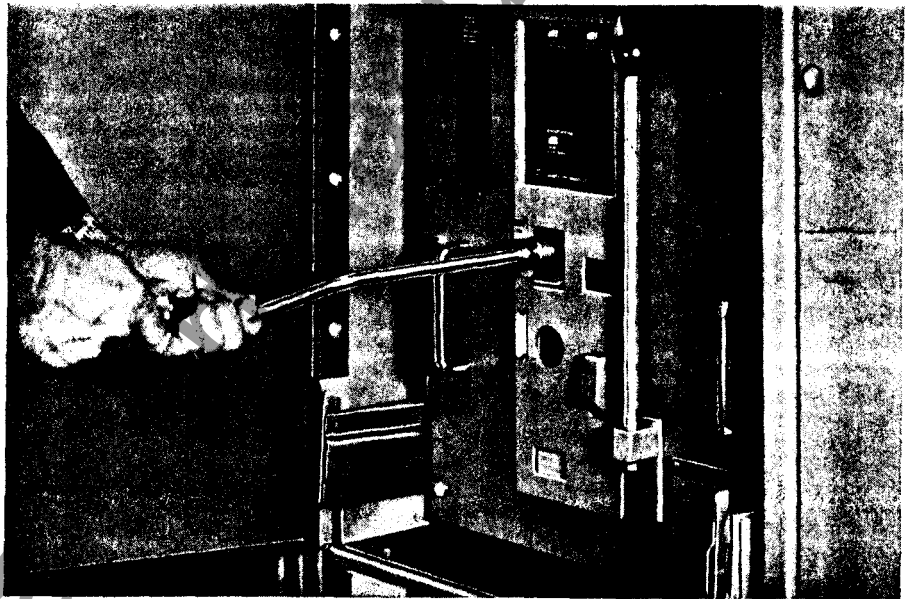
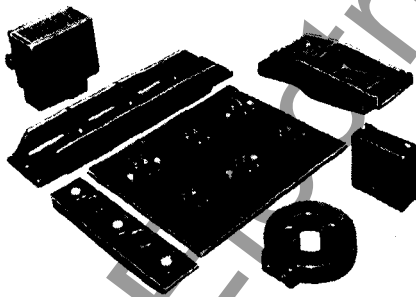


Figure 1: DS Breaker Levering Operation

Glass Polyester and Epoxy Insulation



Offers far better mechanical, thermal and electrical properties than phenolics. It has the mechanical strength to resist short-circuit forces; is highly resistant to heat, flame and moisture; and has been designed with generous creepage distances. Westinghouse gives it to you on all insulating parts in this type of 600-volt switchgear.

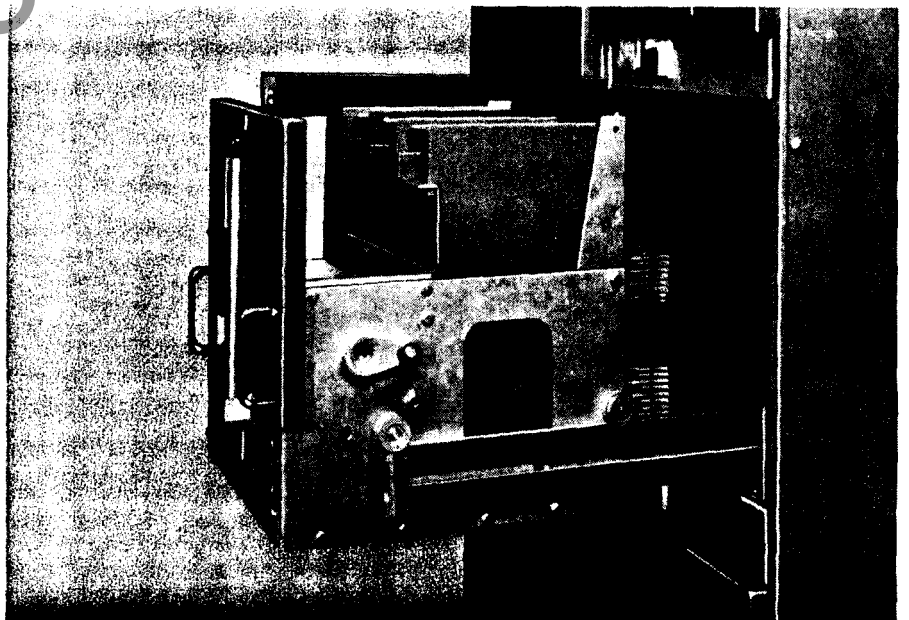


Figure 2: DS Breaker Showing Finger Clusters, Extension Rails and Levering Arms

Westinghouse

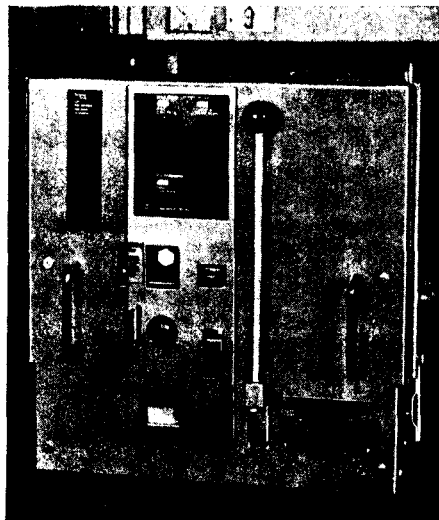


Figure 3: DS Breaker Faceplate

The De-ion® principle is incorporated in all of these circuit breakers. This makes possible faster arc extinction for given contact travel; assures positive interruption and minimum contact burning.

