

Table of Contents	Description	
Vacuum Control	Low Voltage, Medium Voltage	A
NEMA Control - Heavy Duty	TM, 5000	B
NEMA Control - General Duty	HP	C
Pilot Devices	Pushbuttons, Selector Switches, Pilot Lights, STAK-LITE	D
HP, Pump Controllers	Duplex And Triplex Pump Controllers	E
Fire Pump Control	Electric, Diesel, Residential	F
Mill Duty Products	Limit Switch, Foot Switches, Palm Switches	G
Definite Purpose Control	Contactors	H
D.C. Control/RHEO Stats	146, 5DP, 7400	J
Relays	PM, 447	K
Lighting Contactors	Type PM-LC20, LC30, 447, TM-LC	L
Photoelectric Sensors and Control	MEK90 Series:	M
Replacement Coil Data & Reference Pages		N

033

All prices in catalog are in U.S. Dollars.



The logo features the text "Joslyn Clark" in a white, sans-serif font, positioned inside a blue rounded rectangle. To the right of the rectangle is a small, stylized icon resembling a double "J" or a pair of parallel lines.

CV Series**Low Voltage 200V-1500V**

AC Contactors CV4	A2
AC Reversing Contactor CV4	A3, A4
AC Starters CV4	A5
Rev Starter CV4	A6
Technical Specifications CV4,5&6	A7, A13, A19
Diagrams & Dimensions	
AC Contactors CV5	A8
AC Reversing Contactors CV5	A9, A10
AC Starters CV5	A11
AC Rev Starters CV5	A12
AC Contactor CV6	A14
AC Reversing Contactors CV6	A15, A16
AC Starters CV6	A17
AC Rev Starters CV6	A18
CV Series Starter O/L Heaters	A35



A

VC Series**Low Voltage 200V - 3.6KV**

AC Contactors, 200V - 3.6KV	A20
AC Contactors (Mechanically Latched)	A21
AC Reversing Contactors 200V - 3.6KV	A22, A 23
AC Starters 200V - 3.6KV	A24
AC Reversing Starters 200V - 3.6KV	A25
AC Combination Starters 200V - 1.5KV	A26, A27
AC Reduced Voltage Auto Transformer Starters 600V	A28
AC Special Purpose Contactors - 200V - 3.6KV, 160-2500 amp.	A29
Technical Specifications	A30
Dimensions	A31-34
AC Vacuum Starters Overload Heaters	A35
Parts/Accessories	A36
Low Voltage Modifications	A37-38

**MVC Series****Medium Voltage 2.5 - 7.2KV (Contactors)**

AC Contactors - 2.5, 5.0, 7.2KV (Mechanically Latched)	A39
AC Contactors (Mechanically Interlocked)	A40
AC Special Purpose Contactors - 2.5, 5.0, 7.2KV, 200-3000 amp.	A41
Technical Specifications	A42
Dimensions	A43
Medium Voltage Controllers	A44
Medium Voltage Modifications	A45
	A49



AC Vacuum Contactors

USAVAC - Low Voltage

- UL listed to 1500V
- CSA Certified to 1500V
- CE

- Three Ratings
- One Small Size

CV Series
NEMA Size 4 V200
IEC 200A



600V NEMA Size 4 135A

600Volt Nema Size 4 135A Contactor 3 Pole Nema ICS-2 UL508 CSA 22.2

Rating Nema Size 4	Maximum Horsepower KW Rating 3 Phase HP/KW				Open Type	Discount Schedule JC11
600V	200V	230V	460V	575V	Catalog #	Price
HP/KW	40/30	50/37	100/75	100/75	CV77U030406-*	\$1519.00

660Volt 200AMP Contactor 3 Pole IEC 947-4-1 UL508 CSA 22.2

Rating 200A	Maximum Horsepower/KW Rating 3 Phase HP/KW								Open Type	Discount Schedule JC11
1000V	200/208V	220/240V	380/400V	415/440V	460V	500V	575/600V	660-690V	Catalog #	Price
HP/KW	50/37	75/59	100/75	125/95	150/110	190/140	200/150	250/185	CV77U032006-*	\$1629.00

1500Volt 200AMP Contactor 3 Pole IEC 947-4-1 (1000V) UL508 (1500V) CSA 22.2 (1500V)

Rating 200A Nema V200	Maximum Horsepower/KW Rating 3 Phase HP/KW							Open Type	Discount Schedule JC11
1500V	200/208V	220/240V	400V	460V	575/600V	1000V	1500V	Catalog #	Price
HP/KW	50/37	75/59	125/95	150/110	175/130	300/225	500/370	CV77U031615-*	\$1693.00

Options Discount (Schedule JC11) Field Kits

Description	Catalog #	Price
Lug Kit #6 to 250mcm 3 Per Kit	KVC4-2	\$82
Aux. Contact Kit 2N/O 2N/C 10A 600VAC	AK1	\$73
Aux. Contact Kit 2N/O 2N/C 10MA 5VDC	AK3	\$220

Replacement Parts (Discount Schedule JC80)

Description	Catalog #	Price
Interrupter Phase Assembly	A77-457211A	\$520
Coil 110/120V 50/60 HZ	A77-460915A-1	\$248
Coil 220/240V 50/60 HZ	A77-460915A-2	\$248
Coil 380/415V 50/60 HZ	A77-460915A-3	\$248
Coil 440/480V 50/60 HZ	A77-460915A-4	\$248
Coil 125V DC	A77-460915A-5	\$248
Coil 250V DC	A77-460915A-6	\$248
Control PAK 110/120 50/60 HZ	A77-460916A-1	\$258
Control PAK 220/240 50/60 HZ	A77-460916A-2	\$258
Control PAK 380-415V 50/60 HZ 440-480V 50/60 HZ	A77-460916A-3	\$258
Aux. Contact Kit 2N/O 1N/C +1 N/C Late Break	AK Std.	\$ 92

Ordering Information

* Coil Table

- Use complete catalog number when ordering.
Replace the (*) with the suffix from the coil table.

- Engineering Data page A7.
- Renewal Parts page A2.

Voltage	Suffix
120 AC	76
240 AC	26
380 AC	38
460 AC	46
125V DC	125
250V DC	250

AC Mechanically Interlocked Vacuum Contactors Unwired

USAVAC - Low Voltage

- UL listed to 1500V
- CSA Certified to 1500V
- CE
- NEMA Size 4 & V 200 1500V
- IEC 200A

- Three Ratings
- One Small Size
- Use for Reversers, Reduced Voltage Auto Transformer, Wye-Delta, 2 speed single winding, or 2 speed 2 winding applications

A

3 Pole Nema Rated ICS-2 UL508 CSA 22.2 Size 4 Mechanically Interlocked Pair Unwired 600V

135A Contactor

Rating Nema Size 4	Maximum Horsepower/KW Rating 3 Phase HP/KW					Open Type	Discount Schedule JC11
600V	200V	230V	460V	575V		Catalog #	Price
HP/KW	40/30	50/37	100/75	100/75		CV31U030406-*-43	\$3520

3 Pole IEC947-4-1 UL508 CSA 22.2 Mechanically Interlocked Pair Unwired 660V

200A

Rating 200A	Maximum Horsepower/KW Rating 3 Phase					Open Type	Discount Schedule JC11
1000V	200/208V	220/240V	380/415V	460V	575/660V	Catalog #	Price
HP/KW	50/37	75/59	100/75	150/110	200/150	CV31U032006-*-43	\$3740

3 Pole Nema Rated ICS-29 IEC947.4.1 (1000V) UL508 1500V CSA 22.2 Mechanically Interlocked Pair Unwired 1500V

200A Contactor

Rating 200A Nema V200	Maximum Horsepower/KW Rating 3 Phase							Open Type	Discount Schedule JC11
1500V	200/208V	220/240V	380/415V	460V	575/660V	1000V	1500V	Catalog #	Price
HP/KW	50/37	80/59	100/75	150/110	200/150	300/225	500/370	CV31U031615-*-43	\$3980

Options Discount (Schedule JC11)

Description	Catalog #	Price
Lug Kit #6 to 250mcm 3 Per Kit	KVC4-2	\$82
Aux. Contact Kit 2N/O 2N/C 10A 600V ac	AK1	\$73
Aux. Contact Kit 2N/O 2N/C 10MA 5V dc	AK3	\$220

Replacement Parts (Discount Schedule JC80)

Description	Catalog #	Price
Interrupter Phase Assembly	A77-457211A	\$520
Coil 110/120V 50/60 HZ	A77-460915A-1	\$248
Coil 220/240V 50/60 HZ	A77-460915A-2	\$248
Coil 380/415V 50/60 HZ	A77-460915A-3	\$248
Coil 440/480V 50/60 HZ	A77-460915A-4	\$248
Coil 125V DC	A77-460915A-5	\$248
Coil 250V DC	A77-460915A-6	\$248
Control PAK 110/120 50/60 HZ	A77-460916A-1	\$258
Control PAK 220/240 50/60 HZ	A77-460916A-2	\$258
Control PAK 380-415V 50/60 HZ 440-480V 50/60 HZ	A77-460916A-3	\$258
Aux. Contact Kit 2N/O 1N/C +1 N/C Late Break	AK Std.	\$ 92

Plug Stop Jogging Duty

Nema Size	200V	230V	400V	460V	575V
4	25HP	30HP	50HP	60HP	-
V200	40HP	60HP	75HP	100HP	125HP

Ordering Information

* Coil Table

- Use complete catalog number when ordering.
Replace the (*) with the suffix from the coil table.

- Engineering Data page A7.
- Renewal Parts page A3.

Voltage	Suffix
120 AC	76
240 AC	26
380 AC	38
450 AC	46
125V DC	125
250V DC	250

AC Reversing Vacuum Contactors Wired

USAVAC - Low Voltage

- UL listed to 1500V
- CSA Certified to 1500V
- CE

- Three Ratings
- One Small Size
- CV Series Nema Size 4 & V200
- IEC 200A

3 Pole Nema Rated ICS-2 UL508 CSA 22.2 Size 4 Mechanically Interlocked Pair Unwired 600V

135A Contactor

Rating Nema Size 4	Maximum Horsepower/KW Rating 3 Phase HP/KW				Open Type	Discount Schedule JC11
600V	200V	230V	460V	575V	Catalog #	Price
HP/KW	40/30	50/37	100/75	100/75	CV31U030406*-	\$3931

3 Pole IEC947-4-1 UL508 CSA 22.2 Mechanically Interlocked Pair Unwired 660V

200A

Rating 200A	Maximum Horsepower/KW Rating 3 Phase					Open Type	Discount Schedule JC11
1000V	200/208V	220/240V	380/415V	460V	575/660V	Catalog #	Price
HP/KW	50/37	75/59	100/75	150/110	200/150	CV31U032006*-	\$4355

3 Pole Nema Rated ICS-29 IEC947.4.1 (1000V) UL508 1500V CSA 22.2 Mechanically Interlocked Pair Unwired 1500V

200A Contactor

Rating 200A Nema V200	Maximum Horsepower/KW Rating 3 Phase							Open Type	Discount Schedule JC11
1500V	200/208V	220/240V	380/415V	460V	575/660V	1000V	1500V	Catalog #	Price
HP/KW	50/37	80/59	100/75	150/110	200/150	300/225	500/370	CV31U031615*-	\$4538

Options Discount (Schedule JC11)

Description	Catalog #	Price
Lug Kit #6 to 250mcm 3 Per Kit	KVC4-2	\$82
Aux. Contact Kit 2N/O 2N/C 10A 600V ac	AK1	\$73
Aux. Contact Kit 2N/O 2N/C 10MA 5V dc	AK3	\$220

Replacement Parts (Discount Schedule JC80)

Description	Catalog #	Price
Interrupter Phase Assembly	A77-457211A	\$520
Coil 110/120V 50/60 HZ	A77-460915A-1	\$248
Coil 220/240V 50/60 HZ	A77-460915A-2	\$248
Coil 380/415V 50/60 HZ	A77-460915A-3	\$248
Coil 440/480V 50/60 HZ	A77-460915A-4	\$248
Coil 125V DC	A77-460915A-5	\$248
Coil 250V DC	A77-460915A-6	\$248
Control PAK 110/120 50/60 HZ	A77-460916A-1	\$258
Control PAK 220/240 50/60 HZ	A77-460916A-2	\$258
Control PAK 380-415V 50/60 HZ 440-480V 50/60 HZ	A77-460916A-3	\$258
Aux. Contact Kit 2N/O 1N/C +1 N/C Late Break	AK Std.	\$ 92

Plug Stop Jogging Duty

Nema Size	200V	230V	400V	460V	575V
4	25HP	30HP	50HP	60HP	-
V200	40HP	60HP	75HP	100HP	125HP

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.

- Engineering Data page A7.
- Renewal Parts page A4.

* Coil Table

Voltage	Suffix
120 AC	76
240 AC	26
380 AC	38
460 AC	46
125V DC	125
250V DC	250

- UL listed to 1500V
- CSA Certified to 1500V
- CE



- Three Ratings
- One Small Size

CV Series
NEMA Size 4 V200A
IEC 200A

A

600V NEMA Size 4 135A

600Volt Nema Size 4 135A Starter 3 Pole Nema ICS-2 UL508 CSA 22.2

Rating Nema Size 4	Maximum Horsepower/KW Rating 3 Phase HP/KW				Open Type	Discount Schedule JC11
600V	200V	230V	460V	575V	Catalog #	Price
HP/KW	40/30	50/37	100/75	100/75	CV13U030406-*	\$1674.00

660Volt 200AMP Starter 3 Pole IEC 947-4-1 UL508 CSA 22.2

Rating 200A	Maximum Horsepower/KW Rating 3 Phase HP/KW								Open Type	Discount Schedule JC11
660V	200/208V	220/240V	380/400V	415/440V	460V	500V	575/600V	660-690V	Catalog #	Price
HP/KW	50/37	75/59	100/75	125/95	150/110	190/140	200/150	250/185	CV13U032006-*	\$2288.00

1500Volt 200 AMP Starter 3 Pole IEC 947-4-1 (1000V) UL508 (1500V) CSA 22.2 (1500V)

Rating 200A Nema V200	Maximum Horsepower/KW Rating 3 Phase HP/KW							Open Type	Discount Schedule JC11
1500V	200/208V	220/240V	400V	460V	575/600V	1000V	1500V	Catalog #	Price
HP/KW	50/37	75/59	125/95	150/110	175/130	300/225	500/370	CV13U031615-*	\$2654.00

Options Discount (Schedule JC11) Field Kits

Description	Catalog #	Price
Lug Kit #6 to 250mcm 3 Per Kit	KVC4-2	\$82
Aux. Contact Kit 2N/O 2N/C 10A 600VAC	AK1	\$73
Aux. Contact Kit 2N/O 2N/C 10MA 5VDC	AK3	\$220

Replacement Parts (Discount Schedule JC80)

Description	Catalog #	Price
Interrupter Phase Assembly	A77-457211A	\$520
Coil 110/120V 50/60 HZ	A77-460915A-1	\$248
Coil 220/240V 50/60 HZ	A77-460915A-2	\$248
Coil 380/415V 50/60 HZ	A77-460915A-3	\$248
Coil 440/480V 50/60 HZ	A77-460915A-4	\$248
Coil 125V DC	A77-460915A-5	\$248
Coil 250V DC	A77-460915A-6	\$248
Control PAK 110/120 50/60 HZ	A77-460916A-1	\$258
Control PAK 220/240 50/60 HZ	A77-460916A-2	\$258
Control PAK 380-415V 50/60 HZ	A77-460916A-3	\$258
440-480V 50/60 HZ		
Aux. Contact Kit 2N/O 1N/C +1 N/C Late Break	AK Std.	\$ 92

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.
- Order Heaters at \$18.00 each from page A35.

- Engineering Data page A7.
- Renewal Parts page A5.

* Coil Table

Voltage	Suffix
120 AC	76
240 AC	26
380 AC	38
460 AC	46
125V DC	125
250V DC	250

- UL listed to 1500V
- CSA Certified to 1500V
- CE

- Three Ratings
- One Small Size
- CV Series Nema Size 4 & V200
- IEC 200A

CV Series
NEMA Size 4
IEC 200A

3 Pole Nema Rated ICS-2 UL508 CSA 22.2 Size 4 Mechanically Interlocked Pair Unwired 600V

135A Contactor

Rating Nema Size 4	Maximum Horsepower/KW Rating 3 Phase HP/KW					Open Type	Discount Schedule JC11
600V	200V	230V	460V	575V		Catalog #	Price
HP/KW	40/30	50/37	100/75	100/75		CV30U030406-*	\$4381

3 Pole IEC947-4-1 UL508 CSA 22.2 Mechanically Interlocked Pair Unwired 660V

200A

Rating 200A	Maximum Horsepower/KW Rating 3 Phase					Open Type	Discount Schedule JC11
1000V	200/208V	220/240V	380/415V	460V	575/660V	Catalog #	Price
HP/KW	50/37	75/59	100/75	150/110	200/150	CV30U032006-*	\$4805

3 Pole Nema Rated ICS-29 IEC947.4.1 (1000V) UL508 1500V CSA 22.2 Mechanically Interlocked Pair Unwired 1500V

200A Contactor

Rating 200A Nema V200	Maximum Horsepower/KW Rating 3 Phase							Open Type	Discount Schedule JC11
1500V	200/208V	220/240V	380/415V	460V	575/660V	1000V	1500V	Catalog #	Price
HP/KW	50/37	80/59	100/75	150/110	200/150	300/225	500/370	CV30U031615-*	\$4988

Options Discount (Schedule JC11)

Description	Catalog #	Price
Lug Kit #6 to 250mcm 3 Per Kit	KVC4-2	\$82
Aux. Contact Kit 2N/O 2N/C 10A 600V ac	AK1	\$73
Aux. Contact Kit 2N/O 2N/C 10MA 5V dc	AK3	\$220

Replacement Parts (Discount Schedule JC80)

Description	Catalog #	Price
Interrupter Phase Assembly	A77-457211A	\$520
Coil 110/120V 50/60 HZ	A77-460915A-1	\$248
Coil 220/240V 50/60 HZ	A77-460915A-2	\$248
Coil 380/415V 50/60 HZ	A77-460915A-3	\$248
Coil 440/480V 50/60 HZ	A77-460915A-4	\$248
Coil 125V DC	A77-460915A-5	\$248
Coil 250V DC	A77-460915A-6	\$248
Control PAK 110/120 50/60 HZ	A77-460916A-1	\$258
Control PAK 220/240 50/60 HZ	A77-460916A-2	\$258
Control PAK 380-415V 50/60 HZ 440-480V 50/60 HZ	A77-460916A-3	\$258
Aux. Contact Kit 2N/O 1N/C +1 N/C Late Break	AK Std.	\$ 92

Plug Stop Jogging Duty

Nema Size	200V	230V	400V	460V	575V
4	25HP	30HP	50HP	60HP	-
V200	40HP	60HP	75HP	100HP	125HP

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.
- Order Heaters at \$18.00 each from page A35.

- Engineering Data page A7.
- Renewal Parts page A6.

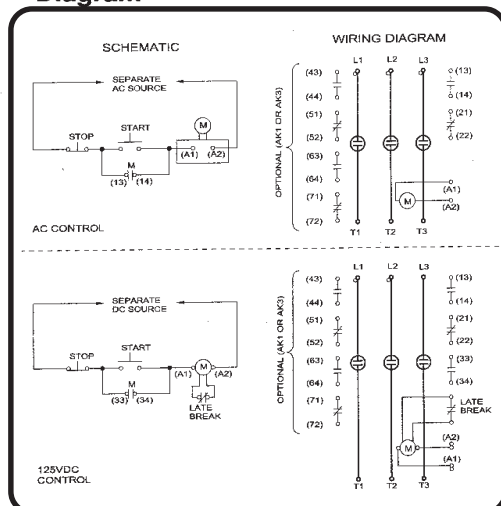
* Coil Table

Voltage	Suffix
120 AC	76
240 AC	26
380 AC	38
450 AC	46
125V DC	125
250V DC	250

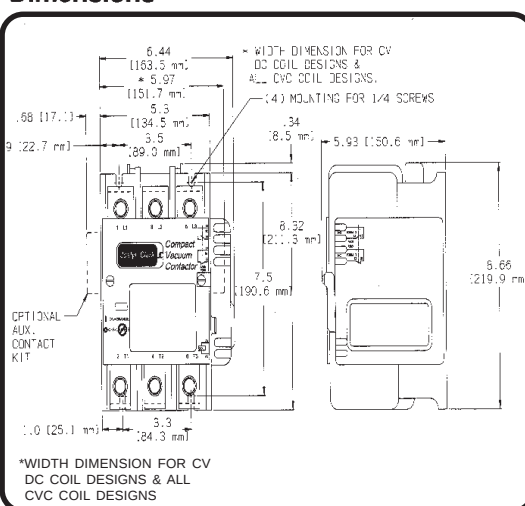
Technical Specifications CV Series

Description Cat #	NEMA Size 4 600V CV 77U030406-*	200 Amp 1000V CV 77U032006-*	200 Amp 1500V CV 77U031615-*
Standard	NEMA 1CS-2 UL508 CSA22.2	IEC 947-4-1 UL508 CSA22.2	NEMA 1CS9-2 1500V IEC 947-4-1 1000V UL508 CSA22.2 1500V
Power Ratings			
Insul. & Operating Volt	600 Volts	1000 Volts	1500 Volts
Rated Oper. AC1	150 Amps	200 Amps	200 Amps
Rated Oper. AC3	100 HP 460/575V	250 HP 185KW-660V	500 HP 370KW-1500V
Rated Oper. AC4	60 HP 460/575V	175HP-130KW-660V	315HP-235KW-1500V
Rated Frequency	50 - 400 Hz		
Making Current	2000 Amps		
Breaking Current	1600 Amps		
Dielectric Strength	6Kv - 1 Min.		
Interrupting Current	2.2 KA		
Short Time Current 1 Sec.	5000 A		
Short Time Current 10 Sec	1600 A		
Mechanical Life	1.2 X 10 ⁶		
Elect. Life AC3 Duty	1 X 10 ⁶		
Switching Frequency	600 / Hour (1 Every 6 Sec)		
Withstand Current	10KA50Msec		
Chop Current Max	0.9 A		
Operating Range	-15% + 10% - at Range Voltage		
Inrush Power VA	1200VA 20 ms Duration		
Holding Power VA	12 VA		
Opening Time MS	120ms		
Closing Time MS	20-40ms		
Pick-Up Voltage	80% Cold 85% Hot or less		
Drop-Out Voltage	70% or less		
Recommended CPT	400VA Machine Tool Transformer 5% Regulation at 20%pf		
Applications Ratings			
Mounting Installation	All Planes (Contactor only)		
Altitude	6600 ft. 2000 Meters		
Ambient Storage	-65°F (-54°C) +160°F (71°C)		
Operating	-40°F (-40°C) +105°F (41°C)		
Vibration / Shock	40Hz - 2G. / 30G.		
Weight	13 lbs. 5.9Kg.		

Diagram



Dimensions



For 250V dc contact 21/22 is
Late Break N/C in series with 'm' late break

	Motor HP/KW AC3	
Voltage	150A	200A
208	40/30	50/37
220/240	50/37	75/59
380/400	----	100/75
415/440	----	125/93
460	100/75	150/110
500	----	190/140
575/600	100/75	200/150
660/690	----	250/185
1000	----	300/225
1500	----	500/370
Three Phase Transformer Load KVA		
Voltage	150A	200A
208	54	72
220/240	57	55
380/400	99	135
415/440	108	152
460/500	119	173
575/600	130	207
660	171	225
1000	260	346
1500	390	519
Three Phase Capacitor Load KVAR		
Voltage	150A	200A
208	40	54
220/240	43	62
380/400	74	104
415/440	81	114
460	90	127
575/600	115	156
1000	195	260
1500	292	390

Options

• Lug Kit 2/0 250mcm	Cat.# KVC4-2
Auxiliary Contact Kits	
• 2NO. 2NC 600V. 10A ac.	Cat.# AK1
• 2NO. 2NC 5V/10mA dc.	Cat.# AK3
Only 1 Kit can be added for total of 3 N/O 3 N/C contacts	

Coils

Description	HZ.	Cat. Suffix
110/120V	50/60Hz.	-76
220/240V	50/60Hz.	-26
380/415V	50/60Hz.	-38
440/480V	50/60Hz.	-46
125V dc		-125
250V dc		-250

- UL listed to 1500V
- CSA Certified to 1500V
- CE



600V NEMA Size 5 270A

- Three Ratings
- One Small Size



1000V 400A

CV Series
NEMA Size 5
IEC 400A

600Volt Nema Size 5 270A Contactor 3 Pole Nema ICS-2 UL508 CSA 22.2

Rating Nema Size 5	Maximum Horsepower/KW Rating 3 Phase HP/KW					Open Type	Discount Schedule JC11
600V	200V	230V	460V	575V		Catalog #	Price
HP/KW	75/56	100/75	200/150	200/150		CV77U030506-*	\$1940.00

1000Volt 400AMP Contactor 3 Pole IEC 947-4-1 UL508 CSA 22.2

Rating 400A	Maximum Horsepower/KW Rating 3 Phase HP/KW						Open Type	Discount Schedule JC11
1000V	200/208V	220/240V	380/415V	460V	575/600V	660-690V	Catalog #	Price
HP/KW	100/75	150/112	250/187	300/220	400/300	450/336	CV77U034A06-*	\$2122.00

1500V 400AMP Contactor 3 Pole IEC 947-4-1 (1000V) UL508 (1500V) CSA 22.2 (1500V)

Rating 400A	Maximum Horsepower/KW Rating 3 Phase HP/KW								Open Type	Discount Schedule JC11
1500V	200/208V	220/240V	415/440V	460V	575/600V	660-690V	1000V	1500V	Catalog #	Price
HP/KW	100/75	150/112	250/187	300/220	400/300	500/370	700/520	850/650	CV77U034A15-*	\$2242.00
Nema V320	100/70	125/95	200/150	300/220	300/220	-	500/370	900/670	CV77U033A15-*	\$2242.00

Options (Discount Schedule JC11) Field Kits

Description	Catalog #	Price
Lug Kit 3 Per Kit #4-500 mcm	KVC5-1	\$ 90
Lug Kit 3 Per Kit (2) #6-300 mcm	KVC5-2	\$100
Aux Contact Kit 2N/O 2N/C 10A 600VAC	AK1	\$73
Aux. Contact Kit 2N/O 2N/C 10MA 5VDC	AK3	\$220

Replacement Parts (Discount Schedule JC80)

Description	Catalog #	Price
Interrupter Phase Assembly	A460880A-1	\$650
Coil 110/120V 50/60 HZ	A77-460930A-1	\$284
Coil 220/240V 50/60 HZ	A77-460930A-2	\$284
Coil 380/415V 50/60 HZ	A77-460930A-3	\$284
Coil 440/480V 50/60 HZ	A77-460930A-4	\$284
Coil 125V DC	A77-460930A-5	\$284
Coil 250V DC	A77-460930A-6	\$284
Control PAK 110/120 50/60 HZ	A77-460916A-4	\$258
Control PAK 220/240 50/60 HZ	A77-460916A-5	\$258
Control PAK 380-415V 50/60 HZ 440-480V 50/60 HZ	A77-460916A-6	\$258
Aux. Contact Kit 2N/O 1N/C +1 N/C Late Break	AK Std.	\$ 92

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.
- Engineering Data page A13.
- Renewal Parts page A8.

* Coil Table

Voltage	Suffix
120 AC	76
240 AC	26
380 AC	38
460 AC	46
125V DC	125
250V DC	250

AC Mechanically Interlocked Vacuum Contactors Unwired

USAVAC - Low Voltage

- UL listed to 1500V
- CSA Certified to 1500V
- CE
- NEMA Size 5 & V320
- IEC 400A

- Three Ratings
- One Small Size
- Use for Reversers, Reduced Voltage Auto Transformer Starters, Wye-Delta, 2 speed single winding, starter applications

A

600Volt Nema Size 5 270A Mechanically Interlocked Pair Unwired 3 Pole Nema ICS-2 UL508 CSA 22.2

Rating Nema Size 5	Maximum Horsepower/KW Rating 3 Phase HP/KW				Open Type	Discount Schedule JC11
600V	200V	230V	460V	575V	Catalog #	Price
HP/KW	75/56	100/75	200/150	200/150	CV31U030506-*43	\$5984.00

1000Volt 400AMP Mechanically Interlocked Pair Unwired 3 Pole IEC 947-4-1 UL508 CSA 22.2

Rating 400A	Maximum Horsepower/KW Rating 3 Phase HP/KW						Open Type	Discount Schedule JC11
1000V	200/208V	220/240V	380/415V	460V	575/600V	660-690V	Catalog #	Price
HP/KW	100/75	150/112	250/187	300/220	400/300	450/336	CV31U034A06-*43	\$6606.00

1500V 400AMP Mechanically Interlocked Pair Unwired 3 Pole IEC 947-4-1 (1000V) UL508 (1500V) CSA 22.2 (1500V)

Rating 400A	Maximum Horsepower/KW Rating 3 Phase HP/KW								Open Type	Discount Schedule JC11
1500V	200/208V	220/240V	415/440V	460V	575/600V	660-690V	1000V	1500V	Catalog #	Price
HP/KW	100/75	150/112	250/187	300/220	400/300	500/370	700/520	850/650	CV31U034A15-*43	\$6972.00
Nema V320	100/70	125/95	200/150	300/220	300/220	-	500/370	900/670	CV31U03A15-*43	\$6972.00

Options (Discount Schedule JC11) Field Kits

Description	Catalog #	Price
Lug Kit 3 Per Kit #4-500 mcm	KVC5-1	\$ 90
Lug Kit 3 Per Kit (2) #6-300 mcm	KVC5-2	\$100
Aux Contact Kit 2N/O 2N/C 10A 600VAC	AK1	\$73
Aux. Contact Kit 2N/O 2N/C 10MA 5VDC	AK3	\$220

Plug Stop Jogging Duty

Nema Size	200V	230V	400V	460V	575V
5	50HP	60HP	100HP	120HP	-
V320	75HP	100HP	150HP	175HP	200HP

Replacement Parts (Discount Schedule JC80)

Description	Catalog #	Price
Interrupter Phase Assembly	A460880A-1	\$650
Coil 110/120V 50/60 HZ	A77-460930A-1	\$284
Coil 220/240V 50/60 HZ	A77-460930A-2	\$284
Coil 380/415V 50/60 HZ	A77-460930A-3	\$284
Coil 440/480V 50/60 HZ	A77-460930A-4	\$284
Coil 125V DC	A77-460930A-5	\$284
Coil 250V DC	A77-460930A-6	\$284
Control PAK 110/120 50/60 HZ	A77-460916A-4	\$258
Control PAK 220/240 50/60 HZ	A77-460916A-5	\$258
Control PAK 380-415V 50/60 HZ 440-480V 50/60 HZ	A77-460916A-6	\$258
Aux. Contact Kit 2N/O 1N/C +1 N/C Late Break	AK Std.	\$ 92

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.
- Engineering Data page A13.
- Renewal Parts page A9.

* Coil Table

Voltage	Suffix
120 AC	76
240 AC	26
380 AC	38
460 AC	46
125V DC	125
250V DC	250

AC Mechanically Interlocked Vacuum Contactors Wired

USAVAC - Low Voltage

- CE
- NEMA Size 5 & V320
- IEC 400A

- Three Ratings
- One Small Size
- Use for Reversers, Reduced Voltage Auto Transformer Starters, Wye-Delta, 2 speed single winding, starter applications

600Volt Nema Size 5 270A Contactor Mechanically Interlocked Pair Wired 3 Pole Nema ICS-2 UL508 CSA 22.2

Rating Nema Size 5	Maximum Horsepower/KW Rating 3 Phase HP/KW					Open Type	Discount Schedule JC11
600V	200V	230V	460V	575V		Catalog #	Price
HP/KW	75/56	100/75	200/150	200/150		CV31U030506-*	\$6719.00

1000Volt 400AMP Contactor Mechanically Interlocked Pair Wired 3 Pole IEC 947-4-1 UL508 CSA 22.2

Rating 400A	Maximum Horsepower/KW Rating 3 Phase HP/KW						Open Type	Discount Schedule JC11
1000V	200/208V	220/240V	380/415V	460V	575/600V	660-690V	Catalog #	Price
HP/KW	100/75	150/112	250/187	300/220	400/300	450/336	CV31U034A06-*	\$7283.00

1500V 400AMP Contactor Mechanically Interlocked Pair Wired 3 Pole IEC 947-4-1 (1000V) UL508 (1500V) CSA 22.2 (1500V)

Rating 400A	Maximum Horsepower/KW Rating 3 Phase HP/KW								Open Type	Discount Schedule JC11
1500V	200/208V	220/240V	415/440V	460V	575/600V	660-690V	1000V	1500V	Catalog #	Price
HP/KW	100/75	150/112	250/187	300/220	400/300	500/370	700/520	850/650	CV31U034A15-*	\$7540.00
Nema V320	100/70	125/95	200/150	300/220	300/220	-	500/370	900/670	CV31U033A15-*	\$7540.00

Options (Discount Schedule JC11) Field Kits

Description	Catalog #	Price
Lug Kit 3 Per Kit #4-500 mcm	KVC5-1	\$ 90
Lug Kit 3 Per Kit (2) #6-300 mcm	KVC5-2	\$100
Aux Contact Kit 2N/O 2N/C 10A 600VAC	AK1	\$73
Aux. Contact Kit 2N/O 2N/C 10MA 5VDC	AK3	\$220

Plug Stop Jogging Duty

Nema Size	200V	230V	400V	460V	575V
5	50HP	60HP	100HP	120HP	-
V320	75HP	100HP	150HP	175HP	200HP

Replacement Parts (Discount Schedule JC80)

Description	Catalog #	Price
Interrupter Phase Assembly	A460880A-1	\$650
Coil 110/120V 50/60 HZ	A77-460930A-1	\$284
Coil 220/240V 50/60 HZ	A77-460930A-2	\$284
Coil 380/415V 50/60 HZ	A77-460930A-3	\$284
Coil 440/480V 50/60 HZ	A77-460930A-4	\$284
Coil 125V DC	A77-460930A-5	\$284
Coil 250V DC	A77-460930A-6	\$284
Control PAK 110/120 50/60 HZ	A77-460916A-4	\$258
Control PAK 220/240 50/60 HZ	A77-460916A-5	\$258
Control PAK 380-415V 50/60 HZ 440-480V 50/60 HZ	A77-460916A-6	\$258
Aux. Contact Kit 2N/O 1N/C +1 N/C Late Break	AK Std.	\$ 92

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.
- Engineering Data page A13.
- Renewal Parts page A10.

* Coil Table

Voltage	Suffix
120 AC	76
240 AC	26
380 AC	38
460 AC	46
125V DC	125
250V DC	250

USAVAC - Low Voltage

AC Vacuum Starters

- UL listed to 1500V
- CSA Certified to 1500V
- CE



- Three Ratings
- One Small Size

CVC Series
NEMA Size 5 V320
IEC 400A

A

600V NEMA Size 5 270A

600Volt Nema Size 5 270A Contactor 3 Pole Nema ICS-2 UL508 CSA 22.2

Rating Nema Size 5	Maximum Horsepower/KW Rating 3 Phase HP/KW				Open Type	Discount Schedule JC11
600V	200/208V	230V	460V	575V	Catalog #	Price
HP/KW	75/56	100/75	200/150	200/150	CV13U030506-*	\$2699

1000Volt 400AMP Contactor 3 Pole IEC 947-4-1 UL508 CSA 22.2

Rating 400A	Maximum Horsepower/KW Rating 3 Phase HP/KW						Open Type	Discount Schedule JC11
1000V	200/208V	220/240V	400V	460V	575/600V	660-690V	Catalog #	Price
HP/KW	100/75	150/112	250/187	300/220	400/300	450/336	CV13U034A06-*	\$2882

1500V 400AMP Contactor 3 Pole IEC 947-4-1 (1000V) UL508 (1500V) CSA 22.2 (1500V)

Rating 400A	Maximum Horsepower/KW Rating 3 Phase HP/KW								Open Type	Discount Schedule JC11
1500V	200/208V	220/240V	380/415V	460V	575/600V	660-690V	1000V	1500V	Catalog #	Price
HP/KW	100/75	150/112	250/187	300/220	400/300	500/370	700/520	850/650	CV13U034A15-*	\$3202
Nema V320	100/75	150/112	250/187	300/220	300/220	-	500/370	900/670	CV13U033A15-*	\$3202

Replacement Parts (Discount Schedule JC80)

Options (Discount Schedule JC11) Field Kits

Description	Catalog #	Price
Lug Kit 3 Per Kit #4-500 mcm	KVC5-1	\$ 90
Lug Kit 3 Per Kit (2) #6-300 mcm	KVC5-2	\$100
Aux Contact Kit 2N/O 2N/C 10A 600VAC	AK1	\$73
Aux. Contact Kit 2N/O 2N/C 10MA 5VDC	AK3	\$220

Description	Catalog #	Price
Interrupter Phase Assembly	A460880A-1	\$650
Coil 110/120V 50/60 HZ	A77-460930A-1	\$284
Coil 220/240V 50/60 HZ	A77-460930A-2	\$284
Coil 380/415V 50/60 HZ	A77-460930A-3	\$284
Coil 440/480V 50/60 HZ	A77-460930A-4	\$284
Coil 125V DC	A77-460930A-5	\$284
Coil 250V DC	A77-460930A-6	\$284
Control PAK 110/120 50/60 HZ	A77-460916A-4	\$258
Control PAK 220/240 50/60 HZ	A77-460916A-5	\$258
Control PAK 380-415V 50/60 HZ 440-480V 50/60 HZ	A77-460916A-6	\$258
Aux. Contact Kit 2N/O 1N/C +1 N/C Late Break	AK Std.	\$ 92

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.
- Order Heaters at \$18.00 each from page 35.
- Engineering Data page A13.
- Renewal Parts page A11.

* Coil Table

Voltage	Suffix
120 AC	76
240 AC	26
380 AC	38
460 AC	46
125V DC	125
250V DC	250

- NEMA Size 5 & V 320
- IEC 400A

- Three Ratings
- One Small Size
- Use for Reversers, Reduced Voltage Auto Transformer Starters, Wye-Delta, 2 speed single winding, starter applications

3 Pole Nema ICS-2 UL508 CSA 22.2 Size 5 Reversing Starter 600V 270 AMP

Rating Nema Size 5	Maximum Horsepower/KW Rating 3 Phase HP/KW					Open Type	Discount Schedule JC11
600V	200V	230V	460V	575V		Catalog #	Price
HP/KW	75/56	100/75	200/150	200/150		CV30U030506-*	\$7269

3 Pole IEC 947-4-4 UL508 CSA 22.2 Reversing Starter 660V 400 AMP

Rating 400A	Maximum Horsepower/KW Rating 3 Phase HP/KW						Open Type	Discount Schedule JC11
1000V	200/208V	220/240V	380/415V	460V	575/600V	660-690V	Catalog #	Price
HP/KW	100/75	150/112	250/187	300/220	400/300	450/336	CV30U034A06-*	\$7833

3 Pole IEC 947-4-1 (1000V) UL508 (1500V) CSA 22.2 (1500V) 400A

Rating 400A Nema V320	Maximum Horsepower/KW Rating 3 Phase HP/KW								Open Type	Discount Schedule JC11
1500V	200/208V	220/240V	415/440V	460V	575/600V	660-690V	1000V	1500V	Catalog #	Price
HP/KW	100/75	150/112	250/187	300/220	400/300	500/370	700/520	850/650	CV30U034A15-*	\$8090
Nema V320	100/70	125/95	200/150	300/220	300/220	-	500/370	900/670	CV30U033A15-*	\$8090

Options (Discount Schedule JC11) Field Kits

Description	Catalog #	Price
Lug Kit 3 Per Kit #4-500 mcm	KVC5-1	\$ 90
Lug Kit 3 Per Kit (2) #6-300 mcm	KVC5-2	\$100
Aux Contact Kit 2N/O 2N/C 10A 600VAC	AK1	\$73
Aux. Contact Kit 2N/O 2N/C 10MA 5VDC	AK3	\$220

Plug Stop Jogging Duty

Nema Size	200V	230V	400V	460V	575V
5	50HP	60HP	100HP	120HP	-
V320	75HP	100HP	150HP	175HP	200HP

Replacement Parts (Discount Schedule JC80)

Description	Catalog #	Price
Interrupter Phase Assembly	A460880A-1	\$650
Coil 110/120V 50/60 HZ	A77-460930A-1	\$284
Coil 220/240V 50/60 HZ	A77-460930A-2	\$284
Coil 380/415V 50/60 HZ	A77-460930A-3	\$284
Coil 440/480V 50/60 HZ	A77-460930A-4	\$284
Coil 125V DC	A77-460930A-5	\$284
Coil 250V DC	A77-460930A-6	\$284
Control PAK 110/120 50/60 HZ	A77-460916A-4	\$258
Control PAK 220/240 50/60 HZ	A77-460916A-5	\$258
Control PAK 380-415V 50/60 HZ 440-480V 50/60 HZ	A77-460916A-6	\$258
Aux. Contact Kit 2N/O 1N/C +1 N/C Late Break	AK Std.	\$ 92

Ordering Information

- Use complete catalog number when ordering.
- Replace the (*) with the suffix from the coil table.
- Order Heaters at \$18.00 each from page A35
- Engineering Data page A13.
- Renewal Parts page A12.

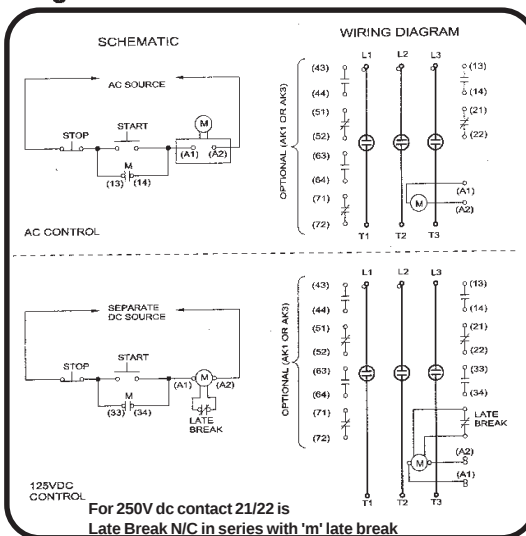
* Coil Table

Voltage	Suffix
120 AC	76
240 AC	26
380 AC	38
460 AC	46
125V DC	125
250V DC	250

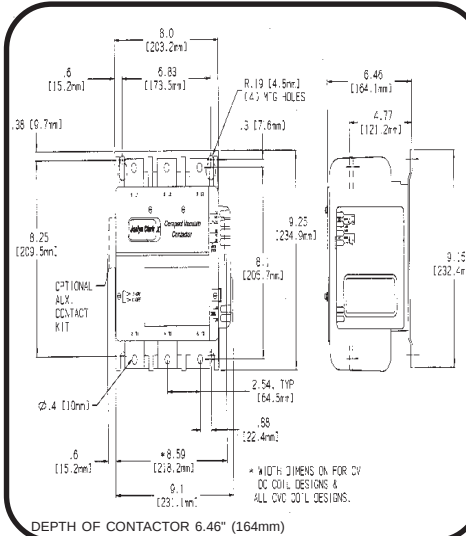
Technical Specifications CV Series

Description	NEMA Size 5 600V	400 Amp 1000V	400 Amp 1500V
Cat #	CV77U030506-*	CV77U034A06-*	CV77U034A15-*
Standard	NEMA ICS-2 UL508 CSA22.2	IEC 947-4-1 1000V UL508 CSA22.2	IEC 947-4-1 1000V NEMA ICS-2.9 1500V UL508 CSA22.2 1500V
Power Ratings			
Insul. & Operating Volt	600 Volts	1000 Volts	1500 Volts
Rated Oper. AC1	270 Amps	400 Amps	400 Amps
Rated Oper. AC3	200 HP 460/575V	500 HP-370KW-660V	850 HP-650KW-1500V
Rated Oper. AC4	120 HP 460/575V	300 HP-260KW-660V	650 HP-570KW-1500V
Rated Frequency	50 - 400 Hz		
Making Current	4000 Amps		
Breaking Current	3200 Amps		
Dielectric Strength	6Kv - 1 Min. Interruptor Gap		
Interrupting Current	4.6 KA		
Short Time Current1 Sec.	7000 A		
Short Time Current 10 Sec.	3200 A		
Mechanical Life	1.2 X 10 ⁶		
Elect. Life AC3 Duty	1 X 10 ⁶		
Switching Frequency	v600/ Hour 1 Every 6 Sec		
Withstand Current	18KA 50 MS		
Chop Current Max	0.9 A		
Operating Range	-15% + 10% - over Range Voltage		
Inrush Power VA	1100VA 120 ms Duration		
Holding Power VA	10-12 VA		
Opening Time MS	160ms		
Closing Time MS	20-40ms		
Pick-Up Voltage	80% Cold 85% Hot or less		
Drop-Out Voltage	70% or less		
Recommended CPT	400VA Machine Tool Transformer 5% Regulation at 20%pf		
Applications Ratings			
Mounting Installation	All Planes Contactor Only		
Altitude	6600 ft. 2000 Meters		
Ambient Storage	-65°F (-54°C) +160°F (71°C)		
Operating	-40°F (-40°C) +105°F (41°C)		
Vibration / Shock	40Hz - 2G. / 30G.		
Weight	26 lbs. 11.8 Kg.		

Diagram



Dimensions



Power Rating

	Motor HP/KW AC3	
Voltage	270A	400A
208	75/56	100/75
220/240	100/75	150/112
380/415	----	250/187
460	200/150	300/220
575/600	200/150	400/300
660/690	----	450/336
1000	----	700/520
1500	----	850/650
Three Phase Transformer Load KVA		
Voltage	270A	400A
208	108	144
220/240	114	110
380/400	198	270
415/440	216	304
460/500	238	346
575/600	260	414
660	342	450
1000	520	692
1500	780	1038
Three Phase Capacitor Load KVAR		
Voltage	270A	400A
208	80	108
220/240	86	124
380/400	148	208
415/440	162	228
460	180	254
575/600	230	312
1000	390	520
1500	584	780

Options

• Lug Kit 2#6-300mcm	Cat.# KVC5-2
Auxiliary Contact Kits	
• 2NO.2 NC 600V.10A ac.	Cat.# AK1
• 2NO.2 NC 5V.10mA dc.	Cat.# AK3
Only 1 Kit can be added for total of 3 N/O 3 N/C contacts	

Coils

Description	HZ.	Cat. Suffix
110/120V	50/60Hz.	-76
220/240V	50/60Hz.	-26
380/415	50/60Hz.	-38
440/480	50/60Hz.	-46
125 DC		-125
250DC		-250

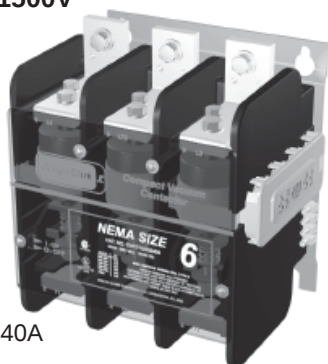
AC Vacuum Contactors

USAVAC - Low Voltage

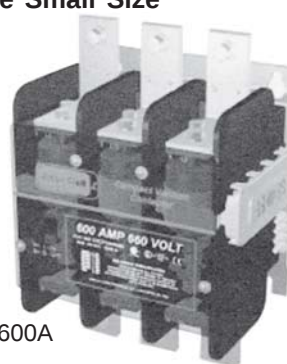
- UL listed to 1500V
- CSA Certified to 1500V
- CE

- Three Ratings
- One Small Size

CVC Series
NEMA Size 6
NEMA V600
IEC 600A



600V NEMA Size 6 540A



1000V 600A

600Volt Nema Size 6 540A Contactor 3 Pole Nema ICS-2 UL508 CSA 22.2

Rating Nema Size 6	Maximum Horsepower/KW Rating 3 Phase HP/KW				Open Type	Discount Schedule JC11
600V	200/208V	250V	460V	575V	Catalog #	Price
HP/KW	150/112	200/150	400/300	400/300	CV77U030606-*	\$3203

1000Volt 400AMP Contactor 3 Pole IEC 947-4-1 UL508 CSA 22.2

Rating 600A 1000V	Maximum Horsepower/KW Rating 3 Phase HP/KW						Open Type	Discount Schedule JC11
1000V	200/208V	220/240V	400V	460V	575/600V	660-690V	Catalog #	Price
HP/KW	200/150	200/150	250/187	400/300	600/4500	650/485	CV77U036A06-*	\$3386

1500V 400AMP Contactor 3 Pole IEC 947-4-1 (1000V) UL508 (1500V) CSA 22.2 (1500V)

Rating 600A Nema V600	Maximum Horsepower/KW Rating 3 Phase HP/KW								Open Type	Discount Schedule JC11
1500V	200/208V	220/240V	400V	460V	575/600V	660-690V	1000V	1500V	Catalog #	Price
HP/KW	250/150	200/150	250/187	400/300	600/450	650/485	1000/750	1200/900	CV77U036A15-*	\$3523
Nema V600	200/150	200/150	375/280	500/350	600/470	-	1100/820	1600/1200	CV77U036V15-*	\$3523

Options (Discount Schedule JC11) Field Kits

Description	Catalog #	Price
Wire Size (2) #2-600 mcm	KVC6-2	\$156
Aux Contact Kit 2N/O 2N/C 10A 600VAC	AK1	\$73
Aux. Contact Kit 2N/O 2N/C 10MA 5VDC	AK3	\$220

Replacement Parts (Discount Schedule JC80)

Description	Catalog #	Price
Interrupter Phase Assembly	A77460880A-2	\$851
Coil 110/120V 50/60 HZ	A77-460930A-1	\$284
Coil 220/240V 50/60 HZ	A77-460930A-2	\$284
Coil 380/415V 50/60 HZ	A77-460930A-3	\$284
Coil 440/480V 50/60 HZ	A77-460930A-4	\$284
Coil 125V DC	A77-460930A-7	\$284
Coil 250V DC	A77-460930A-8	\$284
Control PAK 110/120 50/60 HZ	A77-460916A-4	\$258
Control PAK 110/120 50/60 HZ	A77-460916A-5	\$258
Control PAK 380-415V 50/60 HZ 440-480V 50/60 HZ	A77-460916A-6	\$258
Aux. Contact Kit 2N/O 1N/C +1 N/C Late Break	AK Std.	\$ 92

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.
- Engineering Data page A19
- Renewal Parts page A14.

* Coil Table

Voltage	Suffix
120 AC	-76
240 AC	-26
380 AC	-38
460 AC	-46
125V DC	-125
250V DC	-250

- CE
- NEMA Size 6 & V600
- IEC 600A

- Three Ratings
- One Small Size
- Use for Reversing, Reduced Voltage Auto Transformer, Wye-Delta, 2 speed single winding, or 2 speed 2 winding applications

3 Pole Nema Rated ICS-2 UL508 CSA 22.2 Mechanically Interlocked Pair Unwired 600V Size 6 540 AMP

Rating Nema Size 6	Maximum Horsepower/KW Rating 3 Phase HP/KW				Open Type	Discount Schedule JC11
600V	200/208V	250V	460V	575V	Catalog #	Price
HP/KW	150/112	200/150	400/300	400/300	CV31U030606-*43	\$11968

3 Pole IEC 947-4-1 UL508 CSA 22.2 Mechanically Interlocked Pair Unwired 1000 Volt 600 AMP

Rating 600A 1000V	Maximum Horsepower/KW Rating 3 Phase HP/KW						Open Type	Discount Schedule JC11
1000V	200/208V	220/240V	400V	460V	575/600V	660-690V	Catalog #	Price
HP/KW	200/150	200/150	250/187	400/300	600/450	650/485	CV31U036A06-*43	\$13212

3 Pole IEC 947-4-1 (1000V) UL508 (1500V) CSA 22.2 (1500V) Mechanically Interlocked Pair Unwired 1.5 KV 60AMP

Rating 600A Nema V600	Maximum Horsepower/KW Rating 3 Phase HP/KW								Open Type	Discount Schedule JC11
1500V	200/208V	220/240V	400V	460V	575/600V	660-690V	1000V	1500V	Catalog #	Price
HP/KW	200/150	200/150	250/187	400/300	600/450	650/485	1000/750	1200/900	CV31U036A15-*43	\$13432
Nema V600	200/150	200/150	375/280	500/350	600/470	-	1100/820	1600/1200	CV31U036V15-*43	\$13432

Options (Discount Schedule JC11) Field Kits

Description	Catalog #	Price
Wire Size (2) #2-600 mcm	KVC6-2	\$156
Aux Contact Kit 2N/O 2N/C 10A 600VAC	AK1	\$73
Aux. Contact Kit 2N/O 2N/C 10MA 5VDC	AK3	\$220

Plug Stop Jogging Duty

Nema Size	200V	230V	400V	460V	575V
6	100HP	120HP	200HP	240HP	-
V600	150HP	150HP	300HP	375HP	450HP

Replacement Parts (Discount Schedule JC80)

Description	Catalog #	Price
Interrupter Phase Assembly	A77460880A-2	\$851
Coil 110/120V 50/60 HZ	A77-460930A-1	\$284
Coil 220/240V 50/60 HZ	A77-460930A-2	\$284
Coil 380/415V 50/60 HZ	A77-460930A-3	\$284
Coil 440/480V 50/60 HZ	A77-460930A-4	\$284
Coil 125V DC	A77-460930A-7	\$284
Coil 250V DC	A77-460930A-8	\$284
Control PAK 110/120 50/60 HZ	A77-460916A-4	\$258
Control PAK 110/120 50/60 HZ	A77-460916A-5	\$258
Control PAK 380-415V 50/60 HZ 440-480V 50/60	A77-460916A-6	\$258
Aux. Contact Kit 2N/O 1N/C +1 N/C Late Break	AK Std.	\$ 92

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.
- Engineering Data page A19
- Renewal Parts page A15.

* Coil Table

Voltage	Suffix
120 AC	-76
240 AC	-26
380 AC	-38
460 AC	-46
125V DC	-125
250V DC	-250

USAVAC - Low Voltage

AC Mechanically Interlocked Wired Vacuum Contactors

- CE
- NEMA Size 6 & V600
- IEC 600A

- Three Ratings
- One Small Size
- Use for Reversing, Reduced Voltage Auto Transformer, Wye-Delta, 2 speed single winding, or 2 speed 2 winding applications

3 Pole Nema Rated ICS-2 UL508 CSA 22.2 Mechanically Interlocked Pair Unwired 600V Size 6 540 AMP

Rating Nema Size 6	Maximum Horsepower/KW Rating 3 Phase HP/KW				Open Type	Discount Schedule JC11
600V	200/208V	250V	460V	575V	Catalog #	Price
HP/KW	150/112	200/150	400/300	400/300	CV31U030606-*	\$16052.00

3 Pole IEC 947-4-1 UL508 CSA 22.2 Mechanically Interlocked Pair Unwired 1000 Volt 600 AMP

Rating 600A V600	Maximum Horsepower/KW Rating 3 Phase HP/KW						Open Type	Discount Schedule JC11
1000V	200/208V	220/240V	400V	460V	575/600V	660-690V	Catalog #	Price
HP/KW	200/150	200/150	250/187	400/300	600/450	650/485	CV31U036A06-*	\$16562.00

3 Pole IEC 947-4-1 (1000V) UL508 (1500V) CSA 22.2 (1500V) Mechanically Interlocked Pair Unwired 1.5 KV 600AMP

Rating 600A Nema 1000V	Maximum Horsepower/KW Rating 3 Phase HP/KW								Open Type	Discount Schedule JC11
1500V	200/208V	220/240V	400V	460V	575/600V	660-690V	1000V	1500V	Catalog #	Price
HP/KW	200/150	200/150	250/187	400/300	600/450	650/485	1000/750	1200/900	CV31U036A15-*	\$17477.00
Nema V600	200/150	200/150	375/280	500/350	600/470	-	1100/820	1600/1200	CV31U036V15-*	\$17477.00

Options (Discount Schedule JC11) Field Kits

Description	Catalog #	Price
Wire Size (2) #2-600 mcm	KVC6-2	\$156
Aux Contact Kit 2N/O 2N/C 10A 600VAC	AK1	\$73
Aux. Contact Kit 2N/O 2N/C 10MA 5VDC	AK3	\$220

Plug Stop Jogging Duty

Nema Size	200V	230V	400V	460V	575V
6	100HP	120HP	200HP	240HP	-
V600	150HP	150HP	300HP	375HP	450HP

Replacement Parts (Discount Schedule JC80)

Description	Catalog #	Price
Interrupter Phase Assembly	A77460880A-2	\$851
Coil 110/120V 50/60 HZ	A77-460930A-1	\$284
Coil 220/240V 50/60 HZ	A77-460930A-2	\$284
Coil 380/415V 50/60 HZ	A77-460930A-3	\$284
Coil 440/480V 50/60 HZ	A77-460930A-4	\$284
Coil 125V DC	A77-460930A-7	\$284
Coil 250V DC	A77-460930A-8	\$284
Control PAK 110/120 50/60 HZ	A77-460916A-4	\$258
Control PAK 110/120 50/60 HZ	A77-460916A-5	\$258
Control PAK 380-415V 50/60 HZ 440-480V 50/60 HZ	A77-460916A-6	\$258
Aux. Contact Kit 2N/O 1N/C +1 N/C Late Break	AK Std.	\$ 92

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.
- Engineering Data page A19
- Renewal Parts page A16.

* Coil Table

Voltage	Suffix
120 AC	-76
240 AC	-26
380 AC	-38
460 AC	-46
125V DC	-125
250V DC	-250

- CE
- NEMA Size 6 & V 600
- IEC 600A



- Three Ratings
- One Small Size

CV Series
NEMA Size 6
IEC 600A

A

600Volt Nema Size 6 540A Starter 3 Pole Nema ICS-2 UL508 CSA 22.2

Rating Nema Size 6	Maximum Horsepower/KW Rating 3 Phase HP/KW				Open Type	Discount Schedule JC11
600V	200/208V	2500V	460V	575V	Catalog #	Price
HP/KW	150/112	200/150	400/300	400/300	CV13U030606-*	\$3898

1000Volt 400AMP Contactor 3 Pole IEC 947-4-1 UL508 CSA 22.2

Rating 600A 1000V	Maximum Horsepower/KW Rating 3 Phase HP/KW						Open Type	Discount Schedule JC11
1000V	200/208V	220/240V	400V	460V	575/600V	660-690V	Catalog #	Price
HP/KW	200/150	200/150	250/187	400/300	600/450	650/485	CV13U036A06-*	\$4081

1500 Volt 600 AMP Starter 3 Pole ICS 2-9 IEC 947-4-1 (1000V) UL508 (1500V) CSA 22.2 (1500V)

Rating 600A Nema V600	Maximum Horsepower/KW Rating 3 Phase HP/KW								Open Type	Discount Schedule JC11
1500V	200/208V	220/240V	400V	460V	575/600V	660-690V	1000V	1500V	Catalog #	Price
HP/KW	200/150	200/150	250/187	400/300	600/450	650-485	1000/750	1200/900	CV13U036A15-*	\$4483
Nema V600	200/150	200/150	375/280	500/350	600/470		1100/820	1600/1200	CV13U036V15-*	\$4483

Options (Discount Schedule JC11) Field Kits

Description	Catalog #	Price
Wire Size (2) #2-600 mcm	KVC6-2	\$156
Aux Contact Kit 2N/O 2N/C 10A 600VAC	AK1	\$73
Aux. Contact Kit 2N/O 2N/C 10MA 5VDC	AK3	\$220

Replacement Parts (Discount Schedule JC80)

Description	Catalog #	Price
Interrupter Phase Assembly	A77460880A-2	\$851
Coil 110/120V 50/60 HZ	A77-460930A-1	\$284
Coil 220/240V 50/60 HZ	A77-460930A-2	\$284
Coil 380/415V 50/60 HZ	A77-460930A-3	\$284
Coil 440/480V 50/60 HZ	A77-460930A-4	\$284
Coil 125V DC	A77-460930A-7	\$284
Coil 250V DC	A77-460930A-8	\$284
Control PAK 110/120 50/60 HZ	A77-460916A-4	\$258
Control PAK 110/120 50/60 HZ	A77-460916A-5	\$258
Control PAK 380-415V 50/60 HZ 440-480V 50/60 HZ	A77-460916A-6	\$258
Aux. Contact Kit 2N/O 1N/C +1 N/C Late Break	AK Std.	\$ 92

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.
- Order Heaters at \$18.00 each from page A35
- Engineering Data page A19.
- Renewal Parts page A17.

* Coil Table

Voltage	Suffix
120 AC	-76
240 AC	-26
380 AC	-38
460 AC	-46
125V DC	-125
250V DC	-250

- NEMA Size 6 & V600
- IEC 600A

- Three Ratings
- One Small Size
- Use on Reversers Reduced Voltage Auto Transformers, Wye-Delta & 2 speed single or double winding starter applications.

600Volt Nema Size 6 540A Starter 3 Pole Nema ICS-2 UL508 CSA 22.2

Rating Nema Size 6	Maximum Horsepower/KW Rating 3 Phase HP/KW				Open Type	Discount Schedule JC11
600V	200/208V	250V	460V	575V	Catalog #	Price
HP/KW	150/112	200/150	400/300	400/200	CV30U030606-*	\$16602

1000Volt 600A Reversing Starter 3 Pole IEC 947-4-1 UL508 CSA 22.2

Rating 600A	Maximum Horsepower/KW Rating 3 Phase HP/KW							Open Type	Discount Schedule JC11
660V	200/208V	220/240V	380/400V	415/440V	460V	575/600V	660-690V	Catalog #	Price
HP/KW	200/150	200/150	250/187	450/330	400/300	600/450	650/485	CV30U036A06-*	\$17112

1500 Volt 600 AMP Starter 3 Pole ICS 2-9 IEC 947-4-1 (1000V) UL508 (1500V) CSA 22.2 (1500V)

Rating 600A	Maximum Horsepower/KW Rating 3 Phase HP/KW								Open Type	Discount Schedule JC11
1500V	200/208V	220/240V	400V	460V	575/600V	660-690V	1000V	1500V	Catalog #	Price
HP/KW	200/150	200/150	375/280	400/300	600/450	650/485	1000/750	1200/900	CV30U036A15-*	\$18027
Nema V600	200/150	200/150	375/280	500/350	600/470	-	1100/820	1600/1200	CV30U036V15-*	\$18027

Options (Discount Schedule JC11) Field Kits

Description	Catalog #	Price
Wire Size (2) #2-600 mcm	KVC6-2	\$156
Aux Contact Kit 2N/O 2N/C 10A 600VAC	AK1	\$73
Aux. Contact Kit 2N/O 2N/C 10MA 5VDC	AK3	\$220

Plug Stop Jogging Duty

Nema Size	200V	230V	400V	460V	575V
6	100HP	120HP	200HP	240HP	-
V600	150HP	150HP	300HP	375HP	450HP

Replacement Parts (Discount Schedule JC80)

Description	Catalog #	Price
Interrupter Phase Assembly	A77460880A-2	\$851
Coil 110/120V 50/60 HZ	A77-460930A-1	\$284
Coil 220/240V 50/60 HZ	A77-460930A-2	\$284
Coil 380/415V 50/60 HZ	A77-460930A-3	\$284
Coil 440/480V 50/60 HZ	A77-460930A-4	\$284
Coil 125V DC	A77-460930A-7	\$284
Coil 250V DC	A77-460930A-8	\$284
Control PAK 110/120 50/60 HZ	A77-460916A-4	\$258
Control PAK 110/120 50/60 HZ	A77-460916A-5	\$258
Control PAK 380-415V 50/60 HZ 440-480V 50/60 HZ	A77-460916A-6	\$258
Aux. Contact Kit 2N/O 1N/C +1 N/C Late Break	AK Std.	\$ 92

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.
- Order Heaters at \$18.00 each from page A35
- Engineering Data page A19.
- Renewal Parts page A18.

* Coil Table

Voltage	Suffix
120 AC	-76
240 AC	-26
380 AC	-38
460 AC	-46
125V DC	-125
250V DC	-250

Technical Specifications CVC Series

Description	NEMA Size 6 600V	600 Amp 1000V	600 Amp 1500V
Cat #	CV 77U030606-*	CV 77U036A06-*	CVC 77U036A15-*
Standard	NEMA 1CS-2 UL508 CSA22.2	IEC 947-4-1 NEMA 1CS-2-9 UL508 CSA22.2	IEC 947-4-1 1000V NEMA 1CS-2-9 UL508 CSA22.2 1500V
Power Ratings			
Insul. & Operating Volt	600 Volts	1000 Volts	1500 Volts
Rated Oper. AC1	540 Amps	600 Amps	600 Amps
Rated Oper. AC3	400 HP 460/575V	750 HP-550KW-660V	1200 HP-900KW-1500V
Rated Oper. AC4	250 HP 460/575V	525 HP-390KW-660V	950 HP-700KW-1500V
Rated Frequency	50 - 400 Hz		
Making Current	6000 Amps		
Breaking Current	4800 Amps		
Dielectric Strength	6Kv - 1 Min. Interruptor Gap		
Interrupting Current	6 KA		
Short Time Current 1 Sec.	9000 A		
Short Time Current 10 Sec.	4800 A		
Mechanical Life	.75 X 10 ⁶		
Elect. Life AC3 Duty	.5 X 10 ⁶		
Switching Frequency	300 / Hour 1 Every 12 Sec.		
Withstand Current	30KA50MS		
Chop Current Max	0.9 A		
Operating Range	-15% + 10% - over Range Voltage		
Inrush Power VA	1600VA 120 msec Duration		
Holding Power VA	10-12.5VA		
Opening Time MS	160ms		
Closing Time MS	20-40 msec		
Pick-Up Voltage	80% Cold 85% Hot or less		
Drop-Out Voltage	70% or less		
Recommended CPT	400VA Machine Tool Transformer 5% Regulation at 20%pf		
Applications Ratings			
Mounting Installation	All Planes contactor only		
Altitude	6600 ft. 2000 Meters		
Ambient Storage	-65°F (-54°C) +160°F (71°C)		
Operating	-40°F (-40°C) +105°F (41°C)		
Vibration / Shock	40Hz - 2G. / 30G.		
Weight	28 lbs. 12.7 Kg.		

Power Rating

	Motor HP/KW AC3	
Voltage	540A	600A
208	150/112	200/150
220/240	200/150	200/150
400	----	250/187
460	400/300	500/350
575/600	400/300	600/450
660/690	----	650/485
1000	----	1000/750
1500	----	1200/900
Three Phase Transformer Load KVA		
Voltage	540A	600A
208	194	216
220/240	224	249
380/400	396	415
415/440	432	450
460/500	476	519
575/600	520	620
660	617	685
1000	1040	1384
1500	1560	2076
Three Phase Capacitor Load KVAR		
Voltage	540A	600A
208	160	173
220/240	172	200
380/400	296	332
415/440	324	366
460	360	382
575/600	460	500
1000	780	830
1500	1168	1250

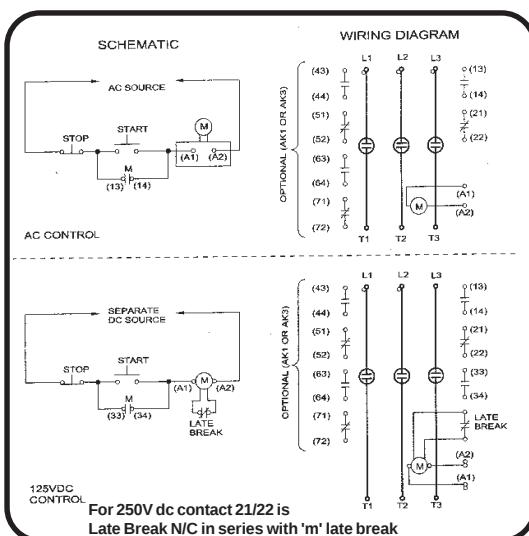
Options

• Lug Kit 2 #2-600mcm	Cat.# KVC6-2
Auxiliary Contact Kits	
• 2NO.2 NC 600V.10A ac.	Cat.# AK1
• 2NO.2 NC 5V.10mA dc.	Cat.# AK3
Only 1 Kit can be added for total of 3 N/O 3 N/C contacts	

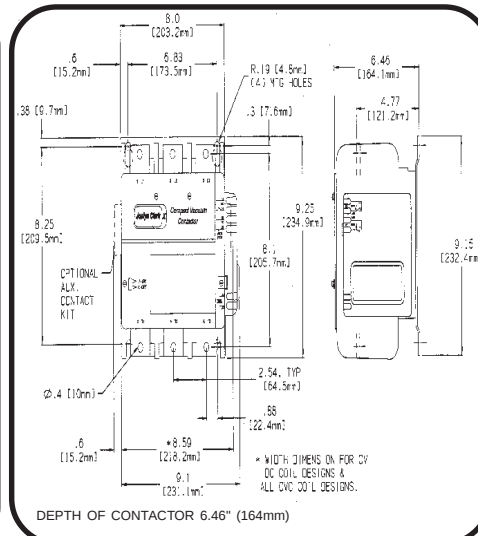
Coils

Description	HZ.	Cat. Suffix
110/120V	50/60Hz.	-76
220/240V	50/60Hz.	-26
380/415	50/60Hz.	-38
440/480	50/60Hz.	-46
125 DC		-125
250DC		-250

Diagram



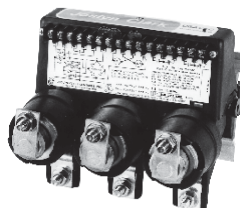
Dimensions



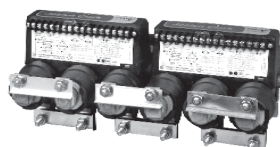
UL Listed to 1500V ⁵
 CSA Certified to 1500V ⁵
 UL/CSA recognized to 3600V

Electrically Held AC or DC Coils

A



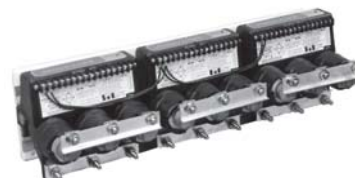
3 Pole, 320A, 1500V



3 Pole, 600A, 1500V



3 Pole, 700A, 600V



3 Pole, 1000A, 1500V

Contactors 200V-1500V - Bulletin 7707

Ampere Rating	Maximum Horsepower Ratings - 3 Phase							Size	Open Type Catalog No.	Price
	200/208V	230V	380V	460V	575V	1000V	1500V			
3 Pole										
160 ³	50	60	100	125	150	300	420	4	VC77U03415 - *	\$1693.
320 ³	100	125	200	250	300	600	830	5	VC77U03515 - *	2150.
600 ¹	200	200	375	500	575	1200	1600	6	VC77U03615 - *	4301.
700 ⁶	225	300	500	550	700	-----	-----	---	VC77U037A06 -*	5948.
1000 ^{1, 2}	-----	-----	-----	-----	-----	-----	-----		SVC77U031015 -*	8967.
2 Pole										
160		-----	-----	-----	-----	-----	-----	4	VC77U02415 - *	1510.
320		-----	-----	-----	-----	-----	-----	5	VC77U02515 - *	1876.
600 ¹		-----	-----	-----	-----	-----	-----	6	VC77U02615 - *	3752.
1000 ¹		-----	-----	-----	-----	-----	-----		SVC77U021015 -*	10138.

Contactors 1501V-3600V - Bulletin 7707

Ampere Rating	Maximum Horsepower Rating - 3 Phase		Open Type	Price
	2300V	3300V	Catalog No.	
3 Pole				
160 ⁴	600	960	VC77U03436- *	\$ 2141.
320 ⁴	1250	1920	VC77U03536- *	2269.
600 ^{1, 3}	2400	3700	VC77U03636- *	5417.
1000 ^{1, 3}	-----	-----	SVC77U031036-*	12444.
2 Pole				
160	-----	-----	VC77U02436- *	1757.
320	-----	-----	VC77U02536- *	2105.

Note: 1. Two 320 ampere contactors connected in parallel for 600A, three in parallel for 1000A.
 2. Motor applications limited to 1000 ampere continuous and LRC 6KA maximum.
 3. Terminal boots provided on center phase.
 4. Terminal boots provided on all phases.
 5. 160, 320, 600A 3 pole contactors UL listed and CSA certified.
 6. UR recognition 600V

- **Mechanically Interlocked Contactors on page A22 and A23 should be used if short circuit current can flow when switching between two or more contactors.**
- **For KW Rating Multiply HP Ratings by .746 (example: 100HP x .746 = 75KW)**

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.
- Engineering Data page A30.
- Renewal Parts page A36.

Coil Table

Voltage AC	Suffix	Voltage DC	Suffix
120	- 76	125	-125
240	- 26	250	-250

Low & Medium Voltage - USAVAC AC Latched Vacuum Contactors

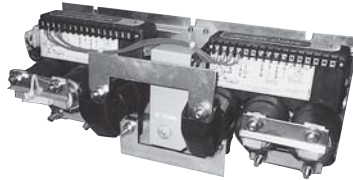
UL Listed to 1500V ³
 CSA Certified to 1500V ³
 UL/CSA to 3600V

Mechanically Latched AC & DC Close And Trip Coils

A



3 Pole, 320A, 1500V



3 Pole, 600A, 1500V



3 Pole, 700A, 600V

Contactors 200V-1500V - Bulletin 7707

Ampere Rating	Maximum Horsepower Ratings - 3 Phase							Size	Type	Price
	200/208V	230V	380V	460V	575V	1000V	1500V		Catalog No.	
3 Pole										
160 ¹	50	60	100	125	150	300	420	4	VCL77U03415-*	\$ 2516.
320 ¹	100	125	200	250	300	600	830	5	VCL77U03515-*	2974.
600 ¹	200	200	375	550	575	1200	1600	6	VCL77U03615-*	5124.
700 ⁴	225	300	500	550	700	-----	-----		VCL77U037A06-*	6863.
2 Pole										
160	-----	-----	-----	-----	-----	-----	-----	4	VCL77U02415-	2333.
320	-----	-----	-----	-----	-----	-----	-----	5	VCL77U02515-	2699.

Contactors 1501V-3600V - Bulletin 7707

Ampere Rating	Maximum Horsepower Rating - 3 Phase		Open Type Catalog No.	Price
	2300V	3300V		
3 Pole				
160 ²	600	960	VCL77U03436-*	\$ 2695.
320 ²	1250	1920	VCL77U03536-*	3093.
2 Pole				
160	----	----	VCL77U02436-*	2580.
320	----	----	VCL77U02536-*	2928.

Note: 1. Terminal boots provided on center phase.
 2. Terminal boots provided on all phases.
 3. 160, 320A 3 pole contactors UL listed and CSA certified.
 4. UR recognition 600V

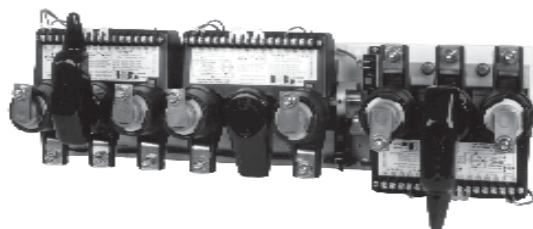
- Mechanically Interlocked Contactors on page A22 and A23 should be used if short circuit current can flow when switching between two or more contactors.
- For KW Rating Multiply HP Ratings by .746 (example: 100HP x .746 = 75KW)

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table. EXAMPLE: VCL77U03515-76-125 (120VAC Close Coil 125VDC Trip Coil)
- Engineering Data page A30.
- Modification Data page A37.
- Renewal Parts page A36.

Coil Table

Voltage AC	Suffix	Voltage DC	Suffix
120	- 76	125	-125
240	- 26	250	-250



One 3 Pole, One 5 Pole, 320A Contactor



Two 3 Pole, 320A Contactors

USAVAC Vacuum Contactors mechanically interlocked suitable for use in reversing, Wye-Delta, reduced voltage auto transformer, and 2 speed single or two winding starters.

Mechanically Interlocked Unwired, 200V-1500V - Bulletin 7707

Ampere Rating	Maximum Horsepower Ratings - 3 Phase							Size	Open Type	Price
	200/208V	230V	380V	460V	575V	1000V	1500V		Catalog No.	
3 Pole - 3 Pole										
160 ³	50	60	100	125	150	300	420	160/160	VC31U03415 -* - 43 ²	\$ 4987.
320 ³	100	125	200	250	300	600	850	320/320	VC31U03515 -* - 43 ²	5847.
600	200	200	375	500	575	1200	1600	600/600	VC31U03615 -* - 43 ²	12096.
320 ³	100	125	200	250	300	600	850	320/160	VC82U03515 -* - 43 ²	5481.
600	200	200	375	500	575	1200	1600	600/320	VC82U03615 -* - 43 ²	9059.
3 Pole - 5 Pole ¹										
160 ³	50	60	100	125	150	300	420	160/160	VC50U04C215 -* - 43 ²	7595.
320 ³	100	120	200	250	300	600	830	320/320	VC50U05C215 -* - 43 ²	9333.

For KW Rating Multiply HP Ratings by .746 (example: 100HP x .746 = 75KW)

Mechanically Interlocked Unwired, 1501V-3600V - Bulletin 7707

Ampere Rating	Maximum Horsepower Rating - 3 Phase		Open Type ²	
	2300V	3300V	Catalog No.	Price
3 Pole - 3 Pole				
160 ⁴	600	960	VC31U03436 -* - 43 ²	\$ 5444.
320 ⁴	1250	1920	VC31U03536 -* - 43 ²	6350.
600 ³	2400	3700	VC31U03636 -* - 43 ²	13322.
3 Pole - 5 Pole ¹				
160 ⁴	600	960	VC50U04C236 -* - 43 ²	8418.
320 ⁴	1250	1920	VC50U05C236 -* - 43 ²	10157.

Note:

1. To be used for 2 speed single winding applications only.
2. Modification 43 in the catalog number suffix means power wiring between contactors not included.
3. Terminal boots provided on center phase.
4. Terminal boots provided on all phases.

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.

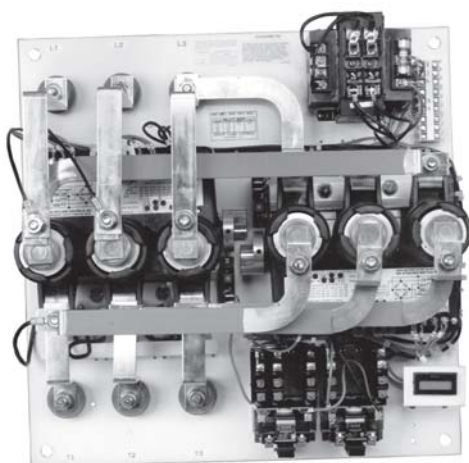
- Engineering Data page A30.
- Modification Data page A37.
- Renewal Parts page A36.

Coil Table

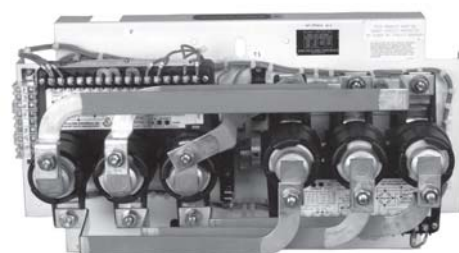
Voltage	Suffix
120	- 76
240	- 26

USAVAC - Low & Medium Voltage AC Reversing Contactors

A



250 HP 460V Jog Duty Reverser with M.O.V. Suppressors



300 HP 575V Reverser

3 Pole AC Reversing Contactors, 200V-1500V - Bulletin 6031

Ampere Rating	Maximum Horsepower Ratings - 3 Phase							Size	Open Type 1500V Standard Duty		Open Type 600V ¹ Jogging Duty	
	200/208V	230V	380V	460V	575V	1000V	1500V		Catalog No.	Price	Catalog No.	Price
160	50	60	100	125	150	300	420	4	VC31U03415 - *	\$ 7302.	VJ31U03406 - *	\$7979.
320	100	125	200	250	300	600	850	5	VC31U03515 - *	8144.	VJ31U03506 - *	8748.
600	200	200	375	500	575	1200	1600	6	VC31U03615 - *	16452.	VJ31U03606 - *	17129.

