

# *MINI-flex*™

## 5KV Controllers—Model 1

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**SQUARE D COMPANY**

# 5KV CONTROLLERS—MODEL 1

## SELECTION GUIDE, GLOSSARY & PRICING INSTRUCTIONS

JANUARY, 1981

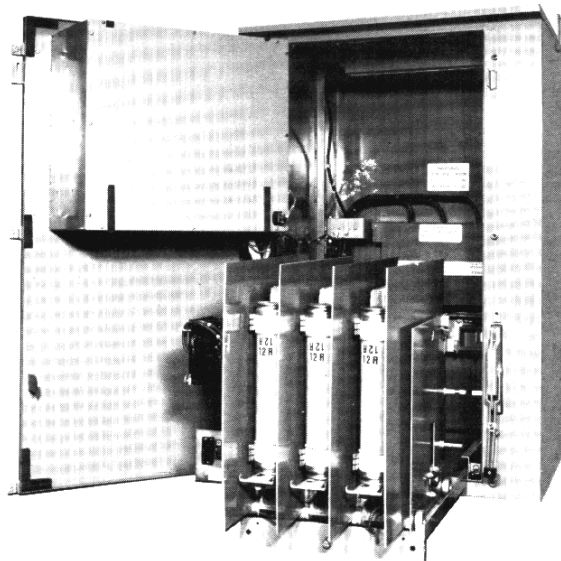
Medium voltage controllers are recommended for motors above 200 horsepower to reduce the overall cost of an installation. Class 8196 medium voltage controllers utilize a single contactor size (NEMA Size H3, 5000 volts, 360 amps enclosed rating). This feature provides greater flexibility for field changes such as contactors interchangeability or change in motor horsepower. It also keeps spare parts stocking to a minimum.

Class 8196 controllers are available for full voltage starting of squirrel cage motors.

- Used where only one controller is required, or where controllers are individually mounted at different locations.
- Ideal for installations where height is limited.
- Can be supplied as part of complete package by original equipment manufacturers. For example:
  1. Deep well pumping industry: Supply pump and controller as a package.
  2. Chiller Equipment: Supply chiller and controller as a package.
- Can be used to build controllers for squirrel cage, wound rotor or synchronous motors by manufacturers who specialize in fabricating their own enclosures.

### U.L. LISTING

Square D Company has submitted Class 8196 controllers to U.L. for listing under U.L. Standard 347. For information concerning U.L. testing, consult factory.



Class 8196 contactors meet NEMA Standard ICS-2-324, ANSI Standard C19.7 and requirements for certification by Canadian Standards Association.

### GLOSSARY

#### FRAME ASSEMBLY:

Consists of "L" shaped frame, contactor rails, drawout arms, connection box assembly with line and load stabs, shutter mechanism, and contactor frame ground system assembly.

#### DRAWOUT HANDLE ASSEMBLY:

Consists of drawout handle and drive rod which is connected to the drawout arms on frame assembly to rack contactor in and out of line and load stabs.

#### MEDIUM VOLTAGE COMPARTMENT:

Contains medium voltage contactor, frame assembly, drawout handle assembly, current transformers and other medium voltage equipment behind the main door of the enclosure.

#### LOW VOLTAGE COMPARTMENT:

Contains control relays and terminal blocks on the inside panel and pushbuttons, overload relays, and meters on the front hinged door. It is completely isolated from the medium voltage equipment and is part of the main door.

#### SERVICE TRAY:

Stored inside medium voltage door behind low voltage compartment on two hangers. When it is attached to the front of the enclosure between the contactor rails, the contactor can be rolled out of enclosure onto this tray.

### PRICING INSTRUCTIONS

- A. For Complete Controller
  1. Price the basic controller first, from the price sheets on page 3 or 4.
  2. If NEMA 1G (gasketed doors), NEMA 12 or NEMA 3 enclosures are required, add price from the modifications table on page 5.
  3. Price additional equipment if required, from modifications table on page 5 and 6. Note carefully the space requirement indicated on the table. Refer to page 5 for the maximum number of various control devices which can be supplied in low voltage compartment and medium voltage compartment.
- B. For Controller Equipment Without Enclosure:
  1. Price the basic equipment: Frame assembly, Drawout Handle Assembly, and Medium Voltage Contactor — from price table on page 7.
  2. Price additional modifications, if required, from page 7.



# 5KV CONTROLLERS—MODEL 1

## SQUIRREL CAGE, FULL VOLTAGE, NON REVERSING

**CLASS**  
**8196**

Class 8196 full voltage controllers are used when full starting torque and resulting inrush current are not objectionable. This is the simplest and least expensive method for starting a squirrel cage motor.

- AIR BREAK, MAXIMUM 5000 VOLTS
- NEMA CLASS E2 (FUSED)
- 50 MVA CONTACTOR
- ISOLATED LOW VOLTAGE COMPARTMENT
- ISOLATED MEDIUM VOLTAGE COMPARTMENT

Each controller price includes:

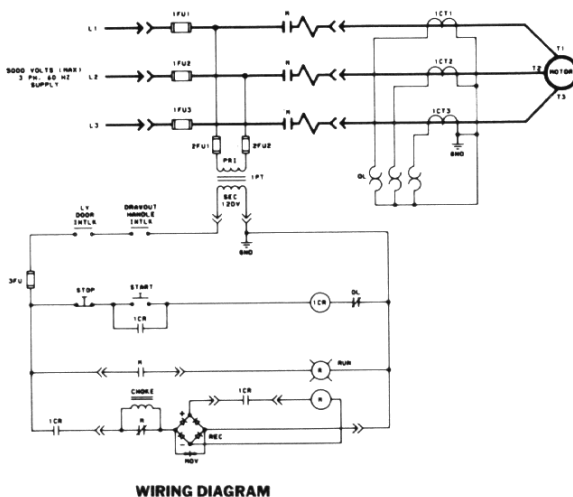
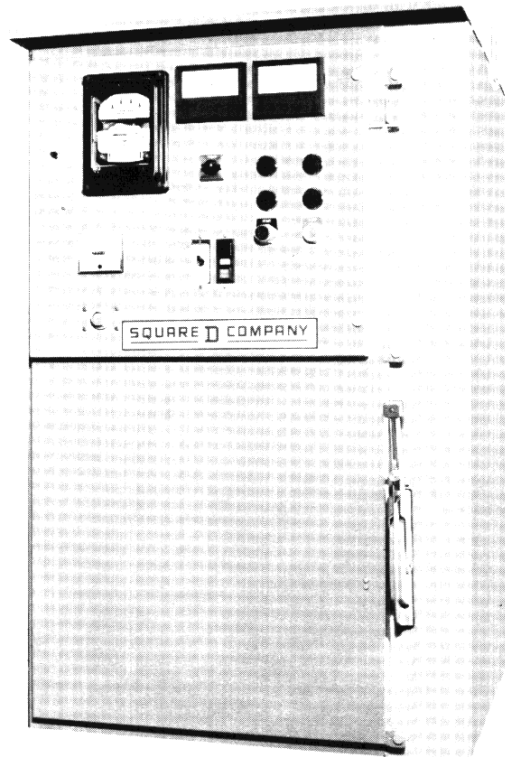
NEMA 1 enclosure 54" high with lifting hangers, frame assembly including line termination pads and drawout handle assembly. Drawout 360 amp, 3 pole, contactor assembly with:

Three current limiting power fuses  
 750 VA control transformer with primary fuses  
 Control circuit contacts: 2 form C

Low voltage control with:

Control circuit fuse  
 Test circuit  
 Three melting alloy overload relays, externally reset  
 Contactor control cable  
 Illuminated start push button  
 Stop push button  
 Electrical door interlock

Three current transformers with load cable termination pads  
 Service tray (to roll contactor out of enclosure)

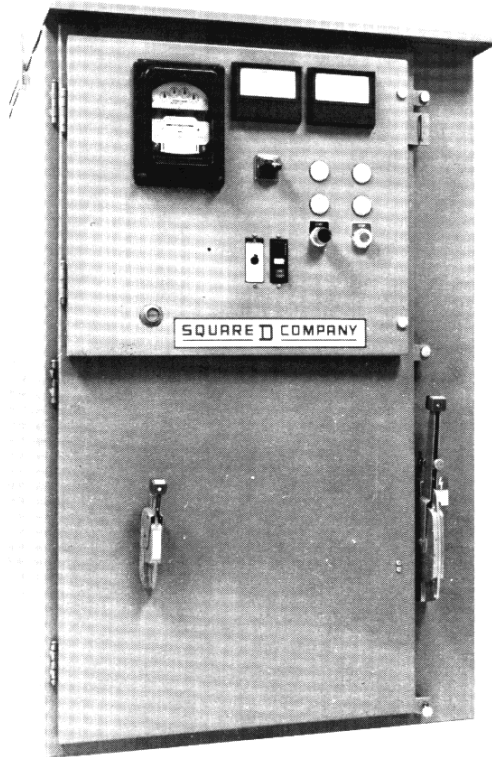


Maximum HP*	Volts	Controller Type	Controller Price (Includes NEMA 1 Enclosure)
700	2200-2400 4000-4800	FC-10 FC-20	\$7100. 7700.
1000	2200-2400 4000-4800	FC-10 FC-20	8200. 7700.
1250	2200-2400 4000-4800	FC-10 FC-20	8200. 7700.
1500	2200-2400 4000-4800	FC-10 FC-20	8200. 8300.
2500	4000-4800	FC-20	8300.

\* For controllers in NEMA 3 or NEMA 12 enclosures, the full load current must not exceed 300A.

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Class 8196 latched contactors remain closed on loss of power and are de-energized by use of a manual trip handle or an optional electrical solenoid release. Latched contactors are used frequently for switching transformers, motors that remain energized for long periods of time and for bus transfer schemes in place of metal clad circuit breakers or disconnect switches.



- AIR BREAK, MAXIMUM 5000 VOLTS
- NEMA CLASS E2 (FUSED)
- 50 MVA CONTACTOR
- ISOLATED LOW VOLTAGE COMPARTMENT
- ISOLATED MEDIUM VOLTAGE COMPARTMENT

Each latched contactor price includes:

NEMA 1 enclosure 54" high with lifting hangers, frame assembly including line termination pads and drawout handle assembly. Drawout 360 amp, 3 pole, latched contactor assembly with:

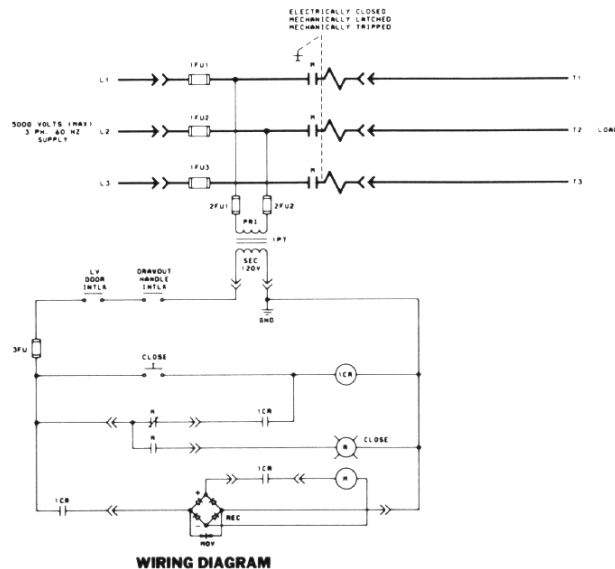
Three current limiting power fuses  
750 VA control transformer with primary fuses  
Control circuit contacts: 2 form C