The worm gear levering mechanism is self-contained on the breaker drawout element and engages slots in the breaker compartment. A removable crank is used to lever the breaker between the Connected-Test-Disconnected positions.

Mechanical interlocking is arranged so that levering cannot be accomplished unless the breaker is in the tripped position.

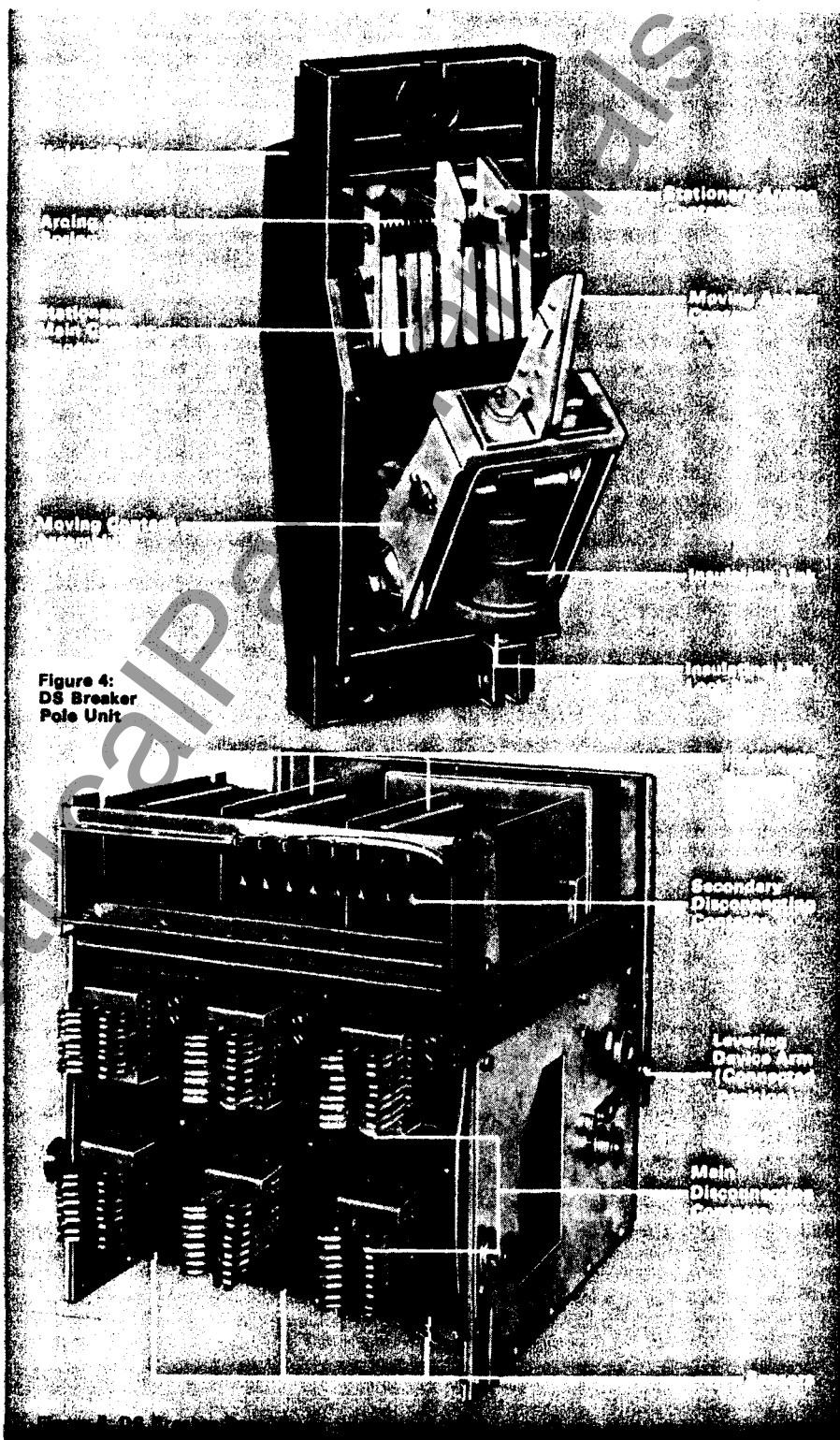
A cam-type closing mechanism closes the breaker. It receives its energy from a spring which can be charged by a manual handle on the front of the breaker or by a universal electric motor.

Release of the stored energy is accomplished by manually depressing a button on the front of the breaker or electrically energizing a releasing solenoid.

All air circuit breakers have solid block, silver tungsten, inlaid main contacts. This construction insures lasting current-carrying ability, which is not seriously impaired even after repeated fault interruptions or repeated momentary overload.

It is not necessary to provide a substantial margin of safety above the actual circuit load current to prevent contact deterioration.

The main contacts are of the butt type and are composed of a multiplicity of fingers to give many points of contact without alignment being critical.

Figure 4:
DS Breaker
Pole Unit

Type DS Low-Voltage Metal-Enclosed Switchgear

The breaker drawout element is interlocked so that it cannot be removed from the compartment with the closing spring charged. The following attachments are available:

1. Shunt trip
2. Undervoltage trip — time delay or instantaneous
3. Electric lockout
4. Key interlock
5. Ac trip
6. Ac capacitor trip
7. Overcurrent trip switch

This switch operates to close or open contacts when the breaker is tripped automatically for an overload or fault condition. It may be used for bell alarm or interlocking circuits.