3 Pole AC Reversing Contactors, 1501V-3600V - Bulletin 6031

Ampere Rating ²	Maximum Horsepower Ratings - 3 Phase		Open Type 3600V Standard Duty	Price
	2300V	3300V	Catalog No.	
160	600	960	VC31U03436 - *	\$ 7668.
320	1250	1920	VC31U03536 - *	8583.

Note:

1. To be used when application involves plugging & inching (e.g. crane control). M.O.V. suppressor included on power circuit. For other voltages consult factory.
2. Terminal boots provided on center phase.

For KW Rating Multiply HP Ratings by .746 (example: 100HP x .746 = 75KW)

Ordering Information

- Use complete catalog number when ordering.
Replace the (*) with the suffix from the coil table.

- Engineering Data page A30.
- Renewal Parts page A36.

Coil Table

Voltage	Suffix
120	- 76
240	- 26

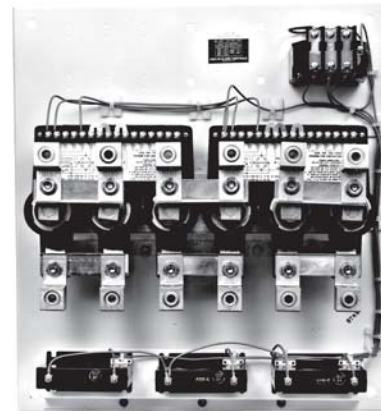
UL listed to 1500V
CSA Certified to 1500V



Open Type
250HP 460V
850 HP 1500V



250 HP, 460V Non Combination
Starter in Type 1 Enclosure



Open Type
500HP 460V
1600 HP 1500V

3 Pole AC Vacuum Starters, 200V-1500V - Bulletin 6013

Amp. Rating	Maximum Horsepower Ratings - 3 Phase							Size	NEMA Type 12 ¹		NEMA Type1 ¹		Open Type ¹	
	200/208V	230V	380V	460V	575V	1000V	1500V		Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
135	40	50	75	100	125	-----	-----	4	VS13TA3406-*	\$ 3312.	VS13AA3406-*	\$ 2763.	VS13U03406-*	\$2223.
160	50	60	100	125	150	300	420	4	VS13TA3E15-*	4410.	VS13AA3E15-*	4044.	VS13U03E15-*	3495.
320	100	125	200	250	300	600	850	5	VS13TA3515-*	4557.	VS13AA3515-*	4191.	VS13U03515-*	3642.
600 ²	200	200	375	500	575	1200	1600	6	VS13TA3615-*	8747.	VS13AA3615-*	8400.	VS13U03615-*	7302.

- For NEMA 3R use NEMA 12 price and change 5th character in catalog number to "R".
- For Latched Starters refer to Note (6) on page "A5" for Ordering Information.
- For KW Rating Multiply HP Ratings by .746 (example: 100HP x .746 = 75KW)

Ampere Rating	Maximum Horsepower Ratings - 3 Phase		Open Type ¹ Catalog No.	Price
	2300V	3300V		
160 ⁴	600	960	VS13U03436 - *	\$ 4566.
320 ⁴	1250	1920	VS13U03536 - *	5472.
600 ^{2,3}	2400	3700	VS13U03636 - *	10943.

Note:

1. Three overload heaters are required see page A26
2. Two 320 ampere contactors connected in parallel for 600A.
3. Terminal boots provided on center phase.
4. Terminal boots provided on all phases.

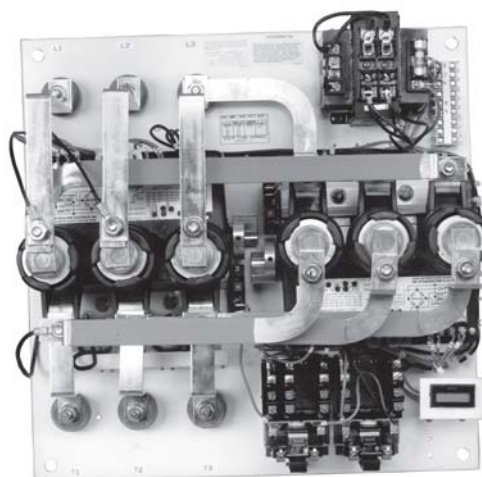
Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.
- Order Heaters at \$18.00 each from page A35.

- Engineering Data page A30.
- Modification Data page A37.
- Renewal Parts page A36.

Coil Table

Voltage	Suffix
120	- 76
240	- 26



460V 250 HP Reversing Starter Suitable for Crane Control

3 Pole Wired Reversing Starters, 200V-1500V - Bulletin 6030

Ampere Rating	Maximum Horsepower Ratings - 3 Phase							Size	Open Type 1500V ¹ Standard Duty		Open Type 600V ^{1,2} Jogging Duty	
	200/208V	230V	380V	460V	575V	1000V	1500V		Catalog No.	Price	Catalog No.	Price
135	40	50	75	100	125	----	----	4	VS30U03406 - *	\$ 7549.	VJ30U03406 - *	\$ 7869
160	50	60	100	125	150	300	420	4	VS30U03E15 - *	8967.	VJ30V03E06 - *	10065
320	100	125	200	250	300	600	850	5	VS30U03515 - *	9333.	VJ30U03506 - *	10431
600	200	200	375	500	575	1200	1600	6	VS30U03615 - *	22052.	VJ30U03606 - *	23534

3 Pole Wired Reversing Starters, 1501V-3600V - Bulletin 6030

Ampere Rating ³	Maximum Horsepower Ratings - 3 Phase		Open Type 3600V ¹ Standard Duty	Price
	2300V	3300V	Catalog No. E	
160	600	960	VS30U03E36 - *	\$ 8711.
320	1250	1920	VS30U03536 - *	10358.

For KW Rating Multiply HP Ratings by .746 (example: 100HP x .746 = 75KW)

Note:

1. Three overload heaters are required.
2. To be used when application involves plugging & inching (e.g. crane control). Includes M.O.V. suppressors on power circuit. For other voltages consult factory.
3. Terminal boots provided on center phase.

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.
- Order Heaters at \$18.00 each from page A35.

- Engineering Data page A30.
- Modification Data page A37.
- Renewal Parts page A36.

Coil Table

Voltage	Suffix
120	- 76
240	- 26

CV Series

A



300 HP 460V Starter in Type 12 Enclosure



400 HP 600V Starter in Type 3 Enclosure

NEMA 1 & 12 Combination Starters 200V-575V - Bulletin 6018/6020

Ampere Rating	Maximum Horsepower Ratings - 3 Phase ²					Size	NEMA Type 1 & 12 Flange Operator	Price
	200/208V	230V	380V	460V	575V		Catalog No.	
Non-Fusible								
135	40	50	75	100	125	4	CV18TA340610 - *	\$ 5216.
200	50	80	135	150	200	--	CV18TA32A610 - *	6131.
270	100	100	200	200	200	5	CV18TA35610 - *	6497.
400	160	160	270	300	400	--	CV18TA34A610 - *	8747.
600	180	250	300	500	500	6	CV18TA360610 - *	14915.
Fusible								
135	40	50	75	100	125	4	CV18TA340692 - *	5474.
200	50	60	100	125	150	4	CV18TA3E0692 - *	6497.
270	100	100	200	200	200	5	CV18TA35694 - *	6863.
400	160	160	270	300	400	--	CV18TA34A697 - *	9113.
600	180	250	300	500	500	6	CV18TA360698 - *	15354.
MCP								
135	40	50	75	100	125	4	CV20TA340678 - *	5765.
200	50	80	135	150	200	--	CV20TA37678 - *	6863.
270	100	100	200	200	200	5	CV20TA350679 - *	7229.
400	160	160	270	300	400	--	CV20TA34A681 - *	9992.
600	180	250	300	500	500	6	CV20TA360681 - *	16799.

- For NEMA 3R use NEMA 12 price and change 5th character of catalog number to "R".

For KW Rating Multiply HP Ratings by .746 (example: 100HP x .746 = 75KW)

Note:

1. Three overload heaters are required.

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.
- Order Heaters at \$18.00 each from page A35.

- Engineering Data page A30.
- Modification Data page A37.
- Renewal Parts page A36.

Coil Table

Voltage	Suffix
120	- 76
240	- 26



250 HP 460V Starter in Type 12 Enclosure



300 HP 600V Starter in Type 3 Enclosure

NEMA 1 & 12 Combination Starters 200V-575V - Bulletin 6018/6020

Ampere Rating	Maximum Horsepower Ratings - 3 Phase ²					Size	NEMA Type 1 & 12 ^{1, 2} Flange Operator Catalog No.	Price
	200/208V	230V	380V	460V	575V			
Non-Fusible								
135	40	50	75	100	125	4	VS18TA340610 - *	\$ 5216.
160 ²	50	60	100	125	150	4	VS18TA3E0610 - *	6131.
320 ²	100	100	200	250	300	5	VS18TA350610 - *	6497.
600	180	250	300	500	500	6	VS18TA36A610 - *	14896.
Fusible								
135	40	50	75	100	125	4	VS18TA340692 - *	5472.
160 ²	50	60	100	125	150	4	VS18TA3E0692 - *	6497.
320 ²	100	100	200	250	300	5	VS18TA350694 - *	6863.
600	180	250	300	500	500	6	VS18TA360697 - *	15354.
700	225	300	500	550	700	--	VS18TA370698 - *	16141.
MCP								
135	40	50	75	100	125	4	VS20TA340678 - *	6057.
160	50	60	100	125	150	4	VS20TA3E0678 - *	6551.
320	100	100	200	250	300	5	VS20TA350679 - *	7119.
600	180	250	300	500	500	6	VS20TA360680 - *	16214.
700	225	300	500	550	700	--	VS20TA370681 - *	19618.

- For NEMA 3R use NEMA 12 price and change 5th character of catalog number to "R".

For KW Rating Multiply HP Ratings by .746 (example: 100HP x .746 = 75KW)

Note:

- Three overload heaters are required.
- Terminal boots provided on center phase.

Ordering Information

- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table. Order heaters at \$18.00 each from page

- Engineering Data page A30.
- Modification Data page A37.
- Renewal Parts page A36.

Coil Table

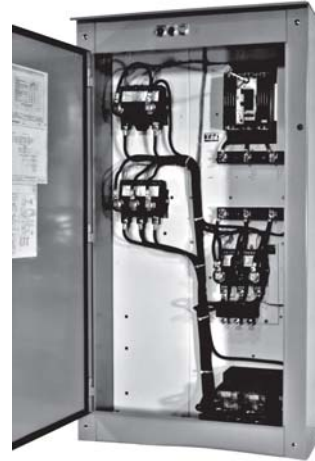
Voltage	Suffix
120	- 76
240	- 26

A

Reduced Voltage - 600 Volts Rated Type CV & VS Auto Transformer Closed Transition

Designed for automatic starting of squirrel cage motors when the starting current must be reduced. Closed transition auto transformer starters provide the highest possible starting torque per ampere of line current.

Auto transformers are 3-coil type, with voltage taps at 50%, 65% and 80% rated in accordance with NEMA Standards ICS-214.21 for medium-duty starting service.



250HP, 460V R.V.A.T. Starter in NEMA 12 Enclosure

Vacuum Starters NEMA 1 & 12 Enclosed

Ampere Rating	Maximum Horsepower Rating 3 Phase		Size	NEMA 1 & 12, 230V ¹ Industrial - Dust tight		NEMA 1 & 12, 460V ¹ Industrial - Dust tight	
	230V	460V		Catalog No.	Price	Catalog No.	Price
Non Combination - Bulletin 6082							
135	50	100	4	CV82TA4JB - *	\$13862.	CV82TA4ME - *	\$14183.
160 ²	60	125	4	VS82TAEKB - *	14439.	VS82TAENE - *	14732.
200	75	150	--	CV82TA2ALB - *	14622.	CV82TA2APE - *	14878.
320 ²	100	250	5	VS82TA5MB - *	14988.	VS82TA5RE - *	15354.
400	150	300	--	CV82TA4APB - *	19197.	CV82TA4ASE - *	21301.
600	200	500	6	CV82TA6QB - *	30543.	CV82TA6VE - *	31092.
Fusible Combination - Bulletin 6083							
135	50	100	4	CV83TA4JB - *	15692.	CV83TA4ME - *	16241.
160 ²	60	125	4	VS83TAEKB - *	16690.	VS83TAENE - *	17056.
200	75	150	--	CV83TA2ALB - *	17111.	CV83TA2APE - *	17531.
320 ²	100	250	5	VS83TA5MB - *	17550.	VS83TA5RE - *	17897.
400	150	300	--	CV83TA4APB - *	21393.	CV83TA4ASE - *	22619.
600	200	500	6	CV83TA6QB - *	34953.	CV83TA6VE - *	35996.
MCP Combination - Bulletin 6084							
135	50	100	4	CV84TA4JB - *	15775.	CV84TA4ME - *	16141.
160 ²	60	125	4	VS84TAEKB - *	16452.	VS84TAENE - *	16818.
200	75	150	--	CV84TA2ALB - *	16653.	CV84TA2APE - *	17056.
320 ²	100	250	5	VS84TA5MB - *	17001.	VS84TA5RE - *	17550.
400	175	350	--	CV84TA4APB - *	22253.	CV84TA4ASE - *	23406.
600	200	500	6	CV84TA6QB - *	34441.	CV84TA6VE - *	35154.

Note:

1. Includes starter complete with 3 N.O. & 2 N.C. interlocks and three phase overload relays less heaters.
2. Terminal boots provided on center phase.
3. For NEMA 3R change the T in the catalog number to an R.

Ordering Information

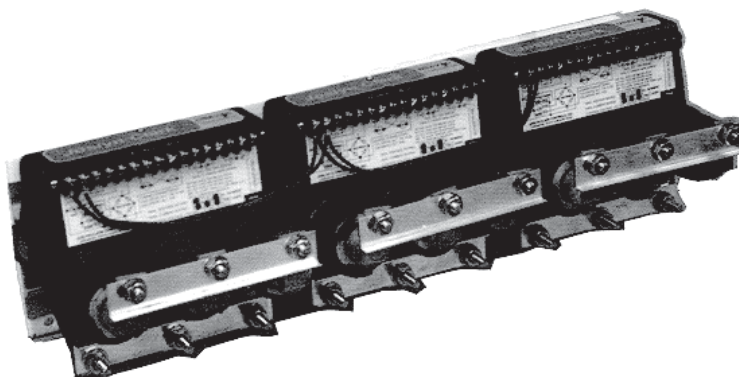
- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table. Order heaters at \$18.00 each from page A35. Refer to factory for 220, 380 or 575 HP ratings.

Coil Table

	Voltage	Suffix
• Engineering Data page A30.	120	- 76
• Modification Data page A37.	240	- 26
• Renewal Parts page A36.		

Special Purpose Contactors

A



3 Pole Three Phase 1000A 3600V

The following controls are for high current applications such as electric arc and induction furnace.

Special Purpose Vacuum Contactors

Ampere Rating	1500V Open Type Catalog No.	Price	3600V Open Type Catalog No.	Price
1 Pole, Single Phase				
450	SVC77U014515 - *	\$ 3431.	SVC77U014536 - *	\$ 5627.
1000	SVC77U011015 - *	6050.	SVC77U011036 - *	7137.
1500	SVC77U011515 - *	8711.	SVC77U011536 - *	9132.
2500	SVC77U012515 - *	9516.	SVC77U012536 - *	10138.
2 Pole, Single Phase				
450	SVC77U024515 - *	7851.	¹ SVC77U024536 - *	8510.
1000	SVC77U021015 - *	8327.	¹ SVC77U021036 - *	9132.
1500	SVC77U021515 - *	16653.	¹ SVC77U021536 - *	17056.
3 Pole, Three Phase				
1000	SVC77U031015 - *	10797.	² SVC77U031036 - *	12444.

Note:

1. Insulation boots provided on 1 pole.
2. Terminal boots provided on all phases.

Ordering Information

- Use complete catalog number when ordering.
Replace the (*) with the suffix from the coil table.

- Engineering Data page A30.
- Renewal Parts page A36.

Coil Table

Voltage	Suffix
120	- 76
240	- 26

Vacuum Contactor & Starter Ratings 200V-3600V

Technical Specifications

Standards NEMA ICS 2-1988, UL 508 (1.5KV), CSA 22.2 (1.5KV), IEC 158-1, BS 547-1

		160A	320A	600A	1000A
Catalog No. 3 Pole	1.5KV	VC77U03415	VC77U03515	VC77U03615	SVC77U031015
	3.6KV	VC77U03436	VC77U03536	VC77U03636	SVC77U031036

Power Ratings

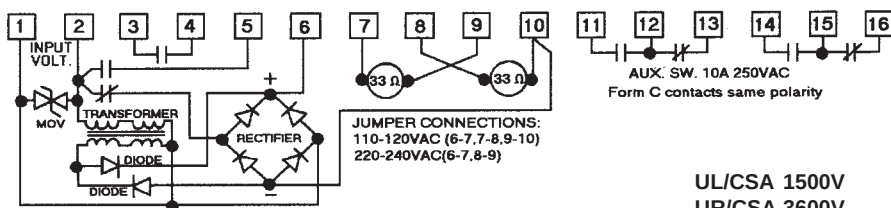
Rated Insulating and Operational Voltage	1500/3600 ¹			
Rated Operational Current	160	320	600	1000
Rated Frequency	50/400Hz			
Making Current	1600	3200	6000	6000
Breaking Current	1600	3200	6000	6000
Dielectric Strength/BIL.	6KV-1 min. / 45KV. 1.2 X 50 Micro/Sec.			
Interrupting Current	4400	5000	6000	6000
Withstand Current	30KA-3Hz			
Short Time Current - 1 Sec.	5000	7000	9000	11000
	2 Sec.	3000	5000	7000
Mechanical Life	2 x 10 ⁶			
Electrical Life at Rated Current - AC3 Duty	1 x 10 ⁶			
Switching Frequency	600/hr every 6 seconds			
Chop Current	Mean	.55A		
	Max.	.9A		

Control Ratings

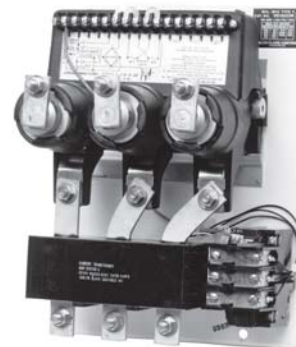
Description	160/320A	600A	1000A
Rated Control Voltage	120/240V 50/400Hz		
Allowable Fluctuation	+10% of rated -25% voltage		
Closing Power VA/Duration	950VA/17MS	1900VA/17MS	2850VA/17MS
Holding Power	9VA	18VA	27VA
Opening Time Ave.	90 MS at 60Hz		
Closing Time Ave.	17 MS at 60Hz		
Pick up Voltage	90V		
Drop Out Voltage	70% or less		
Recommended Control Transformer	When Required 250VA	When Required 500VA	When Required 750VA

Application Conditions

Installation		All Planes contactor only		
Altitude without Derating		Up to 6600 ft. (2000m)		
Ambient	Storage	-65°F (-54°C) +160°F (71°C)		
	Operating	-40°F (-40°C) +135°F (57°C)		
Vibration/Shock		40Hz - 2G/30G		
Weight 160/320A		12lbs. (5.45kg.)	24lbs. (11kg.)	36lbs. (16.36kg.)
Dimensions		8 ⁷ / ₈ " x 7 ⁷ / ₁₆ " x 7 ⁷ / ₈ " 225 x 189 x 200mm	17 ⁷ / ₈ "x7 ⁷ / ₁₆ "x7 ⁷ / ₈ " 450x189x200mm	26 ⁵ / ₈ "x7 ⁷ / ₁₆ "x7 ⁷ / ₈ " 676x189x200mm



Control Diagram

UL/CSA 1500V
UR/CSA 3600VOpen Type
USAVAC Starter Size 5

Accessories & Options:

1. Mechanical Interlocked contactors available, pages A22/23.
2. Vacuum starters in combination and non-combination forms are available in NEMA 1, 3, and 12 enclosures on, pages A24, 26 & 27
3. Terminal Lug Kits, page A36.
4. Suppressor Kits, page A36.

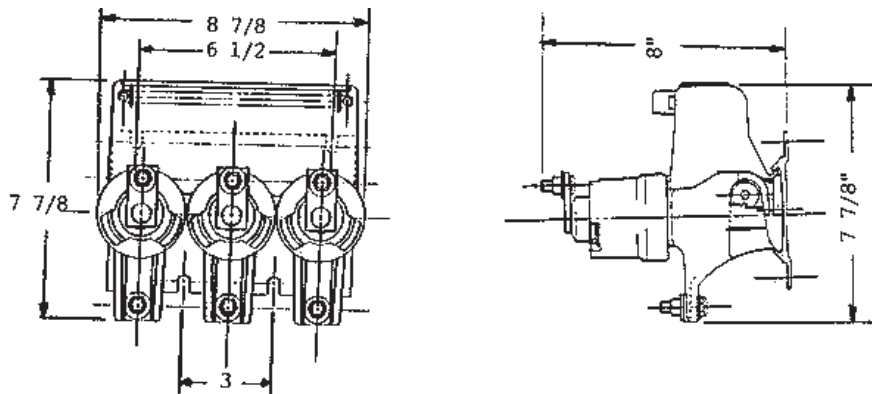
For KW Rating Multiply HP Ratings by .746
(example: 100HP x .746 = 75KW)

Power Application Ratings

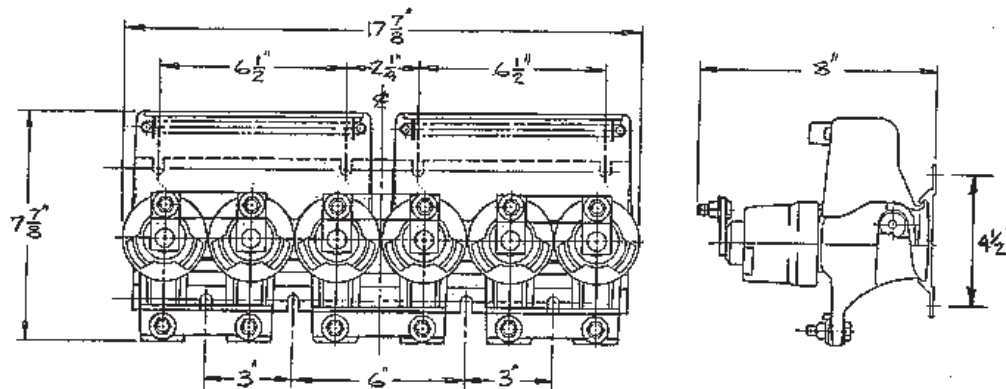
Volts	Motor HP			
	160A	320A	600A	1000A ²
230	60	125	200	-----
460	125	250	500	-----
1000	300	600	1200	-----
1500	420	850	1600	-----
2300	600	1250	2400	-----
3300	960	1920	3700	-----
Volts	Transformer Load KVA			
	160A	320A	600A	1000A
230	66	133	250	415
460	127	255	500	746
1000	277	554	1000	1730
1500	415	850	1500	2600
2300	665	1330	2500	4150
3300	910	1820	3400	5700
Volts	Capacitor Load KVAR			
	160A	320A	600A	1000A
230	50	100	180	310
460	95	190	360	595
1000	205	415	750	1300
1500	310	620	1125	1450
2300	500	1000	1875	3110
3300	700	1365	2550	4275

Note:

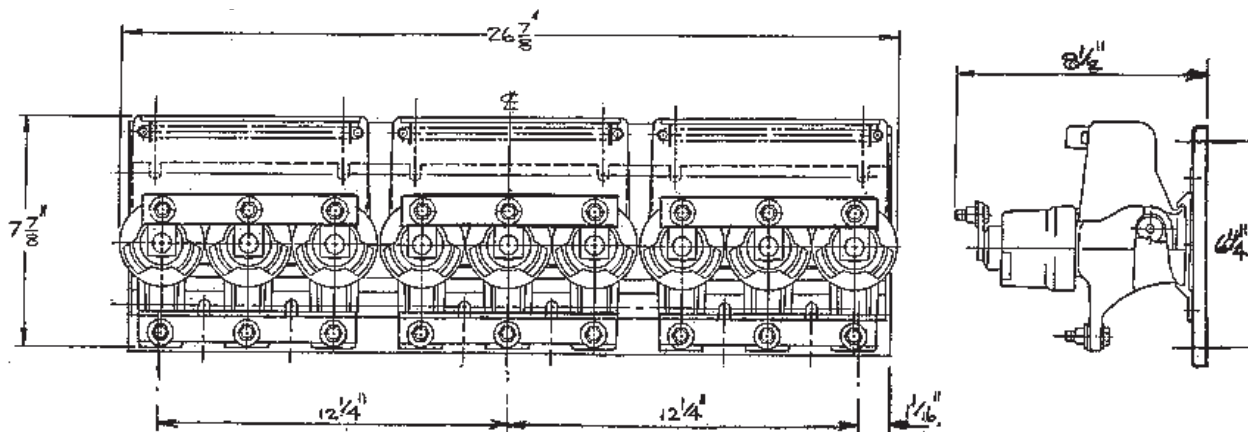
1. 3600V model has a B.I.L. rating of 45KV and an interrupt rating of 4000A.
2. Motor applications ratings are limited to 1000A continuous with maximum LRC of 6000 ampere.



160-320A 2-3 Pole 1.5 KV (As Shown)
450A Single Phase 1 Pole (Center Pole Removed)
1000A Single Phase 1 Pole (All 3 Paralleled)

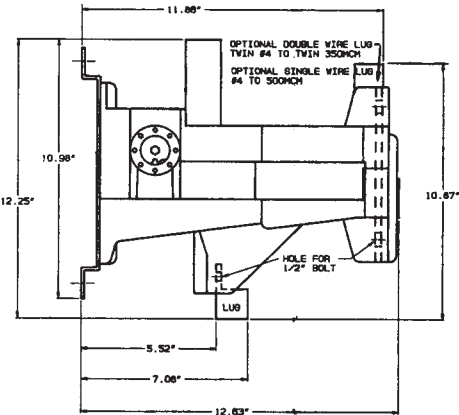
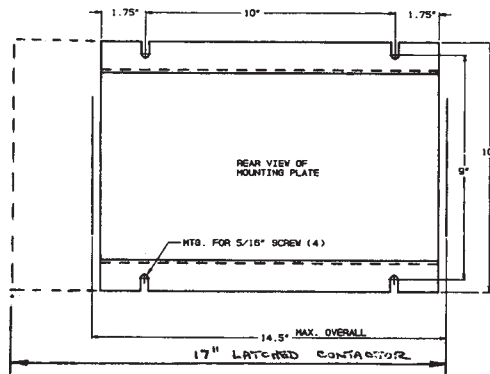


450A Single Phase 12 Pole (Center Pole Removed)
600A Three Phase 1.5KV (As Shown)
1000A Single Phase 2 Pole (2X3 Pole Paralleled)
1500A Single Phase 1 Pole (All 6 Paralleled)

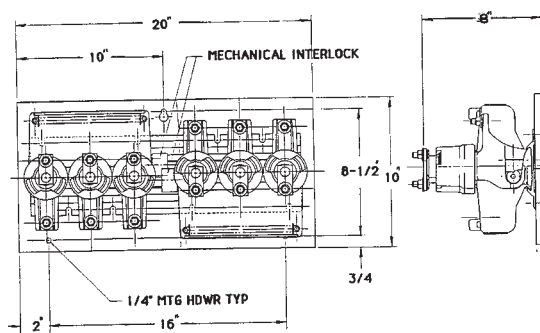


1000A Three Phase 1.5 KV (As Shown)
1500A Single Phase 2 Pole (Center Pole Removed) 2 X 4 Pole Paralleled
2500A Single Phase 1 Pole (All 9 Paralleled)

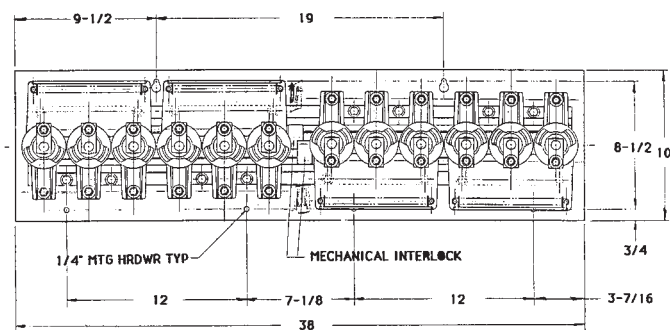
A



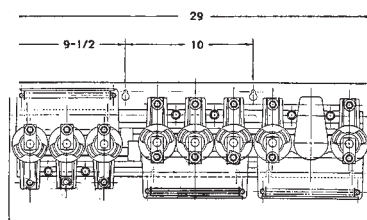
**700 Amp
600V
3 Phase**



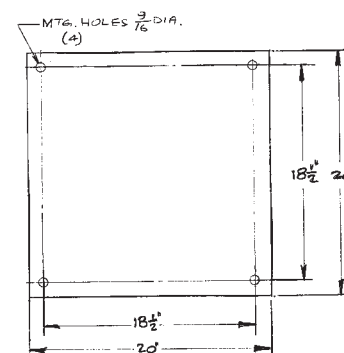
Mechanically Interlocked 160/320A Contactors



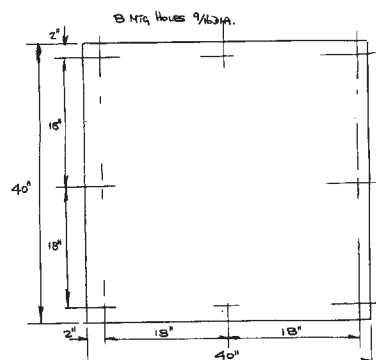
Mechanically Interlocked 600A Contactors



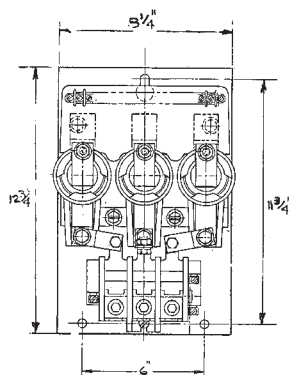
Mechanically Interlocked Contactors
3 Pole/5 Pole 160-320A



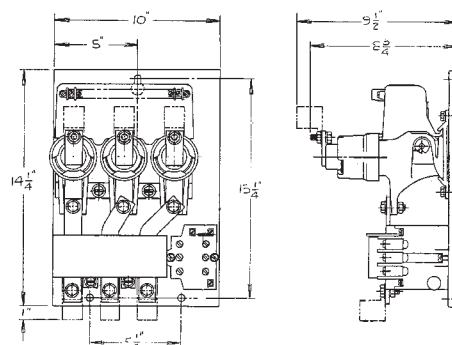
Open, Reverser, Standard or Jogging Duty
160-320A



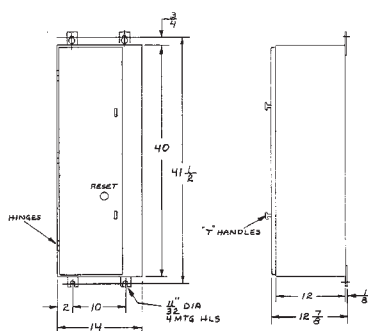
Open Type, Reverser Standard, or Jogging Duty 600A



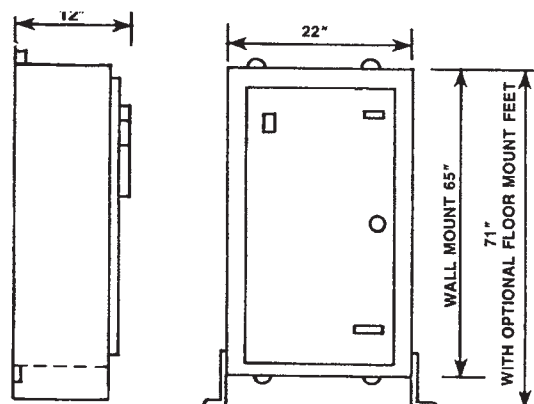
Open Starter 135A 600V



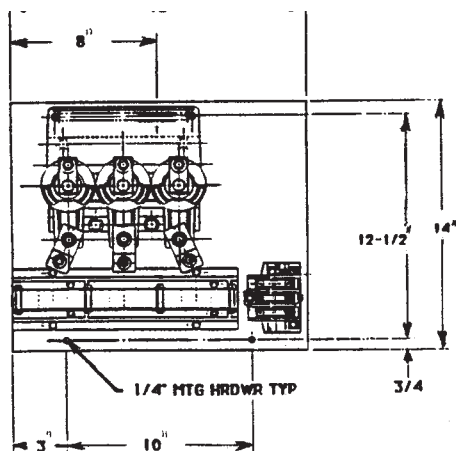
Open Starter 160/320A 1.5 KV



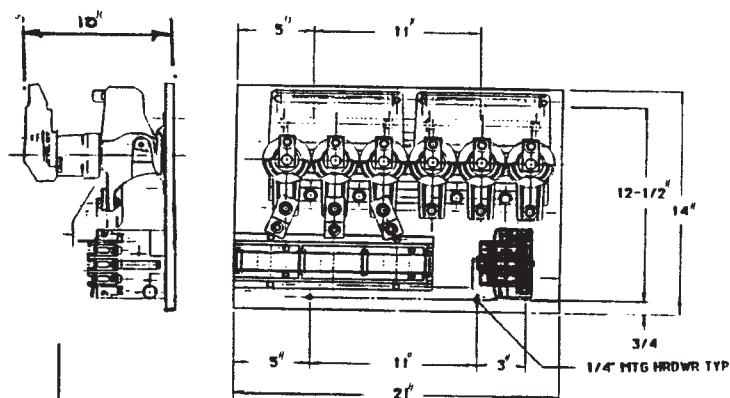
NEMA 1, 12 Non Combination Starter
160/320A



NEMA 1, 12 Combination Starter Fusible & Non Fusible
600 V- 135, 160, 320 AMP.

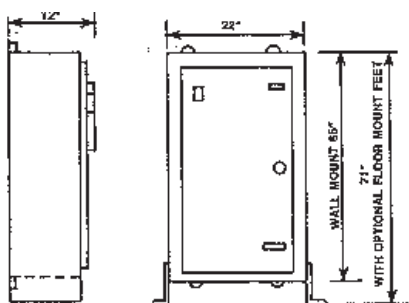


Open Starter 3.3 KV, 160-320A

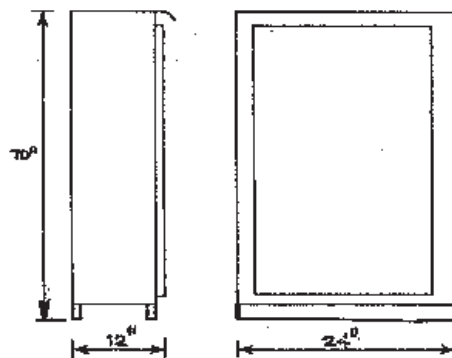


Open Starter 1.5/3.3 KV, 600A

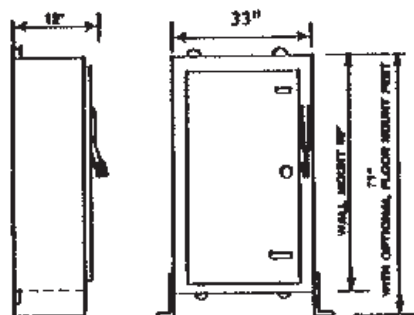
A



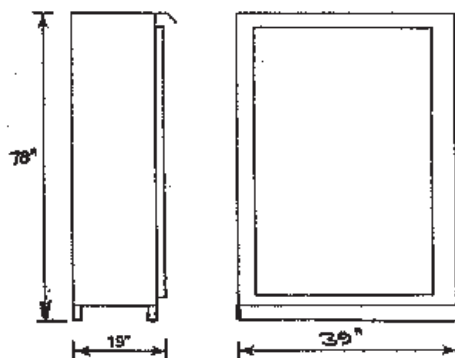
1.5 KV NEMA 1, 12 Standard Width
160-320A Fusible Combination Starters



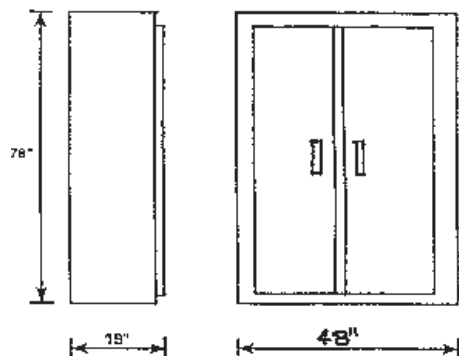
1.5 KV NEMA 1, 12, 600A
Fusible Combination Starters



1.5 KV NEMA 3 Extra Wide
160-320A Fusible Combination Starters



RVAT Starter 135-160-320A
230V-460V Combination Starter



RVAT Starter 600A 230/460V
Combination Starters

USAVAC - Low & Medium Voltage Overload Heaters

Heater Selection

Select heaters based on motor nameplate full-load current. Tables are for continuous rated motors. Full-load current for a given horsepower motor will vary from one manufacturer to another and will depend on RPM of motor.

Type of Protection

Heaters selected directly from the tables provide a maximum of 125% protection at 40°C ambient, is suitable for motors with a 1.15 service factor with a 40°C rise or less and with motor and controller at the same temperature. For motors with 1.0 service factor or with a temperature rise greater than 40°C without service factor rating, use one size smaller heaters than in table. The ultimate trip of the heater is approximately 125% of the minimum current shown in the tables in a 40°C ambient.

The overload relay provides protection in accordance with UL Class 20. For further data refer to Controlog section B.

Ambient Correction

Not necessary when overload relay is ambient compensated as identified by green reset rod. For control at an ambient constantly less than the motor ambient, correct by decreasing the nameplate motor full-load current by 8% per 10°C difference in ambient.

For control at an ambient constantly greater than the motor ambient, correct by increasing the nameplate motor full-load current by 8% per 10°C difference in ambient.

Branch Circuit Protection

Branch circuit protection should be provided per USA National Electric Code or the Canadian Electrical Code. Current rating of the protective device must not exceed the maximum value listed in the table.

Automatic Reset

Automatic reset operation should not be used with two-wire control.

HEATER APPLICATION TABLE FOR 3 PHASE MOTORS		
Bul. 6013, 6030, & 6050 Type CV-200 Standard or Ambient Compensated Overload Relay for use with 400:5 Current Transformer		
HEATER CAT. NO.	MIN.	MAX.
2421	87.0	96.5
2422	96.6	104.9
2423	105.0	117.7
2424	117.8	131.1
2425	131.2	137.5
2426	137.6	152.9
2427	153.0	171.4
2429	171.5	185.5
2430	185.6	200.0

CV 4 HEATER APPLICATION TABLE					
NON-REVERSING, REVERSING AND MULTI-SPEED, WITH STANDARD OR AMBIENT COMPENSATED OVERLOAD RELAY					
ENCL. STANDARD TYPE OPEN OR ENCL. AMBIENT COMP. TYPE		HEATER CATALOG NUMBER	PROTECTIVE DEVICE MAXIMUM FUSE	INVERSE TIME BREAKERS CONT. AMPS.	STARTER SIZE
MOTOR CONTINUOUS AMPERE RATING					
MIN.	MAX.				
28.6	31.6	2525	125	70	3
31.7	35.2	2526	125	70	
35.3	39.1	2527	150	70	
39.2	42.3	2528	150	70	
42.4	46.4	2529	175	100	
46.5	50.8	2530	200	100	
50.9	57.3	2531	225	100	
57.4	63.7	2532	250	100	
63.8	70.7	2533	250	100	
70.8	77.3	2534	300	125	
77.4	83.1	2535	300	150	4
83.2	90.0	2536	300	150	
83.2	90.9	2536	350	150	
91.0	97.6	2537	350	150	
97.7	106.0	2538	400	150	
106.1	115.4	2539	450	200	
115.5	123.9	2540	450	200	
124.0	135.0	2541	450	200	

ALL HEATERS \$18.00 LIST

HEATER APPLICATION TABLE FOR 3 PHASE MOTORS			
Bul. 6013, 6030, & 6050 Type CV5, CV6, CV400 & CV600. Standard or Ambient Compensated Overload Relay for use with 500:5 Current Transformer			
HEATER CAT. NO.	MIN.	MAX.	STARTER SIZE
2425	198.0	215.0	400A
2426	215.1	237.0	
2427	237.1	267.0	
2429	267.1	270.0	
2429	267.1	289.0	
2430	289.1	324.0	
2431	324.1	351.0	
2432	351.1	390.0	
2433	390.1	400.0	
2433	390.1	425.0	
2434	425.1	487.0	600A
2435	487.1	540.0	
2435	487.1	548.0	
2436	548.1	600.0	

HEATER APPLICATION TABLE FOR 3 PHASE MOTORS		
BUL. 6013 TYPE VS SIZE 4 STANDARD OR AMBIENT COMPENSATED OVERLOAD RELAY		
MOTOR CONTINUOUS AMPERE RATING		HEATER CATALOG NUMBER
MIN.	MAX.	
29.2	32.3	2525
32.4	36.0	2526
36.1	39.9	2527
40.0	43.4	2528
43.5	47.6	2529
47.7	52.4	2530
52.5	59.2	2531
59.3	66.0	2532
66.1	73.3	2533
73.4	80.4	2534
80.5	87.9	2535
88.0	95.0	2536
95.1	102.7	2537
102.8	111.9	2538
112.0	122.9	2539
123.0	133.9	2540
134.0	145.0*	2541*

HEATER APPLICATION TABLE FOR 3 PHASE MOTORS			
Bul. 6013, 6030, & 6050 Type VS Size 4, E, and 5 Standard or Ambient Compensated Overload Relay for use with 400:5 Current Transformer			
MIN.	MAX.	600 A.	STARTER SIZE
44.9	49.6	2413	4
49.6	56.0	2414	
56.1	61.6	2415	
61.7	68.0	2416	
68.1	76.7	2417	
76.8	81.5	2418	
81.6	89.4	2419	
89.5	94.1	2420	
94.2	105.9	2421	
106.0	119.9	2422	
120.0	134.4	2423	5
134.5	135.0	2424	
135.1	156.9	2424	
157.0	160.0	2425	
160.1	170.9	2425	
171.0	188.9	2426	
189.0	211.9	2427	
212.0	229.9	2429	
230.0	256.9	2430	
257.0	280.9	2431	
281.0	304.0	2432	E
304.0	320.0	2433	

HEATER APPLICATION TABLE FOR 3 PHASE MOTORS				
Type VS Size 6 Standard or Ambient Compensated Overload Relay For use with 400/5 Current Transformer				
HEATER CATALOG NUMBER	MOTOR AMPERE RATING		INVERSE TIME CIRCUIT BREAKER MAGNETIC TRIP SETTING	
	MAX.	MIN.	600 A.	800 A.
2421	106.0	95.2	LOW	LOW
2422	121.0	106.1	LOW	LOW
2423	136.0	121.1	LOW	LOW
2424	158.0	136.1	LOW	LOW
2425	172.0	158.1	LOW	LOW
2426	190.0	172.1	LOW	LOW
2427	214.0	190.1	LOW	LOW
2429	231.0	214.1	LOW	LOW
2430	259.0	231.1	LOW	LOW
2431	281.0	259.1	2	LOW
2432	312.0	281.1	3	LOW
2433	340.0	312.1	3	LOW
2434	390.0	340.1	4	2
2435	438.0	390.1	6	3
2436	484.0	438.1	7	3
2437	520.0	484.1	HIGH	4
2438	590.0	520.1	HIGH	6
2439	600.0	590.1	HIGH	6

A

Low Voltage Contactors 200V - 3.6Kv

Description	Rating	Catalog Number	Price (Each)
Accessories - Discount Schedule JC11			
Terminal Boots	Line Side (1 Per Kit)	KVC-UB1	\$ 33.
	Load Side (1 Per Kit)	KVC-UL1	33.
Lug Kits (3 per kit)	6-250 MCM (3 Per Kit)	KVCL-250	82.
	4-500 MCM (3 Per Kit)	KVCL-500	104.
	2-600 MCM (3 Per Kit)	KVCL-600	126.
Suppressor Kits	600V, (1 - 3 Phase/Kit)	VCSK600	631.
Parts - Discount Schedule JC80			
Phase Assembly Fig. 1	160 ampere (1 Per Kit)	A77-354115A-1	1041.
	320 ampere (1 Per Kit)	A77-354115A-2	1214.
	600 ampere ¹	A77-354115A-2	1214.
	1000 ampere ¹	A77-354115A-2	1214.
Control Module Fig. 2	120/240V, 50/60Hz (1 Per Kit)	A77-354117A	972.
	125V DC (1 Per Kit)	A77-452580-A2	972.
	250V DC (1 Per Kit)	A77-452580-A4	972.

Note:

1. When ordering for 600A Rating, Qty. (2) of a 320A Phase Assembly are required Per Pole.
 When ordering for a 1000A Rating, Qty. (3) of a 320A Phase Assembly are required Per Pole.

Example: 600A = 2-A77-354115A-2, Price \$1214 X 2 = \$2428. Total For 1 Pole.

1000A = 3-A77-354115A-2, Price \$1214 X 3 = \$3642. Total For 1 Pole.



Fig. 1

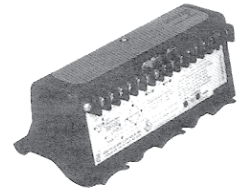


Fig. 2

Medium Voltage Contactors 2.3 - 7.2Kv

Description	Rating	Catalog Number	Price (Each)
Accessories - Discount Schedule JC19			
Lug Kits (3 per kit)	4-350 MCM, (2 - Wires/Lug)	KVCL-350	\$ 97.
	4-500 MCM, (1 - Wire/Lug)	KVCL-500	104.
Suppressor Kits	2.3KV, (1 - 3 Phase/Kit)	VCSK2300	1894.
	4.16KV, (1 - 3 Phase/Kit)	VCSK4160	2031.
	6.6KV, (1 - 3 Phase/Kit)	VCSK6600	2031.
Auxiliary Contacts	2N.O. & 2 N.C. Auxiliary Block	A77-358002-A	73.
Parts - Discount Schedule JC80			
Phase Assembly Fig. 3 (Half Shell)	200 ampere (1 Per Kit)	A77-356249A-1	1145.
	400 ampere (1 Per Kit)	A77-356249A-2	1352.
	600 ampere (1 Per Kit)	A77-356249A-3	1559.
	700 ampere	A77-356249A-5	1559.
	1200 ampere	A77-356249A-4	3118.
Phase Assembly	Complete 3 Phase Assembly	A77-359473-A	3989.
	Complete 1 Pole Assembly	A77-359473-B	1470.
Control Module Fig. 4	120V, 50/60Hz (1 Per Kit)	A77-356277A-1	1179.
	240V, 50/60Hz (1 Per Kit)	A77-356277A-2	1179.
	380/460V, 50/60Hz	A77-356277A-4	1179.
	125V DC (1 Per Kit)	A77-452563-A2	1179.
	250V DC (1 Per Kit)	A77-452563-A4	1179.

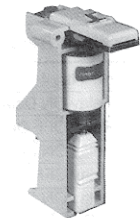


Fig. 3

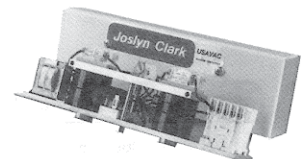
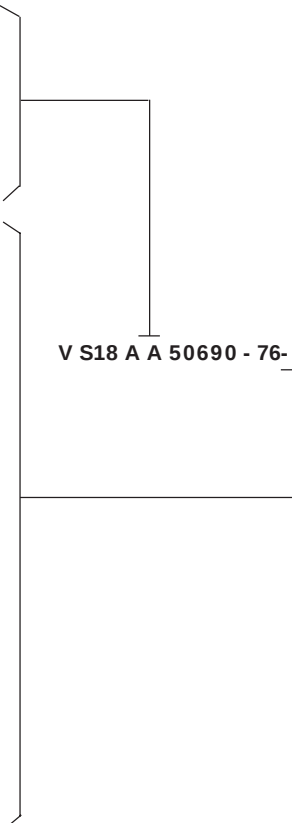


Fig. 4

Modifications For Combination and Non-Combination Controllers

Description	Enclosure Type NEMA 1, 3, 3R, 4, 12	Change Cat. No. Character Indicated To:	Typical Catalog Number
Cover Controls			
Push Buttons & Selector Switches Hand-Off-Auto Selector Switch	\$ 264.	B	
Start-Stop Push Buttons		C	
2 or 3 Position Selector Switch - SPDT	264.	B	
Forward-Reverse-Stop Push Buttons		C	
High-Low-Stop Push Buttons Fast-Slow-Stop Push Buttons	480.	C	
Pilot Lights			
With Electrical Interlock:			
Standard Transformer Type, Red Lens	324.	13	
Push-to-Test Transformer Type, Red Lens	504.	14	
Modification 11-14. Lens color below. Example: Order 11 + 15 = Std. Transformer with interlock & color lens			
Green	N/C	13+15	
Blue	N/C	13+16	
White	N/C	13+17	
Yellow	N/C	13+18	
Amber	N/C	13+19	
Clear	N/C	13+20	
Auxiliary Relays			
Control Relay 4 Pole Maximum 2 N.O., 2 N.C.	560.	21	
Time Relay ON Delay	922.	22	
Time Relay OFF Delay	922.	23	
Time Relay ON Delay & Instantaneous	1032.	24	
Time Relay OFF Delay & Instantaneous	1032.	25	
Time Relay ON Delay & OFF Delay	1169.	26	

Ordering & Pricing Example:

VS18TA350694-76 with the following modifications:	VS18TA350694-76	6863.
1 - Hand-Off-Auto Selector Switch	B	264.
1 - Transformer operated Red Pilot with Interlock	13	324.
1 - Transformer operated Green Pilot Light with Interlock	13 + 15	+ 324.
		\$ 7775. Total

A

Modifications

Description	Price	Change Cat. No. Character Indicated To:	Typical Catalog Number
Overload Relay			
	\$		
777 Electronic Motor Management Relay 970	1775.	27	
RM 2000 motor Monitor for use with 777	695.	27A	
Power Circuit			
Standard Capacity - Primary Volts/Hertz:			
220-240/60 or 220/50		-T26	
440-480/60 or 440/50	747.	-T46	
550-600/60 or 550/50		-T56	
200-208/60		-T86	
380/50	1021.	-T35	
220/25		-T22	
440/25	1120.	-T42	
100 Watts Extra - Primary Volts/Hertz:			
220-240/60 or 220/50		-C26	
440-480/60 or 440/50	966.	-C46	
550-600/60 or 550/50		-C56	
200-208/60		-C86	
380/50		-C35	
220/25		-C22	
440/25	1449.	-C42	
Fused Primary (Includes 2 Fuses)	242.	30	
Control Circuit Separate	N/C	31	
Fused Control Circuit, 2 fuses included	242.	32	
3 Phase Voltage Monitor Relay, Phase loss, Phase reversal	2141.	33A	
Digital Power Meter			
* Ammeter 3 Phase			
* Voltmeter 3 Phase			
* Power (KW) Wattmeter			
* Energy (KWH) KWH Meter			
* PF Meter			
* Frequency Meter			
* Reactive Power (KVAR)			
* Digital Power Meter: All functions included in Mod. 35A	3331.	35A	
Contactors MI 320/160A 3 Phase	----	See page A22	
Contactors MI 600/320A 3 Phase	----	See page A22	

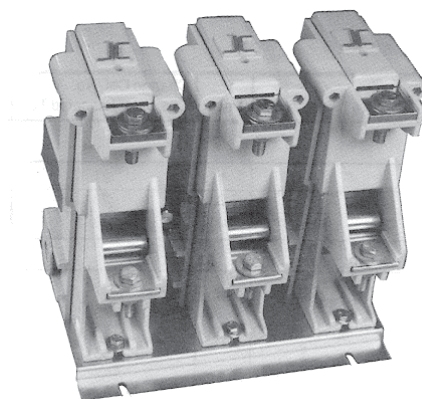
VS 18 A A 3 1 6 0 3 - 46 - ()

Ordering & Pricing Example:

VS18TA350694-76 with the following modifications:	VS18TA350694-76	6863.
1 - 3 Phase Voltage Monitor Relay (Phase loss, Phase reversal)	33A	+2141.
Complete Cat# VS18TA350694-76-33A		\$ 9004. Total

UL Recognition ¹
CSA Certified ¹

Electrically Held
AC or DC Closing
Coils



Ratings Include 2.5, 5.0, 7.2KV,
200, 400, 600, 800 and 1200 Ampere

3 Pole Vacuum Contactors - Bulletin 7707

Ampere Rating	Maximum Horsepower Ratings		Open Type Catalog No.	Price
	.8pf Ind. or Syn. Motor	1.0 pf Syn. Motor		
2500 Volts				
200	900	1000	MVC77U032A25 - *	\$ 3331.
400	1750	2000	MVC77U034A25 - *	3459.
600	2250	2500	MVC77U036A25 - *	4118.
800	2750	-----	SVC77U038A25 - *	8327.
1200	-----	-----	SVC77U031225 - *	9974.
4160 Volts				
200	1500	1750	MVC77U032A50 - *	3468.
400	3000	3500	MVC77U034A50 - *	3605.
600	4500	4750	MVC77U036A50 - *	4200.
800	5500	-----	SVC77U038A50 - *	8455.
1200	-----	-----	SVC77U031250 - *	10394.
6600 Volts				
200	2500	2750	MVC77U032A72 - *	3642.
400	5000	5250	MVC77U034A72 - *	4118.
600	6750	7000	MVC77U036A72 - *	5472.
800	8000	-----	SVC77U038A72 - *	9113.
1200	-----	-----	SVC77U031272 - *	10907.

Note:

1. UL recognized 5KV 500A 7.2KV 400A
CSA Certified 5KV 400A

- Mechanically Interlocked Contactors on Page A41 should be used if short circuit current can flow when switching between two or more contactors.

Ordering Information

- Use complete catalog number when ordering.
- Engineering Data page A43.
- Renewal Parts page A36.

Coil Table

Voltage AC	Suffix	Voltage DC	Suffix
120	-76	125	-125
240	-26	250	-250

A

**UL Recognized
CSA Certified 5KV 400A**

**With Separate
Mechanically Latched
Close and Trip Coils**



Ratings Include 2.5, 5.0, 7.2KV,
200, 400, 600 Ampere

3 Pole Vacuum Contactors - Bulletin 7707

Ampere Rating	Maximum Horsepower Ratings		Open Type Catalog No.	Price
	.8pf Ind. or Syn. Motor	1.0 pf Syn. Motor		
2500 Volts				
200	900	1000	MVCL77U032A25 -*	\$ 4154.
400	1750	2000	MVCL77U034A25 -*	4282.
600	2250	2500	MVCL77U036A25 -*	4850.
1200			MVCL77U031225 -*	10614.
4160 Volts				
200	1500	1750	MVCL77U032A50 -*	4282.
400	3000	3500	MVCL77U034A50 -*	4429.
600	4500	4750	MVCL77U036A50 -*	5014.
1200			MVCL77U031250 -*	10943.
6600 Volts				
200	2500	2750	MVCL77U032A72 -*	4465.
400	5000	5250	MVCL77U034A72 -*	4941.
600	6750	7000	MVCL77U036A72 -*	6295.
1200			MVCL77U031272 -*	12700.

Note:

Mechanically Interlocked Contactors on Page A41 should be used if short circuit current can flow when switching between two or more contactors.

Ordering Information

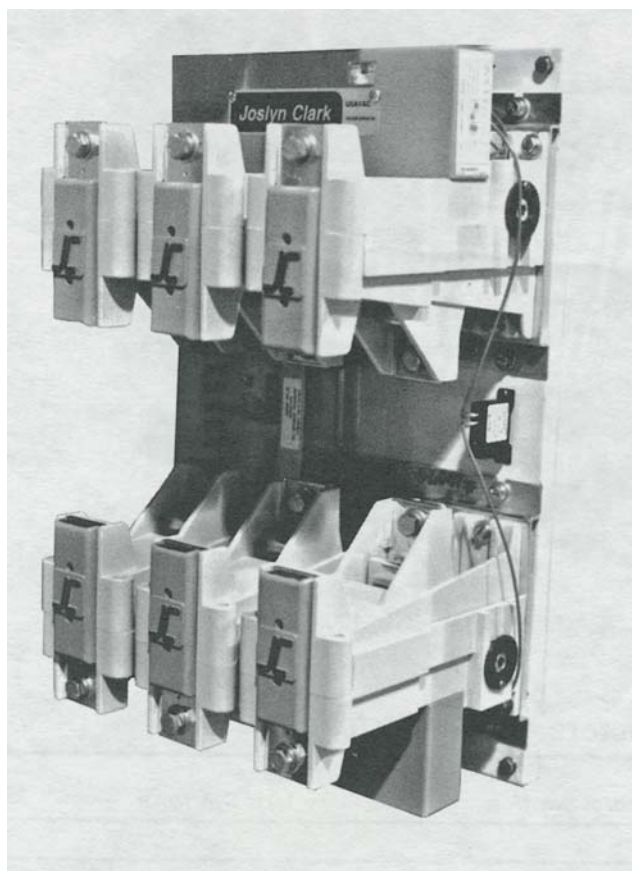
- Use complete catalog number when ordering. Replace the (*) with the suffix from the coil table.
EXAMPLE: MVCL:77UO3450-76-125 (120V AC Close Coil 125V DC Trip Coil)
- Engineering Data page A43.
- Renewal Parts page A36.

Coil Table

Voltage AC	Suffix	Voltage DC	Suffix
120	-76	125	-125
240	-26	250	-250

USAVAC - Medium Voltage Mechanically Interlocked Contactors

A



3 Pole - 3 Pole Mechanically Interlocked - Bulletin 6031

Ampere Rating	Maximum Horsepower Ratings		Open Type Catalog No.	Price
	.8pf Ind. or Syn. Motor	1.0 pf Syn. Motor		
2500V				
200	900	1000	MVC31U032A25 - *	\$ 7759.
400	1795	2000	MVC31U034A25 - *	8015.
600	2250	2500	MVC31U036A25 - *	9150.
4160V				
200	1500	1750	MVC31U032A50 - *	8015.
400	3000	3500	MVC31U034A50 - *	8308.
600	4500	4750	MVC31U036A50 - *	9479.
6600V				
200	2500	2750	MVC31U032A72 - *	8381.
400	5000	5250	MVC31U034A72 - *	9333.
600	6750	7000	MVC31U036A72 - *	12041.

Ordering Information

- Use complete catalog number when ordering.

- Engineering Data page A43.

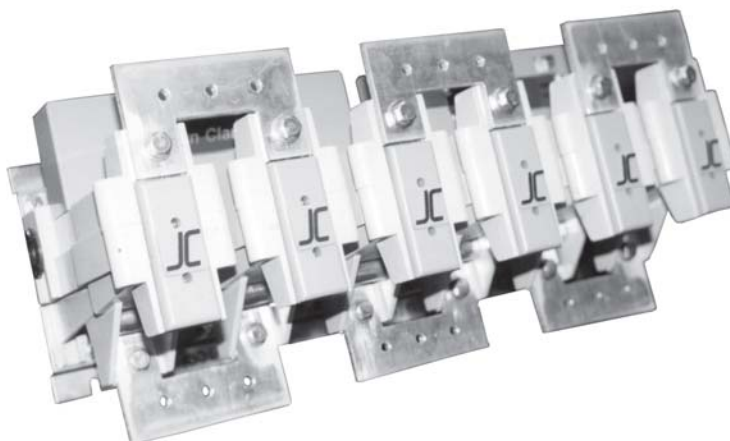
- Renewal Parts Data page A36.

Coil Table

Voltage	Suffix
120	-76
240	-26

Special Purpose Contactors

3000A Single Phase
1200A Three Phase



The following controls are for high current applications such as electric arc and induction furnaces.

Special Purpose Vacuum Contactors - Bulletin 7707

Ampere Rating	Open Type, 2500V Catalog No.	Price	Open Type, 5000V Catalog No.	Price	Open Type, 7200V Catalog No.	Price
1 Pole, Single Phase						
1000	SVC77U011025 - *	\$ 3386.	SVC77U011050 - *	\$ 3935.	SVC77U011072 - *	\$ 4667.
1500	SVC77U011525 - *	5060.	SVC77U011550 - *	5426.	SVC77U011572 - *	6158.
2000	SVC77U012025 - *	6690.	SVC77U012050 - *	7073.	SVC77U012072 - *	8171.
3000	SVC77U013025 - *	10122.	SVC77U013050 - *	10488.	SVC77U013072 - *	11586.
2 Pole, Single Phase						
200	SVC77U022A25 - *	2965.	SVC77U022A50 - *	3102.	SVC77U022A72 - *	3276.
400	SVC77U024A25 - *	3093.	SVC77U024A50 - *	3239.	SVC77U024A72 - *	3752.
600	SVC77U026A25 - *	3752.	SVC77U026A50 - *	3834.	SVC77U026A72 - *	5106.
1000	SVC77U021025 - *	9242.	SVC77U021050 - *	9662.	SVC77U021072 - *	10175.
1500	SVC77U021525 - *	10340.	SVC77U021550 - *	10760.	SVC77U021572 - *	11273.
3 Pole, Three Phase						
800	SVC77U038A25 - *	8327.	SVC77U038A50 - *	8455.	SVC77U038A72 - *	9113.
1200	SVC77U031225 - *	9974.	SVC77U031250 - *	10394.	SVC77U031272 - *	10907.

Ordering Information

- Use complete catalog number when ordering.

- Engineering Data page A43.
- Renewal Parts page A36.

Coil Table

Voltage	Suffix
120	-76
240	-26

Technical Specifications Vacuum Contactor & Starter Ratings

CSA 5KV. 400A

UL Recognized 5KV

500V 7.2KV 400A



Standard - NEMA ICS 2-324, UL 347, CSA 22.2, IEC 470, BS 775

Description	200A	400A	600A	1200A
Catalog Number & 2.5KV	MVC77U032A25	MVC77U034A25	MVC77U036A25	SVC77U031225
Rated Voltage 5.0KV	MVC77U032A50	MVC77U034A50	MVC77U036A50	SVC77U031250
7.2KV	MVC77U032A72	MVC77U034A72	MVC77U036A72	SVC77U031272

A

Power Application Ratings

Voltage KV		2.5	3.3	4.16	6.6
Motor Type	Current	Motor HP			
.8 P.F. Ind. or Syn Motor	200A	900	1250	1500	2500
1.0 P.F. Syn Motor	200A	1000	1500	1750	2750
.8 P.F. Ind. or Syn Motor	400A	1750	2250	3000	5000
1.0 P.F. Syn Motor	400A	2000	2500	3500	5250
.8 P.F. Ind. or Syn Motor	600A	2250	3250	4500	6750
1.0 P.F. Syn Motor	600A	2250	3500	4750	7000
.8 P.F. Ind. or Syn Motor	800A	2750	4000	5500	8000
Transformer Load KVA					
Three Phase Transformer	200A	750	1000	1500	2000
	400A	1500	2000	3000	4000
	600A	2500	3000	4250	6000
	800A	2750	3750	5250	7500
	1200A	4100	5000	7000	10000
Capacitor Load KVAR					
Three Phase Capacitor	200A	550	750	1050	1500
	400A	1125	1500	2250	3000
	600A	1650	2250	3375	4500
	800A	2200	2900	4500	5000
	1200A	2750	3750	5625	7500

Power Ratings

Operational Rated Current	200A	400A	600A	800/1200A
Operational Rated Frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz
E1 Interrupt Rating 2.5KV	20 MVA Equivalent to 4.62 KA			-----
MVA & KA Values 5.0KV	40 MVA Equivalent to 4.62 KA			-----
Contactor Only 7.2KV	60 MVA Equivalent to 4.81 KA			-----
E2 Fuse Co-ordination Rating	400 MVA 45.7 KA RMS			-----
MVA & KA 5.0KV	38R max. fuse size			-----
Withstand KA 5.0KV	57.8 KA - Peak, 38R - Fuse			-----
Short Time Current 1 Sec. KA	6	7	9	12
5 Sec. KA	4	5	6	9
15 Sec. KA	2	2.6	3	6
Switching Frequency	300/Hr			
Elec. Life at Rated Current	.6 x 10 ⁶	.40 x 10 ⁶	.250 x 10 ⁶	.250 x 10 ⁶
Mechanical Life	.75 x 10 ⁶			
Dielectric Strength	20KV 1 min.			
Impulse withstand B.I.L.	1.2 x 50 us			
	60KV			
Chopping Current Max.	.9A			

Control Ratings AC&DC

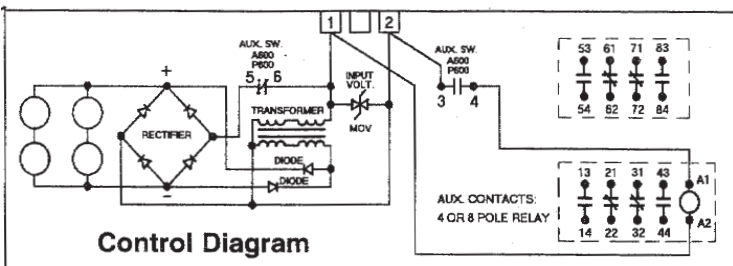
Rated Control Voltage	120/240V 50/60Hz AC	125/250V DC
Allowable Fluctuation	+10-15%	+10-20%
Closing Power VA/Duration	650VA/45MS	1300VA/45MS
Holding Power	7VA AC .47A DC	14VA AC .924A DC
Opening Time Ave.	90 MS at 60Hz	
Closing Time Ave.	40 MS at 60 Hz	
Pick up Voltage Min.	102V or less	
Drop Out Voltage Ave.	70% or less	
Recommended Control Trans.	(AC Only) 300VA	600VA

Application Conditions

Standard	Current	Continuous AC/DC 10A/5A
Auxiliary	Voltage	600V Max. - 48V Min. NEMA A600 (AC) P600 (DC)
Contact	AC	Make/Break 7200VA/720VA
Ratings	DC	Make/Break 125/250V 138VA 300/600V 138VA
Additional	Current	Continuous AC/DC 10A/2.5A
Auxiliary Contact	Voltage	600V Max. - 48 Min. NEMA A600 (AC) Q300 (DC)
Relay Ratings	AC	Make/Break 7200VA/720VA
	DC	Make/Break 125/250V/69VA
Weight	48 lbs. 96 lbs.	

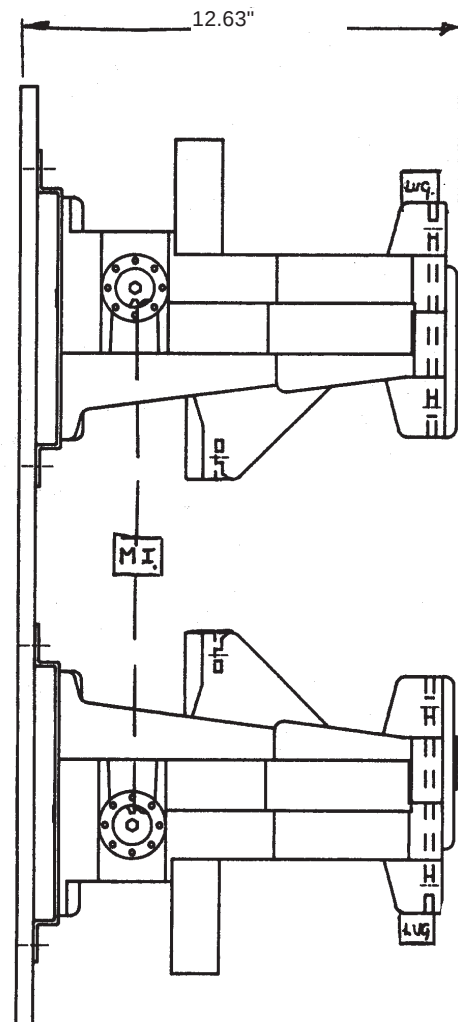
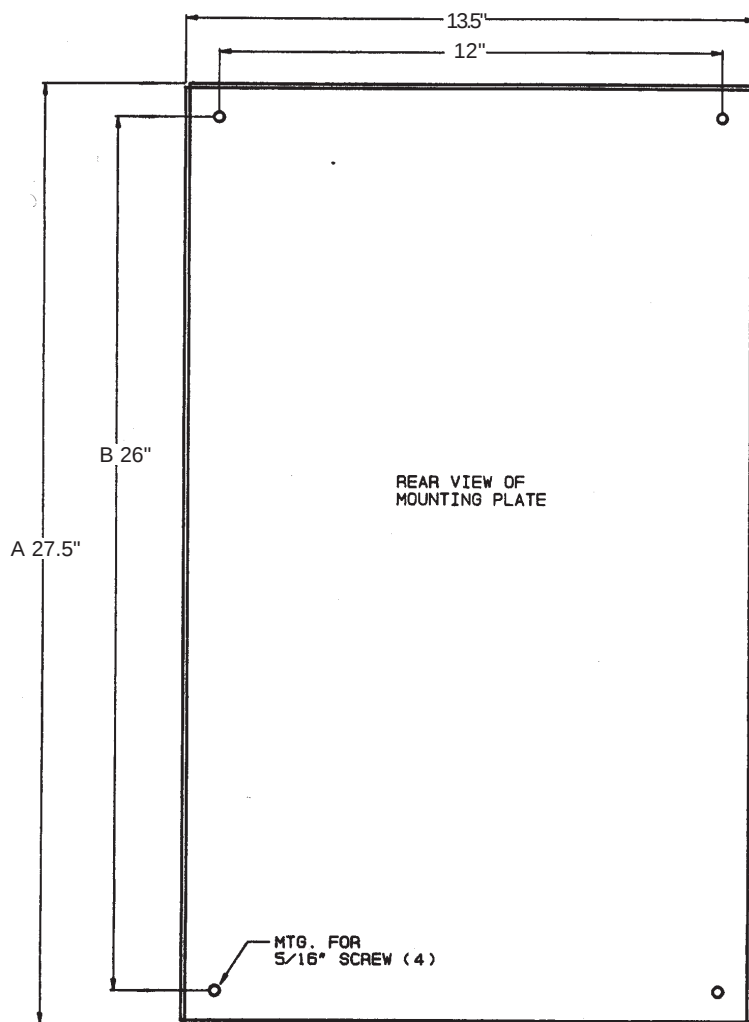
Accessories & Options:

1. 2, 4, & 5 Pole contactors, consult factory.
2. Mechanically interlocked contactors available, page A41.
3. Medium voltage starters available in non-drawout designs in NEMA 12 & 3 enclosures, consult factory.
4. Terminal Lug Kits, page A36.

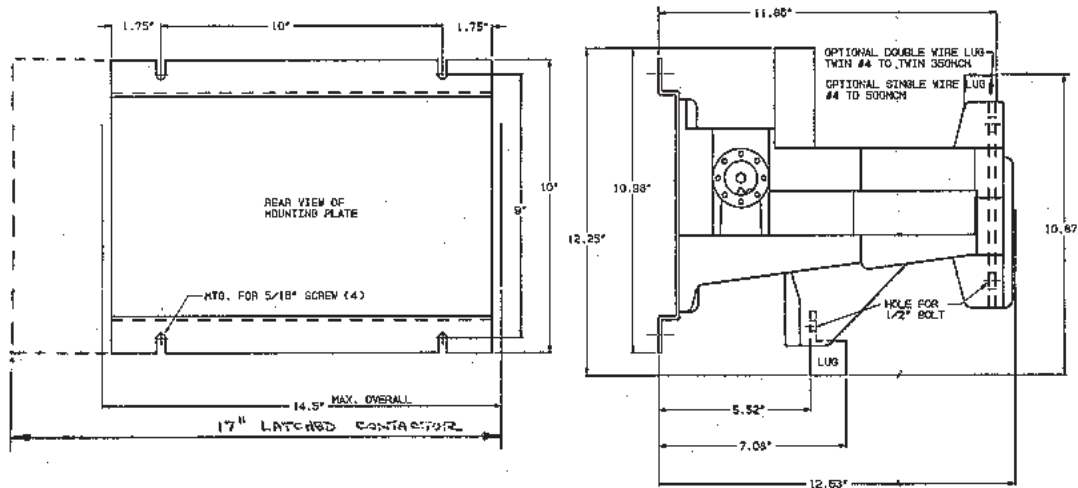


Control Diagram

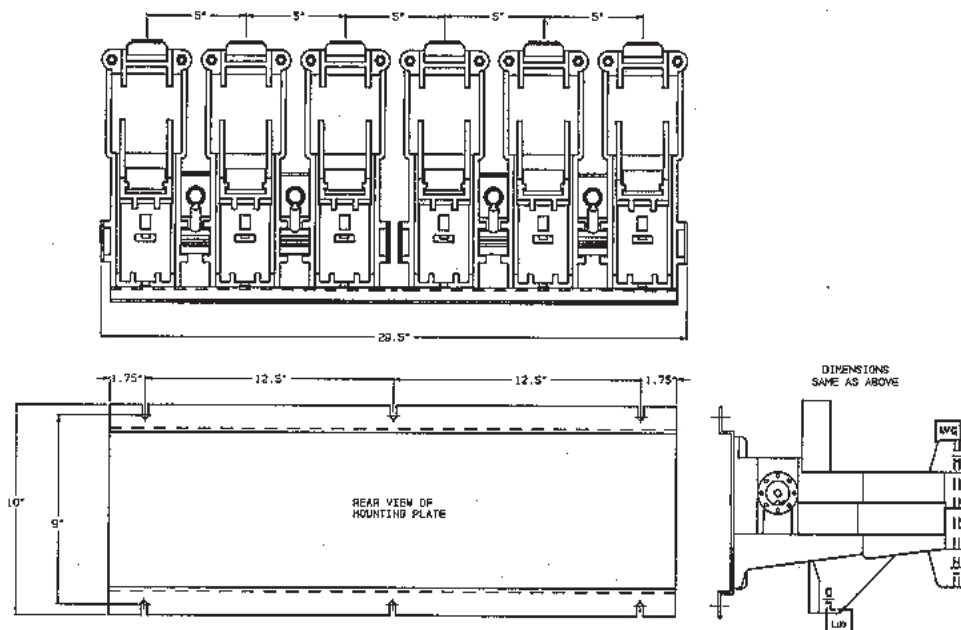
A



- 1 2.5/5.0/7.2 KV 200, 400A
2.5/5.0/7.2 KV 1100A 3 Phase
2.5/5.0/7.2 KV 1000, 1500A 2 Pole
2.5/5.0/7.2 KV 2000, 3000A 1 Pole
- 2 600 AMP
A = 32"
B = 30.5"



2.5/5.0/7.2 KV, 200, 400, 600 Ampere 3 Phase
 2.5/5.0/7.2 KV, 200, 400, 600 Ampere 2 Pole
 2.5/5.0/7.2 KV, 1000, 1500 Ampere 1 Pole



2.5/5.0/7.2 KV 1100A 3 Phase
 2.5/5.0/7.2 KV 1000, 1500A 2 Pole

USAVAC Medium Voltage Controllers

FULL VOLTAGE NON REVERSING - REVERSING

A



**UL 347 LISTED
CSA 2-22 APPROVED**

Free Standing, Single High Compact Vacuum Starter in NEMA 12 Enclosures. Designed to comply with NEMA1CS2-324 Class E 2 controller.

Features Offered:

- Fault Make, Load break visible blade disconnect switch with automatic grounding arm.
- Grounded metal isolation between LV and Medium Voltage Compartments.
- Maintenance free Joslyn Clark Vacuum Contactors.
- Suitably rated current limiting power fuses with striker pins and 3 phase trip bar.
- C.P.T. provided with 2 primary and 1 secondary fuses, 120V secondary.

Ampere Rating	Maximum HP Ratings	NEMA 12 Catalog No.	Price
2300V VACUUM STARTERS With Fused Load Break Disconnect			
160*	125	MVS18TA31A25A-T236	\$17751
160*	150	MVS18TA31A25B-T236	17751
160*	250	MVS18TA31A25C-T236	17751
160*	350	MVS18TA31A25D-T236	17916
160*	500	MVS18TA31A25E-T236	17916
160*	600	MVS18TA31A25F-T236	17952
200	750	MVS18TA32A25A-T236	18026
200	1000	MVS18TA32A25B-T236	18154
320*	1250	MVS18TA33A25A-T236	18483
400	1500	MVS18TA34A25A-T236	21045
600	2250	MVS18TA36A25A-T236	24449

Ampere Rating	Maximum HP Ratings	NEMA 12 Catalog No.	Price
4160V VACUUM STARTERS With Fused Load Break Disconnect			
200	200	MVS18TA32A50A-T416	\$18117
200	350	MVS18TA32A50B-T416	18263
200	400	MVS18TA32A50C-T416	18263
200	500	MVS18TA32A50D-T416	18392
200	600	MVS18TA32A50E-T416	18392
200	750	MVS18TA32A50F-T416	18520
200	1000	MVS18TA32A50G-T416	18520
200	1250	MVS18TA32A50H-T416	18666
200	1500	MVS18TA32A50J-T416	18666
400	3000	MVS18TA34A50A-T416	21594
600	4500	MVS18TA36A50A-T416	25547

Ampere Rating	Maximum HP Ratings	NEMA 12 Catalog No.	Price
7200 V			
200	350	MVS18TA32A72A-T666	\$20313
200	500	MVS18TA32A72B-T666	20313
200	750	MVS18TA32A72C-T666	20679
200	1000	MVS18TA32A72D-T666	20954
200	1500	MVS18TA32A72E-T666	21356
200	2000	MVS18TA32A72F-T666	22582
200	2500	MVS18TA32A72G-T666	23534
400	3500	MVS18TA34A72A-T666	24522
400	5000	MVS18TA34A72B-T666	26901
600	6750	MVS18TA36A72A-T666	32300

NOTE. For Reversing Applications add \$9608. to list prices and change 4th and 5th digit of cat # from 18 to 31.
For Inching or Plugging Duty Refer to Factory.
For Latched Contactors change "MVS" to "MVSL" -- Add \$1281. To List Price & specify Trip Coil Voltage.
* These Starters have 45KV BIL Rating if 60KV Required use 200A or 400A Rated Starters.
For NEMA 3R Rating Change 5th Digit from "T" to "R" & add \$458 to list

Ordering Information

- Engineering Data page A43
- Modification Data page A49 & 50
- Renewal Parts page A36

USAVAC Medium Voltage Controllers



Free standing, single high compact feeder capacitor. Feeder controller to comply with NEMA1CS2-324.

- Fault Make, Load break visible blade disconnect switch with automatic grounding arm.
- Grounded metal isolation between LV and Medium Voltage Compartments.
- Maintenance free Joslyn Clark Vacuum Contactors.
- Suitably rated current limiting power fuses with striker pins and 3 phase trip bar.
- C.P.T. provided with 2 primary and 1 secondary fuses, 120V secondary.

A

Ampere Rating	KVA Ratings	KVAR Rating	Catalog No.	Price
2300V	VACUUM STARTERS With Fused Load Break Disconnect			
200 AMP	750	550	MVF18TA32A25-T236	\$18301
400 AMP	1500	1125	MVF18TA34A25-T236	\$21777
600 AMP	2500	1650	MVF18TA36A25-T236	\$24998
800 AMP	2750	2200	MVF18TA38A25-T236	\$40553
1200 AMP	4100	2750	MVF18TA312A25-T236	\$52667

Ampere Rating	KVA Ratings	KVAR Rating	Catalog No.	Price
4160V	VACUUM STARTERS With Fused Load Break Disconnect			
200 AMP	1500	1050	MVF18TA32A25-T486	\$18940
400 AMP	3000	2250	MVF18TA34A25-T486	\$22326
600 AMP	4250	3375	MVF18TA36A25-T486	\$25547
800 AMP	5250	4500	MVF18TA38A25-T486	\$44579
1200 AMP	7000	5625	MVF18TA312A25-T486	\$54772

Ampere Rating	KVA Ratings	KVAR Rating	Catalog No.	Price
7200V	VACUUM STARTERS With Fused Load Break Disconnect			
200 AMP	2000	1500	MVF18TA32A25-T666	\$21082
400 AMP	4000	3000	MVF18TA34A25-T666	\$25803
600 AMP	6000	4500	MVF18TA36A25-T666	\$30927
800 AMP	7500	5000	MVF18TA38A25-T666	\$50911

- Transformer ratings assume 100% continuous rating for operation at overload ratings Consult Factory

- For latched contactors change "MVF" to "MVFL" add 1281 to list price & specify trip coil voltage.

