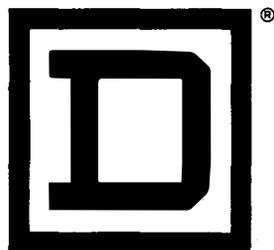
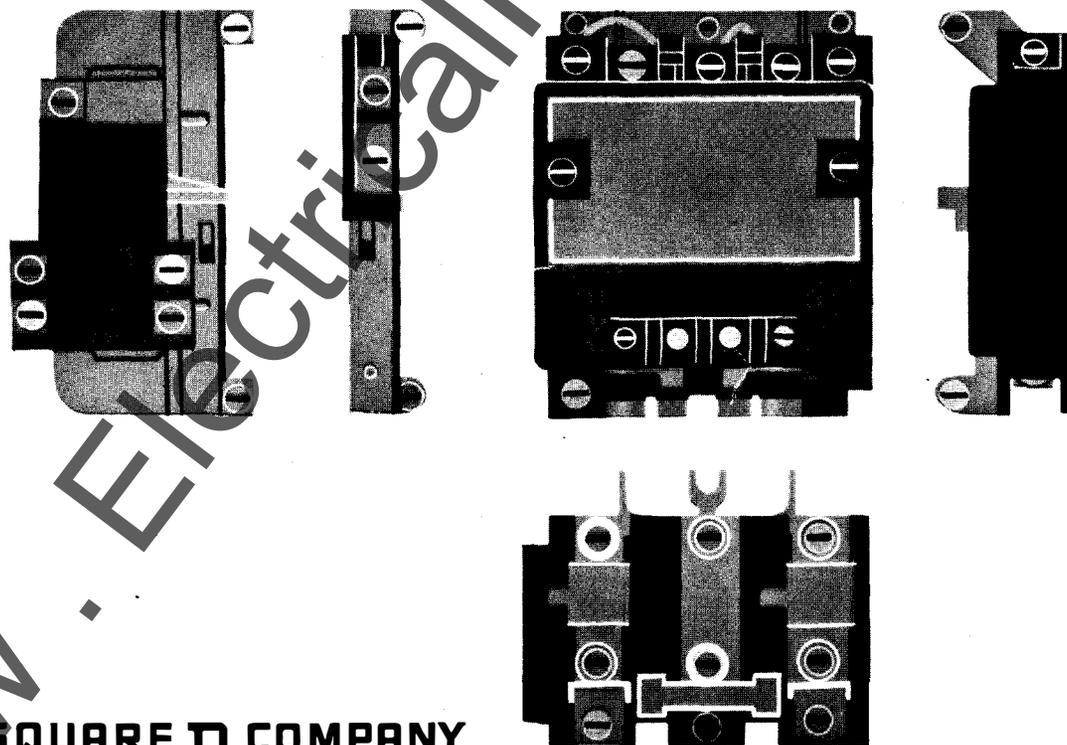


Wherever Electricity is Distributed and Controlled



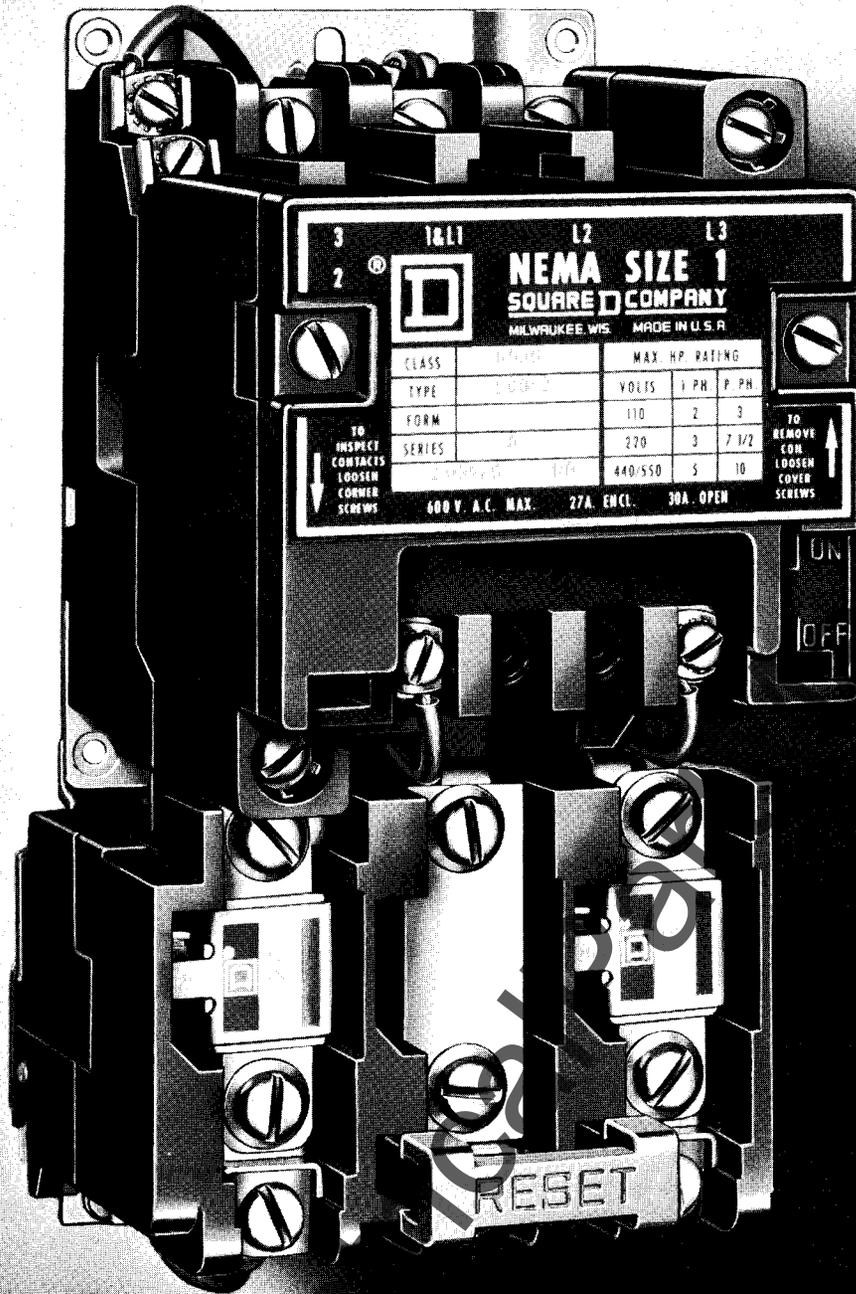
TYPE S

MOTOR STARTERS



SQUARE D COMPANY

www.ElectricalPartManuals.com



**new SQUARE D
MOTOR
STARTERS**

3	L1	L2	L3
2	NEMA SIZE 1 SQUARE D COMPANY MILWAUKEE, WIS. MADE IN U.S.A.		
CLASS		MAX. HP RATING	
TYPE		VOLTS	1 PH. P. PH.
FORM		110	2 3
SERIES		220	3 7 1/2
		440/550	5 10
TO INSPECT CONTACTS LOOSEN CORNER SCREWS		TO REMOVE COIL LOOSEN COVER SCREWS	
600 V. A.C. MAX.		27A. ENCL. 30A. OPEN	

ON
OFF

RESET

a new line of starters joins Square D's starter family featuring smaller size, increased flexibility and the same dependability you've come to expect in Square D starters.

To meet today's requirements for smaller and smaller electrical control equipment, Square D has developed the new Type S starter line. These new starters, while small in size, retain the important features of quick installation and easy maintenance for which the Square D starter is famous. Also, the use of new materials and a unique mechanism offers improvement in mechanical and electrical performance.

CHECK OVER THESE FEATURES NEVER BEFORE AVAILABLE IN ANY ONE STARTER LINE

IMPROVED ELECTRICAL PERFORMANCE — Shorter contact bounce — vertical contact surfaces — new materials.

LONG TROUBLE FREE MECHANICAL LIFE — Simple mechanism with floating, self aligning magnet. Wear resistant materials.

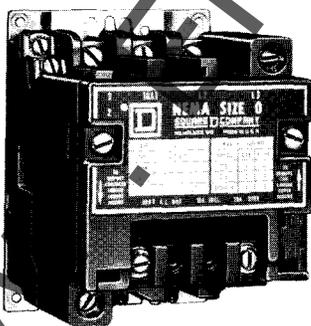
RELIABLE OVERLOAD PROTECTION — With one piece factory tested thermal units — trip free — 2 or 3 overloads in same space.

LESS PANEL SPACE — with modular design.

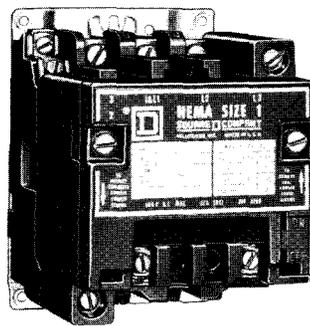
EASY INSPECTION AND MAINTENANCE — quick contact inspection and replacement — fast coil change.

QUICK INSTALLATION — straight through wiring — pressure wire connectors — three point mounting.

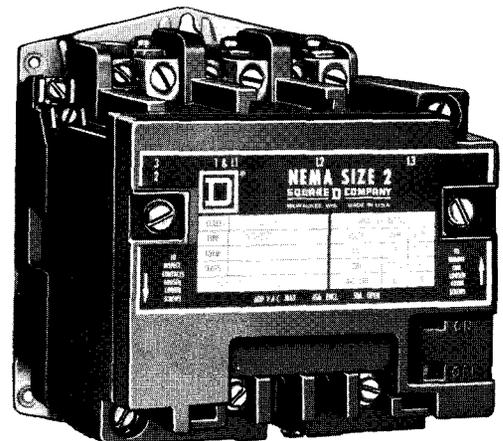
INCREASED FLEXIBILITY — for field modifications — 4 additional electrical interlocks — attached timer — power pole adders — field addition of third overload relay.



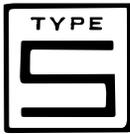
Size 0 Contactor



Size 1 Contactor

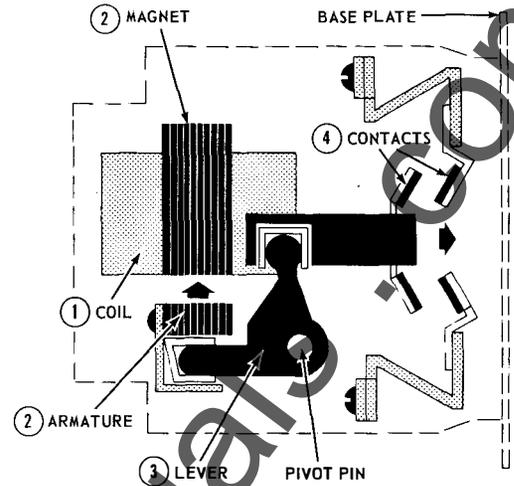


Size 2 Contactor



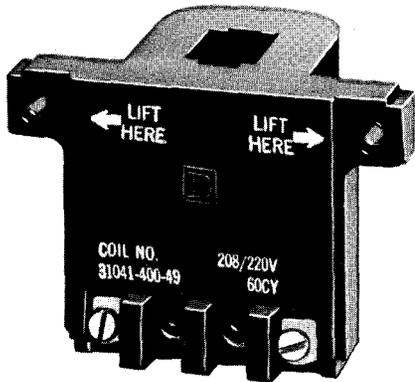
TOP PERFORMANCE AND LONGER LIFE

A unique contactor design with a vertical action magnet assembly and horizontal action contacts results in top electrical and mechanical performance. The armature operates in the vertical plane and its movement is transformed by a lever into a horizontal motion of the contacts. Thus, the shock of armature pickup is not transmitted to the contacts, resulting in a minimum of contact bounce for extra long contact life.



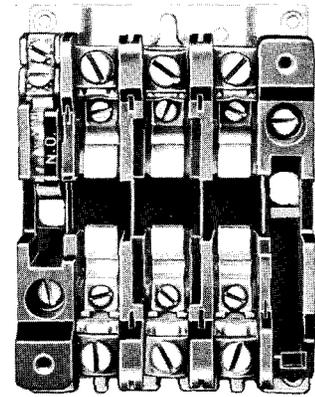
3

A bell crank lever design is used to transform the vertical action of the armature into the horizontal action of the contact carrier. All bearing points and guides are designed using premium materials to assure trouble-free, long life operation.



1

The rugged molded magnet coil provides a tough permanently sealed unit impervious to moisture, oil, and mechanical damage. No danger of coil burnout. Pressure wire connectors on the coil facilitate coil wiring. The rating and part number are clearly stamped on the coil for easy identification.

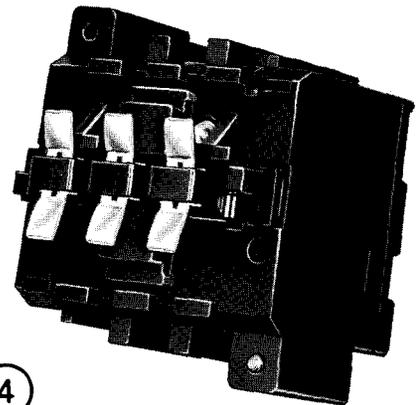
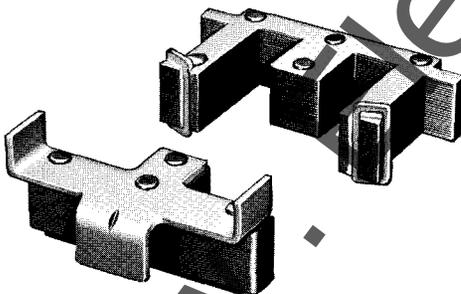


2

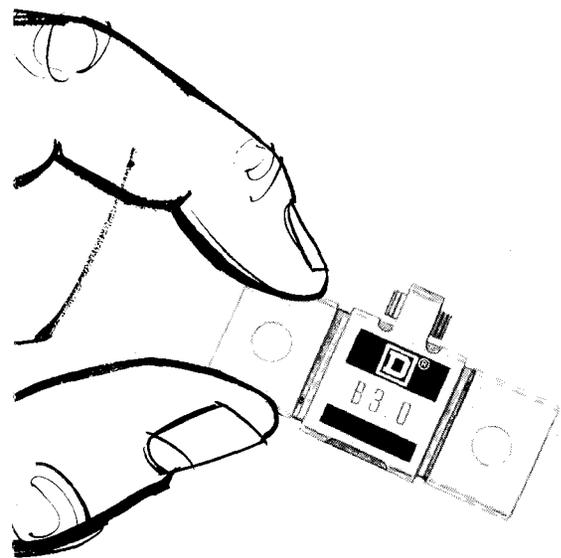
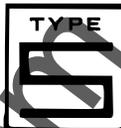
The armature is gravity drop out assisted by return springs for quick contact break. The magnet is shock mounted to absorb armature impact. This, along with hardening of the armature and magnet, results in extremely long life. The use of a floating armature results in quiet operation.

4

The double break silver alloy contacts are in the vertical plane to eliminate accumulation of dust and other foreign matter. Contacts are at an angle from the vertical resulting in high contact pressure and positive seating of movable contacts. Contact bounce is thus decreased and longer contact life results.



RELIABLE OVERLOAD PROTECTION



One of the primary purposes of any starter is that of protecting the motor windings from damage due to overload conditions. The overload relay is actually the heart of the starter. The Type S starter uses the *exclusive* one piece construction thermal units which have been used in Square D starters for over 35 years.

ONE PIECE THERMAL UNIT

Reliable overload protection is insured because the entire assembly is thoroughly factory tested as a unit for proper trip characteristics. Thermal units are tamper proof and easy to install. Standard trip, quick trip and slow trip thermal units are available.

TRIP-FREE CONSTRUCTION

Overload relay contacts can not be closed until the thermal units have cooled.

SNAP ACTION CONTACTS

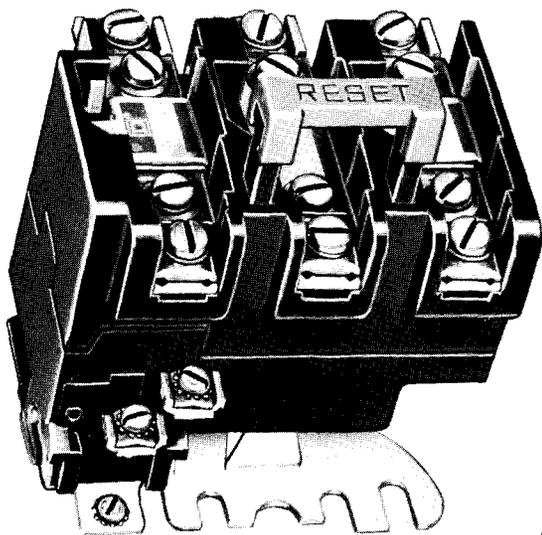
Control module mounts into corner of overload relay block and can easily be replaced. Contacts are only closed when all thermal units are inserted, thus insuring motor overload protection.

THIRD OVERLOAD RELAY

Easy conversion from two to three thermal units. No extra space required.

ALARM CIRCUIT CONTACTS

Available as an optional feature when it is necessary to indicate that overload relay thermal unit has tripped.



QUICK INSTALLATION

THREE POINT MOUNTING

For easier mounting, a keyhole slot is provided in the starter baseplate at the top and two open slots at the bottom. Contactors have two point mounting.

STRAIGHT THROUGH WIRING

Three line terminals at the top and three load terminals at the bottom make wiring easier.

PRESSURE WIRE CONNECTORS

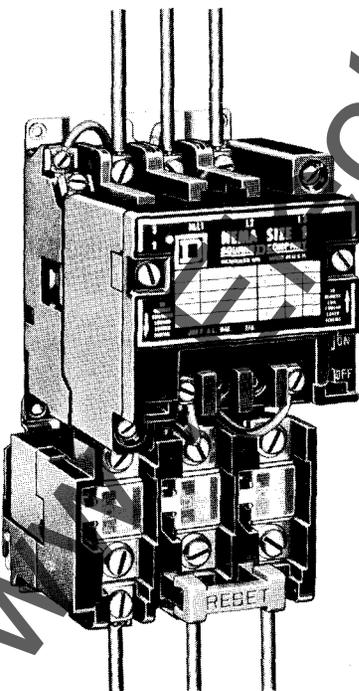
Self-lift clamp type pressure wire connectors allow easy insertion of all power and control wires.

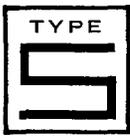
CLEARLY MARKED TERMINALS

No guessing as to terminal identification. All marking clearly visible from the front.

PLENTY OF KNOCKOUTS AND WIRING ROOM

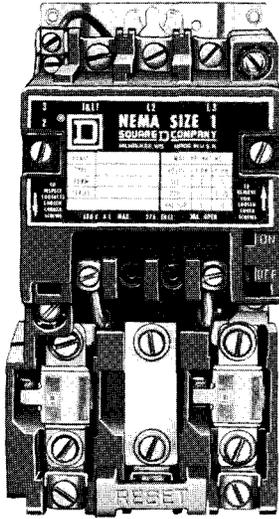
All enclosures have conveniently located knockouts and lots of wiring room.



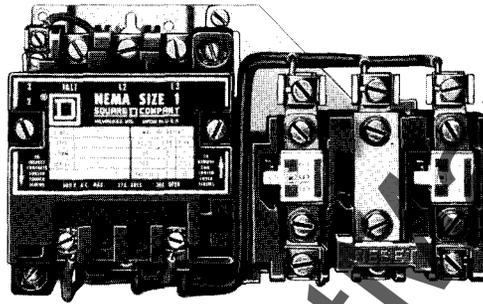


MODULAR DESIGN SAVES PANEL SPACE

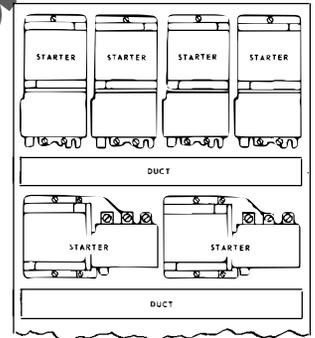
The modular design of the basic contactors and starters allows maximum use of panel space. Devices can be mounted side by side with a minimum of space between. Overload relays can be mounted below or to the side of the contactor. They can also be mounted separately with the panel terminal blocks. The three types of mounting are shown below.



Starters, with overload relays mounted below, can be mounted side by side with a minimum of space between. There are no live electrical parts for which clearance must be provided between adjacent starters.

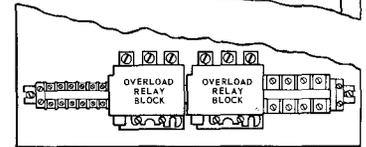
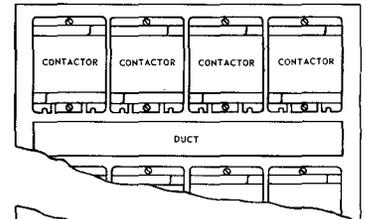
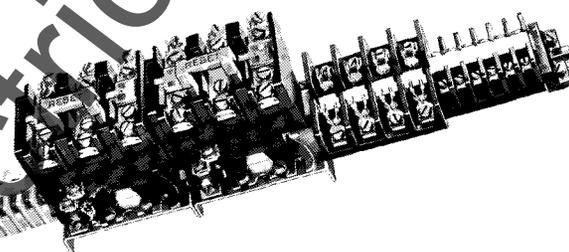


Where height becomes an important consideration starters can be supplied with the overload relays mounted to the side. Starters and contactors can be mounted side by side with no wasted space.