8. Electric Close Release for a Manually Operated Breaker.



Figure 6: Cable Connection Compartment with Barriers in Place

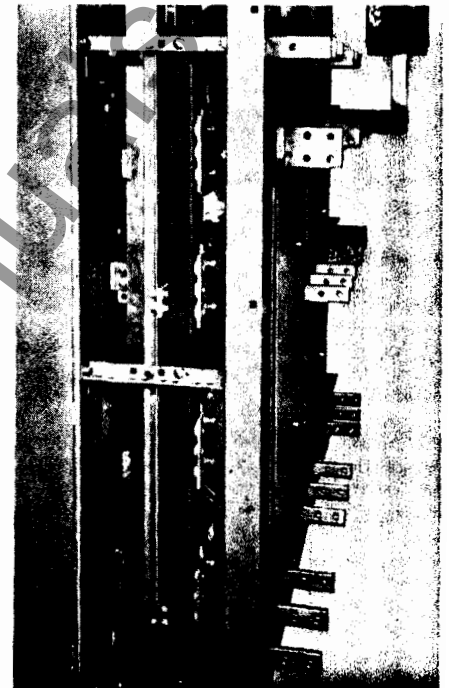


Figure 7: Cable Connections and Bus Compartments

If the purchaser desires, steel barriers will be furnished to separate the main bus and connections from the purchaser's connection compartment.

A ground bus is furnished the full length of the switchgear assembly and is fitted with terminals for purchaser's connections.

Rear covers are the bolt-on type. They are split into two horizontal sections to facilitate handling during removal and installation.

The rear portion of the switchgear assembly houses the main bus, connections, and terminals.

The main bus and connections consist of bare welded aluminum. Connections between shipping groups' and purchasers' connections are silver-plated copper. These copper extensions are flash welded to the bare bus and connections. Silver plated copper bus is also available as an option at an increase in price.

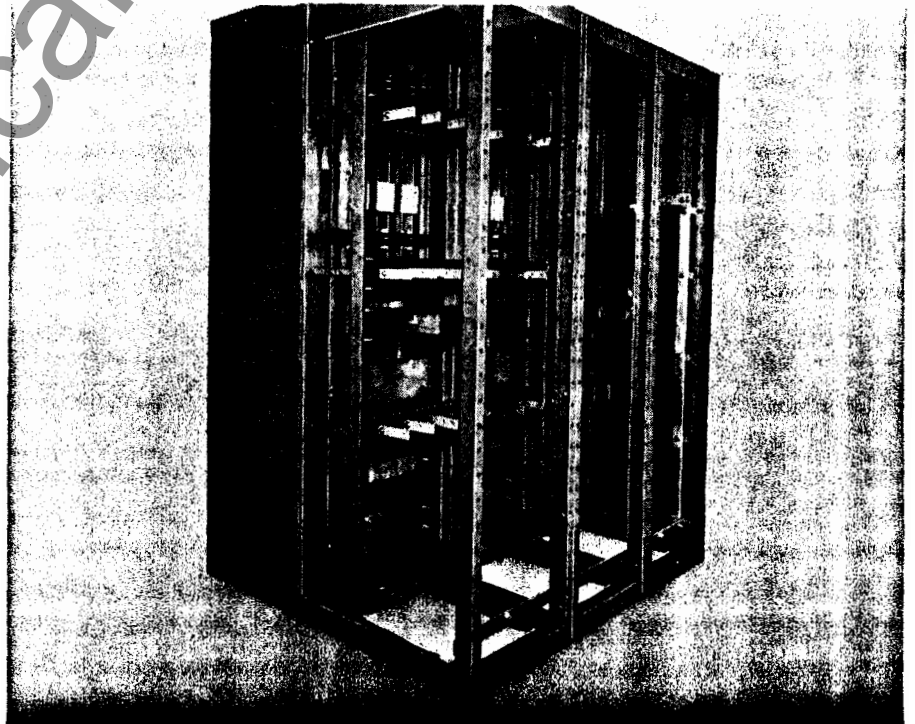


Figure 8: Bus and Cable Connection Compartment with Barriers Removed

Westinghouse

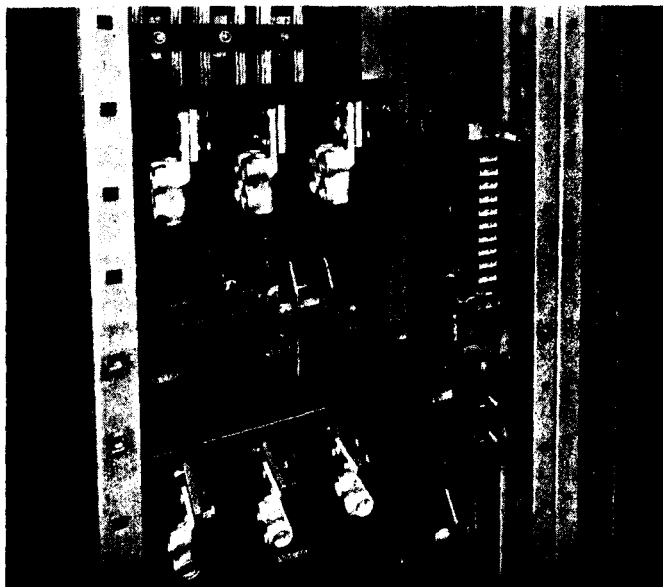


Figure 9: Terminal Blocks and Main Cable Terminals

All insulation is Westinghouse glass polyester, which has been compounded to include the dielectric and mechanical strength necessary for the application. It is highly resistant to heat, flame and moisture, and has been designed with generous creepage distances.