Ordering Information

- Engineering Data page A43
- Modification Data page A49 & 50
- Renewal Parts page A36

A

Designed for automatic starting of Squirrel Cage Motors when the starting current or torque must be reduced.

Joslyn Clark Reduced Voltage Auto Transformer Starters incorporate equipment exactly as the full voltage starters, with the additional following equipment

- 1- Free Standing Cubicle
Containing :-
- 1- 3 Pole Starting Vacuum Contactor
- 1- 3 Pole Shorting Vacuum Contactor
- 1- Set of Mechanical Interlocks
- 1- 3-Coil Auto-Transformer with 50-65-80% taps.

REDUCED VOLTAGE AUTO TRANSFORMER

NON REVERSING - REVERSING

CLOSED TRANSITION

UL 347 LISTED

CSA 2-22 APPROVED



2300V RVAT Starters With Fused Motor Load Break Disconnect

Max HP	Cat # NEMA 12	List Price	Max HP	Cat # NEMA 12	List Price
*100	MVS83TA31A25A-T236	\$32226.	*1250	MVS83TA33A25F-T236	\$40013.
*200	MVS83TA31A25B-T236	33050.	1500	MVS83TA34A25G-T236	41248.
*400	MVS83TA31A25C-T236	34953.	1750	MVS83TA36A25H-T236	43554.
*900	MVS83TA33A25D-T236	36637.	2000	MVS83TA36A25J-T236	45338.
*1000	MVS83TA33A25E-T236	38522.	2250	MVS83TA36A25K-T236	46976.

4160V RVAT Starters With Fused Motor Load Break Disconnect

100	MVS83TA32A50A-T416	\$33398.	2000	MVS83TA34A50J-T416	\$46482.
200	MVS83TA32A50B-T416	34203.	2250	MVS83TA34A50K-T416	48111.
400	MVS83TA32A50C-T416	36051.	2500	MVS83TA34A50L-T416	49593.
900	MVS83TA32A50D-T416	37844.	3000	MVS83TA34A50M-T416	51149.
1000	MVS83TA32A50E-T416	39674.	3500	MVS83TA36A50N-T416	52411.
1250	MVS83TA32A50F-T416	41157.	4000	MVS83TA36A50P-T416	53573.
1500	MVS83TA32A50G-T416	43261.	4500	MVS83TA36A50R-T416	54809.
1750	MVS83TA34A50H-T416	45110.			

6600V RVAT Starter With Fused Motor Load Break Disconnect

1000	MVS83TA32A72E-T666	\$45659.	4000	MVS83TA34A72P-T666	\$61580.
1500	MVS83TA32A72G-T666	49758.	5000	MVS83TA34A72S-T666	63959.
2000	MVS83TA32A72J-T666	53573.	6000	MVS83TA36A72T-T666	66887.
2500	MVS83TA32A72L-T666	57032.	6750	MVS83TA36A72V-T666	70455.
3000	MVS83TA34A72M-T666	58835.			

NOTE.

For NEMA 3R Replace 6th cat.# digit 'T' with 'R' and add \$458. to list price.

For Reversing Applications add \$13725. to list prices and change 4th and 5th digit of cat# from 83 to 86

For Inching or Plugging Duty Refer to Factory.

For Latched Contactor Change "MVS" to "MVSL" - - - Add \$1464. to list price & specify trip volt voltage, refer controlog page A40.

* These Starters have 45KV BIL Rating for, 60KV Rating - - - Add \$1556. to list price change cat# after TA31 to TA32 or TA33 to TA34.

Ordering Information

● Engineering Data page A43

● Renewal Parts page A36.

● Modification Page A49 & 50

Modifications For Combination USAVAC Medium Voltage Controllers

Description	Enclosed Type NEMA 1, 3R, 12	Change Cat. No. Character Indicated To:	Typical Catalog Number
Cover Controls			
Push Button & Selector Switches			
Hand-Off-Auto Selector Switch	\$ 264.	B	
Start-Stop Push Buttons		C	
2 or 3 Position Selector Switch	264.	B	
Forward-Reverse-Stop Push Buttons		C	
Pilot Lights			
With Electrical Interlock:			
Standard Transformer Type, Red Lens	324.	13	
Push-to-Test Transformer Type, Red Lens	504.	14	
Modification 13-14. Lens color. Example: Order (13+15) = Std. Transformer with interlock & color lens			
Green, Green	N/C	(13 + 15)	
Example Blue	N/C	(13 + 16)	
Pilot Light Red Lens -13	White	(13 + 17)	
Pilot Light Red Lens -(13 + 15)	Yellow	(13 + 18)	
	Amber	(13 + 19)	
	Clear	(13 + 20)	
Auxiliary Relays			
Control Relay 4 Pole 2 N.O., 2 N.C.	612.	21	
Time Relay ON Delay	1008.	22	
Time Relay OFF Delay	1008.	23	
Time Relay ON Delay & Instantaneous	1128.	24	
Time Relay OFF Delay & Instantaneous	1128.	25	
Time Relay ON Delay & OFF Delay	1278	26	
Overload Relays			
7777 Electronic Motor Management Relay • (Includes Ground Fault Protection) No RTD Protected	1775.	27	
• RM 2000 Motor Monitor (for use with 777 Relay) Option 27	695.	27A	
• 269+ Motor Management Relay Current Only	11895.	31	
• 369+ Motor Management Relay Current Only	12261.	31A	
• 369+ Motor Management Relay Current & Voltage	17660.	31B	
• 469 + Motor Management Relay Drawout Case	21045.	30	
• PQM Power Quality Meter	5856.	29	
• Transformer Feeder Relay 745	25163.	62	

Includes C/TS & P/T's

Incoming & Auxilliary Cubicle Options

12" Cable Pull Section	2837	53	
18" Cable Pull Section	3074	54	
24" Cable Pull Section (use with option #29)	3569	55	
400A Incoming Section Unit Unfused	6002	56	
400A Incoming Section Unit Fused	8162	57	
600A Incoming Section Unit Unfused	9333	58	
600A Incoming Section Unit Fused	11621	59	
1200A Incoming Section Unit Unfused	22509	60	
1200A Incoming Section Unit Fused	30012	61	

A

Description	Price	Change Cat. No. Character Indicated To:	Typical Catalog Number
3 Phase Voltage Monitor Relay, Phase loss, Phase reversal	<u>2141.</u>	33A	MVS18T A 32A25-T236-
<u>Digital Power Meter</u>			
*Ammeter 3 Phase			
*Voltmeter 3 Phase			
*Power (KW) Wattmeter			
*Energy (KWH) KWH Meter			
*PF Meter			
*Frequency Meter			
*Reactive Power (KVAR)			
Elapsed Time Meter	<u>637.</u>	38	
Operations Counter 8 digit	<u>637.</u>	41	
Lightning Surge Protector	<u>1610.</u>		
Overhead Bus 800A/Cubicle (24" Length)	<u>1288.</u>	47	
Overhead Bus 1200A/Cubicle (24" Length)	<u>2174.</u>	48	
Overhead Bus 1600A/Cubicle (24" Length)	<u>4107.</u>	49	
* A ground Bus is included in busbar prices.			
Overhead Bus 800A (36" Length) 30 or 36	1793.	50	
Overhead Bus 1200A (36" Length) 30 or 36	2727.	51	
Overhead Bus 1600A (36" Length) 30 or 36	5087.	52	

Ordering & Pricing Example:

MVS18TA2A25-T236 with the following modifications:

MVS18TA32A25-T236 **\$18026**

1 - Hand-Off-Auto Selector Switch B 264.

1- Transformer operated Red Pilot with Interlock 13 324.

1- Transformer operated Green Pilot with Interlock (13 + 15) 324.

Complete Cat. # is MVS18TA32A25-T236-33A-35A-41

\$18938 Total**Ordering & Pricing Example:**

MVS18TA2A25-T236 with the following modifications

MVS18TA32A25-T236 **\$18026**

1 - 3 Phase Voltage Monitor Relay, Phase loss, Phase reversal 33A .. 2141.

1- Operations Counter 8 Digit 41 637.

Digital Power Meter 35A .. 3331.

1-777 Electronic Motor Management Relay 27 .. 1775.

1-Rm 2000 Motor Monitor 27A 695.

\$26605 Total

Complete Cat. # is MVS18TA32A25-T236-33A-35A-41

Description	PageNumber
General Information - TM	B2
AC Magnetic Contactors - TM	B5
AC Magnetic Reversing Contactors - TM	B6
AC Magnetic Starters - TM	B7
AC Magnetic Reversing Starters - TM	B8
AC Magnetic Two Speed Starters - TM	B9
General Information Combination Units - TM	B10
AC Magnetic Combination Starters - TM	B13
AC Magnetic Combination Reversing Starters - TM	B18
AC Magnetic Two Speed Combination Starters - TM	B20
AC Magnetic Reduced Voltage A/T Starters - TM	B26
AC Magnetic Wye Delta Starters - TM	B26
AC Magnetic Part Winding Starters - TM	B27
AC Pump Panels - Simplex	B28
AC Panel Mounted Overload Relay	B30
Heater Tables, TM, HP Starter	B32
Factory Modifications - TM	B36
Field Modifications - TM	B39
Renewal Parts - TM	B42
Dimensions - TM	B43
Engineering Data - Diagrams	B50
Catalog Ordering Data	B60
Series 5000 AC NEMA Rated Contactors	B65



B

B

Auxiliary Contacts - Auxiliary contact blocks may be added with the starter in place, without tools. The same block is used on sizes 00 thru size 4 as either N.O. or N.C.. A total of 4 auxiliary contacts can be added. The addition of side mounting kits allows a total of 8 auxiliary contacts through size 4.

Operating Coils - All coils are encapsulated. Size 00 thru 4 are plug-in type and each is factory tested twice, for long reliable service. Coil changes are not required for any combination of add-on accessories.

Power Wiring - Up-front terminals and straight through design make power wiring easy. As few as 3 connection points per pole reduces the possibility of loose connections and contributes to the reliability of the starter.

Power Pole - Full rated power poles, N.O. or N.C. through NEMA size 4, may be field added, without coil change. A tie pole with 2 N.O. contacts is available for two-speed single winding (consequent pole) motor applications.

Contact Inspection - Loosen 2 captive screws and remove the contact carrier, through size 4.

Adapter Plate - Allows use of Type TM starters in place of other make s thru size 2, without drilling new mounting holes. The adapter plate holes align with those of most other starters thru size 2 - proof of the TM compact design.

Overload Relay - Available with ambient compensation (green reset rod) or non-ambient compensation (red reset rod). An easily accessible + 15, adjustment knob can be locked at the 100% setting. High accuracy of repetitive trip is assured by factory testing every unit twice.

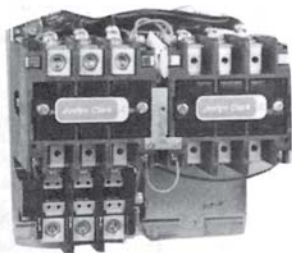
Heaters - Heater numbers are stamped on the surface for easy identification. The same heaters are used for TM & HP series overload relays for both ambient and non-ambient compensated overload relays.

Reliability - The basic contactor design, using polysulphone and teflon guides, melamine and rosite moldings along with stainless steel springs, provides exceptional electrical and mechanical life. The operating state is clearly visible from the front, indicated by the position of the contact carrier. The contactor is easily operated from the front for circuit checking.

Versatility - • Uniform mounting dimensions • Add-on auxiliary contacts • Plug-in coils Accessories, such as power pole, mechanical interlock provides maximum versatility and flexibility of inventory panel layout and installation. Self-rising saddle-clamps are included on all control terminals for quick wiring.



B

3
8
0

Compact Size - Integral overload relay design, with straight through power cable design, provides compact overall size. Straight through wiring reduces overall panel area for a NEMA wired device. Uniform mounting dimensions, along with mechanical interlock design, makes reversing devices and other mechanically interlock devices the same height and depth as nonreversing. This allows intermixing in rows and saves panel space.

Uniform Mounting Dimensions - Only 2 mounting plate sizes for 00 through 4 starters. One mounting plate for sizes 00-2, the second for sizes 3 & 4. This provides great flexibility for intermixing starter sizes in rows and reduces panel layout time.

Pilot Device Kits - Operator devices may be added in the field. Push button and pilot light kits for non-combination enclosures are suitable for use in NEMA Type 1, 4 & 12. This simplifies selection and increases flexibility.

B

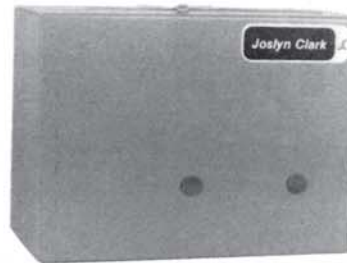
Non-Reversing

- Bulletin 6013 NEMA Starters.
- Bulletin 7707 NEMA Contactors.
- NEMA Size 00-6.
- NEMA Type 1, 4 & 12 Enclosures.
- NEMA Size 00-2.
- NEMA Type 3R Enclosure.
- Bulletin 6013 Starters are available single phase through size 2P, 3 phase through size 6.
- Bulletin 7707 Contactors are available 2 & 3 pole through size 6 and 4 pole thru size 4.



Reversing

- Bulletin 6030 NEMA Starters.
- Bulletin 6031 NEMA Contactors.
- NEMA Size 00-6.
- NEMA Type 1, 4, 12 Enclosures
- Bulletin 6030 reversing starters and Bulletin 6031 reversing contactors include mechanical and electrical interlocks.



Multi-Speed

- Bulletin 6050 NEMA Starters.
- NEMA Size 0-5.
- NEMA Type 1, 4 & 12 Enclosures.
- Bulletin 6050 multi-speed starters are designed for two-speed, single winding (consequent pole) and two-speed, two winding (separate winding) motor applications.
- Mechanical and electrical interlocks are included.
- Starters for three and four speed motor applications can also be supplied.





B

AC Contactors - Bulletin 7707 TM

1-Pole, Single Phase

NEMA Size	Maximum Motor Horsepower Rating			Starter Amps. Continuous	NEMA Type 1 General Purpose Enclosure		NEMA Type 4 Watertight Enclosure		NEMA Type 12 Industrial - Dust-tight Enclosure		Open Type	
	115V	200V	230V		Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
00	1/3	----	1	9	T77A01A - *	\$ 228.	Use Size 0	\$	Use Size 0	\$	T77U01A - *	\$ 204.
0	1	----	2	18	T77A010 - *	300.	T77W010 - *	720.	T77T010 - *	444.	T77U010 - *	276.
1	2	----	3	27	T77A011 - *	360.	T77W011 - *	792.	T77T011 - *	504.	T77U011 - *	336.

2 Pole, Single Phase

00	1/3	----	1	9	T77A02A - *	264.	Use Size 0		Use Size 0		T77U02A - *	240.
0	1	----	2	18	T77A020 - *	336.	T77W020 - *	748.	T77T020 - *	480.	T77U020 - *	312.
1	2	----	3	27	T77A021 - *	396.	T77W021 - *	828.	T77T021 - *	540.	T77U021 - *	372.
2	3	----	7 1/2	45	T77A022 - *	816.	T77W022 - *	1680.	T77T022 - *	1080.	T77U022 - *	696.
3	7 1/2	----	15	90	T77A023 - *	1344.	T77W023 - *	2568.	T77T023 - *	1656.	T77U023 - *	1104.

3 Pole, Three Phase

NEMA Size	200V	230V	460-575V	Continuous				
00	1 1/2	1 1/2	2	9	T77A03A - *	300.	Use Size 0	Use Size 0
0	3	3	5	18	T77A030 - *	372.	T77W030 - *	516.
1	7 1/2	7 1/2	10	27	T77A031 - *	432.	T77W031 - *	576.
2	10	15	25	45	T77A032 - *	864.	T77W032 - *	1128.
3	25	30	50	90	T77A033 - *	1440.	T77W033 - *	1752.
4	40	50	100	135	T77A034 - *	3384.	T77W034 - *	4416.
5	75	100	200	270	U77A035 ² *	7200.	U77W035 ² *	9840.
6	150	200	400	540				9840.

See Vacuum Contactors in Section A

4 Pole, Three Phase

0	3	3	5	18	T77A040 - *	468.	T77W040 - *	900.	T77T040 - *	612.	T77U040 - *	444.
1	7 1/2	7 1/2	10	27	T77A041 - *	528.	T77W041 - *	960.	T77T041 - *	672.	T77U041 - *	504.
2	10	15	25	45	T77A042 - *	1080.	T77W042 - *	2280.	T77T042 - *	1344.	T77U042 - *	960.
3	25	30	50	90	T77A043 - *	1776.	T77W043 - *	3336.	T77T043 - *	2088.	T77U043 - *	1536.
4	40	50	100	135	T77A044 - *	4500.	T77W044 - *	7464.	T77T044 - *	5904.	T77U044 - *	4008.
5	75	100	200	270								
6	150	200	400	540								

Consult Factory or See Vacuum Contactors in Section A

Consult Factory or See Vacuum Contactors in Section A

Note: 1. Price includes contactor complete with one N.O. control-circuit contact.

2. This unit replaces T77 (size 5) and is not interchangeable.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from coil table.

- Engineering Data - see Page B50
- Modifications - see Page B36
- Renewal Parts - see Page B42
- Dimensions - see Page B43

Coil Volt/Hertz

Suffix

24/60 or 24/50

-96

110-120/60 or 110/50

-76

220-240/60 or 220/50

-26

440-480/60 or 440/50

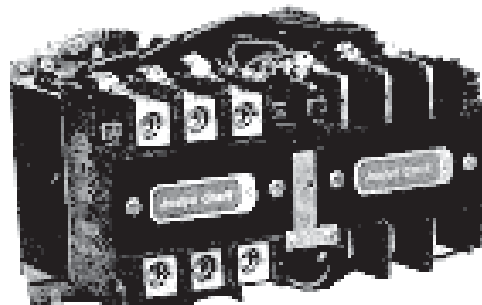
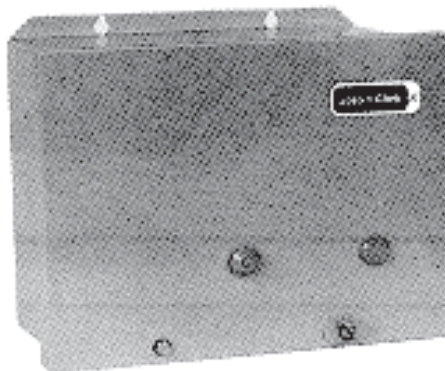
-46

550-600/60 or 550/50

-56

200-208/60

-86



AC Reversing Contactors - Bulletin 6031 TM

3 Pole, Three Phase

NEMA Size	Maximum Motor Horsepower Rating ²			NEMA Type 1 General Purpose Enclosure		NEMA Type 4 Watertight Enclosure		NEMA Type 12 Industrial - Dust-tight Enclosure		Open Type	
	200V	230V	460-575V	Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
00	1 ½	1 ½	2	T31A03A - *	\$ 768.	T31W03A - *	\$ 1320.	Use Size 0	\$	T31U03A - *	\$ 720.
0	3	3	5	T31A030 - *	912.	T31W030 - *	1464.	T31T030 - *	1128.	T31U030 - *	864.
1	7 ½	7 ½	10	T31A031 - *	1056.	T31W031 - *	1824.	T31T031 - *	1272.	T31U031 - *	984.
2	10	15	25	T31A032 - *	2064.	T31W032 - *	3312.	T31T032 - *	2424.	T31U032 - *	1872.
3	25	30	50	T31A033 - *	3454.	T31W033 - *	5292.	T31T033 - *	4236.	T31U033 - *	3108.
4	40	50	100	T31A034 - *	8376.	T31W034 - *	11640.	T31T034 - *	9600.	T31U034 - *	7752.
5 ²	75	100	200	U31A035 - ³ *	17592.	U31W035 - ³ *	20232.	U31T035 - ³ *	20232.	U31U035 - ³ *	13980.
6	150	200	400								

See Vacuum Contactors in Section A

Plug-Stop or Jogging Duty NEMA ICS 2-321-3

NEMA Size	Horsepower Ratings - Three Phase, 60Hz			
	200V	230V	380V	460/575V
0	1 ½	1 ½	1 ½	2
1	3	3	5	5
2	7 ½	7 ½	15	15
3	15	15	30	30
4	25	30	50	60
5	60	75	125	150
6	125	1050	250	300

Notes:

- Price includes contactor complete with one N.O. contact on each contactor. All contactors are mechanically and electrically interlocked.
- For plug-stop or jogging duty, where operations exceed 5 times a minute, contactor size should be chosen in accordance with NEMA Standard ICS 2-321-3, as listed in table.
- This unit replaces T77 (size 5) and is not interchangeable.

Ordering Information

Coil Volt/Hertz

Suffix

- Use complete catalog number. Replace the (*) with the suffix from coil table.

- Engineering Data - see Page B50
- Modifications - see Page B36
- Renewal Parts - see Page B42
- Dimensions - see Page B43

24/60 or 24/50

-96

110-120/60 or 110/50

-76

220-240/60 or 220/50

-26

440-480/60 or 440/50

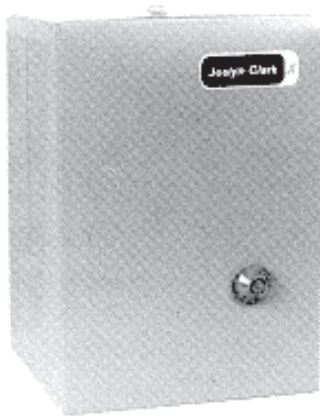
-46

550-600/60 or 550/50

-56

200-208/60

-86



B

AC Non-Reversing Starters - Bulletin 6013 TM

2 Pole, Single Phase (requires 1 overload heater)

NEMA Size	Maximum Motor Horsepower Rating				NEMA Type 1 General Purpose Enclosure Catalog No.	Price ¹	NEMA Type 4 Watertight Enclosure Catalog No.	Price ¹	NEMA Type 12 Industrial - Dust-tight Enclosure Catalog No.	Price ¹	Open Type	
	115V	200V	230V	Continuous							Catalog No.	Price ¹
00	1/3	----	1	9	T13AA2A - *	\$ 348.	Use size 0	\$	Use Size 0	\$	T13U02A - *	\$ 324.
0	1	----	2	18	T13AA20 - *	390.	T13WA20 - *	910.	T13TA20 - *	534.	T13U020 - *	366.
1	2	----	3	27	T13AA21 - *	450.	T13WA21 - *	882.	T13TA21 - *	594.	T13U021 - *	426.
1P	3	----	5	----	T13AA2P - *	582.	T13WA2P - *	1014.	T13TA2P - *	726.	T13U02P - *	558.
2	3	----	7 1/2	45	-----	----	-----	----	-----	----	T13U022 - *	774.

3 Pole, Three Phase (requires 3 overload heaters)

NEMA Size	200V	230V	460- 575V	Contin- uous								
00	1 1/2	1 1/2	2	9	T13AA3A - *	348.	Usesize0		UseSize0		T13U03A - *	324.
0	3	3	5	18	T13AA30 - *	432.	T13WA30 - *	852.	T13TA30 - *	576.	T13U030 - *	408.
1	7 1/2	7 1/2	10	27	T13AA31 - *	492.	T13WA31 - *	924.	T13TA31 - *	636.	T13U031 - *	468.
2	10	15	25	45	T13AA32 - *	972.	T13WA32 - *	1836.	T13TA32 - *	1236.	T13U032 - *	852.
3	25	30	50	90	T13AA33 - *	1620.	T13WA33 - *	2844.	T13TA33 - *	1932.	T13U033 - *	1380.
4	40	50	100	135	T13AA34 - *	3660.	T13WA34 - *	5748.	T13TA34 - *	4692.	T13U034 - *	3156.
5 ²	75	100	200	270	U13AA35 ² *	8634.	U13WA35 ² *	11274.	U13TA35 ² *	11274.	U13U035 ² *	7710.
6	150	200	400	540	See Vacuum Contactors in Section A							

See Vacuum Contactors in Section A

Note:

1. Price includes starter complete with one N.O. contact on each contactor and 3 phase overload relay less heaters.
2. This unit replaces T77 (size 5) and is not interchangeable.
3. For Ambient Compensated overload see B37.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from coil table. Order heaters at \$18 each.

- Engineering Data - see Page B50
- Modifications - see Page B36
- Renewal Parts - see Page B42
- Heater Tables - see Page B33
- Dimensions - see Page B44

Coil Volt/Hertz

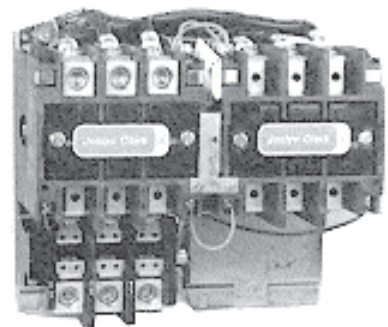
24/60 or 24/50
110-120/60 or 110/50
220-240/60 or 220/50
440-480/60 or 440/50
550-600/60 or 550/50
200-208/60

Suffix

-96
-76
-26
-46
-56
-86



B



AC Reversing Starters - Bulletin 6030 TM

3 Pole, Three Phase (requires 3 overload heaters)

NEMA Size	Maximum Motor Horsepower Rating ²			NEMA 1 General Purpose Enclosure		NEMA 4 Watertight Enclosure		NEMA 12 Industrial - Dust-tight Enclosure		Open Type Enclosure	
	200V	230V	460-575V	Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
00	1 1/2	1 1/2	2	T30AA3A - *	\$ 828.	T30WA3A - *	\$ 1380.	Use Size 0	\$	T30U03A - *	\$ 780.
0	3	3	5	T30AA30 - *	972.	T30WA30 - *	1524.	T30TA30 - *	1188.	T30U030 - *	924.
1	7 1/2	7 1/2	10	T30AA31 - *	1116.	T30WA31 - *	1884.	T30TA31 - *	1332.	T30U031 - *	1044.
2	10	15	25	T30AA32 - *	2172.	T30WA32 - *	3420.	T30TA32 - *	2532.	T30U032 - *	1980.
3	25	30	50	T30AA33 - *	3624.	T30WA33 - *	5472.	T30TA33 - *	4416.	T30U033 - *	3288.
4	40	50	100	T30AA34 - *	8652.	T30WA34 - *	11916.	T30TA34 - *	9876.	T30U034 - *	8028.
5	75	100	200	U30AA35 ³ *	19038.	U30WA35 ³ *	21678.	U30TA35 ³ *	21678.	U30U035 ³ *	15426.
6	150	200	400								

See Vacuum Contactors in Section A

Note:

1. Includes starter complete with one N.O. contact on each contactor and 3 phase overload relay less heaters. All starters are mechanically and electrically interlocked.
2. For plug-stop or jogging duty or where operations exceed 5 per minute, starter sizes should be chosen in accordance with NEMA Standard ICS 2-321-3, as listed in table.
3. This unit replaces T77 (size 5) and is not interchangeable.
4. For Ambient Compensated overload see B37.

Plug-Stop or Jogging Duty NEMA ICS 2-321-3

NEMA Size	Horsepower Ratings - Three Phase			
	200V 60 Hz	230V 60 Hz	380V 50 Hz	460/575V 60 Hz
0	1 1/2	1 1/2	1 1/2	2
1	3	3	5	5
2	7 1/2	10	15	15
3	15	20	30	30
4	25	30	50	60
5	60	75	125	150
6	125	150	250	300

Ordering Information

Coil Volt/Hertz

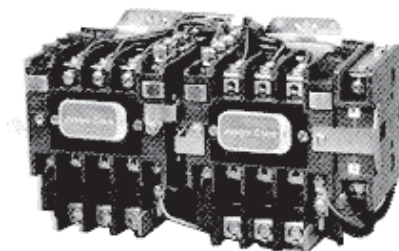
Suffix

- Use complete catalog number. Replace the (*) with the suffix from coil table. Order heaters at \$18 each.

- Engineering Data - see Page B50
- Modifications - see Page B36
- Renewal Parts - see Page B42
- Heater Tables - see Page B33
- Dimensions - see Page B45

24/60 or 24/50	-96
110-120/60 or 110/50	-76
220-240/60 or 220/50	-26
440-480/60 or 440/50	-46
550-600/60 or 550/50	-56
200-208/60	-86

3
7
5



B

AC Two Speed Non Combination Starters - Bulletin 6050

2 Speed, Single Winding (consequent pole)

NEMA Size	Maximum Motor Horsepower Rating			NEMA 1 General Purpose Enclosure		NEMA 4 Watertight Enclosure		NEMA 12 Industrial - Dust-tight Enclosure		Open Type	
	Constant or Variable Torque (Constant Horsepower)			Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
	200V	230V	460-575V								
0	3 (2)	3 (2)	5 (3)	T50AA0C2 - *	\$ 1848.	T50WA0C2 - *	\$3000.	T50TA0C2 - *	\$ 2220.	T50UO0C2 - *	\$ 1800.
1	7 1/2 (5)	7 1/2 (5)	10 (7 1/2)	T50AA1C2 - *	1992.	T50WA1C2 - *	3120.	T50TA1C2 - *	2364.	T50UO1C2 - *	1920.
2	10 (7 1/2)	15 (10)	25 (20)	T50AA2C2 - *	3624.	T50WA2C2 - *	5016.	T50TA2C2 - *	4152.	T50UO2C2 - *	3408.
3	25 (20)	30 (20)	50 (40)	T50AA3C2 - *	5472.	T50WA3C2 - *	7536.	T50TA3C2 - *	6672.	T50UO3C2 - *	5136.
4	40 (30)	50 (40)	100 (75)	T50AA4C2 - *	14616.	T50WA4C2 - *	18840.	T50TA4C2 - *	16992.	T50UO4C2 - *	13296.
5	75 (60)	100 (75)	200 (150)	Consult Factory							

2 Speed, Double Winding (separate winding)

0	3 (2)	3 (2)	5 (3)	T50AA0S2 - *	1320.	T50WA0S2 - *	2472.	T50TA0S2 - *	1692.	T50UO0S2 - *	1272.
1	7 1/2 (50)	7 1/2 (5)	10 (7 1/2)	T50AA1S2 - *	1488.	T50WA1S2 - *	2616.	T50TA1S2 - *	1860.	T50UO1S2 - *	1416.
2	10 (7 1/2)	15 (10)	25 (20)	T50AA2S2 - *	2664.	T50WA2S2 - *	4080.	T50TA2S2 - *	3192.	T50UO2S2 - *	2472.
3	25 (20)	30 (20)	50 (40)	T50AA3S2 - *	4176.	T50WA3S2 - *	6240.	T50TA3S2 - *	5376.	T50UO3S2 - *	3840.
4	40 (30)	50 (40)	100 (75)	T50AA4S2 - *	10248.	T50WA4S2 - *	14472.	T50TA4S2 - *	12624.	T50UO4S2 - *	9624.
5	75 (60)	100 (75)	200 (150)	Consult Factory							

Note:

1. Includes starter complete with one N.O. contact on each contactor and two 3 phase overload relays less heaters. All starters are mechanically and electrically interlocked. Six (6) heaters are required, 3 for each speed rated for HP ratings.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from coil table. Order heaters at \$18 each.

- Engineering Data - see Page B50
- Modifications - see Page B36
- Renewal Parts - see Page B42
- Heater Tables - see Page B33
- Dimensions - see Page B46

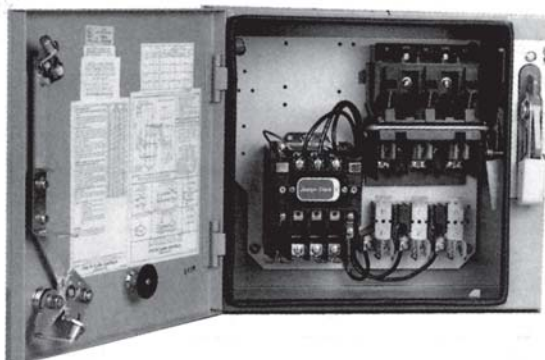
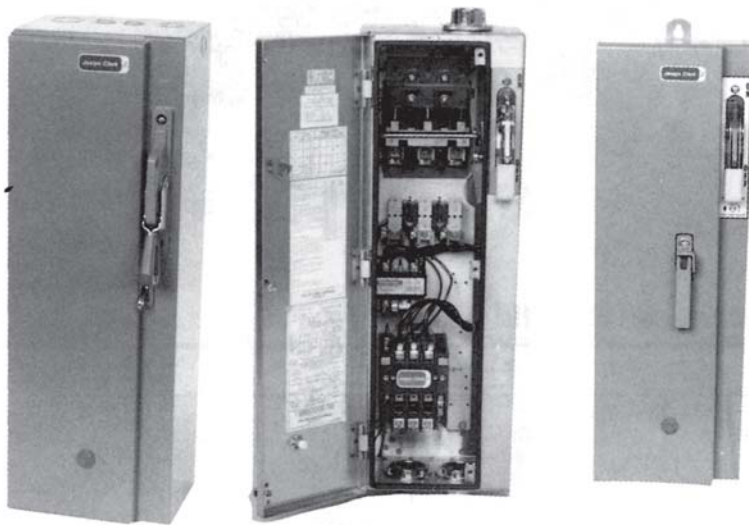
Coil Volt/Hertz

24/60 or 24/50
110-120/60 or 110/50
220-240/60 or 220/50
440-480/60 or 440/50
550-600/60 or 550/50
200-208/60

Suffix

-96
-76
-26
-46
-56
-86

Combination Starters & Contactors



Non-Reversing

- Bulletin 6018 with disconnect switch, fusible and non-fusible.
- Bulletin 6020 with Circuit Breaker 250V thermal magnetic trip breaker or 600V adjustable magnetic trip MCP. breaker.
- NEMA Size 0-6.
- NEMA 1, 4 & 12 enclosures.
- Choose standard, compact or extra-wide enclosure style of enclosure for Sizes 0, 1 & 2.
- All three styles are available in NEMA 1, 4 & 12 enclosure.
- Sizes 3 & 4 are available in standard and extra-wide enclosure styles.
- Size 6 is supplied in the standard enclosure style and includes Vacuum contactor.
- Each starter includes disconnect device and TM non-reversing starter.
- Extensive field modification kits and factory installed modifications are available.

Reversing

- Bulletin 6038 with disconnect switch, fusible and non-fusible.
- Bulletin 6040 with circuit breaker.
- 250V thermal magnetic trip breaker or 600V adjustable trip MCP. breaker.
- NEMA Size 0-5.
- NEMA 1, 4 & 12 Enclosures.
- Each includes disconnect device and TM reversing starter.
- Extensive field modification kits and factory installed modifications are available.

Multi-Speed

- Bulletin 6058 with disconnect switch, fusible and non-fusible.
- Bulletin 6060 with Circuit Breaker.
- 600V MCP. breaker.
- NEMA Size 0-6.
- NEMA 1, 4 & 12 enclosures.
- Each includes disconnect device and TM multi-speed starter.
- They are cataloged for two-speed, single winding (consequent pole) and two speed, two winding (separate winding) motor application.
- Starters for three and four speed motor applications can also be supplied.
- Extensive field modification kits and factory installed modifications are available.

Combination Starters & Contactors

Disconnect Device

- Disconnect switches are heavy duty, visible blade type with positive drive action and meet industrial with stand requirements.
- Above 100 amp., a non-automatic circuit breaker with fuse clips is provided.
- Mounting plates include drilling for field conversion of fuse size and spacing.
- Circuit breaker type starters use motor circuit protectors with a single, seven-point trip adjustment and manual trip feature. An optional current limiter attachment provides 200,000 amp. rms symmetrical interrupting capacity.

Door Swing

The concealed hinge design allows 150° door swing for interior accessibility.

Uniform Enclosure

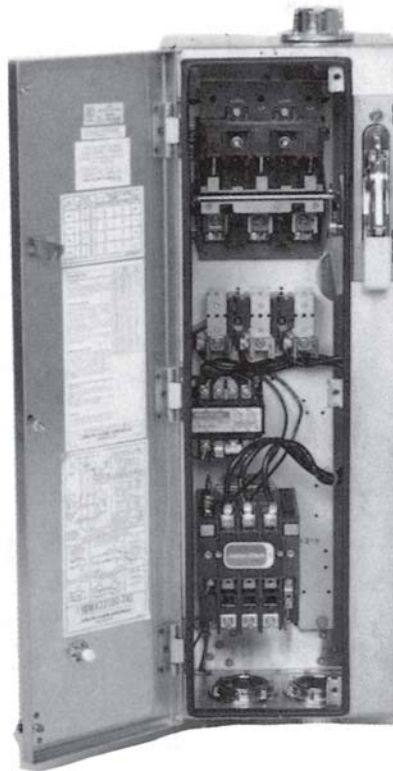
- One enclosure covers Size 0, 1 & 2, for each enclosure style.
- Sizes 3 & 4 are covered by a single enclosure.
- NEMA 1, 4 & 12 enclosure designs are each the same basic size, for each enclosure style. All this for flexibility, ease of layout and ease of installation.

Grounding

- A UL recommended type, green head screw is provided for grounding the enclosure.
- A green ground wire is installed in the non-fused leg of control transformers.

Door Gasketing

- Standard on NEMA 4 & 12 and optional on NEMA 1. Gasketing is neoprene, extruded, closed cell type for increased life, sealing qualities and safety for the installer.

**Disconnect Operator**

- Flange mounted operating handle provides positive control of the disconnect.
- Interlocking prevents opening the door with the disconnect "ON" or turning the disconnect "ON" with the door open.
- Interlock defeaters are provided for maintenance.
- The position of disconnect is clearly visible to determine if controller is "ON" or "OFF".
- A red handle flag is visible in the "ON" state.

Padlocking

- Operating handles can be padlocked in "OFF", with up to 3/8" shackle locks.
- Doors can be locked closed with one 3/8" shackle lock, thus providing security to equipment and safety to personnel.

White Mounting Plate

- Baked ANSI safety white enamel is used for the mounting plate. This provides increased visibility for safety.

Add-On Accessories

- Most TM starter add-on accessories can be installed in combination starters.
- Mounting plates are pre-drilled for field installation of additional control devices.

Quality Enclosure Construction

- Painted surfaces are baked enamel for long life.
- All unpainted hardware is plated for corrosion resistance.
- Hinge pins are stainless steel.
- NEMA 4 enclosures are #304 stainless steel for appearance and corrosion resistance.

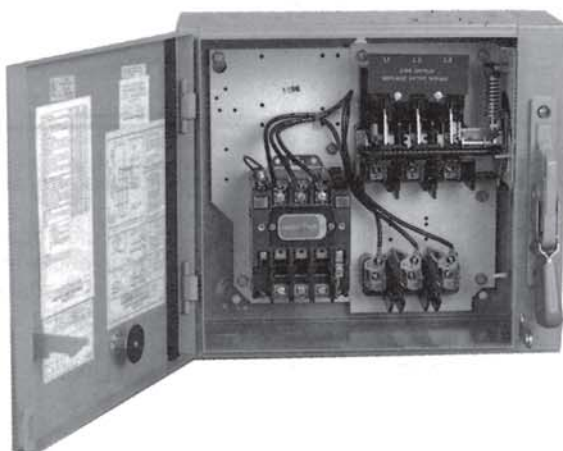
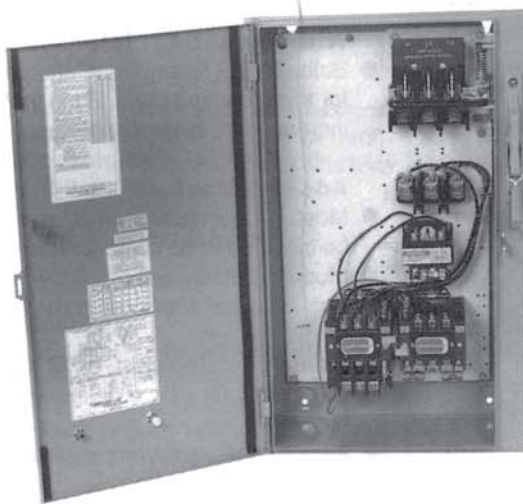
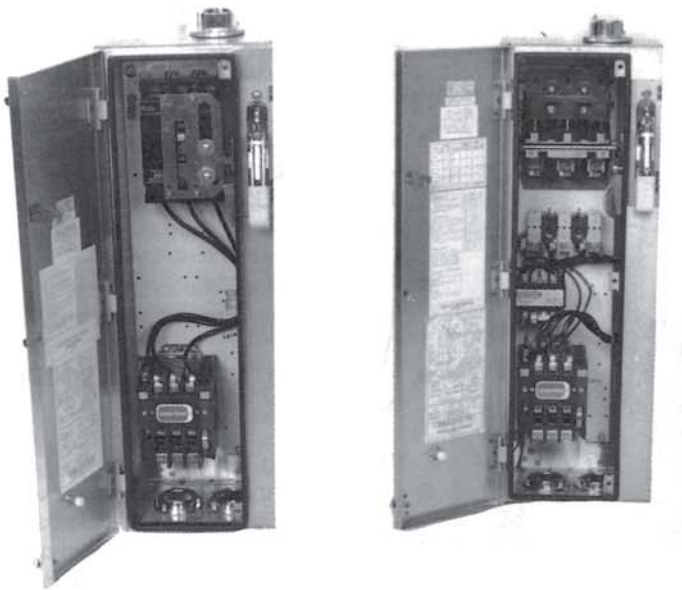
Safety & Reliability

- Flange mounted disconnect handle.
- Disconnect state clearly visible.
- Defined enclosure grounding method.
- Padlocking for both door and disconnect handle.
- Door swing for maximum interior accessories.
- All contribute to safety for the installer and for operating personnel.
- Quality enclosure construction.
- Careful selection of disconnect devices and the basic TM starter all contribute to long, reliable performance.

Space Savings

- Uniform enclosure sizes allow mixing NEMA starter sizes in a row.
- Mount enclosures side-by-side, without restricted door swing.
- Add most modifications without changing the enclosure.
- Select an enclosure style for max. utilization of available space.
- Minimize additional control enclosures by using the space in an extra-wide starter enclosure.
- Space saving economy is built into TM combination starters.

B



Choice of Enclosure Style

- Choose from three enclosure styles, standard, compact or extra-wide for non-reversing starters through NEMA Size 2.
- The compact style fits in low height areas and the extra-wide has approximately 200 square inches of added panel space for mounting of auxiliary equipment.
- Size 3 & 4 non-reversing starters are available in standard and extra-wide.
- Choice of enclosure style provides maximum flexibility.

Versatility

- Choose an enclosure style to meet the application.
- Check the enclosure sizes to simplify your starter layouts.
- Check the interchangeability of mounting plates.
- Choose add-on accessories for the basic TM starter.
- Select from a wide range of factory modifications and field modification kits.
- All of this to improve application flexibility with minimum inventory requirements. This is the versatility of TM combination starters.

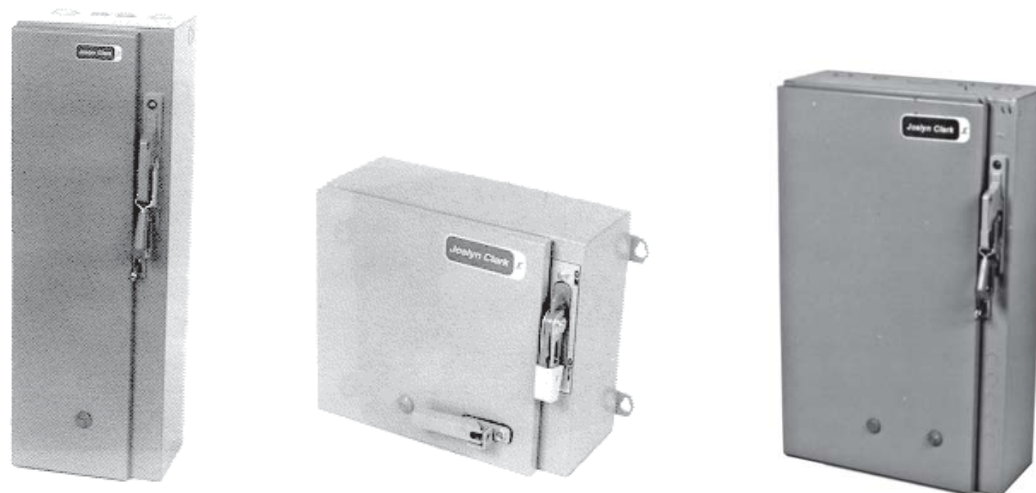
Pilot Devices

- A complete selection of field modification kits or factory installed operator devices are available.
- Most are arranged for mounting on the enclosure flange, eliminating the need for a flexible wire harness to the door.

Control Transformer

- Available factory installed or as a field modification kit.
- All starters can accommodate a 100VA extra capacity transformer in every enclosure style and type.
- Secondary fusing standard.

3
7
5



B

AC Combination Starters with Non-Fusible Disconnect Switch, 600V - Bulletin 6018

Standard - Vertical											
NEMA Size	Maximum Motor Horsepower Rating			Cont. Amps Rating	Switch Rating Amps.	NEMA Type 1 General Purpose Enclosure		NEMA Type 4 Watertight Enclosure		NEMA Type 12 Industrial - Dust-tight Enclosure	
	200V	230V	460-575V			Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
0	3	3	5	18	30	T18AA30610- *	\$ 1092.	T18WA30610- *	\$2244.	T18TA30610- *	\$ 1380.
1	7 ½	7 ½	10	27	30	T18AA31610- *	1152.	T18WA31610- *	2304.	T18TA31610- *	1440.
2	10	15	25	45	60	T18AA32610- *	1824.	T18WA32610- *	3600.	T18TA32610- *	2232.
3	25	30	50	90	100	T18AA33610- *	3036.	T18WA33610- *	6132.	T18TA33610- *	3564.
4	40	50	100	135	150	-use extra wide-		-use extra wide-		-use extra wide-	
5	75	100	200	270	400	Consult Factory					
6	150	200	400	540	600						
Compact - Horizontal											
0	3	3	5	18	30	C18AA30610- *	1092.	C18WA30610- *	2244.	C18TA30610- *	1380.
1	7 ½	7 ½	10	27	30	C18AA31610- *	1152.	C18WA31610- *	2304.	C18TA31610- *	1440.
2	10	15	25	45	60	C18AA32610- *	1824.	C18WA32610- *	3600.	C18TA32610- *	2232.
Extra Wide											
0	3	3	5	18	30	E18AA30610- *	1236.	E18WA30610- *	2736.	E18TA30610- *	1596.
1	7 ½	7 ½	10	27	30	E18AA31610- *	1296.	E18WA31610- *	2796.	E18TA31610- *	1656.
2	10	15	25	45	60	E18AA32610- *	1968.	E18WA32610- *	4092.	E18TA32610- *	2448.
3	25	30	50	90	100	E18AA33610- *	3276.	E18WA33610- *	7092.	E18TA33610- *	3954.
4	40	50	100	135	150	E18AA34610- *	5856.	E18WA34610- *	9816.	E18TA34610- *	7320.

Note:

1. Includes starter complete with N.O. contact and 3 phase overload relay less heaters.

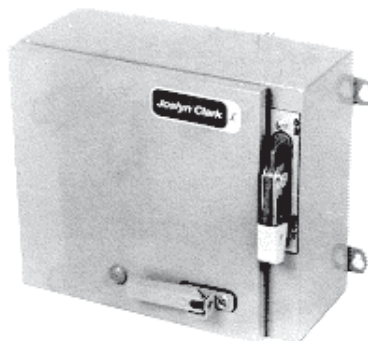
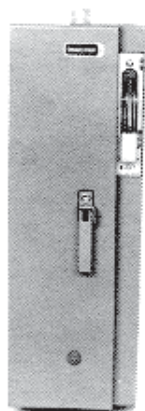
Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from the coil table. Order Heaters at \$18 each.

- Renewal Parts - see Page B42
- Engineering Data - see Page B50
- Modifications - see Page B36
- Heater Tables - see Page B33
- Dimensions - see Page B47

Coil Volt/Hertz**Suffix**

24/60 or 24/50	-96
110-120/60 or 110/50	-76
220-240/60 or 220/50	-26
440-480/60 or 440/50	-46
550-600/60 or 550/50	-56
200-208/60	-86



AC Combination Starters with Fusible Disconnect Switch, 200-230V - Bulletin 6018

Standard - Vertical

NEMA Size	Maximum Motor Horsepower Rating		Starter Cont. Amp. Rating	Disconnect Amp. Rating		NEMA Type 1 General Purpose	Price ¹	NEMA Type 4 Watertight Enclosure		NEMA Type 12 Industrial - Dust-tight Enclosure	Price ¹
	200V	230V		Switch	Fuse ² Clips			Catalog No.	Price ¹	Catalog No.	Price ¹
0	3	3	18	30	30	T18AA30203- *	\$ 1128.	T18WA30203- *	\$2280.	T18TA30203- *	\$ 1416.
1	5	7 ½	27	30	30	T18AA31203- *	1188.	T18WA31203- *	2340.	T18TA31203- *	1476.
1	7 ½	----	27	60	60	T18AA31206- *	1212.	T18WA31206- *	2364.	T18TA31206- *	1500.
2	10	15	45	60	60	T18AA32206- *	1872.	T18WA32206- *	3648.	T18TA32206- *	2280.
3	25	30	90	100	100	T18AA33201- *	3156.	T18WA33201- *	6252.	T18TA33201- *	3684.
4	40	50	135	150	200	-use extra wide-		-use extra wide-		-use extra wide-	
5	75	100	270	400	400	Consult Factory					
6	150	200	540	600	600						

Compact - Horizontal

0	3	3	18	30	30	C18AA30203- *	1128.	C18WA30203- *	2280.	C18TA30203- *	1416.
1	5	7 ½	27	30	30	C18AA31203- *	1188.	C18WA31203- *	2340.	C18TA31203- *	1476.
1	7 ½	----	27	60	60	C18AA31206- *	1212.	C18WA31206- *	2364.	C18TA31206- *	1500.
2	10	15	45	60	60	C18AA32206- *	1872.	C18WA32206- *	3648.	C18TA32206- *	2280.

Extra Wide

0	3	3	18	30	30	E18AA30203- *	1272.	E18WA30203- *	2772.	E18TA30203- *	1632.
1	5	7 ½	27	30	30	E18AA31203- *	1332.	E18WA31203- *	2832.	E18TA31203- *	1692.
1	7 ½	----	27	60	60	E18AA31206- *	1356.	E18WA31206- *	2856.	E18TA31206- *	1716.
2	10	15	45	60	60	E18AA32206- *	2016.	E18WA32206- *	4140.	E18TA32206- *	2496.
3	25	30	90	100	100	E18AA33201- *	3288.	E18WA33201- *	7212.	E18TA33201- *	4074.
4	40	50	135	150	200	E18AA34202- *	6060.	E18WA34202- *	10020.	E18TA34202- *	7524.

Note:

1. Includes starter complete with N.O. contact and 3 phase overload relays less heaters.
2. Class R fuse clips available on request.

Ordering Information

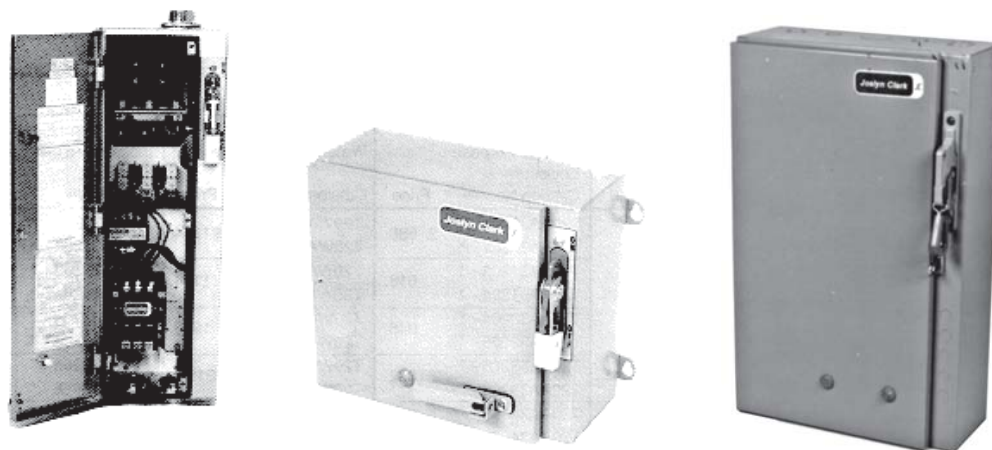
Coil Volt/Hertz

Suffix

- Use complete catalog number. Replace the (*) with the suffix from the coil table. Order Heaters at \$18 each.

- Renewal parts - see Page B42
- Engineering Data - see Page B50
- Modifications - see Page B36
- Heater Tables - see Page B33
- Dimensions - see Page B47

24/60 or 24/50	-96
110-120/60 or 110/50	-76
220-240/60 or 220/50	-26
440-480/60 or 440/50	-46
550-600/60 or 550/50	-56
200-208/60	-86



AC Combination Starters with Fusible Disconnect Switch, 460-575V - Bulletin 6018

Standard - Vertical											
NEMA Size	Maximum Motor HorsepowerRating		Starter Cont. Ampere Rating	Disconnect Ampere Rating		NEMA Type 1 General Purpose		NEMA Type 4 Watertight Enclosure		NEMA Type 12 Industrial - Dust-tight Enclosure	
	460V	575V		Switch	Fuse ² Clips		Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
0	5	5	18	30	30	T18AA30603- *	\$ 1152.	T18WA30603- *	\$ 2304.	T18TA30603- *	\$ 1440.
1	10	10	27	30	30	T18AA31603- *	1212.	T18WA31603- *	2364.	T18TA31603- *	1500.
2	15	15	45	60	30	T18AA32603- *	1884.	T18WA32603- *	3660.	T18TA32603- *	2292.
2	25	25	45	60	60	T18AA32606- *	1908.	T18WA32606- *	3684.	T18TA32606- *	2316.
3	50	50	90	100	100	T18AA33601- *	3216.	T18WA33601- *	6312.	T18TA33601- *	3918.
4	100	100	135	150	200	-use extra wide-		-use extra wide-		-use extra wide-	
5	200	200	270	400	600	Consult Factory					
Compact - Horizontal											
0	5	5	18	30	30	C18AA30603- *	1152.	C18WA30603- *	2304.	C18TA30603- *	1440.
1	10	10	27	30	30	C18AA31603- *	1212.	C18WA31603- *	2364.	C18TA31603- *	1500.
2	15	15	45	60	30	C18AA32603- *	1884.	C18WA32603- *	3660.	C18TA32603- *	2292.
2	25	25	45	60	60	C18AA32606- *	1908.	C18WA32606- *	3684.	C18TA32606- *	2316.
Extra Wide											
0	5	5	18	30	30	E18AA30603- *	1296.	E18WA30603- *	2796.	E18TA30603- *	1656.
1	10	10	27	30	30	E18AA31603- *	1356.	E18WA31603- *	2856.	E18TA31603- *	1716.
2	15	15	45	60	30	E18AA32603- *	2028.	E18WA32603- *	4152.	E18TA32603- *	2508.
2	25	25	45	60	60	E18AA32606- *	2052.	E18WA32606- *	4176.	E18TA32606- *	2532.
3	50	50	90	100	100	E18AA33601- *	3456.	E18WA33601- *	7272.	E18TA33601- *	4134.
4	100	100	135	150	200	E18AA34602- *	6108.	E18WA34602- *	10068.	E18TA34602- *	7572.

Note:

- Includes starter complete with N.O. contact and 3 phase overload relays less heaters.
- Class R fuse clips available on request.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from the coil table. Order Heaters at \$18 each.

- Renewal Parts - see Page B42
- Engineering Data - see Page B50
- Modifications - see Page B36
- Heater Tables - see Page B33
- Dimensions - see Page B47

Coil Volt/Hertz

Suffix

24/60 or 24/50	-96
110-120/60 or 110/50	-76
220-240/60 or 220/50	-26
440-480/60 or 440/50	-46
550-600/60 or 550/50	-56
200-208/60	-86



AC Combination Starters with Circuit Breaker, 200-230V - Thermal Magnetic Trip

Standard - Vertical, Bulletin 6020

NEMA Size	Maximum Motor Horsepower Rating		Starter Cont. Ampere Rating	Circuit Breaker Ampere Rating	Thermal Magnetic Trip	NEMA Type 1 General Purpose Enclosure		NEMA Type 4 Watertight Enclosure		NEMA Type 12 Industrial - Dust-tight Enclosure	
	200V	230V				Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
0	2 3	2 3	18	15 20	TEB	T20AA30201 - *	\$1176.	T20WA30201 - *	\$2328.	T20TA30201 - *	\$1464.
						T20AA30202 - *		T20WA30202 - *		T20TA30202 - *	
1	5 7 1/2	5 7 1/2	27	40 50		T20AA31203 - *	1236.	T20WA31203 - *	2388.	T20TA31203 - *	1524.
						T20AA31204 - *		T20WA31204 - *		T20TA31204 - *	
2	10 15	10 15	45	50 70		T20AA32204 - *	1896.	T20WA32204 - *	3672.	T20TA32204 - *	2304.
						T20AA32205 - *		T20WA32205 - *		T20TA32205 - *	
3	25 30	25 30	90	100 150	TED	T20AA33206 - *	3264.	T20WA33206 - *	6360.	T20TA33206 - *	3792.
						T20AA33208 - *		T20WA33208 - *		T20TA33208 - *	
4	40 ----- 50	40 ----- 50	135	150 150	TEC	T20AA34208 - *	7164	T20WA34208 - *	11118.	T20TA34208 - *	8628.
						T20AA34677 - *		T20WA34677 - *		T20TA34677 - *	
5	50 60 75	----- 60 100	270	200 225 300	TJK4	Consult Factory					

Compact - Horizontal

0	2 3	2 3	18	15 20	TEB	C20AA30201 - *	1176.	C20WA30201 - *	2328.	C20TA30201 - *	1464.
						C20AA30202 - *		C20WA30202 - *		C20TA30202 - *	
1	5 7 1/2	5 7 1/2	27	40 50		C20AA31203 - *	1236.	C20WA31203 - *	2388.	C20TA31203 - *	1524.
						C20AA31204 - *		C20WA31204 - *		C20TA31204 - *	
2	10 15	10 15	45	50 70		C20AA32204 - *	1896.	C20WA32204 - *	3672.	C20TA32204 - *	2304.
						C20AA32205 - *		C20WA32205 - *		C20TA32205 - *	

Extra Wide

0	2 3	2 3	18	15 20	TEB	E20AA30201 - *	1320.	E20WA30201 - *	2820.	E20TA30201 - *	1680.
						E20AA30202 - *		E20WA30202 - *		E20TA30202 - *	
1	5 7 1/2	5 7 1/2	27	40 50		E20AA31203 - *	1380.	E20WA31203 - *	2880.	E20TA31203 - *	1740.
						E20AA31204 - *		E20WA31204 - *		E20TA31204 - *	
2	10 15	10 15	45	50 70		E20AA32204 - *	2040.	E20WA32204 - *	4164.	E20TA32204 - *	2520.
						E20AA32205 - *		E20WA32205 - *		E20TA32205 - *	
3	25 30	25 30	90	100 150	TED	E20AA33206 - *	3504.	E20WA33206 - *	7320.	E20TA33206 - *	4182.
						E20AA33208 - *		E20WA33208 - *		E20TA33208 - *	
4	40 ----- 50	40 ----- 50	135	150 150	TEC	E20AA34208 - *	7464.	E20WA34208 - *	12444.	E20TA34208 - *	9228.
						E20AA34677 - *		E20WA34677 - *		E20TA34677 - *	

Note:

- Includes starter complete with N.O. contact and 3 phase overload relays less heaters.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from the coil table. Order heaters at \$18 each.

- Renewal Parts - see Page B42
- Engineering Data - see Page B50
- Modifications - see Page B36
- Heater Tables - see Page B33
- Dimensions - see Page B47

Coil Volt/Hertz

Suffix

24/60 or 24/50	-96
110-120/60 or 110/50	-76
220-240/60 or 220/50	-26
440-480/60 or 440/50	-46
550-600/60 or 550/50	-56
200-208/60	-86



AC Combination Starters with Circuit Breaker, 600V - Adjustable Magnetic Trip

B

Standard - Vertical, Bulletin 6020

NEMA Size	Maximum Motor Horsepower Rating			Starter Cont. Ampere Rating	Circuit Breaker Ampere Rating	Magnetic Trip Motor Circuit Protector	NEMA Type 1 General Purpose Enclosure		NEMA Type 4 Watertight Enclosure		NEMA Type 12 Industrial - Dust-tight Enclosure	
	200V	230V	460/575V				Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
0	1/2	1/2	1 1/2	18	3	TEC	T20AA30671 - *	\$1524.	T20WA30671 - *	\$2676.	T20TA30671 - *	\$1812.
	1 1/2	1 1/2	3	18	7		T20AA30672 - *		T20WA30672 - *		T20TA30672 - *	
	3	3	5	18	15		T20AA30673 - *		T20WA30673 - *		T20TA30673 - *	
1	1/2	1/2	1 1/2	27	3		T20AA31671 - *	1584.	T20WA31671 - *	2736.	T20TA31671 - *	1872.
	1 1/2	1 1/2	3	27	7		T20AA31672 - *		T20WA31672 - *		T20TA31672 - *	
	3	3	5	27	15		T20AA31673 - *		T20WA31673 - *		T20TA31673 - *	
	7 1/2	7 1/2	10	27	30		T20AA31674 - *		T20WA31674 - *		T20TA31674 - *	
2	7 1/2	7 1/2	10	45	30		T20AA32674 - *	2244.	T20WA32674 - *	4020.	T20TA32674 - *	2652.
	10	15	25	45	50		T20AA32675 - *		T20WA32675 - *		T20TA32675 - *	
3	25	30	50	90	100		T20AA33676 - *	3264.	T20WA33676 - *	6360.	T20TA33676 - *	3792.
4	40	50	100	135	150		T20AA34677 - *	7164.	T20WA34677 - *	11124.	T20TA34677 - *	8628.
5	75	100	200	270	400	TJC4	Consult Factory					

Compact - Horizontal

0	1/2	1/2	1 1/2	18	3	TEC	C20AA30671 - *	1524.	C20WA30671 - *	2676.	C20TA30671 - *	1812.
	1 1/2	1 1/2	3	18	7		C20AA30672 - *		C20WA30672 - *		C20TA30672 - *	
	3	3	5	18	15		C20AA30673 - *		C20WA30673 - *		C20TA30673 - *	
1	1/2	1/2	1 1/2	27	3		C20AA31671 - *	1584.	C20WA31671 - *	2736.	C20TA31671 - *	1872.
	1 1/2	1 1/2	3	27	7		C20AA31672 - *		C20WA31672 - *		C20TA31672 - *	
	3	3	5	27	15		C20AA31673 - *		C20WA31673 - *		C20TA31673 - *	
	7 1/2	7 1/2	10	27	30		C20AA31674 - *		C20WA31674 - *		C20TA31674 - *	
2	7 1/2	7 1/2	10	45	30		C20AA32674 - *	2244.	C20WA32674 - *	4020.	C20TA32674 - *	2652.
	10	15	25	45	50		C20AA32675 - *		C20WA32675 - *		C20TA32675 - *	

Extra Wide

0	1/2	1/2	1 1/2	18	3	TEC	E20AA30671 - *	1668.	E20WA30671 - *	3168.	E20TA30671 - *	2028.
	1 1/2	1 1/2	3	18	7		E20AA30672 - *		E20WA30672 - *		E20TA30672 - *	
	3	3	5	18	15		E20AA30673 - *		E20WA30673 - *		E20TA30673 - *	
1	1/2	1/2	1 1/2	27	3		E20AA31671 - *	1728.	E20WA31671 - *	3228.	E20TA31671 - *	2088.
	1 1/2	1 1/2	3	27	7		E20AA31672 - *		E20WA31672 - *		E20TA31672 - *	
	3	3	5	27	15		E20AA31673 - *		E20WA31673 - *		E20TA31673 - *	
	7 1/2	7 1/2	10	27	30		E20AA31674 - *		E20WA31674 - *		E20TA31674 - *	
2	7 1/2	7 1/2	10	45	30		E20AA32674 - *	2388.	E20WA32674 - *	4512.	E20TA32674 - *	2868.
	10	15	25	45	50		E20AA32675 - *		E20WA32675 - *		E20TA32675 - *	
3	25	30	50	90	100		E20AA33676 - *	3504.	E20WA33676 - *	7320.	E20TA33676 - *	4182.
4	40	50	100	135	150		E20AA34677 - *	7464.	E20WA34677 - *	12444.	E20TA34677 - *	9228.

Note:

1. Includes starter complete with N.O. contact and 3 phase overload relays less heaters.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from the coil table. Order heaters at \$18 each.

- Renewal Parts - see Page B42
- Engineering Data - see Page B50
- Modifications - see Page B36
- Heater Tables - see Page B33
- Dimensions - see Page B47

Coil Volt/Hertz

Suffix

24/60 or 24/50	-96
110-120/60 or 110/50	-76
220-240/60 or 220/50	-26
440-480/60 or 440/50	-46
550-600/60 or 550/50	-56
200-208/60	-86



AC Combination Reversing Starters with Disconnect Switch - Bulletin 6038

Fusible 200 & 230 Volt

NEMA Size	Maximum Motor Horsepower Rating Dual Element Fuses		Starter Cont. Amps Rating	Disconnect Ampere Rating		NEMA Type 1 General Purpose Enclosure		NEMA Type 4 Watertight Enclosure		NEMA Type 12 Industrial - Dust-tight Enclosure	
	200V	230V		Switch	Fuse ² Clips	Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
0	3	3	18	30	30	T38AA30203- *	\$ 1824.	T38WA30203- *	\$ 3288	T38TA30203- *	\$ 2232.
1	5	7 1/2	27	30	30	T38AA31203- *	1944.	T38WA31203- *	3408	T38TA31203- *	2352.
1	7 1/2	----	27	30	60	T38AA31206- *	1968.	T38WA31206- *	3432	T38TA31206- *	2376.
2	10	15	45	60	60	T38AA32206- *	3240.	T38WA32206- *	3972	T38TA32206- *	3768.
3	25	30	90	100	100	T38AA33201- *	5352.	T38WA33201- *	9264	T38TA33201- *	6048.
4	40	50	135	150	200	T38AA34202- *	11292.	T38WA34202- *	16236	T38TA34202- *	13200.
5	75	100	270	400	400	Consult Factory					

Fusible 460 & 575 Volt

	460V	575V									
0	5	5	18	30	30	T38AA30603- *	1848.	T38WA30603- *	3312.	T38TA30603- *	2256.
1	10	10	27	30	30	T38AA31603- *	1968.	T38WA31603- *	3432.	T38TA31603- *	2376.
2	15	15	45	60	30	T38AA32603- *	3252.	T38WA32603- *	5484.	T38TA32603- *	3780.
2	25	25	45	60	60	T38AA32606- *	3276.	T38WA32606- *	5508.	T38TA32606- *	3804.
3	50	50	90	100	100	T38AA33601- *	5424.	T38WA33601- *	9336	T38TA33601- *	6120.
4	100	100	135	150	200	T38AA34602- *	11340.	T38WA34602- *	16284.	T38TA34602- *	13248.
5	200	200	270	400	400	Consult Factory					

Non-Fusible

NEMA Size	Maximum Motor Horsepower Rating			Starter Cont. Ampere Rating	Disconnect Switch Rating	NEMA Type 1 General Purpose Enclosure		NEMA Type 4 Watertight Enclosure		NEMA Type 12 Industrial - Dust-tight Enclosure	
	200V	230V	460/575V			Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
0	3	3	5	18	30	T38AA30610- *	\$ 1788.	T38WA30610- *	\$3252.	T38TA30610- *	\$2196.
1	7 1/2	7 1/2	10	27	30	T38AA31610- *	1908.	T38WA31610- *	3372.	T38TA31610- *	2316.
2	10	15	25	45	60	T38AA32610- *	3192.	T38WA32610- *	5424.	T38TA32610- *	3720.
3	25	30	50	90	100	T38AA33610- *	5292.	T38WA33610- *	9204.	T38TA33610- *	5988.
4	40	50	100	135	150	T38AA34610- *	11908.	T38WA34610- *	15732.	T38TA34610- *	12996.
5	75	100	200	270	400	Consult Factory					

Notes:

1. Includes starter complete with N.O. contact, disconnect switch less fuses, and 3 phase overload relay less heaters.
2. Class R fuse clips are available on request.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from the coil table.
Order heaters at \$18 each.

- Renewal Parts - see Page B42
- Engineering Data - see Page B50
- For Plugging and Jogging Service - Page B8
- Modifications - see Page B36
- Heater Tables - see Page B33
- Dimensions - see Page B48

Coil Volt/Hertz

Suffix

- 24/60 or 24/50 -96
- 110-120/60 or 110/50 -76
- 220-240/60 or 220/50 -26
- 440-480/60 or 440/50 -46
- 550-600/60 or 550/50 -56
- 200-208/60 -86



AC Combination Reversing Starters with Thermal-Magnetic Trip, 240V - Bulletin 6040

NEMA Size	Maximum Motor Horsepower Rating		Starter Cont. Ampere Rating	Circuit Breaker Ampere Rating	Thermal Magnetic Trip	NEMA Type 1 General Purpose Enclosure		NEMA Type 4 Watertight Enclosure		NEMA Type 12 Industrial - Dust-tight Enclosure	
	200V	230V				Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
0	2	2	18	15	TEB	T40AA30201 - *	\$ 1872.	T40WA30201 - *	\$ 3336.	T40TA30201 - *	\$ 2280.
	3	3	18	20		T40AA30202 - *		T40WA30202 - *		T40TA30202 - *	
1	5	5	27	40		T40AA31203 - *	2016.	T40WA31203 - *	3480.	T40TA31203 - *	2424.
	7 ½	7 ½	27	50		T40AA31204 - *		T40WA31204 - *		T40TA31204 - *	
2	10	10	45	50		T40AA32204 - *	3384.	T40WA32204 - *	5616.	T40TA32204 - *	3912.
	----	15	45	70		T40AA32205 - *		T40WA32205 - *		T40TA32205 - *	
3	25	25	90	100	TED	T40AA33206 - *	5472.	T40WA33206 - *	9394.	T40TA33206 - *	6168.
	25	30	90	150		T40AA33208 - *		T40WA33208 - *		T40TA33208 - *	
4	40	40	135	150	TEC	T40AA34208 - *	12396.	T40WA34208 - *	17340.	T40TA34208 - *	14304.
	----	50	135	150		T40AA34677 - *		T40WA34677 - *		T40TA34677 - *	
5	50	----	270	200	TJC4	Consult Factory					
	60	60	270	225							
	75	100	270	300							

B

AC Combination Reversing Starters with Motor Circuit Protector, 600V - Bulletin 6040

NEMA Size	Maximum Motor Horsepower Rating			Starter Cont. Amps Rating	Circuit Breaker Ampere Rating	Magnetic Trip Motor Circuit Protector	NEMA Type 1 General Purpose Enclosure		NEMA Type 4 Watertight Enclosure		NEMA Type 12 Industrial - Dust-tight Enclosure	
	200V	230V	460/575V				Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
0	½	½	1	18	3	TEC	T40AA30671 - *	\$ 2148.	T40WA30671 - *	\$ 3612.	T40TA30671 - *	\$ 2556.
	1 ½	1 ½	3	18	7		T40AA30672 - *		T40WA30672 - *		T40TA30672 - *	
	3	3	5	18	15		T40AA30673 - *		T40WA30673 - *		T40TA30673 - *	
1	½	½	1 ½	27	3		T40AA31671 - *	2292.	T40WA31671 - *	3756.	T40TA31671 - *	2700.
	1 ½	1 ½	3	27	7		T40AA31672 - *		T40WA31672 - *		T40TA31672 - *	
	3	3	5	27	15		T40AA31673 - *		T40WA31673 - *		T40TA31673 - *	
	7 ½	7 ½	10	27	30		T40AA31674 - *		T40WA31674 - *		T40TA31674 - *	
	7 ½	7 ½	10	45	30		T40AA32674 - *	3660.	T40WA32674 - *	5892.	T40TA32674 - *	4188.
2	10	15	25	45	50		T40AA62675 - *		T40WA62675 - *		T40TA62675 - *	
3	25	30	50	90	100		T40AA33676 - *	5472.	T40WA33676 - *	9384.	T40TA33676 - *	6168.
4	40	50	100	135	150		T40AA34677 - *	12396.	T40WA34677 - *	17340.	T40TA34677 - *	14304.
5	75	100	200	270	400	TJC4	Consult Factory					

Note:

1. Includes starter with N.O. contact, circuit breaker and 3 phase overload relays less heaters.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from the coil table. Order heaters at \$18 each.

- Modifications - see Page B36
- Engineering Data - see Page B50
- Renewal Parts - see Page B42
- Full-load Current Table - see Page B34
- Heater Tables - see Page B33
- Dimensions - see Page B48

Coil Volt/Hertz

Suffix

24/60 or 24/50	-96
110-120/60 or 110/50	-76
220-240/60 or 220/50	-26
440-480/60 or 440/50	-46
550-600/60 or 550/50	-56
200-208/60	-86



Non-Fusible AC 2 Speed Starter with Disconnect Switch, 200, 230, 460 and 575V

2 Speed, Single Winding (consequent pole), Bulletin 6058

NEMA Size	Maximum Motor Horsepower Rating			Starter Continue Ampere Rating	Disconnect Switch Ampere Rating	NEMA Type 1 General Purpose Enclosure		NEMA Type 4 Watertight Enclosure		NEMA Type 12 Industrial - Dust-tight Enclosure	
	Constant or Variable Torque (Constant Horsepower)	200V	230V			Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
0	3 (2)	3 (2)	5 (3)	18	30	T58AA0C2610- *	\$2976.	- use size 1- *	—	- use size 1- *	—
1	7 1/2 (5)	7 1/2 (5)	10 (7 1/2)	27	30	T58AA1C2610- *	3120.	T58WA1C2610- *	\$ 4968.	T58TA1C2610- *	\$ 3516.
2	10 (7 1/2)	15 (10)	25 (20)	45	60	T58AA2C2610- *	5064.	T58WA2C2610- *	7368.	T58TA2C2610- *	5688.
3	25 (20)	30 (25)	50 (40)	90	100	T58AA3C2610- *	7296.	T58WA3C2610- *	11232.	T58TA3C2610- *	8664.
4	40 (30)	50 (40)	100 (75)	135	150	T58AA4C2610- *	17136.	T58WA4C2610- *	23328.	T58TA4C2610- *	21048.
5	75 (60)	100 (75)	200 (150)	270	400	Consult Factory					

2 Speed, Double Winding (separate winding)

0	3 (2)	3 (2)	5 (3)	18	30	T58AA0S2610- *	2448.	- use size 1- *	—	- use size 1- *	—
1	7 1/2 (5)	7 1/2 (5)	10 (7 1/2)	27	30	T58AA1S2610- *	2616.	T58WA1S2610- *	4464.	T58TA1S2610- *	3012.
2	10 (7 1/2)	15 (10)	25 (20)	45	60	T58AA2S2610- *	4104.	T58WA2S2610- *	6432.	T58TA2S2610- *	4728.
3	25 (20)	30 (25)	50 (40)	90	100	T58AA3S2610- *	6000.	T58WA3S2610- *	9936.	T58TA3S2610- *	7368.
4	40 (30)	50 (40)	100 (75)	135	150	T58AA4S2610- *	12768.	T58WA4S2610- *	18960.	T58TA4S2610- *	16680.
5	75 (60)	100 (75)	200 (150)	270	400	Consult Factory					

Note:

- Includes starter complete with one N.O. contact on each contactor and two 3 phase overload relays less heaters. All starters are mechanically and electrically interlocked. Six (6) heaters are required, 3 heaters for each speed.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from coil table. Order heaters at \$18 each.

- Engineering Data - see Page B50
- Modification - see Page B36
- Renewal Parts - see Page B42
- Heater Tables - see Page B33
- Dimensions - see Page B49

Coil Volt/Hertz

24/60 or 24/50
110-120/60 or 110/50
220-240/60 or 220/50
440-480/60 or 440/50
550-600/60 or 550/50
200-208/60

Suffix

-96
-76
-26
-46
-56
-86



Fusible AC 2 Speed Starter with Disconnect Switch, 200-230V - Bulletin 6058

2 Speed, Single Winding (consequent pole)

NEMA Size	Maximum Motor Horsepower Rating		Starter Continue Ampere Rating	Disconnect Switch Ampere Rating	NEMA Type 1 General Purpose Enclosure		NEMA Type 4 Watertight Enclosure		NEMA Type 12 Industrial - Dust-tight Enclosure	
	Constant or Variable Torque (Constant Horsepower)	230V			Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
0	3 (2)	3 (2)	18	30	T58AA0C2203 - *	\$3168.	- use size 1 - *	—	- use size 1 - *	—
1	7 1/2 (5)	7 1/2 (5)	27	30	T58AA1C2203 - *	3312.	T58WA1C2203 - *	\$ 5160.	T58TA1C2203 - *	\$ 3708.
2	10 (7 1/2)	15 (10)	45	60	T58AA2C2206 - *	5160.	T58WA2C2206 - *	7464.	T58TA2C2206 - *	5784.
3	25 (20)	30 (25)	90	100	T58AA3C2201 - *	7920.	T58WA3C2201 - *	11856.	T58TA3C2201 - *	9288.
4	40 (30)	50 (40)	135	150	T58AA4C2202 - *	18960.	T58WA4C2202 - *	25152	T58TA4C2202 - *	22506.
5	75 (60)	100 (75)	270	400	Consult Factory					

2 Speed, Double Winding (separate winding)

0	3 (2)	3 (2)	18	30	T58AA0S2203 - *	2640.	- use size 1 - *	—	- use size 1 - *	—
1	7 1/2 (5)	7 1/2 (5)	27	30	T58AA1S2203 - *	2808.	T58WA1S2203 - *	4656.	T58TA1S2203 - *	3204.
2	10 (7 1/2)	15 (10)	45	60	T58AA2S2206 - *	4200.	T58WA2S2206 - *	6528.	T58TA2S2206 - *	4824.
3	25 (20)	30 (25)	90	100	T58AA3S2201 - *	6624.	T58WA3S2201 - *	10560.	T58TA3S2201 - *	7992.
4	40 (30)	50 (40)	135	150	T58AA4S2202 - *	14592.	T58WA4S2202 - *	20784.	T58TA4S2202 - *	18408.
5	75 (60)	100 (75)	270	400	Consult Factory					

Note:

1. Includes starter complete with one N.O. contact on each contactor and two 3 phase overload relays less heaters. All starters are mechanically and electrically interlocked. Six (6) heaters are required, 3 heaters for each speed.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from coil table. Order heaters at \$18 each.