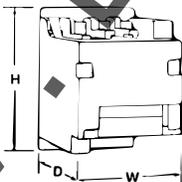
Top row shows starters with overload relay units mounted below. Bottom row shows starters with overload relay units mounted to the side.

For increased flexibility in multi-motor control panels it is sometimes desirable to group overload relays with the terminal blocks. Contactors are mounted separately. Load connections can then be made directly to the overload relay terminals saving the space and cost of load terminal blocks. All overload relays can be reset in one place on the panel.

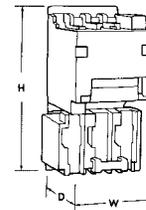


Overload relay units mounted in terminal block assembly.

DIMENSIONS

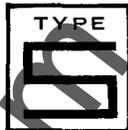


TYPE S CONTACTOR — 3 POLE



TYPE S STARTER — 3 POLE — 2 OR 3 O.L.

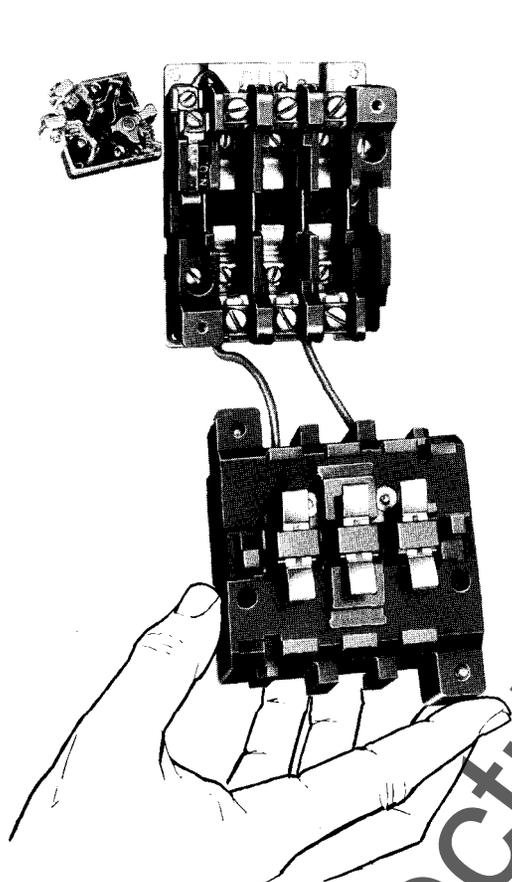
NEMA SIZE	HEIGHT H	WIDTH W	DEPTH D	PANEL AREA IN. ²	NEMA SIZE	HEIGHT H	WIDTH W	DEPTH D	PANEL AREA IN. ²
0 and 1	4 ¹¹ / ₃₂	3 ³ / ₃₂	4 ⁷ / ₃₂	14.0	0 and 1	6 ³ / ₆₄	3 ¹ / ₂	4 ⁷ / ₃₂	23.2
2	5 ⁷ / ₆₄	4 ¹ / ₁₆	4 ¹⁵ / ₁₆	22.0	2	7 ¹³ / ₆₄	4 ³ / ₁₆	4 ¹⁵ / ₁₆	33.7



EASY INSPECTION AND MAINTENANCE

Periodic inspection is routine with all electrical equipment. The Type S starter was designed with the maintenance man in mind. Contact inspection is a snap and contact replacement can be performed with the starter in the enclosure and all wiring in place. Coil change is also an easy job.

The normally open holding circuit interlock and the overload relay contacts are separate control modules which can easily be replaced. All replacement parts are supplied in kit form, packaged in easy to identify cartons for convenience in stocking. A Service Bulletin identifying each part is packaged with every starter.



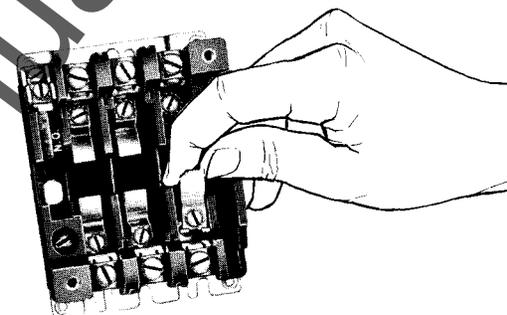
CONTACT INSPECTION

Two captive screws are loosened and the power plant is removed. All contacts, stationary and movable, can be clearly viewed.

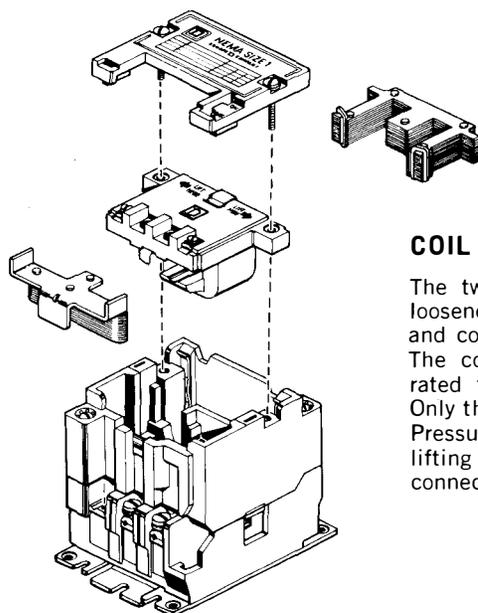
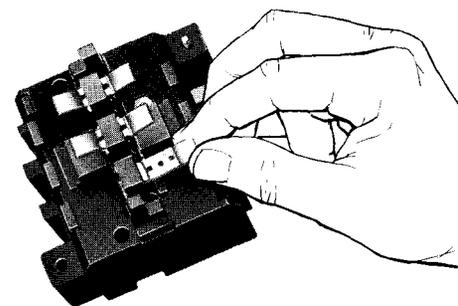
The contacts of the holding circuit interlock can easily be inspected because the control module has a transparent side. The module, as pictured above, lifts out of the contact block.

CONTACT CHANGE

Stationary contacts can be replaced without removal of any wiring. A hook and hang contact finger holds the stationary contacts in place while retightening the captive screw.

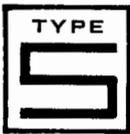


Movable contacts are removed with a simple twist and pull motion.



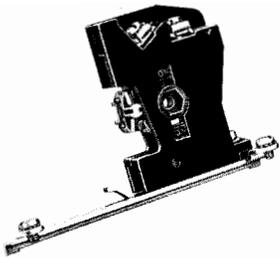
COIL CHANGE

The two captive cover screws are loosened and the magnet assembly and coil can be lifted out as a unit. The coil can then easily be separated from the magnet assembly. Only the two coil leads are removed. Pressure wire connectors with self-lifting clamps make it easy to make connections to the coil.



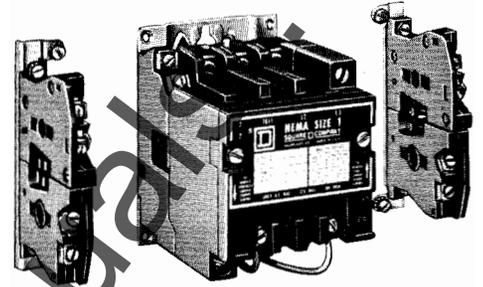
accessory kits for easy modifications

com



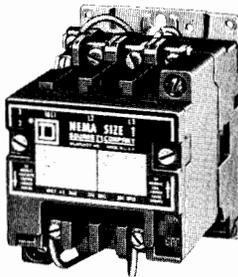
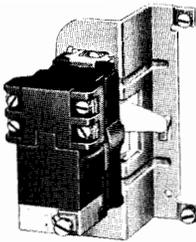
ADDITIONAL INTERLOCK

Four additional single circuit electrical interlocks can be added. All interlocks are front mounted by captive screws. Normally open or normally closed contacts, which can be easily converted, are available. Extremely good contact reliability is provided due to the cam action operation and the bifurcated silver-cadmium alloy contacts.



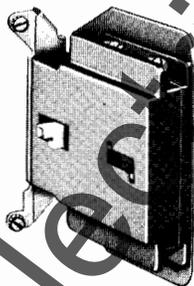
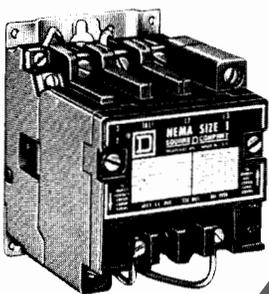
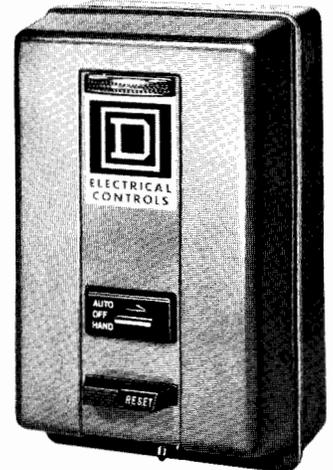
TIMER ATTACHMENT

A pneumatic timer with a .2 second to 1 minute adjustable timing range can be mechanically operated from the contactor saving the panel space of a separate timer. The timer is available in ON and OFF delay and can easily be converted. A single pole double throw timed contact is provided.



COVER MOUNTED CONTROL STATION PILOT LIGHT

A unique incandescent pilot light kit can be added to a starter in a general purpose enclosure. The pilot light is operated by a small coil mounted on the magnet adjacent to the main coil. The coil acts as a transformer secondary and provides the necessary voltage for the pilot light. The flux density the pilot light coil sees is always the same regardless of the main coil voltage. Therefore, the same pilot light kit can be used for all voltages.

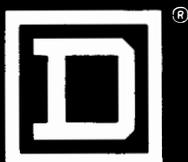
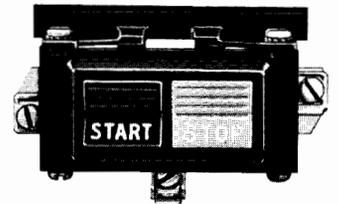


POWER POLE

One or two additional power poles can be added to a basic three pole contactor. The power pole adder is available with normally open or normally closed poles which are convertible. Two captive front mounted screws secure basic contactor. A four or five pole contactor can easily be built up using the power pole kits.

PUSH BUTTON OR SELECTOR SWITCH

All general purpose enclosures have provision for adding START-STOP push button or HAND-OFF-AUTO selector switch.



SQUARE D COMPANY



AC MAGNETIC STARTERS — LINE VOLTAGE TYPE

With Melting Alloy Type Thermal Overload Relays

600 VOLTS MAX.

25-60 CYCLES ††

No. of Poles	NEMA Size	Maximum Ratings‡		General Purpose Enclosure NEMA Type 1		Water-tight Enclosure NEMA Type 4			Dust-tight Industrial Use Enclosure NEMA Type 12		For Hazardous Locations							
		Volts	Max. HP	Type	Price	Type	Type	Price	Type	Price	Class II Groups E, F & G NEMA Type 9		Class I Group C & D NEMA Type 7 Bolted Construction		Spin Top Class I Groups C & D Class II Groups E, F & G NEMA Type 7&9		Open Type	
											Type	Price	Type	Price	Type	Price	Type	Price
2	00	115 230	..... 1 1/2	AG-1	\$30.50	Use Size 0			Use Size 0		Use Size 0		Use Spin Top Size 0		Use Size 0		AO-1	\$28.50
	0	115 230	..... 1 2	BG-1	34.	BW-1	BW-11	\$ 69.	BA-1	\$ 46.	BE-1	\$ 69.	Use Spin Top Size 1		BR-1	\$ 135.	BO-1	32.
	1	115 230	..... 2 3	CG-1	39.	CW-1	CW-11	75.	CA-1	51.	CE-1	75.	CR-1	\$ 141.	CR-5	141.	CO-1	37.
	1P	115 230	..... 3 5	CG-2	50.	CW-2	CW-12	86.	CA-2	62.	CE-2	86.	CR-2	152.	CR-6	152.	CO-2	48.
	2	115 230	..... 3 7 1/2	DG-6	76.	DW-6	DW-16	148.	DA-6	98.	DE-6	182.	DR-6	226.	DR-7	226.	DO-6	66.
	3	00	110 208-220 440-550	3/4 1 1/2 2	AG-2	\$ 32.	Use Size 0			Use Size 0		Use Size 0		Use Spin Top Size 0		Use Size 0		AO-2	$ 30.
0	110 208-220 440-550	2 3 5	BG-2	39.	BW-2	BW-12	\$ 74.	BA-2	\$ 51.	BE-2	\$ 74.	Use Spin Top		BR-2	\$ 140.	BO-2	37.	
1	110 208-220 440-550	3 7 1/2 10	CG-3	44.	CW-3	CW-13	80.	CA-3	56.	CE-3	80.	CR-3	\$ 146.	CR-7	146.	CO-3	42.	
2	110 208-220 440-550	7 1/2 15 25	DG-1	84.	DW-1	DW-11	156.	DA-1	106.	DE-1	190.	DR-1	234.	DR-3	234.	DO-1	74.	
3	110 208-220 440-550	15 30 50	EG-1	138.	EW-1	EW-11	240.	EA-1	164.	EE-1	284.	ER-1	350.	ER-3	350.	EO-1	118.	
4	208-220 440-550	50 100	FG-1	308.	FW-1	FW-11	482.	FA-1	394.	FE-1	556.	FR-1	563.	FR-1	563.	FO-1	266.	
5	208-220 440-550	100 200	GG-1	684.	GW-1	GW-11	904.	GA-1	904.	GE-1	1054.	GR-1	1268.	GR-1	1268.	GO-1	607.	
6†	208-220 440-550	200 400	HG-2	2017.	HW-2	.....	2598.	HA-2	2598.	.....	.....	.....	.....	.....	.....	HO-2	1637.	
7†	208-220 440-550	300 600	JG-1	2629.	JW-1	.....	3210.	JA-1	3210.	.....	.....	.....	.....	.....	.....	JO-1	2248.	
8†	208-220 440-550	450 900	KG-1	4220.	KW-1	.....	5077.	KA-1	5077.	.....	.....	.....	.....	.....	.....	KO-1	3700.	
4	0	220 440-550	3 5	BG-3	\$ 50.	BW-3	BW-13	\$ 89.	BA-3	\$ 62.	BE-3	\$ 89.	Use Size 1		BR-3	\$ 151.	BO-3	\$ 47.
	1	220 440-550	7 1/2 10	CG-4	56.	CW-4	CW-14	94.	CA-4	68.	CE-4	94.	CR-4	\$ 158.	CR-8	158.	CO-4	53.
	2	220 440-550	15 25	DG-2	103.	DW-2	DW-12	207.	DA-2	125.	DE-2	241.	DR-2	309.	.....	.....	DO-2	93.
	3	220 440-550	30 50	EG-2	168.	EW-2	EW-12	298.	EA-2	194.	EE-2	342.	ER-2	446.	.....	.....	EO-2	150.
	4	220 440-550	50 100	FG-2	404.	FW-2	FW-12	650.	FA-2	520.	FE-2	750.	FR-2	.....	.....	.....	FO-2	364.
	5	220 440-550	100 200	GG-2	1200.	GW-2	GW-12	1442.	GA-2	1343.	GE-2	1640.	GR-2	.....	.....	.....	GO-2	1046

Price includes one normally open electrical interlock for holding circuit — no deduction for omission.
Prices do not include push button station. Prices include thermal overload relay units. Deduct \$1.50 each if relay units are omitted.
‡NOTE: Not only should the horsepower rating of the motor be within the limits shown for the starter, but the motor full load current should also be less than the values listed on Class 8502 Price Sheet, Page 3, for the contactor used in the particular size starter.
▲Functionally equivalent to NEMA Type 5.
† Mfg. by EC&M Division.
†† Size 00 available with 50 or 60 cycle coil only.

Additions and Special Features — Refer to Tab "Additions and Special Features" Overload Relay Selection — Refer to Tab "Overload Relays", Tables 3A and 3.

ORDERING INFORMATION REQUIRED

- 1—Class and Type Number.
- 2—Horsepower, voltage, phase, frequency and full load current of motor.
- 3—Control voltage and frequency if different than line voltage.
- 4—Any special features required.
- 5—Order suitable push button station from table at the right or from Class 9001, catalog section.

START-STOP PUSH BUTTON STATIONS

- General Purpose — Standard Duty — Class 9001, Type B-30.
General Purpose — Heavy Duty — Class 9001, Type GG-201.
Water-tight and Dust-tight — Standard Duty — Class 9001, Type BW-40.
Water-tight and Dust-tight — Heavy Duty — Class 9001, Type GW-206.
Class I, Group D or Class II, Group G — Standard Duty — Class 9001, Type BR-11.
Oil Tight — Heavy Duty — Class 9001, Type TY-21.
For other push button stations or pilot control devices see Catalog Sections 9001, 9007, 9011, and 9050.

●Revised



AC MAGNETIC STARTERS — LINE VOLTAGE TYPE

With Automatic/Hand Reset Adjustable Bimetallic Overload Relays

600 VOLTS MAX.

25-60 CYCLES

No. of Poles	NEMA Size	Maximum Ratings†		General Purpose Enclosure NEMA Type 1		Water-tight Enclosure NEMA Type 4			Dust-tight Industrial Use Enclosure▲ NEMA Type 12		For Hazardous Locations								
		Volts	Max. HP			Standard	Stainless Steel	Class II Groups E, F & G NEMA Type 9			Class I Group C & D NEMA Type 7 Bolted Construction		Spin Top Class I Groups C & D Class II Groups E, F & G NEMA Type 7&9		Open Type				
								Type			Price	Type	Price	Type	Price	Type	Price	Type	Price
2	0	115	.....	1	BAG-1	\$ 34.	BAW-1	BAW-11	\$ 69.	BAA-1	\$ 46.	BAE-1	\$ 69.	Use Size 1		BAR-1	\$ 135.	BAO-1	\$ 32.
		230	.....	2															
	1	115	.....	2	CAG-1	39.	CAW-1	CAW-11	75.	CAA-1	51.	CAE-1	75.	CAR-1	\$ 141.	CAR-5	141.	CAO-1	37.
		230	.....	3															
	1P	115	.....	3	CAG-2	50.	CAW-2	CAW-12	86.	CAA-2	62.	CAE-2	86.	CAR-2	152.	CAR-6	152.	CAO-2	48.
		230	.....	5															
2	115	.....	3	DAG-6	76.	DAW-6	DAW-16	148.	DAA-6	98.	DAE-6	182.	DAR-6	226.	DAR-7	226.	DAO-6	66.	
	230	.....	7½																
3	0	110	.....	2	BAG-2	\$ 39.	BAW-2	BAW-12	\$ 74.	BAA-2	\$ 51.	BAE-2	\$ 74.	Use Size 1		BAR-2	\$ 140.	BAO-2	\$ 37.
		208-220	.....	3															
	1	110	.....	3	CAG-3	44.	CAW-3	CAW-13	80.	CAA-3	56.	CAE-3	80.	CAR-3	\$ 146.	CAR-7	146.	CAO-3	42.
		208-220	.....	7½															
	2	110	.....	3	DAG-1	84.	DAW-1	DAW-11	156.	DAA-1	106.	DAE-1	190.	DAR-1	234.	DAR-3	234.	DAO-1	74.
		208-220	.....	15															
	3	110	.....	7½	EAG-1	138.	EAW-1	EAW-11	240.	EAA-1	164.	EAE-1	284.	EAR-1	350.	EAR-3	350.	EAO-1	118.
		208-220	.....	30															
	4	110	.....	15	FAG-1	308.	FAW-1	FAW-11	482.	FAA-1	394.	FAE-1	556.	.....	.....	FAR-1	563.	FAO-1	266.
		208-220	.....	50															
5	110	.....	100	GAG-1	684.	GAW-1	GAW-11	904.	GAA-1	904.	GAE-1	1054.	.....	.....	GAR-1	1268.	GAO-1	607.	
	208-220	.....	200																
6†	208-220	.....	200	HAG-2	2017.	HAW-2	.....	2598.	HAA-2	2598.	.....	.....	.....	.....	.....	.....	HAO-2	1637.	
7†	208-220	.....	300	JAG-1	2629.	JAW-1	.....	3210.	JAA-1	3210.	.....	.....	.....	.....	.....	.....	JAO-1	2248.	
	440-550	.....	600																
8†	208-220	.....	450	KAG-1	4220.	KAW-1	.....	5077.	KAA-1	5077.	.....	.....	.....	.....	.....	.....	KAO-1	3700.	
	440-550	.....	900																
4	0	220	.....	3	BAG-3	\$ 50.	BAW-3	BAW-13	\$ 89.	BAA-3	\$ 62.	BAE-3	\$ 89.	Use Spin Top		BAR-3	\$ 151.	BAO-3	\$ 47.
		440-550	.....	5															
	1	220	.....	7½	CAG-4	56.	CAW-4	CAW-14	94.	CAA-4	68.	CAE-4	94.	CAR-4	\$ 158.	CAR-8	158.	CAO-4	53.
		440-550	.....	10															
	2	220	.....	15	DAG-2	103.	DAW-2	DAW-12	207.	DAA-2	125.	DAE-2	241.	DAR-2	309.	.....	.....	DAO-2	93.
		440-550	.....	25															
	3	220	.....	30	EAG-2	168.	EAW-2	EAW-12	298.	EAA-2	194.	EAE-2	342.	EAR-2	446.	.....	.....	EAO-2	150.
		440-550	.....	50															
4	220	.....	50	FAG-2	404.	FAW-2	FAW-12	690.	FAA-2	520.	FAE-2	750.	.....	.....	.....	.....	FAO-2	364.	
	440-550	.....	100																
5	220	.....	100	GAG-2	1200.	GAW-2	GAW-12	1442.	GAA-2	1343.	GAE-2	1640.	.....	.....	.....	.....	GAO-2	1046.	
	440-550	.....	200																

Price includes one normally open interlock for holding circuit — no deduction for omission.
Prices do not include push button station. Prices include thermal overload relay units. Deduct \$1.50 each if relay units are omitted.
†NOTE: Not only should the horsepower rating of the motor be within the limits shown for the starter, but the motor full load current should also be less than the values listed on Class 8502 Price Sheet, Page 3, for the contactor used in the particular size starter.
▲Functionally equivalent to NEMA Type 5
†Mfg. by EC&M Division.