The incoming line is isolated from the main bus to reduce the possibility of fault transmission between them. Bus sections are also isolated at a bus tie breaker.

Enclosed wiring troughs are used throughout the switchgear. Control circuit terminal blocks are mounted on the rear frame where they are readily accessible for purchaser's connections and inspection. Main circuit terminals may be oriented to suit cable entrance.

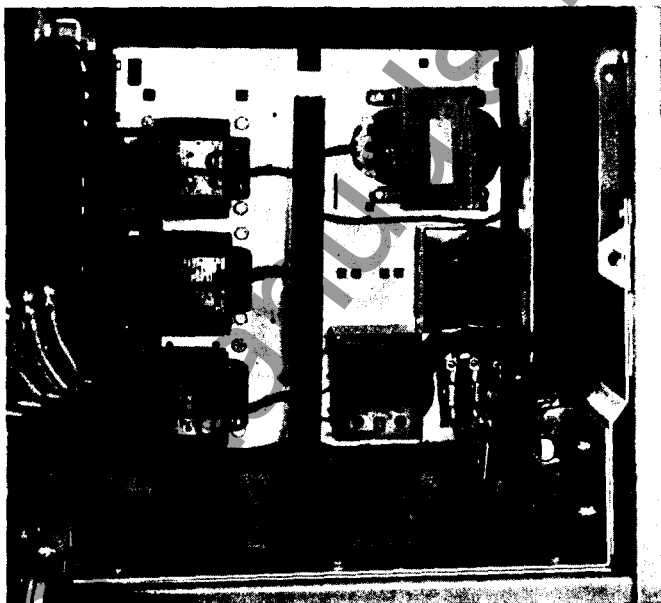


Figure 10: Potential Transformer and Control Power Transformer with Primary and Secondary Fuses