- Engineering Data - see Page B50
- Modification - see Page B36
- Renewal Parts - see Page B42
- Heater Tables - see Page B33
- Dimensions - see Page B49

Coil Volt/Hertz

24/60 or 24/50
110-120/60 or 110/50
220-240/60 or 220/50
440-480/60 or 440/50
550-600/60 or 550/50
200-208/60

Suffix

-96
-76
-26
-46
-56
-86



Fusible AC 2 Speed Starter with Disconnect Switch, 600V - Bulletin 6058

2 Speed, Single Winding (consequent pole)

NEMA Size	Maximum Motor Horsepower Rating		Starter Continue Ampere Rating	Disconnect Switch Ampere Rating	NEMA 1 General Purpose Enclosure		NEMA 4 Watertight Enclosure		NEMA 12 Industrial - Dust-tight Enclosure	
	Constant or Variable Torque (Constant Horsepower)				Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
	460V	575V								
0	5 (3)	5 (3)	18	30	T58AA0C2603 - *	\$3168.	- use size 1 - *	—	- use size 1 - *	—
1	10 (7½)	10 (7½)	27	30	T58AA1C2603 - *	3312.	T58WA1C2603 - *	\$ 5160.	T58TA1C2603 - *	\$ 3708.
2	15 (10)	15 (10)	45	60	T58AA2C2603 - *	5160.	T58WA2C2603 - *	7464.	T58TA2C2606 - *	5784.
2	25 (20)	25 (20)	45	60	T58AA2C2606 - *	5160.	T58WA2C2606 - *	7464.	T58TA2C2601 - *	5784.
3	50 (40)	50 (40)	90	100	T58AA3C2601 - *	7440.	T58WA3C2601 - *	11376.	T58TA3C2602 - *	9288.
4	100 (75)	100 (75)	135	200	T58AA4C2602 - *	17664.	T58WA4C2602 - *	23856.	T58TA4C2604 - *	22776.
5	200 (150)	200 (150)	270	400	Consult Factory					

2 Speed, Double Winding (separate winding)

0	5 (3)	5 (3)	18	30	T58AA0S2603- *	2640.	- use size 1 - *	—	- use size 1 - *	—
1	7½ (5)	7½ (5)	27	30	T58AA1S2603- *	2808.	T58WA1S2603- *	4660.	T58TA1S2603- *	3204.
2	10 (7½)	15 (10)	45	30	T58AA2S2606- *	4200.	T58WA2S2603- *	6530.	T58TA2S2603- *	4820.
2	25 (20)	25 (20)	45	60	T58AA3S2601- *	4452.	T58WA2S2606- *	6530.	T58TA2S2606- *	4820.
3	50 (40)	50 (40)	90	100	T58AA3S2602- *	6624.	T58WA3S2601- *	10080.	T58TA3S2601- *	7510.
4	100 (75)	100 (75)	135	200	T58AA4S2604- *	14592.	T58WA4S2602- *	19490.	T58TA4S2602- *	17140.
5	200 (150)	200 (150)	270	400	Consult Factory					

Note:

1. Includes starter complete with one N.O. contact on each contactor and two 3 phase overload relays less heaters. All starters are mechanically and electrically interlocked. Six (6) heaters are required, 3 heaters for each speed.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from coil table. Order heaters at \$18 each.

- Engineering Data - see Page B49
- Modification - see Page B35
- Renewal Parts - see Page B41
- Heater Tables - see Page B32
- Dimensions - see Page B42

Coil Volt/Hertz

24/60 or 24/50	-96
110-120/60 or 110/50	-76
220-240/60 or 220/50	-26
440-480/60 or 440/50	-46
550-600/60 or 550/50	-56
200-208/60	-86

Suffix



AC 2 Speed Starters with Magnetic Trip Circuit Breaker, 200, 230, 460 and 575V

2 Speed, Single Winding (consequent pole), Bulletin 6060											
NEMA Size	Maximum Motor Horsepower Rating			Starter Continuous Ampere	Circuit Breaker Ampere Ratings	NEMA Type 1 General Purpose Enclosure		NEMA Type 4 Watertight Enclosure		NEMA Type 12 Industrial - Dust-tight Enclosure	
	Constant or Variable Torque (Constant Horsepower)					Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price
	200V	230V	460V/575V								
0	$\frac{1}{2}$ ($\frac{1}{4}$)	$\frac{1}{2}$ ($\frac{1}{8}$)	$1\frac{1}{2}$ (1)	18	3	T60AA0C2671- *	3540.	- use size 1 -	—	- use size 1 -	— ¹
	$1\frac{1}{2}$ ($\frac{3}{4}$)	$1\frac{1}{2}$ (1)	3 (2)	18	7	T60AA0C2672- *	3540.	- use size 1 -	—	- uses size 1 -	—
	3 (2)	3 (2)	5 (3)	18	15	T60AA0C2673- *	3540.	- use size 1 -	—	- use size 1 -	—
1	$\frac{1}{2}$ ($\frac{1}{4}$)	$\frac{1}{2}$ ($\frac{1}{8}$)	$1\frac{1}{2}$ (1)	27	3	T60AA1C2671- *	3684.	T60WA1C2671- *	5652.	T60TA1C2671- *	4080.
	$1\frac{1}{2}$ ($\frac{3}{4}$)	$1\frac{1}{2}$ (1)	3 (2)	27	7	T60AA1C2672- *	3684.	T60WA1C2672- *	5652.	T60TA1C2672- *	4080.
	3 (2)	3 (2)	5 (5)	27	15	T60AA1C2673- *	3684.	T60WA1C2673- *	5652.	T60TA1C2673- *	4080.
	$7\frac{1}{2}$ (5)	$7\frac{1}{2}$ (5)	10 ($7\frac{1}{2}$)	27	30	T60AA1C2674- *	3684.	T60WA1C2674- *	5652.	T60TA1C2674- *	4080.
2	$7\frac{1}{2}$ (5)	$7\frac{1}{2}$ (5)	10 ($7\frac{1}{2}$)	45	30	T60AA2C2674- *	5688.	T60WA2C2674- *	7992.	T60TA2C2674- *	6312.
	10 ($7\frac{1}{2}$)	15 (10)	25 (20)	45	50	T60AA2C2675- *	5688.	T60WA2C2675- *	7992.	T60TA2C2675- *	6312.
3	25 (20)	30 (25)	50 (40)	90	100	T60AA3C2676- *	7716.	T60WA3C2676- *	11652.	T60TA3C2676- *	9084.
4	40 (30)	50 (40)	100 (75)	135	150	T60AA4C2677- *	18720.	T60WA4C2677- *	24816.	T60TA4C2677- *	22536.
5	75 (60)	100 (75)	200 (150)	270	400	Consult Factory					

Note:

Includes starter complete with N.O. contact, on each contactor, and two 3 phase overload relays less heaters. All starters are mechanically and electrically interlocked. Six (6) heaters are required, 3 heaters for each speed.

3
8
0

Ordering Information		Coil Volt/Hertz	Suffix
● Use complete catalog number. Replace the (*) with the suffix from coil table. Order heaters at \$18 each.	● Engineering Data - see Page B49	24/60 or 24/50	-96
	● Modification - see Page B35	110-120/60 or 110/50	-76
	● Renewal Parts - see Page B41	220-240/60 or 220/50	-26
	● Heater Tables - see Page B32	440-480/60 or 440/50	-46
	● Dimensions - see Page B42	550-600/60 or 550/50	-56
		200-208/60	-86



AC 2 Speed Starters with Magnetic Trip Circuit Breaker, 200, 230, 460 and 575V

2 Speed, Double Winding (Separate Winding), Bulletin 6060

NEMA Size	Maximum Motor Horsepower Rating			Starter Continuous Ampere Rating	Circuit Breaker Ampere Ratings	NEMA Type 1 General Purpose Enclosure		NEMA Type 4 Watertight Enclosure		NEMA Type 12 Industrial - Dust-tight Enclosure	
	Constant or Variable Torque (Constant Horsepower)					Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
	200V	230V	460V/575V								
0	$\frac{1}{2}$ ($\frac{1}{4}$)	$\frac{1}{2}$ ($\frac{1}{3}$)	$1\frac{1}{2}$ (1)	18	3	T60AA0S2671- *	3012.	- use size 1 -	—	- use size 1 -	—
	$1\frac{1}{2}$ ($\frac{3}{4}$)	$1\frac{1}{2}$ (1)	3 (2)	18	7	T60AA0S2672- *	3012.	- use size 1 -	—	- use size 1 -	—
	3 (2)	3 (2)	5 (3)	18	15	T60AA0S2673- *	3012.	- use size 1 -	—	- use size 1 -	—
1	$\frac{1}{2}$ ($\frac{1}{4}$)	$\frac{1}{2}$ ($\frac{1}{3}$)	$1\frac{1}{2}$ (1)	27	3	T60AA1S2671- *	3180.	T60WA1S2671- *	5028.	T60TA1S2671- *	3576.
	$1\frac{1}{2}$ ($\frac{3}{4}$)	$1\frac{1}{2}$ (1)	3 (2)	27	7	T60AA1S2672- *	3180.	T60WA1S2672- *	5028.	T60TA1S2672- *	3576.
	3 (2)	3 (2)	5 (5)	27	15	T60AA1S2673- *	3180.	T60WA1S2673- *	5028.	T60TA1S2673- *	3576.
	$7\frac{1}{2}$ (5)	$7\frac{1}{2}$ (5)	10 ($7\frac{1}{2}$)	27	30	T60AA1S2674- *	3180.	T60WA1S2674- *	5028.	T60TA1S2674- *	3576.
2	$7\frac{1}{2}$ (5)	$7\frac{1}{2}$ (5)	10 ($7\frac{1}{2}$)	45	30	T60AA2S2674- *	4728.	T60WA2S2674- *	7056.	T60TA2S2674- *	5352.
	10 ($7\frac{1}{2}$)	15 (10)	25 (20)	45	50	T60AA2S2675- *	4728.	T60WA2S2675- *	7056.	T60TA2S2675- *	5352.
3	25 (20)	30 (25)	50 (40)	90	100	T60AA3S2676- *	6420.	T60WA3S2676- *	10356.	T60TA3S2676- *	7788.
4	40 (30)	50 (40)	100 (75)	135	150	T60AA4S2677- *	14352.	T60WA4S2677- *	20478.	T60TA4S2677- *	18168.
5	75 (60)	100 (75)	200 (150)	270	400	Consult Factory					

Note:

- Includes starter complete with N.O. contact, on each contactor, and two 3 phase overload relays less heaters. All starters are mechanically electrically interlocked. Six (6) heaters are required, 3 heaters for each speed.

4
8
5

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from coil table. Order heaters at \$18 each.

- Engineering Data - see Page 50
- Modification - see Page 36
- Renewal Parts - see Page 42
- Heater Tables - see Page 33
- Dimensions - see Page 49

Coil Volt/Hertz

24/60 or 24/50
110-120/60 or 110/50
220-240/60 or 220/50
440-480/60 or 440/50
550-600/60 or 550/50
200-208/60

Suffix

-96
-76
-26
-46
-56
-86

Autotransformer Closed Transition

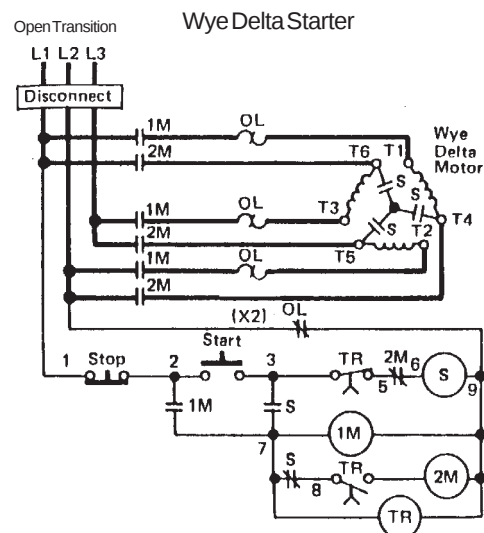
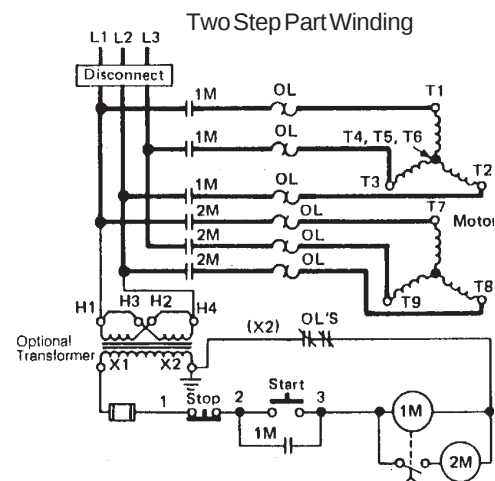
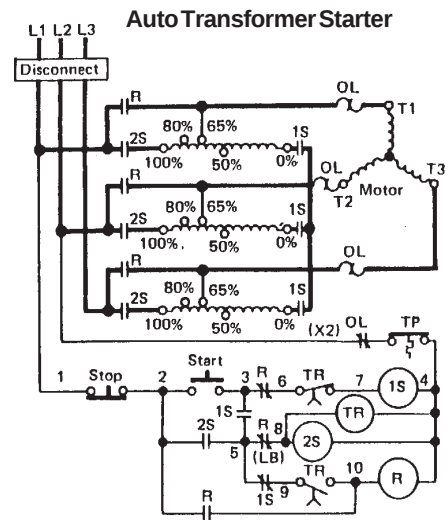
- Reduced Voltage Starting of Squirrel Cage Motors
- Highest Starting Torque per Ampere of Line Current
- Available in Type 4 & 12 Enclosure
- All Disconnect Types Available
- Complete Line Factory Installed Modifications

Part Winding Starters

- Two Step Starting of Squirrel Cage Motors
- Lowest Cost Method of Starting
- NEMA Type 1, 4, & 12 Enclosures
- Factory Installed Modifications

Wye-Delta Starters

- Available Open or Closed Transition
- Inrush Current $1/3$ Normal Line Starting
- NEMA 1 Enclosure Standard



Autotransformer Closed Transition - Bulletin 6082

NEMA Size	Max. Motor Horsepower Rating ¹		NEMA Type 1 General Purpose ²	
	230V	460V	Catalog No.	Price
3	25	-----	T82AA3FB - *	9714.
	30	-----	T82AA3GB - *	9714.
	-----	30	T82AA3GE - *	10788.
	-----	50	T82AA3JE - *	10788.
4	50	-----	T82AA4JB - *	15516.
	-----	100	T82AA4ME - *	15804.
5	75	-----	U2AA5LB - *	24690.
	100	-----	U82AA5MB - *	26560.
	-----	150	U82AA5PE - *	26690.
	-----	200	U82AA5QE - *	28890.
6	125	-----	Refer to Section A	
	150	-----		
	200	-----		
	-----	250		
	-----	300		
	-----	400		

Wye-Delta Starters ³, NEMA 1 Enclosures - Bulletin 6095

Wye Delta Size	Maximum Motor Horsepower Rating			NEMA 1 General Purpose Enclosure			
				Open Transition Catalog No.		Price	Closed Transition Catalog No.
1	10	-----	-----	T95AA30T1A	4122.	T95AA3CT1A	6294.
	-----	10	-----	T95AA30T1B		T95AA3CT1B	
	-----	-----	15	T95AA30T1C		T95AA3CT1C	
2	20	-----	-----	T95AA30T2A	4700.	T95AA3CT2A	7050.
	-----	25	-----	T95AA30T2B		T95AA3CT2B	
	-----	-----	40	T95AA30T2C		T95AA3CT2C	
3	40	-----	-----	T95AA30T3A	7100.	T95AA3CT3A	9830.
	-----	50	-----	T95AA30T3B		T95AA3CT3B	
	-----	-----	75	T95AA30T3C		T95AA3CT3C	
4	60	-----	-----	T95AA30T4A	14880.	T95AA3CT4A	18800.
	-----	75	-----	T95AA30T4B		T95AA3CT4B	
	-----	-----	150	T95AA30T4C		T95AA3CT4C	
5	150	-----	-----	V95AA30T5A	26610.	V95AA3CT5A	32610.
	-----	150	-----	V95AA30T5B		V95AA3CT5B	
	-----	-----	300	V95AA30T5C		V95AA3CT5C	
6	300	-----	-----	ConsultFactory			
	-----	350	-----				
	-----	-----	700				

Note:

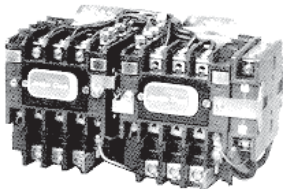
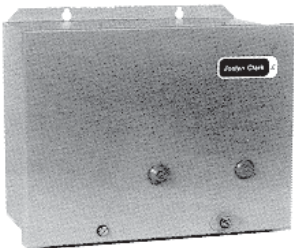
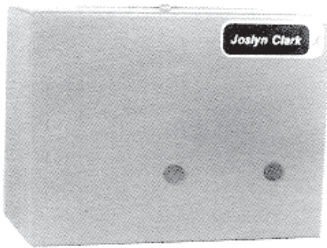
- Maximum horsepower ratings are in accordance with NEMA Standards ICS2-321C:20. Auto transformers are 3-Coil type, with voltage taps at 50%, 65% and 80% rated in accordance with NEMA Standards ICS2-214.21 for medium-duty starting service.
- Size 5 Starters are supplied in floor mounted enclosures without bottom cover plate for mounting against a wall. If not mounted against a wall, a rear cover plate must be ordered.
- Wye-Delta Starters Overload Relay Heater Selected by dividing FLC by 1.73 and select Heaters from index.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from the Coil Table. Heaters are purchased separately at \$18
- each.
- Modifications see Page B36
- Engineering Data Page B50
- Renewal Parts Page B42

Coil Table

Volt/60Hz	Line Voltage	Control Transformer
220-240	-26	-T26
440-480	-46	-T46



Part Winding Starters, Two Step - Bulletin 6090

Size	Max. Motor Horsepower Rating 2 or 3-Phase			Poles	Type 1 General Purpose		Type 4 Watertight		Type 12 Industrial		Open Type U	
	200V	230V	460/575V		Catalog No.	Price	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
1PW	10	10	15	3	T90AA31 - *	\$ 2628.	T90WA31 - *	\$ 4068.	T90TA31 - *	\$ 3828.	T90U031 - *	\$ 2556.
2PW	20	25	40		T90AA32 - *	3744.	T90WA32 - *	5364.	T90TA32 - *	5244.	T90U032 - *	3552.
3PW	40	50	75		T90AA33 - *	5280.	T90WA33 - *	7620.	T90TA33 - *	7080.	T90U033 - *	4944.
4PW	75	75	150		T90AA34 - *	11292.	T90WA34 - *	14976.	T90TA34 - *	13692.	T90U034 - *	10668.
5PW	150	150	350		Consult Factory							
6PW	----	300	600									

Note:
Includes starter complete with two contactors, timing device and two overload relays less heaters. (6 are required)
These starters are usually used with wye(star) connected motors. They may also be used for delta connected motors when the motors are so designed that neither delta winding need be open during starting.

Overload Realy Heater Data
Heater elements should be selected for running current in each winding. A total of 6 heater elements are required per controller.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from the coil table.
 - Order heater elements at \$18 each.
- Modifications see Page B36
 - Renewal Parts see Page B50
 - Engineering Data see Page B42

Coil Volt/Hertz	Suffix
24/60 or 24/50	-96
110-120/60 or 110/50	-76
220-240/60 or 220/50	-26
440-480/60 or 440/50	-46
550-600/60 or 550/50	-56
200-208/60	-86

Fused Disconnect Switch, NEMA 3R - Bulletin 6318

200 & 230 Volts

NEMA Size	Maximum Motor Horsepower Rating				Starter Continuous Ampere Rating	Disconnect Ampere Rating		NEMA Type 3R Weatherproof Enclosure Catalog No.	Price ¹
	Dual Element Fuses		Non-Time Delay Fuses			Switch	Fuse Clips		
	200V	230V	200V	230V					
1	5 7 ½	7 ½ -----	3 -----	3 7 ½	27	30	30 60	K18RB31203 - * K18RB31206 - *	\$ 1530. 1554.
2	10 -----	15 -----	----- 10	----- 15	45	60	60 100	K18RB32206 - * K18RB32201 - *	2070. 2214.
3	25 -----	30 -----	----- 25	----- 30	90	100	100 200	K18RB33201 - * K18RB33202 - *	3342. 3618.
4	40 -----	50 -----	----- 40	----- 50	135	150	200 400	K18RB34202 - * K18RB34204 - *	6258. 6846.
5	75	100	50	60	270	400	400	VK18RB350694 - *	13722.

460 & 575 Volts

	Dual Element Fuses		Non-Time Delay Fuses						
	460V	575V	460V	575V					
1	10 -----	10 -----	7 1/2 10	7 1/2 10	27	30	30 60	K18RB31603- K18RB31606- *	\$ 1554. 1578.
2	15 25	15 25	----- 15	----- 20	45	60	30 60	K18RB32603- K18RB32606- *	2082. 2106.
3	50 -----	50 -----	30 50	40 50	90	100	100 200	K18RB33601- K18RB33602- *	3414. 3666.
4	100 -----	100 -----	60 100	75 100	135	150	200 400	K18RB34602- K18RB34604- *	6306. 6942.
5	200	200	125	150	270	400	400	VK18RB350694- *	13722.

Note:

- Includes Pump Control Panel in NEMA 3R weather-resistant enclosure, complete with integral circuit breaker or fusible disconnect switch less fuses, start push button. Hand-Off-Auto selector switch and 3 phase ambient compensated overload relay less heaters. Heaters are purchased separately at \$9 each. For non ambient compensated overload relay delete "J" from coil suffix.

Ordering Information	Coil Volt/Hertz	Suffix	Coil Volt/Hertz	Suffix
● Use complete catalog number Replace the (*) with the suffix from the coil table.	24/60 or 24/50	-96J	380/50	-35J
Order Heaters at \$18 each.	110-120/60 or 110/50	-76J	110/25	-12J
● Modifications see Page B36	220-240/60 or 220/50	-26J	220/25	-22J
● Engineering Data see Page B50	440-480/60 or 440/50	-46J	440/25	-42J
● Renewal Parts see Page B42	550-600/60 or 550/50	-56J		
	200-208/60	-86J		

Circuit Breaker, 200, 230, 460 and 575V - Bulletin 6320

240 Volts Thermal Magnetic Trip								
NEMA Size	Maximum MotorHorsepower Rating			Starter Continuous Ampere Rating	CircuitBreaker		NEMA Type 3R Weatherproof Enclosure Catalog No.	Price ¹
	200V	230V	460/575V		Ampere Rating	Type		
1	5 ² 7 ½	5 ² 7 ½	----- -----	27	40 50	TEB	K20RB31203 - *	\$ 1580.
2	10 -----	10 15	----- -----	45	50 70		K20RB31204 - *	1580.
	3	25 25	25 30		----- -----		90	100 150
4		40 -----	40 50	----- -----	135			150
	3	25 25	25 30	----- -----		90	100 150	
4					40 -----			40 50
	3	25 25	25 30	----- -----		90	100 150	
4					40 -----			40 50
	600 Volts Adjustable Magnetic Trip M.C.P.							
1	½	½	1 ½	27	3	TEC	K20RB31671 - *	\$ 1962.
	1 ½	1 ½	3		7		K20RB31672 - *	1962.
	3	3	5		15		K20RB31673 - *	1962.
	7 ½	7 ½	10		30		K20RB31674 - *	1962.
2	7 ½	7 ½	10	45	30		K20RB32674 - *	2442.
	15	15	25		50		K20RB32675 - *	2442.
3	25	30	50	90	100		K20RB33676 - *	3462.
4	40	50	100	135	150		K20RB34677 - *	7362.
5	75	100	200	270	400	TJC	K20RB35679 - *	16782.
6	150	200	400	540	600		K20RB36680 - *	36366.

Note:

- Includes Pump Control Panel in NEMA 3R weather-resistant enclosure, complete with integral circuit breaker or fusible disconnect switch less fuses, start push button. Hand-Off-Auto selector switch and 3 phase ambient compensated overload relay less heaters. Heaters are purchased separately at \$9 each.
- Specify HP if less than 5 HP

Ordering Information

- Use complete catalog number Replace the (*) with the suffix from the coil table. Order Heaters at \$18 each.
- Modifications see Page B36
- Engineering Data see Page B50
- Replacement Parts see Page B42

Coil Volt/Hertz

24/60 or 24/50
110-120/60 or 110/50
220-240/60 or 220/50
440-480/60 or 440/50
550-600/60 or 550/50
200-208/60

Suffix

-96J
-76J
-26J
-46J
-56J
-86J

Factory Modifications For K18 & K20 Pump Panels

Description	Add For NEMA Size					Catalog Number Suffix
	1	2	3	4	5	
Control Transformers						
Standard Capacity Primary Volts/Hertz: 220-240/60. or 220/50 440-480/60. or 440/50 550-600/60. or 550/50 220-208/60 380/50	162	228	336	408	462	— T26J — T46J — T56J — T86J — T35J
220/25 440/25	246	342	504	612	612	— T22J — T42J
100 Watts Extra 220-240/60. or 220/50 440-480/60. or 440/50 550-600/60. or 550/50 200-208/60 380/50	288	372	468	528	588	— C26J — C46J — C56J — C86J — C35J
220/25 440/25	432	558	702	792	882	— C22J

Description	Additional Price	Specify As Cat# Suffix
Control Circuit		
Pilot Light, Standard Transformer Type, Red Lens	\$ 180	B
Fused Control Circuit (includes 2 Fuses)	264	C
Power Circuit		
Line Terminal Board, For Size 4 only. 4/0 Aluminum Wire	252	D
Grounded Service Conductor Service Entrance Lug For: NEMA Size 1-3 NEMA Size 4	48 60	E
Relays		
Time Delay Relay (Pneumatic) 0.2 Seconds to 3 Minutes Backspin (Includes Starter Interlock)	\$1068	F
Sequential Start timer	936	G
Lockout Control Relay	360	H
Substitute Non-Ambient Compensated Overload Relay	24 (Deduct)	Remove J From Suffix

ORDERING EXAMPLE

K18RB34604 with 440/480 60 Hz. Std. Transformer, Pilot Light (Options "B"), Grounded Service Entrance Lug for size 4 (Option "E"), Backspin, Timer (Option "F") and Lockout Relay (Option "H").

Catalog # is K18RB34604 - T46J-B-E-F-H
List Price is \$6942 + 816 + 180 + 60 + 1068 + 360
Total Price \$9426.

Coil Suffix Table

Volts	Hertz	Suffix
110-120	60	-76
200-208	60	-86
220-240	60	-26
380	50	-35
440-480	60	-46
550-600	60	-56

Field Modifications Kits For Pump Panels

Description	NEMA Size	Catalog Number	Price
Control Circuit			
Control Transformers -50/60 hz.			
50VA Capacity: 208V (Primary) 240V & 480V 600V	1-2	KTR67-16 KTR67-2 KTR67-12	\$216.
150V Capacity: 208V (Primary) 240V & 480V 600V	1-2	KTR67-20 KTR67-5 KTR67-22	264.
250VA Capacity: 208V (Primary) 240V & 480V 600V	3-4	KTR67-23 KTR67-7 KTR67-25	342.
Pilot Lights With Red Lens			
120V 240V 480V 600V	1-4	A63-435538A-1 A63-435538A-2 A63-435538A-3 A63-435538A-4	132.
Fuse Block, 2 Pole, 30A, 250V, Class H, With Two 1/2 A Dual Element Fuses	1-4	A63-435539A	72.

Notes:

- To complete Cat. No. of relay, add coil suffix from Suffix Table

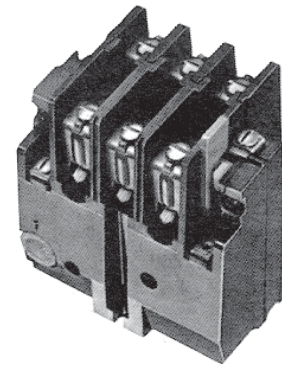
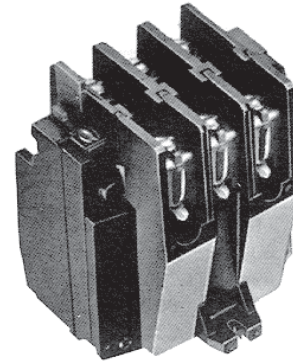
Description	NEMA Size	Catalog Number	Price
Power Circuit			
Line Terminal Board For Size 4 Only, 4/0 Aluminum Wire	4	A63-435540A	\$ 72.
Grounded Service Conductor Service Entrance Lug	1-3 4	A63-435541A A63-435542A	24. 36.
Load Terminals For Aluminum Wire	1-2 3 4	A63-435202A A63-435203A-1 A63-435203A-2	48. 46. 86.
Enclosure			
Mounting Feet	1-2 3-4	A63-435370A-2 A63-435370A-1	240. 300.
Relays			
Time Delay Relay (Pneumatic), 0.2 Seconds To 3 Minutes: Backspin	1-4	713UPDE ¹ Plus KTM-10	780. 60.
Sequential Start	1-4	713UP ¹	600.
Lockout Control Relay	1-4	5SR ¹	168.
Discount Schedule JC80			
Ambient Compensated Overload Relay	1 2 3 4	KTMA31-15 KTMA32-15 KTMA33-15 KTMA34-15	132. 180. 228. 348.

Free Standing Panel Mount

Price & Catalog Numbers Bulletin 7324

Overload Relay Size	Normally Closed Contacts		Normally Open & Normally Closed Contacts	
	Catalog No.	Price ¹	Catalog No.	Price ¹
Standard Bimetallic Overload Relays				
1 -30AMP	KTM31-12	\$108.	KTM31-13	\$ 156.
2 -50AMP	KTM32-12	156.	KTM32-13	204.
Ambient Compensated Bimetallic Overload Relays				
1 -30AMP	KTMA31-12	132.	KTMA31-13	180.
2 -50AMP	KTMA32-12	180.	KTMA32-13	228.

1. Includes 3-Phase Overload Relay complete, less heaters. Heaters may be purchased at \$18.00 each. See page B32.



Single Phase Application

A three phase overload relay is used for single phase applications. Only one heater is required and is to be installed in the center phase cavity of the relay.

Heater Selection

Select heaters based on motor nameplate full-load current. Tables are for continuous rated motors. Full-load current for a given horsepower motor will vary from one manufacturer to another and will depend on RPM of motor.

Type Of Protection

Heaters selected directly from the table provide a maximum of 125% protection at 40°C degree ambient, is suitable for motors with a 1.15 service factor with a 40°C degree rise or less and with motor and controller at the same temperature.

For motors with a 1.0 service factor or with a temperature rise greater than 40°C degree without service factor rating, use one size smaller heaters than in table. The ultimate trip of the heater is approximately 125% of the minimum current shown in the tables in a 40°C degree ambient.

Ambient Correction

Not necessary when overload relay is ambient compensated as identified by green reset rod. For control at an ambient constantly less than the motor ambient, correct by decreasing the nameplate motor full-load current by 1% per °C difference in ambient in ambient for heater selection.

For control at an ambient constantly greater than the motor ambient, correct by increasing the nameplate motor full-load current by 1% per °C difference in ambient.

Branch Circuit Protection

Branch circuit protection should be provided per National Electric Code (USA) or the Canadian Standards Association rules.

Automatic Reset

Automatic reset operation should not be used with two-wire control.

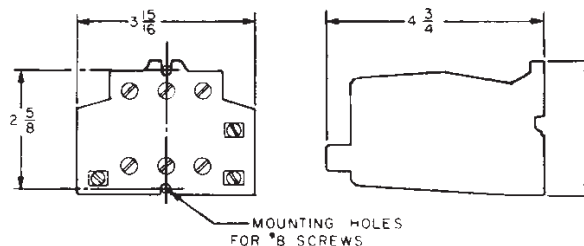
Overload Adjustment

These overload relays are manufactured with an exclusive calibration process to assure the ultimate in tripping accuracy and repeatability. The overload allows a true + 15% adjustment as a result of the process and is well suited for use with unity service factor motors requiring a shorter locked rotor tripping time. The + 15% adjustment is easily made by means of a small dial on the bottom of the relay. A quick field modification also permits removal of the adjustment feature.

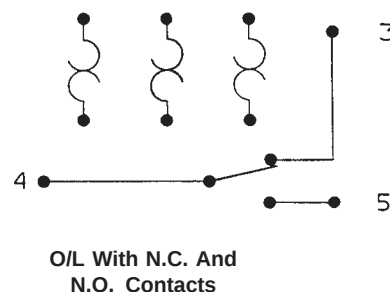
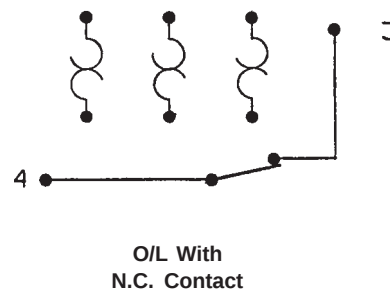
Free Standing Panel Mounted Sizes 1 & 2-Type TM

Bimetallic Standard and Ambient Compensated

Heater Catalog Number	Motor Ampere Rating				\$18.00 List Each	
	Single Phase One Heater		Three Phase 3 Heaters		Overload Relay Size	
	Min.	Max.	Min.	Max.		
2411	.58	.62	.46	.51	1	2
2412	.63	.68	.52	.56		
2413	.69	.78	.57	.62		
2414	.79	.88	.63	.70		
2415	.89	.98	.71	.77		
2416	.98	1.07	.78	.85		
2417	1.08	1.21	.86	.96		
2418	1.22	1.29	.97	1.02		
2419	1.30	1.41	1.03	1.12		
2420	1.42	1.49	1.13	1.18		
2421	1.50	1.68	1.19	1.33		
2422	1.69	1.91	1.34	1.51		
2423	1.92	2.15	1.52	1.70		
2424	2.16	2.49	1.71	1.97		
2425	2.50	2.71	1.98	2.15		
2426	2.72	2.99	2.16	2.37		
2427	3.00	3.37	2.38	2.67		
2429	3.38	3.67	2.68	2.89		
2430	3.68	4.09	2.90	3.24		
2431	4.10	4.53	3.25	3.51		
2432	4.54	4.92	3.52	3.90		
2433	4.93	5.30	3.91	4.25		
2434	5.31	6.14	4.26	4.87		
2435	6.15	6.89	4.88	5.48		
2436	6.90	7.64	5.49	6.05		
2437	7.65	8.19	6.06	6.50		
2438	8.20	9.29	6.51	7.38		
2439	9.30	10.1	7.39	8.07		
2441	10.2	10.7	8.08	8.55		
2442	10.8	11.7	8.56	9.34		
2443	11.8	12.6	9.35	10.0		
2444	12.7	14.0	10.1	11.1		
2445	14.1	16.2	11.2	12.8		
2446	16.3	18.0	12.9	14.3		
2447	18.1	20.7	14.4	16.4		
2448	20.8	23.3	16.5	18.5		
2450	23.4	25.4	18.6	20.0		
2451	25.4	27.9	20.1	22.1		
2452	28.0	32.9	22.2	26.1		
2453	33.0	35.9	26.2	28.4		
2454	36.0	40.6	28.5	30.0		
2453	33.0	35.9	-	-		
2454	36.0	40.6	28.5	32.2		
2455	40.7	45.5	32.3	36.1		
2456	45.6	52.3	36.2	41.4		
2457	52.4	58.0	41.5	47.9		
2459	-	-	48.0	50.0		



Bulletin 7324 Type TM Bimetallic Overload Relay 30 & 50 Ampere, Panel Mounting



Overload Relay Contact Ratings-Type TM

NEMA Size	Contact	Volts, AC	Continuous Amperes	A-C Inductive (0.35pf) Make Break	
00-6	N.C.	120V or less	2.5	15A	1.5A
		120-600 V		1800VA	180VA
	N.O.	120V or less		3A	.3A
		120-600V		360 VA	36 VA

Overload Heater Data

NEMA Controls - TM

Type of Protection

Heaters selected directly from the table provide a maximum of 125% protection at 40°C degree ambient, is suitable for motors with a 1.15 service factor with a 40°C degree rise or less and with motor and controller at the same temperature. For motors with a 1.0 service factor or with a temperature rise greater than 40°C degree without service factor rating, use one size smaller heaters than in table. The ultimate trip of the heater is approximately 125% of the minimum current shown in the tables in a 40°C degree ambient.

Ambient Correction

Not necessary when overload relay is ambient compensated as identified by green reset rod. For control at an ambient constantly less than the motor ambient, correct by decreasing the nameplate motor full-load current by 1% per °C degree difference in ambient. For control at an ambient constantly greater than the motor ambient, correct by increasing the nameplate motor full-load current by 1% per °C degree difference in ambient.

Automatic Reset

Automatic reset operation should not be used with two-wire control.

Heater Selection

Select heaters based on motor nameplate full-load current. Tables are for continuous rated motors. Full-load current for a given horsepower motor will vary from one manufacturer to another and will depend on RPM of motor.

Single Phase - Size 00, 0, 1, 1P, 2			\$18.00 List each	
Motor Ampere Rating - Type TM, HP				
Open Starter Bimetallic Relay		Heater Catalog Number	Enclosed Starter Non-Ambient and Open or Enclosed Starters Ambient Compensated Relay	
Min.	Max.		Min.	Max.
.55	.59	2411	.53	.57
.60	.65	2412	.58	.63
.66	.69	2413	.64	.67
.70	.77	2414	.68	.75
.78	.84	2415	.76	.82
.85	.96	2416	.83	.93
.97	1.06	2417	.94	1.03
1.07	1.14	2418	1.04	1.11
1.15	1.29	2419	1.12	1.25
1.30	1.37	2420	1.26	1.33
1.38	1.47	2421	1.34	1.43
1.48	1.68	2422	1.44	1.63
1.69	1.93	2423	1.64	1.87
1.94	2.17	2424	1.88	2.11
2.18	2.38	2425	2.12	2.31
2.39	2.63	2426	2.32	2.55
2.64	2.96	2427	2.56	2.87
2.97	3.20	2429	2.88	3.11
3.21	3.57	2430	3.12	3.47
3.58	3.90	2431	3.48	3.79
3.91	4.27	2432	3.80	4.15
4.28	4.52	2433	4.16	4.39
4.53	5.10	2434	4.40	4.95
5.11	5.50	2435	4.96	5.34
5.51	5.92	2436	5.35	5.75
5.93	6.58	2437	5.76	6.39
6.59	7.24	2438	6.40	7.03
7.25	8.23	2439	7.04	7.99
8.24	9.05	2441	8.00	8.79
9.06	10.00	2442	8.80	9.75
10.10	10.60	2443	9.76	10.3
10.70	12.30	2444	10.4	11.9
12.40	13.40	2445	12.0	13.0
13.50	14.70	2446	13.1	14.3
14.80	16.80	2447	14.4	16.3
16.90	19.30	2448	16.4	18.7
19.40	21.10	2450	18.8	20.5
21.20	24.20	2451	20.6	23.5
24.30	25.90	2452	23.6	25.0
26.00	28.50	2453	25.0	27.1
28.60	33.80	2454	27.2	31.9
33.90	37.90	2455	23.0	35.9
38.00	40.00	2456	36.0	38.9
		2457	39.0	40.0

Three Phase - Size 00, 0, 1, 1P, 2			\$18.00 List each	
Motor Ampere Rating - Type TM, HP				
Open Starter Bimetallic Relay		Heater Catalog Number	Enclosed Starter Non-Ambient and Open or Enclosed Starters Ambient Compensated Relay	
Min.	Max.		Min.	Max.
.44	.48	2411	.42	.46
.49	.54	2412	.47	.51
.55	.59	2413	.52	.56
.60	.67	2414	.57	.64
.68	.73	2415	.65	.70
.74	.81	2416	.71	.77
.82	.91	2417	.78	.87
.92	.98	2418	.88	.93
.99	1.07	2419	.94	1.02
1.08	1.16	2420	1.03	1.10
1.17	1.27	2421	1.11	1.21
1.28	1.44	2422	1.22	1.37
1.45	1.63	2423	1.38	1.55
1.64	1.88	2424	1.56	1.79
1.89	2.05	2425	1.80	1.95
2.06	2.26	2426	1.96	2.15
2.27	2.55	2427	2.16	2.43
2.56	2.76	2429	2.44	2.63
2.77	3.10	2430	2.64	2.95
3.11	3.35	2431	2.96	3.19
3.36	3.75	2432	3.20	3.55
3.76	4.06	2433	3.56	3.87
4.07	4.64	2434	3.88	4.43
4.65	5.23	2435	4.44	4.99
5.24	5.79	2436	5.00	5.51
5.80	6.20	2437	5.52	5.91
6.21	6.96	2438	5.92	6.71
6.97	7.71	2439	6.72	7.35
7.72	8.15	2441	7.36	7.75
8.16	8.79	2442	7.76	8.47
8.80	9.65	2443	8.48	9.19
9.66	10.6	2444	9.20	10.1
10.7	12.2	2445	10.2	11.6
12.3	13.7	2446	11.7	13.0
13.8	15.7	2447	13.1	14.9
15.8	17.6	2448	15.0	16.8
17.7	19.1	2450	16.9	18.2
19.2	20.9	2451	18.3	19.9
21.0	24.3	2452	20.0	23.1
24.4	26.0	2453	23.2	24.7
26.1	29.3	2454	24.8	27.9
29.4	31.4	2455	28.0	29.9
31.5	34.8	2456	30.0	33.1
34.9	40.1	2457	33.2	38.3
40.2	43.6	2459	38.4	41.5
43.7	45.0	2460	41.6	45.0

Three Phase Starter Overload Relay Heater
Table - Type TM - Sizes 3 & 4

Motor Ampere Rating		\$18.00 List Each		
Open Starter Bimetallic Relay	Min.	Max.	Heater Catalog Number	Enclosed Starter Non-Ambient and Open or Enclosed Starters Ambient Compensated Relay
				Min. Max.
	7.5	8.2	2514	7.4 7.9
	8.3	10.1	2515	8.0 9.9
	10.2	10.8	2516	10.0 10.5
	10.9	12.1	2517	10.6 11.9
	12.2	13.7	2518	12.0 13.5
	13.8	17.0	2519	13.6 16.7
	17.1	19.2	2520	16.8 18.8
	19.3	20.8	2521	18.9 20.3
	20.8	23.2	2522	20.4 22.7
	23.3	25.2	2523	22.8 24.7
	25.3	29.1	2524	24.8 28.5
	29.2	32.3	2525	28.6 31.6
	32.4	36.0	2526	31.7 35.2
	36.1	39.9	2527	35.3 39.1
	40.0	43.4	2528	39.2 42.3
	43.5	47.6	2529	42.4 46.4
	47.7	52.4	2530	46.5 50.8
	52.5	59.2	2531	50.9 57.3
	59.3	66.0	2532	57.4 63.7
	66.1	73.3	2533	63.8 70.7
	73.4	80.4	2534	70.8 77.3
	80.5	87.9	2535	77.4 83.1
	88.0	95.0	2536	83.2 90.9
	95.1	102.7	2537	91.0 97.6
	102.8	111.9	2538	97.7 106.0
	112.0	122.9	2539	106.1 115.4
	123.0	133.9	2540	115.5 123.9
	134.0	135.0	2541	124.0 135.0

The full load currents listed below are "average values" for motors of several manufacturers. These "average values" are as listed in the National Electrical Code 1996 and must only be used as a guide for selecting suitable branch circuit components.

The rated full load current shown on the motor nameplate is likely to vary from the values listed below .
The NAMEPLATE full load current should always be used in determining the rating of devices.

When using a design "E" Motor Special considerations apply refer to NEC 1996 tables 430 -151A & B & 430-152, page 70-453/454.

B

FULL-LOAD MOTOR-RUNNING CURRENTS IN AMPERES
CORRESPONDING TO VARIOUS A.C. HORSEPOWER RATINGS

115 Volts			230 Volts ^{1,2}		380 Volts		460 Volts		575 Volts		2.3 KV	4.16 KV
Phase	Single Phase	Three Phase	Single Phase	Three Phase	Single Phase	Three Phase	Single Phase	Three Phase	Single Phase	Three Phase	Three Phase	Three H.P.
1/10	--	--	--	--	--	--	--	--	--	--	--	--
1/8	--	--	--	--	--	--	--	--	--	--	--	--
1/6	4.4	--	2.2	--	1.40	--	--	--	--	--	--	--
1/4	5.8	--	2.9	--	1.85	--	--	--	--	--	--	--
1/3	7.2	--	3.6	--	2.32	--	--	--	--	--	--	--
1/2	9.8	4.4	4.9	2.2	3.19	1.28	2.5	1.1	2.0	0.9	--	--
3/4	13.8	6.4	6.9	3.2	4.47	1.78	3.5	1.6	2.8	1.3	--	--
1	16.0	8.4	8.0	4.2	5.12	2.30	4.0	2.1	3.2	1.7	--	--
1.5	20.0	12.0	10.0	6.0	6.38	3.32	5.0	3.0	4.0	2.4	--	--
2	24.0	13.6	12.0	6.8	7.66	4.34	6.0	3.4	4.8	2.7	--	--
3	34.0	--	17.0	9.6	10.87	6.14	8.5	4.8	6.8	3.9	--	--
5	56.0	--	28.0	15.2	17.90	9.71	14.0	7.6	11.2	6.1	--	--
7.5	80.0	--	40.0	22.0	26.80	14.00	21.0	11.0	16.0	9.0	--	--
10	100.0	--	50.0	28.0	33.20	17.90	26.0	14.0	20.0	11.0	--	--
15	--	--	--	42.0	--	26.80	34.0	21.0	27.0	17.0	--	--
20	--	--	--	54.0	--	34.50	44.0	27.0	35.0	22.0	--	--
25	--	--	--	68.0	--	43.50	55.0	34.0	44.0	27.0	--	--
30	--	--	--	80.0	--	51.20	68.0	40.0	54.0	32.0	--	--
40	--	--	--	104.0	--	66.50	88.0	52.0	70.0	41.0	--	--
50	--	--	--	130.0	--	83.10	108.0	65.0	86.0	52.0	--	--
60	--	--	--	154.0	--	103.0	--	77.0	--	62.0	16.	9.
75	--	--	--	192.0	--	128.0	--	96.0	--	77.0	20.	11.
100	--	--	--	248.0	--	165.0	--	124.0	--	99.0	26.	14.3
125	--	--	--	312.0	--	208.0	--	156.0	--	125.0	31.	17.
150	--	--	--	360.0	--	240.0	--	180.0	--	144.0	37.	20.
200	--	--	--	480.0	--	320.0	--	240.0	--	192.0	49.	27.
250	--	--	--	--	--	403.0	--	302.0	--	242.0	60.	33.
300	--	--	--	--	--	482.0	--	361.0	--	289.0	72.	40.
350	--	--	--	--	--	560.0	--	414.0	--	336.0	83.	46.
400	--	--	--	--	--	636.0	--	477.0	--	382.0	95.	52.
500	--	--	--	--	--	786.0	--	590.0	--	472.0	118.	65.

NOTES:

1. To obtain F.L.C. for 200 and 208 Volt motors multiply 230 volts values by 1.15 and 1.10 respectively.
2. To obtain F.L.C. for 265 and 277 Volt motors multiply 230 Volt values by .87 and .83 respectively.

Modifications

Cover Controls

	For Bulletin Number	Type Size	Enclosure Type Add to NEMA Type			Change Letter To:	Typical Catalog Number	
			1	4	12			
Overload Reset Change from External to Internal	All Except 6031/7707	00-6	N/C	N/C	N/C	O	T18AA31603-46	
Push Buttons & Selector Switches With External Reset: Hand-Off-Auto Selector Switch Start-Stop Push Button	6013, 6018, 6020, 7707	00-6	\$ 96.	\$264.	\$264.	B C		
With Internal Reset: Hand-Off-Auto Selector Switch Start-Stop Push Button						E F		
With External or Internal Reset: 2 or 3-Position Selector Switch-SPDT Forward-Reverse-Stop Push Buttons	All 6030-31, 6038-40,	00-6	96. 480.	264. 480.	264. 480.	B C		
High-Low-Stop or Fast-Slow-Stop Push Buttons	6050-58, 6060		480.	480.	480.	C		
Pilot Lights Without Electrical Interlock: Standard Transformer Type, Red Lens Push-to-Test Transformer Type, Red Lens	All	00-6	180. 180.	180. 180.	180. 180.	11 12		
With Electrical Interlock: Standard Transformer Type, Red Lens Push-to-Test Transformer Type, Red Lens			324. 504.	324. 504.	324. 504.	13 14		
Standard Lens Color - Green Blue White Yellow Amber Clear			—	N/C	N/C	11+15		
			—	N/C	N/C	11+16		
			—	N/C	N/C	11+17		
	—	N/C	N/C	11+18				
	—	N/C	N/C	11+19				
Control Circuit								
Contacts Each- Extra N.O.(Contact Max 3 N/O or N/C)	All	00-4	132.	132.	132.	21		
Contacts Each- Extra NC. (Contact Max 3 N/O or N/C)			132.	132.	132.	23		
Mtd. on & operated by disconnect operator: Single Pole, Double Throw Double Pole, Double Throw	6018-20, 6038-40, 6058-60	00-4	180. 264.	180. 264.	180. 264.	24 25		
Unwired Terminal Block, Use with Stranded Cu Wire, #22- #10 AWG: 3 Wires Maximum 6 Wires Maximum	6018-20, 6038-40, 6058-60	00-6	120. 162.	120. 162.	120. 162.	27 28		
Fused Control Circuit-2 Fuses Included			264.	264.	264.	29		
Separate Control Circuit	All		N/C	N/C	N/C	30		

Auxiliary Relays	Type	Type Size	Enclosure Type:			Change Letter To:	Typical Catalog Number
			1	4	12		
Control Relay-4 Pole Maximum Timing Relay (Pneumatic)	All	00-6	\$612. 1008.	\$930. 1320.	\$652. 1008.	31 32	T18AA31603-46
Compelling Relay	6050,		792.	792.	792.	33	
Auto. Acceleration Relay for each higher speed	6058,		1848.	1848.	1848.	34	
Auto. Decelerating Relay for each higher speed	6060,		1848.	1848.	1848.	36	
Brake Relay			1176.	1176.	1176.	37	

Enclosure	For Bulletin Number	Encl. Type	Add to NEMA Size						Change Cat. No. Character Indicated To:	Typical Catalog Number
			0	1	2	3	4	5&6		
Door Gasketing Standard & Compact Extra-Wide	6018-20 6018-20	All	120. 216.	120. 216.	192. 312.	264. 264.	456. 456.	792. 792.	38 39	T18AA31603-46 39
All Enclosures	6038-40 6058-60		216. 216.	216. 216.	312. 312.	264. 264.	456. 456.	396. 396.	40	
Engraved Identification Plate	All	1,4,12	80.	80.	80.	80.	80.	80.		
Overload Relay										
Ambient Compensated Overload (Per Relay):	All Except 6031&7707	All	24.	24.	24.	24.	24.	24.	41	T18AA31603-T46
(SPDT) N.O. & N.C. Contacts (Per Relay) Alarm Contact	All Except 6031&7707	All 1,4,12	48.	48.	48.	48.	48.	48.	43	
Omit Overload Relay (Per Relay) () Deduct This \$ Amount	All Except 6031&7707	All 1,4,12	(96.)	(96.)	(144.)	(180.)	(276.)	(1444.)	44	
Power Circuit										
TECL Current Limiter Attachment for TEC Motor Circuit Protectors, 100,00 AIC Max.	6020-40, 6060	1,4,12	360.	360.	360.	960.	1950.	N/A	45	T18AA31603-T46
Class J Fuse Clips, In place of Class H	6018-38		N/C	N/C	N/C	N/C	N/C	N/C	9	
Class R Fuse Clips, In place of Class H	6058									
Control transformer ¹										
Description										
Standard Capacity Primary Volts/Hertz: 220-240/60, or 220/50 440-480/60, or 440/50 550-600/60, or 550/50	All	1,4,12	324.	324.	456.	672.	816.	924.	-T26 -T46 -T56	T18AA31603-T46
200-208/60 380/50			372.	372.	612.	876.	1116.	1284.	-T86 -T35	
220/25 ² 440/25 ²			492.	492.	684.	1008.	1224.	1224.	-T22 -T42	
100 Watts Extra Primary Volts/Hertz: 220-240/60, or 220/50 440/480/60, or 440/50 550-600/60, or 550/50 200-208/60 280/50			576.	576.	744.	936.	1056.	1176.	-C26 -C46 -C56 -C86 -C35	
220/25 ² 440/25 ²			864.	864.	1116.	1404.	1584.	1764.	-C22 -C42	
Fused Primary (Includes 2 Fuses)			112.	112.	112.	112.	112.	112.	47	
Ungrounded Secondary with 2 Dual Element Fuses			N/C	N/C	N/C	N/C	N/C	N/C	48	
Special Voltage on Transformer (Not Std.) Dual Voltage Secondary			Add 10% to Price of Transformer						49	

Notes:

UL Listed for field modification. Other modifications listed factory installed.

- Single or Dual (200-240 & 440-480) Voltage primary with 110-120V secondary. Standard primary voltages are 110-120, 200-205, 220-240, 277, 380, 440-480 and 550-600. Prices included 1 panel-mounted, dual-element secondary fuse, with other side of secondary connected to cabinet ground.
- Price includes extra-wide enclosure when used with any Bulletin 6018-20 starter.

Factory Installed Modifications For Reduced Voltage Starters

Special Enclosure			NEMA Size			Cat. Suffix #
			3	4	5	
Add to NEMA 1 Enclosed Starter for: (Note back & bottom cover plates are required for sizes 5 & 6.)	NEMA 4 Enclosure		\$3720.	\$6840.	\$6840.	61
	NEMA 12 Enclosure		2280.	2880.	3240.	62
Disconnect Devices						
Add to NEMA 1 Enclosed Starter for: Non-Fusible Disconnect Switch Combination	NEMA 1 Enclosure		1824.	2520.	4512.	63
	NEMA 4 Enclosure		6856.	11328.	13320.	64
	NEMA 12 Enclosure		2136.	5736.	8232.	65
Add to NEMA 1 Enclosed Starter for: Fusible Disconnect Switch Combination	100A Clips		1968.	—	—	66
		NEMA 1 200A Clips	2448.	3048	—	67
		Encl. 400A Clips	3384.	4344.	4944.	68
		600A Clips	—	5676.	6636.	69
	NEMA 4 200A Clips		6600.	—	—	70
		Encl. 400A Clips	7080.	11856.	—	71
		600A Clips	8016.	13152.	13752.	72
			—	14484.	15444.	73
	NEMA 12 200A Clips		4416.	—	—	74
		Encl. 400A Clips	4896.	6244.	—	75
		600A Clips	5832.	7560.	8664.	77
			—	8892.	10356.	78
Add to NEMA 1 Enclosed Starter for : Molded Case Circuit Breaker or MCP Combination	NEMA 1 Enclosure		2244.	4104.	7980.	79
	NEMA 4 Enclosure		6876.	12912.	16788.	80
	NEMA 12 Enclosure		4692.	7324.	11700.	81
Auxiliary Devices						
Control Relay (4 pole max.)	NEMA 1 & 12 Encl.		612.	612.	612.	82
	NEMA 4 Enclosure		936.	936.	936.	83
Pneumatic Timing Relay (3 min. max.)	NEMA 1 & 12 Encl.		1008.	1008.	1008.	84
	NEMA 4 Encl.		1320.	1320.	1320.	85
3 Phase Voltage Monitor Relay (Phase loss, Phase reversal, & Undervoltage)	NEMA 1;4, & 12 Encl.		1152.	1152.	1152.	87
Ammeter & 1-Current Transformer	NEMA 1,4 & 12 Encl.		1680.	2376.	2376.	88
Ammeter, Switch & 3-Current Transformer			4440.	4440.	4440.	89
Voltmeter			2376.	2376.	2376.	90
Voltmeter & Switch			3600.	3600.	3600.	91
Elapsed Time Meter			696.	696.	696.	92
Wattmeter			4864.	4864.	4864.	93
Watt-hour meter			5040.	5040.	5040.	94
Convenience Recepticle Mounted on Side			240.	240.	240.	95
Cylinder Lock on Door			600.	600.	600.	96
Space Heater with N.C. Auxiliary			NEMA 1,4 & 12 Encl.		924.	1488.

T 82 A A 4JB—26

T 82 A A 4JB—26

Modification Kits

CoverControl											
Description		For Bulletin Number	Mounting Location	For Enclosure Type	For NEMA Size	Kit Number	Series A	Price			
Push Buttons (Momentary)	Start-Stop	6013 & 7707	Case	1, 4 & 12	00-2	KTM-4		\$ 60.			
			Cover		00-2 3 & 4	KTM-3 ³ KTM4-38		60. 96.			
		6018-20	Flange	1 ¹	0-2 3 & 4	KTM-5 KTM-45	KTM5-1	60. 96.			
	Forward-Reverse-Stop	6030-31	Cover	1, 4 & 12	00-2 3 & 4	KTM-18 ³ KTM4-51	KTM5-2	300. 360.			
		6038-40	Flange	1 ¹	0-2 3 & 4	KTM-54 KTM4-47	KTM5-2	300. 360.			
	Selector Switches (Maintained) ²	Hand-Off-Auto	6013 & 7707	Cover	1, 4 & 12	00-2 3 & 4	KTM-7 ³ KTM4-40		60. 96.		
6030-31-50			Case	1	00-2	KTM-8		60.			
6018-20-38, 6040-58-60			Flange	1 ¹	0-2 3 & 4	KTM-9 KTM4-43	KTM5-3	60. 96.			
Pilot Lights (Include Red Lens)	120V 240V 480V 600V	6013-30, 6031-50, 7707	Cover	1, 4 & 12	00-2		KTM5-4 KTM5-5 KTM5-6 KTM5-7	132. 132. 132. 132.			
	120V 240V 480V 600V						KTM5-4 KTM5-5 KTM5-6 KTM5-7	180. 180. 180. 180.			
	120V 240V 480V	6018-20, 6038-40, 6058-60	Flange	1 ¹	0-2 3 & 4				KTM5-4 KTM5-5 KTM5-6	132. 132. 132.	
	120V 240V 480V						Same As Above	180. 180. 180.			
Reset Buttons (One Reset Per Kit)		6013-30, 6050 (2 Req)	Cover	1, 4 & 12	00-2	KTM32-7		18.			
		6018-20-38-40, 6058-60 (2 Req)									
		6013-30, 6050 (2 Req)							3 & 4	KTM34-8	24.
		6018-20-38-40, 6058-60 (2 Req)								KTM34-19	24.
External Reset for #ETM032-1 & ETM031-1 NEMA Type 3R Enclosure		6013		3R	00-2	KTM34-20		48.			
External Reset - For use with Joslyn Clark panel mounted overload kits in NEMA 1, 4 & 12 Enclosures. Dimensions from outside surface of enclosure cover to device mounting surface must fall in the range:											
Starter Size 00, 0 & 1 5 7/8" -- 7 1/8"		All	Cover	1, 4 & 12	00-2	KTM32-8		36.			
Starter Size 1P & 2 6" -- 7 1/4"											
Panel Mtd. Overload 5 9/16" -- 6 13/16"											
Reset Plug - Pack of 10					00-4	KTM-26		48.			

Notes:

- For Bulletins 6018, 6020, 6038, 6040, 6058, & 6060, NEMA 4 & 12 enclosed, use 30 mm. units.
- Kits may be changed in the field from 3-position to 2-position operation. In addition to HAND-OFF-AUTO, four labels are included, marked: FORWARD-OFF-REVERSE; HIGH-OFF-LOW; TEST-LAG-HEAD; ON-OFF.
- Not suitable for enclosed starters with transformer.

Enclosure Kits ¹

For Use With Bulletin No. of Open Type Devices	NEMA Size	NEMA Type 1 (General Purpose) Kit Number	Price	NEMA Type 4 Stainless Steel (Watertight - Dust tight) Kit Number	Price	NEMA Type 12 Industrial Dust tight Kit Number	Price
6013 & 7707	00-2	ETM012-1 ²	\$ 120.	ETM042-1 ²	\$ 540.	ETM122-1 ²	\$ 168.
		ETM012-2	192.	ETM042-2	930.	ETM122-2	384.
6030, 6031, & 6050	3 & 4	ETM014-1	240.	ETM044-1	1110.	ETM124-1	552.
	00-2	ETM012-2 ²	192.	ETM042-2 ²	930.	ETM122-2 ²	384.
		ETM012-3	312.	-----	----	-----	----
	3 & 4	ETM014-2	336.	ETM044-2	1830.	ETM124-2	1128.
NEMA Type 3R (Rainproof-Sleet Resistance)							
6013-7707	00-1	ETM031-1 ^{2 & 3}	168.				
6013-7707	2	ETM032-1 ^{2 & 3}	168.				

Transformer Mounting Plate

Bulletin No. of Open Type Devices	NEMA Size	Use with Enclosure Kit No.	Kit Numbers	Price	Bulletin No. of Open Type Devices	NEMA Size	Use with Enclosure Kit No.	Kit Numbers	Price
6013 & 7707	00-2	ETM012-2	KTM-28	\$ 24.	7707-PM	20A	ETM012-3	KTM-80	\$ 24.
	3 & 4	ETM014-1	KTM4-54	30.	6030-31 & 6050	00-2	ETM014-2 ETM044-2 ETM124-2	KTM-29	24.
		ETM044-1 ETM124-1				3 & 4		KTM4-55	60.

Control Circuit Kits

	Bulletin No.	NEMA Size	Kit Number	Price
Auxiliary contacts for cavity mounting in starter and contactors. One Normally Open, Convertible	All	00-4 TM 5 U5	KTM-10 KTM35-10 KUM35-10	\$ 60. 60. 48.
One Normally Closed, Convertible	All	00-4 TM 5 U5	KTM-11 KTM35-11 KUM35-11	60. 60. 48.
For side mounting on starters and contactors Two Normally Open, Non-Convertible	All	00-2 3-4	KTM-20 KTM-19	120. 120.

Transformer Kits: Complete J Fused primary a midget single fused 120V secondary ⁴

	VA Capacity	Primary Voltage	Hertz	Bulletin No.	NEMA Size	Kit Number	Price
Note: Can be used in NEMA 1, 4 & 12 enclosures that have available space. See enclosure kits to determine those with available space.	Standard Capacity - 50	208 240 & 480 600	50/60	All (See Note at Left)	00-2 ⁵	KTR67-16	\$ 216.
	100VA Extra Capacity - 150	208 240 & 480 600				KTR67-2	216.
						KTR67-12	216.
	Standard Capacity - 250	208 240 & 480 600			3 & 4	KTR67-20	264.
						KTR67-5	264.
						KTR67-22	264.
			KTR67-23	342.			
			KTR67-7	342.			
			KTR67-25	342.			

Accessories

Fuse Block, 2 Pole, 30 Amp., 250V, Class H, with two 1/2 Amp. Dual Element Fuses.	6018-20-38, 6040-58-60	0-2	KTM2-1	72.
Universal Starter Adaptor Kit. NEMA Size 1 Type TM starter with an assortment of heaters, auxiliary contacts, and coils and A60-300999 adaptor plate. For rush and emergency repairs; can replace most NEMA Size 00-1 starters	All	00-1	KTM-USA	1584.

Notes:

1. For use with the listed open type devices. Each kit includes external "Reset" button(s) and "Reset" plug(s), either of which may be installed in the predrilled enclosure cover. All enclosures have sufficient space to allow mounting a transformer or other equipment of similar size, unless otherwise noted.

2. Does not have space for transformer.

3. External "Reset" not included. For external "Reset", add Kit Number KTM32-20.

4. Will not fit standard enclosures.

5. Not applicable to NEMA 1 - Bulletin 6018, 6038 & 6058

Field Modification Kits

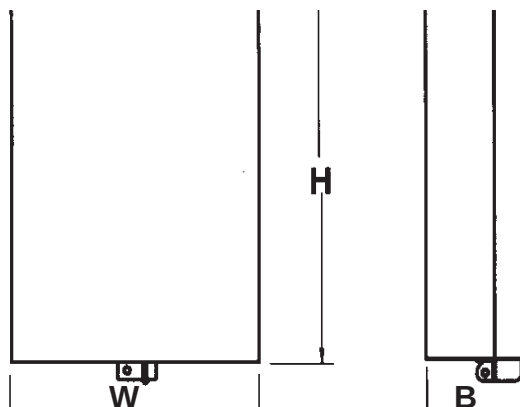
NEMA Control - TM

Power Circuit

Fuse Clips - Kit includes 6 clips and mounting screws, without base for lower clips.			Bulletin No.	NEMA Size	Kit No.	Kit No.	Price
	Fuse Class	Switch Amp. Size	6018-38-58	0-2	<i>If unit was purchased after 1/1/98</i>	<i>If unit was purchased before 1/1/98</i>	\$ 48.
30 amp. 250 volt (incl. 3 adaptor plates)	H	30 & 60			KTMF-332*	KTMF-332	
30 amp. 600 volt & 60 amp. 250 volt	H & J			KTMF-336*	KTMF-336	48.	
60 amp. 600 volt	H & J			KTMF-366*	KTMF-366	72.	
100 amp. 250 volt & 600 volt	H	60 & 100		2&3	KTMF-312*	KTMF-312	120.
Fuse Clip Lower Mounting Base - required only when converting a non-fusible starter to fusible or when changing from 60 to 100 amp. 30 & 60 amp. 250 & 600V			6018-38-58	00-2	KTMF-036*	KTMF-036	60.
100 amp. 250 & 600 volt				2&3	KTMF-061*	KTMF-061	96.

* Add series letter from catalog # on the label on the door of Enclosure Series "A", "B" or "C"

Power Pole - Auxiliary pole for side-mounting on starter or contactor.	N.O. Type	Bulletin No.	NEMA Size	Kit No.	Price
	NC. Type	All	0 & 1 1P & 2 3 4	KTM41-1 KTM42-1 KTM43-1 KTM44-1	132. 240. 300. 900.
Tie Pole - Auxiliary 4th & 5th power pole, both N.O. with 3-terminal connection for side-mounting on starter or contactors.		6050-58-60	0 & 1 2	KTM51-1 KTM52-1	264. 480.
Power Take Off - For multiple sets of overload relays.		All	3 4	KTM53-1 KTM54-1	600. 1800.
Power Pole Insulator - Required when a power pole or tie pole is added to a device in a 6 3/4" wide enclosure.			00-2	KTM32-6	72.
		6013 & 7707	00-2	KTM-27	12.
Accessories					
Cavity Cover (when auxiliary contact is not used)		All	00-4	A77-300545	N/C
Adapter Plate - Used to enable replacement of competitive starters with type TM.		6013	00-2	A60-300999	18.
Adjusting Knob Wedges - Package of 25. Used in overload adjustment knob to fix trip setting at 100%.		All	00-2	KTM-25	12.
Heater Rack - Designed for stocking heaters for all TM starters. Rack has 25 compartments and will hold 900 of the #2400 series heaters or 600 of the #2500 series heaters or a combination there of.		----	----	KTM-99	390.



Enclosure Dimensions

Figure Number	Overall Dimensions - inches			Enclosure Kit Number
	Height	Width	Depth	
1	10 1/8	6 3/4	6 7/16	ETM012-1
	10 1/8	12 5/8	6 15/16	ETM012-2
	14 1/2	12 5/8	6 4/8	ETM012-3
	22	12	9	ETM014-1
	24 3/8	18 1/2	9	ETM014-2
2	11	7 1/4	6 15/16	ETM042-1
	11	13 1/8	6 15/16	ETM042-2
	22 5/8	12 1/4	9 3/16	ETM044-1
	26 3/8	18 3/4	9 3/16	ETM044-2
	11	7 1/4	6 15/16	ETM122-1
	11	13 1/8	6 15/16	ETM122-2
	22 5/8	12 1/4	9 3/16	ETM124-1
	26 3/8	18 3/4	9 3/16	ETM124-2
	11	7 1/4	6 15/16	ETM031-1
	11	7 1/4	6 15/16	ETM032-1

NEMA 12 Enclosure Dimensions Modified for Outdoor Use

Joslyn Clark NEMA 12 enclosures may be field modified for outdoor use as follows:

NEMA 3

1. Watertight conduit hubs shall be used at all conduit entrances.

NEMA 3R

1. Watertight conduit hubs shall be used at all conduit entrances when the conduit enters at a level higher than the lowest live part.
2. Drain holes of 1/8 inch diameter shall be added to the bottom of the enclosure.

Starter Size	Catalog	Price
0 & 1	KTM042-11	\$120.
2	KTM042-12	330.
3	KTM044-13	354.
4	KTM044-14	676.

Hubs for NEMA Type 4 Enclosures

B

Description of Kit		For NEMA Size	Kit Number	Price
Power Contact Kit, For 3 Pole Type TM Starter Or Contactor (Movable And Stationary Contacts & Springs)		00,0,&1	KTM31-1	\$ 212.
		1P,2	KTM32-1	345.
		3	KTM33-1	909.
		4	KTM34-1	1139.
		5	KTM35-1	1863.
Power Contact Kit, For 2 Pole TM5 Starter Or Contactor (Movable And Stationary Contacts & Springs)		5	KTM25-1	1530.
Power Contact Kit, 1 Pole, For Type TM6 Starter or Contactor (Movable And Stationary Contacts & Springs) (3 Required for 3 Pole Devices)		6	KTM16-1	2298.
Power Contact Kit, For Type TM Normally Open Auxillary Side-mounted Power Pole on 1 & 2 Pole Starters And Contactors (1 Kit Required Per Pole-Movable And Stationary Contacts & Springs)		0&1	KTM31-2	87.
		1P &2	KTM32-2	122.
		3	KTM43-1	345.
		4	KTM44-1	1035.
Power Contact Kit, For Normally Closed Type TM Auxillary Side-mounted Power Pole (Movable And Stationary Contacts & Springs)		0,1,1P &2	KTM32-17	104.
		3	KTM43-2	345.
		4	KTM44-2	1035.
Power Contact Kit, For Type TM Auxillary Side-mounted Tie Pole (Movable And Stationary Contacts & Springs)	2 REQD.	0&1	KTM32-17	\$ 97.
	1 REQD.	2	KTM32-18	221.
	2 REQD.	3	KTM53-1	690.
	2 REQD.	4	KTM54-1	2070.
Arc Shield Cover Kit (1 Required Per Power Pole) TM6		6	A77-434905A	863.
Replacement Overload Relay, Standard Bimetallic, Less Heaters, For Single Phase Type TM Starter. Non Ambient Compensated		00,0,1&1P	KTM31-14	62.
Replacement Overload Relay, Non Ambient Compensated, Less Heaters, For 2 or 3 Phase Type TM Starter		00,0,1 &1P	KTM31-15	124.
		2	KTM32-15	179.
		3	KTM33-15	235.
		4	KTM34-15	373.
		5&611	KTM35-13	152.
Replacement Overload Relay, Ambient Compensated, Less Heaters, For 2 or 3 Phase Type TM Starter		00,0 &1	KTMA31-15	152.
		1P &2	KTMA32-15	207.
		3	KTMA33-15	262.
		4	KTMA34-15	400.
		5 &611	KTMA35-13	179.
Replacement Current Transformer Assembly, For Use with KTM35-13 & KTMA35-13 Kits		5	A60-306547	1564.
Power Contact Kit, 3 Pole Type "U" Size 5 Starter or Contactor (Movable & Stationary Contacts & Springs)		5	KUM35-1	2330.
For Replacement Parts For Size 6 Vacuum Contactors, refer to Section A		6	_____	_____

Coil Part Numbers For Volts/Hertz									
NEMA		110-120	200-208	220-240	277	380	440-480	550-600	
Size	Poles	110		220			440	550	Price
00-2	2-4	TB159-1	TB159-10	TB159-2	TB159-13	TB159-11	TB159-3	TB159-4	\$ 124.
3	2-4	TB162-7	TB162-14	TB162-8	TB162-13	TB162-15	TB162-9	TB162-10	207.
4	2-4	TB162-1	TB162-16	TB162-2	TB162-18	TB162-17	TB162-3	TB162-4	248.
5 T Series	2-3	TB161-1	TB161-5	TB161-2	TB161-12	TB161-10	TB161-3	TB161-4	483.
6 ¹ T Series	2-3	TB163-1	TB163-5	TB163-2	TB163-7	TB163-6	TB163-3	TB163-4	476.
5 U Series	2-3	335L1	_____	335L2	_____	_____	335L3	335L4	225.
6 V Series	Refer to Section A								

2
4
1

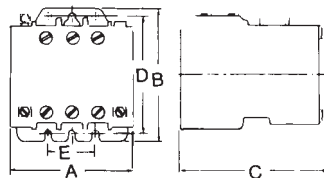
NEMA Open Type, Type 1, 4 & 12

Open Type		Dimensions - inches				
NEMA Size	Poles	Wide	High	Deep	Mounting	
		A	B	C	D	E
00	3	3 7/8	4 1/4	4 5/8	3 3/4	1 1/2
0-1	1-3	3 7/8	4 1/4	4 5/8	3 3/4	1 1/2
0-1	4	4 7/8	4 1/4	4 13/16	3 3/4	1 1/2
2	2-3	3 7/8	4 1/4	4 15/16	3 3/4	1 1/2
2	4	4 7/8	4 1/4	4 15/16	3 3/4	1 1/2
3-4	2-3	5 7/16	8 1/8	7 1/16	6 7/8	3 1/2
3-4	4	6 15/16	8 1/8	7 1/16	6 7/8	3 1/2
5	2-3	8 3/4	12 1/4	9 1/2	11 1/2	7
6		See Section A				
Type 1						
00	3	6 3/4	9 1/2	6 1/4	7 3/4	5
0-2	1-4	6 3/4	9 1/2	6 1/4	7 3/4	5
3-4	2-4	12	22	9	19	9
5	2-3	22	49	11 3/8	47 1/2	18
6		See Section A				
Type 1 (with transformer)						
00	3	12 5/8	9 1/2	6 1/4	7 3/4	11
0-2	1-4	12 5/8	10 1/8	6 1/4	9 1/2	11
3-4	2-4	12	22	9	19	9
5	2-3	22	49	11 3/8	47 1/2	18
6		See Section A				
Type 4						
00	3	7 1/4	11	6 7/8	10 1/2	4 1
0-1	1-4	7 1/4	11	6 7/8	10 1/2	4 1
2	2-4	7 1/4	11	6 7/8	10 1/2	4 1
3	2-4	12 1/4	24 5/8	9 3/16	23 1/2	7 1
4	2-4	12 1/4	24 5/8	9 3/16	23 1/2	7 1
5	2-3	17	49	11 3/8	47 1/2	18
6		See Section A				
Type 4 (with transformer)						
00	3	13 1/8	11	6 7/8	10 1/2	6
0-1	1-4	13 1/8	11	6 7/8	10 1/2	6
2	2-4	13 1/8	11	6 7/8	10 1/2	6
3	2-4	12 1/4	24 5/8	9 3/16	23 1/2	7 1
4	2-4	12 1/4	24 5/8	9 3/16	23 1/2	7 1
5	2-3	17	49	11 3/8	47 1/2	18
6		See Section A				
Type 12						
00	3	7 1/4	11	6 15/16	10 1/2	4 1
0-2	1-4	7 1/4	11	6 15/16	10 1/2	4 1
3-4	2-4	12 1/4	24 5/8	9 3/16	23 1/2	7 1
5	2-3	22	49	11 3/8	47 1/2	18
6		See Section A				
Type 12 (with transformer)						
00	3	13 1/8	11	6 15/16	10 1/2	6
0-2	1-4	13 1/8	11	6 15/16	10 1/2	6
3-4	2-4	12 1/4	24 5/8	9 3/16	23 1/2	7 1
5	2-3	22	49	11 3/8	47 1/2	18
6		See Section A				

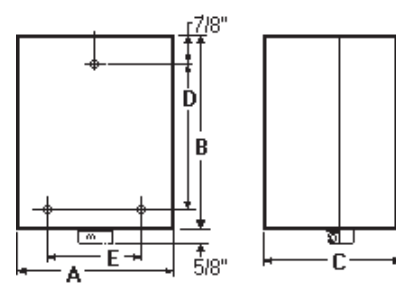
¹One top mtg. keyhole on center line.