Low voltage controls with:

- Control circuit fuse
- Test circuit
- Contactor control cable
- Manual trip handle
- Illuminated start push button
- Electrical door interlock
- Provisions for remote electrical trip
- Service tray (to roll contactor out of enclosure)

Maximum KVA*	Volts	Latched Contactor Type	Price (Includes NEMA 1 Enclosure)
500	2200-2400 4000-4800	FL-10 FL-20	\$7500. 8100.
700	2200-2400 4000-4800	FL-10 FL-20	8600. 8100.
1000	2200-2400 4000-4800	FL-10 FL-20	8600. 8100.
2000	4000-4800	FL-20	8700.
2500	4000-4800	FL-20	8700.

\* For latched contactor in NEMA 3 or NEMA 12 enclosures, the full load current must not exceed 300A.



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# 5KV CONTROLLERS—MODEL 1

## ADDITIONS & MODIFICATIONS

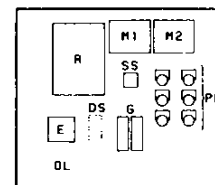
**CLASS**  
**8196**

### SPACE AVAILABLE IN MEDIUM VOLTAGE AND LOW VOLTAGE COMPARTMENT

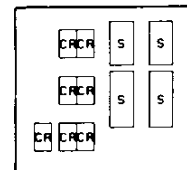
Listed below is the maximum number of different devices which can be mounted in medium voltage and low voltage compartment and on the low voltage compartment door. Devices are identified in "space requirements" column of modifications listing (page 5 and 6).

TABLE 1

Device*	Maximum Number Which Can Be Mounted		
	On Low Voltage Comp't Door	On Low Voltage Relay Panel	In Medium Voltage Compartment
A	—	—	1
B	—	—	3
C	—	—	3
CR	—	7	—
E	1	—	—
G	1	—	—
M	2	—	—
OL	1	—	—
PB	6	—	—
R	1	—	—
S	—	4	—
SH	—	1	—
SS	1	—	—



LOW VOLTAGE DOOR (FRONT VIEW)



LOW VOLTAGE RELAY PANEL (FRONT VIEW)

Item Number	Description	Space Requirements	Price	Item Number	Description	Space Requirements	Price
<b>ENCLOSURE MODIFICATIONS:</b>				<b>II. Potential Transformers</b>			
101	Gasketed door for NEMA 1 Enclosure	—	\$ 180.	+ + 311	Potential transformer, instrument type	B	576.
102	NEMA 3 enclosure (in place of NEMA 1) 58" high. Includes 4" high bottom channel.	—	—		(1) 2200-2400V 60 cycles	B	776.
	1 With solid low voltage compartment door	—	900.	321	Additional current transformer (donut)	B	260.
	2 With window in low voltage compartment door	—	1100.	322	Additional instrument type C.T. 400/5 Maximum	—	405.
104	NEMA 12 enclosure (in place of NEMA 1)	—	550.	323	Set of three instrument type current transformers in place of Standard C.T.s	—	690.
105	Bottom steel mounting channel (4" high) for NEMA 1 & NEMA 12 enclosure	—	200.	<b>NOTE:</b> Use standard donut C.T.s for thermal overload relays, solid state relays and ammeter. For all other applications use instrument type C.T.s			
107	Weatherproof undercoating	—	150. per controller	<b>IV. Space Heaters</b>			
109	Key interlock (mechanical)	—	332. per cylinder	331	Cabinet space heater (300 watts) wired to normally closed contact.	A	140.
110	Special paint (any color, baked enamel):	—	—	332	Cabinet space heater (300 watts) with manual ON-OFF switch.	SS	214.
	(a) Single coat (exterior only, in place of standard ASA-49)	—	100.	333	Cabinet space heater with thermal switch for temperature regulation.	A + CR	288.
	(b) Two coats of paint (standard ASA-49)	—	160.	334	Low voltage compartment space heater (125 watts) with thermal switch for temperature regulation	SH + CR	288.
	(c) Primer on NEMA-1 & 12 Enclosure	—	160.	<b>V. Miscellaneous (Test-Switch, Safety Interlocks, etc.)</b>			
<b>POWER CIRCUIT MODIFICATIONS:</b>				341	"Test-Normal" selector switch	1/2S	90.
203	Ground Pad	—	No charge	342	Circuit breaker in place of low voltage control fuse	CR	94.
207	Compression type, copper lugs Max. 500MCM (set of three)	—	90.	343	Additional circuit breaker, 2 pole, 120/240V, 15A, ac for control circuit	CR	104.
209	Power factor corrective capacitors 3 phase with fuses:	3B	1330.	344	Control circuit cabling, including 120V circuit breaker (This is required when control circuit power is obtained from separate source, rather than integrally mounted control transformer)	CR	290. per controller
	25KVAR	3B	1550.				
	50KVAR	3B	1750.	345	Extra control wires (for external circuit) connected to terminal strip	—	20. each
	75KVAR	3B	2040.	348	Electrical release for latched contactor	PB	\$200.
	100KVAR	3B	—	349	Additional control circuit contacts on contactor: 3 Form C	►	128.
210	Lightning arrestors, 3 phase	3B	1700.	350	Resistor used as load sensing device for air-conditioners	C	120.
	(A) Distribution Type:	3B	1920.	351	14 gauge control wires in place of std. 16 gauge wires	—	80.
	(1) 3000 volts	3B	2100.	<b>VI. Control Relays, Timers, etc.</b>			
	(2) 6000 volts	3B	2320.	361	Control relay, 4 pole	CR	152.
<b>CONTROL CIRCUIT MODIFICATIONS:</b>				362	Control relay, 8 pole	CR	232.
<b>I. Control Transformers</b>				363	Mechanically latched control relay (maximum 4 pole)	1/2S	180.
301	750VA, 60KV BIL rated control transformer (in place of standard transformer) 120V secondary	—	536.	364	Pneumatic timer	1/2S	200.
+ 302	Two 750VA control transformers (connected in open delta for 3 phase, 120 volt output)	►	416.	365	Motor driven timer	S	352.
303	1.5KVA control transformer (in place of standard transformer) 120-240V secondary	►	416.				
304	2.5KVA control transformer (in place of standard transformer) 120-240V secondary	►	782.				
305	3KVA control transformer (in place of standard transformer), separately mounted from the contactor 120-240V second	3B	856.				
306	Omission of standard control circuit transformer:	—	256.				
	Deduct: (1) 2200-2400 V	—	256.				
	(2) 4000-4800 V	—	—				