Additions and Special Features — Refer to Tab "Additions and Special Features" Overload Relay Selection — Refer to Tab "Overload Relays", Table 11

ORDERING INFORMATION REQUIRED

- 1—Class and Type Number.
- 2—Horsepower, voltage, phase, frequency and full load current of motor.
- 3—Control voltage and frequency if different than line voltage.
- 4—Any special features required.
- 5—Order suitable push button station from table at the right or from Class 9001 catalog section.

START-STOP PUSH BUTTON STATIONS

- General Purpose — Standard Duty — Class 9001, Type B-30.
General Purpose — Heavy Duty — Class 9001, Type GG-201.
Water-tight and Dust-tight — Standard Duty — Class 9001, Type BW-40.
Water-tight and Dust-tight — Heavy Duty — Class 9001, Type GW-206.
Class I, Group D or Class II, Group G — Standard Duty — Class 9001, Type BR-11.
Oil Tight — Heavy Duty — Class 9001, Type TY-21.
For other push button stations or pilot control devices see Catalog Sections 9001, 9007, 9011, and 9050.

•Revised



AC MAGNETIC STARTERS — LINE VOLTAGE TYPE

With Oil Dashpot Type Magnetic Overload Relays

25-60 CYCLES CLASS 8536 600 VOLTS MAX.

No. of Poles	Size	Ratings \odot			General Purpose Enclosure NEMA Type 1		Dust-Tight Industrial Use Enclosure NEMA Type 5-12		Open Type	
		Volts	Maximum Horsepower		Type	Price	Type	Price	Type	Price
			Poly- phase	Single phase						
3	2	110 208-220 440-550	7½ 15 25	3 7½ 10	DMG-1	\$ 117.	DMD-1	\$ 161.	DMO-1	\$ 107.
	3	110 208-220 440-550	15 30 50	7½ 15 25	EMG-1	171.	EMD-1	223.	EMO-1	151.
	4	208-220 440-550	50 100		FMG-1	341.	FMD-1	427.	FMO-1	299.
	5	208-220 440-550	100 200	.....	GMG-1	684.	GMD-1	904.	GMO-1	607.
	6 †	208-220 440-550	200 400	.....	HMG-2	2017.	HMA-2	2598.	HMO-2	1637.
	7 †	208-220 440-550	300 600	.....	JMG-1	2629.	JMA-1	3210.	JMO-1	2248.
	8 †	208-220 440-550	450 900	.....	KMG-1	4220.	KMA-1	5077.	KMO-1	3700.
4	2	110 220 440-550	7½ 15 25	.....	DMG-2	136.	DMD-2	192.	DMO-2	126.
	3	110 220 440-550	15 30 50	.....	EMG-2	201.	EMD-2	281.	EMO-2	183.
	4	220 440-550	50 100	.....	FMG-2	437.	FMD-2	553.	FMO-2	397.
	5	220 440-550	100 200	.....	GMG-2	1200.	GMD-2	1343.	GMO-2	1046.

Prices do not include push button stations. Prices include automatic reset magnetic overload relays.

Prices include one normally open electrical interlock for holding circuit — no deduction for omission.

NOTE: Not only should the horsepower rating of the motor be within the limits shown for the starter, but the motor full load current should also be less than the values listed on Class 8502 Price Sheet, Page 3, for the contactor used in the particular size starter.

† Mfg. by EC&M Division and furnished with ZM magnetic overload relays.

Additions and Special Features — Refer to Tab "Additions and Special Features"

ORDERING INFORMATION REQUIRED

- 1—Class and Type Number.
- 2—Horsepower, voltage, phase, frequency and full load current of motor.
- 3—Control voltage and frequency if different from line voltage.
- 4—Any special features required.
- 5—Order suitable push button station from table at the right or from Class 9001 catalog section.

START-STOP PUSH BUTTON STATIONS

- General Purpose — Standard Duty — Class 9001, Type B-30.
 General Purpose — Heavy Duty — Class 9001, Type GG-201.
 Water-tight and Dust-tight — Standard Duty — Class 9001, Type BW-40.
 Water-tight and Dust-tight — Heavy Duty — Class 9001, Type GW-206.
 Class I, Group D or Class II, Group G — Standard Duty — Class 9001, Type BR-11.
 Oil-Tight — Heavy Duty — Class 9001, Type TY-21.
 For other push button stations or pilot control devices see Catalog Sections 9001, 9007, 9011, and 9050.

Minor Changes

SQUARE D COMPANY

Prices Subject to Change without Notice.

SCHEDULE DS-1 DISCOUNTS

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DECEMBER, 1966

AC MAGNETIC STARTERS—LINE VOLTAGE TYPE

APPLICATION OF LINE VOLTAGE MAGNETIC STARTERS

Class 8536 Line Voltage Type Magnetic Starters are electro-mechanical devices which provide a safe, convenient, and economic means for starting and stopping ac squirrel cage motors. These devices are widely used because of their features of economy and safety. They are generally used where a full voltage starting torque may be safely applied to the driven machinery and where the current inrush resulting from across-the-line starting is not objectionable.

These starters are usually controlled by pilot devices such as push buttons, limit switches, or timing relays.

RATINGS

Size — Class 8536 magnetic starters are built in ten sizes from Size 00, 10 amperes through Size 8, 1350 amperes. Each size has been assigned horsepower ratings which apply when the motor is used for normal starting duty. All ratings correspond with the National Electrical Manufacturers Association Standards. For complete information on the electrical ratings of starters refer to the Class 8536 Application Data Section, Page 106.

Poles — Three pole starters are built in Sizes 00 through 8 for applications with motors operating on two or three phase, three wire systems. Four pole starters are built in Sizes 0 through 5 for two phase, four wire applications. Two pole starters in Sizes 00, 0, 1, 1P (1½) and 2 are built for single phase motor starting. Standard three phase starters may be used for single phase motors of larger sizes.

Volts — The Size 00 through 8 starters are available for operation at any system voltage up to 600 volts maximum. Magnet coils are designed to operate satisfactorily on line voltages of 85% to 110% of rated voltage. Size 00 through 6 starters have an ac magnet structure and operate directly from ac power. Single phase devices are supplied with dual voltage coils as standard.

The Size 7 and 8 starters are supplied with a 100 volt dc magnet consisting of two 50 volt coils connected in series. A rectifier and transformer, with suitable primary voltage rating, are supplied as a source of dc power. A single transformer is used for 240 and 480 volts by means of reconnecting the primary windings. For other voltages, a different transformer with a suitable primary voltage rating is provided.

Frequency — Standard magnet coils are available for 60, 50 and 25 cycle operation on Sizes 0 through 8 and for 50 and 60 cycle operation on Size 00. If coils for other frequencies, or for use in abnormal ambient temperatures are required, the factory should be consulted.

CONTROL

Remote Control — Frequently it is necessary for an operator to be able to control the operation of a motor at some distance from the motor. Magnetic starters are quite suitable in this respect as the starter may be mounted near the load, with a control station such as push buttons, or other pilot devices mounted within easy reach of the operator. Since only two or three control circuit wires are required for such an installation, each control station may be located for the maximum operating efficiency and installation economy. If it is necessary that a load be operated from several remote locations, a number of push buttons or pilot switches may be used with each starter.

Holding Circuit Interlocks for 3-wire control are provided on all standard Class 8536 starters. Depending upon the control station and the connection scheme used, either low voltage protection (3-wire control) or low voltage release (2-wire control) can be obtained with a standard starter. Those starters having a selector switch in the cover of the enclosure, which

do not require a holding circuit interlock, are provided with that interlock, unwired, on the left hand side of the starter. This normally open contact may be used for the operation of signal lights, or to interlock with other electrical equipment.

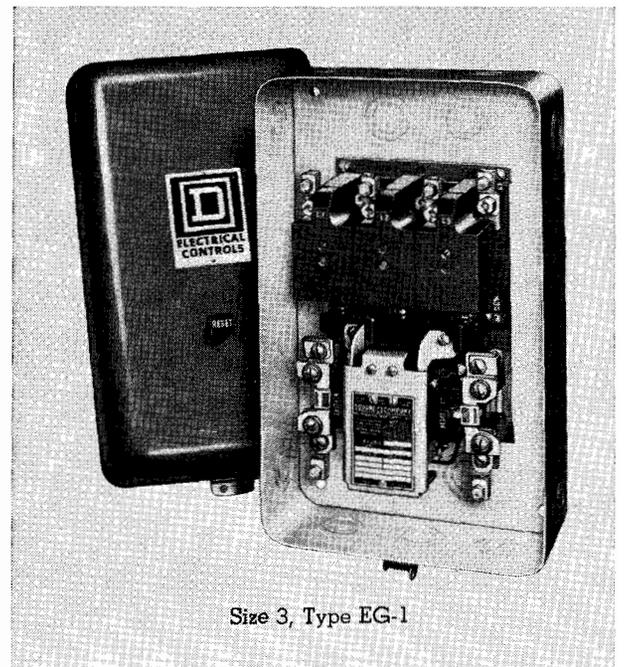
Low Voltage Protection is a necessary safety feature for starters where an application is subject to power failures, and where the unexpected automatic restarting of a motor might endanger the safety of personnel or damage driven machinery. The three wire control scheme provides this important safety feature by the use of an electrical interlock that is wired in parallel with a momentary contact start button. The electrical interlock forms a "holding" circuit around the start button contacts when the starter is energized. If, while the starter is energized, a power failure occurs, the electrical interlock opens the control circuit as the starter opens. Upon the resumption of power the motor cannot restart until the start button is once again operated.

Low Voltage Release is obtained with a 2-wire control scheme, using a maintained contact pilot device in series with the starter coil. No holding circuit interlock is necessary. This scheme is used when a starter is required to function automatically without the attention of an operator. If power fails, the starter opens. Upon resumption of power, the starter will reclose automatically through the closed contacts of the pilot device.

CONSTRUCTION

Class 8536 starters in Sizes 0 through 5 are of the vertical action design, employing double break silver alloy contacts which will not corrode, and never require cleaning or dressing. The Size 00 starter is horizontal direct acting with a single moving assembly which moves perpendicular to the mounting surface. Sizes 6, 7 and 8 devices are of the mill type design employing single break silver alloy contacts.

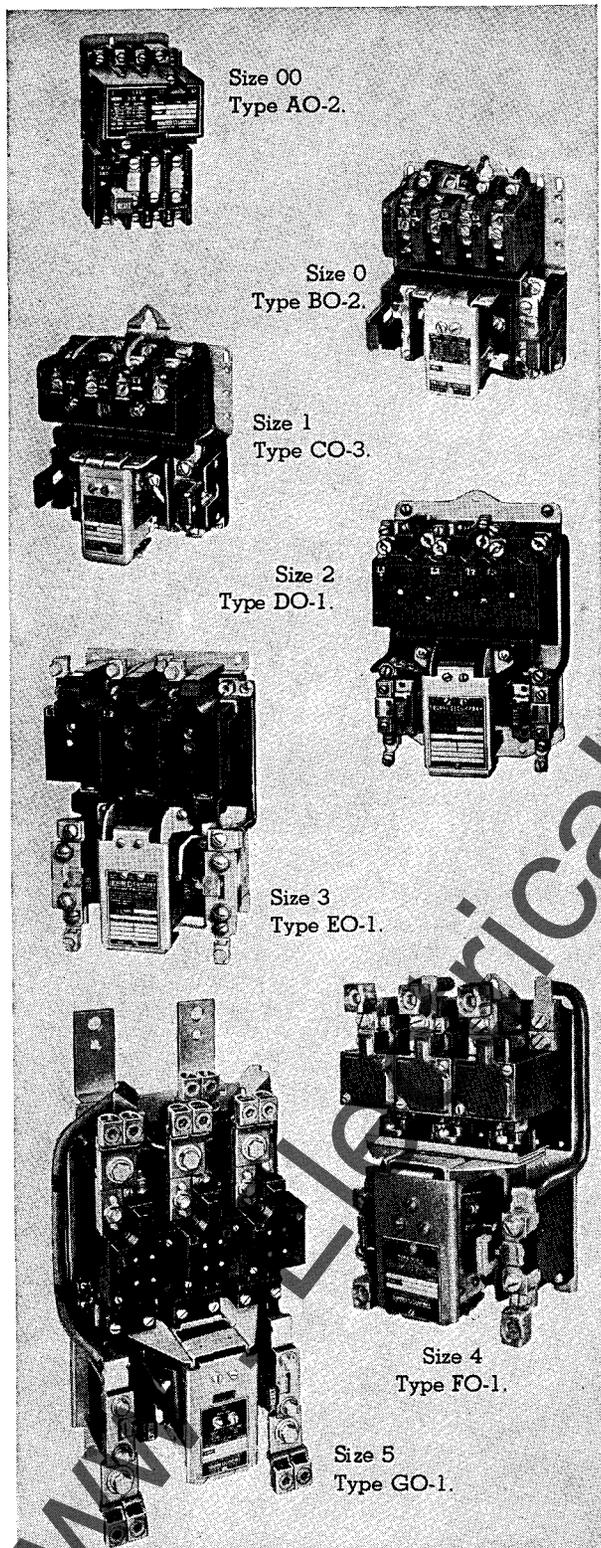
All starters are provided with shading coils, imbedded in the magnet frame, to reduce the ac hum to a minimum.



Size 3, Type EG-1

General Revision.

SQUARE D COMPANY



STANDARD FEATURES

Sizes 00 Through 5

Accessibility — One of the foremost features of Square D starters is accessibility for maintenance or repair. All electrical equipment needs maintenance and replacement attention at regular intervals. Equipment which is easy to inspect and maintain receives more maintenance service and enjoys longer life. All renewable parts of Square D starters can be inspected with a minimum of time and labor. Thus, double economy is realized. Only a screwdriver and a wrench are needed for maintenance and repair.

To facilitate the maintenance of equipment, complete sets of contacts as well as magnet coils, are available in kit form (see Catalog Section Class 9998). Contact parts kits contain stationary and movable contacts, movable contact springs, and a service bulletin necessary to service a starter.

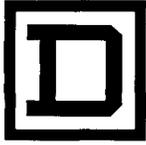
Some of the outstanding features of Class 8536 starters are:

1. Contacts replaceable without disturbing line and load wiring.
2. All parts front mounted. It is unnecessary to remove the starter from its enclosure for maintenance or replacement of any part.
3. Molded Coils. Coils are less subject to mechanical injury. Coils operate cooler because of better heat transfer, thus last longer.
4. NEMA Standard Wiring. All starters have a holding circuit interlock on the left, standard terminal markings, and standard wiring.

"Start-Stop" push buttons, "Hand-Off-Auto" selector switches and pilot light units may be added to the cover of any starter, Size 00-5, in a general purpose enclosure. These push buttons, selector switches and pilot lights are available in kit form for installation by user (see Catalog Section Class 9999). Enclosure covers are provided with either a knockout, or a covered hole in the cover, to permit the installation of a control station.

Sizes 6, 7 and 8 Starters

Class 8536 Sizes 6, 7 and 8 starters are of the mill type design. Size 6 starters have an ac operating coil which is switched by a line voltage control relay to minimize the load on pilot control device. Sizes 7 and 8 starters have a pilot control relay which operates on the 120 volt secondary of the control transformer that also supplies power to the self-contained rectifier for the dc main operating coil.



DECEMBER, 1966

AC MAGNETIC STARTERS—LINE VOLTAGE TYPE

SPECIAL FEATURES

Push Button in Cover (Form A) — Class 8536 starters in Sizes 00-8 are available with a "Start-Stop" momentary contact push button mounted in the cover of the starter enclosure for external operation. Where this arrangement is convenient from the operating standpoint, installation economies are obtained through the elimination of a separate push button station and its wiring. Separately mounted push buttons may also be connected in parallel with the one included with the starter.

Selector Switch in Cover (Form C) — When motors are automatically controlled by two wire pilot devices, independent manual means for starting and stopping is frequently desirable. For such an application, a three position maintained contact selector switch may be used.

Pilot Light in Cover (Form P) — Class 8536 starters in Sizes 00-8 are available with pilot lights mounted in the cover. NEMA 1 starters Sizes 00-5 are supplied with a red or clear color cap and neon bulb. NEMA 4 and 12 starters and all Sizes 6, 7 or 8 starters use a Class 9001 Type T oiltight pilot light with a color cap of any color.

Starters are manufactured with a knockout in the cover or with a hole fitted with a closing plate. Thus pilot lights can be added in the field with the additions of a pilot light kit or a Class 9001 Type T pilot light.

Additional Electrical Interlocks (Form X) — are available on Sizes 0-8 in arrangement and number to satisfy every practical need. These interlocks will be installed at the factory if specified on the order, or can be easily installed in the field. Interlocks for installation by users are listed in Catalog Section Class 9999. Interlocks are not available on Size 00 starters.

Low Voltage Control Circuits may be used to provide additional safety for personnel by allowing operation of control circuits and magnet coils at a low voltage. This feature is available in two ways.

- a. **Separate Control (Form S)** — The control circuit may be wired for connection to a separate power source. With this arrangement it is possible to operate the control circuit at a different voltage and/or frequency than that required for motor operation.
- b. **Control Circuit Transformer (Form FT)** — A control circuit transformer may be used to provide a 120 volt operating voltage for the control circuit. Usually one side of the transformer has a provision for grounding when conditions permit. Short circuit protection for the transformer and control circuit is provided by a fuse adjacent to the transformer and in the secondary circuit. The fuse is placed on the ungrounded side of the transformer.



Size 6, Type HG-2, Series A
with start-stop
push button in cover

Start-stop
push button
in cover

Pilot light
in cover

Hand-off-auto
selector switch
in cover

•Revised.

SQUARE D COMPANY



com

AC MAGNETIC STARTERS—LINE VOLTAGE TYPE

DECEMBER, 1966

Alarm Circuit Contacts are available on the overload relay blocks (melting alloy type) of starter sizes 00-8. These normally open contacts, additional to the normally closed contacts furnished as standard, may be wired to operate an appropriate signal or alarm, when an overload relay unit trips. Alarm circuit contacts are limited to voltages not exceeding 120 volts above ground for Sizes 0 and 1. The alarm circuit contacts of Sizes 2-5 are rated 600 volts.

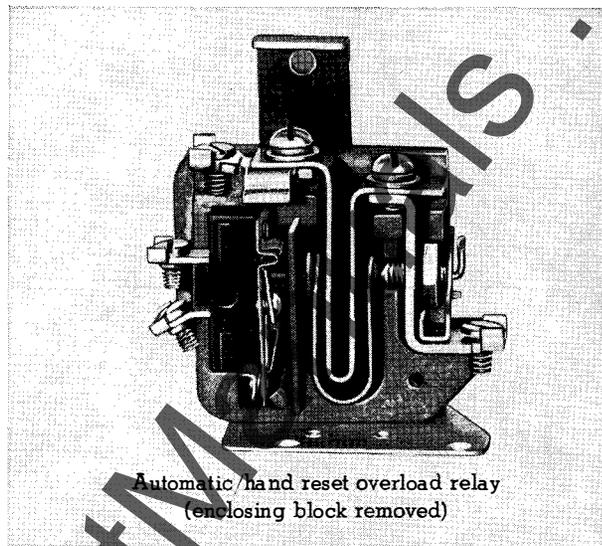
OVERLOAD PROTECTION

Overload protection for an electric motor is necessary to prevent early burnout and to insure maximum operating life. Electric motors will, if permitted, operate at an output of more than rated capacity. Conditions of motor overload may be caused by an overload on driven machinery, by a low line voltage, or by an open line in a polyphase system which results in single phase operation. Under any condition of overload, a motor will draw excessive current which causes overheating. Since winding insulation deteriorates when subjected to overheating, there are established limits on motor operating temperatures. To protect a motor from overheating, overload relays are employed on a starter to limit the amount of current drawn to some predetermined value.

The overload relays of a starter function to prevent a motor from drawing excessive currents that are destructive to motor insulation. Current sensitive thermal or magnetic elements of overload relays are connected either directly in the motor lines (Sizes 00 through 5), or indirectly in the motor lines through current transformers (Sizes 6, 7 and 8). The overload relays act when excessive current is drawn to de-energize the starter and stop the motor.

Thermal Overload Relays of either the melting alloy (Sizes 00-8) or bimetallic type (Sizes 0-8) as described below can be supplied. Both types offer excellent protection for a motor against excessive line current. A wide selection of thermal units is offered for both type overload relays to give exact protection to motors of any full load current. Selection of thermal units should always be made on the basis of full load motor current shown on the motor nameplate or obtained from the motor manufacturer.