Magnetic Contactors

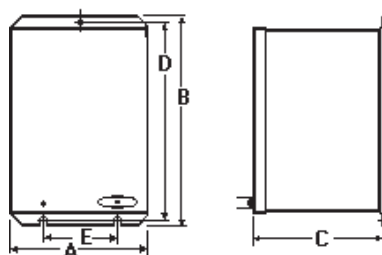
Open Type



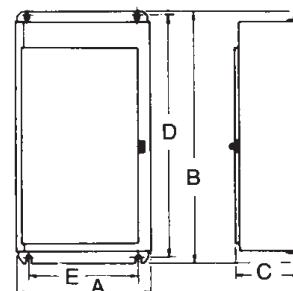
NEMA Type 1



NEMA Type 4



NEMA Type 12



Conduit Hub Size and Location

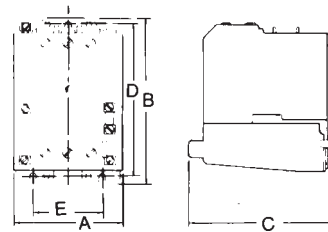
Encl. Size	Top & Bottom	Bottom Only	H	J	K
00-1	³ / ₄	³ / ₄	3	1 ⁵ / ₈	1 ⁵ / ₈
2	1 ¹ / ₂	³ / ₄	3	1 ⁵ / ₈	1 ⁵ / ₈
3	2	³ / ₄	3	2	2
4	2 ¹ / ₂	³ / ₄	3	2	2
5	3	³ / ₄	5	3	3

B

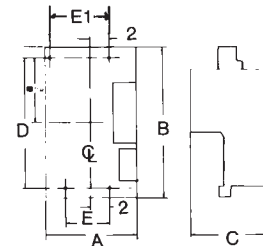
Open Type		Dimensions-inches				
NEMA Size	Poles	Wide	High	Deep	Mounting	
		A	B	C	D	E
00	2-3	3 ⁷ / ₈	6	5 ³ / ₁₆	5 ¹ / ₂	2 ¹ / ₂
0-1	1-3	3 ⁷ / ₈	6	5 ³ / ₁₆	5 ¹ / ₂	2 ¹ / ₂
0-1	4	4 ⁷ / ₈	6	5 ³ / ₁₆	5 ¹ / ₂	2 ¹ / ₂
1P	2	3 ⁷ / ₈	6	5 ³ / ₁₆	5 ¹ / ₂	2 ¹ / ₂
2	2-3	3 ⁷ / ₈	6	5 ³ / ₁₆	5 ¹ / ₂	2 ¹ / ₂
2	4	4 ⁷ / ₁₆	6	5 ³ / ₁₆	5 ¹ / ₂	2 ¹ / ₂
3-4	3	5 ¹⁵ / ₁₆	11	7 ¹ / ₁₆	9 ³ / ₄	3 ¹ / ₂
3-4	4	6 ⁷ / ₈	11	7 ¹ / ₁₆	9 ³ / ₄	3 ¹ / ₂
5	3	10 ¹ / ₈	15 ⁷ / ₈	9 ⁵ / ₈	13 ¹ / ₂	6 ³ / ₈
6		See Section A				
Type 1						
00	2-3	6 ³ / ₄	9 ¹ / ₂	6 ¹ / ₄	7 ³ / ₄	5
0-2	2-4	6 ³ / ₄	9 ¹ / ₂	6 ¹ / ₄	7 ³ / ₄	5
1P	2	6 ³ / ₄	9 ¹ / ₂	6 ³ / ₄	7	5
3-4	3-4	12	22	9	19	9
5	3	72	49	11 ³ / ₈	47 ¹ / ₂	18
6		See Section A				
Type 1 (with transformer)						
00	2-3	12 ⁵ / ₈	9 ¹ / ₂	6 ¹ / ₄	7 ³ / ₄	11
0-2	2-4	12 ⁵ / ₈	10 ¹ / ₈	6 ¹ / ₄	9 ¹ / ₂	11
1P	2	12 ⁵ / ₈	10 ¹ / ₈	6 ¹ / ₄	9 ¹ / ₂	11
3-4	3-4	12	22	9	19	9
5	3	22	49	11 ³ / ₈	47 ¹ / ₂	18
6		See Section A				
Type 4						
00	2-3	7 ¹ / ₄	11	6 ⁷ / ₈	10 ¹ / ₂	4 ¹
0-1	2-4	7 ¹ / ₄	11	6 ⁷ / ₈	10 ¹ / ₂	4 ¹
1P	2	7 ¹ / ₄	11	6 ⁷ / ₈	10 ¹ / ₂	4 ¹
2	3-4	7 ¹ / ₄	11	6 ⁷ / ₈	10 ¹ / ₂	4 ¹
3	3-4	12 ¹ / ₄	24 ⁵ / ₈	9 ³ / ₁₆	23 ¹ / ₂	7 ¹
4	3-4	12 ¹ / ₄	24 ⁵ / ₈	9 ³ / ₁₆	23 ¹ / ₂	7
5	3	17	49	11 ³ / ₈	47 ¹ / ₂	18
6		See Section A				
Type 4 (with transformer)						
00	2-3	13 ¹ / ₈	11	6 ⁵ / ₁₆	10 ¹ / ₂	6
0-2	2-4	13 ¹ / ₈	11	6 ⁵ / ₁₆	10 ¹ / ₂	6
1P	2	13 ¹ / ₈	11	6 ⁵ / ₁₆	10 ¹ / ₂	6
2	3-4	13 ¹ / ₈	11	6 ⁵ / ₁₆	10 ¹ / ₂	6 ¹
3	3-4	12 ¹ / ₄	24 ⁵ / ₈	9 ³ / ₁₆	23 ¹ / ₂	7 ¹
4	3-4	12 ¹ / ₄	24 ⁵ / ₈	9 ³ / ₁₆	23 ¹ / ₂	7
5	3	17	49	11 ³ / ₈	47 ¹ / ₂	18
6		See Section A				
Type 12						
00	2-3	7 ¹ / ₄	11	6 ¹⁵ / ₁₆	10 ¹ / ₂	4 ¹
0-2	2-4	7 ¹ / ₄	11	6 ¹⁵ / ₁₆	10 ¹ / ₂	4 ¹
1P	2	7 ¹ / ₄	11	6 ¹⁵ / ₁₆	10 ¹ / ₂	4 ¹
3-4	3-4	12 ¹ / ₄	24 ⁵ / ₈	9 ³ / ₁₆	23 ¹ / ₂	7
5	3	22	49	11 ³ / ₈	47 ¹ / ₂	18
6		See Section A				
Type 12 (with transformer)						
00	2-3	13 ¹ / ₈	11	6 ¹⁵ / ₁₆	10 ¹ / ₂	6
0-2	2-4	13 ¹ / ₈	11	6 ¹⁵ / ₁₆	10 ¹ / ₂	6
1P	2	13 ¹ / ₈	11	6 ¹⁵ / ₁₆	10 ¹ / ₂	6 ¹
3-4	3-4	12 ¹ / ₄	24 ⁵ / ₈	9 ³ / ₁₆	23 ¹ / ₂	7
5	3	22	49	11 ³ / ₈	47 ¹ / ₂	18
6		See Section A				

AC Magnetic Starters

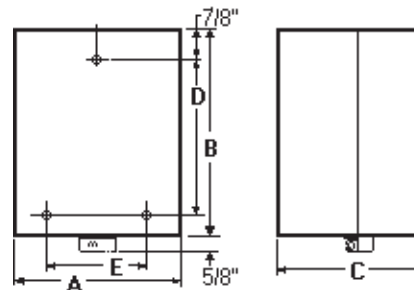
Open Type



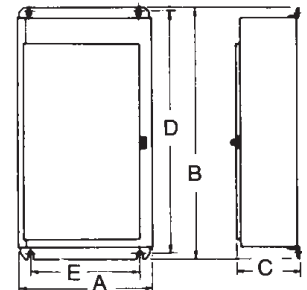
Size 5



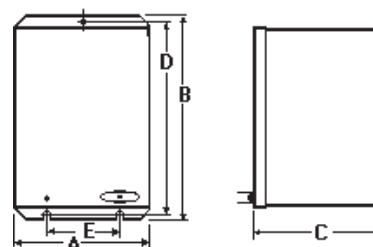
NEMA Type 1 — Sizes 00 to 4



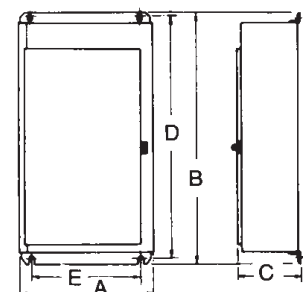
NEMA Type 1 — Size 5



NEMA Type 4



NEMA Type 12



Conduit Hub Size and Location

Encl. Size	Top & Bottom	Bottom Only	H	J	K
00-1	³ / ₄	³ / ₄	3	1 ⁵ / ₈	1 ⁵ / ₈
2	1 ¹ / ₂	³ / ₄	3	1 ⁵ / ₈	1 ⁵ / ₈
3	2	³ / ₄	3	2	2
4	2 ¹ / ₂	³ / ₄	3	2	2
5	3	³ / ₄	5	3	3

Note:

1. One top mtg. keyhole on center line.

NEMA Open Type, Type 1, 4 & 12

Open Type			Dimensions - inches						
NEMA Size	Poles	Fig.	Wide	High	Deep	Mounting			
			A	B	C	D	E	E1	
00	3	1	8 ³ / ₁₆	4 ¹ / ₄	4 ³ / ₄	3 ³ / ₄	6 ¹³ / ₁₆	4 ⁵ / ₁₆	
0-1	3		8 ³ / ₁₆	4 ¹ / ₄	4 ³ / ₄	3 ³ / ₄	6 ¹³ / ₁₆	4 ⁵ / ₁₆	
0-1	4		9 ³ / ₁₆	4 ¹ / ₄	4 ³ / ₄	3 ³ / ₄	6 ¹³ / ₁₆	4 ⁵ / ₁₆	
2	3		8 ³ / ₁₆	4 ¹ / ₄	4 ³ / ₄	3 ³ / ₄	6 ¹³ / ₁₆	4 ⁵ / ₁₆	
2	4		9 ³ / ₁₆	4 ¹ / ₄	4 ³ / ₄	3 ³ / ₄	6 ¹³ / ₁₆	4 ⁵ / ₁₆	
3-4	3		11 ⁵ / ₁₆	8 ¹ / ₈	7 ¹ / ₁₆	6 ⁷ / ₈	9 ³ / ₈	5 ⁷ / ₈	
3-4	4		14 ¹⁵ / ₁₆	8 ¹ / ₈	7 ¹ / ₁₆	6 ⁷ / ₈	9 ³ / ₈	5 ⁷ / ₈	
5	3		19 ³ / ₄	16 ¹ / ₄	10 ¹ / ₈	15 ¹ / ₂	17 ¹ / ₁₆		
5	3			Starter Refer Factory					
6				See Section A					
Type 1 Contactors and Starters									
00	3	5	12 ⁵ / ₈	9 ¹ / ₂	6 ¹ / ₄	7 ³ / ₄	11	*	
0-2	3-4	5	12 ⁵ / ₈	9 ¹ / ₂	6 ¹ / ₄	7 ³ / ₄	11	*	
3-4	3-4	5	18 ¹ / ₂	25 ³ / ₄	9	23	16	16	
5	3	6	22	49	9 ³ / ₈	47 ¹ / ₂	18		
6			See Section A						
Type 1 (with transformer) Contactors and Starters									
00	3	5	12 ⁵ / ₈	13 ⁷ / ₈	6 ¹ / ₄	12 ³ / ₄	11	*	
0-2	3-4	5	12 ⁵ / ₈	13 ⁷ / ₈	6 ¹ / ₄	12 ³ / ₄	11	*	
3-4	3-4	5	18 ¹ / ₂	25 ³ / ₄	9	23 ¹ / ₂	16	16	
5	3	6	22	49	9 ³ / ₈	47 ¹ / ₂	18		
6			See Section A						
Type 4 Contactors and Starters									
00	3	7	13 ¹ / ₈	11	6 ⁷ / ₈	10 ¹ / ₂	6	6	
0-2	3-4		13 ¹ / ₈	11	6 ⁷ / ₈	10 ¹ / ₂	6	6	
3	3-4		18 ³ / ₄	28 ³ / ₈	9 ³ / ₁₆	27 ¹ / ₄	13	13	
4	3-4		18 ³ / ₄	28 ³ / ₈	9 ³ / ₁₆	27 ¹ / ₄	13	13	
5	3		25	37 ¹ / ₂	10 ¹ / ₂	36	11		
6			See Section A						
Type 4 (with transformer) Contactors and Starters									
00	3	8	17	13	6 ⁷ / ₈	9	16	16	
0-2	3-4	8	17	13	6 ⁷ / ₈	9	16	16	
3	3-4	7	18 ³ / ₄	28 ³ / ₈	9 ³ / ₁₆	27 ¹ / ₄	13	13	
4	3-4	7	18 ³ / ₄	28 ³ / ₈	9 ³ / ₁₆	27 ¹ / ₄	13	13	
5	3	7	25	37 ¹ / ₂	10 ¹ / ₂	36	11		
6			See Section A						
Type 12 Contactors and Starters									
00	3	7	13 ¹ / ₈	11	6 ¹⁵ / ₁₆	10 ¹ / ₂	6	6	
0-2	3-4		13 ¹ / ₈	11	6 ¹⁵ / ₁₆	10 ¹ / ₂	6	6	
3-4	3-4		18 ³ / ₄	23 ³ / ₈	9 ³ / ₁₆	27 ¹ / ₂	13	13	
5	3		22	49	11 ³ / ₈	47 ¹ / ₂	18		
6			See Section A						
Type 12 (with transformer) Contactors and Starters									
00	3	8	17	13	6 ⁷ / ₈	9	6	6	
0-2	3-4	8	17	13	6 ⁷ / ₈	9	6	6	
3-4	3-4	7	18 ³ / ₄	28 ³ / ₄	9 ³ / ₁₆	27 ¹ / ₄	13	13	
5	3	7	22	49	11 ³ / ₈	47 ¹ / ₂	18		
6			See Section A						

Note:

- One top mtg. keyhole on center line.

Reversing Starters & Contactors

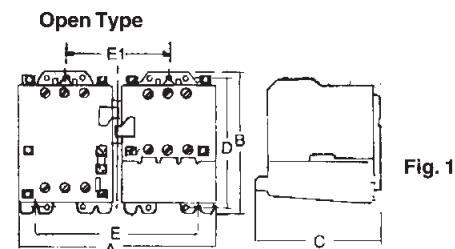
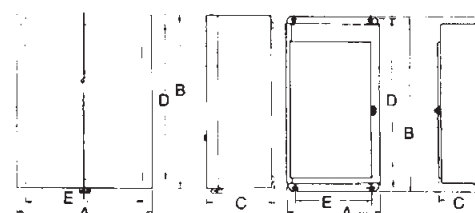
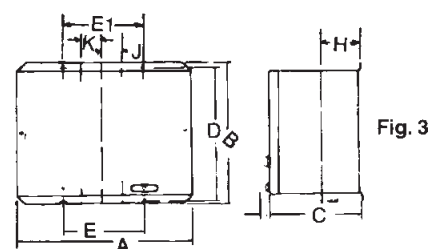


Fig. 1



NEMA Type 1

Fig. 2



NEMA Type 4

Fig. 3

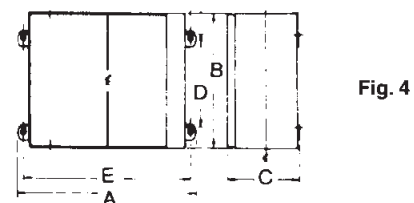


Fig. 4

Steel Enclosure

NEMA Type 12 — No Hub Provisions

Conduit Hub Size and Location					
Enclo. Size	Top & Bottom	Bottom Only	H	J	K
00-1	³ / ₄	³ / ₄	3	1 ⁵ / ₈	1 ⁵ / ₈
2	1 ¹ / ₂	³ / ₄	3	1 ⁵ / ₈	1 ⁵ / ₈
3	2	³ / ₄	3	2	2
4	2 ¹ / ₂	³ / ₄	3	2	2
5	3	³ / ₄	5	3	3

AC Non-Reversing 2 Speed Starters

NEMA Size	Fig.	Dimensions-Inches			Mounting			
		Wide	High	Deep	D	E1	E	F
		A	B	C				
Open type - 2 Speed, Single Winding								
00-2	1	9 ³ / ₁₆	6	5 ⁵ / ₁₆	5 ¹ / ₂	4 ⁵ / ₁₆	6 ³ / ₁₆	¹ / ₄
3-4		13 ⁵ / ₁₆	11	7 ¹ / ₁₆	9 ³ / ₄	5 ⁷ / ₈	9 ³ / ₈	⁵ / ₁₆
Open type - 2 Speed, Double Winding								
00-2	1	8 ³ / ₁₆	6	5 ⁵ / ₁₆	5 ¹ / ₂	4 ⁵ / ₁₆	6 ¹⁵ / ₁₆	¹ / ₄
3-4		11 ⁵ / ₁₆	11	7 ¹ / ₁₆	9 ³ / ₄	5 ⁷ / ₈	9 ³ / ₈	⁵ / ₁₆
Type 1 - 2 Speed, Single Winding								
00-2	2	12 ⁵ / ₈	9 ¹ / ₂	6 ³ / ₄	7 ³ / ₄	4 ⁵ / ₁₆	6 ¹³ / ₁₆	¹ / ₄
3-4		18 ¹ / ₂	25 ³ / ₄	9	23	5 ⁷ / ₈	9 ⁹ / ₈	⁵ / ₁₆
Type 1 - 2 Speed, Single Winding (with transformer)								
00-2	2	12 ⁵ / ₈	13 ⁷ / ₈	6 ¹ / ₄	12 ³ / ₄	1	11	⁷ / ₈
3-4		18 ¹ / ₂	25 ³ / ₄	9	23	16	16	1 ³ / ₈
Type 1 - 2 Speed, Double Winding								
00-2	2	12 ⁵ / ₈	9 ¹ / ₂	6 ¹ / ₄	12 ³ / ₄	1	11	⁷ / ₈
3-4		18 ¹ / ₂	25 ³ / ₄	9	23	16	16	1 ³ / ₈
Type 1 - 2 Speed, Double Winding (with Transformer)								
00-2	2	12 ⁵ / ₈	13 ⁷ / ₈	6 ¹ / ₄	12 ³ / ₄	1	11	⁷ / ₈
3-4		18 ¹ / ₂	25 ³ / ₄	9	23	16	16	1 ³ / ₈
Type 4 - 2 Speed, Single Winding 3								
00-1	3	13 ¹ / ₈	11	6 ⁵ / ₁₆	10 ¹ / ₂	6	6	¹ / ₄
2		13 ¹ / ₈	11	6 ⁵ / ₁₆	10 ¹ / ₂	6	6	¹ / ₄
3		18 ³ / ₄	28 ³ / ₈	9 ³ / ₁₆	27 ¹ / ₄	13	13	⁹ / ₁₆
4		18 ³ / ₄	28 ³ / ₈	9 ³ / ₁₆	27 ¹ / ₄	13	13	⁹ / ₁₆
Type 4 - 2 Speed, Single Winding (with transformer) 3								
00-1	3	15	13	6 ⁷ / ₈	9	16	16	2
2		15	13	6 ⁷ / ₈	9	16	16	2
3		18 ³ / ₄	28 ³ / ₈	9 ³ / ₈	27 ¹ / ₄	13	13	⁹ / ₁₆
4		18 ³ / ₄	28 ³ / ₈	9 ³ / ₁₆	27 ¹ / ₄	13	13	⁹ / ₁₆
Type 12 - 2 Speed, Single Winding								
00-2	4	13 ¹ / ₈	11	6 ¹⁵ / ₁₆	10 ¹ / ₂	6	6	¹ / ₄
3-4		18 ³ / ₄	28 ³ / ₈	9 ³ / ₁₆	27 ¹ / ₄	13	13	⁹ / ₁₆
Type 12 - 2 Speed, Single Winding (with transformer)								
00-2	4	15	13	6 ⁷ / ₈	9	16	16	¹ / ₄
3-4		18 ³ / ₄	28 ³ / ₈	9 ³ / ₁₆	27 ¹ / ₄	13	13	⁹ / ₁₆
Type 12 - 2 Speed, Double Winding								
00-2	4	13 ¹ / ₈	11	6 ¹⁵ / ₁₆	10 ¹ / ₂	6	6	¹ / ₄
3-4		18 ³ / ₄	28 ³ / ₈	9 ³ / ₁₆	27 ¹ / ₄	13	13	⁹ / ₁₆
Type 12 - 2 Speed, Double Winding (with transformer)								
00-2	4	13 ¹ / ₈	11	6 ⁵ / ₁₆	10 ¹ / ₂	6	6	¹ / ₄
3-4		18 ³ / ₄	28 ³ / ₈	9 ³ / ₁₆	27 ¹ / ₄	13	13	⁹ / ₁₆

Notes:

1. Indicates mounting hole is on the center line of enclosure.
2. For NEMA size 5 refer to factory.
3. NEMA Type 4 includes conduit hubs.

Open Type

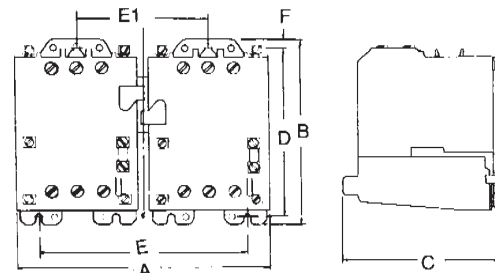


Fig.1

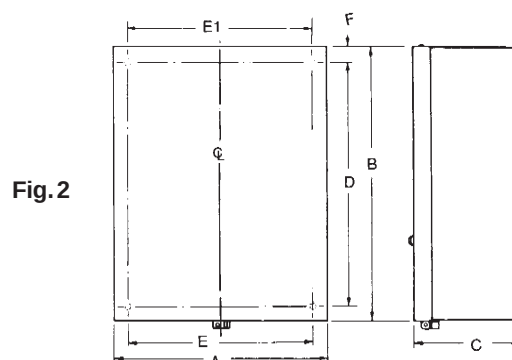
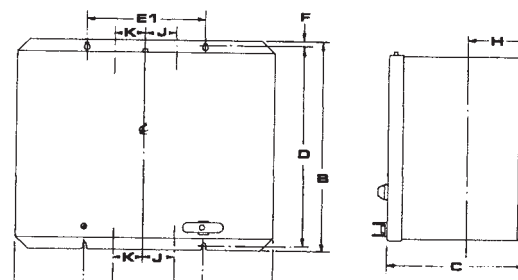
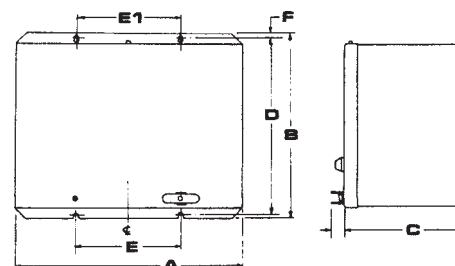


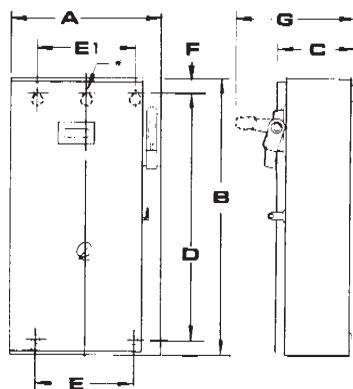
Fig.2



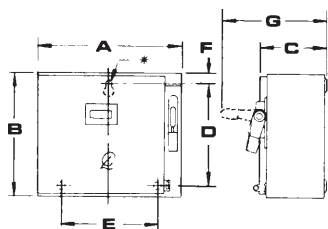
NEMA Type 4



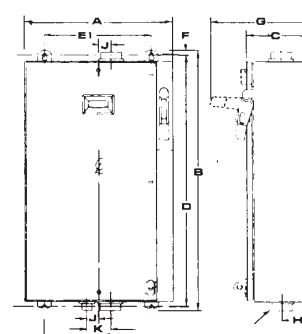
NEMA Type 12-No Hub Provisions



Standard or Extra-Wide Style
NEMA 1

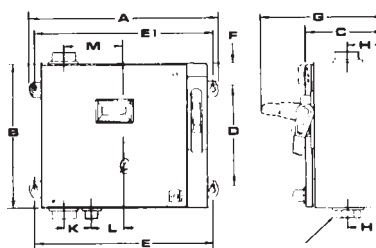


Compact Style
NEMA 1



Standard or Extra-Wide Style
NEMA 4 & 12

Conduit
Hub



Compact Style
NEMA 4 & 12

Conduit
Hub

NEMA 4 Hub
Application Table

NEMA Size	Dimensions-Inches	
	Top Hub	Bottom Hub
0 & 1	3/4	3/4
2	1 1/4	3/4 & 1 1/4
3	2	3/4 & 2
4	2 1/2	3/4 & 2 1/2

NEMA 1 Enclosures

NEMA Size	Cabinet Style	Dimensions- Inches								Mounting
		Wide A	High B	Deep C	Mounting					Hole Diameter
					D	E1	E	F	G	
0-2	Standard	8 ⁷ / ₈	26 ¹ / ₂	7 ³ / ₄	24	1	4 ¹ / ₂	1 ⁹ / ₃₂	11	1 ¹ / ₃₂
	³ Compact Extra-Wide	Consult Factory 15 ⁷ / ₈	26 ¹ / ₂	7 ³ / ₄	24	11 ¹ / ₂	11 ¹ / ₂	1	11	1 ¹ / ₃₂
3	Standard	14	35 ³ / ₈	8 ⁷ / ₈	33	9 ¹ / ₂	9 ¹ / ₂	1 ¹ / ₄	13	1 ¹ / ₃₂
3	³ Extra-Wide	22	35 ³ / ₈	8 ⁷ / ₈	33	16	16	1 ¹ / ₄	13	1 ¹ / ₃₂
4	Standard	22	39 ³ / ₈	8 ⁷ / ₈	37	16	16	1 ¹ / ₄	13	1 ¹ / ₃₂
5	Standard	22	49	9 ⁷ / ₈	47 ¹ / ₂	18	18	1 ⁵ / ₈	14 ¹ / ₄	⁷ / ₁₆

NEMA 4 & 12 Enclosures

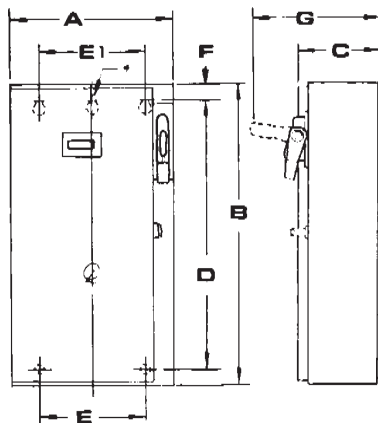
NEMA Size	Cabinet Style	Dimensions- Inches														Mounting Hole Diameter
		Wide A	High B	Deep C	Mounting											
					D	E1	E	F	G	H	J	K	L	M		
0-2	Standard	8 7/8	28 9/16	7 3/4	27 13/16	1	4 1/2	1/2	11	3 5/32	1 1/2	3	—	—	11/32	
	³ Extra-Wide	15 7/8	28 9/16	7 3/4	27 13/16	11 1/2	11 1/2	1/2	11	3 5/32	1 1/2	3	—	—	11/32	
3	³ Extra-Wide	14	37 1/2	8 7/8	36 3/4	9 1/2	9 1/2	3/8	13	2 3/4	1 1/2	4	—	—	11/32	
3		22	37 1/2	8 7/8	36 3/4	16	16	3/8	13	2 3/4	1 1/2	4	—	—	11/32	
4		Standard	22	41 1/2	8 7/8	40 3/4	16	16	3/8	13	2 3/4	1 1/2	4	—	—	11/32
5	Contact factory															

Notes:

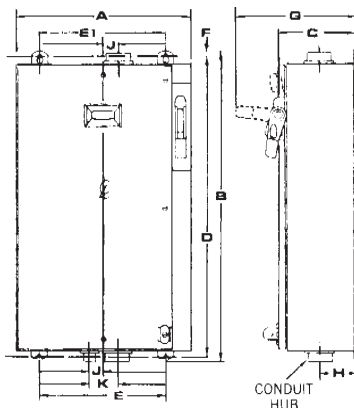
Consult Factory

- Indicates mounting hole is on the center line of the enclosure.
- Hub included on NEMA Type 4 enclosure only.
- Use Extra Wide Dimension for Duplex and Irrigation Pump Panels.

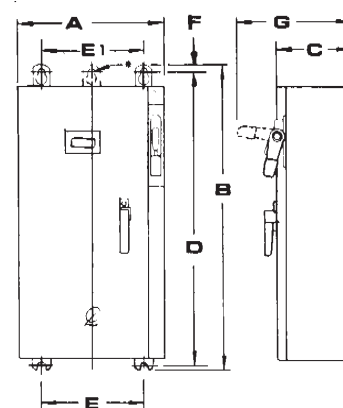
Combination Reversing Starters



NEMA 1



NEMA 4



NEMA 12

NEMA 4 Hub Application Table

NEMA Size	Dimensions-Inches	
	Top Hub	Bottom Hub
0 & 1	$\frac{3}{4}$	$\frac{3}{4}$
2	$1 \frac{1}{4}$	$\frac{3}{4}$ & $1 \frac{1}{4}$
3	2	$\frac{3}{4}$ & 2
4	$2 \frac{1}{2}$	$\frac{3}{4}$ & $2 \frac{1}{2}$

NEMA 1 Enclosures

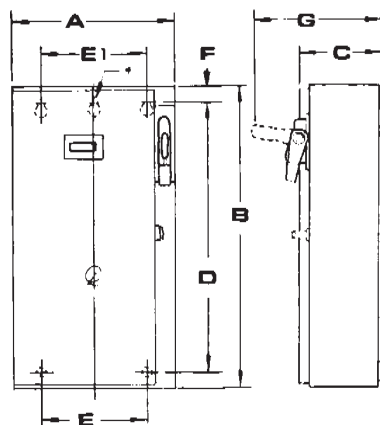
NEMA Size	Cabinet Style	Dimensions- Inches									Mounting Hole Diameter
		Wide A	High B	Deep C	Mounting						
					D	E1	E	F	G		
0-2	Standard	15 7/8	26 1/2	7 3/4	24	11 1/2	11 1/2	1	11	11/32	
3	Standard	22	35 3/8	8 7/8	33	16	16	1 1/4	13	11/32	
4	Standard	22	39 3/8	8 7/8	37	16	16	1 1/4	13	11/32	
5					Contact factory						

NEMA 4 Enclosures

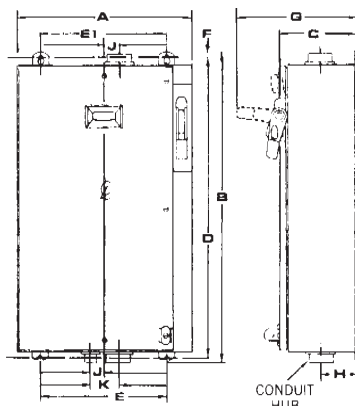
NEMA Size	Cabinet Style	Dimensions- Inches													Mounting Hole Diameter	
		Wide A	High B	Deep C	Mounting											
					D	E1	E	F	G	H	J	K	L	M		
0-2	Standard	15 7/8	28 9/16	73/4	2713/16	11 1/2	11 1/2	3/8	11	3 5/32	1 1/2	3	—	—	11/32	
3	Standard	22	37 1/2	8 7/8	36 3/4	16	16	3/8	13	2 3/4	1 1/2	4	—	—	11/32	
4	Standard	22	41 1/2	8 7/8	40 3/4	16	16	3/8	13	2 3/4	1 1/2	4	—	—	11/32	
5					Contact factory											

NEMA 12 Enclosures

NEMA Size	Cabinet Style	Dimensions- Inches								Mounting Hole Diameter
		Wide A	High B	Deep C	Mounting					
					D	E1	E	F	G	
0-2	Standard	15 ⁷ / ₈	28 ⁹ / ₁₆	7 ³ / ₄	27 ¹³ / ₁₆	11 ¹ / ₂	³ / ₈	³ / ₈	11	¹¹ / ₃₂
3	Standard	22	37 ¹ / ₂	8 ⁷ / ₈	36 ³ / ₄	16	16	³ / ₈	13	¹¹ / ₃₂
4	Standard	22	41 ¹ / ₂	8 ⁷ / ₈	40 ³ / ₄	16	16	³ / ₈	13	¹¹ / ₃₂
5					Contact factory					

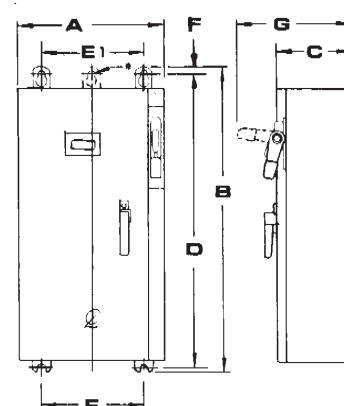


NEMA 1



NEMA 4

Combination 2 Speed



NEMA 12

B

NEMA 4 Hub
Application Table

NEMA Size	Dimensions-Inches	
	Top Hub	Bottom Hub
0 & 1	$\frac{3}{4}$	$\frac{3}{4}$
2	$1 \frac{1}{4}$	$\frac{3}{4}$ & $1 \frac{1}{4}$
3	2	$\frac{3}{4}$ & 2
4	$2 \frac{1}{2}$	$\frac{3}{4}$ & $2 \frac{1}{2}$

NEMA 1 Enclosures

NEMA Size	Cabinet Style	Dimensions- Inches									Mounting Hole Diameter
		Wide A	High B	Deep C	Mounting						
					D	E1	E	F	G		
0-2	Standard	15 7/8	26 1/2	7 3/4	24	11 1/2	11 1/2	1	11	11/32	
3	Standard	22	35 3/8	8 7/8	33	16	16	1 1/4	13	11/32	
4	Standard	22	39 3/8	8 7/8	37	16	16	1 1/4	13	11/32	
5					Contact factory						

NEMA 4 Enclosures

NEMA Size	Cabinet Style	Dimensions- Inches														Mounting Hole Diameter
		Wide A	High B	Deep C	Mounting											
					D	E1	E	F	G	H	J	K	L	M		
0-2	Standard	15 7/8	28 9/16	7 3/4	27 13/16	11 1/2	11 1/2	3/8	11	3 5/32	1 1/2	3	—	—	11/32	
3	Standard	22	37 1/2	8 7/8	36 3/4	16	16	7/8	13	2 3/4	1 1/2	4	—	—	11/32	
4	Standard	22	41 1/2	8 7/8	40 3/4	16	16	3/8	13	2 3/4	1 1/2	4	—	—	11/32	
5					Contact factory											

NEMA 12 Enclosures

NEMA Size	Cabinet Style	Dimensions- Inches									Mounting Hole Diameter
		Wide A	High B	Deep C	Mounting						
					D	E1	E	F	G		
0-2	Standard	15 7/8	28 9/16	7 3/4	27 13/16	11 1/2	3/8	3/8	11	11/32	
3	Standard	22	37 1/2	8 7/8	36 3/4	16	16	3/8	13	11/32	
4	Standard	22	41 1/2	8 7/8	40 3/4	16	16	3/8	13	11/32	
5					Contact factory						

Ratings - Controllers - Type TM

Continuous ampere and maximum horsepower ratings are in accordance with the following NEMA Standards:

Starters ICS 2-32.1B, ICS 2-321F

Contactors ICS 2-211.23, ICS 2-211.24

Power Wiring Accommodation - Type TM1

NEMA Size 2				Wire Type	Pressure Terminal Type	Provision For Ring Tongue Lugs 3	
	Wire Range		Terminal Width, In.			Screw Size	
	Line	Load					
		Contact					Overload
00	#14-#6	#14-#6	#14-#4	Copper (Cu)	Saddle	.625	#10-32
0	#14-#6	#14-#6	#14-#4	Copper (Cu)	Saddle	.625	#10-32
1	#14-#6	#14-#6	#14-#4	Copper (Cu)	Saddle	.625	#10-32
2	#14-#4	#14-#4	#14-#4	Copper (Cu)	Box	.62	#10-32
3	#8-#2/0	#8-#2/0	#8-#2/0	Copper (Cu)	Box	1.04	⁵ / ₁₆ -18
4	#6-250MCM	#6-250MCM	#6-250MCM	Copper (Cu)	Box	1.04	³ / ₄ -18
5	#4-500MCM	#4-500MCM	#4-500MCM	Aluminum	Box	1.25	³ / ₈ -Hole
6	(2)#4-500MCM	(2)#4-500MCM	(2)#4-500MCM	or Copper (Cu)		1.25	³ / ₈ -Hole

¹ For aluminum (Al) load wiring accommodations on Size 00-4, refer to local sales office.

² Devices are equipped with one (1) lug per phase, except size 6.

³ UL specifies only one (1) wire per lug.

Control Circuit Contact & Coil Terminals - Type TM

NEMA Size	Terminal Type	Copper Wire Size Min. - Max.	4,5 Screw Size
00-6	Pressure Saddle	#18-#12AWG	#8-32

4 One or two stranded copper wires of same size, or differing by (2) gauge sizes.

5 Coil terminal wire on TM 00-2 is #14 AWG maximum.

Control Circuit Contact Rating - Type TM

10 Ampere Continuous Rating - Maximum 600 Volts, AC or DC

NEMA Size	Contacts	Volts, AC	Amperes Continuous	A-C Inductive (0.35pf)		Volts, DC	D-C Inductive Make or Break
00-4	KTM-10 KTM-11	120V or less 120-600V	10	30A 3600VA	3A 360VA	125V 250V (300V OR LESS) 600V	1.1 .55A (138VA) .2A (120VA)
00-2	KTM-20						
3-4	KTM-19						
5-6	KTM35-10 KTM35-11		10	60A 7200VA	6A 720VA	(301-600V)	

Overload Relay Contact Ratings - Type TM

NEMA Size	Contact	Volts, AC	Continuous Amperes	A-C Inductive (0.35pf)	
00-6	N.C.	120V or less 120-600V	2.5	15A 1800VA	1.5A 180VA
	N.O	120V or less 120-600V		3A 360VA	.3A 36VA

Coil Burden - Type TM

NEMA Size	Poles	60Hz. Volt - Amperes		50Hz. Volt - Amperes		25Hz. Volt - Amperes	
		Inrush	Sealed	Inrush	Sealed	Inrush	Sealed
00-2	2-4	210	18	210	20	135	19
3	2-4	724	30	724	32	--	--
4	2-4	880	39	880	42	--	--
5	2-3	1790	295	--	--	--	--
6 ¹	2-3	3160	435	3300	490	--	--

1 Size 6 has two operating coils connected in series. Values given for two coils so connected.

**Control Transformer Sizes
For Type TM A-C Contactors Or Starters**

Contactor or Starter		Transformer Sizes- Volt-Amperes, 60 Hertz	
NEMA Size	No. of Poles	Standard Capacity	100W Extra Capacity
00.0.			
1 & 2	2-4	50	150
3 & 4	2-4	250	500
5	2-3	350	500
6 ²	2-3	50	150

2 For starter with control relay; starter coil is full voltage.

B

**Ratings Of Low-Voltage Contactors
For Transformer Primaries 3**

Contactor Size	Transformer Rating 4 -KVA, 50/60 Hz.					8-Hour Rating of Contactor Amperes	
	Single Phase		Three Phase				
	460 or					Open	Enclosed
	115V	230V	575V	230V	575V		
0	0.9	1.4	1.9	1.7	2.5	20	18
1	1.4	1.9	3	4.1	5.3	30	27
2	1.9	4.6	5.7	7.6	12	50	45
3	4.6	8.6	14	15	23	100	90
4	5.7	11	22	23	46	150	135
5	14	28	40	46	91	300	270
6	28	57	86	91	180	600	540

3 This table does not apply to transformers in resistance welding service.

4 This table applies to contactors used with transformers having an inrush of not more than (20) times their full-load current, irrespective of the nature of the secondary load.

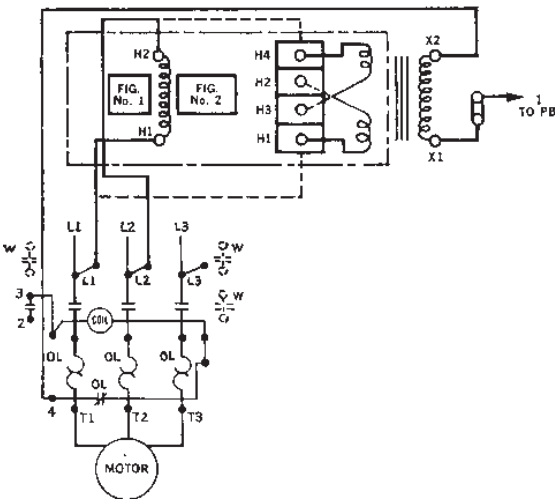
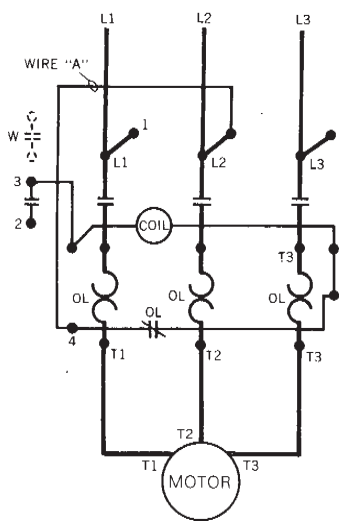
**Kilowatt Ratings Of Low-Voltage Transformers
For Resistive-Heating Loads Other Than Infrared-Lamp Loads 5
Per NEMA ICS 2.210-1**

Contactor Size	1 ϕ , 2-Pole Contactors (Open or Closed) Heating Load, KW				3 ϕ , 3-Pole Contactors (Open or Closed) Heating Load, KW			8-Hour Rating of Contactor Amperes	
	115V	230V	460V	575V	230V	460V	575V	Open	Enclosed
1	3	6	12	15	10	20	25	30	27
2	5	10	20	25	17	34	43	50	45
3	10	20	40	50	34	68	86	100	90
4	15	30	60	75	52	105	130	150	135
5	30	60	120	150	105	210	260	300	270
6	60	120	240	300	210	415	515	600	540
7	90	180	360	450	315	625	775	900	810

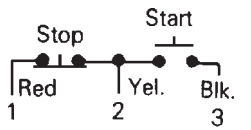
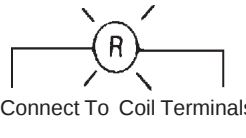
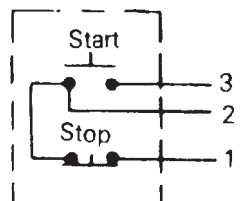
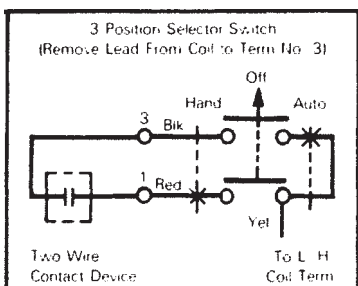
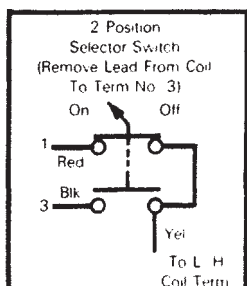
5 This Table applies to contactors used to switch the load at the utilization voltage of the heat-producing elements with a duty which requires continuous operation of not more than five (5) openings per minute.

For Starters 6013-TM;
Contactors 7707-TM Non-Combination

Wiring Diagram Front View

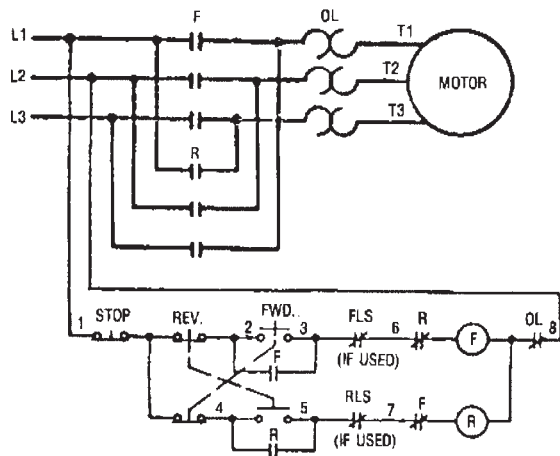


Connection For Pilot Devices

Cover Mounted Pilot Devices		3 Wire Control Remote Pilot Devices	Transformer Connections				
 Start-Stop Pushbutton	 Pilot Light	 Momentary Contact Pushbutton	Volts	Connections	L1	L2	Fig.
			240	H1 & H3,H2 & H4	H1	H4	2
			480	H2 & H3	H1	H4	2
			All Others	--			
			Automatic Reset				
			Automatic reset operation should not be used with two wire control.				
			Separate Control				
			Remove wire "A" when it is supplied. Connect separate control lines to the "1" terminal on the pilot device and the "4" terminal on the starter. Coil Terminal wire to be #14 AWG maximum.				

For Starters 6030-TM;
Contactors 6031-TM

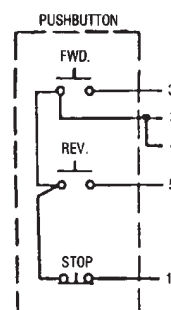
Elementary Diagram



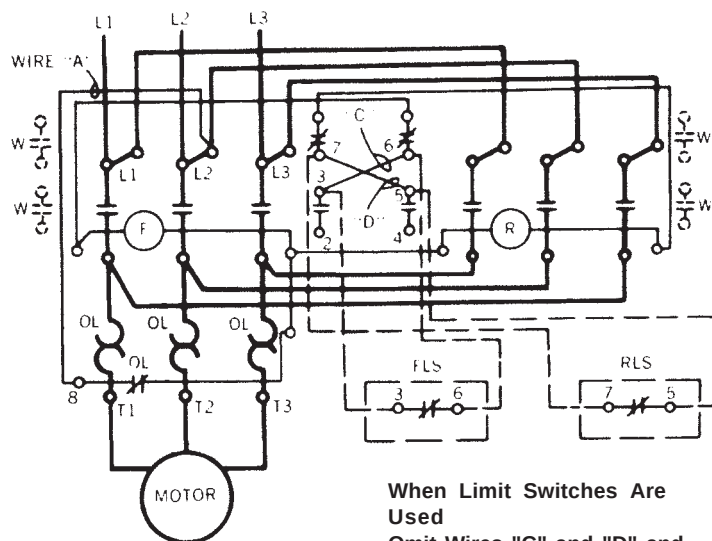
Seperate Control

Remove wire "A" when it is supplied
Connect seperate control lines to the
"1" terminal on the pilot device and
the "8" terminal on the starter. Coil
terminal wire to be No. 14 AWG
maximum.

Pushbutton Control



Wiring Diagram Front View

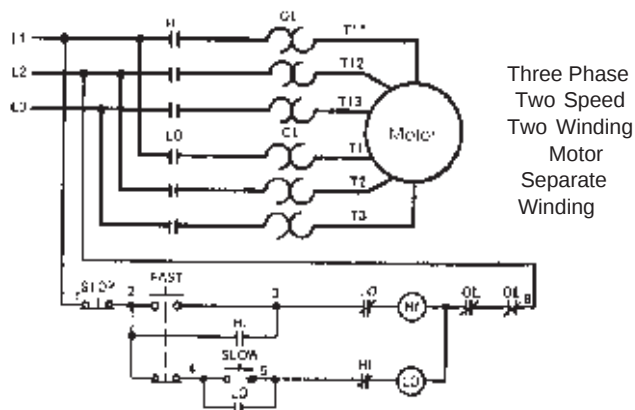


Contactors "F" & "R" Are
Mechanically Interlocked

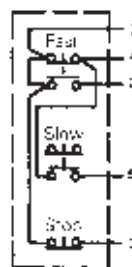
When Limit Switches Are
Used
Omit Wires "C" and "D" and
Connect Per Dotted Lines

For Starters 6050-TM

Elementary Diagram



Pushbutton

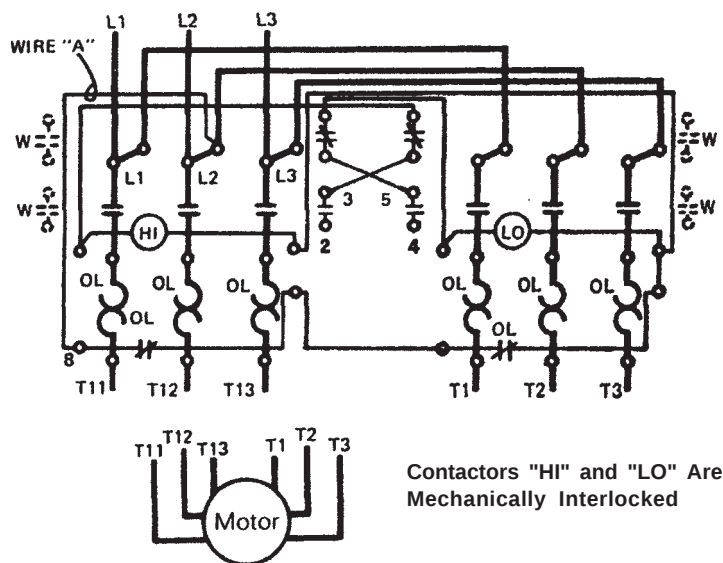


Separate Control

Remove wire "A" when it is supplied
Connect separate control lines to the
"1" terminal on the pilot device and
the "8" terminal on the starter. Coil
terminal wire to be No. 14 AWG
maximum.

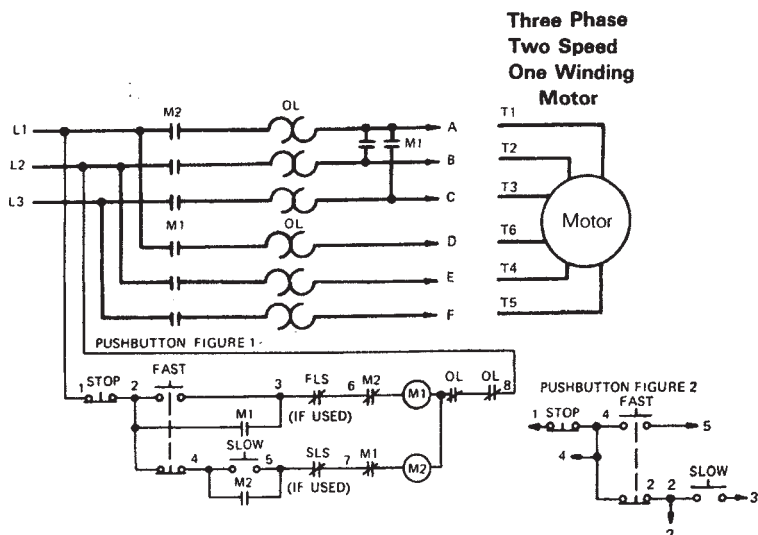
Pushbutton Control

Wiring Diagram Front View

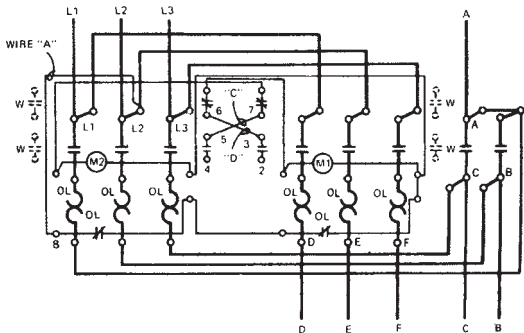


For Starters 6050-TM

Elementary Diagram



Wiring Diagram Front View



Momentary Contact Pushbuttons
Figure 1 Figure 2

Connections Of Motor And Pushbutton Terminals To Starter Terminals

Motor	Pushbutton	A	B	C	D	E	F	M1	M2
Figure 1	Figure 2	T6	T4	T5	T1	T2	T3	Low	High
Figure 2	Figure 1	T1	T2	T3	T6	T4	T5	High	Low
Figure 3	Figure 1	T1	T2	T3	T6	T4	T5	High	Low

Figure 1

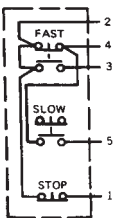
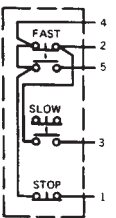


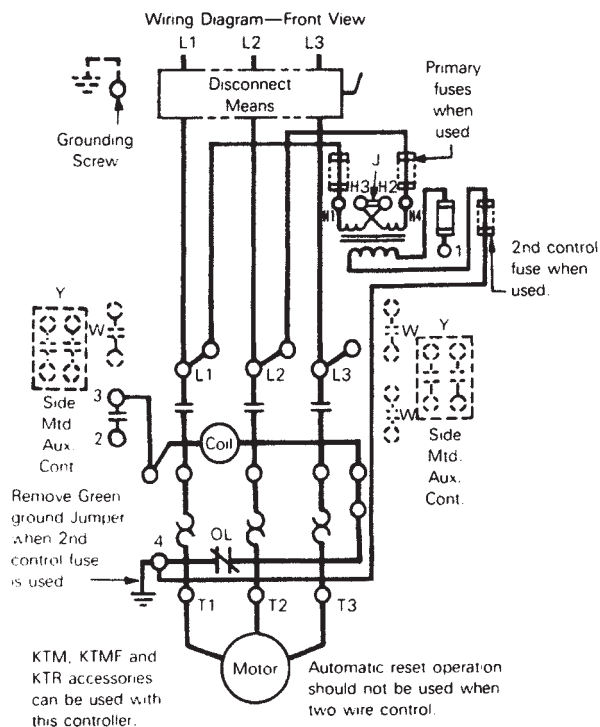
Figure 2



Three Phase Two Speed One Winding Motor Connection Data

Figure 1 Constant Horsepower						Figure 2 Constant Torque						Figure 3 Variable Torque					
L1	L2	L3	Open	Together	Speed	L1	L2	L3	Open	Together	Speed	L1	L2	L3	Open	Together	Speed
T1	T2	T3	—	T4,T5,T6	Low	T1	T2	T3	T4,T5,T6	—	Low	T1	T2	T3	T4,T5,T6	—	Low
T6	T4	T5	T1,T2,T3	—	High	T6	T4	T5	—	T1,T2,T3	High	T6	T4	T5	—	T1,T2,T3	High

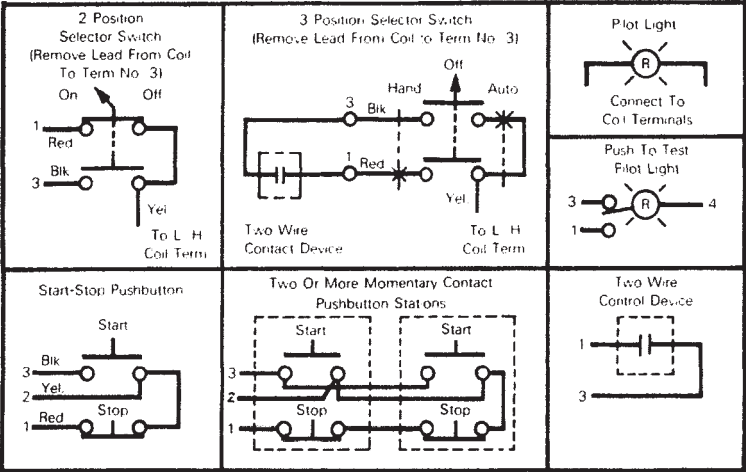
For Starters 6018-TM, 6020-TM Combination



Dual voltage transformer is shipped as shown connected for higher voltage. Reconnect jumpers "J" per table for lower voltage.

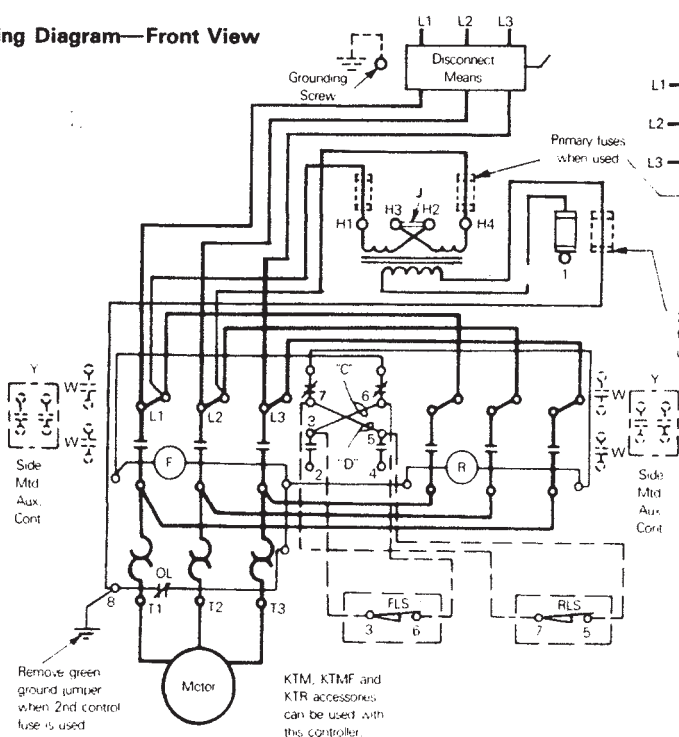
Voltage	Connect	L1	L2
230	H1 to H3 H2 to H4	H1	H4
460	H2 to H3	H1	H4
All Single Primary Transformers		H1	H2

Connections For Flange Mounted Or Remote Pilot Devices
Wire Colors Shown Are For Flange Mounted Units Only

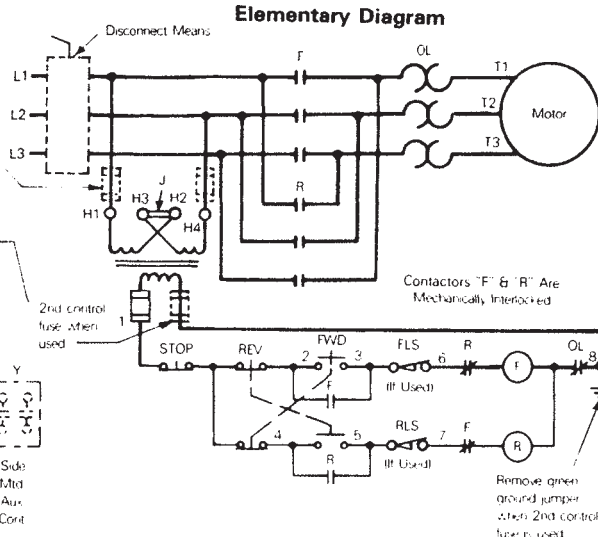


For Starters 6038-TM, 6040-TM Combination

Wiring Diagram—Front View

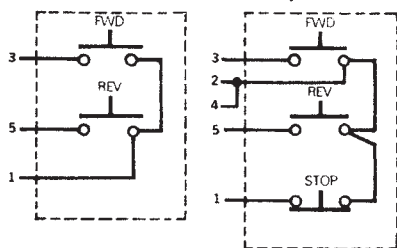


Elementary Diagram

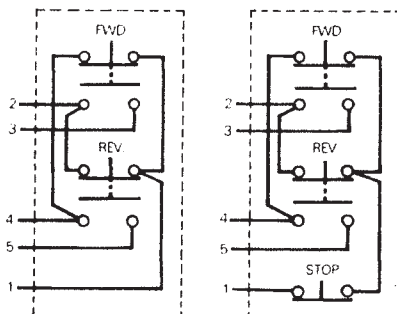


Connections For Flange Mounted Or Remote Pilot Devices

Pushbuttons Not Electrically Interlocked



Pushbuttons Electrically Interlocked



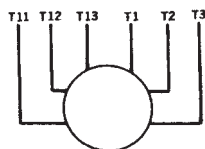
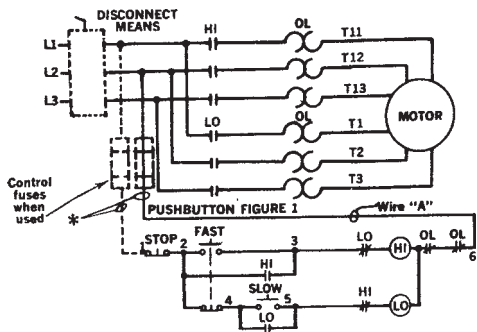
Dual voltage transformer is shipped as shown connected for higher voltage. Reconnect jumpers "J" per table for lower voltage.

Voltage	Connect	L1	L2
230	H1 to H3 H2 to H4	H1	H4
460	H2 to H3	H1	H4
All Single Primary Transformers		H1	H2

Standard A-C Wiring Diagrams Two-Speed, Two Winding (Separate Winding)

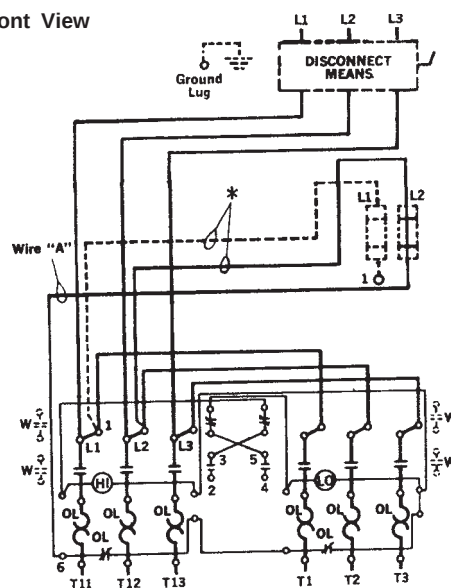
For Starters 6058-TM, 6060-TM Combination

Elementary Diagram:



Contactors
"HI" and "LO" are
Mechanically
Interlocked

Wiring Diagram - Front View



Common Control

When control circuit obtains power from the line side of the starter as shown, and control conductors extend beyond the enclosure, they must have overcurrent protection rated not in excess of 500% of the control circuit conductor ampacity. Such protection should be installed in the field if starter does not have control fuses.

Separate Control

Remove wire "A" when it is supplied.

Connect separate control lines as follows:

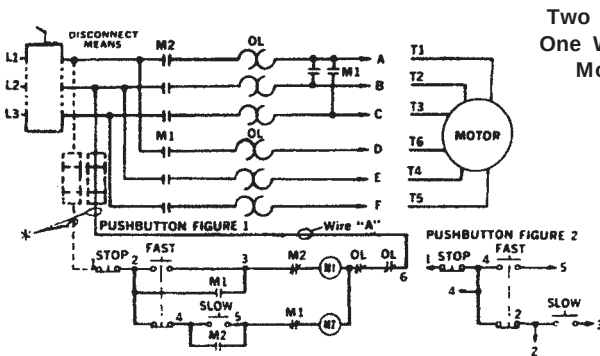
With internally mounted fuses, connect to fuse block.

Without internal fuses, an external fuse must be mounted immediately adjacent to the controller. Connect to "1" terminal on pilot devices and "6" terminal on starter.

Wiring Diagrams Two-Speed, One Winding (Consequent Pole)

For Starters 6058-TM, 6060-TM Combination

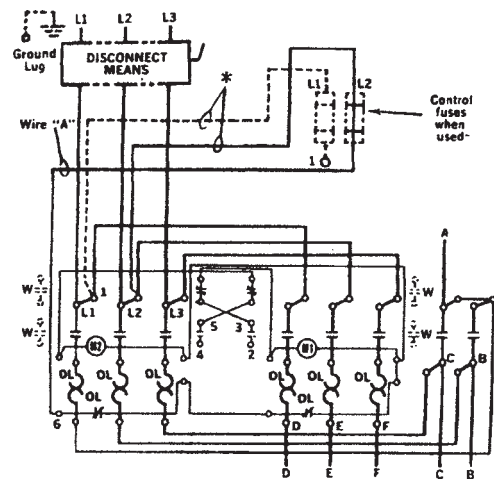
Elementary Diagram



Two Speed
One Winding
Motor

Contactors "M1" and "M2"
are
Mechanically interlocked

Wiring Diagram - Front View



Connections Of Motor And Pushbutton Terminals

Motor	Pushbutton	A	B	C	D	E	F	M1	M2
Figure 1	Figure 2	T6	T4	T5	T1	T2	T3	Low	Hi
Figure 2	Figure 1	T1	T2	T3	T6	T5	Hi	Low	
Figure 3	Figure 1	T1	T2	T3	T6	T4	T5	Hi	Low

Three Phase Two Speed One Winding Motor Connection Data

Figure 1 Constant Horsepower						Figure 2 Constant Torque						Figure 3 Variable Torque					
L1	L2	L3	Open	Together	Speed	L1	L2	L3	Open	Together	Speed	L1	L2	L3	Open	Together	Speed
T1	T2	T3	—	T4, T5, T6	Low	T1	T2	T3	T4, T5, T6	—	Low	T1	T2	T3	T4, T5, T6	—	Low
T6	T4	T5	T1, T2, T3	—	High	T6	T4	T5	—	T1, T2, T3	High	T6	T4	T5	—	T1, T2, T3	High

Connections For Case Mounted Or Remote Pilot Devices Momentary Contact Pushbuttons

Figure 1

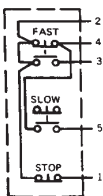
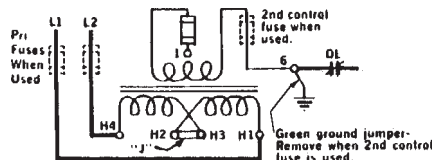
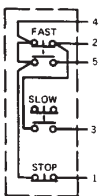


Figure 2



Voltage	Connect	L1	L2
230	H1 to H3 H2 to H4	H1	H4
460	H2 to H3	H1	H4
All Single Primary Transformers		H1	H2

Accessory And Replacement Kits

KTM and KTR accessories can be used with this controller. Other replacement coil by Part No. on coils.

For other renewal parts information, refer to S.B. 6000 TM. Auxiliary contacts "W" rated for standard duty 600 volts maximum.

Contact Cat. No.

1 N.O.	KTM-10
1 N.C.	KTM-11

Dual voltage transformer is shipped as shown connected for higher voltage. Reconnect jumpers "J" per table for lower voltage.

Contactors & Non Combination Starters

Type of Starter or Contactor

T - Standard unit with standard TM size 00-4 starter or contactor.
 V - Standard unit with standard Vacuum starter or contactor.
 U - Standard unit with standard TM size 5 starter or contactor.
 A - Standard unit except with ambient compensated overload relays.
 K - Irrigation Pump Controller.

Product Code

13 - Starters
 30 - Rev. Starter
 31 - Rev. Contactors
 77 - Contactors
 90 - Part Winding Starters

Enclosure Type

A - NEMA 1
 W - NEMA 4
 R - NEMA 3R
 T - NEMA 12
 U - Open Type

Cover Control

A- Reset button in cover for overloads.
 B- Reset button and Hand-Off-Auto selector switch.
 C- Reset button and Start-Stop push button
 O- None (no reset button or controls in cover)

T 13 A A 3 1 - 46

Number of Poles

1 - One Pole
 2 - Two Pole
 3 - Three Pole
 4 - Four Pole

NEMA Size or Amp. Rating

A - Size 00
 O - Size 0
 1 - Size 1, 1PW
 P - Size 1 1/2
 2 - Size 2, 2PW
 3 - Size 3, 3PW
 4 - Size 4, 4PW
 5 - Size 5, 5PW
 6 - Size 6, 6PW

OR

Suffix With Transformer			Suffix W/O Transformer	
(secondary 110-120V with single fuse)			Coil Volts & Hertz	Suffix
Transformer Primary Volts & Hertz	Suffix	100 Watt Extra Capacity	110-120/60 or 110/50	- 76
	Standard Capacity	Capacity	220-240/60 or 220/50	- 26
220-240/60 or 220/50	- T26	- C26	440-480/60 or 440/50	- 46
440-480/60 or 440/50	- T46	- C46	550-600/60 or 550/50	- 56
550-600/60 or 550/50	- T56	- C56	208/60	- 86
208/60	- T86	- C86		
380/50	- T35	- C35		
220/25	- T22	- C22		
440/25	- T42	- C42		

Combination Starters

Type of Starter or Contactor

T - Std. unit with standard Type TM starter or contactor.
 V - Std. unit with std.Type Vacuum starter or contactor.
 U - Std. unit with std. TM size 5 starter or contactor.
 A - Standard unit except with ambient compensated overload relays.
 C - Compact
 E - Extra-Wide
 D - Duplex Pump Controller. (Include Dual Dis. Switch)
 SD - Duplex Pump Controller. (Include Single Dis. Switch)
 K - Irrigation Pump Controller.

Product Code

18 -Fused Starter
 20 -C/B Starter
 38 -FusedRev. Starter
 40 -C/B Rev. Starter

Suffix With Transformer

(secondary 110-120V with single fuse)

Transformer Primary Volts & Hertz	Suffix	
	Standard Capacity	100 Watt Extra Capacity
220-240/60 or 220/50	- T26	- C26
440-480/60 or 440/50	- T46	- C46
550-600/60 or 550/50	- T56	- C56
208/60	- T86	- C86
380/50	- T35	- C35
220/25	- T22	- C22
440/25	- T42	- C42

Suffix W/O Transformer

Coil Volts & Hertz	Suffix
110-120/60 or 110/50	- 76
220-240/60 or 220/50	- 26
440-480/60 or 440/50	- 46
550-600/60 or 550/50	- 56
208/60	- 86

Number of Poles

3 - Three Pole

T 18 T A 3 1 6 03 - T46

Enclosure Type

A - NEMA1
 W - NEMA4
 R - NEMA3R
 T - NEMA12

Size of Starter

0 - Size 0
 1 - Size 1
 2 - Size 2
 3 - Size 3
 4 - Size 4
 5 - Size 5
 6 - Size 6

Disconnect Rating

2 - 240 Volts
 4 - 480 Volts
 6 - 600 Volts

Cover Control

A - Reset button in cover for overloads
 B - Reset button and Hand-Off-Auto selector switch
 C - Reset button and Start-Stop push button
 E - Hand-off Auto Selector Switch but no reset button
 F - Start-Stop push button but no reset button
 O - None (no reset button or controls in cover)

Fuse Clip Size or Circuit Trip Rating or Range

Fuse Clip Size

(Applicable only to Bull. 6018-38 & 6318)

03 - 30 amp
 06 - 60 amp
 01 - 100 amp
 02 - 200 amp

Class J Fuse Clip Size

13 - 30 amp
 16 - 60 amp
 11 - 100 amp

Class R Fuse Clip Size

93 - 30 amp
 96 - 60 amp
 91 - 100 amp
 92 - 200 amp

Circuit Breaker Trip Rating or Range

(Applicable only to Bull. 6020-40 & 6320)

Motor Circuit Protector

(Used as standard at 440-600V)
 Adjustable Trip 600V AC Max.

71 - 3 amp
 72 - 7 amp
 73 - 15 amp
 74 - 30 amp
 75 - 50 amp
 76 - 100 amp

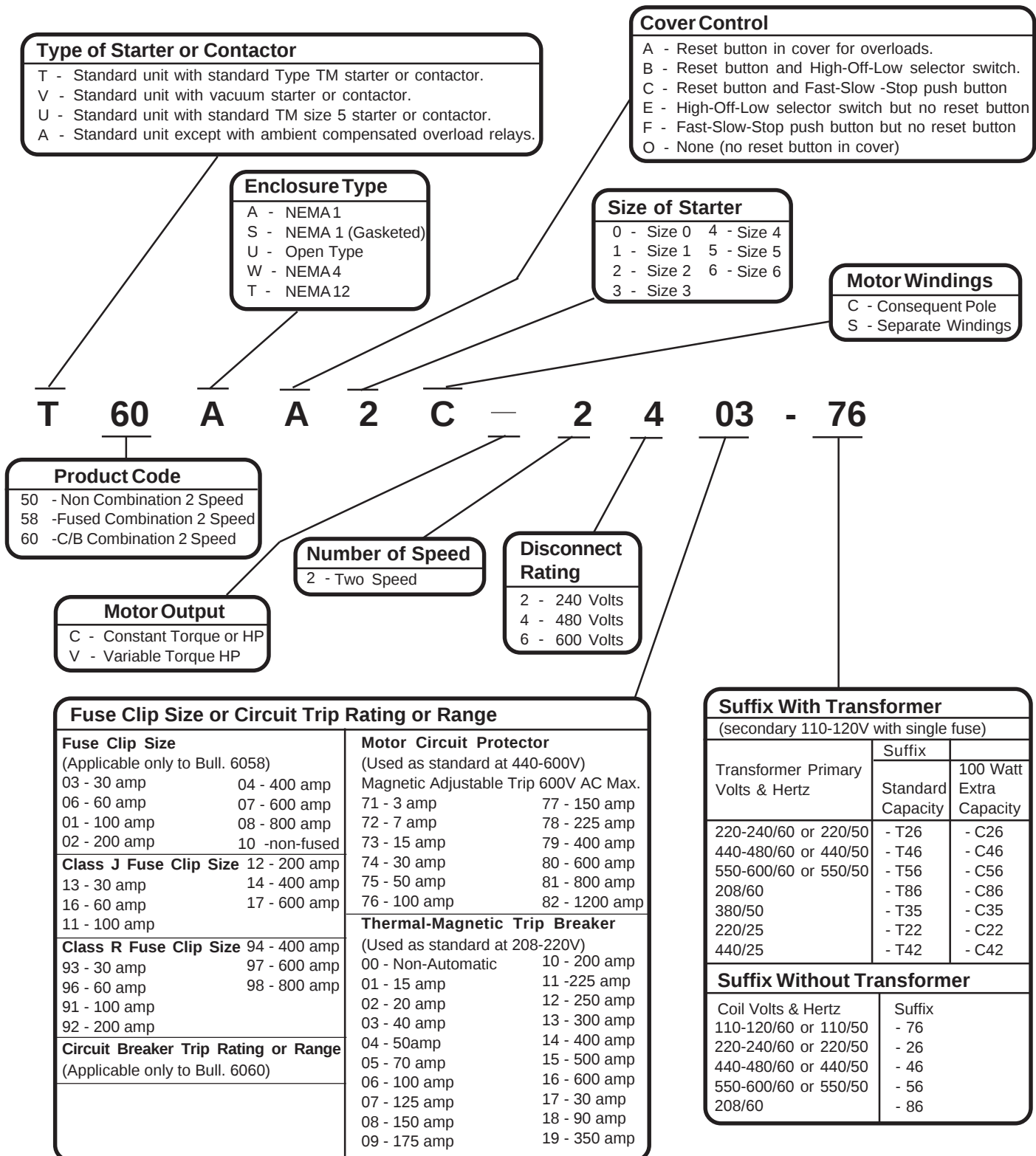
Thermal-Magnetic Trip Breaker

(Used as standard at 208-220V)

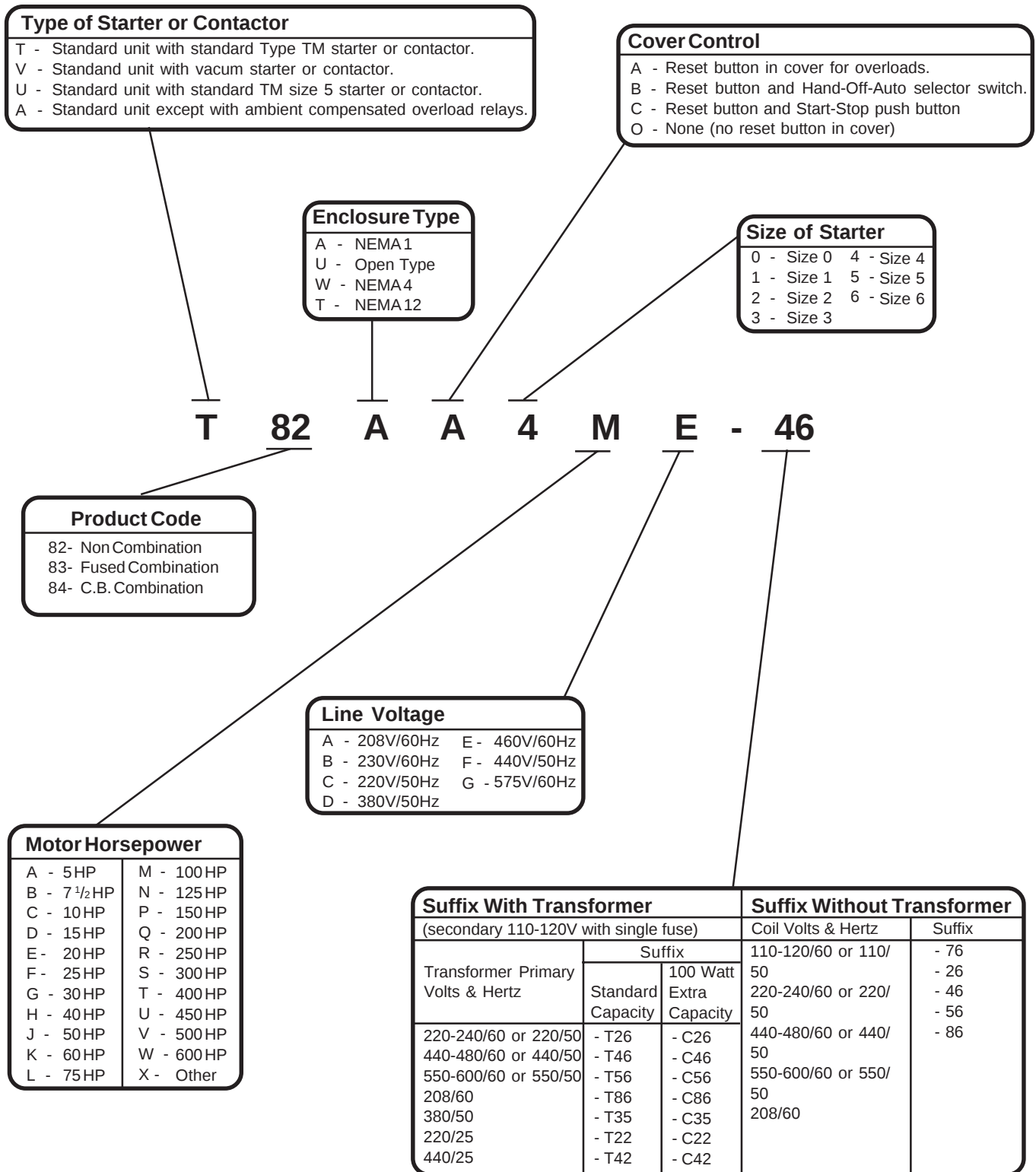
00 - Non-Auto
 01 - 15 amp
 02 - 20 amp
 03 - 40 amp
 04 - 50 amp
 05 - 70 amp
 06 - 100 amp
 07 - 125 amp
 08 - 150 amp
 09 - 175 amp

2 Speed Starters

B



Reduced Voltage Auto Transformer Starters



Application

The 5000 Space Savers in NEMA Sizes 00 thru 5 offer versatile and compact AC contactors for industrial motor, heating and other power circuit switching. Simplified design coupled with built-in reliability assures the user long, trouble-free operation in machine tools, process controls, air-conditioning, custom panels and other demanding applications.

Description

All 5000 magnetically operated contactors incorporate a modern, modular design compatible with other control component modules. Terminal location make them ideal for straight-through wiring and for wire-channel layouts. Accessible, up-front pressure-type terminals are standard.

The hot molded, high arc resistant two or three piece housings not only totally enclose contacts and operating coils for environmental protection; but also separate them as added protection against internal phase-to-phase short circuits.

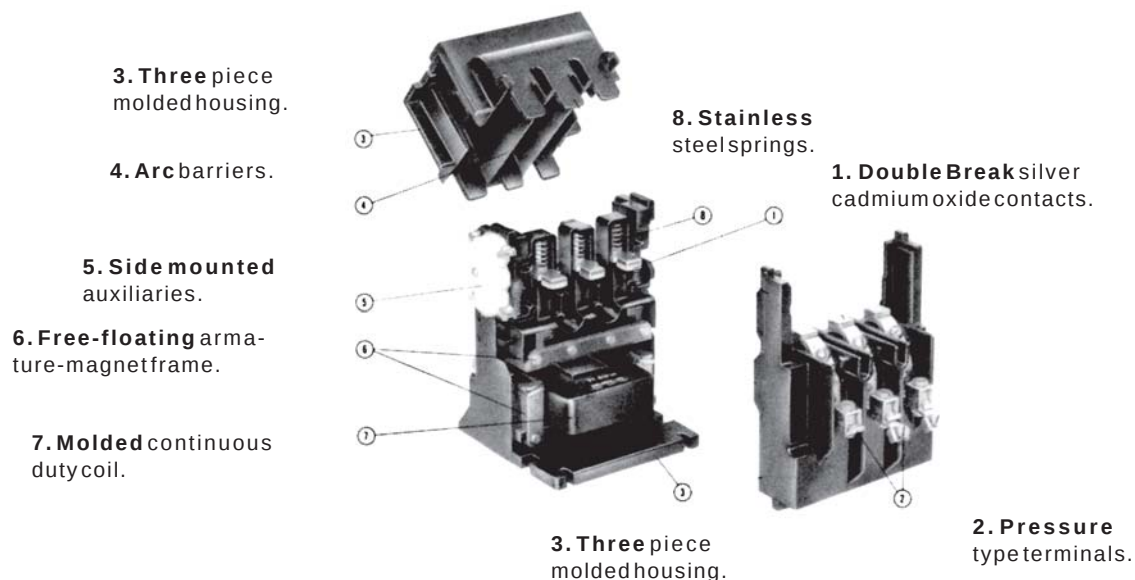
Generous size, long wearing double break contacts are furnished on all sizes. Contacts are made of silver cadmium oxide for "anti-weld" protection under high inrushes. Contacts do not require adjustment or periodic dressing (filing).

Coil Data

Standard coils for continuous duty service are equipped with pressure type terminals. Molded coil construction resists moisture; thermal and mechanical stress.

Typical User Benefits:

- **Modern Modular Design** - makes contactors compatible with other control panel components. Ideal for wire-channel layouts.
- **Compact Size** - 5000 Contactors conserve control panel area without sacrificing accessibility or reliability. The 100 amp. Size 3 contactors occupy less than 19.0 sq. in. of panel space.
- **Only 15 Basic Parts** - This simple design affords longer operating life and greater reliability than more complex units.
- **Fast Installation** - Accessible up-front pressure type terminals on both power and control circuits, take unlugged stripped wire. Design permits straight-through wiring.
- **Quick, Easy Inspection** - Simply withdraw the front housing piece, after removing two screws, all main contacts are in full view. No need to disturb wiring or remove contactor from panel for complete inspection of all parts.



**3 Pole Contactors - Three Phase**

NEMA Size	8-Hour Rating in Amperes		Open Type	Price
	Open	Enclosed	Catalog No.	
00	10	9	5009A3001- *	\$ 276.
0	20	18	5000A3001- *	348.
1	30	27	5001A3001- *	408.
2	50	45	5002A3001- *	744.
3	100	90	5003A3001- *	1200.
4	150	135	5004-3001- *	2880.
5	300	270	5005-3001- *	6276.

Contactor comes standard with 1N.O. auxiliary.

Auxiliary Contact Rating

AC Volts	Sizes 00 - 5	
	Amperes Continuous	Inrush
120	6	60
280	3	30
480	1.5	15
600	1.2	12

Auxiliary Contacts (Interlocks)

NEMA Size	Max. No. of N.O. or N.C. or N.O.-N.C. Auxiliary units
00, 0 & 1	2
2, 3, 4, 5	4

B

Ratings¹ - Ampere and Horsepower, Single Speed Motors

NEMA Size	Amperes		Three Phase - Horsepower Rating						Single Phase - Horsepower Rating					
			Starting			Plug-Stop or Jogging Duty			Starting		Plug-Stop or Jogging Duty			
	Open	Enclosed	115V	230V	480/575V	115V	230V	480/575V	115V	230V	115V	230V		
00	10	9	³ / ₄	1	¹ / ₂	2	----	----	----	¹ / ₃	1	¹ / ₂	----	----
0	20	18	2	3		5	1	1	¹ / ₂	2	1	2	¹ / ₂	1
1	30	27	3	7	¹ / ₂	10	2	3		5	2	3	1	2
2	50	45	7	15		25	----	10		15	3	7	2	5
3	100	90	----	30		50	----	20		30	----	----	----	----
4	150	135	----	50		100	----	30		60	----	----	----	----
5	300	270	----	100		200	----	75		150	----	----	----	----

Notes:

- These ratings are based on locked rotor current not exceeding six times motor full load current for the max. horsepower rating.

Ordering Information**Coil Table**

- Use complete catalog number. Replace the (*) with the suffix from the coil table.
- Modification Page

NEMA Size	DC Voltage	Suffix	NEMA Size	60Hz/Voltage	Suffix
00-5 incl.	24	82	00-5 incl.	120	11
00-5 incl.	48	32	3, 4, 5	208/240	21
00-5 incl.	120	12	00, 0, 1, 2	208	90
00-5 incl.	240	22	00, 0, 1, 2	240	21
** For all DC Coils up to NEMA Size 3 add \$192			00-5 incl.	480	41
Size 4 & 5 add \$480			00-5 incl.	600	51

Accessory Kits & Special Features

For Field Installation Auxiliary Interlocks For NEMA Sizes 00-5 Contactors		Discount Sch. JC 20	
	Kit No.	Price	
N.O. Std.	5M63	\$ 50.	
N.C. Std.	5M64	50.	
N.O. & N.C. Std.	5M65	88.	
N.O. Low Power	5M63L	176.	
N.C. Low Power	5M64L	176.	
N.O. & N.C. Low Power	5M65L	302.	
N.O. Std. & N.C. Low Power	5M66	227.	
N.O. Low Power & N.C. Std.	5M65L0	227.	
N.C. Std. Early Close	5M64E	50.	
N.O. Low Power & N.C. Std. Late Break	5M68E ²	88.	
N.C. Low Power - Late Break	5M64LE	176.	
N.O. Std. & N.C. Low Power			
Late Break	5M67 ²	227.	
N.O. Low Power & N.C. Low Power	5M69 ²	302.	
Tandem Mounting Kit ¹	5M60DA	32.	
Reversing & Multi-Speed Accessory Kit		Discount Sch. JC 20	
	Starter or Contactor Size	Kit No.	Price
Mechanical Interlock	00, 0 & 1 ³	5M115	\$ 76.
	0 & 1 ⁴	5M110	76.
	2, 3, & 4	5999-4737	76.
	2 ³	5999-4717	76.
	5	5999-4757	315.
	5 to 4	5999-4748	315.
Reversing Contactor Base Plate: Series 5000	0 & 1	23081.692-1	50.
	2 & 3A	23082.79	69.
	4	23083.30	88.
	5	23085.312-1	189.