■ There is no space available in the controller for mounting surge capacitors  
 • See Table 1 above for various devices which can be mounted in controller

+ Recommended for 2% accuracy meter  
 + + Recommended for 1% accuracy meter

► Mounted on medium voltage contactor

# 5KV CONTROLLERS—MODEL 1

## ADDITIONS & MODIFICATIONS

JANUARY, 1981

Item Number	Description	Space Requirements	Price	Item Number	Description	Space Requirements	Price
<b>VII. Protective Relays</b>				<b>METERING EQUIPMENT (MOUNTED ON DOOR)</b>			
<b>A. Overload, Overcurrent and Instantaneous</b>				401	AC Ammeter—2% Accuracy (90° Scale)	M	396.
371	Thermal overload relay, 3 pole, bimetallic ambient temperature compensated, with standard C.T.s	OL	no charge	402	AC Ammeter—1% Accuracy (180° or 250° scale)	M	476.
372	N.O. alarm circuit contact on overload relay (not available on magnetic overload relays)	.....	50. per controller	403	Recording Type AC Ammeter	Consult Factory	1790.
373	Magnetic overload relays (requires instrument type C.T.s item 323)	Contact Factory	72. per controller 1590.	+ 404	Ammeter Transfer Switch	SS	204.
374	Solid state over current relay (Three phase)	S		405	AC Voltmeter—Standard (90° scale)	M	396.
375	Switchboard type over current or instantaneous relay single pole (requires instrument type C.T.s, item 323)	R	1020. per pole	406	AC Voltmeter—Switchboard Type (180° or 250° scale)	M	476.
376	Under current relay (adjustable) 3 phase	S	200.	+ 409	Voltmeter Transfer Switch (requires item 302 or 311)	SS	204.
377	Locked rotor overload (stalled rotor protection)	S	542. per pole	410	Watt-hour Meter (drawout type). Requires 2 P.T.s (item 302 or 311) and instrument type C.T.s (item 322 or 323)	R	1030.
<b>B. Under Voltage, Phase Sequence</b>				411	Watt-hour Meter with demand register. Requires 2 P.T.s (item 302 or 311) and instrument type C.T.s (item 322 or 323)	R	1240.
378	Instantaneous under voltage protection (standard)	.....	no charge	412	Wattmeter, Requires 2 P.T.s (item 302 or 311) and instrument type C.T.s (item 322 or 323)	M	1120.
379	Time delay under voltage circuit 1. With timing relays 2. With resistor-capacitor network	2 CR Contact Factory	280. Contact Factory	414	Varmeter, Requires 2 P.T.s (item 302 or 311) and instrument type C.T.s (item 322 or 323)	M	1120.
380	Undervoltage and overvoltage relay (adjustable) Solid State	2M or S	920.	415	Power Factor Meter, Requires 2 P.T.s (item 302 or 311) and instrument type C.T.s (item 322 or 323)	M	1120.
381	Phase sequence voltage relay (switchboard type)	R	920.	416	Frequency Meter	M	780.
<b>C. Ground Fault</b>				417	Elapsed Time Meter	E	166.
382	Ground fault protection for grounded system including donut type C.T. (Manual reset) (1) Without test circuit (2) With test circuit	G G	855. 1500.	418	Operating Counter	E	238.
383	Ground fault detection for ungrounded system (1) 2400V (2) 4160V	3B + 4PB 3B + 4PB	1900. 2500.	419	Test Blocks (1) 4 Pole (2) 6 Pole (3) 8 Pole (4) 10 Pole	Contact Factory	148. 212. 296. 370.
384	Ground fault detection and protection for ungrounded system (1) 2400V (2) 4160V	3B + 4PB + CR 3B + 4PB	2200. 2800.	420	Current Transducer (used for remote metering)	S	580.
<b>D. Reverse Phase, Phase Failure/Unbalance</b>				421	Voltage Transducer (used for remote metering)	S	580.
386	Reverse Phase—Phase Failure Relay (Solid State Type)	R or S	860.	422	Watts Transducer (used for remote metering)	S	1290.
387	Phase balance current relay (Solid State Type) 3 phase.	S	1590.	<b>PILOT DEVICES MOUNTED ON DOOR</b>			
<b>E. Differential</b>				501	Hand-Off-Auto Selector Switch	PB	60.
388	Differential current relay, 3-phase (does not include C.T.s) For 3 C.T. scheme (use 3 window type C.T.s at motor)	R	1590.	502	Indicating Light (specify color)	PB	60.
<b>F. Temperature Monitoring Devices</b>				503	Push-to-Test Indicating Light	PB	90.
389	Temperature Relay: Monitors one preselected 10, 100, or 120 ohm Resistance Temperature Detector (RTD) located in motor winding or motor bearing. 1. Induction disc type 2. Solid state type 3. Temperature meter relay (indicating type) 4. Mounting and Wiring (relay supplied by customer)	R S M & S R or S	1470. 1470. 720. 140.	504	Other Push Button Units (price per operator)	PB	60.
390	Six position RTD selector switch (for use with item 389)	SS	408.	505	Maintained Contact Push Button	2 PB	120.
<b>G. Solid State Multifunction Relays</b>				506	Pistol Grip Selector Switch (ON-OFF)	SS	204.
391	Multifunction module with following protective functions: Overload Stalled rotor Current unbalance/open phase Ground fault (for grounded system, includes window C.T.) Over temperature (single RTD, winding or bearing)	R or 2S	2937.	<b>ACCESSORY AND SPARES</b>			
392	Multifunction programmable module with following protective functions: Overload Stalled rotor Current unbalance/open phase Phase reversal Ground fault (for grounded system, includes window C.T.) Over temperature (monitors 6 winding RTDs and 2 bearing RTDs simultaneously)	R or 2S	6295.	701	Spare contactor assembly consisting of 3-pole contactor with control circuit contacts, 2 Form C Power fuse clips (less fuses) 750 VA control transformer complete with primary current limiting fuses D.C. operating coil with rectifier and economizing reactor for operation from 120V, 60Hz, ac supply.		4700.
				702	Contactor test cord (to test contactor on bench)		178.
				703	Spare fuses (the following prices are applicable for spare fuses purchased with the starter. When the fuses are purchased separately, refer to HI Repair & Component Parts Price List)		
					2300 V 4800 V FUSE SIZE		
					Max. H.P. 200 400 2R, 3R, 4R		162. each
					500 1000 6R, 9R		385. each
					700 1200 12R		385. each
					800 1500 18R†		602. each
					Max. KVA 200 400 65E, 80E, 100E		193. each
					500 1000 †125E, 150E, 200E		350. each
					1000 2000 †300E, 375E		602. each
					†These fuses are double barrel type		
				704	Control transformer primary fuse (2E Max.)		65. each
				705	Control transformer secondary fuse (250V, 6.25A Max)		3. each
				<b>MISCELLANEOUS</b>			
				801	Export Packing (1) Below Deck (standard) (2) Above Deck (special)	Contact Factory	