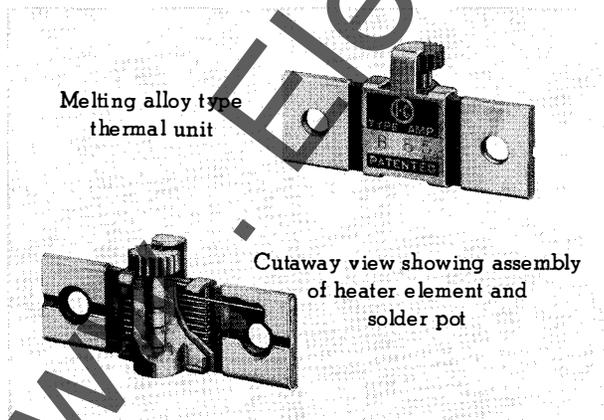
Both types of thermal units have an "inverse time" tripping characteristic and as a result the relays act almost instantaneously on extremely high currents, however, not as quickly on lesser values of current. Normal starting currents or harmless momentary overloads will not cause these relays to trip.



Automatic/hand reset overload relay (enclosing block removed)

In these cases, motor currents resume their normal value before sufficient heat is transferred to operate the tripping mechanism. However, in the case of a harmful overload, sufficient heat is transferred to trip the overload relay which in turn de-energizes the starter and stops the motor.

Melting Alloy Thermal Units are interchangeable, and of a ONE-PIECE construction. ONE-PIECE construction of heater element and solder pot insures a constant relationship between these important components, and allows factory calibration and test of each individual unit. These important features are not possible with any other type of overload relay construction. A wide selection of these interchangeable thermal units is offered to give exact overload protection to a motor of any full load current.



Melting alloy type thermal unit

Cutaway view showing assembly of heater element and solder pot



Size 2 Starter with Magnetic Overload Relays. Dashpot is removed to show plunger

No changes since previous issue.



DECEMBER, 1966

AC MAGNETIC STARTERS—LINE VOLTAGE TYPE

SPECIAL FEATURES

Push Button in Cover (Form A) — Class 8536 starters in Sizes 00-8 are available with a "Start-Stop" momentary contact push button mounted in the cover of the starter enclosure for external operation. Where this arrangement is convenient from the operating standpoint, installation economies are obtained through the elimination of a separate push button station and its wiring. Separately mounted push buttons may also be connected in parallel with the one included with the starter.

Selector Switch in Cover (Form C) — When motors are automatically controlled by two wire pilot devices, independent manual means for starting and stopping is frequently desirable. For such an application, a three position maintained contact selector switch may be used.

Pilot Light in Cover (Form P) — Class 8536 starters in Sizes 00-8 are available with pilot lights mounted in the cover. NEMA 1 starters Sizes 00-5 are supplied with a red or clear color cap and neon bulb. NEMA 4 and 12 starters and all Sizes 6, 7 or 8 starters use a Class 9001 Type T oiltight pilot light with a color cap of any color.

Starters are manufactured with a knockout in the cover or with a hole fitted with a closing plate. Thus pilot lights can be added in the field with the additions of a pilot light kit or a Class 9001 Type T pilot light.

Additional Electrical Interlocks (Form X) — are available on Sizes 0-8 in arrangement and number to satisfy every practical need. These interlocks will be installed at the factory if specified on the order, or can be easily installed in the field. Interlocks for installation by users are listed in Catalog Section Class 9999. Interlocks are not available on Size 00 starters.

Low Voltage Control Circuits may be used to provide additional safety for personnel by allowing operation of control circuits and magnet coils at a low voltage. This feature is available in two ways.

- a. **Separate Control (Form S)** — The control circuit may be wired for connection to a separate power source. With this arrangement it is possible to operate the control circuit at a different voltage and/or frequency than that required for motor operation.
- b. **Control Circuit Transformer (Form FT)** — A control circuit transformer may be used to provide a 120 volt operating voltage for the control circuit. Usually one side of the transformer has a provision for grounding when conditions permit. Short circuit protection for the transformer and control circuit is provided by a fuse adjacent to the transformer and in the secondary circuit. The fuse is placed on the ungrounded side of the transformer.



Size 6, Type HG-2, Series A
with start-stop
push button in cover

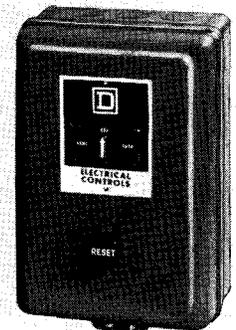
Start-stop
push button
in cover



Pilot light
in cover



Hand-off-auto
selector switch
in cover



● Revised.

SQUARE D COMPANY



AC MAGNETIC STARTERS—LINE VOLTAGE TYPE

DECEMBER, 1966

Alarm Circuit Contacts are available on the overload relay blocks (melting alloy type) of starter sizes 00-8. These normally open contacts, additional to the normally closed contacts furnished as standard, may be wired to operate an appropriate signal or alarm, when an overload relay unit trips. Alarm circuit contacts are limited to voltages not exceeding 120 volts above ground for Sizes 0 and 1. The alarm circuit contacts of Sizes 2-5 are rated 600 volts.

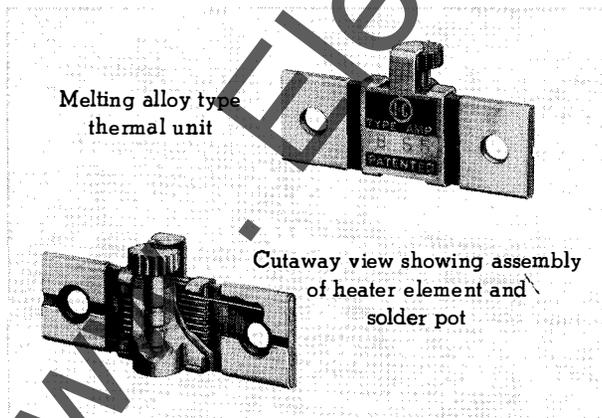
OVERLOAD PROTECTION

Overload protection for an electric motor is necessary to prevent early burnout and to insure maximum operating life. Electric motors will, if permitted, operate at an output of more than rated capacity. Conditions of motor overload may be caused by an overload on driven machinery, by a low line voltage, or by an open line in a polyphase system which results in single phase operation. Under any condition of overload, a motor will draw excessive current which causes overheating. Since winding insulation deteriorates when subjected to overheating, there are established limits on motor operating temperatures. To protect a motor from overheating, overload relays are employed on a starter to limit the amount of current drawn to some predetermined value.

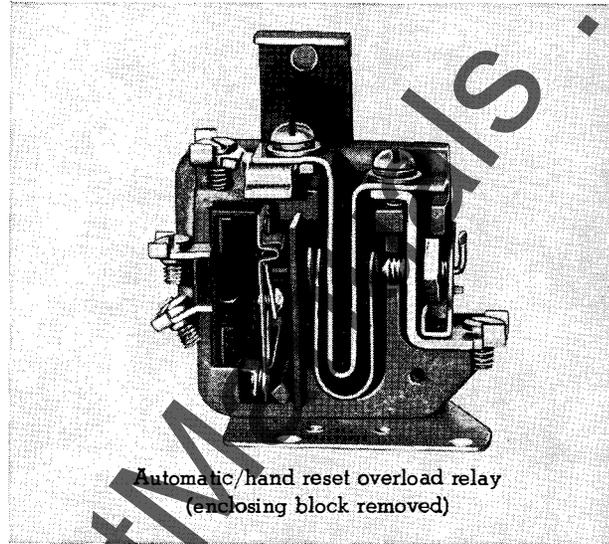
The overload relays of a starter function to prevent a motor from drawing excessive currents that are destructive to motor insulation. Current sensitive thermal or magnetic elements of overload relays are connected either directly in the motor lines (Sizes 00 through 5), or indirectly in the motor lines through current transformers (Sizes 6, 7 and 8). The overload relays act when excessive current is drawn to de-energize the starter and stop the motor.

Thermal Overload Relays of either the melting alloy (Sizes 00-8) or bimetallic type (Sizes 0-8) as described below can be supplied. Both types offer excellent protection for a motor against excessive line current. A wide selection of thermal units is offered for both type overload relays to give exact protection to motors of any full load current. Selection of thermal units should always be made on the basis of full load motor current shown on the motor nameplate or obtained from the motor manufacturer.

Both types of thermal units have an "inverse time" tripping characteristic and as a result the relays act almost instantaneously on extremely high currents, however, not as quickly on lesser values of current. Normal starting currents or harmless momentary overloads will not cause these relays to trip.

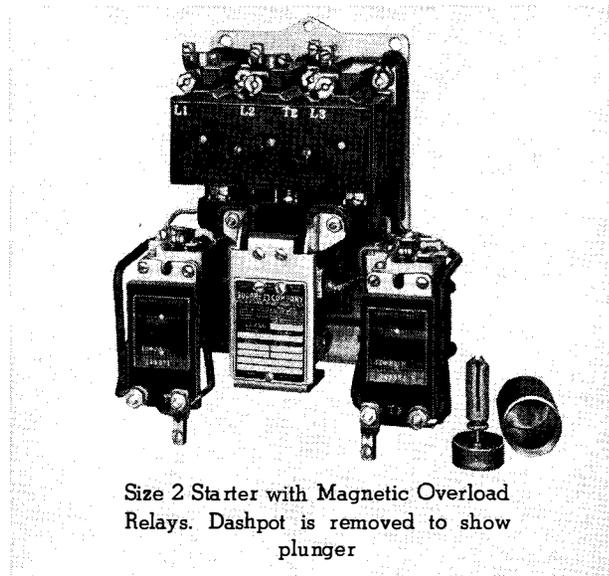


No changes since previous issue.



In these cases, motor currents resume their normal value before sufficient heat is transferred to operate the tripping mechanism. However, in the case of a harmful overload, sufficient heat is transferred to trip the overload relay which in turn de-energizes the starter and stops the motor.

Melting Alloy Thermal Units are interchangeable, and of a ONE-PIECE construction. ONE-PIECE construction of heater element and solder pot insures a constant relationship between these important components, and allows factory calibration and test of each individual unit. These important features are not possible with any other type of overload relay construction. A wide selection of these interchangeable thermal units is offered to give exact overload protection to a motor of any full load current.





DECEMBER, 1966

AC MAGNETIC STARTERS—LINE VOLTAGE TYPE

Bimetallic Overload Relays are designed specifically for two general types of application. First, the automatic reset feature is of decided advantage when devices are mounted in a location not easily accessible for manual operation. Second, these relays can easily be adjusted to trip within a range of 85% to 115% of the nominal trip rating of the heater unit. This feature is useful when the recommended heater size might result in unnecessary tripping, while the next larger size would not give adequate protection.

Excellent calibration on these units is afforded by the use of a U-shaped bimetallic strip. This U-shaped strip with heater element inserted into the center of the "U" compensates for uneven heating due to variations in mounting the heater element. The illustration on page 4 shows the bimetallic overload relay with the U-shaped bimetallic strip and heater element.

Magnetic Overload Relays are available either with automatic reset contacts, or with the hand reset contacts. Tripping current adjustment is achieved by adjusting the plunger core with respect to the overload relay coil. The current range is such that the maximum current setting is twice the minimum giving an adjustment ratio of 2 to 1.

GENERAL PURPOSE AND SPECIAL PROTECTIVE ENCLOSURES

The correct selection of an enclosure for a particular application can contribute considerably to the length of life and trouble free operation of a starter. In order to shield electrically live parts from accidental contact, some form of enclosure is always necessary. This function is usually fulfilled by a general purpose, sheet steel cabinet. Frequently, dust, moisture or explosive gases make it necessary to employ a special enclosure to protect the starter from corrosion or the surrounding equipment from explosion. In selecting control apparatus

it is always necessary to carefully consider the conditions under which the apparatus must operate, as there are many applications where a general purpose sheet steel enclosure does not afford sufficient protection.

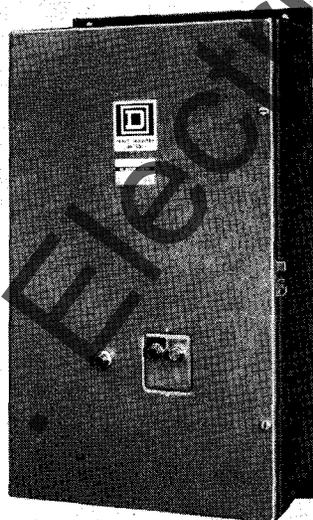
Watertight and dust-tight enclosures are used for the protection of control apparatus. Dirt, oil, or excessive moisture are destructive to insulation, and frequently form current carrying paths which lead to short circuits or grounded circuits. The extra cost of special enclosures is soon repaid by the reduced cost of maintenance and freedom from unnecessary shutdowns.

Special enclosures for hazardous locations are for the protection of life and property. Explosive vapors or dusts exist in some locations of many industrial plants, as well as in grain elevators and chemical plants. Article 500 of The National Electrical Code describes hazardous locations, and the Underwriters' Laboratories have defined the requirements for protective enclosures according to the hazardous conditions.

•**General Purpose Enclosure — NEMA Type 1** — are constructed of sheet steel and finished in a standard gray enamel. The NEMA Type 1 enclosures are designed to prevent accidental contact with live parts. Sizes 00-5 enclosures have covers of the slip on style with latches which allow padlocking. Sizes 6, 7 and 8 have hinged cover enclosures with provisions for padlocking.

Watertight Enclosures — NEMA Type 4 — are either of a cast or a sheet steel construction finished in a corrosion resistant standard gray enamel and feature neoprene cover gaskets. The NEMA Type 4 enclosures are designed to pass a hose test with no leakage of water, and are suitable for outdoor applications on docks, or indoor application in dairies or breweries where the equipment is subjected to dripping or splashing liquids.

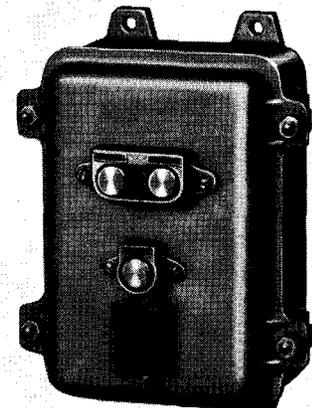
Stainless steel enclosures are available in NEMA 4 construction and are used where corrosion is a major problem.



General purpose enclosure
NEMA Type 1
for size 6 (series A)



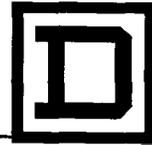
Industrial use
NEMA Type 12
enclosure



Water-tight
NEMA Type 4
cast enclosure

●Revised.

SQUARE D COMPANY



AC MAGNETIC STARTERS—LINE VOLTAGE TYPE

DECEMBER, 1966

Dust-tight Industrial Use Enclosure — NEMA Type 12 — are of a sheet steel construction designed to prevent the entrance of dust, lint, fibres, oil and coolant. These enclosures meet the requirements for NEMA Type 5 and NEMA Type 12 enclosures as specified in NEMA Standards.

EXPLOSION PROOF ENCLOSURES FOR HAZARDOUS LOCATIONS

Spin Top — NEMA Type 7 and 9 — Class I, Groups C and D and Class II, Groups E, F, and G. These enclosures are built in accordance with the requirements of Underwriters' specifications for Class I, Groups C and D, and Class II, Groups E, F, and G, hazardous locations, covered by Article 500 of The National Electrical Code. They are of a three section design consisting of a center collar section plus an upper and lower tank. Each is an individual casting of high density aluminum alloy, thereby obtaining maximum strength and minimum weight.

Threaded joints between the collar section and the tanks provide a flame-tight seal. Acme threads are used to minimize the possibility of stripped threads and positively prevent cross-threading. The arrangement of external threads on the collar section and internal threads on the tanks plus a drip ring on the collar section prevents water from entering at the threads. These threaded joints are also dust-tight, weatherproof and watertight without the use of gaskets. Threaded joints are factory lubricated with a silicone grease to permit tank removal at temperatures as low as -70° F. This grease also prevents thread corrosion.

Operating shafts for reset mechanisms, push button stations, and housings for pilot lights are all stainless steel thread-in-thread construction. When starters are ordered less push button stations, and it is desired to add a push button station in the collar section later, the installation is simple because a thread-

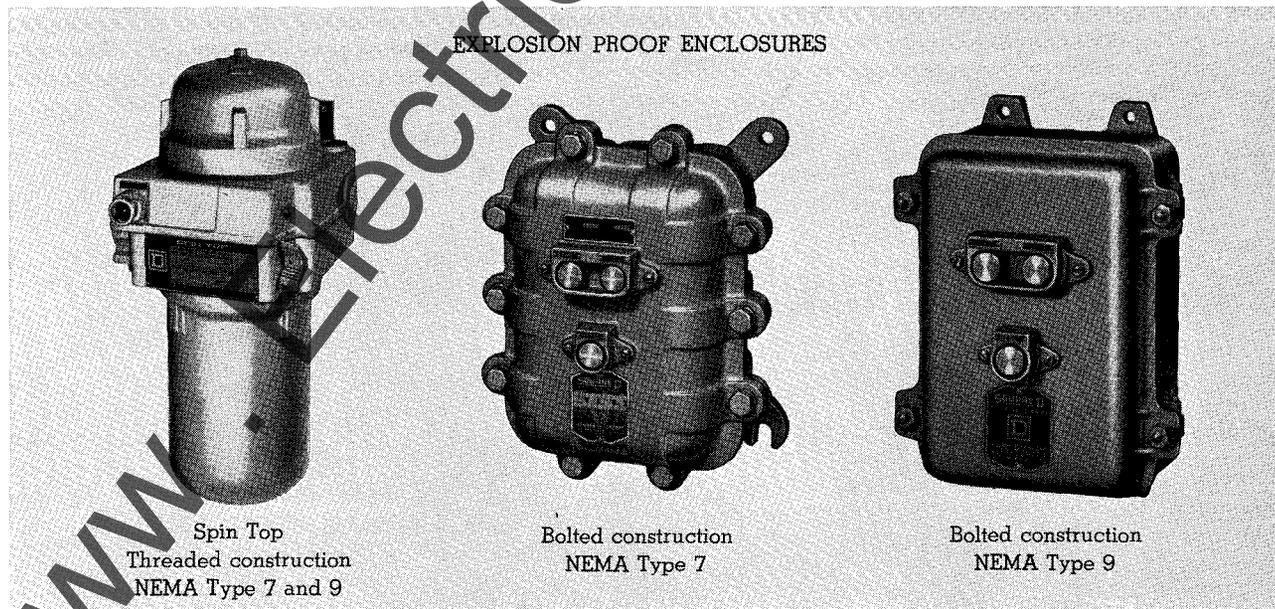
ed and plugged hole in the collar section is provided for future installation of those accessories. Similar provisions can be furnished for field installation of one or two pilot lights at slight additional charge.

Two conduit drillings are provided in both the bottom and in the top of the collar section. Pads are provided so that conduit openings can be tapped in both sides and in the rear. A $\frac{1}{2}$ " tapped and plugged opening is furnished in each tank for addition of a drain and breather, if required.

Maintenance is easily accomplished. The mounting frame containing the starter is easily installed and removed by means of a slide and hook arrangement. Lugs on each tank permit easy and rapid removal. With the tanks removed the starters are fully exposed for inspection or maintenance.

Bolted Type Construction — NEMA Type 9 — Class II, Groups E, F, and G. These enclosures are of cast iron with machined sealing surfaces or of sheet steel with suitable flame resistant gaskets, and are built in accordance with the requirements of Underwriters' specifications for Class II, Groups E, F, and G hazardous locations, covered by Article 500 of the National Electrical Code. Typical installations are found in flour and feed mills, grain elevators and sugar mills.

Bolted Type Construction — NEMA Type 7 — Class I, Groups C and D. These enclosures are made of heavy gray iron castings, and have machined mating surfaces which provide the metal-to-metal seal required to cool hot gases. Construction is in accordance with the requirements of Underwriters' specifications for Class I, Groups C and D hazardous locations, covered by Article 500 of The National Electrical Code. Electrical equipment requires the protection of this type of enclosure, where atmospheres containing gasoline, naphtha, alcohol, acetone, or lacquer vapors are present or may be encountered.



Spin Top
Threaded construction
NEMA Type 7 and 9

Bolted construction
NEMA Type 7

Bolted construction
NEMA Type 9

No changes since previous issue.