Notes:

1. Contains mounting hardware only. Order auxiliary separately. Not for 7000 or 7001 Series Contactors.
2. Not for use on 5000 contactor size 00, 0, 1 & 2 or 5DP contactors 10/40, 40 & 75 amp. sizes.
3. For use with style A contactors only. Style A contactors are identified by the letter A following the fourth digit in the catalog number.
4. Not for use on style A contactors.
5. Kit contains: stationary contacts, movable contacts & contact springs.

Contact Kits - 1 Pole ⁵

Basic Cat. No.	NEMA Size	Discount Sch. JC 80 Kit No.	Price
5009-	00	5M59	\$ 62.
5009A or B	00	5M87	62.
5000A or B	0	5M87	62.
5000-	0	5M50	83.
5001A or B	1	5M19	83.
5001-	1	5M51	104.
5002A or B	2	5999-2521	131.
5002-	2	5M52	173.
5003A or B	3	5M80	207.
5003-	3	5M53	207.
5004-	4	5M54	386.
5005-	5	5999-0045	803.

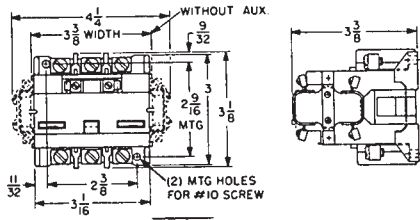
AC Coil Data and Coil Kits

Basic Cat. No.	NEMA Size	Volts 60Hz	V.A. 60Hz Inrush Sealed	Discount Sch. JC 80 Kit No.	Price
5009A	00	120	120 28	5ML25	53.
5000A	0	208		5ML26	53.
5001A	1	240		5ML29	53.
		480		5ML27	53.
		600		5ML28	53.
5002A	2	120	290 48	5999-1801	76.
		208		5999-1805	76.
		240		5999-1802	76.
		480		5999-1803	76.
		600		5999-1804	76.
5002	2	120	264 41	5ML21	110.
5003A	3	240		5ML22	110.
		480		5ML23	110.
		600		5ML24	110.
5003	3	120	672 72	5ML41	156.
5004	4	240		5ML42	156.
		480		5ML43	156.
		600		5ML44	156.
5005	5	120	1776 144	5ML51	276.
		240		5ML52	322.
		480		5ML53	322.
		600		5ML54	322.

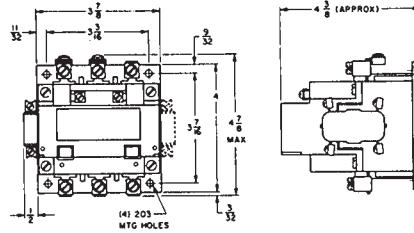
OPEN TYPE CONTACTORS—DIMENSIONS—Approx.
Contactors base must be mounted vertically.

Contactor base must be mounted vertically.

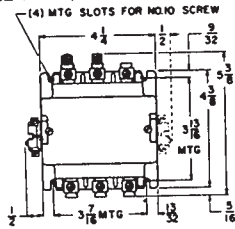
SIZE 00, 0 & 1 — 3-pole



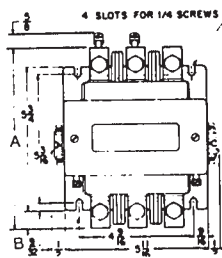
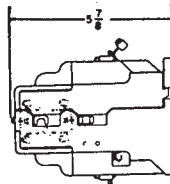
SIZE 2 — 3-pole



SIZE 3 — 3-pole

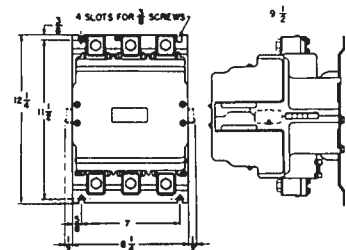


SIZE 4 — 3-pole



Size 4 - A = 7¼", B = ¾"

SIZE 5 — 3-pole



DIMENSIONS — *Approximate*

Reversing Contactor base plate must be vertically mounted with long dimension horizontal.

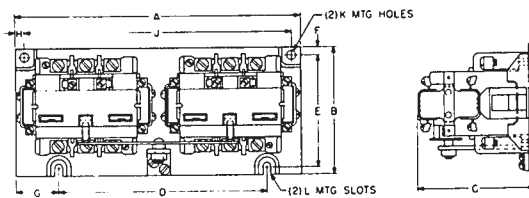


Fig. 1 Sizes 0 and 1 — Open type

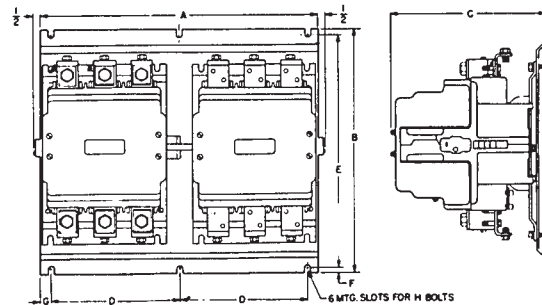


Fig. 3 Size 5 — Open type

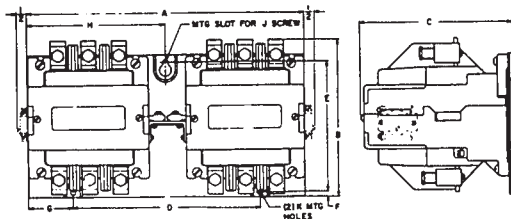


Fig. 2 Sizes 2, 3 and 4 — Open type

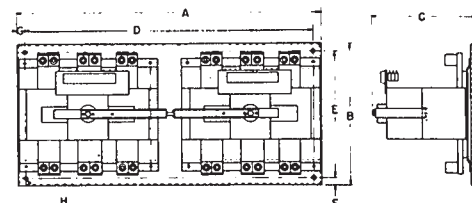


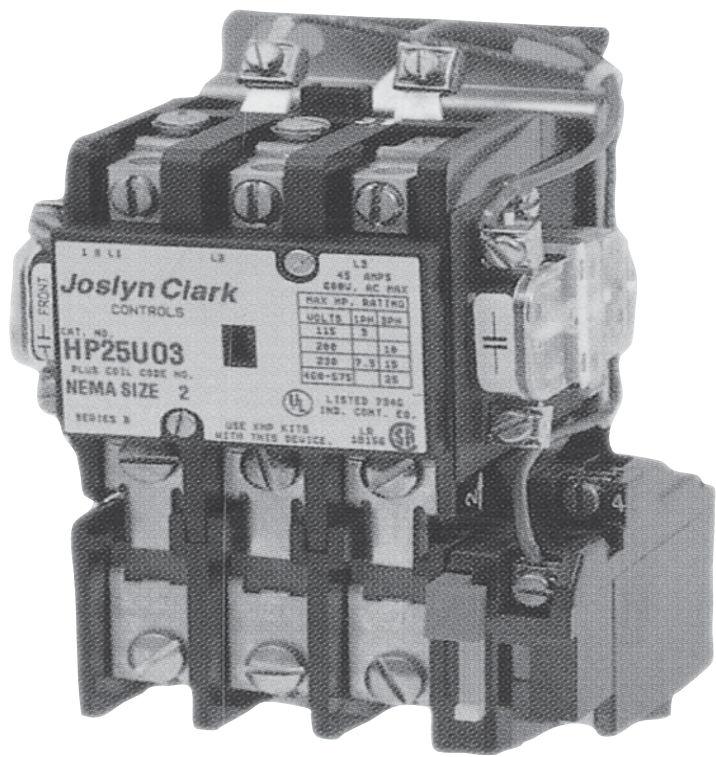
Fig. 4 Size 6 — Open type

OPEN TYPE REVERSING CONTACTORS

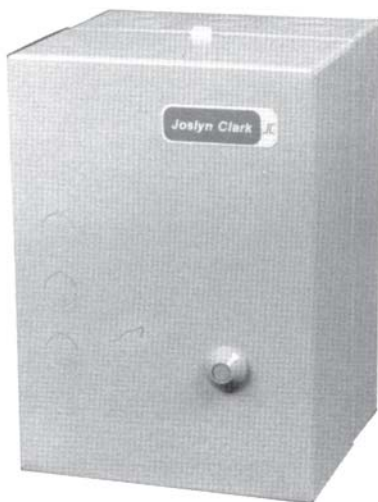
Series 5200

NEMA Size	Dim. Fig.	DIMENSIONS — In Inches										
		A	B	C	D	E	F	G	H	J	K	L
0 & 1	1	8 $\frac{1}{16}$	3 $\frac{1}{8}$	3 $\frac{3}{8}$	6 $\frac{1}{16}$	3 $\frac{1}{16}$	$\frac{1}{4}$	1 $\frac{1}{16}$	$\frac{5}{32}$	8 $\frac{1}{4}$	.281	.266
2	2	10 $\frac{1}{16}$	5 $\frac{3}{8}$	4 $\frac{1}{32}$	7 $\frac{1}{8}$	4 $\frac{1}{16}$	$\frac{1}{4}$	1 $\frac{1}{32}$	5 $\frac{3}{32}$	$\frac{1}{4}$	.281	—
3	2	10 $\frac{1}{16}$	5 $\frac{3}{8}$	6 $\frac{1}{8}$	7 $\frac{1}{8}$	4 $\frac{1}{16}$	$\frac{1}{4}$	1 $\frac{1}{32}$	5 $\frac{9}{32}$	$\frac{1}{4}$	.281	—
4	2	13 $\frac{1}{16}$	7 $\frac{1}{2}$	7 $\frac{3}{8}$	9	6 $\frac{1}{16}$	$\frac{1}{4}$	2 $\frac{3}{32}$	6 $\frac{1}{32}$	$\frac{1}{4}$	$\frac{1}{4}$	—
5	3	18 $\frac{3}{8}$	16 $\frac{1}{4}$	10 $\frac{1}{4}$	8 $\frac{1}{32}$	15 $\frac{1}{2}$	$\frac{3}{8}$	2 $\frac{1}{32}$	$\frac{3}{8}$	—	—	—
6	4	35 $\frac{1}{16}$	16 $\frac{1}{2}$	12 $\frac{1}{4}$	33 $\frac{1}{16}$	14 $\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{3}{8}$	—	—	—

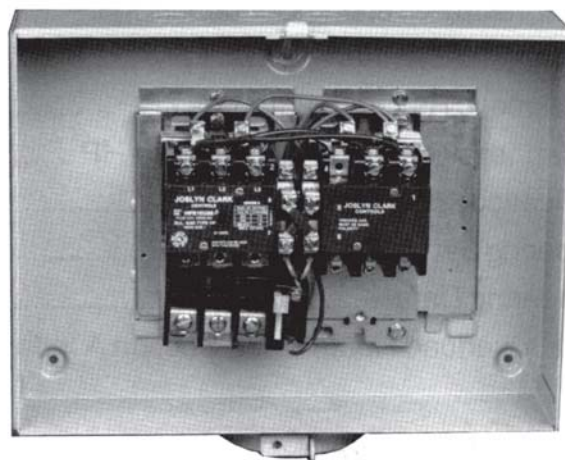
Description	Page Number
General Information - HP	C2
AC Magnetic Contactors - HP	C4
AC Magnetic Reversing Contactors - HP	C4
AC Magnetic Starters - HP	C5
AC Magnetic Reversing Starters - HP	C5
AC Magnetic Combination Starters - HP	C6
Modifications and Parts	C7
Modification and Spare Parts	C8
Numbering System	C9
Engineering Data	C10
For HP Overload Heaters see SectionB Index	



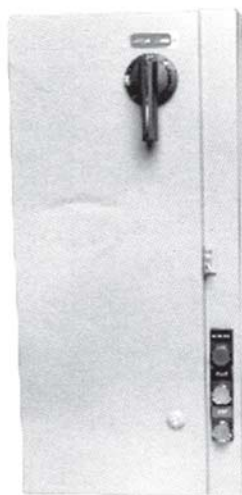
The Joslyn Clark NEMA Size Starter That Saves You Money



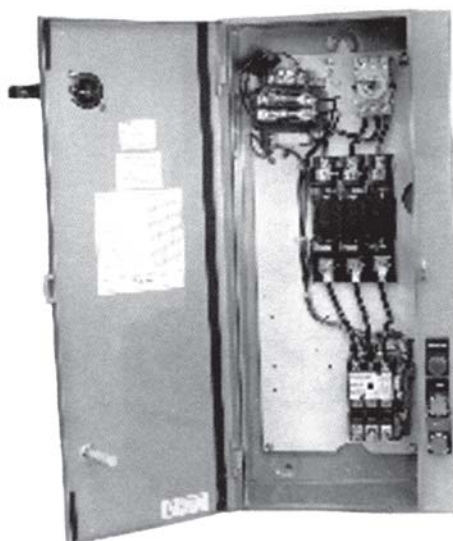
NEMA Type 1 Enclosed
Non - Reversing Starter



NEMA Type 1 Enclosed
Reversing Starter



NEMA Type 1 Enclosed



Combination Starters



Duplex Pump Controller

Quality — with economy of cost and space

The Joslyn Clark HP Motor Starter has been developed through many generations of controllers. Closely related to the TM design, the HP starter is rated for its horsepower capability as well as in standard NEMA frame sizes. Like the TM starter, our HP starter was designed in one piece as a starter, a single integrated unit consisting of a power contactor and a thermal overload relay mounted on a rigid common base.

This compact starter takes less than 19 sq. in. of panel space, permitting the use of smaller, less costly enclosures. It provides more wiring space for easy wiring and requires only two mounting screws to save installation time and cost.

NEMA sizes 00, 0, 1 & 2 are the same small physical size, providing greater flexibility.

C

NEMA Sizes 00, 0, 1, & 2

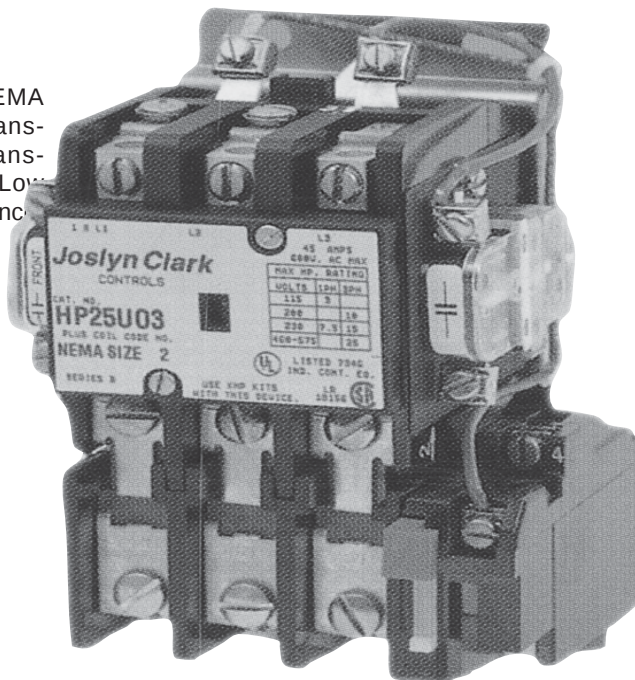
Quality— with economy of cost and space

LOW ENERGY 8.4 VA COIL

Same energy efficient coil for NEMA sizes 00, 0, 1 & 2. Reduces transformer size and cost. Small transformer size saves panel space. Low VA inrush coil reduces line disturbance. Ideal for use with solid state control.

TRUE "UP-FRONT" "STRAIGHT THROUGH" WIRING DESIGN

Makes the HP Starter easy to wire and safe to trace. Save through reduced wiring time and panel cost.



COVER NAME PLATE

Clear and easy to identify size, rating, and catalog number.

AUXILIARY CONTACTS

- Easy to install
- Clear side cover
- One Kit may be attached to each side of the starter providing up to four contacts
- Contacts positive driven from main contact carrier
- Contact Kits -

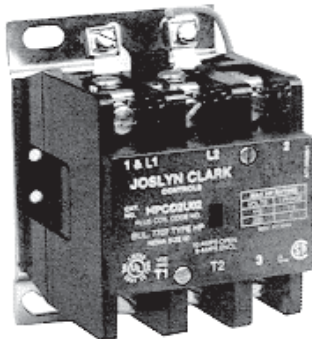
One N.O.	KHP - M10
Two N.O.	KHP - M20
N.O. & N.C.	KHP - M11

SMALL SIZE

Requires only 19 sq. in. of panel space.

"UNIQUE" SPRING LOAD TERMINALS

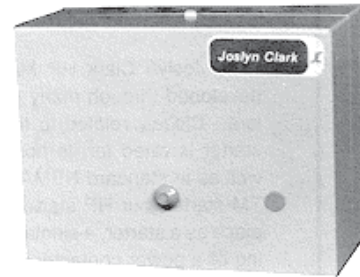
For fast load connection. Save by reducing starter wiring time.



HPC020U2



HPC10AA3



HPRC25AO3

Non-Reversing Contactors - Type HPC

2-Pole, Single Phase

NEMA Size	Maximum Motor Horsepower Rating				Continuous Ampere Rating	Tungs Lamp Load	NEMA Type 1 General Purpose		NEMA Type 4 Watertight		NEMA Type 12 Industrial - Dust-tight		Open Type	
	115V	220V					Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
00	1/3	1	----		9	5	HPC02A02 *	\$204.	HPC02W02 *	\$556.	HPC02T02 *	\$334.	HPC02U02 *	\$180.
0	1	2	----		18	10	HPC05A02 *	256.	HPC05W02 *	606.	HPC05T02 *	384.	HPC05U02 *	232.
1	2	3	----		27	15	HPC10A02 *	306.	HPC10W02 *	664.	HPC10T02 *	432.	HPC10U02 *	282.
2	3	7 1/2	----		45	30	HPC25A02 *	660.	HPC25W02 *	1260.	HPC25T02 *	810.	HPC25U02 *	510.

3-Pole, Three Phase

NEMA Size	Maximum Motor Horsepower Rating				Continuous Ampere Rating	Tungs Lamp Load	NEMA Type 1 General Purpose		NEMA Type 4 Watertight		NEMA Type 12 Industrial - Dust-tight		Open Type	
	200V	230V	460-575V				Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
00	1 1/2	1 1/2	2		9	5	HPC02A03 *	234.	HPC02W03 *	586.	HPC02T03 *	364.	HPC02U03 *	210.
0	3	3	5		18	10	HPC05A03 *	286.	HPC05W03 *	636.	HPC05T03 *	414.	HPC05U03 *	262.
1	7 1/2	7 1/2	10		27	15	HPC10A03 *	336.	HPC10W03 *	690.	HPC10T03 *	462.	HPC10U03 *	312.
2	10	15	25		45	30	HPC25A03 *	660.	HPC25W03 *	1296.	HPC25T03 *	846.	HPC25U03 *	540.

Reversing Contactors - Type HPRC

3-Pole, Three Phase

NEMA Size	Maximum Motor Horsepower Rating				Continuous Ampere Rating	NEMA Type 1 General Purpose		NEMA Type 4 Watertight		NEMA Type 12 Industrial - Dust-tight		Open Type	
	200V	230V	460/575V			Catalog No.	Price ²	Catalog No.	Price ²	Catalog No.	Price ²	Catalog No.	Price ²
00	1 1/2	1 1/2	2		9	HPRC02A03 *	588.	HPRC02W03 *	1062.	HPRC02T03 *	800.	HPRC02U03 *	540.
0	3	3	5		18	HPRC05A03 *	696.	HPRC05W03 *	1170.	HPRC05T03 *	906.	HPRC05U03 *	648.
1	7 1/2	7 1/2	10		27	HPRC10A03 *	870.	HPRC10W03 *	1458.	HPRC10T03 *	1018.	HPRC10U03 *	800.
2	10	15	25		45	HPRC25A03 *	1572.	HPRC25W03 *	2484.	HPRC25T03 *	1818.	HPRC25U03 *	1380.

Note:

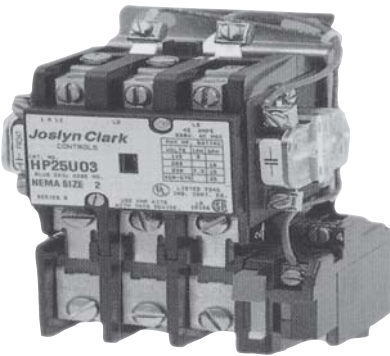
- Price includes contactor complete with one N.O. control-circuit contact.
- Price includes contactor complete with N.O. interlock on each contactor. All contactors are mechanically and electrically interlocked.

Ordering Information

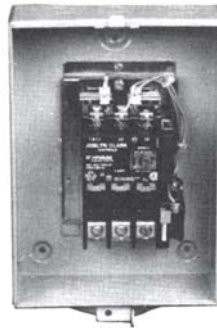
- Use complete catalog number. Replace the (*) with the suffix from coil table.
- Engineering Data pages C10-13
- Modification pages C7-8

Coil Table

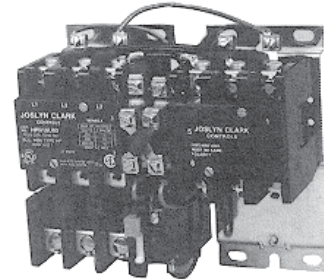
60Hz Voltage	Suffix	60Hz Voltage	Suffix
24 Separate Control	-96	200-240	-26
120 Separate Control	-76	277	-66
		440-480	-46
		550-600	-56



HP10U03



HP02AA3



HPR10U03

C

Non-Reversing Starter Type HP

2-Pole, Single Phase (Requires 1 Overload Heater)												
NEMA Size	Maximum Motor Horsepower Rating			Continuous Ampere Rating	NEMA Type 1 General Purpose		NEMA Type 4 Watertight		NEMA Type 12 Industrial - Dust-tight		Open Type	
	115V	220V	460/575V			Price ¹		Price ¹	Catalog No.	Price ¹	Catalog No.	Price ¹
00	¹ / ₃	1	----	9	HP02AA2 *	\$ 286.	HP02WA2 *	\$ 618.	HP02TA2 *	\$ 396.	HP02U02 *	\$ 262.
0	1	2	----	18	HP05AA2 *	318.	HP05WA2 *	650.	HP05TA2 *	426.	HP05U02 *	294.
1	2	3	----	27	HP10AA2 *	366.	HP10WA2 *	708.	HP10TA2 *	474.	HP10U02 *	342.
3-Pole, Three Phase (Requires 3 Overload Heaters)												
	200V	230V	460/575V									
00	1 ¹ / ₂	1 ¹ / ₂	2	9	HP02AA3 *	286.	HP02WA3 *	618.	HP02TA3 *	396.	HP02U03 *	262.
0	3	3	5	18	HP05AA3 *	352.	HP05WA3 *	684.	HP05TA3 *	462.	HP05U03 *	328.
1	7 ¹ / ₂	7 ¹ / ₂	10	27	HP10AA3 *	400.	HP10WA3 *	742.	HP10TA3 *	510.	HP10U03 *	376.
2	10	15	25	45	HP25AA3 *	762.	HP25WA3 *	1380.	HP25TA3 *	928.	HP25U03 *	642.

Reversing Starters - Type HPR

3-Pole, Three Phase (Requires 3 Overload Heaters)												
NEMA Size	Maximum Motor Horsepower Rating			Contin- uous Ampere Rating	NEMA Type 1 General Purpose		NEMA Type 4 Watertight		NEMA Type 12 Industrial - Dust-tight		Open Type	
	200V	230V	460/ 575V			Price ²	Catalog No.	Price ²	Catalog No.	Price ²	Catalog No.	Price ²
00	1 1/2	1 1/2	2	9	HPR02AA3 *	\$ 672.	HPR02WA3 *	\$ 1104.	HPR02TA3 *	\$ 838.	HPR02U03 *	\$ 624.
0	3	3	5	18	HPR05AA3 *	786.	HPR05WA3 *	1218.	HPR05TA3 *	952.	HPR05U03 *	738.
1	7 1/2	7 1/2	10	27	HPR10AA3 *	906.	HPR10WA3 *	1506	HPR10TA3 *	1066.	HPR10U03 *	834.
2	10	15	25	45	HPR25AA3 *	1674.	HPR25WA3 *	2566.	HPR25TA3 *	1900.	HPR25U03 *	1482.

Note:

- Price includes starter complete with N.O. interlock and overload relay less heaters.
- Price includes starter complete with N.O. interlock on each contactor and overload relay less heaters. All starters are mechanically and electrically interlocked.
- NEMA 3R add 60.00 to NEMA 12 List

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from Coil Table.
- Order heater elements at \$18 each from Section B

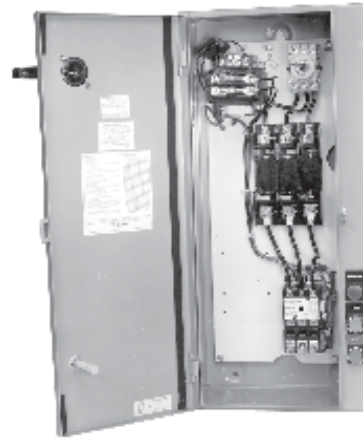
- Engineering Data page C10-13
- Modification page C7-8
- Spare Parts C8

Coil Table

60Hz Voltage	Suffix	60Hz Voltage	Suffix
24 Separate Control	-96	200-240	-26
120 Separate Control	-76	277	-66
		440-480	-46
		550-600	-56



HPS25AA3296



HPS25AA3296

Non-Fusible Disconnect Switch - Type HPS

NEMA Size	Maximum Motor Horsepower Rating ¹			Starter Ampere Rating	Disconnect Ampere Rating	NEMA Type 1 ³ General Purpose Enclosure		NEMA Type 3R ³ Raintight	
	200V	230V	460/575V			Catalog No.	Price ²	Catalog No.	Price
00	1 1/2	1 1/2	2	9	30	HPS02AA3610 *	\$ 786.	HPS02RA3610 *	\$ 1018.
0	3	3	5	18	30	HPS05AA3610 *	874.	HPS05RA3610 *	1104.
1	7 1/2	7 1/2	10	27	30	HPS10AA3610 *	922.	HPS10RA3610 *	1152.
2	10	10	25	45	60	HPS25AA3610 *	1378.	HPS25RA3610 *	1678.

Fusible Disconnect (200 & 230 Volts)

NEMA Size	Max. Motor Horsepower Rating ¹				Starter Ampere Rating	Disconnect Ampere Rating		NEMA Type 1 ³ General Purpose Enclosure		NEMA Type 3R ³ Raintight	
	Dual Element Fuse		Non-Time Delay Fuses			Switch	Fuse Clips	Catalog No.	Price ²	Catalog No.	Price
	200V	230V	200V	230V							
00	1 1/2	1 1/2	1 1/2	1 1/2	9	30	30	HPS02AA3293 *	\$ 814.	HPS02RA3293 *	\$ 1044.
0	3	3	3	3	18	30	30	HPS05AA3293 *	904.	HPS05RA3293 *	1134.
1	5	7 1/2	3	3	27	30	30	HPS10AA3293 *	952.	HPS10RA3293 *	1182.
1	7 1/2	----	7 1/2	7 1/2	27	30	60	HPS10AA3296 *	970.	HPS10RA3296 *	1200.
2	10	15	----	----	45	60	60	HPS25AA3296 *	1404.	HPS25RA3296 *	1714.

Fusible Disconnect (460 & 575 Volts)

NEMA Size					Starter Ampere Rating	Disconnect Ampere		NEMA Type 1		NEMA Type 3R	
	460V	575V	460V	575V		Rating	Fuse	General Purpose Enclosure	Price	Raintight	Price
00	2	2	2	2	9	30	30	HPS02AA3693 *	\$ 828.	HPS02RA3693 *	\$ 1060.
0	5	5	5	5	18	30	30	HPS05AA3693 *	922.	HPS05RA3693 *	1152.
1	10	10	7 1/2	7 1/2	27	30	30	HPS10AA3693 *	970.	HPS10RA3693 *	1200.
1	----	----	10	10	27	30	60	HPS10AA3696 *	990.	HPS10RA3696 *	1222.
2	15	15	----	----	45	60	30	HPS25AA3693 *	1414.	HPS25RA3693 *	1722.
2	25	25	15	15	45	60	60	HPS25AA3696 *	1432	HPS25RA3696 *	1740.

Notes:

- Motor Full load must not exceed starter continuous ampere rating.
- Prices includes starter complete with N.O. interlock, disconnect switch less fuses, and 3-phase overload relay less heaters.

- For other Enclosure Types consult factory.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from coil table.
- Order heater elements at \$18 each from Section page B32
- Engineering Data pages C10-14
- Modification pages C7-8

Coil Table

60hz Voltage	Suffix	60Hz Voltage	Suffix
24 Separate Control	-96	200-240	-26
120 Separate Control	-76	277	-66
		440-480	-46
		550-600	-56

Modifications

Description	Factory Installation Price Addition - Change Catalog No. as outlined on Page C9.			For Field Installation Kit Catalog Number		Price
	For Bulletin Number	Type HP Size	Enclosure Type		Kits Only For Type 1 Enclosures	
			1	4 & 12		
Cover Controls						
Over Load Reset Hole plug for Internal Reset (10 per pack)	6013, 6030 & 6018	00,0,1 & 2	N/C	N/C	KTM-26	\$ 48.
Reset Button (one reset per kit)	6013 & 6030 6018				KHP-EC2 A60-	18. 36.
Push Buttons & Selector Switches Start-Stop Push Buttons Hand-Off Auto Selector Switch ¹ Forward-Reverse-Stop Selector Switch Forward-Reverse-Stop Push Button	6013, 6030, 6031, & 7707		\$ 96.	\$ 264.	306413 KHP-4 KHP-8 KHP-8 KTM-18	60. 60. 60. 300.
Pilot Lights Without Electrical Interlocks, Standard Transformer Type, with Red Lens.	120V 6013, 240V 6030, 480V 6031, 600V & 7707		90.	90.	KTM5-4 KTM5-5 KTM5-6 KTM5-7	66. 66. 66. 66.
Push Buttons & Selector Switches Start-Stop Buttons Hand-Off-Auto Selector Switch Pilot Lights Without Electrical Interlocks, Standard Transformer Type, with Red Lens.	120V 240V 480V 6018	00,0,1 & 2	96.	---	KTM5-1 KTM5-3 KTM5-4 KTM5-5 KTM5-6	60. 60. 132. 132. 132.
Control Circuit						
Auxiliary Contacts Extra N.O. Contact Extra N.O. and N.C. Contacts Two extra N.O. Contacts	All	All	132. 198. 198.	132. 198. 198.	KHP-M10 KHP-M11 KHP-M20	60. 90. 90.
Enclosure Kits	6013 & 6030				Same as type TM, see Section B	

C

Power Circuit - For HPS Combination Starters

Fuse Clips-Kit includes 6 clips and mounting screws, without base for lower clips. ²						
Description	Fuse Class	Switch Amp. Size	For Bulletin Number	Type HP Size	Catalog No.	Price
Base 30 Amp. 250 Volts 60 Amp. 250 Volts 30 Amp. 600 Volts 60 Amp. 600 Volts	R R R R	30 & 60	6018	00-2	A63-452135-2 A63-452133-2 A63-452136-2 A63-452841-2	\$48. 48. 72. 72.

Note:

- Kits may be changed in the field from 3-position to 2-position operation. In addition to HAND-OFF-AUTO, four labels are included, marked FORWARD-OFF-REVERSE: HIGH-OFF-LOW, TEST-LAG-LEAD, ON-OFF.
- Lower Mounting Base for Fuse Clips- required only when converting a non-fusable unit to a fusable unit.

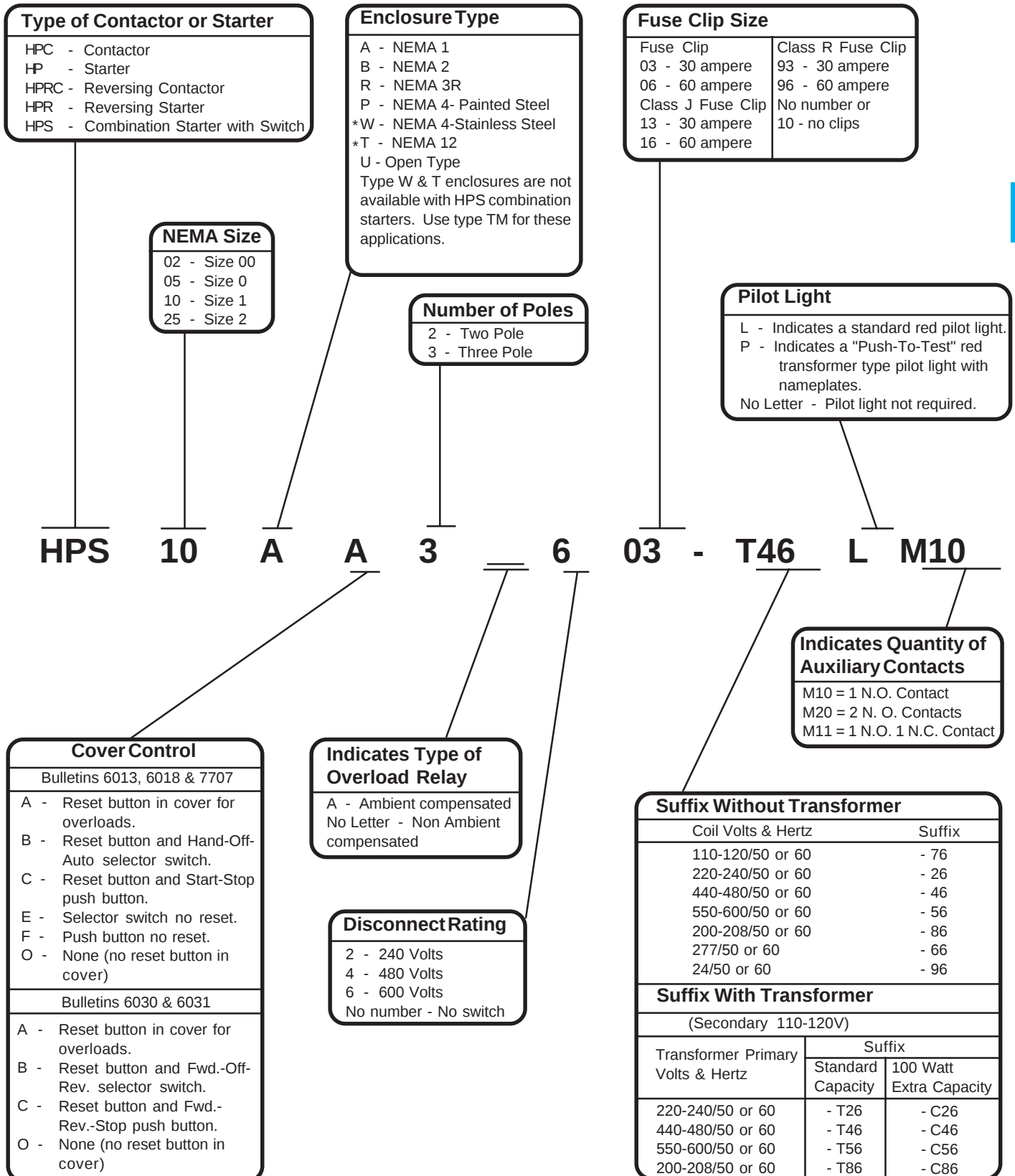
Modifications

Description				Factory Installed Price Addition			For Field Installtion Kit Catalog Number	Discount Schedule JC12 Price
				For Bulletin Number	Type HP Size	Add to NEMA Type 1, 4 & 12		
Control Transformer - Includes Single Fused 120 Volt Secondary								
	V A Capacity	Primary Voltage	Hertz			2		
Standard ³ Capacity	50	208 240 & 480 600	50 / 60	6013 & 6018	00-2	324.	KTR67-16 KTR67-2 KTR67-12	\$216.
Extra ³ Capacity	150	208 240 & 480 600				576.	KTR67-20 KTR67-5 KTR67-25	\$264.
Miscellaneous								
Ambient Compensated Overload Relay				All	00-2	24.		
Fused Control Circuit: Fuse Holder for one fuse Fuse Holder for two fuses				All	00-2	264.	KHP-F1 KHP-F2	\$48. 72.
Enclosure Adaptor Kits: Starter Mounting Plate Mtg. Plate with O/L Reset - Required with Enclosure Kit Transformer Mtg. Plate ¹							KHP-EC1 KHP-EC3 KTM-28	\$24. 42. 24.

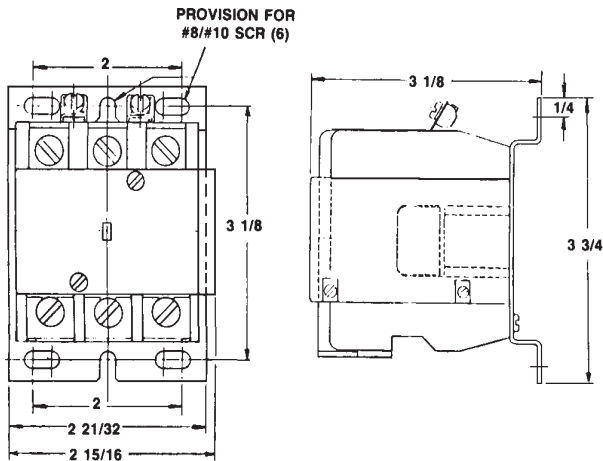
Notes:

- Reversing Starters require 1-KHP-EC1 and 1-KHP-EC3 with reset.
- Prices include larger cabinets required for Bul. 6013 & 6030.
- Includes one secondary fuse and 2 Primary Fuse Clips.

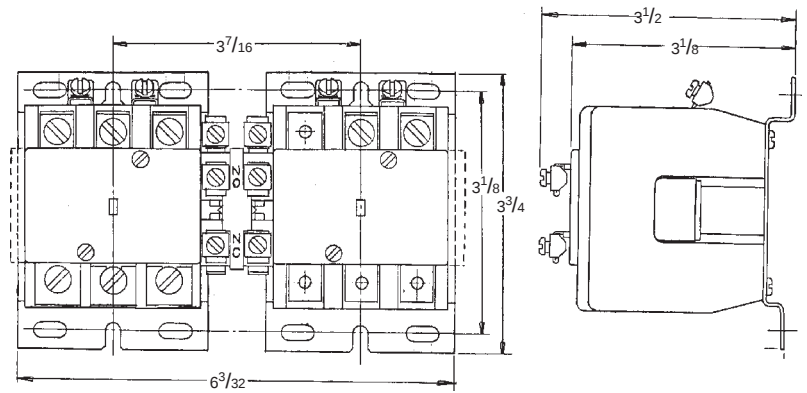
Renewal Parts		Size	Discount Schedule JC80	
Replacement Overload		00-2	KHP31-15	\$ 124.
Ambient Compensated		00-2	KHPA31-15	156.
Replacement Power Contact Kit		00-1	KHP31-1	166.
		2	KHP32-1	260.
		Forward Side	KHPR31-S	189.
		00-1 Reverser		
		Reverse Side	KHPR31-C	189.
		00-1 Reverser		
		Forward Side	KHPR32-S	283.
		Size 2 Reverser		
		Reverse Side	KHPR32-C	283.
		Size 2 Reverser		
Replacement Coil Kits			Discount Schedule JC80	
Voltage	Hertz			
110-120	50 or 60	00, 0, 1 & 2	KTB174-1	\$ 97.
208-240	50 or 60		KTB174-2	97.
440-480	50 or 60		KTB174-5	97.
550-600	50 or 60		KTB174-6	97.
380	50 or 60		KTB174-7	97.
277	50 or 60		KTB174-4	97.
24	50 or 60		KTB174-3	97.



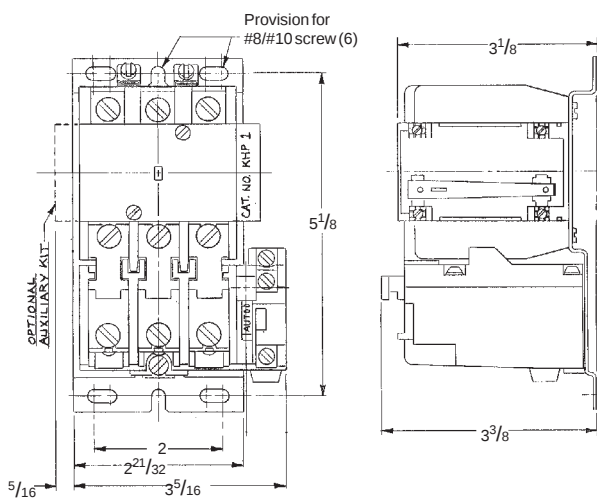
Type HP NEMA Sizes 00, 0, 1 & 2 Outline Drawings



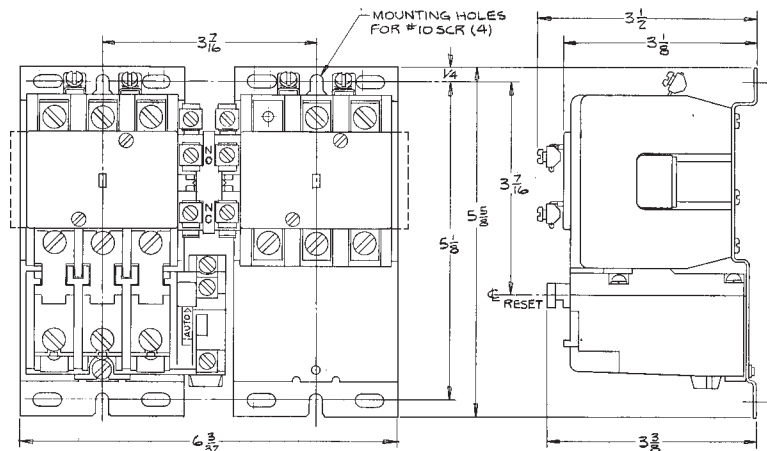
Contactor Type HPC



Reversing Contactor Type HPRC



Starter Type HP



Reversing Starters Type HPR

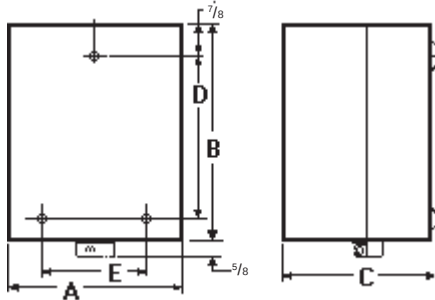
Power Wiring Accommodations						Control Circuit							
Wire Range		Wire Type	Pressure Terminal Type	Provision for Ring Tongue Lugs ¹		Continuous Amperes	A-C Inductive		Terminal Type	Copper Wire Size Max. ^{2,3}	Screw Size	Coil Burden	
Line	Load			Terminal Width in.	Screw Size		Make	Break				Inrush	Sealed
# 14 - #8	#14 - #4	Copper (Cu)	Pressure Clamp	.450	#10 - 32	5	880VA	40VA	Pressure Saddle	#12AWG	#6 - 32	48VA	8.4VA

Notes:

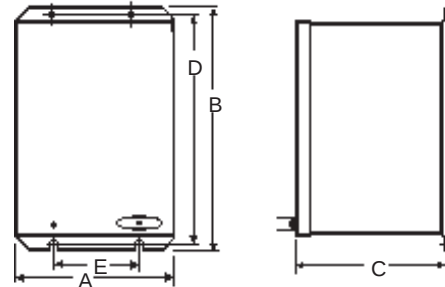
1. UL specifies only one (1) wire per lug.
2. One or two stranded copper wires of same size, or differing by two (2) gauge sizes.
3. Coil terminal wire size is #14 AWG maximum.

Approximate Dimensions In Inches

Type HP NEMA Sizes 00, 0, 1 & 2 Outline Drawings



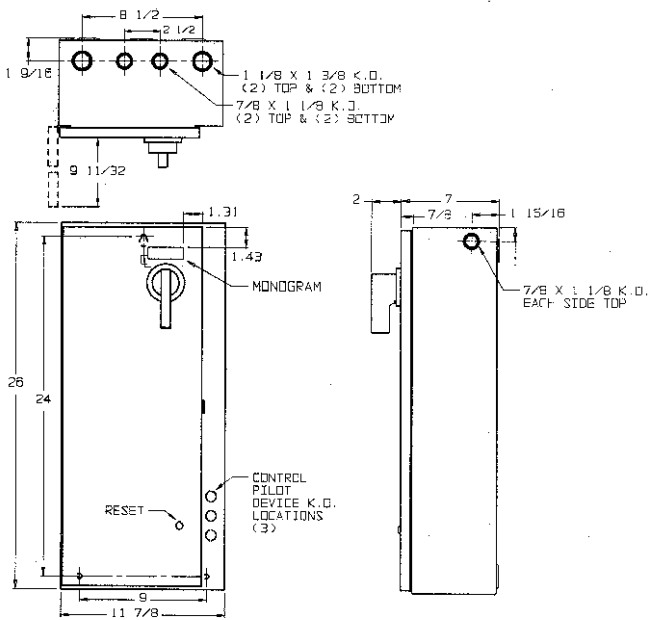
NEMA Type 1 Enclosure



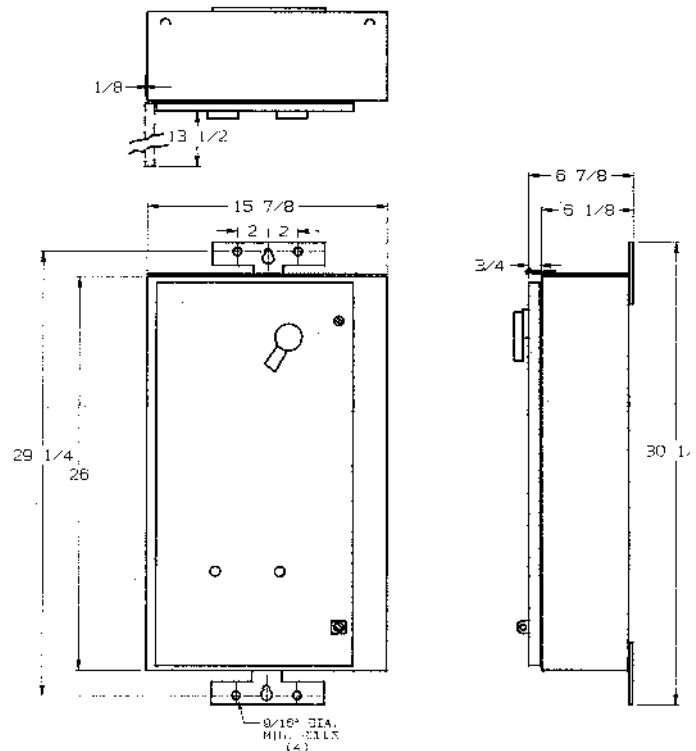
NEMA Type 4 & 12 Enclosures

Starter Type	NEMA Type 1 Enclosure										NEMA Type 4 & 12 Enclosure									
	Without Transformer					With Transformer					Without Transformer					With Transformer				
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
HP & HPC	6 ³ / ₄	9 ¹ / ₂	6 ¹ / ₄	7 ³ / ₄	5	12 ⁵ / ₈	9 ¹ / ₂	6 ¹ / ₄	7 ³ / ₄	11	7 ¹ / ₄	11	6 ⁷ / ₈	10 ¹ / ₂	4	13 ¹ / ₈	11	6 ⁷ / ₈	10 ¹ / ₂	6
HPR & HPRC	12 ⁵ / ₈	9 ¹ / ₂	6 ¹ / ₄	7 ³ / ₄	11	12 ⁵ / ₈	13 ⁷ / ₈	6 ¹ / ₄	12 ³ / ₄	11	13 ¹ / ₈	11	6 ⁷ / ₈	10 ¹ / ₂	6	17	13	6 ⁷ / ₈	9	16

Type HPS NEMA Sizes 00, 0, 1 & 2 Outline Drawings

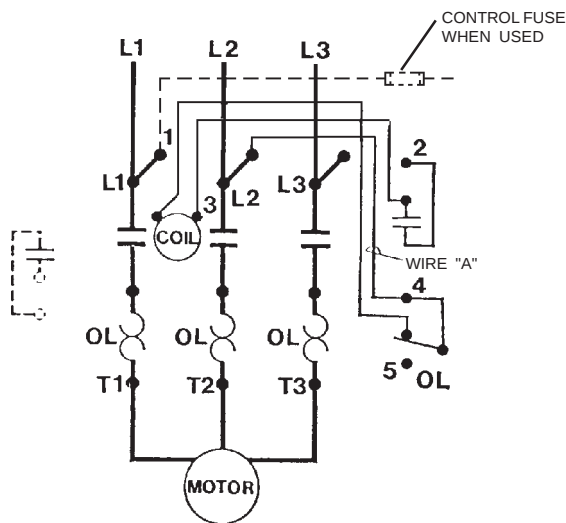


NEMA Type 1 Enclosure

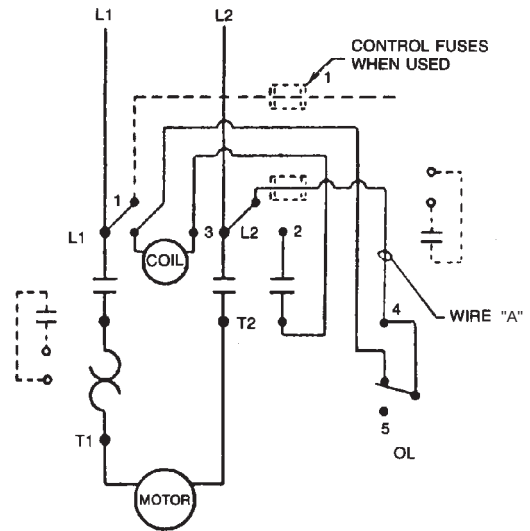


NEMA 3R-4&12 Enclosure

Wiring Diagram Type HP - Non-Combination Starter



3 Pole, Three Phase



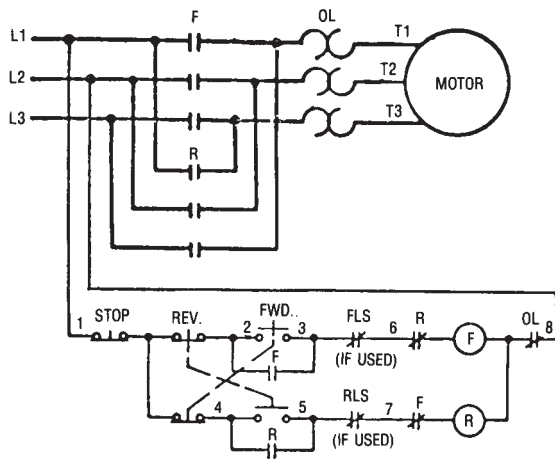
2 Pole, Single Phase

Connection For Pilot Devices

Cover Mounted Pilot Devices		3 Wire Control Remote Pilot Devices	Automatic Reset Automatic reset operation should not be used with two wire control.
Stop-Start Pushbutton	Pilot Light	Momentary Contact Pushbutton	
Two Wire Contact Device	2 Position Selector Switch	Two or More Momentary Contact Pushbutton Stations	Separate Control Remove wire "A" when it is supplied. Connect separate control lines to the "1" terminal on the pilot device and the "4" terminal on the starter.
3 Position Selector Switch (Remove Lead from Coil to Term No. 3)	2 Position Selector Switch (Remove Lead from Coil to Term No. 3)		

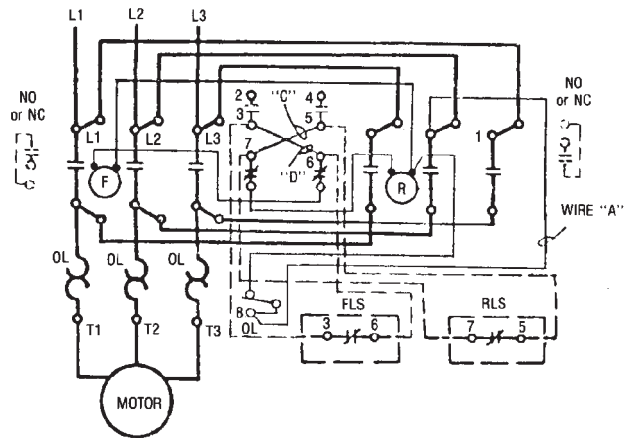
Wiring Diagram

Type HPR - Non-Combination Starters



Elementary Diagram

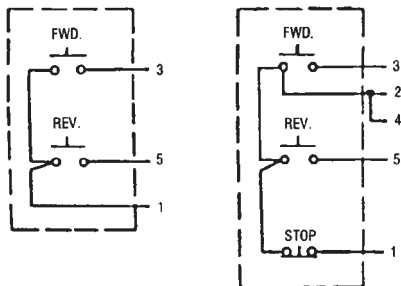
Contactors "F" & "R" are Mechanically Interlocked



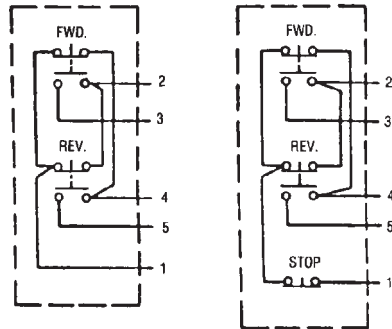
Wiring Diagram Front View

When Limit Switches are used, remove Jumpers "C" & "D" and connect per dotted lines.

Two Wire Control for Maintained Pushbuttons



Three Wire Control for Momentary Control Pushbuttons



Pushbutton with Forward and Reverse Buttons Electrically Interlocked

Automatic Reset

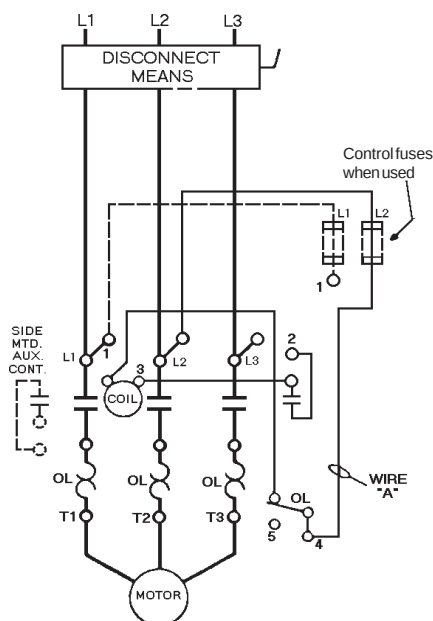
Automatic reset operation should not be used with two wire control.

Separate Control

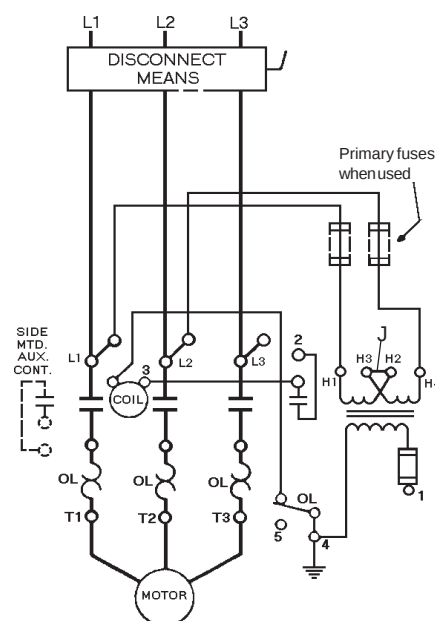
Remove wire "A" when it is supplied. Connect separate control lines to the "1" terminal on the pilot device and the "8" terminal on the starter.

Wiring Diagram

Type HPF - Combination Starter



Without Control Transformer
(Wiring Diagram - Front View)



With Control Transformer
(Wiring Diagram - Front View)

Connection For Pilot Devices

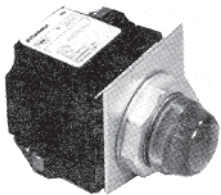
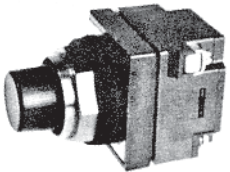
Connections for Cover Mounted or Remote Pilot Devices																			
2 Position Selector Switch (Remove Lead from Aux. to Term No. 3)	3 Position Selector Switch (Remove Lead from Aux. to Term No. 3)	Pilot Light	Dual voltage transformer is shipped as shown connected for higher voltages. Reconnect jumpers "J" per table for lower voltage. <table border="1"> <thead> <tr> <th>Voltage</th> <th>Connect</th> <th>L1</th> <th>L2</th> </tr> </thead> <tbody> <tr> <td>230</td> <td>H1 to H3 H2 to H4</td> <td>H1</td> <td>H4</td> </tr> <tr> <td>460</td> <td>H2 to H3</td> <td>H1</td> <td>H4</td> </tr> <tr> <td colspan="2">All Single Primary Transformers</td> <td>H1</td> <td>H2</td> </tr> </tbody> </table>	Voltage	Connect	L1	L2	230	H1 to H3 H2 to H4	H1	H4	460	H2 to H3	H1	H4	All Single Primary Transformers		H1	H2
Voltage	Connect	L1		L2															
230	H1 to H3 H2 to H4	H1		H4															
460	H2 to H3	H1	H4																
All Single Primary Transformers		H1	H2																
Start-Stop Pushbutton	Two or More Momentary Contact Pushbutton Stations	Push-To-Test Pilot Light																	
Two Wire Control Device																			

Automatic Reset

Automatic reset operation should not be used with two wire control.

Index

Description	Page Number
100T Push Buttons:	Page
General Information	D2
Push Buttons - Std. & Mushrooms	D4
Key Operated - Push Pull Push Buttons	D5
Illuminated Push Buttons	D6
Illuminated Push Pull Units	D7
Pilot Lights & Press-to-Test Pilot Lights	D8
Selector Switches: 2 - 3 - 4 Position	D9
Illuminated Selector Switches: 2 & 3 Position	D11
Joy Sticks: 3 & 5 Position	D12
Assembled Push Button Units	D13
Assembled Stations: 1 - 2 - 3 Elements	D13
Assembled Selector Switch Units	D14
Separate Enclosures: 1 - 16 Hole	D15
Legend Plates	D16
Accessories	D17
Dimensions & Ratings	D18
Catalog Numbering System	D19
STAK-LITE NEMA Type 1, 3R, 12, 4X, and 13	D21



D

Joslyn Clark Type 100T Heavy Duty Push Buttons are available in Standard, Mushroom Head, Push Pull, and Key-Operated.

All units are suitable for use in NEMA Type 1, 3, 3R, 4, 4X, 12, and 13 applications when mounted in enclosures rated for those same applications. Although not needed on all Type 4X applications, protective caps provide improved resistance to some corrosive materials. They are not required by UL.

D NEMA 13 Oiltight and NEMA 4 Watertight integrity is assured by a unique collapsing neoprene diaphragm. Three neoprene gaskets in back of the panel insure a tight fit and flexibility for different thickness enclosures. The diecast housing fits both standard oiltight mounting holes with a 1-13/64" or 30.56mm diameter.

Single circuit double break contact blocks are made of tough clear plastic for easy contact inspection. Blocks are attached to the operator by a single captive screw and positioning pin to make installation quick and easy. Up to 8 blocks may be stacked on each push button operator (2 wide, 4 deep). Up to 6 blocks on each selector switch.

Brushed aluminum legend plates are held in place by a locking thrust washer which extends through the plate into the panel for easy alignment. Standard legend plates are 1-7/8" square with black etched in letters. Jumbo automotive size 2-1/2" square legends are also available.

Standard Operators

Interchangeable snap-on, reusable tough molded-in-plastic cups, are available in Black, red, green, yellow, amber, blue, white, and brown. Your choice of three octagonal, brushed aluminum guard rings comes in: Unguarded -Button extends beyond ring for easy access.

Guarded -Ring is flush with button to prevent accidental operation.

Extended-Ring extends beyond button Guard making accidental operation unlikely.



Standard and Jumbo Mushroom Head

Both mushroom heads fit the same operator and come in black, red, green, and yellow. The diameter of the standard head is 1-3/8" - jumbo head is 2-1/4" in diameter.

Illuminated Push Button

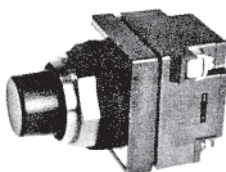
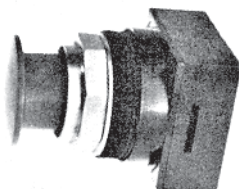
Plastic Lens are available in seven colors and in standard and mushroom head (1 3/8") variety. The operator combines a momentary push button and pilot light in one unit.

Push-Pull

Both Illuminated and Non-Illuminated standard mushroom heads are available in 2 position maintained operators.

Key-Operated

When the key-type cylinder lock is depressed with or without key inserted - the operator is locked down and can only be released by the key. A red jumbo mushroom head can be field or factory installed for emergency stop applications. Other types of key operations are obtainable.



Joslyn Clark Type 100T Heavy Duty Selector Switches are available in Standard Knob, Chrome Lever, Key-Operated, Joy Stick and Selector-Push.

The standard knob and chrome lever switches are obtainable with two, three and four position operators. They come in 2 position maintained and spring return; 3 position maintained, spring return from right to center, left to center, right and left to center; and 4 position maintained. Key operated switches come in two or three position maintained and spring return and all 4 position switches are maintained.

There are several cams for all selector switches in order to accomplish numerous types of circuits. Positive indexing assures operating reliability.

Up to eight single circuit contact blocks - four on either side - may be attached to any operator with a single captive screw and positioning pin on each block.

A tip on the locking thrust washer extends through the legend plate to the panel, locking both plate and operator in position.

Legend plates are of brushed aluminum with etched black lettering. An octagonal aluminum guard ring locks operator on the panel adding to the look of quality.

Standard Knob

Interchangeable knobs are of high-impact plastic in black, red, green, yellow and blue. They fit tightly to an inner white knob which provides an easy-to-see white index mark for the cap.

Standard Knob Illuminated Selector Switch

Available with seven interchangeable colored lenses in both two position maintained and three position maintained and spring return.

Selector Switches

Chrome Lever

These selector switches have the same operating characteristics as the Standard Knob model. An extended chrome lever, 1-3/4" long, provides quick and positive operation with or without gloves.

Key-Operated

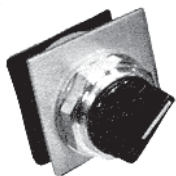
Key-operated switches have the same positive action as the Standard Knob and Chrome Lever types. Operators are obtainable with many key removal positions. There are special keys available for added security.

Joy Stick

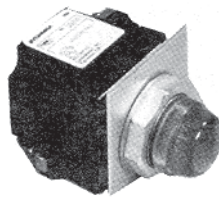
All 3 position and 5 position maintained and spring return joy sticks have the same positive action as the other selector switches. A special joy stick model can be supplied with a release button on top. This prevents movement of the joy stick until the button is depressed - an excellent safety feature.

Selector-Push

Selector-Push operators combine the actions of a selector switch and momentary push button. A rotating collar provides the selectivity needed to provide for several functions in one operator.



Pilot Lights



Joslyn Clark Type 100T Heavy Duty Pilot Lights are available in Standard and Press-To-Test. A choice of power configurations to match various shock and vibration levels insure longer lamp life. Plastic lenses come in red, green, yellow, amber, blue, white and clear. All lamps have bayonet type bases.

There are four basic power configurations.

- 1 Transformer Type (120, 240 or 480 Volts)** uses a modular heavy-duty transformer - 50 or 60 Hertz - to step line voltage down to 6 volts for longer lamp life under high shock and vibration conditions.
- 2 Resistor Type (120 or 240 Volts)** drops voltage to 60 and 120 volts respectively to lengthen lamp life in less severe applications.
- 3 Full-Voltage Types (6, 12, 24 or 120 Volts)** are used in applications with little shock or vibration. AC and DC rated.
- 4 Neon Type (120 Volts)** will withstand extremely heavy shock and vibration conditions - use of clear and yellow lens is recommended. AC and DC rated.

Standard

Dome Lenses are made of thick plastic, fluted to give wide visibility. They come in red, green, yellow, amber, blue, white and clear.

Press-To-Test

Features and colors are the same as Standard Pilot Lights except the lenses are tubular. A N.O. and a N.C. contact block comes with unit.

Contact Blocks (600 Volt)



Features

- Contacts enclosed in a clear plastic housing
- Fine silver contact tips
- Long life steel springs
- Same contact block for all operators
- "Quick-Stack" assembly
- "Easy-Access" terminals
- "One-Block-At-A-Time" removal
- Easy contact mode identification
- UL listed

Joslyn Clark Type 100T Heavy Duty Contact Blocks are designed to simplify installation and assure trouble-free operation.

Contacts are enclosed in sturdy plastic to prevent foreign material from entering the block. The clear plastic allows easy contact inspection. Contact tips are made of fine silver for high conductivity. Strong resilient springs reduce contact bounce and assure long reliable operation. The 3/4" blocks may be used on all operators installed side by side and four in tandem.

The single No. 8 tapped-head captive screw and positioning pin on each block make stacking fast and easy. Terminals are inclined for direct access and speedy wiring also angled to provide extra wiring room. A self-rising saddle assures a solid vibration resistant connection at each terminal for two No. 12 copper wires. Individual block removal is automatic without possibility of the entire stack coming off when the top block is removed.

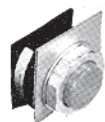
Contact mode is readily identified. Normally-Open contact blocks have green operators marked with both N.O. and NO symbol. The normally-closed blocks have red operators and are marked with N.C. and NC symbol.



Pushbuttons Momentary Operation



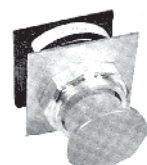
Standard Contact Blocks



Extended
Pushbutton



Flush
Pushbutton



1-3/8 inch
Mushroom Head

NEMA Type 1, 4, 12, 13			
Operator	Color	Catalog Number	Price
Extended	Black	100T-PB1B	\$32.00
	Red	100T-PB1R	
	Green	100T-PB1G	
	Yellow	100T-PB1Y	
	Amber	100T-PB1A	
	Blue	100T-PB1E	
	White	100T-PB1W	
	Brown	100T-PB1N	
	None	100T-PB1O	
Flush	Black	100T-PB2B	\$32.00
	Red	100T-PB2R	
	Green	100T-PB2G	
	Yellow	100T-PB2Y	
	Amber	100T-PB2A	
	Blue	100T-PB2E	
	White	100T-PB2W	
	Brown	100T-PB2N	
	None	100T-PB2O	
1-3/8 inch Mushroom	Black	100T-PB4B	\$68.00
	Red	100T-PB4R	
	Green	100T-PB4G	
	Yellow	100T-PB4Y	
	None	100T-PB4O	
2-1/4 inch Mushroom	Black	100T-PB5B	\$68.00
	Red	100T-PB5R	
	Green	100T-PB5G	
	Yellow	100T-PB5Y	

Standard Contact Block	Type	Symbol	Rod Color	Catalog Number	Price
	1-N.O.		Green	100T-CB10	\$18.00
	1-N.C.		Red	100T-CB01 100T-CBH01 ²	\$18.00
	1-N.O. & 1-N.C.		1-Green & 1-Red	100T-CB11 ¹	\$36.00

1. Consists of one 100T-CB10 and one 100T-CB01 packaged together.
2. Additional spring pressure for resistance to vibration.

Contact Ratings

NEMA Rating Desig.	Max. Volts	Amps.			VA.	
		Make	Break	Continuous	Make	Break
Maximum A-C Contact Rating Per Pole, 50 or 60 Hertz.						
A600	120	60	6	10	7200	720
	240	30	3			
	480	15	1.5			
	600	12	1.2			
Maximum D-C Contact Rating Per Pole						
P600	125	1.1		5	138	120
	250	0.55				
	301-600	0.2				

Pushbutton Color Caps and Mushroom Head

Color Caps for Flush Unguarded or Guarded Push Buttons			1-3/8 inch Mushroom Head for Mushroom Buttons and Push Pull Units			2-1/4 inch Mushroom Head for Mushroom Buttons and Push Pull Units		
Color	Catalog Number	Price	Catalog Number	Price	Catalog Number	Price	Catalog Number	Price
Black	100T-BB	\$1.00	100T-BM4B	\$8.00	100T-BM5B	\$8.00		
Red	100T-BR		100T-BM4R		100T-BM5R			
Green	100T-BG		100T-BM4G		100T-BM5G			
Yellow	100T-BY		100T-BM4Y		100T-BM5Y			
Amber	100T-BA							
Blue	100T-BE							
White	100T-BW							
Brown	100T-BN							
Mixed	100T-BM	\$8.00	100T-BM4M	\$32.00				

Selection Guide

Select push button operators from table above and contact blocks from table on the right. Select legend plates from page D16.

For complete units see page D13. All units on this page will accept a total of eight contact blocks.

Item	Page	Item	Page
Accessories	D17	Pilot Lights	D7
Legend Plates	D16	Selector Switches	D8
Ratings and Dimensions	D18	Special Devices	D4
Assembled Units	D13	Assembled Stations	D13

Ordering Information

Complete Control Unit Consists Of:



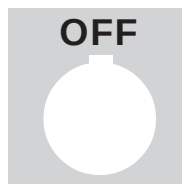
Operator
100T-PB2B

+



Contact Blocks
100T-CB01

+



Legend Plate
100T-L07

=

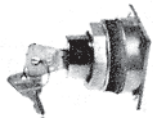
Complete
Push Button
Unit

Special Purpose Push Button Units



Key Operated Push Button

This key operated push button is a chrome, unguarded unit that locks in the depressed position. It must be unlocked with a key to release it. Two keys are provided with each unit.



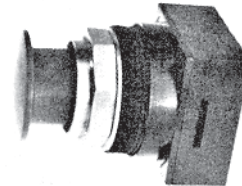
Key Operated
Push Button

Description ¹	Catalog No.	Price
Unit Locks in Depressed Position Key Required to Release Chrome Unit	100T-PB61 Legend Plate & Contact Blocks Not Included	\$104.00

1. 100T-BM6R 2 1/4 inch Red Mushroom Head available for this unit at \$36.00 List Price each.

Push-Pull Units

Push-Pull units are available as two position, maintained (buttons remain in the depressed position until manually released). Standard units have 1 3/8 inch mushroom head operator.



Push-Pull Unit

Push-Pull Units

Comes with 1 3/8 inch Standard Mushroom Head. Legend Plate and Contact Blocks not included.

Description	Color ⁴	Catalog Number	Price
Maintained	Black	100T-PP4B	\$104.00
	Red	100T-PP4R	104.00
	None	100T-PP40	96.00

1. For colors not listed, or for units with 2 1/4 inch diameter Mushroom Heads, order with "none" and select desired Mushroom Head from below.

Standard Contact Blocks

Type	Symbol	Rod Color	Catalog Number	Price
1-N.O.		Green	100T-CB10	\$18.00
1-N.C.		Red	100T-CB01 100T-CBH01 ³	\$18.00
1-N.O. & 1-N.C.		1-Green & 1-Red	100T-CB11 ²	\$36.00

2. Consists of one 100T-CB10 and one 100T-CB01 packaged together.
3. Additional spring pressure for resistance to vibration.

Item	Page
Accessories	D17
Legend Plates	D16
Ratings and Dimensions	D18

Mushroom Head Color Caps

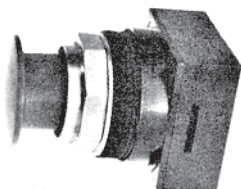
	1- ³ / ₈ inch Mushroom Head for Mushroom Buttons and Push Pull Units		2- ¹ / ₄ inch Mushroom Head for Mushroom Buttons and Push Pull Units	
Color	Catalog Number ⁵	Price	Catalog Number ⁶	Price
Black	100T-BM4B	\$8.00	100T-BM5B	\$8.00
Red	100T-BM4R		100T-BM5R	
Green	100T-BM4G		100T-BM5G	
Yellow	100T-BM4Y		100T-BM5Y	
Mixed	100T-BM4M	32.00	100T-BM5M	32.00

5. Packaged 1 per carton except 100T-BM4M contains one of each color.

6. Packaged 1 per carton except 100T-BM5M contains one of each color.

Ordering Information

Complete Control Unit Consists Of:



Operator
100T-PP4B

+



Contact Blocks
100T-CB01

+



Legend Plate
100T-L30

=

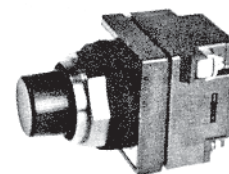
Complete
Push Button
Unit

Illuminated Push Buttons

Illuminated Momentary Push Buttons comes with Standard Lens.
Legend Plate and Contact Blocks Not Included.



Operator & Lenses
100T-PBLT1R



Selection Guide

Select Illuminated push button operators from table at left and contact blocks from below. Units without lenses will accept either standard lens or mushroom lens. All units are provided with "unguarded" guard ring. Clear plastic guard 100T-PGR is available at \$36.00 list price.

Select legend plates from page D16

For complete units, see page D13

All units on this page will accept a total of eight contact blocks.

Standard Contact Blocks

	Type	Symbol	Rod Color	Catalog Number	Price
	1-N.O.		Green	100T-CB1O	\$18.00
	1-N.C.		Red	100T-CBO1	\$18.00
	1-N.O. & 1-N.C.		1-Green & 1-Red	100T-CB11 ³	\$36.00

3 Consists of one 100T-CB1O and one 100T-CBO1 packaged together.

4 Additional spring pressure for resistance to vibration.

Standard Lenses and Mushroom Lenses

	Standard Lenses for Guarded or Unguarded Push Buttons or Press-to-Test Pilot Lights		1-3/8 inch Mushroom Lenses for Illuminated Push Buttons and Illuminated Push-Pull Units	
Color	Catalog Number	Price ⁵	Catalog Number	Price ⁶
Red	100T-LBR	\$8.00	100T-LBMR	\$8.00
Green	100T-LBG		100T-LBMG	
Yellow	100T-LBY		100T-LBMY	
Amber	100T-LBA		100T-LBMA	
Blue	100T-LBE		100T-LBME	
White	100T-LBW	\$56.00	100T-LBMW	\$56.00
Clear	100T-LBC		100T-LBMC	
Mixed	100T-LBM	\$56.00	100T-LBMM	\$56.00

5. Packaged one per carton except 100T-LBM contains seven lenses, one of each color.

6. Packaged one per carton except 100T-LBMM contains seven lenses, one of each color.

Type	Voltage	Lamp Number	Lens Color	Catalog Number ¹	Price
Transformer	120 AC only 50/60 Hz	755	Red	100T-PBLT1R	\$128.00
			Green	100T-PBLT1G	128.00
			None	100T-PBLT1O	120.00
	240 AC only 50/60 Hz	755	Red	100T-PBLT2R	\$128.00
			Green	100T-PBLT2G	128.00
			None	100T-PBLT2O	120.00
	480 AC only 50/60 Hz	755	Red	100T-PBLT4R	\$128.00
			Green	100T-PBLT4G	128.00
			None	100T-PBLT4O	120.00
Resistor	120 AC DC	60MB	Red	100T-PBLR1R	\$104.00
			Green	100T-PBLR1G	104.00
			None	100T-PBLR1O	96.00
	240 AC DC	120MB	Red	100T-PBLR2R	\$104.00
			Green	100T-PBLR2G	104.00
			None	100T-PBLR2O	96.00
Full Voltage	120 AC DC	120MB	Red	100T-PBLF1R	\$104.00
			Green	100T-PBLF1G	104.00
			None	100T-PBLF1O	96.00
	6 AC DC	6MB	Red	100T-PBLF6R	\$104.00
			Green	100T-PBLF6G	104.00
			None	100T-PBLF6O	96.00
	12 AC DC	12MB	Red	100T-PBLF7R	\$104.00
			Green	100T-PBLF7G	104.00
			None	100T-PBLF7O	96.00
	24 AC DC	24MB	Red	100T-PBLF8R	\$104.00
			Green	100T-PBLF8G	104.00
			None	100T-PBLF8O	96.00
Neon ²	120 AC DC	NE51	Yellow	100T-PBLN1Y	\$104.00
			Clear	100T-PBLN1C	104.00
			None	100T-PBLN1O	96.00

1 Catalog number with lens are for standard lens. For colors not listed, or for 1 3/8 inch mushroom lens, order with "none" and select desired standard or mushroom lens from table at right.

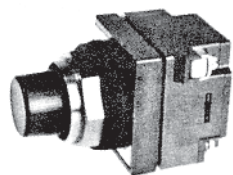
2 Yellow or clear lens only recommended for neon unit.

Item	Page
Accessories	D17
Legend Plates	D16
Ratings and Dimensions	D18
Assembled Units	D13

Replacement Lamps		
Voltage	Catalog #	Price
6V	080 MB1	13.00
12V	080 MB2	13.00
24V	080 MB3	13.00
48V	080 MB5	13.00
120V	080 MB7	13.00

Ordering Information

Complete Control Unit Consists Of:



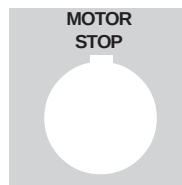
Operator
100T-PBLT1R

+



Contact Blocks
100T-CB01

+



Legend Plate
100T-L92

=

Complete
Push Button
Unit

Illuminated Push-Pull Units

Illuminated Push-Pull Units (Maintained Position) Comes With and Without 1 $\frac{3}{8}$ inch Mushroom Head.
Legend Plate and Contact Blocks Not Included.



Operator & Lenses
100T-PPLT1R



Type	Voltage	Lamp Number	Lens Color	Catalog Number ¹	Price
Transformer	120 AC only 50/60 Hz	755	Red	100T-PPLT1R	\$164.00
			Green	100T-PPLT1G	164.00
			None	100T-PPLT1O	156.00
	240 AC only 50/60 Hz	755	Red	100T-PPLT2R	\$164.00
			Green	100T-PPLT2G	164.00
			None	100T-PPLT2O	156.00
	480 AC only 50/60 Hz	755	Red	100T-PPLT4R	\$164.00
			Green	100T-PPLT4G	164.00
			None	100T-PPLT4O	156.00
Resistor	120 AC DC	60MB	Red	100T-PPLR1R	\$140.00
			Green	100T-PPLR1G	140.00
			None	100T-PPLR1O	132.00
	240 AC DC	120MB	Red	100T-PPLR2R	\$140.00
			Green	100T-PPLR2G	140.00
			None	100T-PPLR2O	132.00
Full Voltage	120 AC DC	120MB	Red	100T-PPLF1R	\$140.00
			Green	100T-PPLF1G	140.00
			None	100T-PPLF1O	132.00
	6 AC DC	6MB	Red	100T-PPLF6R	\$140.00
			Green	100T-PPLF6G	140.00
			None	100T-PPLF6O	132.00
	12 AC DC	12MB	Red	100T-PPLF7R	\$140.00
			Green	100T-PPLF7G	140.00
			None	100T-PPLF7O	132.00
	24 AC DC	24MB	Red	100T-PPLF8R	\$140.00
			Green	100T-PPLF8G	140.00
			None	100T-PPLF8O	132.00
Neon ²	120 AC DC	NE51	Yellow	100T-PPLN1Y	\$140.00
			Clear	100T-PPLN1C	140.00
			None	100T-PPLN1O	132.00

1 For colors not listed, order with "none" and select desired mushroom lens form table at right.

2 Yellow or clear lens only recommended for neon unit.

Item	Page
Accessories	D17
Legend Plates	D16
Ratings and Dimensions	D18

Selection Guide

Illuminated push-pull units are two position illuminated mushroom buttons which remain in the depressed position until manually released. Select the operator from table at left and contacts from below. Select legend plate from page D16.