► Mounted on medium voltage contactor.  
● See Table 1 on Page 5 for various devices which can be mounted in controller.

+ A combination ammeter-voltmeter transfer switch is supplied when both are specified.



# 5KV CONTROLLERS—MODEL 1

## CONTROLLER KIT

**CLASS**  
**8196**

Controller Kit consists of a medium voltage contactor, frame assembly, drawout handle assembly and a control cable assembly. The controller kit is available in various configurations and modifications for building controllers for squirrel cage, wound rotor or synchronous motors. This kit can be used by manufacturers fabricating their own sheet metal enclosures and specializing in the assembly of electrical equipment.

The equipment price includes:

Drawout 360 amp, 3 pole, contactor assembly with:

- DC operating coil with rectifier and economizing reactor for operation from 120 V, 60 Hz., ac supply
- Power fuse clips (less fuses): 3" diameter, 12" clip center
- Control power transformer: 750 VA, single phase, 120 V secondary, with two primary fuses
- Control circuit receptacle (male) mounted as integral part of contactor
- Control circuit contacts: 3 Form C

Control cable assembly with:

- Control cable female plug (To match control circuit male receptacle on contactor) with a total of seventeen #16 gauge control wires (six feet long) connected to it

Frame assembly includes:

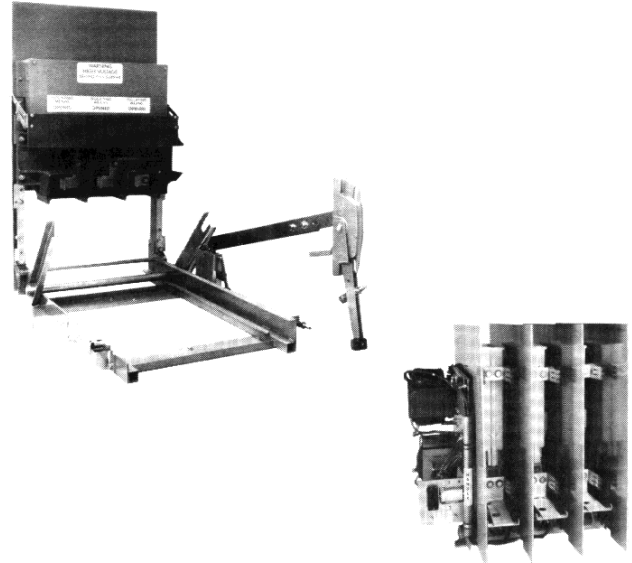
- Contactor rails
- Contactor frame ground system assembly
- Drawout arms

Connection box assembly with:

- Incoming line termination pads, line stabs, line side shutter plate and line terminal cover
- Load stabs
- Insulated barrier

Drawout handle assembly includes:

- Drawout handle with gasket, locking screw and support brackets
- Drive rod (Linkage between drawout handle and drawout arm)
- Handle electrical interlock assembly consisting of threaded engagement plate and snap switch with gasket
- Door catch



Maximum H.P. ▶	Volts	CONTROLLER KIT		LATCHED CONTACTOR CONTROLLER KIT *	
		Type	Price	Type	Price
1500	2200-2400	CK-10	<b>\$4400.</b>	CKL-10	<b>\$4650.</b>
2500	4000-4800	CK-20	<b>4400.</b>	CKL-20	<b>4650.</b>

\* Latched contactor includes latching mechanism mounted on left hand side plate of contactor (see Figure 1, Page 8), and manual release handle (for separate mounting on door).

▶ Limited by the size and type of enclosure used. Refer to page 9, Contactor Current Rating vs Enclosure Size Table, for details.