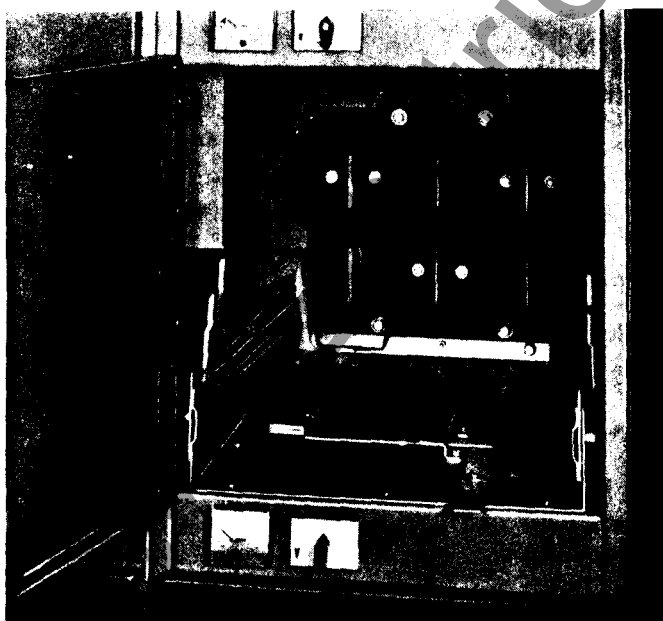


Figure 11: Current Transformers

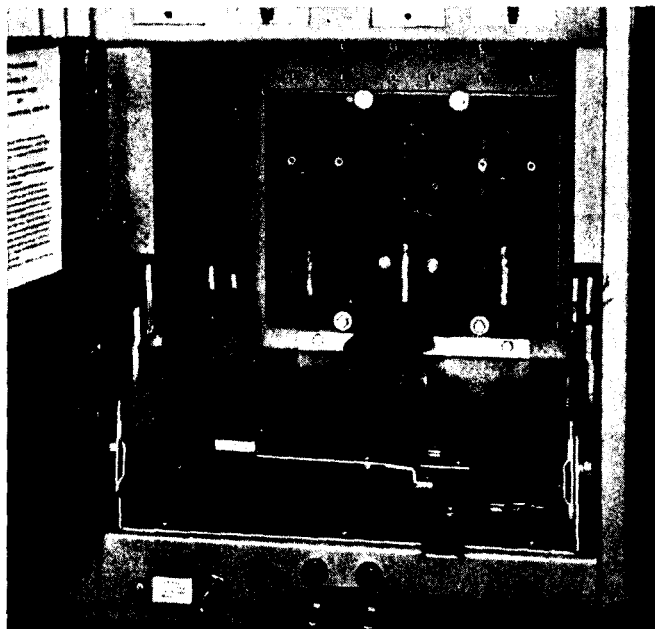


Figure 12: Insulating Boots

Type DS Low-Voltage Metal-Enclosed Switchgear

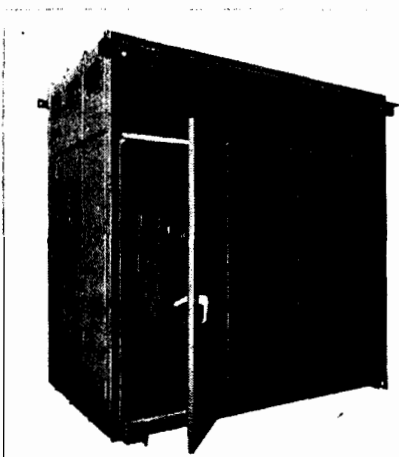


Figure 13: Outdoor Structure

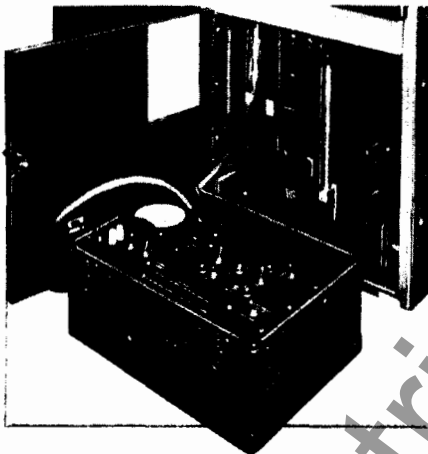


Figure 14: Test Kit



Figure 15: Key Interlock - Blocking Position

Potential transformers, control power transformers, primary and secondary fuses are mounted on a removable tray. The fuses for the control power circuits are also mounted on this tray.

Primary fuses are NEMA Class J pull-out type. The metering potential transformers are type EMP or EMPL depending on the burden. Instrument and control wiring is type SIS with insulated ring-tongue crimp type terminals.

Instrument current transformers are mounted

in the breaker compartment where they are accessible from the front of the switchgear assembly.

Insulating boots are furnished for protection from the energized stationary studs when maintenance is being performed in the breaker compartment.

A portable test set is available for test and field calibration of the Amptector at the low-voltage switchgear assembly. Operational, pick-up and time-delay tests are very easily performed.



Figure 16: Traveling Lifter

Westinghouse



Westinghouse Amprector™ Trip

The Westinghouse Amprector is a solid-state device that provides adjustable over-current tripping for Westinghouse Type DS low-voltage a-c power circuit breakers. Only one Amprector is required per breaker, and it receives all its energy from a set of sensors — one mounted on each pole of the breaker. It develops an output for an associated trip actuator when preselected conditions of current magnitude and duration are exceeded.

The device can be supplied with any combination of four continuously adjustable over-current tripping functions: these are: 1. long delay, 2. short delay, 3. instantaneous, and 4. ground protection.

The particular breaker current rating for any breaker frame size is determined by the rating of the sensor used with the Amprector. Sensor ratings are available as shown in the chart.

The breaker current rating for any frame size can be changed by simply changing the sensors, which are easily removed from the breaker drawout element. The wide range of long-delay pickup on the Amprector makes one set of sensors suitable for a number of current ratings. The Amprector itself need not be changed when the associated sensors are changed.

Each Amprector includes terminal receptacles to permit easy field checking of operation and calibration with an external power supply. A specially designed portable test device with a plug to match the Amprector receptacle is available to provide the utmost in simplicity for checking Amprector operation.

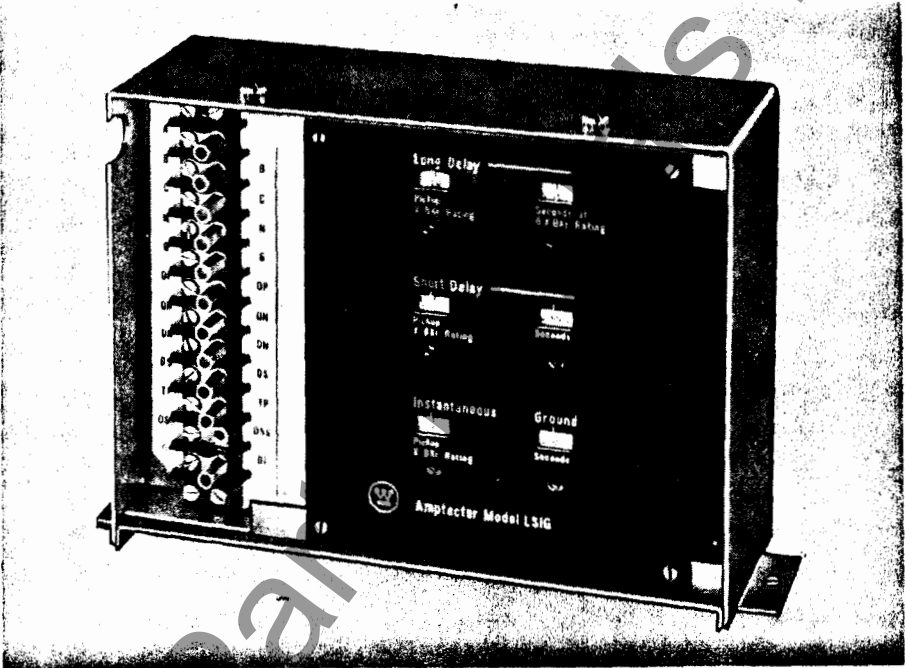


Figure 17: Amprector with Long, Short, Instantaneous and Ground Characteristics

Long delay pickup (multiples of sensor rating)	Long delay time seconds (6 times sensor rating)	Short delay pickup (multiples of sensor rating)	Short delay time seconds	Instantaneous pickup (multiples of sensor rating)	Ground pickup (multiples of sensor rating)	Ground time delay seconds
0.5 to 1.25	4 to 36	4 to 10	0.18 to 0.50	4 to 12	0.20	0.22 to 0.50