SQUARE D COMPANY



AC MAGNETIC STARTERS — OPEN TYPE

With Thermal Overload Relays

Approximate Dimensions and Shipping Weights

NEMA Size	Dimensions	2 Pole	3 Pole	4 Pole
00	Diagram 1			
	X	$1\frac{3}{16}$	$1\frac{1}{16}$	....
	Y	$2\frac{29}{32}$	$4\frac{25}{32}$	....
	Weight	$2\frac{1}{2}$	$2\frac{1}{2}$	....
0	Diagram 2			
	A	$4\frac{7}{8}$	$4\frac{7}{8}$	$4\frac{7}{8}$
	B	$6\frac{5}{16}$	$6\frac{5}{16}$	$6\frac{5}{16}$
	C	$3\frac{3}{8}$	$3\frac{3}{8}$	$3\frac{3}{8}$
	D	$5\frac{1}{2}$	$5\frac{1}{2}$	$5\frac{1}{2}$
	E	1	1	1
	F	#10-24	#10-24	#10-24
	G (Std.)	....	....	$\frac{1}{16}$
	G (One Interlock)	....	$\frac{1}{16}$	$\frac{1}{16}$
	G (Two Interlocks)	$\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$
Weight	4	4	5	
1	Diagram 2			
	A	$5\frac{9}{32}$	$5\frac{1}{8}$	$5\frac{1}{8}$
	B	$7\frac{1}{8}$	$7\frac{1}{8}$	$7\frac{1}{8}$
	C	$3\frac{11}{16}$	$3\frac{11}{16}$	$3\frac{11}{16}$
	D	$6\frac{1}{2}$	$6\frac{1}{2}$	$6\frac{1}{2}$
	E	1	1	1
	F	#10-24	#10-24	#10-24
	G (Std.)	....	....	$\frac{3}{16}$
	G (One Interlock)	....	$\frac{5}{16}$	$\frac{3}{16}$
	G (Two Interlocks)	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$
Weight	6	6	6	
2	Diagram 3			
	A	....	$6\frac{5}{16}$	$7\frac{3}{4}$
	B	....	$10\frac{1}{4}$	$10\frac{1}{4}$
	C	....	$4\frac{3}{4}$	$4\frac{3}{4}$
	D	....	$9\frac{1}{2}$	$9\frac{1}{2}$
	E	....	$1\frac{1}{2}$	$1\frac{1}{2}$
	F	....	$\frac{5}{32}$	$\frac{5}{32}$
	G	....	$\frac{7}{16}$	$\frac{7}{16}$
Weight	....	14	17	
3	Diagram 4			
	A	....	$8\frac{1}{8}$	$9\frac{3}{8}$
	B	....	$11\frac{1}{8}$	$11\frac{1}{8}$
	C	....	$5\frac{5}{8}$	$5\frac{5}{8}$
	D	....	$10\frac{1}{4}$	$10\frac{1}{4}$
	E	....	2	2
	F	....	$\frac{3}{32}$	$\frac{1}{32}$
	G	....	$1\frac{1}{8}$	$1\frac{1}{8}$
	H	....	3	3
	Weight	....	26	32
4	Diagram 5			
	A	....	$8\frac{1}{4}$	$10\frac{9}{16}$
	B	....	$12\frac{3}{8}$	$12\frac{3}{8}$
	C	....	$6\frac{5}{32}$	$6\frac{5}{32}$
	D	....	11	11
	E	....	2	2
	F	....	$\frac{7}{16}$	$\frac{7}{16}$
	G	....	$2\frac{29}{32}$	$2\frac{29}{32}$
Weight	....	29	33	
5	Diagram 6			
	A	....	$11\frac{1}{2}$	$14\frac{11}{16}$
	B	....	$23\frac{1}{4}$	$23\frac{1}{4}$
	C	....	$9\frac{13}{32}$	$9\frac{13}{32}$
	D	....	$20\frac{3}{16}$	$20\frac{3}{16}$
	E	....	$2\frac{3}{4}$	$2\frac{3}{4}$
	F	....	$\frac{9}{16}$	$\frac{9}{16}$
	G	....	$1\frac{1}{16}$	$1\frac{1}{16}$
Weight	....	80	85	
6	See Diagram 7			
7 and 8	See Diagram 7A			

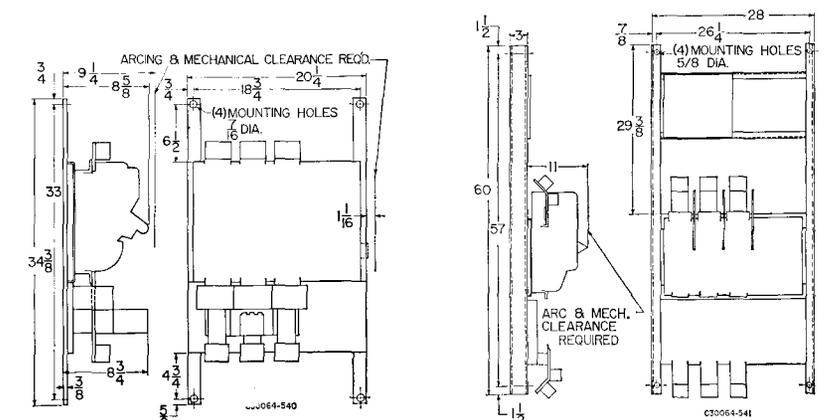
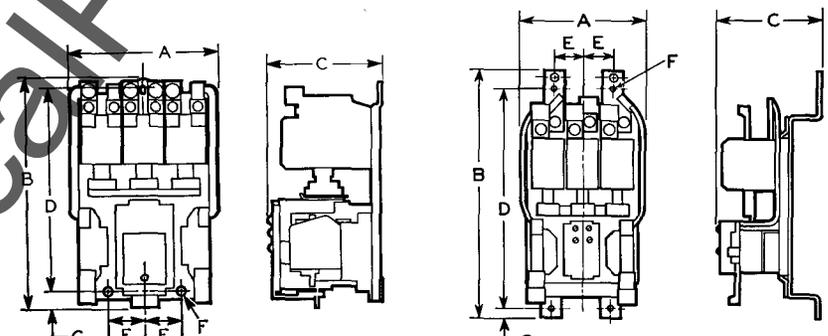
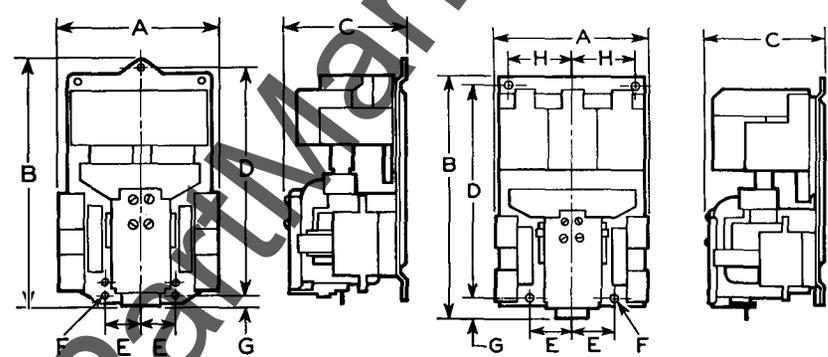
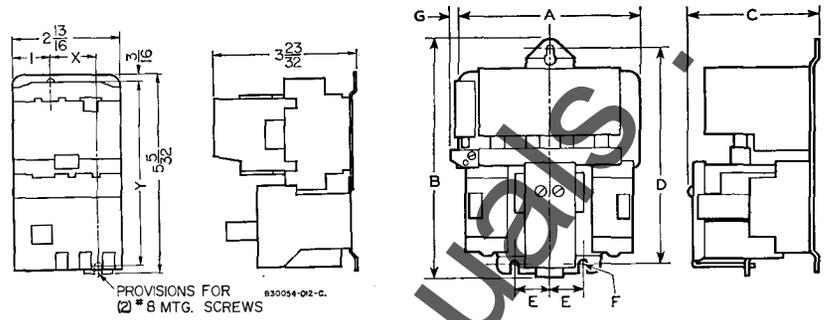


Diagram 7
 NEMA Size 6 (Series A)

Diagram 7A
 NEMA Sizes 7 and 8 (Series A)



**AC MAGNETIC STARTERS — LINE VOLTAGE TYPE
WITH THERMAL OVERLOAD RELAYS**

Approximate Dimensions and Shipping Weights

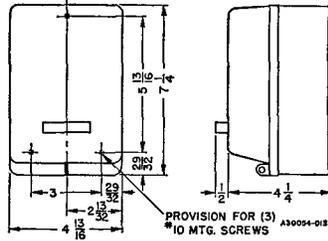


Diagram 8

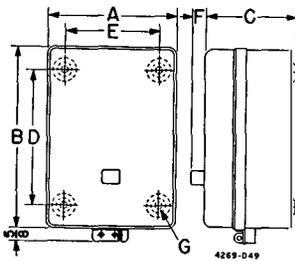


Diagram 9

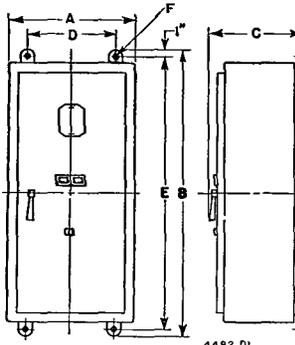


Diagram 10

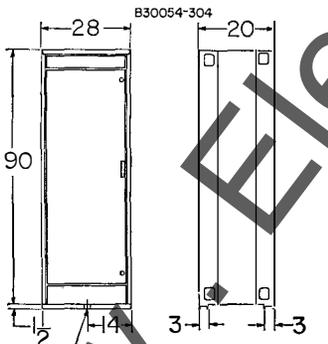


Diagram 11A
Size 7 and 8, Series A
NEMA Types 1, 4 or 12 Enclosures

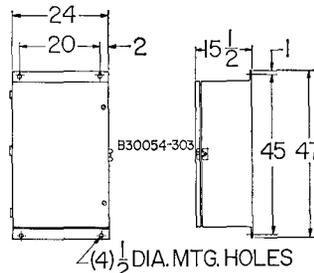


Diagram 11
Size 6, Series A
NEMA Type 1, 4 or 12 Enclosures

Size	Dimen- sions	NEMA Type 1		NEMA Type 12		NEMA Type 4 or 9		NEMA Type 7
		3 Pole	4 Pole	3 Pole	4 Pole	3 Pole	4 Pole	3 or 4 Pole
00	Diagram	Diagram 8	.....	.....	.....	.....	.....	.....
	Weight	4 1/2	.....	.....	.....	.....	.....	.....
0 1 1 1/2 (1P)	Diagram	Diagram 9		Diagram 14 ★		Diagram 12 ★		Diag. 13 ★
	A	6 5/16	6 5/16	6 1/8	6 3/16	8 7/8	8 7/8	10 1/16
	B	8 15/16	8 15/16	10 3/4	10 13/16	12 1/4	12 1/4	12 3/16
	C	4 15/32	4 15/32	6 11/16	6 1/16	5 7/16	5 7/16	6 5/8
	D	6 3/8	6 3/8	4	4	4	4	8
	E	4 3/8	4 3/8	10	10	11 1/4	11 1/4	10 1/2
	F	2 1/32	2 1/32	5/16	5/16	5/8	5/8	9/16
G	1 1/4	1 1/4	.....	.....	7/8	7/8	7/8	
Weight	9	10	10	11	29	30	48	
2	Diagram	Diagram 9		Diagram 14 ★		Diagram 12 ★		Diag. 13 ★
	A	8 3/8	10 11/16	8 3/8	10 3/4	11 3/4	11 3/4	12 1/2
	B	14 1/8	14 1/8	15 5/8	15 5/8	16 3/4	16 3/4	17 1/2
	C	5 15/16	5 3/4	7 7/16	7 7/16	6 3/8	6 3/8	8 5/8
	D	11 13/16	11 13/16	6 3/4	8 3/4	7	7	10 1/2
	E	6 7/8	6 7/8	14 3/4	14 3/4	15 3/4	15 3/4	15 1/2
	F	1 15/16	1 15/16	.....	.....	7/8	7/8	7/8
G	5/16	5/16	.....	.....	.....	.....	.....
Weight	25 5/16	28	26	29	60	63	124	
3	Diagram	Diagram 9		Diagram 14 ★		Diagram 12 ★		Diag. 13 ★
	A	10 7/8	12 3/8	10 1/16	12 1/2	13 1/2	13 1/2	15 1/4
	B	18 1/2	18 1/2	18 3/4	18 13/16	21 3/4	21 3/4	22 1/4
	C	6 13/16	6 3/4	8 15/32	8 15/32	7 5/8	7 5/8	9 5/8
	D	16 3/4	16	8	10	7 1/2	7 1/2	13
	E	8 3/4	10	18	18	20 1/4	20 3/4	20 1/2
	F	1 15/16	1 13/16	1/16	1/16	7/16	7/16	13/16
G	1 13/32	5/16	.....	.....	7/8	7/8	7/8	
Weight	41	48	43	50	105	111	225	
4	Diagram	Diagram 9		Diagram 14 ★		Diagram 15 ★		.....
	A	14 1/4	14 1/4	12 1/8	12 1/8	14 3/8	14 3/8	.....
	B	25 1/2	25 1/8	20 1/4	20 1/4	20 7/8	20 7/8	.....
	C	7 3/8	7 3/8	9 13/16	9 13/16	9 1/2	9 1/2	.....
	D	22 11/16	22 11/16	10	10	10	10	.....
	E	12	12	19 1/2	19 1/2	19 1/2	19 1/2	.....
	F	1 13/16	1 13/16	5/16	5/16	5/8	5/8	.....
G	1 17/32	1 17/32	.....	.....	.....	.....	.....
Weight	56	62	.....	.....	.....	.....	.....
5	Diagram	Diagram 10		Diagram 15 ★		Diagram 15 ★		.....
	A	17 3/16	17 3/16	19 3/8	19 3/8	19 3/8	19 3/8	.....
	B	39	39	39	39	39	39	.....
	C	13 27/32	13 27/32	13 7/16	13 7/16	13 7/16	13 7/16	.....
	D	13	13	13	13	13	13	.....
	E	37	37	37	37	37	37	.....
	F	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	.....
Weight	.....	.....	.....	.....	.....	.....	.....
6, 7 & 8	See Diagrams 11 and 11A							

★Shown on Page 3.



AC MAGNETIC STARTERS — LINE VOLTAGE TYPE

Approximate Dimensions — Not for Construction

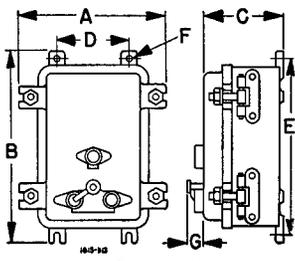


Diagram 12

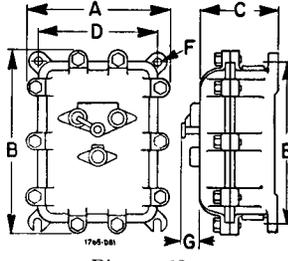


Diagram 13

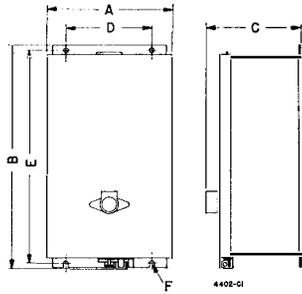


Diagram 14

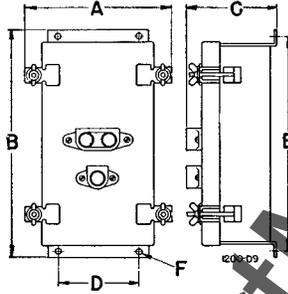


Diagram 15

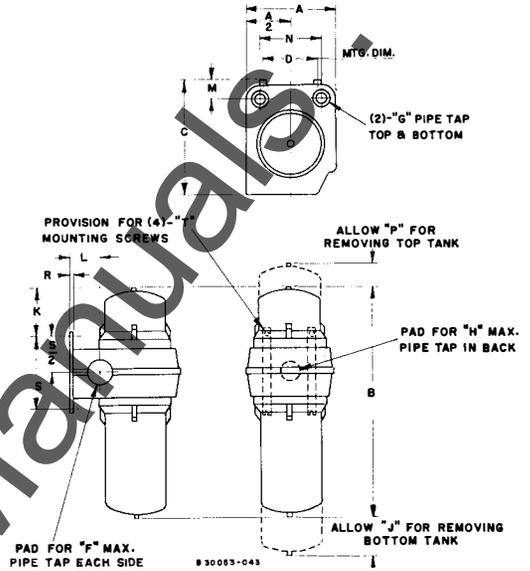


Diagram 16

SPIN TOP EXPLOSION PROOF ENCLOSURES

DIAGRAM 16

SIZES 0-5

Class	Type	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	Wt. ▲
8536	BR-1 thru BR-3 BAR-1 thru BAR-3 CR-5 thru CR-8 CAR-5 thru CAR-8	10 3/4	25 1/4	13 3/16	5 1/4	2	1 1/4	1 1/2	7	4 1/16	3 1/4	2 1/2	7 1/2	2	5 1/16	9 3/8	3/8	47	
	DR-3 DAR-3	12 1/4	31 1/16	14 3/16	5 1/4	2	1 1/2	1 1/2	10 1/2	5 1/2	3 3/16	2 1/8	8 3/4	2 1/2	5 1/16	9 3/8	3/8	81	
	ER-3 EAR-3	15 1/2	36 3/8	18 1/16	5 1/4	3	2 1/2	2 1/2	11 1/2	9 3/16	3 13/16	2 13/16	10 1/4	6	5 1/16	9 3/8	3/8	135	
	FR-1 FAR-1	15 1/2	42 1/4	18 7/16	5 1/4	3	2 1/2	2 1/2	19	9 3/16	3 13/16	2 13/16	10 1/4	6	5 1/16	9 3/8	3/8	155	
	GR-1 GAR-1	20 3/4	57 1/16	23 13/16	7	5	4	*	25	10 3/16	6 3/4	4 1/8	13 1/2	7	1	17	5/8	350	

*This pad not available on these sizes.
 ▲Weight of enclosed type starter only.

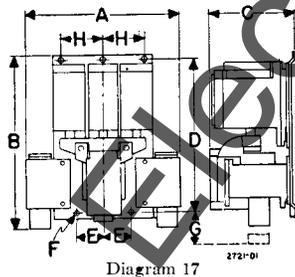


Diagram 17

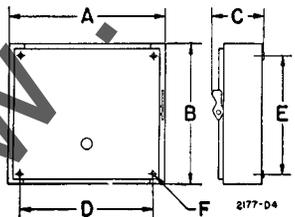


Diagram 18

OPEN TYPE AND ENCLOSED DEVICES

MAGNETIC OVERLOAD

Size	Dimensions	Open Type		NEMA Type 1		NEMA Type 5 & 12	
		3 Pole	4 Pole	3 Pole	4 Pole	3 Pole	4 Pole
2	A	8 7/8	8 7/8	10 1/4	10 1/4	10 1/4	10 1/4
	B	11 3/16	11 3/16	15 1/8	15 1/8	16 7/8	16 7/8
	C	4 7/16	4 7/16	7	7	7	7
	D	9 1/2	9 1/2	8	8	8	8
	E	1 1/2	1 1/2	13	13	16	16
	F	3 1/2	3 1/2	5 1/16	5 1/16	9 3/32	9 3/32
	G	2 3/4	2 3/4	...	...	...	...
Weight		19	22	30	33	31	34
3	A	11 1/4	11 1/4	13 1/4	13 1/4	14 7/8	14 7/8
	B	11 7/8	11 7/8	18 1/8	18 1/8	19 7/8	19 7/8
	C	5 3/8	5 3/8	7 3/8	7 3/8	8 5/8	8 5/8
	D	10 3/4	10 3/4	11	11	10 1/2	10 1/2
	E	2	2	16	16	19	19
	F	9 1/2	9 1/2	9 3/32	9 3/32	3/8	3/8
	G	2 3/8	2 3/8	...	...	...	...
Weight		29	35	44	50	64	71

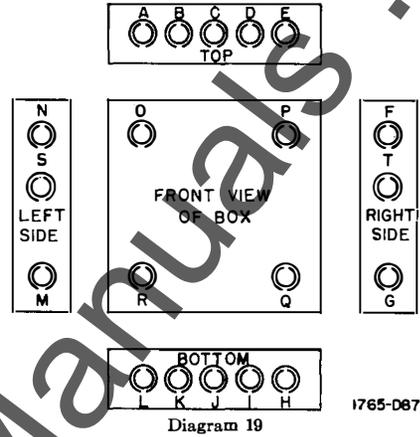


AC MAGNETIC STARTERS — LINE VOLTAGE TYPE

Approximate Dimensions — Not for Construction
Location and Size of Knockouts and Conduit Drillings

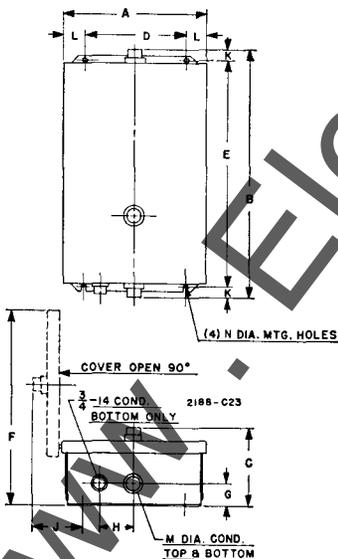
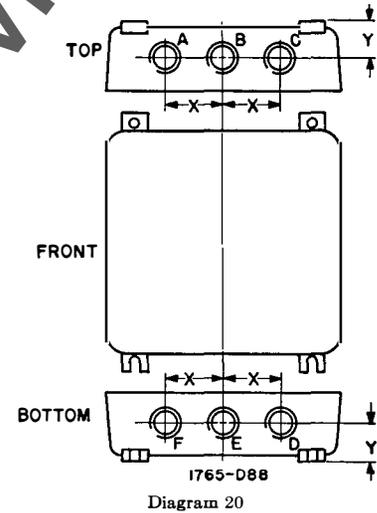
KNOCKOUT SIZES AND LOCATIONS FOR NEMA TYPE 1 ENCLOSURES
(See Diagram 19)

Starter Size	Knockout Size and Location									
	1/2"	1/2"-3/4"	3/4"-1"	1 1/2"-3/4" 1"-1 1/4"	1"-1 1/4" 1 1/2"-2"	1"-1 1/4" 2"-2 1/2"	3/4" 2"-2 1/2"	3"		
00	B, D, F I, K, N	....	....	....	....	....	....	....	....
0, 1, 1 1/2	B, C, D, F, I, J, K, N, O, P	....	....	....	....	....	....	....	....
2	O, P	B, C, D, F, G, I J, K, M, N	....	....	....	....	....	....
3	B, D, G, I, K, N, P, R	O, Q	C, F, J, M	....	....	....	....
4	B, K S, T	....	D, I	C, F, G, J, M, N	O, P, R, Q	....	....
5	F, G, M, N	C, J	....	....	....	....	....	....	B, D, I, K	....