All units on this page will accept a total of eight contact blocks.

Standard Contact Blocks

Type	Symbol	Red Color	Catalog Number	Price
1-N.O.		Green	100T-CB1O	\$18.00
1-N.C.		Red	100T-CBO1 100T-CBHO1 ⁴	\$18.00
1-N.O. & 1-N.C.		1-Green & 1-Red	100T-CB11 ³	\$36.00

3 Consists of one 100T-CB1O and one 100T-CBO1 packaged together.
4 Additional spring pressure for resistance to vibration.

Mushroom Lenses for Illuminated Push-Pull Units

1 $\frac{3}{8}$ inch Mushroom Lenses for Illuminate Push-Pull Units		
Color	Catalog Number	Price ⁵
Red	100T-LBMR	\$8.00
Green	100T-LBMG	
Yellow	100T-LBMY	
Amber	100T-LBMA	
Blue	100T-LBME	
White	100T-LBMW	
Clear	100T-LBMC	\$56.00
Mixed	100T-LBMM	

5 Packaged one per carton except 100T-LBMM contains seven lenses, one of each color.

Ordering Information

Complete Control Unit Consists Of:



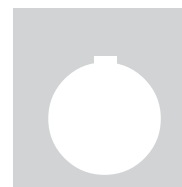
Operator
100T-PPLT1R

+



Contact Blocks
100T-CB01

+



Legend Plate
100T-L30

=

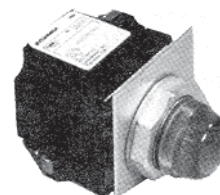
Complete
Push Button
Unit

Pilot Lights and Press-To-Test Pilot Lights



Standard Lens

Pilot Light
Operator & Lens
100T-PLT1R

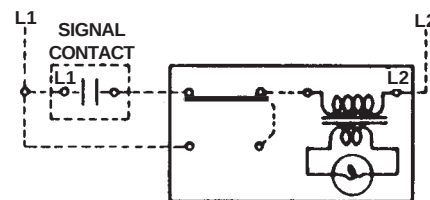


Pilot Light

Pilot Lights are available in four different power configurations - transformer, resistor, full voltage, and neon types. Transformer types are available with 480, 240, and 120 volt primary voltages and all have a 6.3 volt secondary for long lamp life. They will withstand a considerable amount of shock and vibration. The resistor type is available in 240 and 120 volt varieties with the resistor dropping the voltage to 120 and 60 volts respectively. Full voltage units are available with 6, 12, 24, and 120 volt lamps. The neon bulbs burn less brightly therefore it is recommended that only yellow and clear lens be used for these units.

Press-To-Test Lights

Press-To-Test Lights are available in the same four power configurations as the standard pilot lights - Transformer, resistor, full voltage, and neon. They are furnished pre-wired with a normally open and a normally closed contact. As shown in the diagram below it will allow you to test the lamp without interfering with the normal operation of the pilot light.



(Transformer type shown as typical)

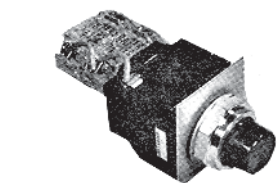
Type	Voltage	Lamp Number	Lens Color	Pilot Lights ⁴		Press-To-Test ⁴	
				Catalog Number ¹	Price	Catalog Number ³	Price
Transformer	120 AC only 50/60 Hz	755	Red	100T-PLT1R	\$128.00	100T-PTT1R	\$164.00
			Green	100T-PLT1G	128.00	100T-PTT1G	164.00
			None	100T-PLT1O	120.00	100T-PTT1O	156.00
	240 AC only 50/60 Hz	755	Red	100T-PLT2R	\$128.00	100T-PTT2R	\$164.00
			Green	100T-PLT2G	128.00	100T-PTT2G	164.00
			None	100T-PLT2O	120.00	100T-PTT2O	156.00
	480 AC only 50/60 Hz	755	Red	100T-PLT4R	\$128.00	100T-PTT4R	\$164.00
			Green	100T-PLT4G	128.00	100T-PTT4G	164.00
			None	100T-PLT4O	120.00	100T-PTT4O	156.00
Resistor	120 AC DC	60MB	Red	100T-PLR1R	\$104.00	100T-PTR1R	\$140.00
			Green	100T-PLR1G	104.00	100T-PTR1G	140.00
			None	100T-PLR1O	96.00	100T-PTR1O	132.00
	240 AC DC	120MB	Red	100T-PLR2R	\$104.00	100T-PTR2R	\$140.00
			Green	100T-PLR2G	104.00	100T-PTR2G	140.00
			None	100T-PLR2O	96.00	100T-PTR2O	132.00
Full Voltage	120 AC DC	120MB	Red	100T-PLF1R	\$104.00	100T-PTF1R	\$140.00
			Green	100T-PLF1G	104.00	100T-PTF1G	140.00
			None	100T-PLF1O	96.00	100T-PTF1O	132.00
	6 AC DC	6MB	Red	100T-PLF6R	\$104.00	100T-PTF6R	\$140.00
			Green	100T-PLF6G	104.00	100T-PTF6G	140.00
			None	100T-PLF6O	96.00	100T-PTF6O	132.00
	12 AC DC	12MB	Red	100T-PLF7R	\$104.00	100T-PTF7R	\$140.00
			Green	100T-PLF7G	104.00	100T-PTF7G	140.00
			None	100T-PLF7O	96.00	100T-PTF7O	132.00
	24 AC DC	24MB	Red	100T-PLF8R	\$104.00	100T-PTF8R	\$140.00
			Green	100T-PLF8G	104.00	100T-PTF8G	140.00
			None	100T-PLF8O	96.00	100T-PTF8O	132.00
Neon ²	120 AC DC	NE51	Yellow	100T-PLN1Y	\$104.00	100T-PTN1Y	\$140.00
			Clear	100T-PLN1C	104.00	100T-PTN1C	140.00
			None	100T-PLN1O	96.00	100T-PTN1O	132.00

- For colors not listed, order with "none" and select desired lens from table below.
- Yellow or clear lens only recommended for neon unit.
- Catalog number with lens are for standard lens. For colors not listed or for 1 3/8 inch mushroom lens order with "none" and select desired standard or mushroom lens from table below.
- Legend Plate Not Included.
- For Replacement Lamps see page D6.

Standard Lenses and Mushroom Lenses

Color	Standard Lenses for Pilot Lights (Purchased after Jan. 1997)		Standard Lenses for Guarded or Unguarded Buttons or Press-To-Test Pilot Lights		1 3/8 inch Mushroom Lenses for Illuminated Press-To-Test Pilot Lights	
	Catalog Number	Price ⁵	Catalog Number	Price ⁶	Catalog Number	Price ⁷
Red	100T-LR	\$8.00	100T-LBR	\$8.00	100T-LBMR	\$8.00
Green	100T-LG		100T-LBG		100T-LBMG	
Yellow	100T-LY		100T-LBY		100T-LBMY	
Amber	100T-LA		100T-LBA		100T-LBMA	
Blue	100T-LE		100T-LBE		100T-LBME	
White	100T-LW		100T-LBW		100T-LBMW	
Clear	100T-LC		100T-LBC		100T-LBMC	
Mixed	100T-LM	\$56.00	100T-LBM	\$56.00	100T-LBMM	\$56.00

- Packaged 1 per carton except 100T-LM contains seven lenses one of each color.
- Packaged 1 per carton except 100T-LBM contains seven lenses one of each color (\$58.80/ctn).
- Packaged 1 per carton except 100T-LBMM contains seven lenses one of each color (\$58.80/ctn).



Press-To-Test Pilot Light
Operator & Lens
100T-PTT1R

Selector Switches 2-3-4 Position Non-Illuminated

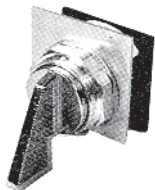


Selector Switches

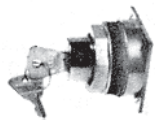
Legend Plate and Contact Blocks not included



Black Knob
100T-SS2MB1



Chrome Lever
100T-SL2MC1



Key Operated
100T-SK3M

Type	Black Knob Operator ^{1 2}			Crome Lever Operator			Key Operator			
	Catalog Number	Cam ³ Code	Price	Catalog Number	Cam ³ Code	Price	Catalog Number	Cam ³ Code	Key ⁴ Removal	Price
2 Positioned Maintained	100T-SS2MB	1	\$44.00	100T-SL2MC	1	\$44.00	100T-SK2M	1	A	\$116.00
2 Position Spring Return Right To Center	100T-SS2RB	1	68.00	100T-SL2RC	1	68.00	100T-SK2R	1	C	140.00
3 Positioned Maintained	100T-SS3MB	3,4,5, 6, or 7	44.00	100T-SL3MC	3,4,5, 6, or 7	44.00	100T-SK3M	3,4,5, 6, or 7	A	\$116.00
3 Position Spring Return Right To Center	100T-SS3RB	3,4,5, 6, or 7	68.00	100T-SL3RC	3,4,5, 6, or 7	68.00	100T-SK3R	3,4,5, 6, or 7	C	140.00
3 Position Spring Return Left To Center	100T-SS3LB	3,4,5, 6, or 7	68.00	100T-SL3LC	3,4,5, 6, or 7	68.00	100T-SK3L	3,4,5, 6, or 7	C	140.00
3 Position Spring Return Rt. & Lt. to Ctr.	100T-SS3BB	3,4,5, 6, or 7	68.00	100T-SL3BC	3,4,5, 6, or 7	68.00	100T-SK3B	3,4,5, 6, or 7	C	140.00
4 Position Maintained	100T-SS4MB	8	44.00	100T-SL4MC	8	44.00	100T-SK4M	8	A	\$116.00

1 Available in other colors Change "B" in operator catalog number to "R" for Red, "G" for Green, "Y" for Yellow, or "E" for Blue.

2 Available without Knob Change "B" in operator Catalog number to "O" and select knob from table below.

3 Cam code is a part of catalog number: Example 100T-SS3MB3 See table of cam developments.

4 Key Removal code is part of catalog number. Example: 100T-SK3B3C See Key Removal table below.

Key Spare Parts

- For Standard Key Operator use 100T-3095 @ \$17.00 using JC80 disc. sch.
- For 501 Key Operator use 100T-CH501 @ \$28.00 using JC80 disc. sch.

Key Removal Codes

Key Removal Code	Two Position				Three Position			Four Position			
	Maintained		Spring Return								
	Left	Right	Center	Right	Left	Center	Right	Left	Left Center	Right Center	Right
L (Left)	Yes	No	----	----	Yes	No	No	Yes	No	No	No
R (Right)	No	Yes	No	Yes	No	No	Yes	No	No	No	Yes
C (Center)	----	----	Yes	No	No	Yes	No	----	----	----	----
A (All)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

NOTE: No 501 Key is available for above Key Operators Selector Switches. To order add "5" for 501 Key to the end of the catalog number add \$24.00 to list price.
Example: 100T-SK2M1A5.

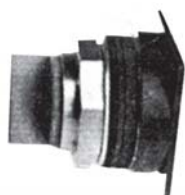
Color Plastic Knobs

Standard Plastic Knob for Knob Operated Selector Switches		
Color	Catalog Number	Price ⁵
Black	100T-SB	\$8.00
Red	100T-SR	8.00
Green	100T-SG	8.00
Yellow	100T-SY	8.00
Blue	100T-SE	8.00
Mixed	100T-SM	40.00

⁵ Packaged one per carton except 100T-SM contains one of each color knob.

Ordering Information

Complete Control Unit Consists Of:



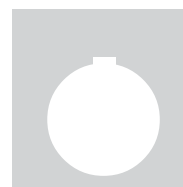
Operator
100T-SS2MB1

+



Contact Blocks
100T-CB01

+



Legend Plate
100T-L52

=

Complete
Push Button
Unit

Selector Switches



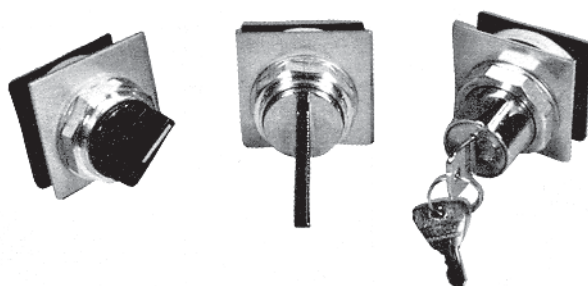
Contact Block Switching Sequence and Selection

2 Position Selector Switch

Location of Contact Block (Front View)		Contact Block			Selector Position Cam Code 1			
					Maintained		Spring Return	
		Catalog Number 100T-	Symbol	Rod Color	Left	Right	Center	Right
Left	N.O.	CB10		Green	O	X	O	X
	N.C.	CB01		Red	X	O	X	O
Right	N.O.	CB10		Green	O	X	O	X
	N.C.	CB01		Red	X	O	X	O

Cam codes are same for maintained or spring return operation.

X = Contact Closed
O = Contact Open



3 Position Selector Switch

Location of Contact Block (Front View)		Contact Block			Selector Position Cam Code 3			Selector Position Cam Code 4			Selector Position Cam Code 5			Selector Position Cam Code 6			Selector Position Cam Code 7		
		Catalog Number 100T-	Symbol	Rod Color	Left	Center	Right	Left	Center	Right	Left	Center	Right	Left	Center	Right	Left	Center	Right
Left	N.O.	CB10		Green	O	O	X	O	O	X	X	O	O	O	O	X	O	O	X
	N.C.	CB01		Red	X	O	O	O	X	O	O	X	O	X	X	O	X	O	O
Right	N.O.	CB10		Green	O	O	X	O	O	X	X	O	O	X	O	O	O	O	X
	N.C.	CB01		Red	X	O	O	O	X	O	O	X	O	O	X	X	O	X	O

Cam Codes are the same for maintained or spring return operation.

X = Contact Closed:

O = Contact Open

4 Position Selector Switch

Location of Contact Block (Front View)		Contact Block			Selector Position Cam Code 8			
		Catalog Number 100T-	Symbol	Rod Color	Left	Left Center	Right Center	Right
Left	N.O.	CB10		Green	O	O	X	O
	N.C.	CB01		Red	X	O	O	O
Right	N.O.	CB10		Green	O	X	O	O
	N.C.	CB01		Red	O	O	O	X

Cam codes are same for maintained or spring return operation.

X = Contact Closed
O = Contact Open

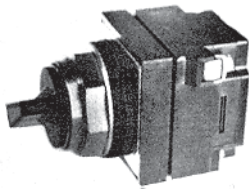
Standard Contact Blocks

	Type	Symbol	Rod Color	Catalog Number	Price
	1-N.O.		Green	100T-CB10	\$18.00
	1-N.C.		Red	100T-CB01 100T-CBHO1 ²	\$18.00
	1-N.O. & 1-N.C.		1-Green & 1-Red	100T-CB11 ¹	\$36.00

1. Consists of one 100T-CB10 and one 100T-CB01 packaged together.
2. Additional spring pressure for resistance to vibration.

Item	Page
Accessories	D17
Legend Plates	D16
Ratings and Dimensions	D18
Assembled Units	D14

Illuminated Selector Switches



100T-S12MT1R

Illuminated Selector Switches

The Illuminated Selector Switch combines the functions of a standard selector switch and a pilot light in one unit. Power supply types and selector functions other than those shown are available. The same cams as used with the standard selector switch are available for the Illuminated Selector Switch. See page D10 for cams and contact sequences for two and three position selector switches. All units will accept a total of eight contact blocks. Select legend plates from page D16.

Standard Contact Blocks

 Standard Contact Block	Type	Symbol	Rod Color	Catalog Number	Price
	1-N.O.		Green	100T-CB1O	\$18.00
	1-N.C.		Red	100T-CBO1 100T-CBHO1 ²	\$18.00
	1-N.O. & 1-N.C.		1-Green & 1-Red	100T-CB11 ¹	\$36.00

1. Consists of one 100T-CB1O and one 100T-CBO1 packaged together.
2. Additional spring pressure for resistance to vibration

Illuminated Knob Operated Selector Switches
Legend Plate and Contact Blocks Not Included.

		Transformer Type Operator with Red Lens ^{3,4}		
Type	Voltage	Catalog No.	Cam Code ⁵	Price
2 Postions Maintained	120	100T-S12MT1R	1	\$140.00
	240	100T-S12MT2R	1	140.00
	480	100T-S12MT4R	1	140.00
2 Position Spring Return Right to Center	120	100T-S12RT1R	1	\$164.00
	240	100T-S12RT2R	1	164.00
	480	100T-S12RT4R	1	164.00
3 Position Maintained	120	100T-S13MT1R	3,4,5, 6, or 7	\$140.00
	240	100T-S13MT2R		140.00
	480	100T-S13MT4R		140.00
3 Position Spring Return Rt. & Lt. to Ctr.	120	100T-S13BT1R	3,4,5, 6, or 7	\$164.00
	240	100T-S13BT2R		164.00
	480	100T-S13BT4R		164.00

3. Available without lens. Change last "R" in operator catalog number to "O" and select knob from table below.
4. Available in other colors Change "R" in operator catalog number to "G" for Green, "Y" for Yellow, "A" for Amber, "E" for Blue, "W" for White, "C" for Clear.
5. Cam Code is part of catalog number Example: 100T-S13MT1R3. See table of cam developments on page D10.

Standard Lenses for Illuminated
Selector Switches

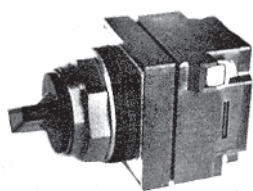
Standard Plastic Lens for Knob Operated Illuminated Selector Switches ⁶		
Color	Catalog No.	Price
Red	100T-SLR	\$8.00
Green	100T-SLG	
Yellow	100T-SLY	
Amber	100T-SLA	
Blue	100T-SLE	
White	100T-SLW	
Clear	100T-SLC	
Mixed	100T-SLM	\$59.00

6. Packaged one per carton except 100T-SLM contains seven lenses, one of each color (\$58.80/ctn).

Item	Page
Accessories	D18
Legend Plates	D17
Ratings and Dimensions	D19

Ordering Information

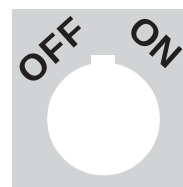
Complete Control Unit Consists Of:

Operator
100T-S12MT1R

+

Contact Blocks
100T-CB01

+

Legend Plate
100T-L52

=

Complete
Push Button
Unit

Special Devices - Joy Stick

Joy Stick Operator



The Joy Stick Operator is available in three (left-center-right) and five (left-up-right-down-center) position, maintained and spring return (to center) types. They are also available with a release button on the end of the operator which must be depressed in order to operate the joy stick.

Joy Stick - Contact Blocks and Legend Plate Not Included



100T-JP5M Joy Stick Unit

	Without Release Button		With Release Button	
Type	Catalog No.	Price	Catalog No.	Price
3 Positions Maintained	100T-JS3M	\$212.00	100T-JP3M	\$260.00
3 Position Spring Return to Center	100T-JS3B	212.00	100T-JP3B	\$260.00
5 Position Maintained	100T-JS5M	212.00	100T-JP5M	\$260.00
5 Position Spring Return to Center	100T-JS5B	212.00	100T-JP5B	\$260.00

Three Position Joy Stick - Contact Sequence

Type	Location (Front View)	Contacts ¹		Joy Stick Position (Front View)		
		Type and Symbol	Rod Color	Left	Center	Right
Three Position, Maintained and Spring Return to Center, With or Without Release Button	Left	N.O.	Green	X	O	O
		N.C.	Red	O	O	X
	Right	N.O.	Green	O	O	X
		N.C.	Red	X	O	O

1. Contact Blocks are not supplied. Order contact blocks from table below.

Five Position Joy Stick - Contact Sequence

Type	Location (Front View)	Contacts ⁴		Joy Stick Position (Front View)				
		Type and Symbol	Rod Color	Left	Up	Center C	Down	Right
Five Position, Maintained and Spring Return to Center, With or Without Release Button	Left	N.O.	Green	O	O	O	X	O
		N.C.	Red	O	X	O	O	O
	Right	N.O.	Green	O	O	O	O	X
		N.C.	Red	X	O	O	O	O

4. Contact Blocks are not supplied. Order contact blocks from table below.

Standard Contact Blocks

Type	Symbol	Rod Color	Catalog Number	Price
1-N.O.		Green	100T-CB1O	\$18.00
1-N.C.		Red	100T-CBO1	\$18.00
1-N.O. & 1-N.C.		1-Green & 1-Red	100T-CB11 ²	\$36.00

2. Consists of one 100T-CB1O and one 100T-CBO1 packaged together.

3. Additional spring pressure for resistance to vibration.

Item	Page
Accessories	D18
Legend Plates	D17
Ratings and Dimensions	D19

Ordering Information

Complete Control Unit Consists Of:



Operator
100T-JS3M

+



Contact Blocks
100T-CB10

+

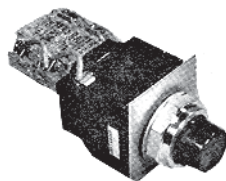


Legend Plate
100T-L30

=

Complete
Joy Stick
Unit

Assembled Push Buttons



Assembled Push Buttons, including Contact Blocks as shown.
(Does not include Legend Plate)

Operator	Type	Symbol	Red Color	Catalog Number	Price
Unguarded	1-N.O.		Black	100T-PB1B-10X	\$50.00
	1-N.C.		Red	100T-PB1R-01X	\$50.00
	1-N.C.		Black	100T-PB1B-11X	\$68.00
	1-N.O.		Red	100T-PB1R-11X	\$68.00
Guarded	1-N.O.		Black	100T-PB2B-10X	\$50.00
	1-N.C.		Black	100T-PB2B-11X	\$68.00
			Red	100T-PB2R-11X	\$68.00
	1-N.O.		Green	100T-PB2G-11X	\$68.00
1 3/8" Mushroom	1-N.C.		Black	100T-PB4B-11X	\$104.00
	1-N.O.		Red	100T-PB4R-11X	\$104.00
2 1/4" Mushroom	1-N.C.		Black	100T-PB5B-11X	\$104.00
	1-N.O.		Red	100T-PB5R-11X	\$104.00
Illuminated Push Button 120V Transformer Type	1-N.C.		Red	100T-PBLT1R-11X	\$164.00
	1-N.O.				
Illuminated Push Button 120V Resistor Type	1-N.C.		Red	100T-PBLR1R-11X	\$140.00
	1-N.O.				



Assembled 100T Push Button Stations

The most commonly used push button stations are available assembled in NEMA Type 13 (oiltight and dusttight) sheet steel and in NEMA 4 (water-tight) stainless steel enclosures.

For custom control stations not listed, order operators, contact blocks, nameplates, and enclosures as separate items.



Assembled Push Buttons Stations

Assembled Push Buttons Stations In Surface mounted Enclosures

Description of Elements	NEMA 13 ¹ Sheet Steel		NEMA 4 ² Stainless Steel	
	Catalog Number	Price	Catalog Number	Price
Single element Stations				
START (black guarded push button)	100T-S1-1	\$156.	100T-W1-1	\$288.
START (black 2 1/4" mushroom push button)	100T-S1-2	192.	100T-W1-2	324.
STOP (red unguarded push button)	100T-S1-3	156.	100T-W1-3	288.
STOP (red Mushroom unguarded push button with lockdown)	100T-S1-4	192.	100T-W1-4	324.
STOP (red 2 1/4" mushroom push button)	100T-S1-5	192.	100T-W1-5	324.
OFF-ON (black knob selector switch)	100T-S1-6	168.	100T-W1-6	300.
HAND-OFF-AUTO (black knob selector switch)	100T-S1-7	168.	100T-W1-7	300.
FWD-OFF-REV (black knob selector switch)	100T-S1-8	168.	100T-W1-8	300.
Two Element Stations				
START-STOP (black guarded-red unguarded push buttons)	100T-S2-1	240.	100T-W2-1	372.
START-STOP (black guarded-red 1 3/8" mushroom push buttons)	100T-S2-2	276.	100T-W2-2	408.
FORWARD-REVERSE (black guarded-black guarded push buttons)	100T-S2-3	240.	100T-W2-3	372.
OPEN-CLOSE (black guarded-black guarded push buttons)	100T-S2-4	240.	100T-W2-4	372.
UP-DOWN (black guarded-black guarded push buttons)	100T-S2-5	240.	100T-W2-5	372.
Three Element Stations				
FORWARD-REVERSE-STOP (black guarded-black guarded-red unguarded push buttons)	100T-S3-1	324.	100T-W3-1	528.
OPEN-CLOSE-STOP (black guarded-black guarded-red unguarded push buttons)	100T-S3-2	324.	100T-W3-2	528.
UP-DOWN-STOP (black guarded-black guarded-red unguarded push buttons)	100T-S3-3	324.	100T-W3-3	528.
START-STOP-JOG (black guarded-red unguarded-black guarded push buttons)	100T-S3-4	324.	100T-W3-4	528.
START-STOP-MOTOR RUN (black guarded-red unguarded push buttons-red 120 volt transformer unguarded pilot light)	100T-S3-5	384.	100T-W3-5	588.

1 Use NEMA 13 enclosures for applications requiring NEMA1.

2 Protective watertight boots are not required for indoor (non-freezing) applications. If for outdoor (freezing) use, order boots as separate items, from page D17.

Assembled Selector Switches



Assembled Selector Switches, Including Contact Blocks as shown

**2 Position Selector Switch** (Does not include Legend Plate)

Type	Contacts			Selector Position (Front View)			Complete Catalog No. and Price for Assembled Unit			
	Location (Front View)	Type and Symbol	Rod Color	Left ←	Center ↑	Right →	Black Knob Operator		Chrome Lever Operator	
							Catalog No.	Price	Catalog No.	Price
2 Position Maintained	Left	N.O. ○ ○	Green	O	--	X	100T-		100T-	
		N.C. ○ ○	Red	X	--	O	SS2MB1-11X	\$80.00	SL2MC1-11X	\$80.00
2 Position Spring Return Right to Center	Left	N.O. ○ ○	Green	--	O	X	100T-		100T-	
		N.C. ○ ○	Red	--	X	O	SS2RB1-11X	104.00	SL2RC1-11X	104.00

3 Position Selector Switch (Does not include Legend Plate)

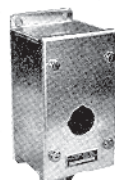
Type	Contacts			Selector Position (Front View)			Complete Catalog No. and Price for Assembled Unit			
	Location (Front View)	Type and Symbol	Rod Color	Left ←	Center ↑	Right →	Black Knob Operator		Chrome Lever Operator	
							Catalog No.	Price	Catalog No.	Price
3 Position Maintained	Left	N.O. ○ ○	Green	O	O	X	100T-		100T-	
		N.C. ○ ○	Red	X	O	O	SS3MB3-11X	\$80.00	SL3MC3-11X	\$80.00
3 Position Spring Return Right & Left to Center	Left	N.O. ○ ○	Green	O	O	X	100T-		100T-	
		N.C. ○ ○	Red	X	O	O	SS3BB3-11X	104.00	SL3BC3-11X	104.00

4 Position Selector Switch (Does not include Legend Plate)

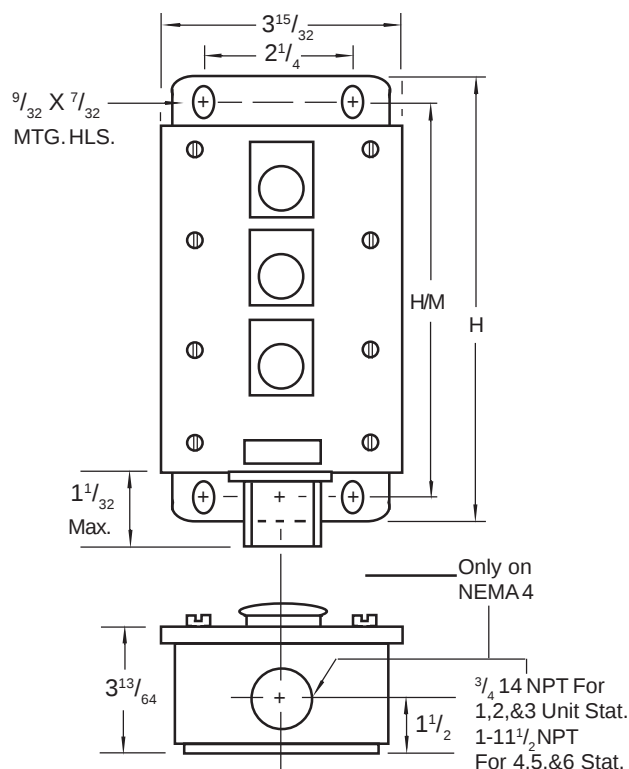
Type	Contacts			Selector Position (Front View)				Complete Catalog No. and Price for Assembled Unit			
	Location (Front View)	Type and Symbol	Rod Color	Left ←	Left Center ↙	Right Center ↘	Right →	Black Knob Operator		Chrome Lever Operator	
								Catalog No.	Price	Catalog No.	Price
4 Position Maintained	Left	N.O. ○ ○	Green	O	O	X	O	100T- SS4MB8-22X	\$116.00	100T- SL4MC8-22X	\$116.00
		N.C. ○ ○	Red	X	O	O	O				
	Right	N.O. ○ ○	Green	O	X	O	O				
		N.C. ○ ○	Red	O	O	O	X				

Separate Enclosures

NEMA Type 13, and NEMA Type 4 Stainless Steel surface mounting enclosures are available with from one through sixteen element openings. All enclosures will accommodate non-illuminated operators with up to two contact blocks (1 per side). Consult factory for stations with 7 through 16 elements.



NEMA 13, Sheet Steel
NEMA 4, Stainless Steel



Separate Enclosures

Enclosures Only, Without Elements				
Number Of Element	NEMA 13 ¹ Sheet Steel Surface Mounted Enclosure		NEMA 4 ² Stainless Steel Surface Mounted Enclosure	
	Catalog Number	Price Each	Catalog Number	Price Each
1	100T-S1	\$84.	100T-W1	\$216.
2	100T-S2	96.	100T-W2	228.
3	100T-S3	108.	100T-W3	312.
4	100T-S4	132.	100T-W4	408.
5	100T-S5	156.	100T-W5	600.
6	100T-S6	156.	100T-W6	600.
9	100T-S9	192.	100T-W9	744.
12	100T-S12	240.	100T-W12	900.
16	100T-S16	300.	100T-W16	1188.

1. Use NEMA 13 enclosures for applications requiring NEMA 1.
2. Protective watertight boots are not required for indoor (non-freezing) applications. If for outdoor (freezing) use, order boots as separate items from page D17.

NEMA 13, Sheet Steel					
Number of Elements	W	Surface Mounted Enclosure H	D	W/M	H/M
1	3- ¹⁵ / ₃₂	6- ¹³ / ₁₆	3- ¹³ / ₆₄	2- ¹ / ₄	6- ¹ / ₄
2		6- ¹³ / ₁₆			6- ¹ / ₄
3		9- ¹ / ₁₆			8- ¹ / ₂
4		11- ⁵ / ₁₆			10- ³ / ₄
5		15- ¹ / ₁₆			14- ¹ / ₂
6		16- ¹⁵ / ₁₆			16- ³ / ₈

NEMA 4, Stainless Steel					
Number of Elements	W	Surface Mounted Enclosure H	D	W/M	H/M
1	3- ¹⁵ / ₃₂	6- ¹³ / ₁₆	3- ¹³ / ₆₄	2- ¹ / ₄	6- ¹ / ₄
2		9- ¹ / ₁₆			8- ¹ / ₂
3		11- ⁵ / ₁₆			10- ³ / ₄
4		13- ³ / ₁₆			12- ⁵ / ₈
5		15- ¹ / ₁₆			14- ¹ / ₂
6		16- ¹⁵ / ₁₆			16- ³ / ₈

Ordering Information

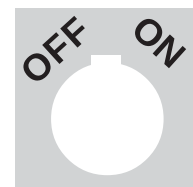
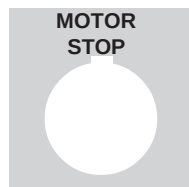
- Select enclosure desired by catalog number.

- Select Pilot Devices from 100T section.

Legend Plates

Standard Legend Plates - Available with markings listed below at \$3.60 list each.

Non-Standard Legend Plates - Can be provided with special markings at \$15.60 list each.



Marking	Catalog No. Standard Size 1-7/8" Square ¹	Catalog No. Jumbo Size 2-1/2" Square ²
For Push Buttons and Pilot Devices		
Start	100T-L01	100HF-N701
Stop	100T-L02	100HF-N702
Fast	100T-L03	100HF-N703
Slow	100T-L04	100HF-N704
Open	100T-L05	100HF-N705
Close	100T-L06	100HF-N706
Off	100T-L07	100HF-N707
On	100T-L08	100HF-N708
Up	100T-L09	100HF-N709
Down	100T-L10	100HF-N710
Raise	100T-L11	100HF-N711
Lower	100T-L12	100HF-N712
Low	100T-L13	100HF-N713
High	100T-L14	100HF-N714
Out	100T-L15	100HF-N715
In	100T-L16	100HF-N716
Jog	100T-L17	100HF-N717
Inch	100T-L18	100HF-N718
Reset	100T-L19	100HF-N719
Run	100T-L20	100HF-N720
Forward	100T-L21	100HF-N721
Reverse	100T-L22	100HF-N722
Jog Forward	100T-L23	100HF-N723
Jog Reverse	100T-L24	100HF-N724
Emergency Stop	100T-L25	100HF-N725
Push Stop	100T-L41	100HF-N741
Pull Start		
Cycle Start	100T-L83	100HF-N783
Cycle Stop	100T-L84	100HF-N784
Power On	100T-L91	100HF-N791
Motor Run	100T-L92	100HF-N792
Motor Stop	100T-L93	100HF-N793
Light Indicates Motor Running	100T-L94	100HF-N794
(Blank)	100T-L30	100HF-N730

Standard Size Marking	Catalog No. Jumbo Size 1-7/8" Square ¹	Catalog No. 2-1/2" Square ²
For Two Position Selector Switches		
Man-Auto	100T-L51	100HF-N751
Off-On	100T-L52	100HF-N752
For-Rev	100T-L53	100HF-N753
Safe-Run	100T-L54	100HF-N754
Jog-Run	100T-L55	100HF-N755
High-Low	100T-L56	100HF-N756
Open-Close	100T-L57	100HF-N757
Up-Down	100T-L58	100HF-N758
Hand-Auto	100T-L59	100HF-N759
Start-Stop	100T-L60	100HF-N760
Run-Jog	100T-L61	100HF-N761
Start-Jog	100T-L62	100HF-N762
For Three Position Selector Switch		
Hand-Off-Auto	100T-L71	100HF-N771
Auto-Off-Hand	100T-L72	100HF-N772
For-Off-Rev	100T-L73	100HF-N773
Open-Off-Close	100T-L74	100HF-N774
Man-Off-Close	100T-L75	100HF-N775
For-Safe-Rev	100T-L76	100HF-N776
Run-Safe-Jog	100T-L77	100HF-N777
Jog-Safe-Run	100T-L78	100HF-N778
Up-Off-Down	100T-L79	100HF-N779
For Four Position Selector Switches		
1-2-3-4	100T-L31	100HF-N731
For Joy Stick Operator		
(Blank)	100T-L30	100HF-N730

¹ Character height is 1/8 inch on Standard Legend Plate.

² Character height is 1/4 inch on Jumbo Legend Plate.

NOTE:

Use the trim washer if no legend plate is used. Discard the trim washer when using a legend plate.

Accessories

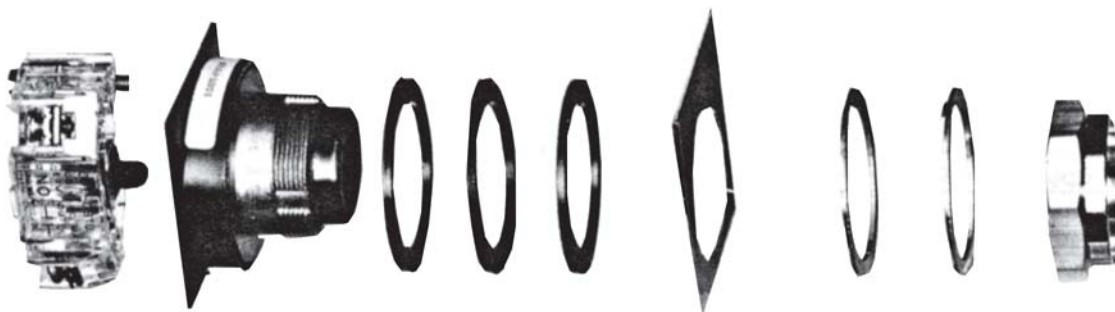


Description		Catalog Number	Price
	Guard Rings for Push Buttons Unguarded Guarded Extended Guard Standard Mushroom Head Guard Jumbo Head Guard Half Guarded	100T-1GR 100T-2GR 100T-3GR 100T-4GR 100T-5GR 100T-7GR	\$6.00 6.00 12.00 80.00 80.00 12.00
	Lens Guard for Press-To-Test Pilot Lights Plastic Metal	100T-PGR 100T-MGR	12.00 12.00
	Water Resistant Boots for Push Buttons Black Red Green Yellow Translucent	100T-PBB 100T-PBR 100T-PBG 100T-PBY 100T-PBT	24.00 24.00 24.00 24.00 24.00
	Translucent Water Resistant Boots for Illuminated Push Buttons, Pilot Lights, and Press-To-Test Pilot Lights	100T-PLTB	36.00
	Translucent Water Resistant Boots for Knob Operated Standard and Illuminated Selector Switches	100T-SSTB	36.00
	Mechanical Interlock for Push Buttons (Interlocks two buttons so they cannot be simultaneously depressed)	100T-PBM	36.00
	Maintained Interlock for Push Buttons (Interlocks two buttons so that when one is depressed, the other is released-maintained operation)	100T-PBMA	36.00
	Lock-Down attachment for Push Buttons	100T-PBL	36.00
	Lock-Down attachment for Push Buttons with Boots	100T-PBLB	36.00
	Wobble Stick Operator for Push Buttons	100T-WS	36.00
	Guard Ring Wrench (for Octagonal Guard Rings)	100T-F1X3	108.00
	Special Screwdriver (Positively mates with Contact Block assembly screw)	100T-SD	36.00
	Chrome Lever attachment for Selector-Push Units	100T-SPL	24.00
	Key (2-3-4 Position /Non-Illuminated Selector Switch) Hole Plug, 1 & 13-Grey Hole Plug, NEMA 4-Chrome	100T-3095 1X4 2X4	14.40 12.00 12.00

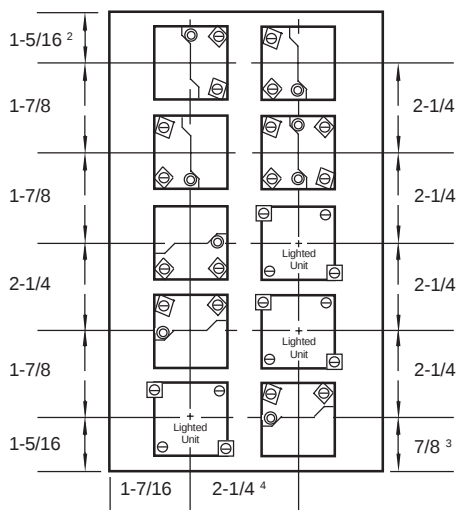
D

4
1
5

Dimensions and Ratings

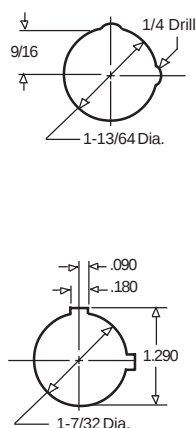


Minimum Centerline Clearance



Enclosure or grounded metal part

Panel Drilling



Contact Ratings

NEMA Rating	Max. Volts	Amp. Rating			VA.	
		Make	Break	Continuous	Make	Break
Maximum A-C Contact Rating Per Pole, 50 or 60 Hertz						
A600	120	60	6	10	7200	720
	240	30	3			
	480	15	1.5			
	600	12	1.2			
Maximum D-C Contact Rating Per Pole						
P600	125	1.1		5	138	
	250	0.55			138	
	301-600	0.2			120	

Max. Panel Thickness, In.	Spacers Required
1/16	3
1/8	2
3/16	1

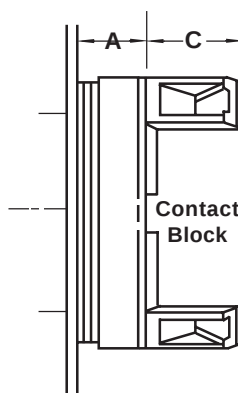
Panels thicker than 3/16" must be Counter Bored

Depth Behind Panel	Push Buttons & Selector Switches	Push-Pull Units (Non-Illuminated)	Illuminated Units (all)
A ⁵	21/32	1-11/32	11/16
B	---	---	1-3/32
C ⁶	3/4	3/4	3/4

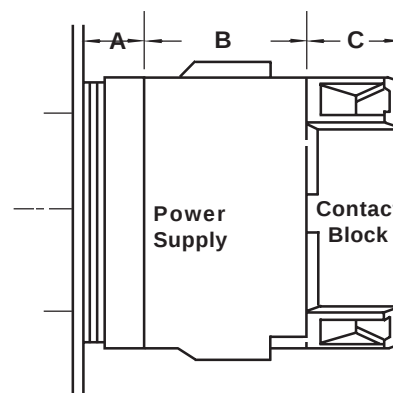
Notes:

1. Use the trim washer if no legend plate is used. Discard the trim washer when using a legend plate.
2. Must be 1-5/8" for 100-HF Legend Plate
3. Must be 1-1/8" for 2-1/4" Mushroom Head
4. When using 100-HF Legend Plate, both horizontal and vertical centerlines between operators must be 2-1/2" min. When using either 2-1/4" mushroom head or lever selector switch, both horizontal and vertical centerlines between operators must be 2-1/4" min.
5. Depth when three neoprene spacers are used. Reduce depth by 1/16 inch for each spacer omitted.
6. Depth per contact block. Maximum contact stack depth is three (3) inches.

Rear of Mounting Panel

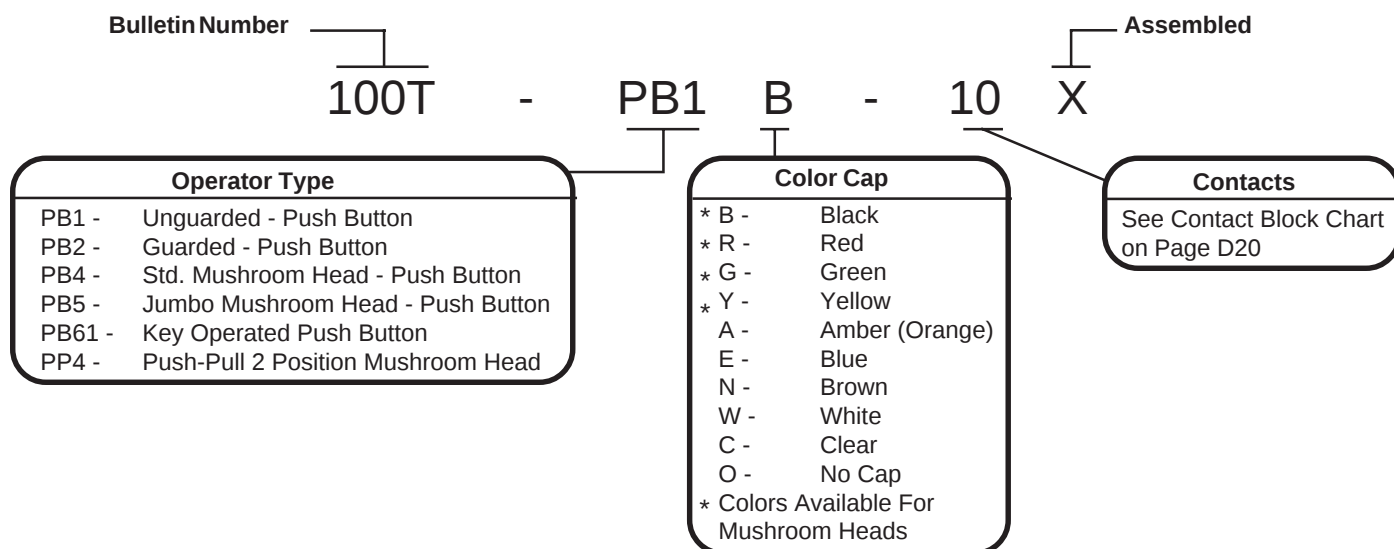


Rear of Mounting Panel

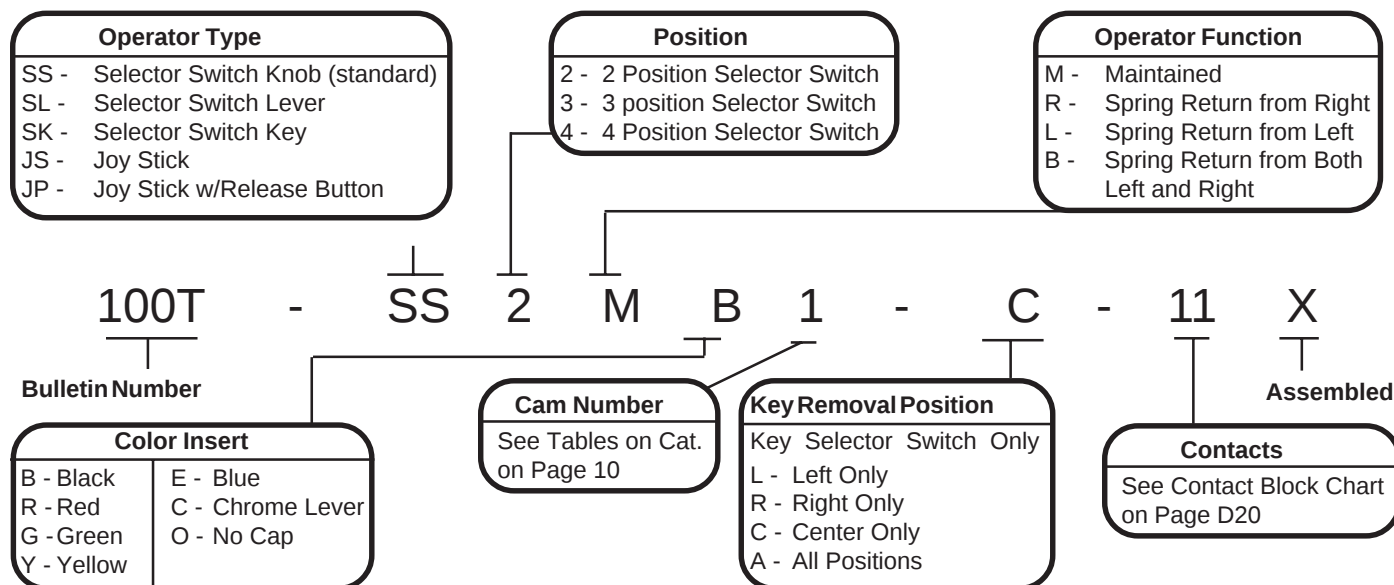


Catalog Numbering System

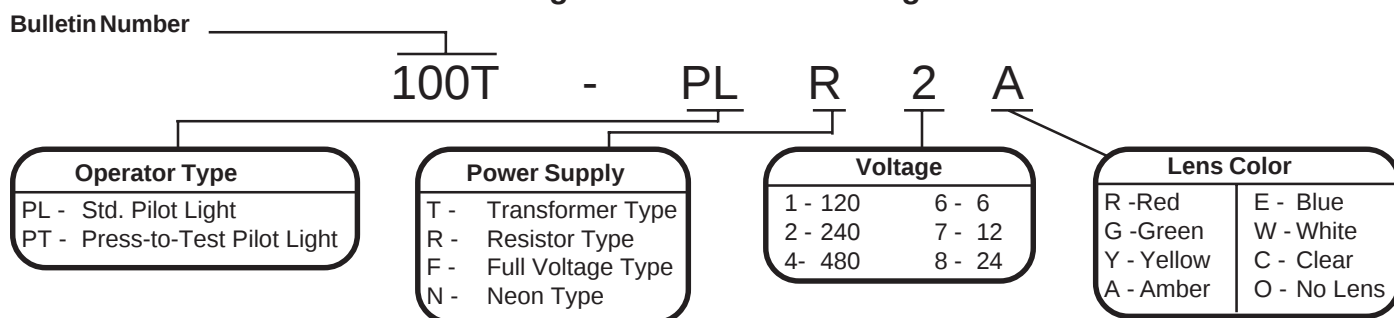
Push Button & Push-Pull



Selector Switch

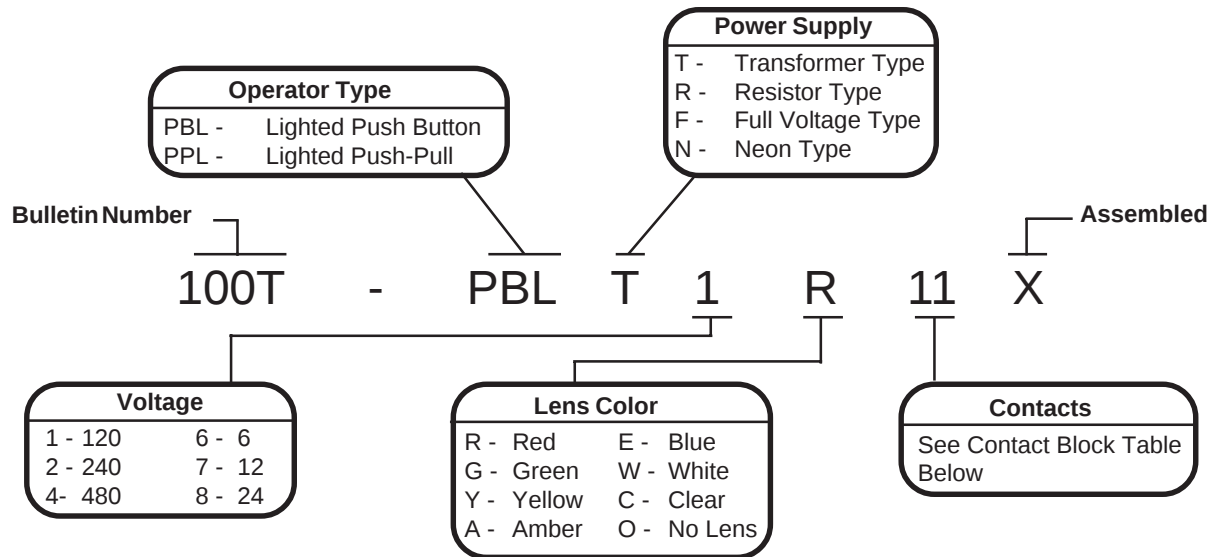


Pilot Lights & Press To Test Lights

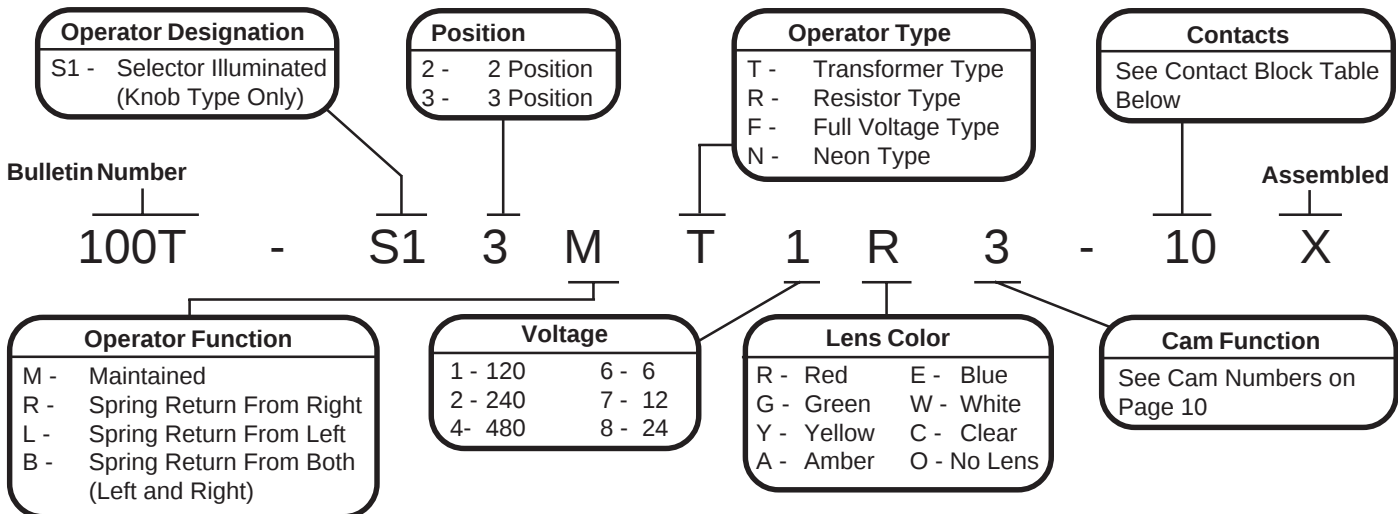


Catalog Numbering System

Illuminated Push Button & Push-Pull



Illuminated Selector Switch



Contact Table

For This Contact Arrangement	Catalog Suffix Code	To Order These As Separate Units	
		Qty.	Catalog No.
1 N.O.	-10	1	100T-CB10
1 N.C.	-01	1	100T-CB01
2 N.O.	-20	2	100T-CB10
2 N.C.	-02	2	100T-CB01
1 N.O., 1 N.C.	-11	1	100T-CB11
2 N.O., 2 N.C.	-22	2	100T-CB11

Contact Ratings

NEMA Rating	Max. Volts	Amp. Rating			Va.	
		Make	Break	Continuous	Make	Break
Maximum A-C Contact Rating Per Pole, 50 or 60 Hertz						
A600	120 240 480 600	60 30 15 12	6 3 1.5 1.2	10	7200	720
Maximum D-C Contact Rating Per Pole						
P600	125 250 301-600	1.1 0.55 0.2		5	138 138 120	

Joslyn Clark's STAK-LITE® will tell you what is happening. From far or near, the bright LITE-BAR™ status lights instantly communicate the information you need.

Joslyn Clark's STAK-LITE® is a versatile and high quality monitoring component for the VISUAL FACTORY. The units are designed to NEMA 1, 3R, 12, 4X, and 13 standards which make them ideally suited for harsh environments commonly found on the factory floor.

Joslyn Clark's STAK-LITE® status indicators come in six colors: Red, Green, Amber, Blue, Frosted White, and clear, and are available for either steady or flashing operation.



- Available in 9 MM or 15 MM Filament Bulbs
- Led Lamps available in 6 Colors
- 6 Lens Colors: Red, Blue, Green, Amber, Frosted White, and Clear
- Modular design permits easy conversion to any number of lenses from 1 to 6 high
- Steady or flashing operation
- Easy to change lamps. (Lift off entire stack of lenses and change any bulb no tools required)



- Readily available standard type MB replacement lamps. Two (2) spare bulbs are furnished in the cover on 9MM Bulb units
- NEMA Type 1, 3R, 12, 4X, and 13
- Panel mount or 3/4" NPT conduit mounting
- Panel mounting interchangeable with competitive units



Stak-Lite Technical Data

Codes, standards and approvals: All Stak-Lites are UL listed and CSA certified. As supplied, assembled Stak-Lites are rated as Type 1, 12, or 13 enclosures and may be conduit or panel mounted.

Environments: To convert to Type 3R, knock out one of the two bolt holes in the mounting base. Stak-Lites modified for Type 3R cannot be panel mounted as panel mounting would interfere with drainage.

For Type 4 and 4X applications specify the 4SL Series Stak-Lites.

Operating Temperature: -25 Deg. C to +45 Deg. C

Relative Humidity: Rated for operation in non-condensing relative humidities between 5% and 95%.

Lamps: Ba 15D, Ba9s

Audible output / frequency: 95dB sound pressure level at 1.0 foot @ 2800Hz. tone frequency 30.5 Hz.

Electrical Wiring: All wiring is copper. Wiring and insulation is rated at 300V, 105 Deg. C.

In leads out version, wire destination is determined by length. The shortest black wire coming out from the base goes to the bottom lens; the longest black wire goes to the bottom lens. Leads out Stak-Lites with the flasher option have only one white wire common to all positions.

Table 1

Number of Lenses	Height						
	0	1	2	3	4	5	6
With Leads "out"	- - - -	5"	8"	11"	14"	17"	20"
With terminal block "or" leads out with base options	5"	8"	11"	14"	17"	20"	23"

Maximum height is 23" from bottom of mounting base to top of cap.

Terminal referencing: Optional terminal boards feature two vertical sets of connectors numbered 1-6 and one horizontal set of connectors numbered 1-6 and "N". These numbers correspond with lens position, with 1 being the top lens, 2 the next lens down, and so on. The set of vertical connectors on the left is for black (hot) leads; the set on the right is for white (neutral) leads. The horizontal set is for customer connections.

Note: Strobe flashes 75 times/minute.

**Status Indicating System - Assembled**

Total Number Lamps	SL System With 18" Wire Leads		SL System With Terminals		SL System W/Audible Signal and 18" Wire Leads		SL System W/Audible Signal & Terminals	
	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price	Catalog No.	Price
1	SL1-*1	\$150.	SLT1-*1	\$230.	SLA1-*1	\$290.	SLTA1-*1	\$370.
2	SL2-*1	236.	SLT2-*1	316.	SLA2-*1	376.	SLTA2-*1	456.
3	SL3-*1	322.	SLT3-*1	402.	SLA3-*1	462.	SLTA3-*1	542.
4	SL4-*1	408.	SLT4-*1	488.	SLA4-*1	548.	SLTA4-*1	628.
5	SL5-*1	494.	SLT5-*1	574.	SLA5-*1	634.	SLTA5-*1	714.
6	SL6-*1	580.	SLT6-*1	660.	SLA6-*1	720.	SLTA6-*1	800.

NEMA 4X For NEMA 4X add 4 in front of the catalog number and multiply list price time 1.5. NEMA 4X not available with audible alarm.

Flasher Installed: Add \$100.00 total for each set of 3 lights, add letter F after color light that should flash.
Example: SL4-120-RFGFACF

Strobe Installed: Add \$300.00 per light and add letter S after light that is to be a strobe.
Example: SL5-120-CSRGBA **Note: Strobe flashes 75 times/minute.**

When ordering, specify light colors in sequence from top to bottom on the STAK-LITE®

Strobe and Flasher can be added to the same unit in any sequence.

Top Cap: Standard color is black,
Cap to match top color, add suffix "V" after designated color.
Example: SL3-120-RVAG (Add \$40.00 to list)
Chrome Cap, Add suffix "CR" to the end of the catalog number.
Example: SL3-120-RAG-CR (Add \$40.00 to list)

Special Lamp: If 15mm lamp is required, put a "B" after voltage; example:(SL1-120B-R).

Special Lamp: If Led lamp is required, put an "L" after voltage; example:(SL1-120L-R). (Consult Factory for Pricing)

Modular System And Accessories

Description	Catalog No.	Price
Flasher Assembly (3 Lts. Max. per Flasher)	KSLF- *	\$ 100.00
Strobe Light (120V, 240V only)	KSLS- * 1	300.00
Gasket for Base and Lens (Qty. 2)	KSLG	6.00
Chrome Retaining Cap	KSLC	40.00
Retaining Cap to match Lens Color	KSLC- 1	50.00
Lens Assembly	KSLL09- 1	75.00
Lens Only (Does not include post or lamp holder)	KS-1	40.00
Mounting Base	KSLB	40.00
Terminal Board Assembly	KSLT	80.00
Audible Alarm Assembly (97 DB's at 1 foot)	KSLA- *	140.00
Lamp Holder only for 9mm	KSL-09	34.00
Lamp Holder only for 15mm	KSL-15	34.00
- For mounting flange and extending tubing, see accessories page D26		
- For wire leads 36" or 48" there is a \$20.00 adder		

Ordering Information	* A.C. Voltage	¹ Color
* Select Lamp Voltage From Chart	6 VAC - 6	Red - R
¹ Select One Color For Each Lens From Chart	12 VAC -12	Amber - A
Example:	24VAC -24	Green - G
SL4-120 RAGC is 4 Lamp 120 VAC	48VAC -48	Clear - C
STAK-LITE® Assembled With	120VAC -120	Blue - B
Red, Amber, Green and Clear Lens	240VAC -240	White - W
		Black - K

STAK-LITE Mounted On Switch Panel 1



Total Number Lights	STAK-LITE Mounted On Wired Base w/ Switches		In Inches	Extended Tubing			Color - Specify In Sequence From Top To Bottom
	Cat. No.	Price		Cat. No.	Length	Price	
1	SLE1-	\$462.	+				R Red
2	SLE2-	548.		00	-	N/C	A Amber
3	SLE3-	634.		04	04"	\$52.	G Green
4	SLE4-	720.		08	08"	72.	C Clear
5	SLE5-	806.		16	16"	92.	B Blue
6	SLE6-	892.					W White

1. NEMA 1 Enclosure complete with one switch for every light and 9 ft. - 120 VAC fused line cord. All units include (3) Position Switch. Up-Steady, Center-Off, Down-Flashing.

EXAMPLE: (4) Lights - Red, Amber, Green, and Blue, with 8" Extended Tubing.
SLE4-08-RAGB \$792.00 List.

Audible Alarm: Add (A) after 3rd. digit of catalog number, and add \$140.00 List.
Example: SLEA3-04-R,A,G \$826.00 List.

Strobe : Add Letter (S) after the letter for the color that is to be a strobe and add 300.00 List.
Example: SLE4-08-RS,A,G,B \$1092.00 List.

Colored Top Cap: For top cap made from colored lens material add letter (V) after light color that matches lens color and add \$50.00 List.
Example: SLE4-08-RV,A,G,B \$842.00 List.

Accessories

Description	Cat. No.	Length	Price
Mounting Flange	KSLH		\$30.00
Extended Tubing	KSLP04	04"	24.00
	KSLP08	08"	34.00
	KSLP16	16"	44.00

STAK-LITE Replacement Lamps

AC or DC (9MM Lamp)*			
Voltage	Wattage	Catalog No.	Price
6 Volt	4.2 Watt	KRB09-6	\$13.00
12 Volt	6 Watt	KRB09-12	13.00
24 Volt	6 Watt	KRB09-24	13.00
48 Volt	6 Watt	KRB09-48	13.00
120 Volt	6 Watt	KRB09-120	13.00
Replacement Strobe Lamp			
Any Voltage Strobe Tube	4000V Tube Zennon	KRZ	84.00

*For 15MM Bulbs, see page D26

Light Frame Assembly Kits



Light Frame assembly kits are furnished without lamps or lenses, making them very easy to stock and modify. For a complete STAK-LITE ® order (1) Light Frame and separate lenses and lamps (15mm) for every height of frame.

Light Frame Assembly Kits

SK Version W/18" Wire Leads			SKT Version W/Terminal Block		
Frame Height	Catalog No.	Price	Frame Height	Frame Catalog No.	Price
1	SK1	\$ 110.	1	SKT1	\$190.
2	SK2	156.	2	SKT2	236.
3	SK3	202.	3	SKT3	282.
4	SK4	248.	4	SKT4	328.
5	SK5	294.	5	SKT5	374.
6	SK6	340.	6	SKT6	420.



With Wire Leads



With Terminal Block

Light Frame Assembly Kits With Audible Alarm

SKA Version W/120VAC Audible Alarm and 18" Leads			SKTA Version W/120 VACAudible Alarm and Term		
Frame Height	Catalog No.	Price	Frame Height	Catalog No.	Price
1	SKA1	\$250.	1	SKTA1	\$330.
2	SKA2	296.	2	SKTA2	376.
3	SKA3	342.	3	SKTA3	422.
4	SKA4	388.	4	SKTA4	468.
5	SKA5	434.	5	SKTA5	514.
6	SKA6	480.	6	SKTA6	560.

Light Frame Assembly Kits With Flasher

SK Version W/18" Leads & Flasher				SKT Version W/Terminal Block & Flasher		
Frame Height	Voltage	Catalog No.	Price	Frame Height	Catalog No.	Price
1	24 VAC	SK1-24AC-F	\$210.	1	SKT1-24AC-F	\$290.
1	120 VAC	SK1-120AC-F	210.	1	SKT1-120AC-F	290.
2	24 VAC	SK2-24AC-F	256.	2	SKT2-24AC-F	336.
2	120 VAC	SK2-120AC-F	256.	2	SKT2-120AC-F	336.
3	24 VAC	SK3-24AC-F	302.	3	SKT3-24AC-F	382.
3	120 VAC	SK3-120AC-F	302.	3	SKT3-120AC-F	382.
4	24 VAC	SK4-24AC-F	348.	4	SKT4-24AC-F	428.
4	120 VAC	SK4-120AC-F	348.	4	SKT4-120AC-F	428.
5	24 VAC	SK5-24AC-F	394.	5	SKT5-24AC-F	474.
5	120 VAC	SK5-120AC-F	394.	5	SKT5-120AC-F	474.
6	24 VAC	SK6-24AC-F	440.	6	SKT6-24AC-F	520.
6	120 VAC	SK6-120AC-F	440.	6	SKT6-120AC-F	520.

Light Frame Assembly Kits With Top Strobe



SK Version W/18" Leads & One Top Mounted Strobe				SKT Version W/Terminal Block & One Top Mounted Strobe		
Frame Height	Voltage	Catalog No.	Price	Frame Height	Catalog No.	Price
1	240 VAC	SK1-240AC-S	\$410.	1	SKT1-240AC-S	\$490.
1	120 VAC	SK1-120AC-S	410.	1	SKT1-120AC-S	490.
2	240 VAC	SK2-240AC-S	456.	2	SKT2-240AC-S	536.
2	120 VAC	SK2-120AC-S	456.	2	SKT2-120AC-S	536.
3	240 VAC	SK3-240AC-S	502.	3	SKT3-240AC-S	582.
3	120 VAC	SK3-120AC-S	502.	3	SKT3-120AC-S	582.
4	240 VAC	SK4-240AC-S	548.	4	SKT4-240AC-S	628.
4	120 VAC	SK4-120AC-S	548.	4	SKT4-120AC-S	628.
5	240 VAC	SK5-240AC-S	594.	5	SKT5-240AC-S	674.
5	120 VAC	SK5-120AC-S	594.	5	SKT5-120AC-S	674.
6	240 VAC	SK6-240AC-S	640.	6	SKT6-240AC-S	720.
6	120 VAC	SK6-120AC-S	640.	6	SKT6-120AC-S	720.



Separate Lenses

Color	Catalog No.	Price
Red	KS-R	\$40.
Amber	KS-A	40.
Green	KS-G	40.
Clear	KS-C	40.
Blue	KS-B	40.
White	KS-W	40.



• One Lens required for every height of frame.

Separate Lamps
(AC or DC) 9MM

Voltage	Catalog No.	Price
6 VAC	KRB09-6	\$13.00
12 VAC	KRB09-12	13.00
24 VAC	KRB09-24	13.00
48 VAC	KRB09-48	13.00
120 VAC	KRB09-120	13.00
240 VAC	KRB09-240	13.00



• One Lamp required for every height of frame.

Separate Lamps
(AC or DC) 15MM

Voltage	Catalog No.	Price
6 VAC	KRB15-6	\$20.00
12 VAC	KRB15-12	20.00
24 VAC	KRB15-24	20.00
48 VAC	KRB15-48	20.00
120 VAC	KRB15-120	20.00
240 VAC	KRB15-240	20.00



• One Lamp required for every height of frame.

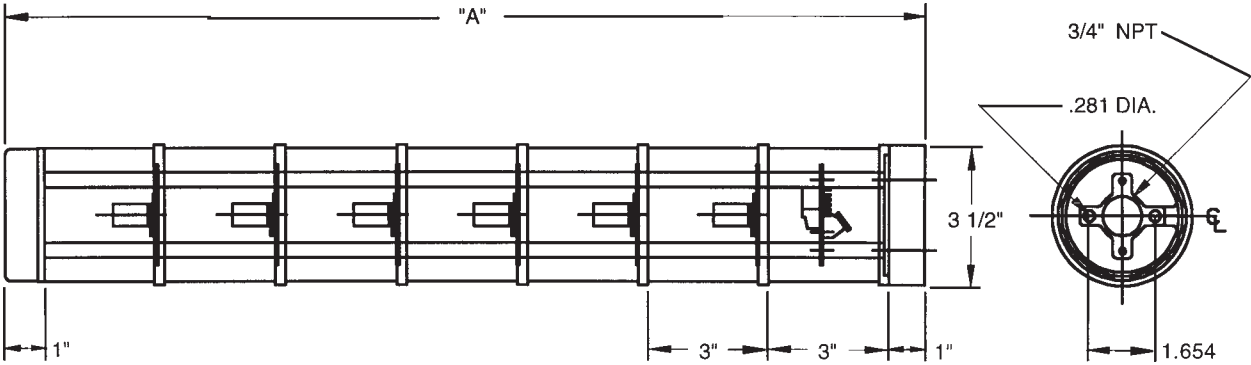
STAK-LITE Options

Description	Catalog No.	Price
3/4" Conduit Mounting Flange 1	KSLH	\$30.
Extended Tubing - 4"	KSLP04	24.
Extended Tubing - 8"	KSLP08	34.
Extended Tubing - 16"	KSLP16	44.

1 The standard unit can be panel mounted directly to any flat surface through two 5/16" DIA. holes. To elevate the unit, use standard 3/4" conduit or JCC Extended Tubing, and the KSLH mounting flange.

Separate LED Lamps

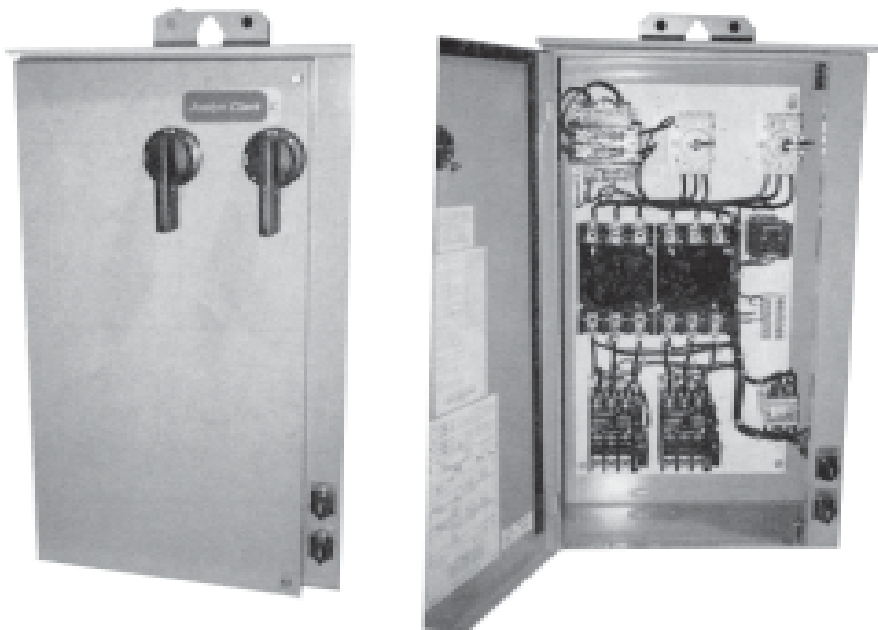
For LED Replacement Lamps, Consult Factory



Height "A" With Terminals							
Number Of Lenses	0	1	2	3	4	5	6
Dimension "A"	5"	8"	11"	14"	17"	20"	23"

Height "A" With 18" Wire Leads						
Number Of Lenses	1	2	3	4	5	6
Dimension "A"	5"	8"	11"	14"	17"	20"

Description	Page Number
Duplex and Triplex Pump Controllers	E2
Pump Modifications	E3
Numbering System	E4



E

General Application

Joslyn Clark Duplex and Triplex Controllers may be specified with a wide variety of modifications to meet the following application requirements:

- Water Booster Systems
- Condenser Water Recirculation
- Chilled Water Recirculation
- Heat Transfer
- Boiler Feed
- Cooling Tower
- Sump Pump
- Sewage Pumps
- Air Compressors
- Fish Farm Ponds

Standard Equipment

All Standard Three Phase Controllers include the following:

- Heavy guage steel enclosure, NEMA Type 2 Drip-Proof construction
- Corrosion resistant gray baked enamel offers superior resistance to the damp corrosive environment of pump rooms
- Single disconnect switch with separate power fuse blocks for each starter
- Two or Three Disconnect Switch types also available
- Two Duplex or Three Triplex NEMA Starters with overload heaters for each pump motor
- Control transformer with primary and secondary fuses
- Hand-Off-Automatic selector switch for each starter

AC Starters

Pump Controllers

As standard all 3 phase controllers include transformer and H-O-A selector switch for each starter.

Duplex Controller with Single Disconnect Switch & Two sets of Fuse Blocks

NEMA Starters				
NEMA Cont. Size	Maximum Horsepower Rating 200V 230V	Fuse Clips Amp Rating	NEMA Type 2 Enclosure Catalog No.	Price
0	3 3	30	DSNE00BE3203- *	\$2420.
1	5 7½	30	DSNE10BE3203- *	2520.
1	7½ 7½	60	DSNE10BE3203- *	2700.
2	10 15	60	DSNE20BE3203- *	2880.
3	25 30	100	DSNE30BE3203- *	6560.
460-575V				
0	5	30	DSNE00BE3603- *	\$2480.
1	10	30	DSNE10BE3603- *	2580.
2	15	30	DSNE20BE3603- *	2760.
2	25	60	DSNE20BE3606- *	2920.
3	50	100	DSNE30BE3601- *	6560.

Duplex Controller with Two Disconnect Switches & Two sets of Fuse Blocks

NEMA Starters				
NEMA Cont. Size	Maximum Horsepower Rating 200V 230V	Fuse Clips Amp Rating	NEMA Type 2 Enclosure Catalog No.	Price
0	3 3	30	DDNE00BE3203- *	\$2760.
1	5 7½	30	DDNE10BE3203- *	2820.
1	7½ 7½	60	DDNE10BE3206- *	3200.
2	10 15	60	DDNE20BE3206- *	3360.
3	25 30	100	DDNE30BE3201- *	7720.
4	40 50	200	DDNE40BE3202- *	10300.
460-575V				
0	5	30	DDNE00BE3603- *	\$2820.
1	10	30	DDNE10BE3603- *	2880.
2	15	30	DDNE20BE3603- *	3260.
2	25	60	DDNE20BE3606- *	2920.
3	50	100	DDNE30BE3601- *	7720.
4	100	200	DDNE40BE3602- *	10300.

Triplex Controller with Single Disconnect Switch & Three sets of Fuse Blocks

NEMA Starters				
NEMA Cont. Size	Maximum Horsepower Rating 200V 230V	Fuse Clips Amp Rating	NEMA Type 2 Enclosure Catalog No.	Price
0	3 3	30	TSNE00BE3203- *	\$3020.
1	5 7½	30	TSNE10BE3203- *	3780.
1	7½ 7½	60	TSNE10BE3206- *	3900.
2	10 15	60	TSNE20BE3206- *	4080.
460-575V				
0	5	30	TSNE00BE3603- *	\$3100.
1	10	30	TSNE10BE3603- *	3860.
2	15	30	TSNE20BE3603- *	3980.
2	25	60	TSNE20BE3606- *	4140.

Triplex Controller with Three Disconnect Switches & Three sets of Fuse Blocks

NEMA Starters				
NEMA Cont. Size	Maximum Horsepower Rating 200V 230V	Fuse Clips Amp Rating	NEMA Type 2 Enclosure Catalog No.	Price
0	3 3	30	TTNE00BE3203- *	\$3620.
1	5 7½	30	TTNE10BE3203- *	4380.
1	7½ 7½	60	TTNE10BE3206- *	4700.
2	10 15	60	TTNE20BE3206- *	4880.
460-575V				
0	5	30	TTNE00BE3603- *	\$3700.
1	10	30	TTNE10BE3603- *	4460.
2	15	30	TTNE20BE3603- *	4780.
2	25	60	TTNE20BE3606- *	4940.

Note: For circuit breaker in place of switch, add \$84.00 list per switch.

For circuit breaker in place of power fuse block, add \$160.00 list per block.

Ordering Information

- Select Catalog Number and Price for largest Motor HP size. If different HP sizes are required Specify with modification "S" from page E3.
Pump Controllers include heaters for NEMA Starters
- When ordering specify each motor full load amps, HP and Voltage for correct selection of motor overload protection.
Use complete catalog number. Replace the (*) with the suffix from coil table.

Coil Table

Voltage/Hertz	Suffix
220-240/60 or 220/50	- T26
440-480/60 or 440/50	- T46
550-600/60 or 550/50	- T56
200-208/60	- T86

Enclosure	Duplex Price	Triplex Price	Change Letter To:	Typical Catalog Number	
Type 2 Enclosure - Standard	\$N/C	\$N/C	A		
Type 3R Enclosure	300.	400.	R		
Type 3R Double Door Enclosure	CF	CF	D		
Type 12 Enclosure	300.	400.	T		
Type 4 Stainless Steel	CF	CF	W		
Type 4 Painted Steel	CF	CF	P		
Type 4 Painted Steel With Double Door	CF	CF	S		
Cover Controls For Each Starter					DS NE 20 A E 3 6 0 -T 46 ---
Internal O/L Reset Only	\$N/C	\$N/C	O		
H-O-A With Internal O/L Reset - Standard	N/C	N/C	E		
H-O-A With External O/L Reset	120.	180.	B		
Start-Stop PB'S Internal O/L Reset	200.	300.	F		
Start-Stop PB'S W/External O/L Reset	320.	480.	C		
Modifications					
Duplex Alternating Relay	\$400.	----	A		
Triplex Alternating Relay Pumps 1 & 2 Only	-----	\$400.	A1		
Triplex Alternating Relay Pumps 2 & 3 Only	-----	400.	A2		
24 Hour Alternation	400.	960.	A3		
Manual Alternation Selector Switch	160.	560.	A4		
Min. Run Timer All Pumps	560.	840.	B		
Min. Run Timer Pump 1	280.	280.	B1		
Min. Run Timer Pump 2	280.	280.	B2		
Min. Run Timer Pump 3	-----	280.	B3		
Time Delay Start All Pumps	560.	840.	C		
Time Delay Start In Auto Pump 1	280.	280.	C1		
Time Delay Start In Auto Pump 2	280.	280.	C2		
Time Delay Start In Auto Pump 3	-----	280.	C3		
Off Delay Timer All Pumps	560.	840.	D		
Off Delay Timer Pump 1	280.	280.	D1		
Off Delay Timer Pump 2	280.	280.	D2		
Off Delay Timer Pump 3	-----	280.	D3		
Elapsed Time Meter For Each Pump Running	400.	600.	E		
Mounting Feet 12"	200.	200.	F1		
Audible & Visible Alarm With Silencing Circuit	600.	600.	H1		
- Signal Source Separate					
Timer For Delayed Alarm Activation	280.	280.	J		
- Specify Alarm To Be Delayed					
Surge Arrester	400.	400.	K		
Light - Power On	140.	140.	L1		
Light - Pump Run For Each Pump	280.	420.	L2		
Light High Water Level	140.	140.	L3		
Light Low Water Level	140.	140.	L4		
Light - Specify Function	140.	140.	L5		
N.O. Pump Run Contacts	200.	300.	M		
Power Fuses	CF	CF	P1		
4 Pole Relay - Specify Function	400.	400.	R1		
Alternate Starter Sizes					
Alternate Starter Size For Pump 1	N/C	N/C	S1 *		
Alternate Starter Size For Pump 2	N/C	N/C	S2 *		
Alternate Starter Size For Pump 3	N/C	N/C	S3 *		
Pressure Switches Mounted On Outside Of Enclosure					
5-150 PSI, Bourdon Type	500.	500.	T1		
10-200 PSI, Bourdon Type	500.	500.	T2		
10-300 PSI, Bourdon Type	500.	500.	T3		
18-116 PSI Diaphragm Type	400.	400.	T4		
15-232 PSI Diaphragm Type	400.	400.	T5		
2-60 PSI, For Low Suction Alarm	500.	500.	T6		

E

0
4
3

CF = Consult Factory * Specify Contactor size for a Duplex Pump (ie: S220=pump 1 NEMA size 1)

Duplex & Triplex Pump Control Catalog Numbering

DS = Duplex Single Switch 2 Fuse Blocks
DD = Duplex Double Switch 2 Fuse Blocks
DO = Duplex No Switch or Fuse Block (Non-Combination)
TS = Triplex Single Switch 3 Fuse Blocks
TD = Triplex Double Switch 3 Fuse Blocks
TT = Triplex Three Switch 3 Fuse Blocks
SS = Simplex Switch & Fuse Block

NE = NEMA Starters - HP Sizes 0-2
TM Size 3 & 4

B = Type 2 Enclosure
R = Type 3R Enclosure
D = Type 3R Double Door Enc.
T = Type 12 enclosure
W = Type 4 Stainless Steel
P = Type 4 Painted Steel
S = Type 4 Painted Steel With Double Door

A = Alternating Relay
A1 = Triplex Alternating Relay Pumps 1 & 2 Only
A2 = Triplex Alternating Relay Pumps 2 & 3 Only
A3 = 24 Hour Alternating Relay
A4 = Manual Alternation Selector Switch
B = Min. Run Timer All Pumps
B1 = Min. Run Timer Pump 1
B2 = Min. Run Timer Pump 2
B3 = Min. Run Timer Pump 3
C = Time Delay Start In Auto All Pumps
C1 = Time Delay Start In Auto Pump 1
C2 = Time Delay Start In Auto Pump 2
C3 = Time Delay Start In Auto Pump 3
D = Off Delay Timer All Pumps
D1 = Off Delay Timer Pump 1
D2 = Off Delay Timer Pump 2
D3 = Off Delay Timer Pump 3
E = Elapsed Time Meter for each Pump Running
F1 = Mounting Feet 12"
H1 = Audible & Visible Alarm With Silencing Circuit - Signal Source Separate

J = Timer For Delayed Alarm Activation - Specify Alarm To Be Delayed
K = Surge Arrestor
L1 = Light - Power On
L2 = Light - Pump Run For Each Pump
L3 = Light High Water Level
L4 = Light Low Water Level
L5 = Light - Specify Function
M = N.O. Pump Run Contacts
P1 = Power Fuses
R1 = 4 Pole Relay - Specify Function
S1* = Alternate Starter Size For Pump 1
S2* = Alternate Starter Size For Pump 2
S3* = Alternate Starter Size For Pump 3

Pressure Switches Mounted On Outside Of Enclosure

T1 = 5-150 PSI, Bourdon Type
T2 = 10-200 PSI, Bourdon Type
T3 = 10-300 PSI, Bourdon Type
T4 = 18-116 PSI Diaphragm Type
T5 = 15-232 PSI Diaphragm Type
T6 = 2-60 PSI, For Low Suction Alarm

* Specify Contactor Size after modification
ie: S110=Pump 1 NEMA Size 1, S212 Pump 2 CL01

DS NE 20 R E 3 6 03 -T46 A D - 20/460

Contactors Sizes *

05 = HP05 Starter
10 = HP10 Starter
25 = HP25 Starter
30 = TM3 Starter
40 = TM4 Starter

3 = 3 Phase
2 = Single Phase

1 = 120 Volt Rating
2 = 250 Volt Rating
6 = 600 Volt Rating

Transformer and Voltage Code Suffix refer to Page C9.