Figure 18: Amprector Trip Device Continuously Adjustable Ranges

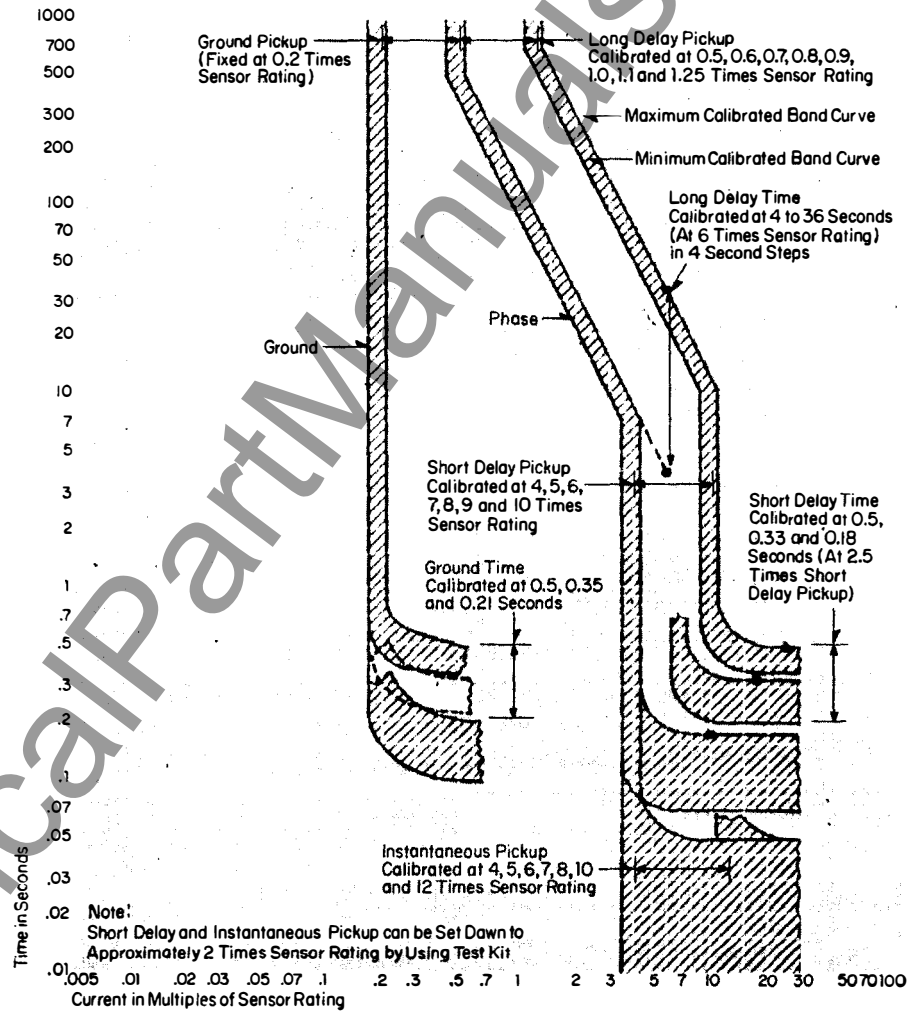
Available Sensor Ratings

Breaker Type
DS-206
DS-416
DS-532

Sensor Rating in Amperes
100 150 200 300 400 600
100 150 200 300 400 600 800 1,200 1,600
2,400 3,200

Type DS Low-Voltage Metal-Enclosed Switchgear

Amptector Characteristics



Application Data Ratings

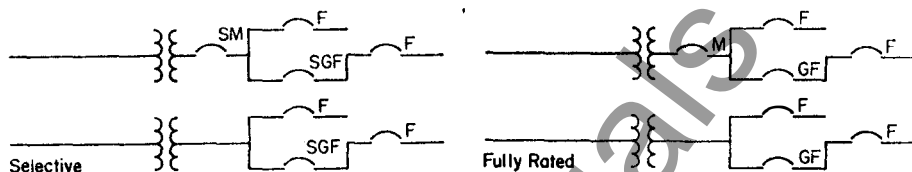
Ac voltage	Breaker type	Trip current range	Interrupting capacity symmetrical amperes	Maximum short-circuit current at which breaker can be applied when furnished with short-time delay
481 to 600	DS-206 DS-416 DS-532	50-600 50-1600 1200-3200	22,000 42,000 50,000	22,000 42,000 50,000
241 to 480	DS-206 DS-416 DS-532	50-600 50-1600 1200-3200	30,000 50,000 50,000	30,000 50,000 50,000
240 and below	DS-206 DS-416 DS-532	50-600 50-1600 1200-3200	42,000 65,000 65,000	30,000 50,000 50,000

Westinghouse



Recommended Type DS Air Circuit Breakers

For Application with Standard Westinghouse
Transformers (Liquid, Dry Ventilated and
Dry Sealed Type)



Transformer Rating 3 Phase Kva and Impedance Percent	Maximum Short Cir- cuit Kva Available from Primary System	Rated Load Continuous Current Amperes	Short-circuit Current ^① Rms Symmetrical Amperes			Selective Trip Systems			Fully-rated Non- selective Systems	
			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 Phase^②