### CONTROLLER KIT MODIFICATIONS

Item Number	Description	Price
<b>I. Control Circuit</b>		
1	14 gauge control wires in place of 16 gauge wires with: • (a) 17 or 19 wire control cable and plug • (b) 28 wire control cable and plug	<b>\$ 80. 120.</b>
2	Additional control circuit contacts on contactor: 3 Form C (Includes 28 wire control cable with plug)	<b>128.</b>
3	Electrical release for latched contactor	<b>200.</b>
4	750VA, 60KV BIL rated control transformer (in place of standard transformer)	<b>536.</b>
5	Two 750VA control transformers connected in open delta	<b>416.</b>
6	1.5KVA control transformer (in place of standard transformer)	<b>416.</b>
7	2.5KVA control transformer (in place of standard transformer)	<b>782.</b>

Item Number	Description	Price
8	Omission of standard control transformer (750VA). Deduct: (a) 2200-2400V (b) 4000-4800V	<b>\$256. 444.</b>
<b>II. Power Circuit</b>		
11	Front bus assembly on contactor in place of power fuses and fuse clips (see Fig. 2A, Page 8)	<b>150.</b>
12	Third stab assembly (added to contactor) with associated connection box (See Fig. 2B, Page 8)	<b>300.</b>
13	Adapters for 7" clip center power fuses (Set of three)	<b>150.</b>

\* 17 wire control cable is standard, 19 wire control cable is supplied with latched contactor having 3 Form C control circuit contacts. 28 wire control cable is required when 3 Form C additional control circuit contacts are supplied.



# 5KV CONTROLLERS—MODEL 1

## CONTACTOR CONFIGURATIONS

JANUARY, 1981

The basic contactor listed below can be supplied in many configurations by a selection of modifications:

Class 8110, 3 pole, drawout, clapper type air break contactor. Rated 5 KV, 360 amps (enclosed), 60 KV BIL, with interrupting capacity of 50 MVA symmetrical. Includes DC operating coil with rectifier, economizing reactor for operation from 120 volt 60 HZ AC supply, and control circuit contacts: 3 Form C

Modifications to basic contactor include:

- 2 poles
- Power fuse clips for power fuses
- Shorting bus in place of power fuse clips
- Control power transformers with 750 VA, 1500 VA, or 2500 VA capacity. Two 750 VA transformers connected in open delta for control power and 3 phase power supply. Primary fuses included on contactor with all control transformers
- Third stab assembly for power connection at line side of contactor
- Additional control circuit contacts: 3 Form C
- Mechanical latch in Fig. 1

The standard contactor assembly (Figures 1A & 1B) includes:

- Basic contactor — 3 pole
- Three sets of power fuse clips
- Control power transformer (CPT):  
750 VA, 1  $\phi$ , 120V secondary, with two primary fuses

Some optional contactor assemblies are:

- Standard contactor assembly as described with solid bus in place of power fuse clips. See Fig. 2A
- Standard contactor assembly as described with additional third stab assembly. See Figs. 2B & 2C
- Standard contactor assembly as described with solid bus in place of power fuse clips and additional third stab assembly. See Figs. 2A & 2C

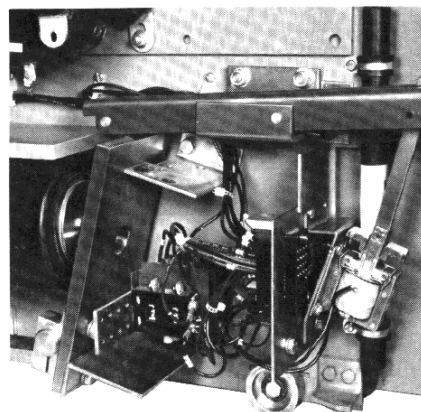


Figure 1

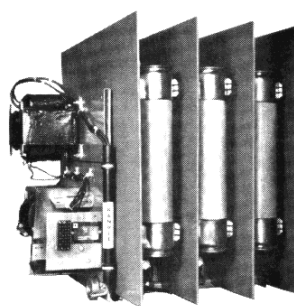


Figure 1A

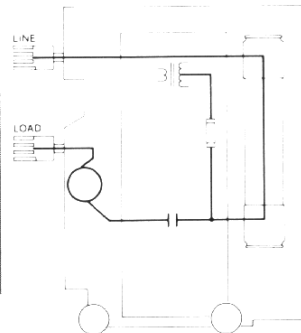


Figure 1B

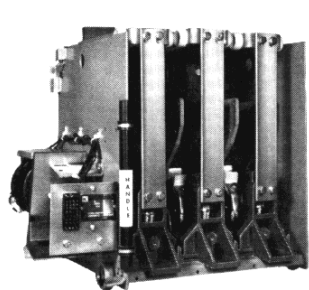


Figure 2A

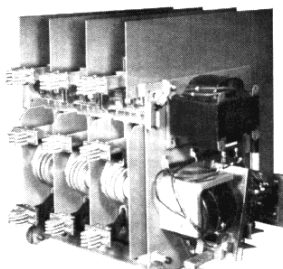


Figure 2B

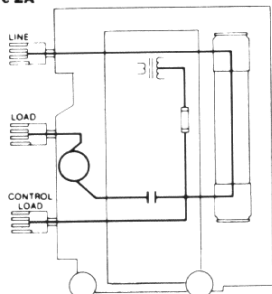
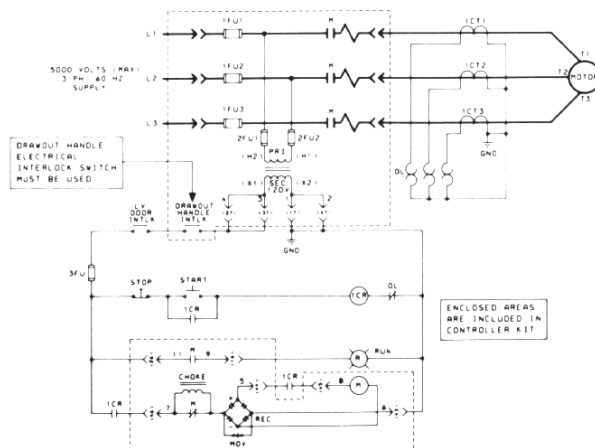