CONDUIT DRILLING SIZE AND LOCATION FOR NEMA TYPES 4, 7 AND 9 ENCLOSURES
(See Diagram 20)

Starter Size	NEMA Type	Pipe Tap Size and Location						Dimensions	
		3/4"-14	1"-11 1/2	1 1/2"-11 1/2	2"-11 1/2	2 1/2"-8	3 1/2"-8	Y	X
0, 1, or 1 1/2	4 or 9	F	B, D	....	....	....	....	1 1/2	1 1/16
	7	F	B, E	....	....	....	....	1 3/4	2 1/8
2	4 or 9	F	....	B, E	....	....	....	1 3/4	2 3/8
	7	F	....	B, E	....	....	....	2	2 1/2
3	4 or 9	F	....	....	C, D	....	....	2 1/8	2 3/8
	7	F	....	....	B, E	....	....	2 1/2	3 1/4
4	4 or 9	F	....	....	....	B, E	....	2 3/8	3 1/4
5	4 or 9	F	....	....	....	....	B, E	3 1/2	4



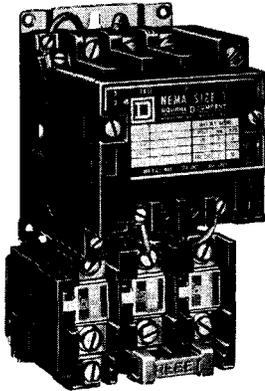
Type	STAINLESS STEEL NEMA 4 ENCLOSURES											DIAGRAM 21		SIZES 0-5	
	A	B	C	D	E	F	G	H	J	K	L	M	N	Wgt.	
BW-11 thru 13 BAW-11 thru 13 CW-11 thru 14 CAW-11 thru 14	8 7/16	12 13/16	7 23/32	6	11 1/4	14 7/16	1 3/8	2 3/16	3 3/16	5/8	1 7/16	1 - 11 1/2	3/16	18 1/4	
DW-11, 12 DAW-11, 12	10 7/16	16 7/16	9 1/2	8	15	17 3/16	2 1/16	2 3/4	3 3/16	5/8	1 1/2	1 1/2 - 11 1/2	5/16	36 3/4	
EW-11, 12 EAW-11, 12	12 3/16	19 3/8	10 13/16	10	18	20	2 5/16	3	3	1 1/16	1 1/2	2 - 11 1/2	5/16	....
FW-11, 12 FAW-11, 12	12 3/16	21 1/4	10 23/32	10	19 1/2	20 1/8	2 5/8	3 3/16	3	7/8	1 3/16	2 1/2 - 8	5/16	....
GW-11, 12 GAW-11, 12	17 1/4	38 1/4	14 5/16	13	36 3/4	28 13/32	2 15/16	3 1/2	4 1/16	3/4	2 1/2	3 1/2 - 8	5/16	....

Diagram 21



TYPE S AC MAGNETIC STARTERS — LINE VOLTAGE

With Melting Alloy Type Thermal Overload Relays



Class 8536 Type SCO-3
 Size 1, 3 Pole Starter with
 Three Thermal Units

Line voltage starters are used for starting and stopping ac squirrel cage motors. They are used where full voltage starting torque may be safely applied to the driven machinery and where the current inrush resulting from across-the-line starting is not objectionable.

To protect the motor from overheating, overload relays are provided on all starters.

A normally open holding circuit interlock for three wire control is provided on all starters as standard.

50-60 HERTZ CLASS 8536 600 VOLTS MAX.

No. of Poles	NEMA Size	Maximum Ratings		General Purpose Enclosure NEMA Type 1		Water-tight (AISI #304) Stainless Steel Enclosure NEMA Type 4		Dust-tight Industrial Use Enclosure NEMA Type 12		Open Type		
		Volts	Max HP		Type	Price *	Type	Price *	Type	Price *	Type	Price *
			Poly-Phase	Single phase								
2 Pole Single Phase	0	115 230	...	1 2	SBG-1	\$ 34.	SBW-11	\$ 69.	SBA-1	\$ 46.	SBO-1	\$ 32.
	1	115 230	...	2 3	SCG-1	39.	SCW-11	75.	SCA-1	51.	SCO-1	37.
	1P	115 230	...	3 5	SCG-2	50.	SCW-12	86.	SCA-2	62.	SCO-2	48.
	2	115 230	...	3 7½	SDG-6	76.	SDW-16	148.	SDA-6	98.	SDO-6	66.
	3	115 230	...	7½ 15	SEG-6	97.	SEW-16	199.	SEA-6	119.	SEO-6	77.
3 Pole Poly-phase	0	110 208-220 440-550	2 3 5	1 2	SBG-2	39.	SBW-12	74.	SBA-2	51.	SBO-2	37.
	1	110 208-220 440-550	3 7½ 10	2 3	SCG-3	44.	SCW-13	80.	SCA-3	56.	SCO-3	42.
	2	110 208-220 440-550	7½ 15 25	3 7½	SDG-1	84.	SDW-11	156.	SDA-1	106.	SDO-1	74.
	3	110 208-220 440-550	15 30 50	7½ 15	SEG-1	138.	SEW-11	240.	SEA-1	164.	SEO-1	118.
4 Pole Poly-phase	0	220 440-550	3 5	...	SBG-3	50.	SBW-13	89.	SBA-3	62.	SBO-3	47.
	1	220 440-550	7½ 10	...	SCG-4	56.	SCW-14	94.	SCA-4	68.	SCO-4	53.
	2	220 440-550	15 25	...	SDG-2	103.	SDW-12	207.	SDA-2	125.	SDO-2	93.

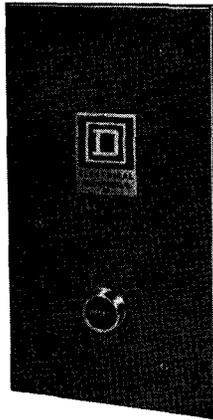
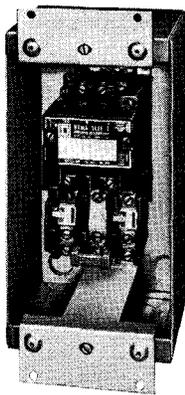
*Prices include one overload relay thermal unit for 2-pole starters and two thermal units for 3 and 4 pole starters. Deduct \$1.50 each if thermal units are omitted.

<p>ORDERING INFORMATION REQUIRED</p> <ol style="list-style-type: none"> 1—Class and type number. 2—Quantity and type number of thermal units. 3—Horsepower, voltage, phase, frequency and full load current of motor. 4—Control voltage and frequency if different from line voltage. 5—Any special features required. 	<p>THERMAL UNITS Refer to tab "Overload Relay Selection"</p> <p>FIELD MODIFICATION KITS Refer to Class 9999 Section</p> <p>ADDITIONS AND SPECIAL FEATURES Refer to tab "Additions and Special Features"</p>
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TYPE S FLUSH MOUNTING AC MAGNETIC STARTERS — LINE VOLTAGE

General Purpose Enclosure — With Melting Alloy Type Thermal Overload Relays



Flush Mounting Starter "With Pull Box and Mounting Strap, Having Plaster Adjustment Feature"

Flush mounting starters are used where final appearance is of particular importance. With the starter mounted in a recess, and the cover virtually flush with the surrounding surface, the smooth contour of the machine is retained. Where the proper recess is provided in the machine for mounting the starter, much unsightly conduit can be eliminated, and wiring may be much less expensive. In stores and buildings, starters flush mounted in plaster walls follow the trend established by lighting panels.

To facilitate delivery of flush mounted starters, it is suggested that they be ordered by their component parts. See "Ordering Information Required" on Page 103 for complete information.

TABLE 1 — WITHOUT PULL BOX — For machine cavity mounting where the starter will not be subjected to dust, dirt or metallic particles.

50-60 HERTZ		CLASS 8536								600 VOLTS MAX.				
No. of Poles	NEMA Size	Maximum Ratings			Component Parts								Complete Device	
		Volts	Max. HP		Flush Plates				Mounting Strap		Starter		Type	Price *
			Poly-Phase	Single phase	Standard		Stainless Steel		Type	Price	Type	Price *		
Type	Price	Type	Price	Type	Price	Type	Price	Type	Price	Type	Price *			
2 Pole Single Phase	0	115 230	...	1 2	S-11	\$ 4.	SS-11	\$ 14.	S-31	\$ 5.	SBO-1	\$ 32.	SBF-1	\$ 41.
	1	115 230	...	2 3	S-11	4.	SS-11	14.	S-31	5.	SCO-1	37.	SCF-1	46.
	1P	115 230	...	3 5	S-11	4.	SS-11	14.	S-31	5.	SCO-2	48.	SCF-4	57.
3 Pole Poly-phase	0	110 208-220 440-550	2 3 5	1 2 ...	S-11	4.	SS-11	14.	S-31	5.	SBO-2	37.	SBF-4	46.
	1	110 208-220 440-550	3 7½ 10	2 3 ...	S-11	4.	SS-11	14.	S-31	5.	SCO-3	42.	SCF-7	51.
	2	110 208-220 440-550	7½ 15 25	3 7½ ...	S-12	12.	SS-12	27.	S-32	7.	SDO-1	74.	SDF-1	93.
4 Pole Poly-phase	0	220 440-550	3 5	...	S-11	4.	SS-11	14.	S-31	5.	SBO-3	47.	SBF-7	56.
	1	220 440-550	7½ 10	...	S-11	4.	SS-11	14.	S-31	5.	SCO-4	53.	SCF-10	62.
	2	220 440-550	15 25	...	S-12	12.	SS-12	27.	S-32	7.	SDO-2	93.	SDF-4	112.

*Prices include one overload relay thermal unit for 2-pole starters and two thermal units for 3 and 4 pole starters. Deduct \$1.50 each if thermal units, are omitted.

<p>THERMAL UNITS Refer to tab "Overload Relay Selection"</p> <p>FIELD MODIFICATION KITS Refer to Class 9999 Section</p> <p>ADDITIONS AND SPECIAL FEATURES Refer to tab "Additions and Special Features"</p>	<p style="text-align: center;">Cover Mounted Control Station Kits</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Kit Description</th> <th>NEMA Size</th> <th>Kit No. Class 9999 Type</th> </tr> </thead> <tbody> <tr> <td>Start-Stop Push Button</td> <td>0, 1, 1P & 2</td> <td>SA-2</td> </tr> <tr> <td>Hand-Off-Auto Selector Switch</td> <td>0, 1, 1P & 2</td> <td>SC-2</td> </tr> <tr> <td>On-Off Selector Switch</td> <td>0, 1, 1P & 2</td> <td>SC-22</td> </tr> <tr> <td rowspan="2">Red Pilot Light 6-600 Volts 50 or 60 Cycles</td> <td>0, 1 & 1P</td> <td>SP-2R</td> </tr> <tr> <td>2</td> <td>SP-3R</td> </tr> </tbody> </table> <p>Standard flush plates have a knockout for field addition of either a START-STOP push button or a selector switch. A knockout is also provided for a pilot light</p>	Kit Description	NEMA Size	Kit No. Class 9999 Type	Start-Stop Push Button	0, 1, 1P & 2	SA-2	Hand-Off-Auto Selector Switch	0, 1, 1P & 2	SC-2	On-Off Selector Switch	0, 1, 1P & 2	SC-22	Red Pilot Light 6-600 Volts 50 or 60 Cycles	0, 1 & 1P	SP-2R	2	SP-3R
Kit Description	NEMA Size	Kit No. Class 9999 Type																
Start-Stop Push Button	0, 1, 1P & 2	SA-2																
Hand-Off-Auto Selector Switch	0, 1, 1P & 2	SC-2																
On-Off Selector Switch	0, 1, 1P & 2	SC-22																
Red Pilot Light 6-600 Volts 50 or 60 Cycles	0, 1 & 1P	SP-2R																
	2	SP-3R																



NEW SHEET

TYPE S FLUSH MOUNTING AC MAGNETIC STARTERS — LINE VOLTAGE

General Purpose Enclosure — With Melting Alloy Type Thermal Overload Relays

TABLE 2 — WITH PULL BOX — WITHOUT PLASTER ADJUSTMENT — For machine cavity mounting with box to protect the starter.

50-60 CYCLES		CLASS 8536										600 VOLTS MAX.		
No. of Poles	NEMA Size	Maximum Ratings			Component Parts								Complete Device	
		Volts	Max. HP		Flush Plates				Pull Box		Starter		Type	Price *
			Poly-Phase	Single phase	Standard		Stainless Steel		Type	Price	Type	Price *		
Type	Price	Type	Price	Type	Price	Type	Price	Type	Price	Type	Price *	Type	Price *	
2 Pole Single Phase	0	115 230	...	1 2	S-11	\$ 4.	SS-11	\$ 14.	S-1	\$ 6.	SBO-1	\$ 32.	SBF-2	\$ 42.
	1	115 230	...	2 3	S-11	4.	SS-11	14.	S-1	6.	SCO-1	37.	SCF-2	47.
	1P	115 230	...	3 5	S-11	4.	SS-11	14.	S-1	6.	SCO-2	48.	SCF-5	58.
3 Pole Poly-phase	0	110	2	1	S-11	4.	SS-11	14.	S-1	6.	SBO-2	37.	SBF-5	47.
		208-220	3	2										
		440-550	5	5										
	1	110	3	2	S-11	4.	SS-11	14.	S-1	6.	SCO-3	42.	SCF-8	52.
		208-220	7½	3										
		440-550	10	3										
2	110	7½	3	S-12	12.	SS-12	27.	S-2	8.	SDO-1	74.	SDF-2	94.	
	208-220	15	7½											
4 Pole Poly-phase	0	220 440-550	3 5	...	S-11	4.	SS-11	14.	S-1	6.	SBO-3	47.	SBF-8	57.
	1	220 440-550	7½ 10	...	S-11	4.	SS-11	14.	S-1	6.	SCO-4	53.	SCF-11	63.
	2	220 440-550	15 25	...	S-12	12.	SS-12	27.	S-2	8.	SDO-2	93.	SDF-5	113.

*Prices include one overload relay thermal unit for 2-pole starters and two thermal units for 3 and 4 pole starters. Deduct \$1.50 each if thermal units are omitted.

TABLE 3 — WITH PULL BOX — WITH PLASTER ADJUSTMENT — For mounting in plaster walls. The starter is mounted on a strap which can be moved with respect to the box for varying thickness of plaster.

50-60 CYCLES		CLASS 8536										600 VOLTS MAX.				
No. of Poles	NEMA Size	Maximum Ratings			Component Parts								Complete Device			
		Volts	Max HP		Flush Plates				Mounting Strap		Pull Box		Starter		Type	Price*
			Poly-Phase	Single phase	Standard		Stainless Steel		Type	Price	Type	Price	Type	Type		
Type	Price	Type	Price	Type	Price	Type	Price	Type	Price	Type	Price	Type	Price *			
2 Pole Single Phase	0	115 230	...	1 2	S-11	\$ 4.	SS-11	\$ 14.	S-31	\$ 5.	S-1	\$ 6.	SBO-1	\$ 32.	SBF-3	\$ 47.
	1	115 230	...	2 3	S-11	4.	SS-11	14.	S-31	5.	S-1	6.	SCO-1	37.	SCF-3	52.
	1P	115 230	...	3 5	S-11	4.	SS-11	14.	S-31	5.	S-1	6.	SCO-2	48.	SCF-6	63.
3 Pole Poly-phase	0	110	2	1	S-11	4.	SS-11	14.	S-31	5.	S-1	6.	SBO-2	37.	SBF-6	52.
		208-220	3	2												
		440-550	5	5												
	1	110	3	2	S-11	4.	SS-11	14.	S-31	5.	S-1	6.	SCO-3	42.	SCF-9	57.
		208-220	7½	3												
		440-550	10	3												
2	110	7½	3	S-12	12.	SS-12	27.	S-32	7.	S-2	8.	SDO-1	74.	SDF-3	101.	
	208-220	15	7½													
4 Pole Poly-phase	0	220 440-550	3 5	...	S-11	4.	SS-11	14.	S-31	5.	S-1	6.	SBO-3	47.	SBF-9	62.
	1	220 440-550	7½ 10	...	S-11	4.	SS-11	14.	S-31	5.	S-1	6.	SCO-4	53.	SCF-12	68.
	2	220 440-550	15 25	...	S-12	12.	SS-12	27.	S-32	7.	S-2	8.	SDO-2	93.	SDF-6	120.

*Prices include one overload relay thermal unit for 2-pole starters and two thermal units for 3 and 4 pole starters. Deduct \$1.50 each if thermal units are omitted.

ORDERING INFORMATION REQUIRED

1—To facilitate delivery of flush mounted starters, it is suggested that they be ordered by their component parts by Class and type number from Tables 1—3.

2—Quantity and type number of thermal units.

3—Horsepower, voltage, phase, frequency and full load current of motor.

4—Control voltage and frequency if different from line voltage.

5—For listing of control station kits for field installation, refer to table on Page 102.

6—For factory assembled starters with stainless steel flush plate, specify by adding "Form Y-56" to complete type number and add \$10. to the list price for Sizes 0, 1 and 1P and add \$15. for Size 2.

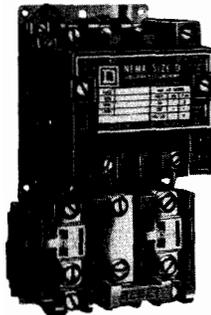
7—Flush mounted contactors are available — consult factory for information.

www.ElectricalPartManuals.com

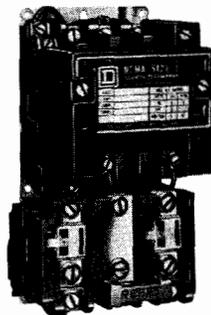


TYPE S AC MAGNETIC STARTERS — LINE VOLTAGE

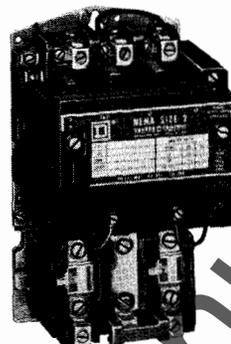
APPLICATION DATA



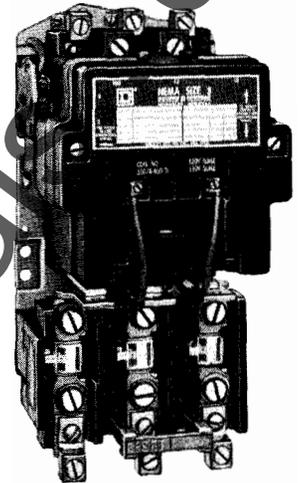
Size 0, 3 Pole



Size 1, 3 Pole



Size 2, 3 Pole



Size 3, 3 Pole

BASIC CONTACTOR

Size — Single phase in NEMA Sizes 0, 1, 1P, 2, and 3. Polyphase in NEMA Sizes 0, 1, 2, and 3.

Poles — Two poles single phase; three and four poles polyphase.

Contact Rating — For complete electrical ratings of contacts, see Table on Page 106.

Holding Circuit Interlock — A normally open holding circuit interlock is provided as standard on all devices. On the Size 0, 1, and 2 the interlock is internal. An external interlock is used on the Size 3. The holding circuit interlock on contactors is rated as follows:

Device	Volts AC	Pilot Duty — AC only (35% Power Factor)	
		Make	Carry and Break
0, 1, & 2	120 or less	30 amps	3 amps
	120-600	3,600 VA	360 VA
3	120 or less	60 amps	6 amps
	120-600	7,200 VA	720 VA

Voltage — 600 volts ac maximum.

Frequency — Coils are available for application on 50 or 60 Hertz. Contacts can be applied at any frequency 25-60 Hertz. Consult factory for use at other frequencies.

TERMINALS

NEMA Size	Power Terminals		Control Terminals	
	Type of Lug	Wire Sizes * Min.—Max.	Type of Lug	Wire Sizes * Min.—Max.
0 & 1	Pressure Wire	#14—#8	Pressure Wire	#16—#12
2	Box Lug	#14—#4	Pressure Wire	#16—#12
3	Box Lug	#6—#0	Pressure Wire	#16—#12

*Solid or stranded copper wire.

COIL SELECTION — Single Voltage Coils

NEMA Size	Type	Poles	Coil Prefix	Frequency	Suffix Numbers (Coil part numbers consist of coil prefix followed by suffix number)															
					24 Volts	110 Volts	120 Volts	208 Volts	220 Volts	230 Volts	240 Volts	277 Volts	380 Volts	440 Volts	460 Volts	480 Volts	550 Volts	600 Volts		
0, 1 & 1P	SB & SC	1-5	31041-400-	60	20	‡	42	48	△	△	51	52	..	★	★	60	●	62		
				50	22	42	43	..	51	52	52	..	58	60	..	61	62	64		
2	SD	2 & 3	31063-409-	60	16	‡	38	44	△	△	47	49	..	★	★	57	●	60		
				50	17	38	39	..	47	49	48	..	55	57	..	58	60	61		
		4 & 5	31063-400-	60	16	‡	38	44	△	△	47	49	..	★	★	57	●	60		
				50	17	38	39	..	47	49	48	..	55	57	..	58	60	61		
3	SE	1-3	31074-400-	60	16	‡	38	44	△	△	47	49	..	★	★	57	●	60		
				50	17	38	39	..	47	△	48	..	55	57	..	58	60	61		

‡Use 120 Volt coil. △Use 240 Volt coil. ★Use 480 Volt coil. ●Use 600 Volt coil.