300 5%	50000	834	14900	1700	16600	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		15700		17400					
	150000		16000		17700					
	250000		16300		18000					
	500000		16500		18200					
	Unlimited		16700		18400					
500 5%	50000	1388	23100	2800	25900	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		25200		28000					
	150000		26000		28800					
	250000		26700		29500					
	500000		27200		30000					
	Unlimited		27800		30600					
750 5.75%	50000	2080	28700	4200	32900	DS-532	DS-416	DS-206	DS-532	DS-206
	100000		32000		36200					
	150000		33300		37500					
	250000		34400		38600					
	500000		35200		39400					
	Unlimited		36200		40400					
1000 5.75%	50000	2780	35900	5600	41500	DS-532	DS-416	DS-206	DS-532	DS-206
	100000		41200		46800					
	150000		43300		48900					

Table B: 240 Volts – 3 Phase^②

300 5%	50000	722	12900	2900	15800	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		13600		16500					
	150000		13900		16800					
	250000		14100		17000					
	500000		14300		17200					
	Unlimited		14400		17300					
500 5%	50000	1203	20000	4800	24800	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		21900		26700					
	150000		22500		27300					
	250000		23100		27900					
	500000		23600		28400					
	Unlimited		24100		28900					
750 5.75%	50000	1804	24900	7200	32100	DS-532	DS-416	DS-206	DS-532	DS-206
	100000		27800		35000					
	150000		28900		36100					
	250000		29800		37000					
	500000		30600		37800					
	Unlimited		31400		38600					
1000 5.75%	50000	2406	31000	9600	40600	DS-532	DS-416	DS-206	DS-532	DS-206
	100000		35600		45200					
	150000		37500		47100					
	250000		39100		48700					
	500000		40400		50000					

M=Main breaker selected to have adequate inter-
rupting and continuous ratings.

SM=Selective main breaker selected to have adequate
interrupting, short-time and continuous current ratings
and equipped with short time overcurrent tripping.

GF=Group feeder breaker selected to have adequate
interrupting rating. The breaker is assumed to have
adequate continuous current capacity.

SGF=Selective group feeder breaker selected to have
adequate interrupting and short-time ratings, and
equipped with short time overcurrent tripping. The
breaker is assumed to have adequate continuous cur-
rent capacity.

F=Feeder breaker selected to have adequate inter-
rupting rating.

① Short 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 assumed to be 4 times total motor load.

② Standard sensor ratings are listed in a table on
page 8.

Type DS Low-Voltage Metal-Enclosed Switchgear

Transformer Rating 3 Phase Kva and Impedance Percent	Maximum Short Cir- cuit Kva Available from Primary System	Rated Load Continuous Current Amperes	Short-Circuit Current① Rms Symmetrical Amperes			Selective Trip Systems			Fully-rated Non- selective Systems	
			Transformer Alone	100% Motor Load	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 Phase

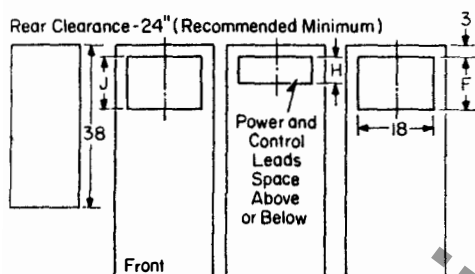
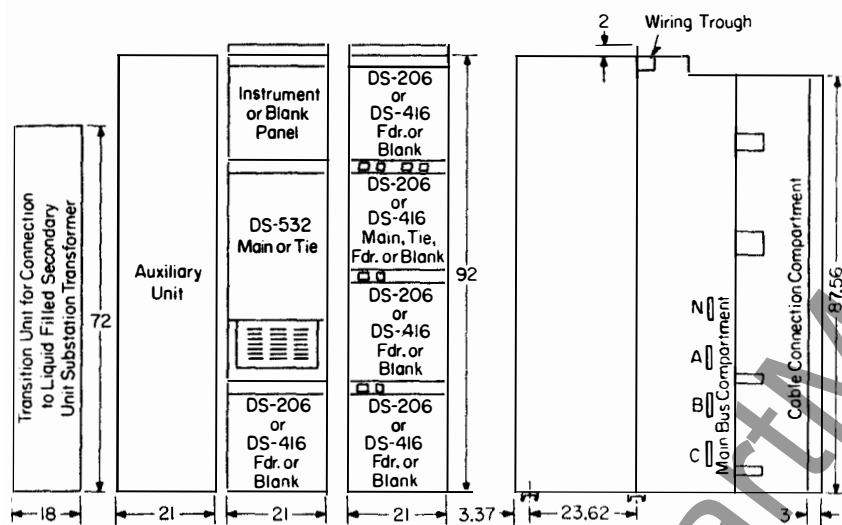
500 5%	50000	601	10000	2400	12400	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		10900		13300		DS-206	DS-206		DS-206
	150000		11300		13700		DS-206	DS-206		DS-206
	250000		11600		14000		DS-206	DS-206		DS-206
	500000		11800		14200		DS-206	DS-206		DS-206
	Unlimited		12000		14400		DS-206	DS-206		DS-206
750 5.75%	50000	902	12400	3600	16000	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		13900		17500		DS-206	DS-206		DS-206
	150000		14400		18000		DS-206	DS-206		DS-206
	250000		14900		18500		DS-206	DS-206		DS-206
	500000		15300		18900		DS-206	DS-206		DS-206
	Unlimited		15700		19300		DS-206	DS-206		DS-206
1000 5.75%	50000	1203	15500	4800	20300	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		17800		22600		DS-206	DS-206		DS-206
	150000		18700		23500		DS-206	DS-206		DS-206
	250000		19600		24400		DS-206	DS-206		DS-206
	500000		20200		25000		DS-206	DS-206		DS-206
	Unlimited		20900		25700		DS-206	DS-206		DS-206
1500 5.75%	50000	1804	20600	7200	27800	DS-532	DS-206	DS-206	DS-532	DS-206
	100000		24900		32100		DS-416	DS-416		DS-416
	150000		26700		33900		DS-416	DS-416		DS-416
	250000		28400		35600		DS-416	DS-416		DS-416
	500000		29800		37000		DS-416	DS-416		DS-416
	Unlimited		31400		38600		DS-416	DS-416		DS-416
2000 5.75%	50000	2406	24700	9600	34300	DS-532	DS-416	DS-416	DS-532	DS-416
	100000		31000		40600		DS-416	DS-416		DS-416
	150000		34000		43600		DS-416	DS-416		DS-416
	250000		36700		46300		DS-416	DS-416		DS-416
	500000		39100		48700		DS-416	DS-416		DS-416