Figure 2C



RECOMMENDED CONTROLLER CIRCUIT

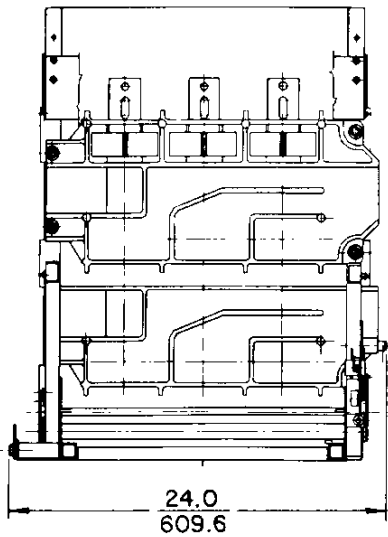


# 5KV CONTROLLERS—MODEL 1

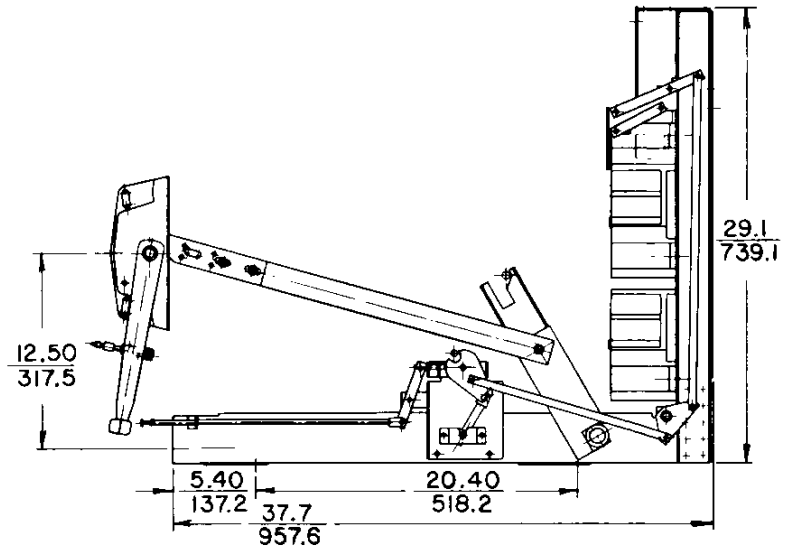
## CONTROLLER KIT DIMENSIONS & MOUNTING DETAILS

NOT FOR CONSTRUCTION

CLASS  
8196



FRONT VIEW



RIGHT SIDE VIEW

Dual Dimensions: **INCHES**  
Millimeters

### Contactor Current Rating vs Enclosure Size

The continuous rating of the contactor is determined by the enclosure size as shown in table below.

Contactor Current Rating	Enclosure Without Ventilation	Enclosure With Ventilation	
	Minimum Volume Cu. Ft.	Minimum Volume Cu. Ft.	Minimum Door Ventilation Sq. In. ▶
360	—	41	160
330	—	20	60
250	20	—	—

▶ This is the total area of ventilation openings one half of this area shall be in a vent at bottom of door (at rail level on contactor) and the other half of area to be in a vent just above the top (phase barrier) of the contactor

# 5KV CONTROLLERS—MODEL 1

## APPLICATION DATA

JANUARY, 1981

### ENCLOSURE (When Supplied)

Sheet Steel ..... #14 gauge

Paint Finish ..... NEMA 1 and 12: One coat of medium light gray (ASA-49) baked enamel over cleaned and phosphatized surface.

NEMA 3: One coat of medium light gray (ASA-49) baked enamel over one coat of baked zinc chromate over cleaned and phosphatized surface.

Types ..... NEMA 1, NEMA 1 with gasketing, NEMA 3, NEMA 12.

### CONTROLLER RATINGS

#### \* Maximum Ratings at Utilization Voltages (Three Phase) (Per NEMA Standard Part ICS 2-324)

	Contactor Rating		2300 Volt	4000 Volt	4600 Volt
	NEMA Size	Amperes (Enclosed)	60 Hertz	60 Hertz	60 Hertz
Squirrel Cage Motors	H3	360	1500 HP	2500 HP	2500 HP
Wound Rotor Motors	H3	360	1500 HP	2500 HP	2500 HP
Synchronous Motors (0.8 Pf) (1.0 Pf)	H3	360	1500 HP	2500 HP	2500 HP
	H3	360	1750 HP	3000 HP	3000 HP
Interrupting Capacity Class E1 (Unfused) Class E2 (Fused)	H3	360	50 MVA	50 MVA	50 MVA
	H3	360	200 MVA**	350 MVA**	400 MVA**
Basic Impulse Level	H3	360	60 KV	60 KV	60 KV

\*\* With 50 KA (symmetrical) rated fuse

Interrupting Ratings ... 50,000 amps symmetrical, 80,000  
amps asymmetrical, 200MVA(sym)  
2300V, 350MVA(sym) 4160V

### INCOMING LINE

\*Location ..... Behind line terminal cover at top of frame assembly.

Cables ..... Supports for three cables, maximum 500MCM.

Entrance ..... 2" knockout located at lower left corner (front view) of enclosure backplate, or through bottom at left rear corner.

\*Termination ..... Termination pad provided. (Two-hole lugs must be used to prevent rotation of lugs.)

Stress Cones ..... Maximum size 7".