Magnet Coil

COIL BURDEN

NEMA Size	No. of Poles	Inrush VA		Sealed VA		Sealed Watts	
		50 Hertz	60 Hertz	50 Hertz	60 Hertz	50 Hertz	60 Hertz
0 & 1	1-5	232	245	26	27	7.7	7.8
2	2 & 3	296	311	36	37	12	14
2	4 & 5	429	438	37	38	12	14
3	2 & 3	†	700	†	46	†	14

†Consult field office.

COIL SELECTION — Dual Voltage Coils

115/230 volt, 60 Hertz dual voltage coils:
 Sizes 0, 1 and 1P (1-5 pole)—31041-402-01
 Size 2 (2 and 3 pole)—31063-411-01
 Size 2 (4 and 5 pole)—31063-402-01
 Size 3 (2 and 3 pole)—31074-402-01

115/230 volts, 50 Hertz dual voltage coils:
 Sizes 0, 1 and 1P (1-5 pole)—31041-402-03
 Size 2 (2 and 3 pole)—31063-411-03
 Size 2 (4 and 5 pole)—31063-402-03
 Size 3 (2 and 3 pole)—31074-402-03



APPLICATION DATA

**ELECTRICAL RATINGS
 FOR AC MAGNETIC CONTACTORS AND STARTERS**

NEMA Size	Volts	Maximum Horsepower Rating — Nonplugging and Nonjogging Duty		Maximum Horsepower Rating — Plugging or Jogging Duty †		Continuous Current Rating, Amperes — 600 Volts Max.	Service-Limit Current Rating, Amperes *	Tungsten and Infrared Lamp Load, Amperes — 250 Volts Max. ★	Resistance Heating Loads, KW — other than Infrared Lamp Loads ‡		KVA Rating for Switching Transformer Primaries at 50 or 60 Cycles		3 Phase Rating for Switching Capacitors ○	
		Single Phase	Poly-Phase	Single Phase	Poly-Phase				Single Phase	Poly-Phase	Single Phase	Poly-Phase	Volts	Kvar
00	110	1/3	3/4	...	...	9	11	5	...	...	...	...	...	...
	208-220	1	1 1/2	...	...	9	11	5	...	...	...	...	...	...
	440	2	2	...	...	9	11	...	...	...	...	...	...	...
	550	2	2	...	...	9	11	...	...	...	...	...	...	...
0	110	1	2	1/2	1	18	21	10	...	...	0.9	1.2	...	...
	208-220	2	3	1	1 1/2	18	21	10	...	...	1.4	1.7	...	...
	440	5	5	...	2	18	21	...	...	...	1.9	2.5	...	...
	550	5	5	...	2	18	21	...	...	...	1.9	2.5	...	...
1	110	2	3	1	2	27	32	15	3	5	1.4	1.7	...	...
	208-220	3	7 1/2	2	3	27	32	15	6	10	1.9	4.1	...	...
	440	10	10	...	5	27	32	...	20	25	3	5.3	...	...
	550	10	10	...	5	27	32	...	25	25	3	5.3	...	...
1P	115	3	...	1 1/2	...	36	42	24	...	...	...	...	...	...
	230	5	...	3	...	36	42	24	...	...	...	...	...	...
2	110	3	7 1/2	2	...	45	52	30	5	8.5	1.9	4.1	...	...
	208-220	7 1/2	15	5	10	45	52	30	10	17	4.6	7.6	230	13
	440	25	25	...	15	45	52	...	20	34	5.7	12	460	26
	550	25	25	...	15	45	52	...	25	43	5.7	12	575	33
3	110	7 1/2	15	...	...	90	104	60	10	17	4.6	7.6	...	...
	208-220	15	30	...	20	90	104	60	20	34	8.6	15	230	27
	440	...	50	...	30	90	104	...	40	68	14	23	460	53
	550	...	50	...	30	90	104	...	50	86	14	23	575	67
4	110	...	...	...	...	135	156	120	15	26	5.7	12	...	...
	208-220	...	50	...	30	135	156	120	30	52	11	23	230	40
	440	...	100	...	60	135	156	...	60	105	22	46	460	80
	550	...	100	...	60	135	156	...	75	130	22	46	575	100
5	110	...	...	...	...	270	311	240	30	52	14	23	...	...
	208-220	...	100	...	75	270	311	240	60	105	28	46	230	80
	440	...	200	...	150	270	311	...	120	210	40	91	460	160
	550	...	200	...	150	270	311	...	150	260	40	91	575	200
6	110	...	...	...	...	540	621	480	60	105	28	46	...	...
	208-220	...	200	...	150	540	621	480	120	210	57	91	230	160
	440	...	400	...	300	540	621	...	240	415	86	180	460	320
	550	...	400	...	300	540	621	...	300	515	86	180	575	400
7	110	...	...	...	...	810	932	720	90	155	...	...	...	...
	208-220	...	300	...	...	810	932	720	180	315	...	...	230	240
	440	...	600	...	...	810	932	...	360	625	...	...	460	480
	550	...	600	...	...	810	932	...	450	775	...	...	575	600
8	110	...	...	...	...	1215	1400	1080	...	...	...	...	...	...
	208-220	...	450	...	...	1215	1400	1080	...	...	...	...	230	360
	440	...	900	...	...	1215	1400	...	...	...	...	...	460	720
	550	...	900	...	...	1215	1400	...	...	...	...	...	575	900

Tables and footnotes are taken from NEMA Standards Publication No. IC 1-1965 Section 2, Part 11 for Magnetic Contactors and Section 3, Parts 21B, 21C, 21D and 21F for Magnetic Starters.

† Ratings shown are for applications requiring repeated interruption of stalled motor current or repeated closing of high transient currents encountered in rapid motor reversal, involving more than five openings per minute such as plug-stop, plug-reverse or jogging duty. Ratings apply to single speed and multi-speed controllers.

* Per NEMA Standards paragraph IC 1-21A.20, the service-limit current represents the maximum rms current, in amperes, which the controller may be expected to carry for protracted periods in normal service. At service-limit current ratings, temperature rises may exceed those obtained by testing the controller at its continuous current rating. The ultimate trip current of overcurrent (overload) relays or other motor protective devices shall not exceed the service-limit current ratings of the controller.

★ FLUORESCENT LAMP LOADS — 300 VOLTS AND LESS — The characteristics of fluorescent lamps are such that it is not necessary to derate Class 8502 contactors below their normal continuous current rat-

ing. Class 8903 contactors may also be used with fluorescent lamp loads. For controlling tungsten and infrared lamp loads, Class 8903 ac lighting contactors are recommended. These contactors are specifically designed for such loads and are applied at their full rating as listed in the Class 8903 Catalog Section. Do not use Class 8903 contactors with motor loads or resistance heating loads.

‡ Ratings apply to contactors which are employed to switch the load at the utilization voltage of the heat producing element with a duty which requires continuous operation of not more than five openings per minute.

▲ Applies to contactors used with transformers having an inrush of not more than 20 times their rated full load current, irrespective of the nature of the secondary load.

○ Kilovar ratings of contactors employed to switch power capacitor loads. When capacitors are connected directly across the terminals of an alternating current motor for power factor correction, the motor manufacturer should be consulted as to the maximum size of the capacitor and the proper rating of the motor overcurrent protective device.



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TYPE S AC MAGNETIC STARTERS — LINE VOLTAGE

APPLICATION DATA

OVERLOAD RELAYS

Thermal Units — Standard starters include hand reset, melting alloy type overload relays. Interchangeable thermal units are available in standard trip, quick trip, or slow trip designs — refer to Class 9065 catalog section for additional information. Single phase starters use one thermal unit, while polyphase starters will accept two or three thermal units.

Third Overload Relay — Three and four pole polyphase starters include an overload relay block with a three pole trip mechanism. A special metal strap in the center leg allows these starters to be used with two thermal units, one in each outside leg. Where overload protection is required in three lines, a third thermal unit can be added in the field in place of the center strap. No extra parts are required and panel space is not increased.

Standard Contact — One normally closed contact is provided in each overload relay block regardless of the number of thermal units. The contact unit is a replaceable part, secured by one screw, and is identified as Class 9998 Type SO-1.

Alarm Contact — A normally open alarm circuit contact can be supplied in addition to the standard normally closed contact. A pilot light or alarm bell can be wired in series with this contact to indicate tripped overload relays. The alarm circuit contact unit, identified as a Class 9998 Type SO-2, consists of an SPDT switch with one terminal common to both circuits. Class 9998 Type SO-1 and Type SO-2 contact units are interchangeable.

Automatic Reset Overloads — Bimetallic overload relays are available with an automatic reset feature allowing the relay contacts to automatically reclose, after tripping, when the relay has cooled down. This is an advantage when the starter is mounted in an inaccessible location.

Temperature Compensated Overloads — Bimetallic overload relays are available with a temperature-compensation feature and are intended for use where the motor is located in a constant ambient, or where the temperature of the motor ambient and the starter ambient vary independently.

CONTROL TRANSFORMER SELECTION

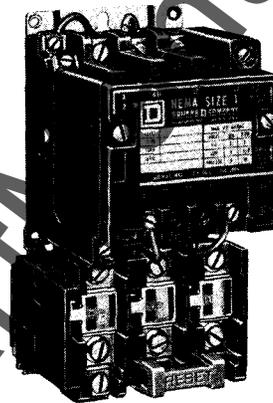
The following table gives the proper size control transformer to be used with Size 0, 1, 2, and 3 starters and contactors with or without additional electrical interlocks or timer.

NEMA Size	No. of Poles	Auxiliary Units	Transformer Size
0 & 1	1-3	With max. of 3 external interlocks.	50 VA *
		With timer and maximum of 2 external interlocks	
		With 4 external interlocks	100 VA
		With timer and 3 external interlocks	
0 & 1	4 & 5	With or without external interlocks or timer	100 VA
2	2-5	With and without any attachment	100 VA
3	2-3	With and without any attachment	150 VA

*100 VA control transformer is required if units are mechanically interlocked, as in Class 8702 reversing contactors.

Contact Ratings

Volts AC	Pilot Duty — AC Only (35% Power Factor)	
	Make	Carry and Break
120 or Less	30 Amps.	3 Amps.
120-600	3600 VA	360 VA



Size 1 Starter with Three Thermal Units



Class 9998 Type SO-2 Contact Unit with Alarm Circuit

MODIFICATIONS

Auxiliary Units — Additional electrical interlocks and a timer attachment can be added by the factory or in the field on all sizes. A power pole can also be added on the 0, 1, & 2.

The maximum number of attachments which can be added are given in the following table:

TABLE A

NEMA Size	No. of Poles of Basic Contactor	Maximum Number of Auxiliary Units† (In addition to holding circuit interlock).
0, 1, and 2	1, 2 or 3	4 single circuit external interlocks (N.O. or N.C.)
		3 single circuit external interlocks (N.O. or N.C.) plus 1 attached timer (ON or OFF delay).
	4 or 5	2 single circuit external interlocks (N.O. or N.C.) plus 1 power pole adder (1 or 2 poles, N.O. or N.C.).
		1 attached timer (ON or OFF delay) plus 1 power pole adder (1 or 2 poles, N.O. or N.C.).
3	2 and 3	2 single circuit external interlocks (N.O. or N.C.)
		1 timer attachment.
		4 single circuit external interlocks (N.O. or N.C.)
		2 single circuit external interlocks plus 1 attached timer (ON or OFF delay).

†Class 8502 size 0, 1, 2, and 3 contactors in NEMA Type 1, 4, and 12 enclosures have sufficient room for the addition of the above combinations with the exception of the timer attachment on the size 0, 1, and 2. A wider enclosure is required for the timer attachment on the size 0, 1, and 2. All size 3 enclosures have required width.



TYPE S AC MAGNETIC STARTERS — LINE VOLTAGE

APPLICATION DATA

MODIFICATIONS — POWER POLE — Size 0, 1, & 2

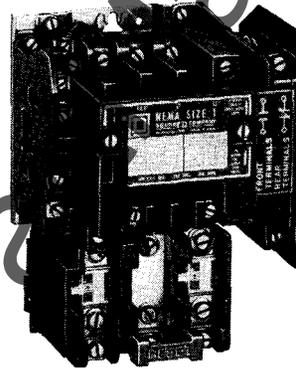
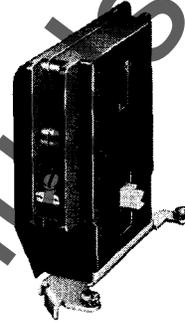
A one or two power pole unit can be added to a basic 1, 2 or 3-pole size 0, 1, or 2 contactor or starter. Available with normally open or normally closed poles, the power pole adder mounts on either side of the basic contactor with two screws. The same power pole adder is used for both Sizes 0 and 1. Only one power pole unit, one or two poles, can be added.

Adding a power pole unit to a Size 2 starter requires a different coil selection. (The Size 2 starter has a different coil selection for 2-3 poles and 4-5 poles.) Size 0 and 1 starters use the same coil, 1-5 poles.

The power pole adders can be factory or field installed. Sufficient room is provided in all enclosures, Classes 8502, 8536, 8538 and 8539, for the addition of a power pole unit. The following table lists the power pole adder kits. For prices, refer to the Class 9999 Catalog Section.

POWER POLE ADDER KIT	NEMA Size	Class 9999 Type
One normally open power pole adder.....	0, 1 2	SB-6 SB-11
One normally closed power pole adder.....	0, 1 2	SB-7 SB-12
One normally open and one normally closed power pole adder.....	0, 1 2	SB-8 SB-13
Two normally open power pole adder.....	0, 1 2	SB-9 SB-14
Two normally closed power pole adder.....	0, 1 2	SB-10 SB-15

Class 9999 Type SB-6
One Pole Power Pole Adder



Size 1 Starter with Two Interlocks and Two Pole Power Pole Adder

MODIFICATIONS — PNEUMATIC TIMER — Size 0, 1, 2, & 3

For applications requiring the simultaneous operation of a timer and contactor, a mechanically operated pneumatic timer can be mounted on the Type S starter. The use of a mechanically operated timer results in an appreciable saving in panel space over a separately mounted timer.

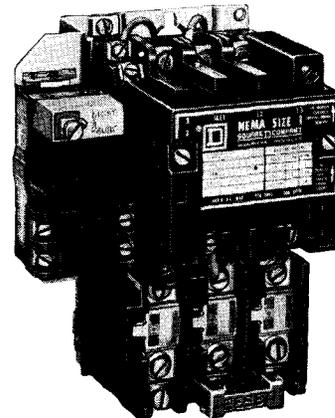
Available in time delay after de-energization (off delay) or time delay after energization (on delay), the timer attachment has an adjustable timing period of from .2 seconds to 1 minute and an accuracy of within + or - 15% of the average time setting. The timer can be field converted from time delay after de-energization or vice versa without any additional parts; however, the timer kit is offered both ways. The timer mounts on the side of the basic contactor and is secured to the baseplate by two self-retaining screws which fasten from the front. One N.O. and one N.C., single pole, double throw, electrical contacts are provided. Only one timer can be added to a starter or contactor as listed in Table A on Page 107. Addition of a timer DOES NOT require a coil change in the basic contactor. The electrical ratings of the timed contacts are given in the following table:

Volts AC	Pilot Duty — AC Only (35% Power Factor)		AC Amms. (75-80% Power Factor)
	Make	Carry and Break	
120 or Less	30 Amps.	3 Amps.	3
120-600	3600 VA	360 VA	3

Timer attachment kits for field addition are listed in the following table. For pricing information refer to the Class 9999 Catalog Section.

Timer Attachment Kit	Class 9999 Type
Mechanically operated pneumatic timer, time delay after de-energization (off delay).....	SK-3
Mechanically operated pneumatic timer, time delay after energization (on delay).....	SK-4

Class 9999 Type SK-3
Timer Attachment on Size 1 Starter





TYPE S AC MAGNETIC STARTERS — LINE VOLTAGE APPLICATION DATA

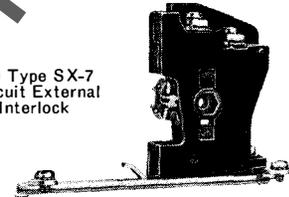
MODIFICATIONS — ELECTRICAL INTERLOCKS

Additional electrical interlocks can easily be added to any open or enclosed starters in the arrangements shown in Table A on Page 107. The external interlocks mount on the side of the basic contactor and are mounted from the front by two captive screws on the size 0, 1, & 2 and one captive screw on the size 3. The external interlocks have single throw normally open or normally closed contacts which are field convertible. External interlocks are available to provide overlapping contacts. The electrical ratings of the external interlocks are given in the following table:

Voits AC	Pilot Duty — AC Only (35% Power Factor)		AC Amps. (75-80% Power Factor)
	Make	Carry and Break	
120 or Less	60 Amps.	6 Amps.	6
120-600	7200 VA	720 VA	6

Electrical Interlock Kits	Class 9999 Type
External Electrical Interlock with 1 N.O. contact, L.H. or R.H. mounting.....	SX-6
External Electrical Interlock with 1 N.C. contact, L.H. or R.H. mounting.....	SX-7
External Electrical Interlock with 1 N.O. and 1 N.C. isolated contacts, L.H. or R.H. mounting.....	SX-8
External Electrical Interlock with 1 N.O. overlapping contact, L.H. or R.H. mounting.....	SX-9
External Electrical Interlock with 1 N.C. overlapping contact, L.H. or R.H. mounting.....	SX-10

*Types SX-9 and SX-10 must be used together and are suitable for applications where it is necessary for a normally open interlock contact to overlap a normally closed interlock contact.



Interlock kits for field installation are listed in the table to the right. The same interlocks are used for Sizes 0, 1, 2, and 3. For pricing information of interlocks, see Class 9999 Catalog Section.

FORM NUMBER AND LOCATION OF ADDITIONAL ELECTRICAL INTERLOCKS For Classes 8502, 8536, 8538 and 8539 Type S, Sizes 0, 1, 2 and 3 Open Type and in NEMA 1, Flush Mounted, 4 and 12 Enclosures

The Form designations and location of additional external interlocks are shown in Table 1 and 2. When ordering factory installed additional interlocks, the Form designations listed should be used.

**TABLE 1 *
 SIZE 0, 1 AND 2
 1-3 POLE DEVICES ONLY**

1 NO FORM X1	1 NC FORM X2	2 NO FORM X3	1 NO 1 NC FORM X4	2 NC FORM X5	3 NO FORM X6	2 NO 1 NC FORM X7	1 NO 2 NC FORM X8
3 NC FORM X9	4 NO FORM X10	3 NO 1 NC FORM X11	2 NO 2 NC FORM X12	1 NO 3 NC FORM X13	4 NC FORM X14	CHANGE NO HOLDING CIRCUIT INTERLOCK TO NC FORM X22	

*N.O. holding circuit interlock supplied as standard and is located internally.

**TABLE 2 *
 4 AND 5 POLE DEVICES ONLY**

1 NO FORM X1	1 NC FORM X2	2 NO FORM X3	1 NO 1 NC FORM X4	2 NC FORM X5	CHANGE NO HOLDING CIRCUIT INTERLOCK TO NC FORM X22
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*N.O. holding circuit interlock supplied as standard and is located internally.

**TABLE 3 *
 SIZE 3
 2-3 POLE DEVICES**

1 NO FORM X1	1 NC FORM X2	2 NO FORM X3	1 NO 1 NC FORM X4	2 NC FORM X5	3 NO FORM X6	2 NO 1 NC FORM X7	1 NO 2 NC FORM X8
3 NC FORM X9	4 NO FORM X10	3 NO 1 NC FORM X11	2 NO 2 NC FORM X12	1 NO 3 NC FORM X13	4 NC FORM X14	CHANGE NO HOLDING CIRCUIT INTERLOCK TO NC FORM X22	

*N.O. holding circuit interlock supplied as standard is located externally on upper left hand corner of starter base.



TYPE S AC MAGNETIC STARTERS — LINE VOLTAGE

APPLICATION DATA

MODIFICATIONS — COVER MOUNTED CONTROL STATIONS

Class 9999 push button, selector switch and pilot light kits can be factory or field added to the cover of Class 8502, 8536, 8538 and 8539 contactors and starters in a NEMA Type 1 enclosure. The kits include the control unit complete with leads and clearly illustrated installation instructions. A knockout is provided in NEMA Type 1 general purpose enclosures for the field addition of either a push button or selector switch. A second knockout allows the field addition of a pilot light unit. All kits are identical to the units which are installed at the factory.

The pilot light kit provides positive indication of starter energization. The pilot light is energized by a small coil mounted on the contactor magnet adjacent to the operating coil. This coil serves as a transformer secondary and provides the necessary voltage for the pilot light. Since the pilot light coil operates on magnetic flux, the same pilot light kit (which includes the pilot light bulb, socket assembly, color cap and pilot light coil) is used on all operating voltages through 600 volts ac, 50 or 60 cycles. An incan-

descent bulb is used with a red color cap which snaps into a knockout in the enclosure cover. No wiring is required for the installation of the kit as the light socket clips on to coil terminal pins.