Table D: 600 Volts – 3 Phase

500 5%	50000	481	8000	1900	9900	DS-206	DS-206	DS-206	DS-206	DS-206
	100000		8700		10600		DS-206	DS-206		DS-206
	150000		9000		10900		DS-206	DS-206		DS-206
	250000		9300		11200		DS-206	DS-206		DS-206
	500000		9400		11300		DS-206	DS-206		DS-206
	Unlimited		9600		11500		DS-206	DS-206		DS-206
750 5.75%	50000	722	10000	2900	12900	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		11100		14000		DS-206	DS-206		DS-206
	150000		11600		14500		DS-206	DS-206		DS-206
	250000		11900		14800		DS-206	DS-206		DS-206
	500000		12200		15100		DS-206	DS-206		DS-206
	Unlimited		12600		15500		DS-206	DS-206		DS-206
1000 5.75%	50000	962	12400	3900	16300	DS-416	DS-206	DS-206	DS-416	DS-206
	100000		14300		18200		DS-206	DS-206		DS-206
	150000		15000		18900		DS-206	DS-206		DS-206
	250000		15600		19500		DS-206	DS-206		DS-206
	500000		16200		20100		DS-206	DS-206		DS-206
	Unlimited		16700		20600		DS-206	DS-206		DS-206
1500 5.75%	50000	1444	16500	5800	22300	DS-416	DS-416	DS-416	DS-416	DS-416
	100000		20000		25800		DS-416	DS-416		DS-416
	150000		21400		27200		DS-416	DS-416		DS-416
	250000		22700		28500		DS-416	DS-416		DS-416
	500000		23900		29700		DS-416	DS-416		DS-416
	Unlimited		25100		30900		DS-416	DS-416		DS-416
2000 5.75%	50000	1924	19700	7800	27500	DS-532	DS-416	DS-416	DS-532	DS-416
	100000		24800		32600		DS-416	DS-416		DS-416
	150000		27200		35000		DS-416	DS-416		DS-416
	250000		29400		37200		DS-416	DS-416		DS-416
	500000		31300		39100		DS-416	DS-416		DS-416
	Unlimited		33500		41300		DS-416	DS-416		DS-416

Type DS Low-Voltage Metal-Enclosed Switchgear

Indoor Dimensions (Inches)



Front Clearance for Breaker Removal-36" (Minimum)

Weights

Breaker	Pounds
DS-206	175
DS-416	180
DS-532	275
4 High Unit - without breakers	1300
Transition for connection to transformer	700
Auxiliary unit, without devices	500

Further Information:

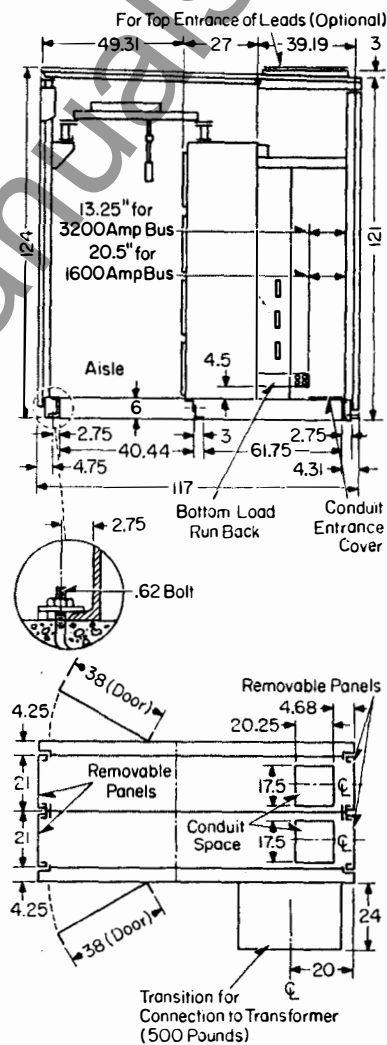
Prices: Price List 32-620

Standard Conditions of Sale:

Selling Policy 32-600

Application: Application Data 33-760-B

Outdoor Dimensions (Inches)



Weights

21" Housing, 1250 pounds

End Trims, 1550 pounds

These weights must be added to the weight of indoor switchgear for total weight of the assembly.