### LOAD CABLE

Location ..... Right side of enclosure near the front.

Cables ..... Supports for three cables, maximum 500MCM.

Entrance ..... 2" knockout located at lower right corner (front view) of enclosure backplate, or through bottom at right side.

Termination ..... (a) Terminal pad on stand-off insulators when donut C.T.s are supplied.

(b) Directly on bar of C.T.s when bar type C.T.s are supplied.

(Two-hole lugs must be used to prevent rotation of lugs.)

Stress Cones ..... Maximum size 7".

### CONTACTOR

Location ..... Located in medium voltage compartment.

Construction ..... Clapper type, line and load connection disconnected in drawn out position.

\*Volts and Frequency .. 5000V maximum, 50-60 Hertz.

\*Current Ratings ..... NEMA type H3, 360A enclosed.

\*Interrupting Rating ... 50MVA.

\*Contact Tips ..... Silver-tungsten carbide faced cooper.

\*Control Voltage ..... 120V, 60 Hertz, single phase.

\*Control Current ..... a. Pickup 3.0 amps AC  
b. Sealed 0.6 amps AC

\*Coil Circuit Rectifier .. 12 Amps, 120 Volts, AC, full wave bridge silicon.

### \*Control Circuit

Contacts ..... a. Standard: 2 Form C for customer use.

Optional: Maximum of 5 contact blocks.

b. Rating: (i) Continuous: 10 amps  
(ii) Break (Inductive): 2.2 amps at 120V AC.

Test Circuit ..... Standard extension cord for testing starter in enclosure.

### \* CONTROL TRANSFORMER

Location ..... Integral part of contactor or separate mounting for 3KVA.

Rating (Contactor Mounted) .....

a. Standard 750VA.

b. Optional 1.5KVA, 2.5KVA.

Accuracy .....  $\pm 2\%$  at 50% rated VA. Regulation 5%.

Protection ..... a. Primary: Two current limiting fuses.

b. Secondary: One 6 amps fuse. Circuit breaker — optional.

Ratios ..... 2400/120, 3300/120, 4200/120, 4800/120.

\* Application data applies to controllers and controller kits

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D3A DISCOUNT

SQUARE D COMPANY



# 5KV CONTROLLERS—MODEL 1

## APPLICATION DATA & ORDERING INFORMATION

**CLASS**  
**8196**

### CURRENT TRANSFORMERS (when supplied)

**Location** . . . . . Mounted in medium voltage compartment.

	Standard	Optional
Type	Donut	Instrument (Bar Type)
Accuracy & burden (a) Metering (b) Relaying	1.2B-0.2 ...	0.3B-2.0 2.5T100
Ratios	25/5 through 1200/5	25/5 through 800/5

### OVERLOAD PROTECTION (when supplied)

**Location** . . . . . Standard relays on low voltage compartment door.

**Standard Relays** . . . . . Square D Class 9065, Type SEO-5 melting alloy.

**Optional Relays** . . . . . a. Square D Class 9065 bimetallic Type SEO-6B temperature compensated or Type SEO-6B2 non-compensated.  
b. Square D Class 9055 Magnetic Oil Dash Pot.  
c. Switch Gear or Static Type for special applications.

**Reset (thermal relays)** . External hand operated.

### LOW VOLTAGE CONTROLS (when supplied)

**Location** . . . . . Separate isolated compartment.

**Terminal Strip** . . . . . Wire #10 and smaller, 600V ratings.

**\*Wiring** . . . . . Standard: 600V, 16 gauge stranded.  
Optional: 600V, 14 gauge stranded.

**\*Push Buttons** . . . . . Class 9001, 10 amp, 600V ratings.

**Pilot Lights** . . . . . Class 9001, Type K, 120V (transformer operated).

**Standard Relays** . . . . . Class 8501, Type L, 10 amp, 600V

### MECHANICAL INTERLOCKING

**\*Contactor** . . . . . a. Cannot engage line stabs with contacts closed.

b. Cannot disengage line stabs with contacts closed.

**\*Drawout Handle** . . . . . a. Cannot move handle down to draw out contactor with contacts closed.

b. Cannot move handle up to draw in contactor with either contactor closed or medium voltage door open.

**\*Medium Voltage Door** a. Cannot open medium voltage door with drawout handle up.

b. Drawout handle must be moved down to withdraw contactor from line and load stabs before medium voltage door can be opened.

**\*Shutters** . . . . . a. Shutters close after contactor disengages line and load stabs.

b. Shutters open as contactor is drawn in to engage line and load stabs.

**Defeaters** . . . . . a. Defeat system will permit authorized personnel to open medium voltage door with contactor engaged to line and load. Note: A tool and two separate operations are required.

b. Defeat system will permit authorized personnel to draw in contactor to line and load stabs with door open. CAUTION: Incoming line must be de-energized.

### ELECTRICAL INTERLOCKING

**Low Voltage Door** . . . . . a. Controller is de-energized when low voltage door is opened.

b. Interlock may be defeated by authorized personnel to keep controller energized when low voltage door is opened. Note: Tool required.

**\*Drawout Handle** . . . . . Causes contactor to de-energize before drawout handle can be moved down to withdraw contactor.

## ORDERING INFORMATION

### A. CONTROLLERS

#### Class and Type

**System:** Volts, phases, frequency, short circuit capacity, grounded or ungrounded.

**Motor:** Horsepower, full load current, locked rotor current, service factor, class of insulation, acceleration time.

**Enclosure:** NEMA Type 1, 3, 12 or 1 with gasketed doors.

**Load:** Acceleration time, duty cycle (number of starts/hour)

#### Modifications

### B. CONTROLLER KIT

#### Class and Type

**System:** Volts, phases, frequency.

#### Contactors modifications

\* Application data applies to controllers and controller kits