Class 8536 Starter in NEMA 1 Enclosure with Pilot Light and Selector Switch Kits Installed

COVER MOUNTED CONTROL STATION KITS — FOR NEMA TYPE 1 ENCLOSURES

Kit Description	Class 9999 Type	Starter NEMA Size	Where Used — Class
Start-Stop Push Button	SA-2		
Hand-Off-Auto Selector Switch	SC-2	0, 1, 1P, 2, and 3	8502, 8502 Form FT, 8536, 8536 Form FT, 8538 and 8539
On-Off Selector Switch	SC-22		
Pilot Light (6-600 volts, 50-60 cycles)	SP-2R	0, 1 and 1P	8502 and 8536
	SP-3R	2	
	SP-12R	0, 1 and 1P	8502 Form FT, 8536 Form FT, 8538 and 8539
	SP-13R	2	
	SP-4R	3	8502, 8502 Form FT, 8536, 8536 Form FT.
	SP-14R	3	8538 and 8539

MODIFICATIONS CONTROL CIRCUIT TRANSFORMER KIT

Class 8536 Size 3 standard NEMA 1, 4, and 12 enclosures have space for field mounting a kit that includes a Class 9070 Type GO compact transformer and a Class 9070 Type AP-1 fuse block for form FT applications. This kit is identified as a Class 9070 Type GFT-3 and also includes the necessary wire and instructions for mounting. Note: Sizes 0, 1 and 2 use a different transformer and require a larger enclosure.

ENCLOSURES

CLASSES 8502 AND 8536 — ENCLOSURE CONSTRUCTION

NEMA Type Enclosure	Form Modifications	Cover Construction		Enclosure Material		Finish
		Hinged	Slip-On	Sheet Steel	Stainless Steel AISI No. 304	
1	A, C, J, P1, S, X, Power Pole	◆	X	X		Blue Gray Enamel
	FT	X		X		Blue Gray Enamel
1 Flush Mtg.	A, C, J, P1, S, X, Power Pole		X	X		Blue Gray Enamel*
4	All	X			X	Electro-Polished
12	All	X		X		Blue Gray Enamel

*Available with Stainless Steel Flush Plate.

MAINTENANCE OF EQUIPMENT

Class 9998 repair parts kits are available for all Class 8502 contactors and Class 8536 starters. Each kit includes the necessary parts to completely replace the movable and stationary contacts as well as the movable contact springs. Replacement coils can also be selected from the listing on the bottom of page 105. Service bulletins with a complete list of replaceable parts are always supplied with the device. Separate bulletins can be ordered and are listed below along with the appropriate parts kit:

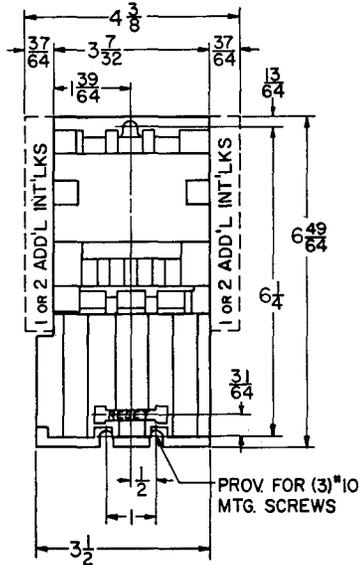
NEMA Size	Series	No. of Poles	Service Bulletin	Replacement Contacts Class 9998 Type
0	A	1-3	277AS	SL-2
0	A	4	277AS & 250AS	SL-12
1	A	1-3	278AS	SL-3
1	A	4	278AS & 250AS	SL-13
1P	A	2	278AS	SL-3
2	A	1-3	279AS	SL-4
2	A	4	279AS & 293AS	SL-14
3	A	2	305AS	SL-6
3	A	3	305AS	SL-7



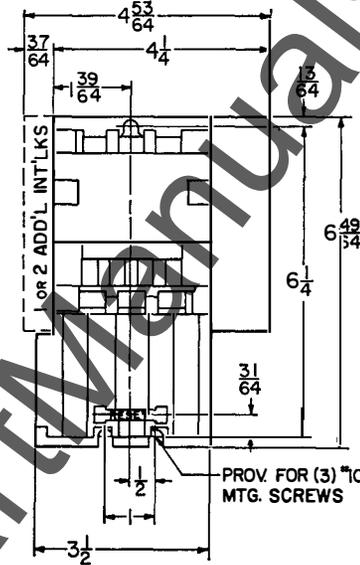
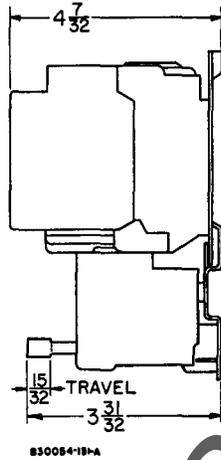
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TYPE S AC MAGNETIC STARTERS — LINE VOLTAGE

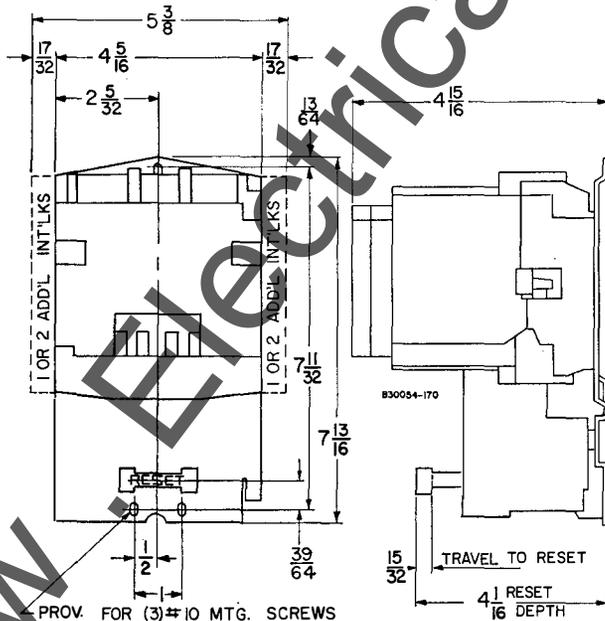
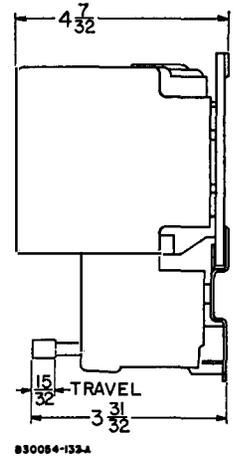
Approximate Dimensions and Shipping Weights



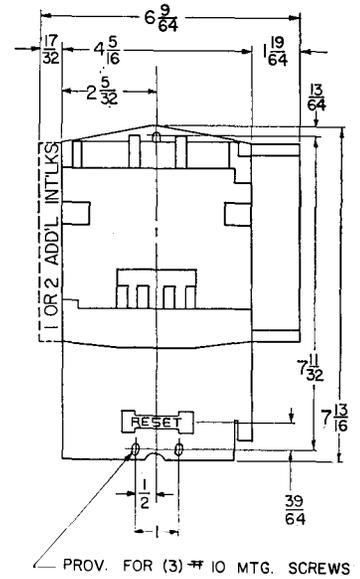
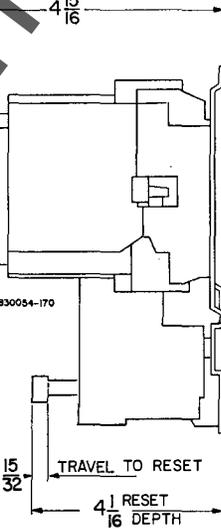
SIZE 0 and 1, 2 and 3 Pole, OPEN TYPE
 Approximate Shipping Weight — 5 lbs.



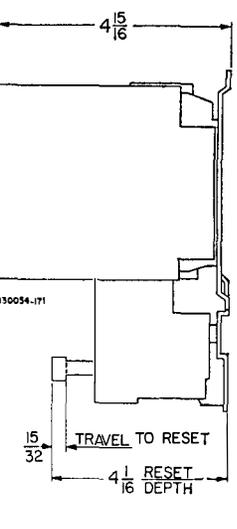
SIZE 0 and 1, 4 and 5 Pole, Open Type
 Approximate Shipping Weight — 5 1/2 lbs.



Size 2, 2 and 3 Pole, Open Type
 Approximate Shipping Weight — 7 3/4 Lbs.



Size 2, 4 and 5 Pole, Open Type
 Approximate Shipping Weight — 9 1/4 Lbs.



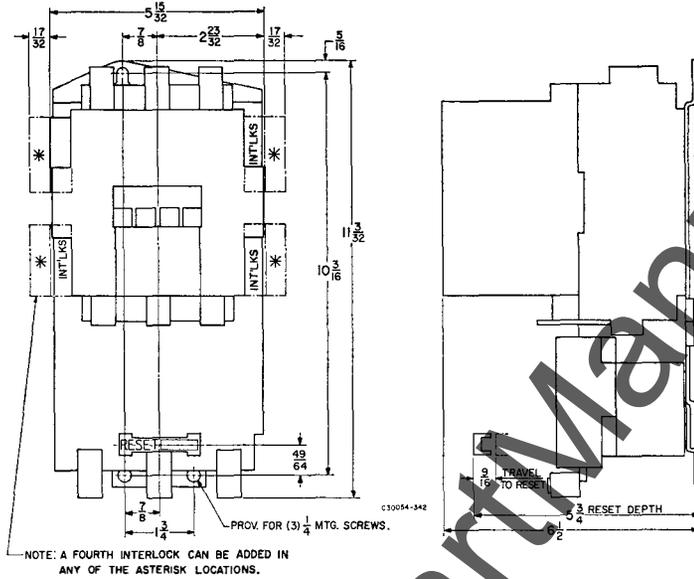
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TYPE S AC MAGNETIC STARTERS — LINE VOLTAGE

Approximate Dimensions and Shipping Weights



SIZE 3, 2-3 Pole, Open Type
 Weight — 17 lbs.



TYPE S AC MAGNETIC STARTERS — LINE VOLTAGE

Approximate Dimensions and Shipping Weights

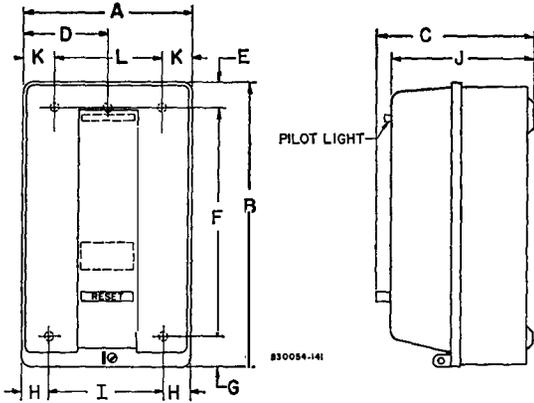


Figure 1
 NEMA Type 1, General Purpose Enclosure

NEMA Size	NEMA Type 1 — Figure 1											Wt. (Lbs.)	
	A	B	C	D	E	F	G	H	I	J	K		L
0 & 1	6	10	5 ⁹ / ₁₆	3	7 ⁷ / ₈	8 ¹ / ₈	1	1 ⁵ / ₈	4 ¹ / ₈	5	—	—	8
2	7 ¹³ / ₁₆	12 ¹ / ₁₆	6 ⁵ / ₁₆	—	1 ³ / ₂	10 ¹ / ₂	1 ³ / ₂	4 ³ / ₂	5 ⁵ / ₈	5 ³ / ₄	1 ³ / ₂	5 ⁵ / ₈	15 ¹ / ₂
3	11 ⁷ / ₁₆	21 ¹³ / ₁₆	8 ¹ / ₈	—	1 ¹⁷ / ₃₂	18 ³ / ₄	1 ¹⁷ / ₃₂	1 ¹⁷ / ₃₂	8 ³ / ₈	7 ¹ / ₂	1 ¹⁷ / ₃₂	8 ³ / ₈	37

Size and Number of Mounting Screws: Size 0 or 1 — Three #10
 Size 2 — Four 1/4"
 Size 3 — Four 3/8"

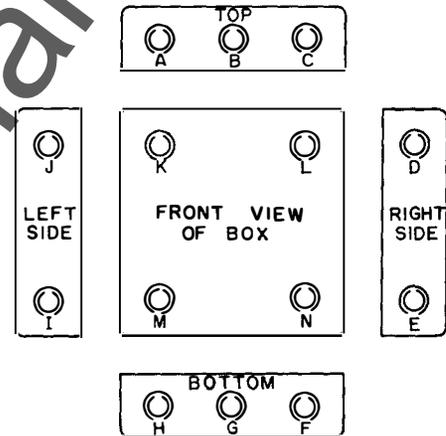


Figure 2
 Knockout Plan for NEMA Type 1 Enclosure

830054-259-A

NEMA Size	Conduit Size Accepted by Lettered Knockouts — Figure 2													
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
0 & 1	3/4-1	1/2-3/4	3/4-1	1/2-3/4	1/2-3/4	3/4-1	1/2-3/4	3/4-1	1/2-3/4	1/2-3/4	1/2-3/4	1/2-3/4	.....	.....
2	1/2-3/4 1-1/4	3/4-1	1/2-3/4 1-1/4	1/2-3/4 1-1/4	1/2-3/4 1-1/4	1/2-3/4 1-1/4	3/4-1	1/2-3/4 1-1/4	1/2-3/4 1-1/4	1/2-3/4 1-1/4	1/2-3/4-1	1/2-3/4-1	.....	.....
3	1/2-3/4 1-1/4	1-1/4 1 1/2-2	1-1/4 2-2 1/2	1-1/4 2-2 1/2	1-1/4 2-2 1/2	1-1/4 2-2 1/2	1-1/4 1 1/2-2	1/2-3/4 1-1/4	1-1/4 2-2 1/2	1-1/4 2-2 1/2	3/4-2-2 1/2	3/4-2-2 1/2	3/4-2-2 1/2	3/4-2-2 1/2

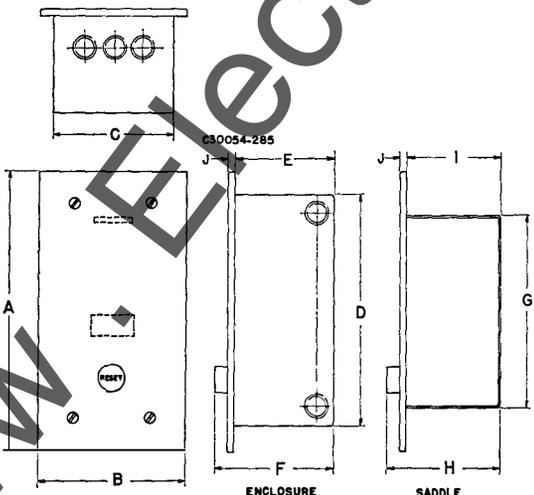


Figure 3
 Flush Mounting General Purpose Enclosure

NEMA Size	Flush Mounting — Figure 3											4 Knock-outs Back of Box	2 Knock-outs Each Side	2 Top & 2 Bottom Knock-outs
	A	B	C	D	E	F	G	H	I	J				
0 & 1	13 ¹ / ₃₂	7 ⁵ / ₃₂	5 ⁷ / ₈	11 ¹ / ₈	4 ¹ / ₂	5 ¹ / ₂	9 ³ / ₁₆	5 ¹⁵ / ₁₆	4 ¹ / ₂	1 ¹ / ₂	1/2-3/4 Cond.	1/2-3/4 Cond.	1/2-3/4-1 Cond.	
2	15 ⁵ / ₃₂	8 ²⁹ / ₃₂	7 ⁵ / ₈	12 ⁷ / ₈	5 ⁵ / ₈	6 ¹ / ₃₂	10 ¹⁵ / ₁₆	6 ³ / ₃₂	5 ⁵ / ₈	1 ¹ / ₂	1/2-3/4-1 Cond.	1-1/4 Cond.	1-1/4* Cond.	

*Size 2 has one additional 1/2-3/4 knockout top and bottom.

Weights: Size 0 or 1 — 12 lbs.
 Size 2 — 24 lbs.

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TYPE S AC MAGNETIC STARTERS — LINE VOLTAGE

Approximate Dimensions and Shipping Weights

NEMA Size	NEMA Type 12 — Figure 5									Weight (Lbs.)
	A	B	C	D	E	F	G	H	I	
0 & 1	6 ³ / ₈	7 ³ / ₈	12 ³ / ₄	1 ¹ / ₁₆	4 ¹ / ₄	12	3 ⁷ / ₈	2 ⁵ / ₃₂	12 ¹ / ₄	16
2	8 ¹ / ₈	8 ¹ / ₈	13 ¹ / ₄	1 ¹⁵ / ₁₆	4 ¹ / ₄	12 ¹ / ₂	3 ⁷ / ₈	3 ¹ / ₃₂	14 ³ / ₄	21
3	11 ³ / ₈	8 ¹ / ₂	20 ¹ / ₂	3 ³ / ₁₆	4 ¹ / ₄	19 ³ / ₄	3 ⁷ / ₈	4 ²¹ / ₃₂	18	45

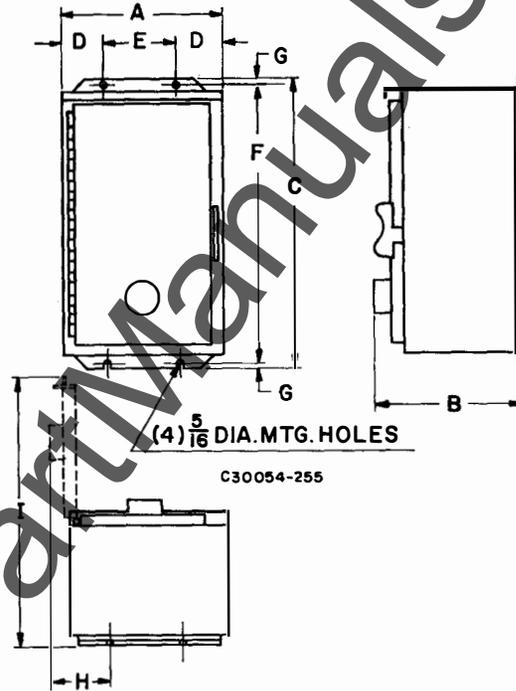


Figure 5
NEMA Type 12 Industrial Use Enclosure

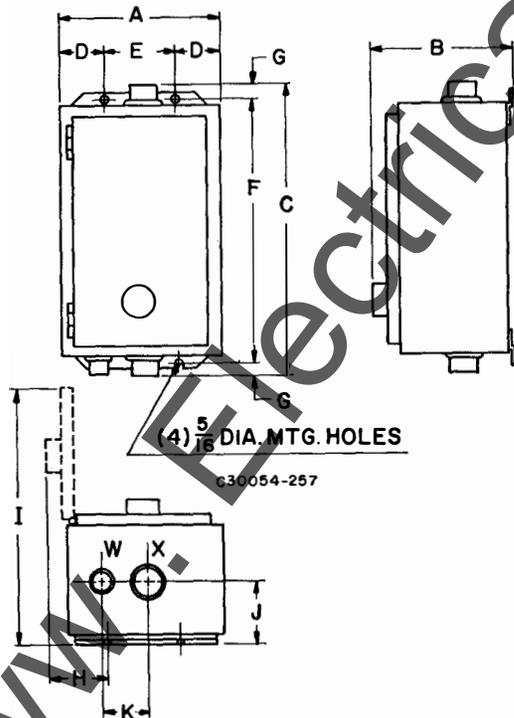


Figure 4
NEMA Type 4 Water-Tight Enclosure

NEMA Size	NEMA Type 4 — Figure 4						
	A	B	C	D	E	F	G
0 & 1	6 ³ / ₈	7 ¹ / ₁₆	13 ³ / ₁₆	1 ¹ / ₁₆	4 ¹ / ₄	12	1 ⁹ / ₃₂
2	8 ¹ / ₈	8 ³ / ₁₆	13 ¹¹ / ₁₆	1 ¹⁵ / ₁₆	4 ¹ / ₄	12 ¹ / ₂	1 ⁹ / ₃₂
3	11 ³ / ₈	8 ⁹ / ₁₆	21 ¹ / ₁₆	3 ⁹ / ₁₆	4 ¹ / ₄	19 ³ / ₄	2 ⁷ / ₃₂

NEMA Size	NEMA Type 4 — Figure 4				W Bot. Only	X Top & Bot.	Weight (Lbs.)
	H	I	J	K			
0 & 1	2 ³ / ₈	11 ²⁵ / ₃₂	1 ⁵ / ₈	2 ⁵ / ₁₆	3/4 Dia. Hub	1 Dia. Hub	18
2	3 ¹ / ₄	14 ⁹ / ₃₂	2	1 ¹⁵ / ₁₆	3/4 Dia. Hub	1 ¹ / ₂ Dia. Hub	23
3	4 ⁷ / ₈	17 ²⁵ / ₃₂	2 ⁹ / ₁₆	3 ³ / ₁₆	3/4 Dia. Hub	2 ¹ / ₂ Dia. Hub	50

AC MAGNETIC CONTACTORS & STARTERS
OBSOLETE DEVICES

CLASS
8536
8736

The devices listed below are stock items in the Square D distribution system, but not listed elsewhere in either the Digest or Catalog. This listing is for price reference only. For further details on these devices, contact your local Square D field office.

Product Class	Type	Form	Volt	Product Code	Price
8536	BAO-2	S	120	73302	\$204.
	BO-2	S	120	73382	204.
	CAO-3	S	120	73432	234.
	CO-3	S	120	73541	234.
	DAO-1	S	120	73612	426.
	DO-1	S	120	73661	426.
	EAO-1	S	120	73700	690.
	EO-1	S	120	73731	690.
	FAO-1	S	120	82812	1578.
	FO-1	S	120	75561	1578.
8736	BO-4	S	120	74463	462.
	CO-8	S	120	74511	522.

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