Horse Power / Voltage

Cover Controls

O = Internal O/L Reset Only
E = H-O-A Internal O/L Reset
B = H-O-A with External O/L Reset
F = Start-Stop PB'S Internal O/L Reset
C = Start-Stop PB'S W/External O/L Reset

Fuse Clip Size

Fuse Clip	Class R Fuse Clip
03 - 30 ampere	93 - 30 ampere
06 - 60 ampere	96 - 60 ampere
Class J Fuse Clip	No number or
13 - 30 ampere	00 - no clips
16 - 60 ampere	

Ordering Information

- As standard all 3 phase controllers include transformer and H-O-A selector switch for each starter.
- Select Catalog Number and Price for largest Motor HP size. If different HP sizes are required specify with modification "S" to change starter size.
- Pump Controllers include heaters for NEMA Starters
When ordering specify each motor full load amps, HP and Voltage for correct selection of motor overload protection.
Complete Cat. No. by including HP & Voltage at the end.

Description	Page Number
General Information	F2
Electric Motor Controller	F3
Diesel Engine Controller	F4
Alarm Panel	F5
Medium Voltage	F6



F

3
0
5

Visit our Website www.joslynclark.com for detailed information

Fire Pump Controller For Electric Driven Fire Pumps

Standard Equipment & Performance

- Single handle operator for easy operation of isolating switch & circuit breaker
- Door interlocked with switch to prevent unintended exposure to electrical hazard
- Automatic start with Pressure Control, Display & Logging
- Complies with latest edition of NFPA 20



System Pressure Display

- Ten inch pressure Chart Recording accessible through outer door
- Programmable Pressure Units (psi, kPa, bars)
- Pressure Adjustable in Increments of 1psi
- Failsafe Design (motor runs on loss of control power)
- Built-in Running Period Timer and LED
- Standard Sequential Start Timer and LED
- Deluge valve start from normally closed contact (open to start)
- Remote start from normally open contact (close to start)
- Emergency start, by simply lifting the mechanical start handle



Operator interface:

- 2 line liquid crystal display of all 3 phase to phase RMS voltage and current measurements simultaneously
- Real time clock
- RS485 communications
- LED "Power Available": (Green) Illuminates when all three phase voltage are greater than 83% of nominal. Extinguishes if one or more phases are below 83% of nominal. LED will flash for 5 seconds if a brownout condition is detected
- LED "Phases Reversed": (Red) Illuminates if phases are reversed.
- LED "Locked Rotor Impending Trip": (Red) Flashes on impending breaker trip
- Test function for motor locked rotor protection. Software test through keypad combination, will cause Motor Locked Rotor LED to flash. After appropriate time delay, shunt trip relay of the Motor Protector will energize.
- Test function for Phases Reversed. Software test through keypad combination to test the phase detection circuit for five seconds.
- Data logging at time of motor start (auto or manual), Motor Stop, Power On and Power Off
- Tamper proof Membrane keypad for setting clock and recalling data logging

Microprocessor Motor Protector:

- Locked Rotor over-current protection: - Non-adjustable trip set to NFPA 20 7-4.4 requirements
- Detects phase loss by voltage level (one or more phases below 17% of nominal for more than 30 cycles, phase angle and voltage imbalance greater than 6% for more than three seconds)
- "Brown-out" detection: one or more phases below 83% of nominal to signal front panel. Typical scan time: 1 per $\frac{1}{4}$ to $\frac{1}{2}$ second
- Phase reversal detection
- Provides Static Single Phase Protection: Permits motor to run under dynamic single phase condition
- Accuracy: Voltage 1%, Current 3% at normal motor running conditions



Visit our Website www.joslynclark.com for detailed information

Motor Starting Types

Across-The-Line Type D10630

The most economical and most commonly used type of fire pump controller. Full voltage is applied to the motor for starting, by use of a single motor contactor. Starting inrush is approximately 600% of rated motor full-load amperes.

Autotransformer Type D10640

The motor circuit voltage is reduced by autotransformer action during the motor starting period. A line contactor bypasses the autotransformer after a time delay.

Starting line current is 42% of across-the-line starting inrush approximately 250% rated motor full-load amperes with the autotransformer on the 65% tap as shipped from the factory. A 50% and 80% tap can be used.

Primary Resistor Type D10650

A resistor, inserted in the motor line, results in soft starting and smooth acceleration. A line contactor bypasses the resistor after a time delay. Starting line current is 65-74% of across-the-line starting inrush approximately 390-444% of rated motor full-load amperes.

Part Winding Type D10670

2-winding type motor required - the first winding is connected to the line to start; the second connected in parallel by a second contactor, after a time delay. Starting line current is 65% of across-the-line starting inrush - approximately 390% of rated motor full-load amperes.

Wye-Delta Type D10680 and D10690

Under a normal automatic start mode, the start contactors close connecting the motor to the line in a wye connection. After approximately 3 second time delay the start contactors open and the run contactor closes reconnecting the motor in a Delta connection.

Starting line current is 33.3% of across-the-line starting inrush - approximately 200% rated motor full-load amperes.

Closed transition type D10680 provides no power interruption to the motor during transition from Wye to Delta connection. This provides smooth acceleration.

Open transition type D10690 provides on brief interruption of power to the motor during transition from start to run.

Solid State Reduced Voltage Type D10620

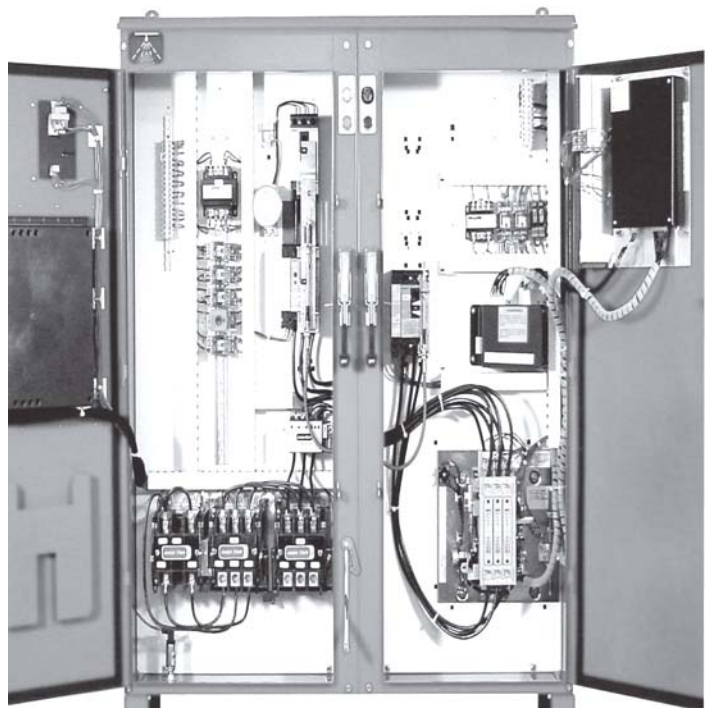
Solid State reduced voltage fire pump controllers provide smooth, stepless transition from initial voltage to full run voltage. This results in soft starting with smooth acceleration and deceleration. Starting line current may be adjusted down to 200% of rated full-load amperes.

Automatic Transfer Switch Modification

Fire Pump Controllers with Automatic Transfer Switches provide for power connections to the fire pump motor from the primary power source or an alternate power source. If the primary power fails, the transfer switch automatically switches to the emergency source. Automatic retransfer to primary power source occurs after restoration of normal power.

The alternate source may be an emergency generator or second utility supply. Circuit requirements differ for each type, therefore the alternate source must be specified.

The Automatic Transfer Switch is housed in a barriered compartment of the Fire Pump Controller. This complete assembly, consisting of Fire Pump Controller and Automatic Transfer Switch is factory assembled, wired, tested and shipped as a single unit.



Visit our Website www.joslynclark.com for detailed information

General

Joslyn Clark Diesel Fire Pump Controllers are designed and listed specifically for diesel engine driven fire pump service. These controllers meet or exceed all requirements of the National Fire Protection Association Standard NFPA 20, are listed by Underwriters Laboratories Inc., and approved by the Factory Mutual System.

The diesel controller provides four (4) major functions:

- Starts the diesel engine automatically from water pressure control or nonautomatically from manual electric control.
- Monitors engine as well as system conditions.
- Maintains charge on engine starting batteries.
- Initiates a weekly test of the system.

Standard Equipment

- Type 2 Drip-Proof, Moisture Resistant, lockable enclosure with break glass panel, is suitable for wall or floor mounting. Painted with a UL Recognized Corrosion Resistant red baked enamel offers superior resistance to the damp corrosive environment of pump rooms.
- Voltage surge arrester for incoming 120 Volt AC supply is connected to a line disconnect switch. Provides an added degree of component protection against lightning strikes for greater reliability.
- Visual indicators and audible alarms are provided to indicate the following:

Automatic ON	Charger Loss
Low Oil Pressure	#1 Battery Overcharge
Engine Over Temp	#1 Battery Failure
Safety Shut Down	#2 Battery Overcharge
Fail To Start	#2 Battery Failure
Engine Overspeed	
- 2 SETS OF SPDT contacts for remote alarm of : Engine Running, Engine Failure and Controller Switch Off.
- Battery chargers are solid state, 12 amps current limiting for 225 ampere hour batteries.
- Pressure recorder 7 day spring wound type is located with the pressure switch below and away from electric components.
- Programable Weekly Timer to automatically start and run the engine for 30 minutes once a week.
- Solid State crank cycle controller is a plug-in tamper resistant module.
- Internal plumbing and solenoid valve is rated for 500 PSI service.

CE



- Safety shut down circuit will shut down engine on "Low Oil Pressure" and "Engine Over Temperature" if engine is running due to "Weekly Test" or "AC Power failure". An alarm will signal this condition.
- Two "Manual Start" pushbuttons are provided to crank from either battery or both at the same time for hard start conditions.
- LED's (light emitting diodes) provide easy diagnostics of engine and controller interaction as well as charger and battery conditions.

Visit our Website www.joslynclark.com for detailed information

Alarm Panel

General

Joslyn Clark alarm panels provide visual signals and audible alarms to monitor the status and operation of the pump controller. A separate, "reliable" source of 115V supervisory power must be provided to the alarm panel. Each abnormal condition lights the appropriate light and sounds the audible alarm. The audible alarm can be push button silenced, but the light remains lit until the abnormality is cleared. Signals are independent of each other and the panel operation will repeat for each new abnormal condition, regardless of the previous status.

Standard Equipment & Performance

- Type 1 wall mounting enclosure
- Key lockable enclosure
- Alarm test button
- Individual audible alarm silence button
- Basic Type 10665-1 alarm panel includes both visual and audible alarms for:
 - Supervisory power failure
 - Pump Running
 - Phase Reversal
 - Phase Loss and-or Controller power loss

Field Connection Diagram A10-357165

Schematic Diagram A10-357160

Listed Modifications

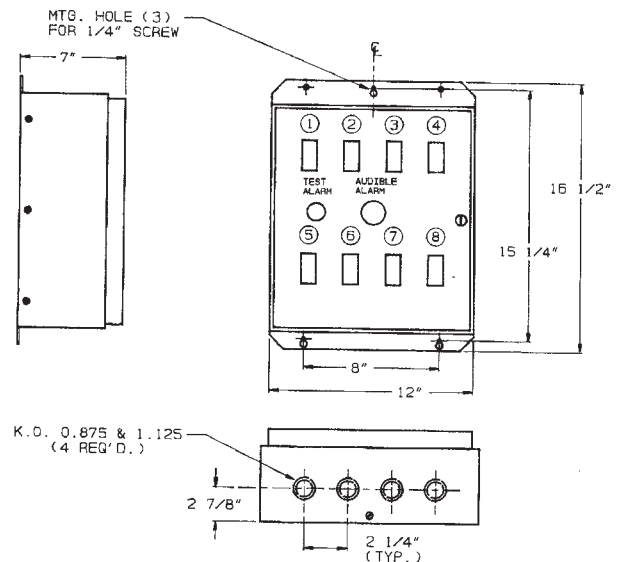
- Fire Pump Start - This is commonly called "Remote Start" for starting the main fire pump controller.
- Up to three additional alarm lights and silence buttons may be ordered. Specify name plate markings. Signal contacts must close for alarm.

1 Thru 8 is a combination Pushbutton & Light.

- Supervisory Power Failure
- Pump Running
- Phase Reversal
- Phase Loss and/or Control Power Loss
- Option 1 "Fire Pump Start" Button (Remote Start)
- Option 4
- Option 5
- Option 2



Cabinet Outline



Visit our Website www.joslynclark.com for detailed information

Ordering Information

- See Price Sheet PS-10600-1

Medium Voltage Type

General

Medium voltage fire pump controllers are primarily used to start large horsepower motors. These starters are designed for automatic starting of squirrel cage motors when starting current must be reduced.

Motors starting current at 2300 volts or 4160 volts is considerably below that at 460 volts. This eliminates many problems that exists when starting large horsepower motors at lower voltages.

Approvals and Standards

Joslyn Clark Controllers are UL listed and FM approved for applications up to 7200 volts. They are built to meet or exceed the following standards:

NEMA ICS2-329 class E2
UL 347 High Voltage Industrial Control Equipment
NFPA 20 The Installation of Electric Fire Pumps
NFPA 70 National Electrical Code



Construction Details

Enclosures - Free standing, single high, non withdrawable starter mounted in a NEMA 2 enclosure. NEMA 3R and 12 enclosures are also available. NEMA 4 design includes an outer shell. The enclosure is painted, all other parts are plated with corrosion resistant materials. Type 4X outer enclosure is constructed with #304 stainless steel.

Grounding - The control enclosure can be grounded through the conduit connections and by ground wire to grounding pad.

Isolating Means - The isolating means is Fault Making, Load Breaking, visible break disconnect switch externally operable. The 3 blades are grounded in the open position. It has an auxiliary contact that disconnects the control supply when opened. It has a mechanical interlock so that the switch had to be open before the high voltage door can be opened, and the door has to be closed before the isolating switch can be closed. The contactor is interlocked so that the isolating switch can not be opened with contactor closed.

Power Fuse - Three medium voltage power fuses R-rated are provided for short circuit protection.

Fuses - For Control Transformers - Three medium voltage control transformers primary E-rated fuses are provided for short circuit protection of control transformers.

Motor Starting - Manual electric starting may be obtained when control circuit power is available by push button or by an externally operable handle through a lever which actuates interlock contacts. Manual electric starting causes the starting contactor coils to be energized.

If control circuit power is not available, manual mechanical starting may be obtained by the externally operable handle through a lever which mechanically closes the motor run contact.



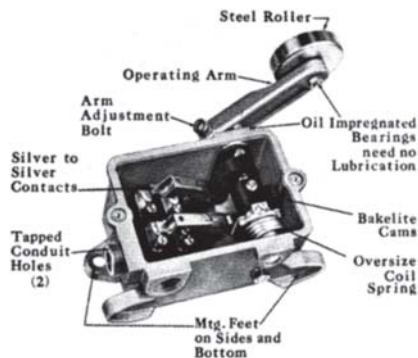
Visit our Website www.joslynclark.com for detailed information

Description	Page Number
Limit Switches - Type	102HL G2
	102TL G4
	102RS G6
	102CHL G7
	102BST G8
Master Switch - Type	101FS G9
	101SD G13
Palm Buttons - Type	100 RN G15



G

Right Hand Shown



Lever Travel is 50°
Each Direction



Application

Type 102HL and HLD Hatchway Limit Switches are designed as pilot circuit devices for all heavy duty applications to limit travel or set up function at predetermined positions. OnType HL single acting switches, the lever operates in one direction only; while on Type HLD double acting switches, it operates in two directions with a variety of contact sequences.

Features:

- Double Break removable Silver-to-Silver Contacts.
- Each contact may be independently changed from normally open to normally closed and vice versa without disassembly.
- Operating Arm on most models may be field changed to the other side by reversing the shaft.
- Oil impregnated bearings at contact finger pivot points.
- Oil impregnated shaft bearings need no lubrications.

Type HL Single Acting Hatchway - Limit Switch

Right Hand ²								
Type	Contacts	Poles	Standard Enclosures Catalog No.	Price ¹	Dust-tight Enclosure Catalog No.	Price ¹	Watertight Enclosure Catalog No.	Price ¹
HLA-1	NO or NC	1	A102-41252A-1	\$ 402.	A102-231414A-1	\$ 474.	A102-54634A-1	\$ 582.
HLA-2	2 NO or 2 NC	2	A102-41251A-1	438.	A102-231413A-1	510.	A102-54635A-1	618.
HLA-3	1 NO & 1 NC	2	A102-41251A-3	582.	A102-231413A-3	654.	A102-54635A-3	768.
HLA-30	1 NO & 1 NC overlapping ⁴	2	A102-54268A-1	582.	A102-273562A-1	654.	A102-68866A-1	768.
Left Hand ²								
HLLA-1	NO or NC	1	A102-41252A-3	402.	A102-231414A-3	474.	A102-54634A-3	582.
HLLA-2	2 NO or 2 NC	2	A102-41251A-4	438.	A102-231413A-4	510.	A102-54635A-4	618.
HLLA-3	1 NO & 1 NC	2	A102-41251A-6	582.	A102-231413A-6	654.	A102-54635A-6	768.
HLLA-30	1 NO & 1 NC overlapping ⁴	2	A102-54268A-2	582.	A102-273562A-2	654.	A102-68866A-2	768.

Any 1 or 2 pole switch may be converted from right to left hand and vice versa using a screwdriver.

Note:

1. Price includes operating lever and standard steel roller.
2. Type HLA-1, 2 & 44, HLLA-1 & 2 contacts are normally closed when shipped from the factory. To change to normally open, loosen cam and rotate 180°.
3. Any 1 or 2 pole switch may be converted from right to left hand and vice versa using a screwdriver.
4. Overlapping contacts are not convertible.

Limit Switch Electrical Ratings

25 Amp - 600V AC Maximum Heavy Pilot Duty 600V AC A600, 250V DC Maximum N300.			
Volts	Current - Amperes		
	Carry	Break	Inrush/ Make
110-120V AC	25	6.0	6.0
220-240V AC	25	3.0	3.0
440-480V AC	25	1.5	1.5
550-600V AC	25	1.2	1.2
115-125V DC	10	2.2	2.2
230-250V DC	10	1.1	1.1

Ordering Information

- Use complete catalog number when ordering. If modification is required, state in full detail on the order.

Modifications:

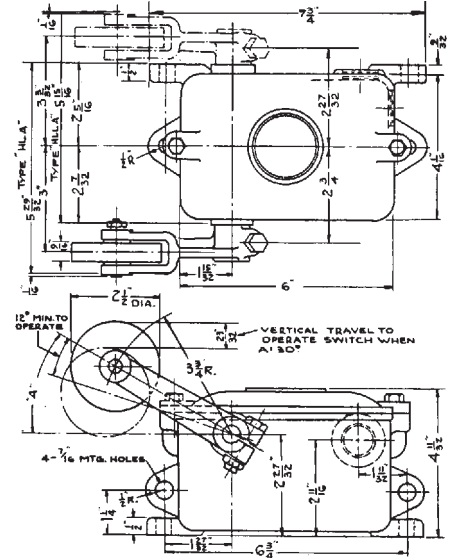
- Omit standard lever and roller, Deduct \$ 24.
- Phenolic composition roller, 2 1/2" dia., on standard lever in place of standard steel roller, A102-426105A . . . Add \$ 30.
- Five-inch lever with standard steel roller, in place of standard lever and roller, A102-248096A . . . Add \$ 162.
- Seven-inch dia., composition roller on 5" lever, in place of standard lever and roller, A102-75993A . . . Add \$ 294.

Type HLD - Double Acting Hatchway - Limit Switch

Poles ²	Contacts Sequence ³		Standard Enclosure		Dust-tight Enclosure		Ship. Weight
	CCW	CW	Catalog No.	Price ¹	Catalog No.	Price ¹	
1			HLD-1	\$ 660.	HLD-5	\$ 726.	11 lbs.
2			HLD-2	738.	HLD-6	804.	
2			HLD-3	738.	HLD-7	804.	
2	as specified		HLD-4	780.	HLD-8	846.	
Poles	Contacts Sequence CCW CW		Watertight Enclosure Catalog No.		Price		Ship. Weight
1			HLD-9		\$ 858.		12 lbs.
2			HLD-10		936.		
2			HLD-11		936.		
2	as specified		HLD-12		978.		

HLA-1, 2, 3 & 30, HLLA-1, 2, 3 & 30, Standard and Dust-tight Enclosures

12° min. to operate std. 1 & 2 pole switches.
Switches with overlapping contacts require 22° min.

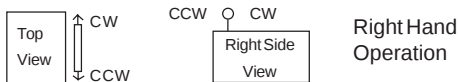


Cams are \$38.00 each and included under JC80

Contact Sequence

Cam No.	As Supplied		Converted To:	
	CCW	CW	CCW	CW
A102-277623				
A102-277624				
A102-277625				

Contact Closed Contact Open

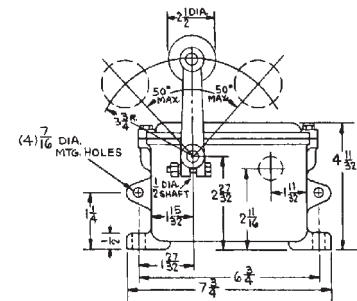
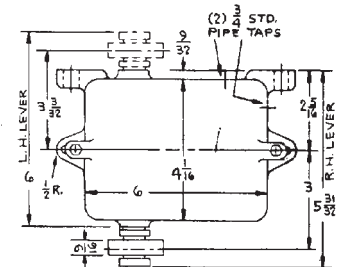


Limit Switch Electrical Ratings

25 Amp - 600V AC Maximum Heavy Pilot Duty 600V AC A600, 250V DC Maximum N300.			
Current - Amperes			
Volts	Carry	Break	Inrush/ Make
110-120V AC	25	6.0	6.0
220-240V AC	25	3.0	3.0
440-480V AC	25	1.5	1.5
550-600V AC	25	1.2	1.2
115-125V DC	10	2.2	2.2
230-250V DC	10	1.1	1.1

HLD-1, 2, 3 & 4 in Standard Enclosure HLD-5, 6, 7 & 8 in Dust-tight Enclosure

Spare Parts		JC 80
Movable Contact	A101-028965	\$26.00
Torsen Spring	A101-062988	\$25.00
1 Pole Base	A102-041256A	\$90.00
2 Pole Base	A102-041255A	\$156.00
Std. Arm & Roller	A102-302350A	\$122.00
5" Lever with Steel Roller	JC32	
	A102-248096A	\$270.00
5" Lever with 7" Dia. Composition Roller	A102-075993A	402.00



Notes:

- Price includes operating lever and standard steel roller.
- All contacts are NC when shipped from the factory. To change to NO, loosen cam and rotate 180°.
- Any 1 or 2 pole switches may be converted from right to left hand and vice versa, using a screwdriver.

Ordering Information

- Use complete catalog number when ordering.
- Modifications on page G2. If modifications are required, state in full detail on the order.



Application

Type 102TL Track Type Limit Switches are designed as pilot circuit devices for all heavy duty applications to limit travel or set up functions at predetermined positions.

Operation

The contacts of these switches make and break very quickly due to the snap action of the toggle type operating mechanism. The operating arm is secured to a hollow outer shaft that fits over the camshaft. When the arm is tripped, it turns the outer shaft which actuates the toggle mechanism. The toggle mechanism does not change position until the operating lever is past the midpoint of its travel; then it snaps over and turns the camshaft quickly. Since the cams are fastened rigidly to the camshaft, they in turn impart snap action opening and closing to the contacts. Force to operate switch is approximately 25 inch-pounds.

Angular Travel

Total angular travel of the arm from one tripped position to the other is 90°. However, the contacts are actuated when the arm moves 60°, the balance of the travel is to clear the arm so that the linear operator may pass over.

Features:

Double Break removable Silver-to-Silver Contacts.

- Each contact may be independently changed from normally open to normally closed and vice versa without disassembly.
- Operating Arm adjustable on shaft.
- Oil impregnated bearings at contact finger pivot points.
- Cast weatherproof enclosure standard. Dust-tight and watertight

Available Levers:



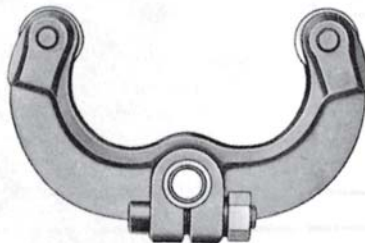
Part # A102-054262
TLSF Straight
Fork Lever



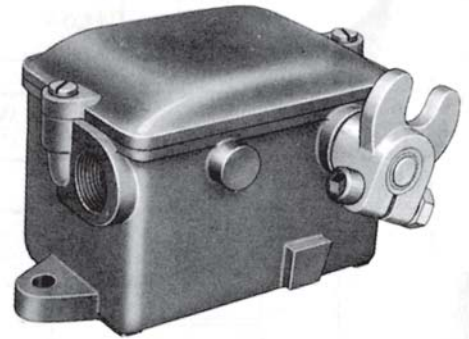
Part # A102-054261
TLS Rod or
Chain Type Lever



A102-460805A-1 \$214
TLRS Straight Roller Lever



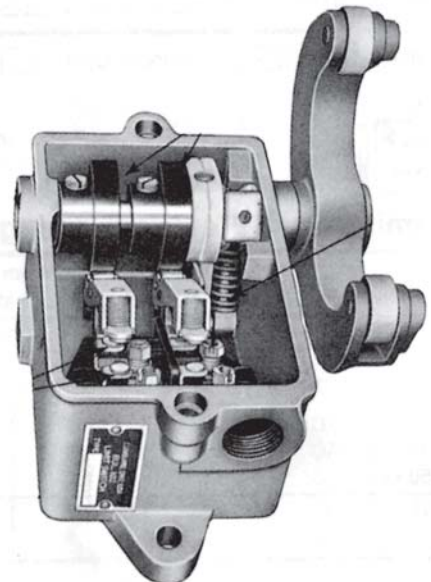
Part # 102-54260A \$366
TLF Roller Fork
Lever



TLFSF-11 or 22 with Straight Fork Lever

- enclosures are also available for all types.
- Contact wearing parts completely interchangeable with same parts in Type 101SD Master Switch, 101FS Foot Switch, and 102HL & CHL Limit Switch.

Left Hand Shown:



TLF-22, 2 Contacts, Cover Removed

Type TL Snap Action - Limit Switch

Type	Operating Lever	Contacts ²	Standard Enclosure Catalog No.	Price ¹	Dust-tight Enclosure Catalog No.	Price ¹	Watertight Enclosure Catalog No.	Price ¹
TLS-11	Rod or Chain	1	A102-80579A-1	\$ 846.	A102-80579A-2	\$ 918.	A102-80580A	\$ 1746.
TLS-22	Rod or Chain	2	A102-80581A-1		A102-80581A-2		A102-80582A	
TLSR-11	Straight or Roller	1	A102-80591A-1		A102-80591A-2		A102-80592A	
TLSR-22	Straight or Roller	2	A102-80593A-1		A102-80593A-2		A102-80594A	
TLF-11	Roller Fork	1	A102-80575A-1	900.	A102-80575A-2	972.	A102-80576A	1824.
TLF-22	Roller Fork	2	A102-80577A-1		A102-80577A-2		A102-80578A	
TLSF-11	Straight Fork	1	A102-80583A-1		A102-80583A-2		A102-80584A	
TLSF-22	Straight Fork	2	A102-80585A-1		A102-80585A-2		A102-80586A	

Note:

1. Price includes limit switch complete with operating lever.
2. Contacts can be changed from open to close by rotating cam 180°.

Ordering Information:

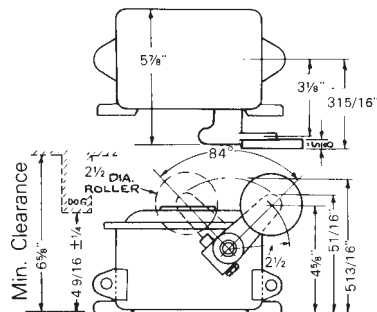
- Use complete catalog number when ordering.

Limit Switch Electrical Ratings

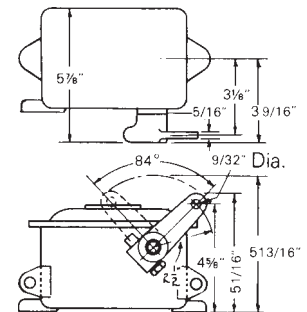
25 Amp - 600V AC Maximum Heavy Pilot Duty 600V AC A600, 250V DC Maximum N300.			
Volts	Current - Amperes		
	Carry	Break	Inrush/ Make
110-120V AC	25	6.0	6.0
220-240V AC	25	3.0	3.0
440-480V AC	25	1.5	1.5
550-600V AC	25	1.2	1.2
115-125V DC	10	2.2	2.2
230-250V DC	10	1.1	1.1

Approximate Outline Dimensions

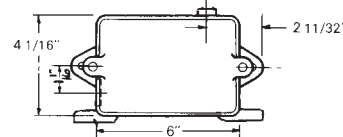
TLSR Straight Roller Lever



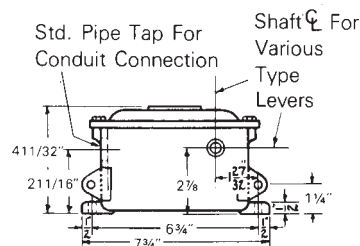
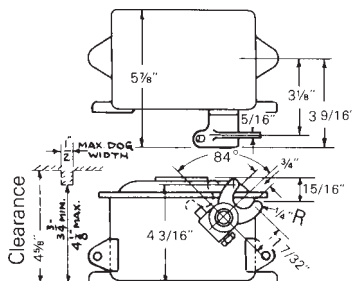
TLS Rod or Chain Type Lever



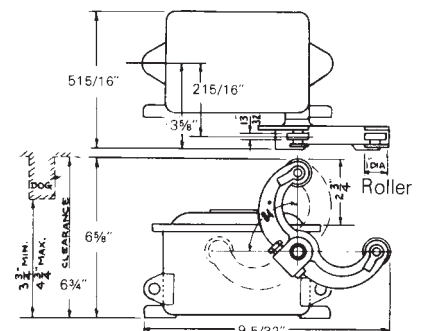
Enclosure Dimensions Only
(Same for all types)

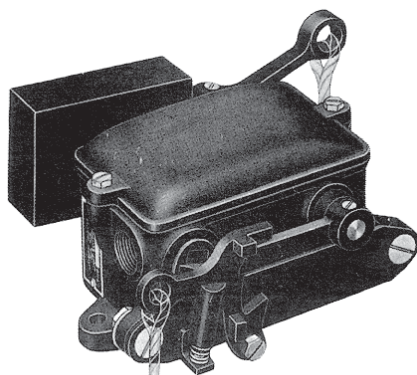


TLSF Straight Fork Lever



TLF Roller Fork Lever





Application

Type 102RS Rubber Calender Safety Switch is a pilot circuit device used chiefly in the Rubber Industry as an emergency stop arrangement on Calenders, and similar motor driven machinery.

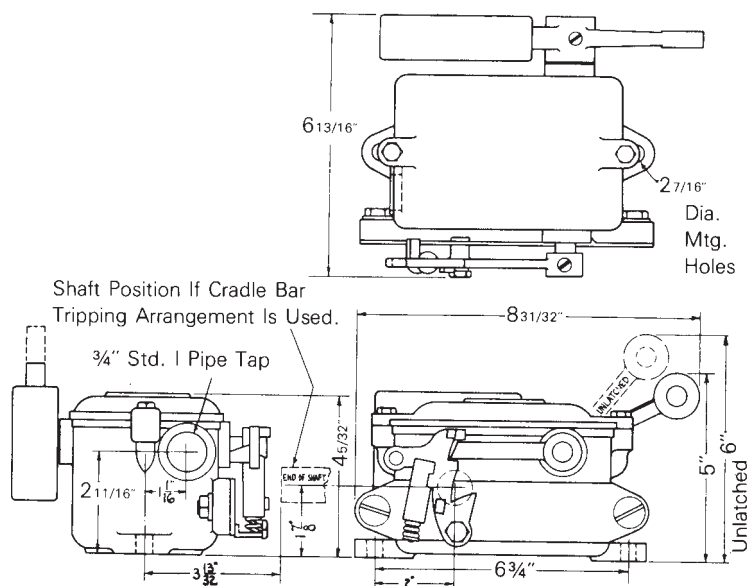
Features:

- Gravity Operated.
- Double break removable silver-to-silver contacts.
- Can be mounted horizontally or vertically.
- Oil impregnated shaft bearings need no lubrication.
- Contact wearing parts completely interchangeable with same parts in type 101SD Master Switches, type 101FS Foot Switches and type 102HL, CHL, TL Limit Switches.
- Dust-tight enclosure is standard.

Limit Switch Electrical Ratings

25 Amp - 600V AC Maximum Heavy Pilot Duty 600V AC A600, 250V DC Maximum N300.			
Current - Amperes			
Volts	Carry	Break	Inrush/ Make
110-120V AC	25	6.0	6.0
220-240V AC	25	3.0	3.0
440-480V AC	25	1.5	1.5
550-600V AC	25	1.2	1.2
115-125V DC	10	2.2	2.2
230-250V DC	10	1.1	1.1

Approximate Dimensions



Ordering Information

- Use complete catalog number when ordering. If modification is required, state in full detail on the order.

Modifications:

- If cradle bar tripping arrangement is desired, add the following to the catalog number, "including part number A102-66747A tripping bar"Add \$ 72.

Rubber Calender

Type	Contacts	Poles	Dust-tight Enclosure Catalog No.	Price ¹
RS22	2 NC	2	A102-66750A	\$ 1224.

Note:

1. Price includes limit switch complete with cable, cable weight and counterweight.



Application

The Type 102CHL pilot circuit limit switches are designed for mounting beneath the hoisting mechanism of electrically operated cranes to serve as upper limit safety stop switches. Such a safety device is necessary to prevent the hook from being raised into the hoisting mechanism where it would cause damage.

Enclosure - Standard die cast aluminum enclosures.

Dust-tight Enclosures - Dust-tight enclosures can be furnished at an additional charge for the dust seal gasket.

Watertight - Watertight enclosures are also available. The same heavy case is specially fitted with watertight bushings and seals to meet NEMA watertight tests.

Features:

- Toggle type snap action.
- Double break removable Silver-to-Silver Contacts.
- Contact wearing parts completely interchangeable with same parts in Type 101SD Master Switch, Type 101FS Foot Switches and Type 102HL and TL Limit Switches.
- Each contact may be independently changed from N.O. to N.C. and vice versa without disassembly, by turning cams on shaft 180°.
- Operating arm adjustable on shaft.
- Automatic reset when hook is lowered.
- Die cast aluminum enclosure standard.



- Cams A102A52609 for \$38
- 2 Pole Base A102A41255A \$179
- Weight 1 B102-80615 \$411
- Weight 2 A102-54265 \$340

G

Type 102CHL Crane Hook - Limit Switch

Type	Contacts	Poles	Standard Enclosure Catalog No. Price ¹	Watertight Enclosure Catalog No. Price ¹
CHL-22	2 NC	2	A102-80886A \$ 1392.	A102-80887A \$2256.

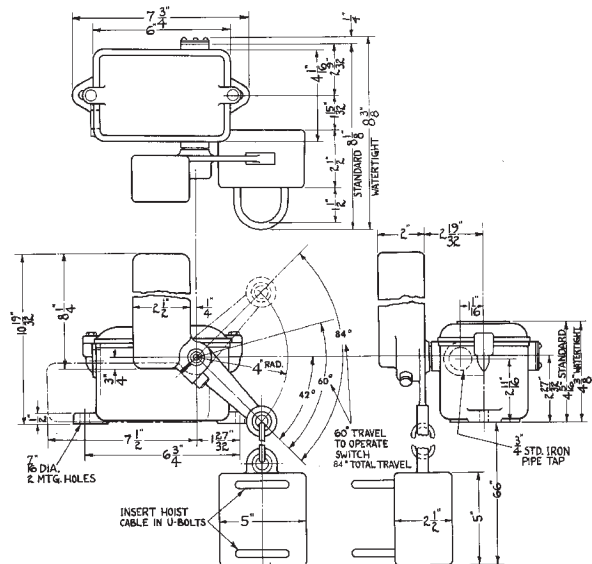
Limit Switch Electrical Ratings

25 Amp - 600V AC Maximum Heavy Pilot Duty 600V AC A600, 250V DC Maximum N300.			
Current - Amperes			
Volts	Carry	Break	Inrush/ Make
110-120V AC	25	6.0	6.0
220-240V AC	25	3.0	3.0
440-480V AC	25	1.5	1.5
550-600V AC	25	1.2	1.2
115-125V DC	10	2.2	2.2
230-250V DC	10	1.1	1.1

Note:

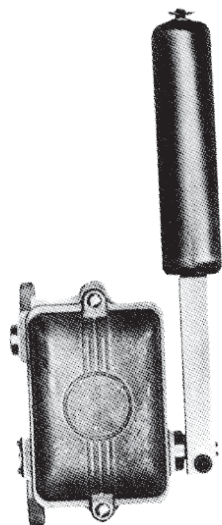
1. Price includes limit switch complete with cable, cable weight and counterweight. Approximate shipping weight is 45 lbs.

Approximate Dimensions



Ordering Information

- Use complete catalog number.
- If dust-tight enclosure is desired, add \$66 to the standard enclosure price. Use the same catalog number as for standard enclosure and specify "Dust-tight" on the order.



Application

The Type 102BST Switch is a pilot device used for special protection against side movement of conveyor belts.

Operation

One Switch is mounted on each side of the conveyor belt with the lever mounted roller close to the belt edge. If the belt tends to move either side due to misalignment of its rollers, the belt edge moves the limit switch lever arm. After a selected number of degrees of lever movement the normally open contact in the switch closes. This can operate a warning system, either a light or audio signal. If the fault is not corrected and the belt moves the lever arm to large degree, a second contact, normally closed, will open and shut down the system. The type BST switch can save untold down time and expense in torn and damaged conveyor belts. Also when used in conjunction with the Type RS Safety Limit Switch, they form a team of safety devices that provide protection to both the operators and belts. The Type BST Switch uses a NEMA Type 4 Watertight enclosure. The Type BST-22 has an 8" Stainless Steel Roller with Nylon Bushings, mounted on a lever arm so that the middle of the roller has a 9 3/8" radius.

G

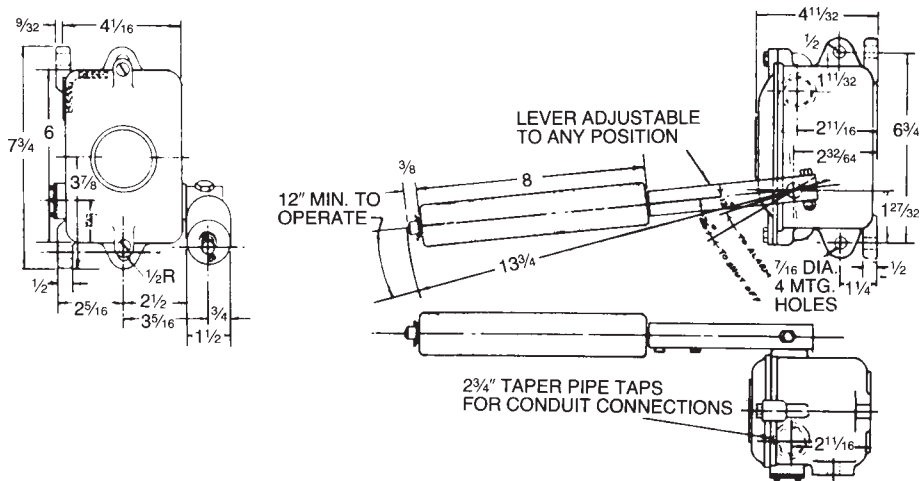
Type 102BST Belt Side Travel - Limit Switch

Type	Contacts ¹	Shaft Type	Operator Type	Dust tight Enclosure Catalog No.	Price
BST-22-R	2	Standard	8" long stainless steel roller with nylon bushing	A102-351409A-1	\$ 1392.

Note:

1. One normally open and one normally closed overlapping contacts.
Lever only A102-463807A \$ 820 x JC80

Approximate Dimensions



3
8
0

Application

Type 101 FS Foot Operated Master Switches are used on applications requiring a rugged foot operated pilot circuit device.

Weatherproof enclosures are standard on all types.

Dust tight enclosures can be furnished at an additional charge for the dust seal gasket.

Features

- Double Break removable Silver-to-Silver Contacts.
- Contact wearing parts completely interchangeable with the same parts in Type 101SD Master Switch, and Type 102HL, TL and CHL Limit Switch.
- Each contact may be independently changed from NO to NC and vice versa without disassembly.

Enclosures

Two pole foot switches have cast aluminum enclosures.

Watertight enclosures are available for all types except Type FWLSA-22. The same heavy case is specially fitted with watertight bushings and seals to meet NEMA watertight tests.

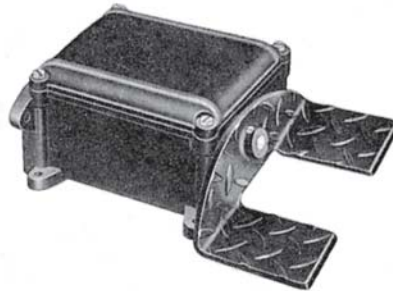
- Oil impregnated bearings at contact finger pivot points.
- Oil impregnated shaft bearings need no lubrications
- Malleable iron operating pedal.
- Spring return standard.
- Cast Weatherproof enclosure standard.



FSVA-11, 22 or 33, 1 or 2 Pole with Latch, Vertical Mounting



FSLA-11, 22 or 33, 1 or 2 Pole with Latch, Horizontal Mounting



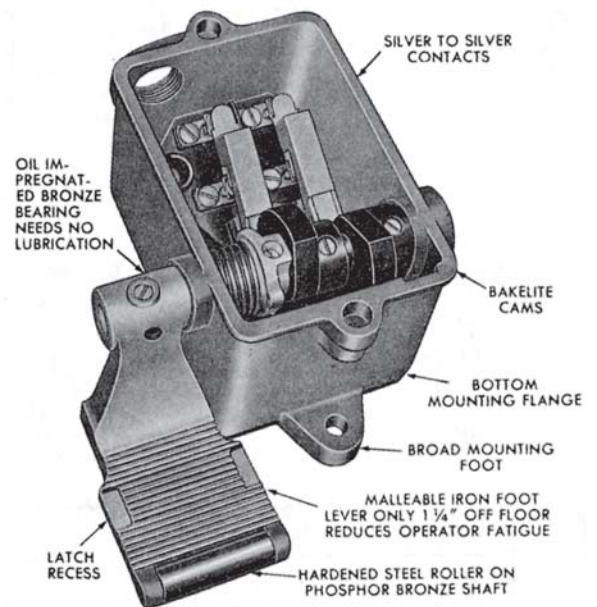
FRSA-22, 2 Pole 3 Position



FWSA-22, 2 Pole Sequence Operation



FWLSA-22, 2 Pole, Sequence Operation with Latch



FSA-22, 2 Pole Horizontal Mounting, Left Hand, Open View

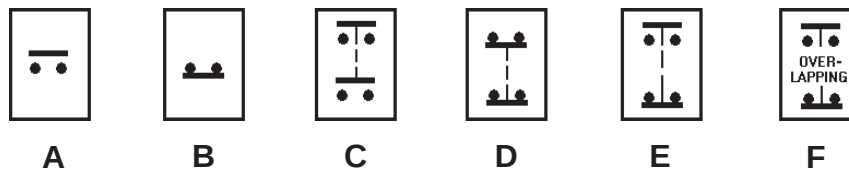


Type 101FS - Foot Operated

Standard NEMA 1 Enclosure

Type	Poles	Contact Arrangement	Contact Symbol	Special Features	Mounting Arrangement	Pedal Arrangement	Catalog No.	Price ¹	Dim. Ref & ² Ship Weight
FSA-11	1	NO or NC	A or B	-----	Horizontal or Vertical	R.H. or L.H.	A101-55171A-2	\$ 654.	1 & 2
FSA-22	2	Both NO or NC	C or D	-----			A101-55172A-2	738.	
FSA-33	2	1 NO & 1 NC	E	-----			A101-55172A-2	738.	
FSA-330	2	1 NO & 1 NC Overlapping	F	Overlapping			A101-46250A	(3)	
FSLA-11	1	NO or NC	A or B	With latch	Vertical Only	R.H. or L.H.	A101-55173A	690.	1
FSLA-22	2	Both NO or NC	C or D				A101-55174A	768.	
FSLA-33	2	1 NO & 1 NC	E				A101-55174A	768.	
FSVA-11	1	NO or NC	A or B				A101-55175A	768.	
FSVA-22	2	Both NO or NC	C or D	Contacts operate in Sequence	Horizontal or Vertical	R.H. or L.H.	A101-55176A	846.	2
FSVA-33	2	1 NO & 1 NC	E				A101-55176A	846.	
FSA-22S	2	2 NO or 2 NC - Sequence operation	---				A101-46250A	738	
FSA-33S	2	1 NO or 1 NC - Sequence operation	---				A101-46250A	738	
FRSA-22	2	1 forward, 1 reverse and an off point	---	Double treadle foot pedal for reverse operating	Horizontal Only	R.H. or L.H.	A101-62266A	900.	3

Contact Symbols



Note:

- Price includes switch complete with operating pedal.
- Page G12 for Dimension reference and shipping weight.
- Overlapping Contacts:

Standard switches provide for only one contact closed at a time. If overlapping is required, one contact must close before the other contact opens. Type FSA-330 switches have overlapping contacts. If the degree and/or point of overlap is not specified, price in quantities of 1 or more is \$ 738. If purchaser specifies degree and/or point of overlap: Price in quantities of 5 or less is \$900.00. Price in quantities of 6 or more is \$738.

Ordering Information

- Use complete catalog number when ordering. If modifications are required, state in full detail on the order.
- Note:**
- Type 101FS does not meet the safety standards for press applications.

Modifications

For Dust tight use same catalog number as for a standard enclosure and specify "Dust tight" on order.
Floor plate

Price

\$ 84.

42.



Type 101FS - Foot Operated

NEMA 4 Enclosure

Type	Poles	Contact Arrangement	Contact Symbol	Special Features	Mounting Arrangement	Pedal Arrangement	Catalog No.	Price ¹	Dim. Ref & ² Ship Weight
FSA-11	1	NO or NC	A or B	-----	Horizontal or Vertical	R.H. only	A101-60224A	\$ 846.	1 & 2
FSA-22	2	Both NO or NC	C or D	-----			A101-60225A	924.	
FSA-33	2	1 NO & 1 NC	E	-----			A101-60225A	924.	
FSA-11	1	NO or NC	A or B	-----		L.H. only	A101-60226A	846.	
FSA-22	2	Both NO or NC	C or D	-----			A101-60227A	924.	
FSA-33	2	1 NO & 1 NO	E	-----			A101-60227A	924.	
FSLA-11	1	NO or NC	A or B	With Latch	Horizontal Only	R.H. only	A101-60228A	900.	1
FSLA-22	2	Both NO or NC	C or D				A101-60229A	978.	
FSLA-33	2	1 NO & 1 NC	E				A101-60229A	978.	
FSLA-11	1	NO or NC	A or B			L.H. only	A101-60230A	900.	
FSLA-22	2	Both NO or NC	C or D				A101-60231A	978.	
FSLA-33	2	1 NO & 1 NC	E				A101-60231A	978.	
FSVA-11	1	NO or NC	A or B		Vertical Only	R.H. only	A101-62868A	978.	2
FSVA-22	2	Both NO or NC	C or D				A101-77635A	1056.	
FSVA-33	2	1 NO & 1 NC	E				A101-77635A	1056.	
FRSA-22	2	1 forward, 1 reverse and an off point	---	Double treadle foot pedal for reverse operating	Horizontal Only	R.H. or L.H.	A101-62267A	1110.	3

G

Contact Symbols



A



B



C



D



E



F

Notes:

1. Price includes switch complete with operating pedal.
2. Page G12 for Dimension reference and shipping weight.

Ordering Information

- Use complete catalog number when ordering. If modifications are required, state in full detail on the order.
- Note:**
- Type 101FS does not meet the safety standards for press applications.

Modifications

For Dust tight use same catalog number as for a standard enclosure and specify "Dust tight" on order.
 Floor plate

Price

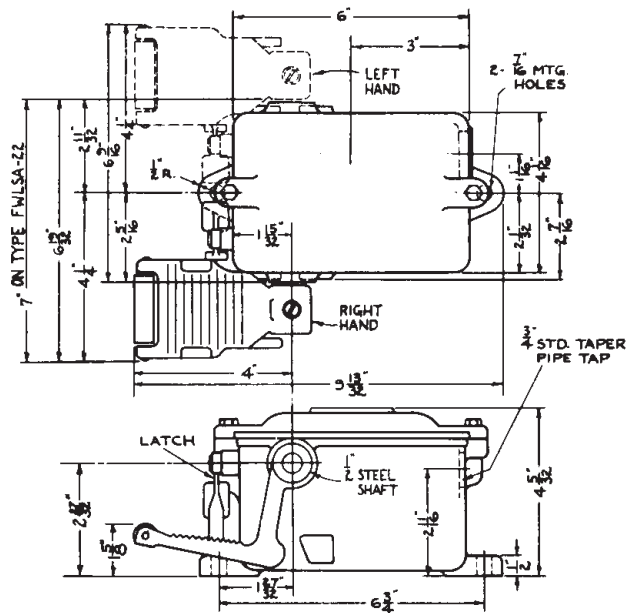
\$ 84.

42.



Dimensional Information

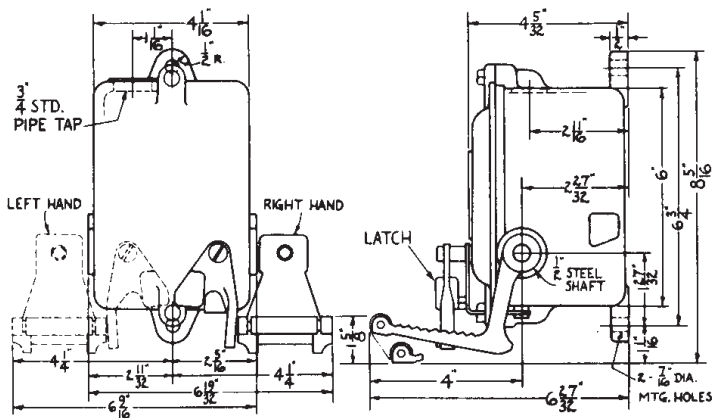
Reference No. 1 - Horizontal



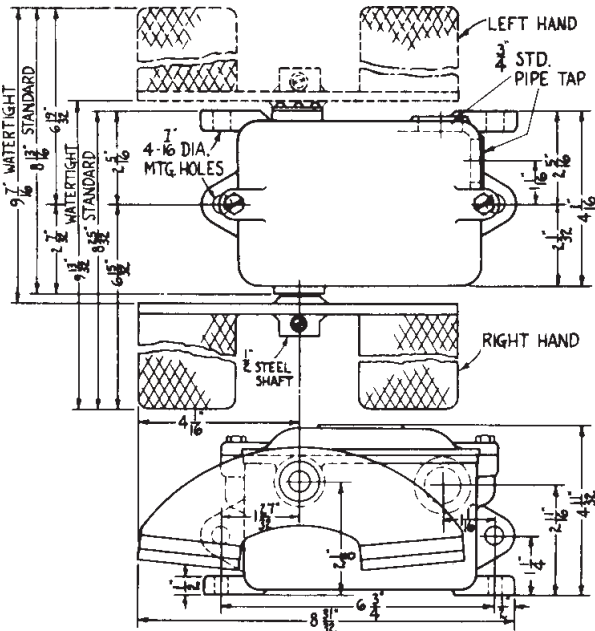
Shipping Weight (approx.)

Reference	Weight
No. 1	12 lbs.
No. 2	12 lbs.
No. 3	15lbs.

Reference No. 2 - Vertical



Reference No. 3- Double Treadle



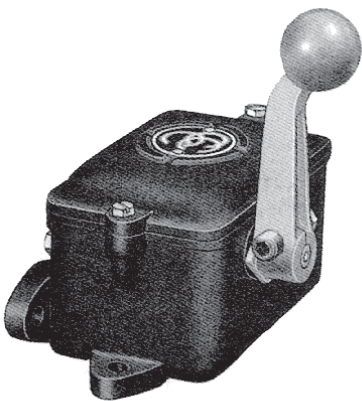


Type 101SD Master Switches are designed as pilot circuit devices for frequent operation with minimum maintance on heavy duty application in all industries. The type SD units are sturdy devices constructed for heavy duty service where few control circuits are required. Type SD Switches are made in two frame sizes:

Type SD-2 is a single point device, one point either side of the off point, and there are two isolated contacts which can be opened or closed in various combinations.

For the usual circuit arrangements refer to page G14.

Type SD Master Switches are supplied in watertight enclosures; panel mounted units have angle brackets for back of panel mounting. Spring return to the off point is available.



Master Switch, Enclosed Type SD-2 Two Circuit

G

Mill Master Jr. - Master Switch

Standard Operation									
Type	Number of Operating Points	No. of Cir-cuits	Reversing	Surface Mounting Catalog No.	Price ¹	Dim. Ref.	Panel Mounting Catalog No.	Price ²	Dim. Ref.
SD-2	1 (each direction) 1 (one direction only)	2	yes no	A101-88359A A101-88363A	\$ 798.	A	A101-88360A A101-88364A	\$ 1272.	C
Spring Return Operation									
SD-2-S	1 (each direction) 1 (one direction only)	2	yes no	A101-88361A A101-88365A	1080.	A	A101-88362A A101-88366A	1512.	C

Notes:

- 1. Price includes master switch in watertight enclosure complete with operating handle.
- 2. Price includes master switch in watertight enclosure complete with metal pistol grip handle, steel mounting plate and standard anular name plate. Specify nameplate markings; standard nameplate provides one marking for each point of the switch.
- Advise detailed cam development for each switch. Refer to page G14 for diagram of standard cam development.

Ordering Information:

- Use complete catalog number when ordering.
- Dimensional reference on page G14

3
8
0

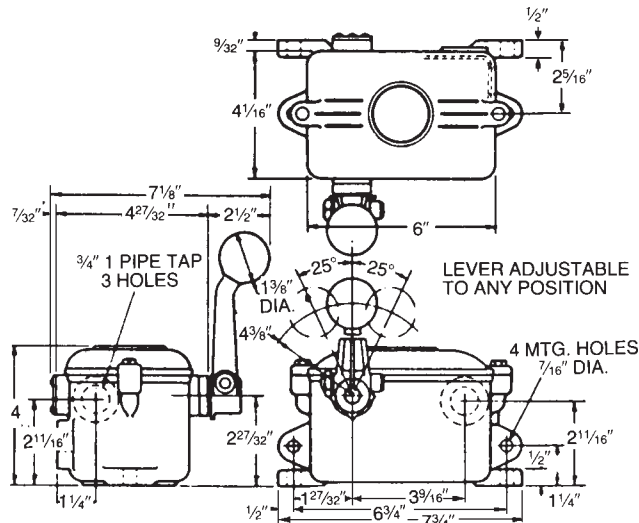


Shipping Weight (approx.)

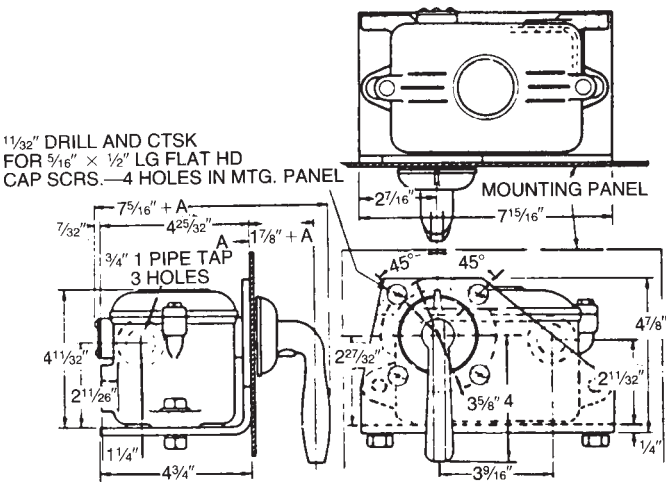
Reference	Weight
A & C	10 lbs.
Spring Return	
A & C	15 lbs.

Dimensional Information

Reference A - Surface Mounting



Reference C - Back of Panel Mounting



Standard Contact Sequence Diagrams

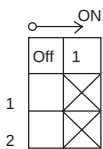


Figure 1
Type SD-2
Type SD-2-S

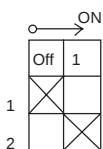


Figure 2
Type SD-2
Type SD-2-S

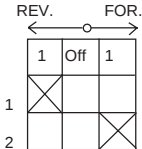


Figure 3
Type SD-2
Type SD-2-S



Mill Type Push Buttons (Heavy Duty)
Type H Assembled

Features:

- Heavy cast enclosure and mushroom operating head.
- Oil impregnated bushing.
- Heavy duty Type H push button element with double break silver-to-silver wipe action contacts.
- Large electrical clearance.
- Push button stop independent of contacts. All shock absorbed by the cast case.
- All parts removable and replaceable with a screwdriver.



Type H Form RN
Unprotected



Type H Form RNG
With Guard Ring for
Palm Operation

Type H - Momentary Contact

Name Plate ² Marking	Contacts Available	Contact Symbol	Form RN - Without Guard Ring		Form RNG - With Guard Ring	
			Catalog Number	Price ¹	Catalog Number	Price ¹
None	1 N.O. and 1 N.C.	1	1RN-1	\$258.	1RNG-1	\$258.
None	2 N.O. and 2 N.C.	4	1RN-2	300.	1RNG-2	300.
Start	1 N.O. and 1 N.C.	1	1RN-3	258.	1RNG-3	258.
Stop	1 N.O. and 1 N.C.	1	1RN-4	258.	1RNG-4	258.
Emer Stop	1 N.O. and 1 N.C.	1	1RN-5	258.	1RNG-5	258.
On	1 N.O. and 1 N.C.	1	1RN-6	258.	1RNG-6	258.
Off	1 N.O. and 1 N.C.	1	1RN-7	258.	1RNG-7	258.
Forward	1 N.O. and 1 N.C.	1	1RN-8	258.	1RNG-8	258.
Reverse	1 N.O. and 1 N.C.	1	1RN-9	258.	1RNG-9	258.
Jog	1 N.O. and 1 N.C.	1	1RN-10	258.	1RNG-10	258.
Jog Forward	1 N.O. and 1 N.C.	1	1RN-11	258.	1RNG-11	258.
Jog Reverse	1 N.O. and 1 N.C.	1	1RN-12	258.	1RNG-12	258.
Reset	1 N.O. and 1 N.C.	1	1RN-13	258.	1RNG-13	258.
Run	1 N.O. and 1 N.C.	1	1RN-14	258.	1RNG-14	258.
Slow	1 N.O. and 1 N.C.	1	1RN-15	258.	1RNG-15	258.
Fast	1 N.O. and 1 N.C.	1	1RN-16	258.	1RNG-16	258.
Up	1 N.O. and 1 N.C.	1	1RN-17	258.	1RNG-17	258.
Down	1 N.O. and 1 N.C.	1	1RN-18	258.	1RNG-18	258.
Start	2 N.O. and 2 N.C.	4	1RN-19	300.	1RNG-19	300.
Stop	2 N.O. and 2 N.C.	4	1RN-20	300.	1RNG-20	300.
Emer Stop	2 N.O. and 2 N.C.	4	1RN-21	300.	1RNG-21	300.

Note:

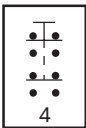
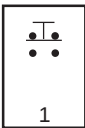
1. Price includes assembled push button station complete with element and nameplate as designated.
2. With Name Plate at top, case may be turned so that Conduit Opening is at top or bottom.

Contact Blocks			
INO & INC 2NO & 2NC	BA BB	\$ 62.00 \$104.00	JC80 Discount Schedule

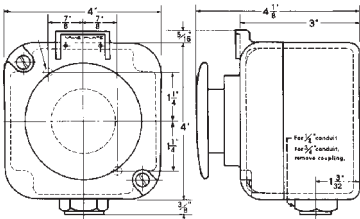
Maximum Contact Ratings (Per Pole)

Volts	AC (50 or 60 Hz)		DC (Inductive)
	Normal	Inrush	Normal
110-120	6.0	60	2.2
220-240	3.0	30	1.1
440-480	1.5	15	---
550-600	1.2	12	0.4

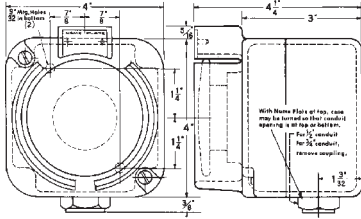
Contact Symbols



Dimensions



Form RN
Unprotected



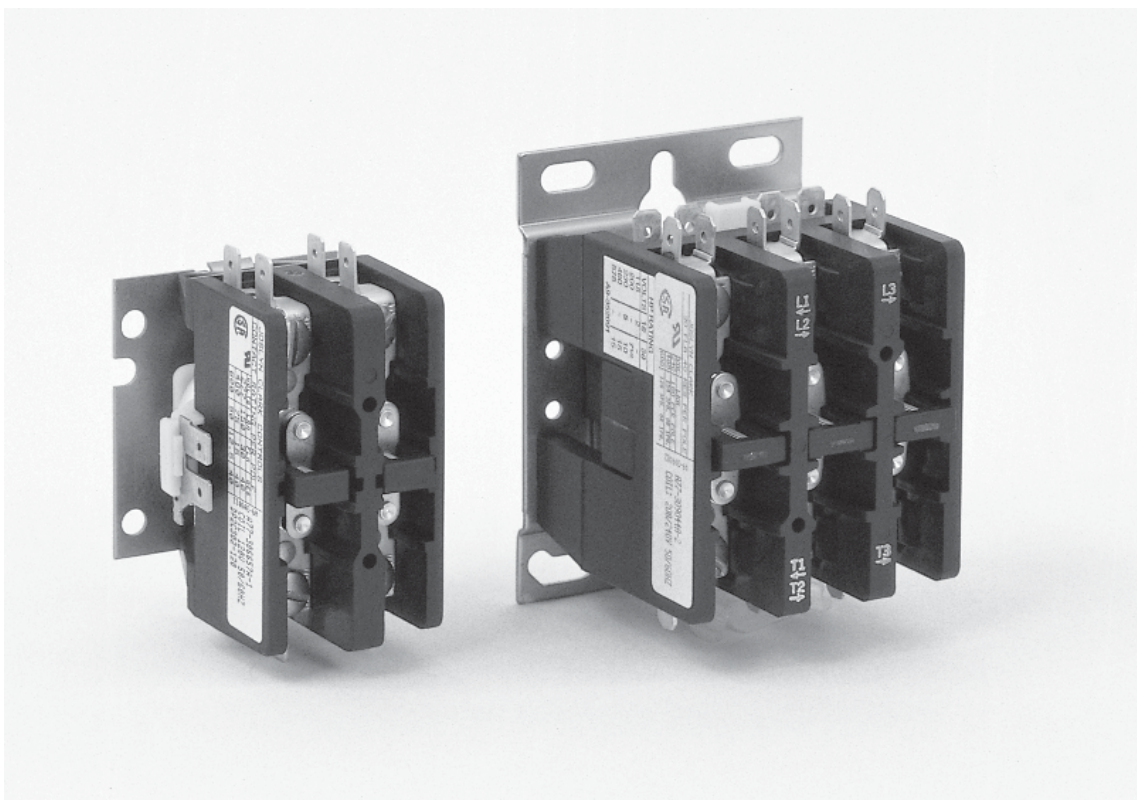
Form RNG
With Guard Ring for
Palm Operation

Description	Page Number
General Application and Features	H2
2 Pole AC Contactors - Type DP2	H3
2, 3 and 4 Pole Contactors - Type DP3 and DP5	H3
Two 3 Pole Contactors Mechanically and Electrically Interlocked - Type DP33	H4
Modifications and Parts	H5
Engineering Data	H6

H



4
1
0



H

Application

Definite Purpose Contactors are intended for use in applications where the control requirements are well defined. They are not recommended for general industrial use.

As a magnetic motor controller, they are inductively rated for both maximum continuous current and maximum locked rotor current. Resistive ratings apply to resistive heating applications only.

Joslyn Clark definite purpose contactors have been specifically designed for use with air conditioning, heating and refrigeration control equipment. They are suitable for other non cycling duty applications requiring reliable low cost switching.

Low Coil Inrush and Sealed VA

Provides maximum efficiency, permitting potential cost savings on transformer requirements. This efficient magnet system assures clean pick-up and drop-out without chattering when subjected to slowly rising and slowly decreasing voltages.

Versatile Operating Positions

Joslyn Clark 2 pole contactors are designed to operate effectively in the vertical, horizontal or tabletop mounting positions. This gives design engineers maximum versatility for designing low cost systems.

Interchangeable

Along with being compact in size, the mounting plate is designed to facilitate proper alignment and interchangeability with practically all competitive 2 pole contactors. Also, the low v-a permits direct interchangeability without requiring a transformer change.

Terminals

As an optional feature, Joslyn Clark contactors can be supplied with pressure clamp terminals which are UL Recognized for field connections of #14 through #8 copper wire. They may also be supplied with box lugs for #4 through #14 Al/ Cu wire.

Up To 600 Volts A-C Rating

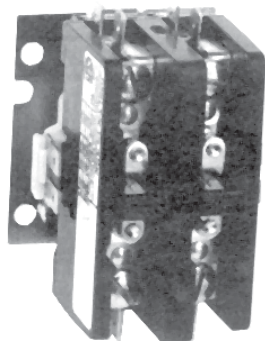
The 2 pole contactors have been designed with the customer in mind. They provide clearance between terminals permitting total utilization of all quick connects without requiring special insulation between terminals on equipment rated up to 600 volts.

4
1
0



2 Pole Contactors - Type DP2

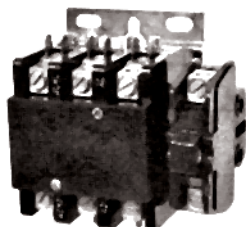
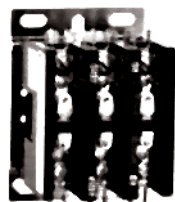
20, 25 and 30 Ampere (Discount Schedule JC54)



Type	Amp. Ratings		LRA	Volts	Model Number	Catalog Number	Price
	FLA	Res					
DP2	20	30	100	240/277	DP2C202- *	A77-306680A- *	\$ 31.00.
	10	25	50	480			
	10	25	50	600			
	25	30	125	240/277	DP2C252- *	A77-306658A- *	39.00.
	10	25	50	480			
	10	25	50	600			
	25	35	150	240/277	DP2HC252- ¹ *	A77-306660A- ¹ *	41.00
	21	35	125	480			
	17	35	100	600			
	30	40	150	240/277	DP2C302- ¹ *	A77-306657A- ¹ *	43.00
	15	40	75	480			
	12.5	40	60	600			
	----	50	----	600	DP2HC302- *	A77-306657A-5 *	46.00.

2, 3 & 4 Pole Contactors - Type DP3

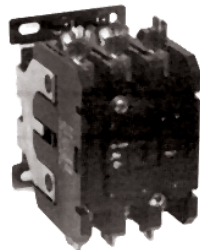
25, 30 & 40 Amp. (Discount Schedule JC54)



Type	Amp. Rating		Locked Rotor Amps.			Poles	Model Number	Catalog Number	Price
	FLA	Res	240V	480V	600V				
DP3	25	30	150	125	100	2	DP3C252- *	A77-309039A- *	49.00.
						3	DP3C253- *	A77-309040A- *	52.00.
						4	DP3C254- *	A77-309026A- *	67.00.
	25	35	150	125	100	2	DP3HC252- *	A77-309041A- *	52.00.
						3	DP3HC253- *	A77-309042A- *	56.00.
						2	DP3C302- *	A77-309043A- *	56.00.
	30	40	180	150	120	3	DP3C303- *	A77-309044A- *	61.00.
						4	DP3C304- *	A77-309027A- *	76.00.
						3	DP3HC303- *	A77-309044A-15- *	68.00.
	40	50	240	200	160	2	DP3C402- ¹ *	A77-309045A- ¹ *	68.00.
						3	DP3C403- ¹ *	A77-309046A- ¹ *	76.00.
						4	DP3C404- ¹	A77-309028A- ¹	92.00.
	50					3	DP3LC503- ¹	A77-309046A-15* ¹	90.00

2 & 3 Pole Contactors - Type DP5

50 and 60 Amp. (Discount Schedule JC50)



Type	Amp. Rating		Locked Rotor Amps.			Poles	Model Number	Catalog Number	Price
	FLA	Res	240V	480V	600V				
DP5	50	65	300	250	200	2	DP5C502- *	DP5C502- *	259.
						3	DP5C503- *	DP5C503- *	284.
	60	75	360	300	240	2	DP5C602- *	DP5C602- *	288.
						3	DP5C603- *	DP5C603- *	320.

Ordering Information

- Use complete catalog number. Replace the (*) with a suffix from the Coil Table.

Example:

DP3C303-24 (A77-309044A-3) is a 3 pole 30 ampere, contactor with a 24 Volt, 50/60 Hz Coil.

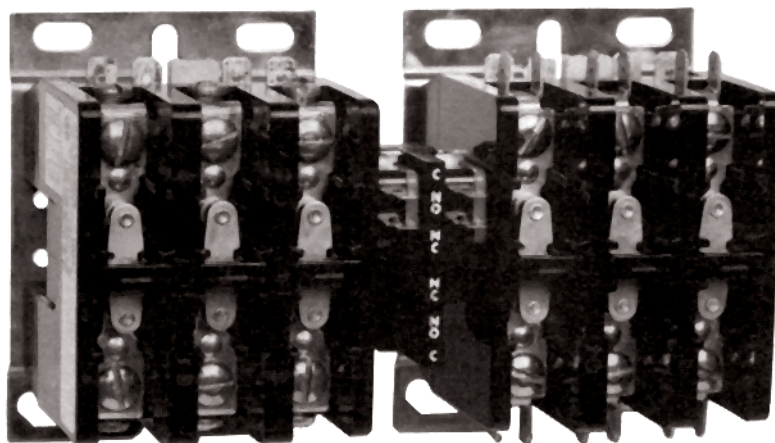
- Engineering Data- Page H6
- Modification Data- Page H5

Note:

1- comes with cover

Coil Table

50/ 60Hz Voltage	Model No. Suffix	Cat.No. Suffix		
		DP3	DP2	DP5
120	-120	1	1	120.
208-240	-240	2	2	240.
24	-24	3	3	24.
277	-277	Factory	Factory	277.
480	-480	Factory	Factory	480.



Reversing Contactors - Mechanically & Electrically Interlocked Type DP33 - Bulletin 7735

25, 30 & 40 Amp.

Type	Current Ratings					Maximum 3 Phase Horsepower Ratings						Model No.	Catalog No.	No. of Aux. Contacts	Price
	Amp. Rating		Locked Rotor Amps.			General Duty			Jogging Duty						
	Ind.	Res.	240V	480V	600V	200V	240V	460/575V	200V	240V	460/575V				
DP33	25	30	150	125	100	5	7 1/2	15	3	3	7 1/2	DP33C253-*	A77-350735A-*	2 4	\$421.00 494.00
	30	40	180	150	120	7 1/2	10	15	5	5	7 1/2	DP33C303-*	A77-350737A-*	2 4	470.00 543.00
	40	50	240	200	160	10	10	25	5	7 1/2	15	DP33C403-*	A77-352100A-*	2 4	527.00 599.00

Mechanically and electrically interlocked contactors for low cost motor reversing applications such as hoists, doors, gates, etc.. Standard assembly includes mechanical interlock with two SPDT auxiliary contacts for electrical interlocking. Four additional auxiliary contacts may be factory added. Two may be field added.

Use jogging duty rating on full-voltage magnetic controllers for plug-stop, plug-reverse and jogging duty regarding repeated interruption of stalled motor current or repeated closing of high transient currents encountered in rapid motor reversal beyond five openings or closings per minute or more than ten in a ten minute period.

Approvals

Underwriters Laboratories, Inc. recognized component for air conditioning, refrigeration and resistance heating equipment. File number E6591, Section 27. Guide number NLDX2.

Canadian Standards Associations (CSA) Guide 361-E-0.2 Class 1222 File 18156-55

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from the coil table.

Example: DP33C253-120 (A77-350735A-1) is a 3 Phase, 25 amp., reversing contactor with 120V, 50/60 HZ coil and SPDT auxiliary.

- Engineering Data Page H6.
- Modification Page H5.

Coil Table

50/60Hz Voltage	Model No.		Cat. No.	
	2 Aux.	4 Aux.	2 Aux.	4 Aux.
120	120	120CC	1	4
208-240	240	240CC	2	5
24	24	24CC	3	6
480	480	480CC		

Modifications and Parts Definite Purpose Contactors-DP

Types DP2, DP3, DP5, DP, DP33, and DP3S Accessories & Parts Kits Discount Schedule JC50 ²

Description	TypeDP2 20, 25 & 30 Ampere		TypeDP3, DP33 25, 30, & 40 Ampere		TypeDP5 50 & 60 Ampere	
	Catalog Number	Price	Catalog Number	Price	Catalog Number	Price
SPDT Auxiliary Contact Kit	----		KHP-C ²	\$ 39.00	----	
N.O. Auxiliary Contact Kit	----		----	---	KDP5-10	\$41.00
N.O. & N.C. Auxiliary Contact Kit	----		----		KDP5-11	61.00
Contact Cover	A77-356577A-1	\$ 4.00	A77-356577A-2	4.00	----	
Pressure (Box) Lug Kit (Contains 3 Lugs)	A77-352648A	7.00	A77-352648A	7.00	----	

Replacement Coil Kits

Discount Schedule JC53

Description	TypeDP3, DP33 25, 30 & 40 Ampere		TypeDP5 50 & 60 Ampere	
	Catalog Number	Price	Catalog Number	Price
120V, 50/60Hz	KTB170-1	\$ 48.00	CDP5-120	\$ 97.00
208-240V, 50/60Hz	KTB170-2	48.00	CDP5-240	97.00
24V, 50/60Hz	KTB170-3	48.00	CDP5-24	97.00
277V, 50/60Hz	KTB170-4	48.00	CDP5-277	97.00
480V, 50/60Hz	KTB170-5	48.00	CDP5-480	97.00
600V, 60Hz	KTB170-6	48.00	CDP5-600	97.00

H

Field Modifications ¹

	Cat. No.	Price	Discount Schedule
Type 1 Enclosure Kit	P6E-01	\$80.	JC14

Notes:

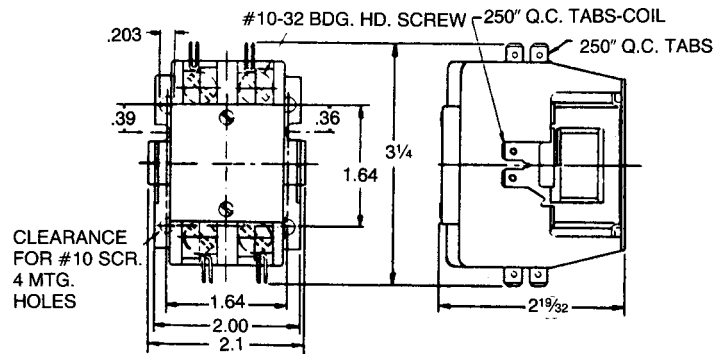
1. Additional modifications may be selected from NEMA HP Section C page C7
2. JC12 Discount Schedule for KHP-C.

2 Pole Contactors, Type DP2

Coil Volts 50/60Hz	Max. Inrush VA	Max. Sealed VA	Pick-up Volts	D-C Resistance Ohms
24	31	7	18	11
120	31	7	90	290
208-240	31	7	176	1173

Coil insulation - Class B
Coil connections - Double male 1/4" quick connect
Maximum ambient - 155°F

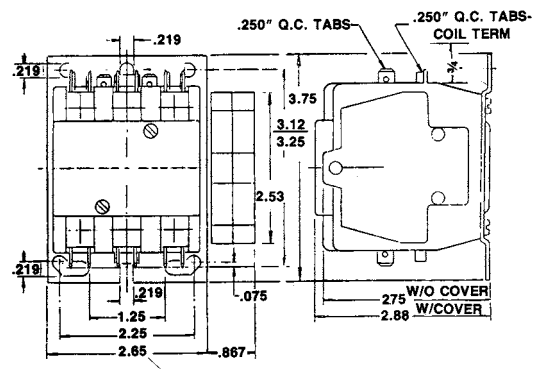
Dimensions (Approximate)



3 & 4 Pole Contactors - Type DP3

Coil Volts 50/60Hz	Inrush VA	Sealed VA	Pick-up Volts	D-C Resistance Ohms
24	48	8.4	16	6.5
120	48	8.4	80	170
208-240	48	8.4	160	680

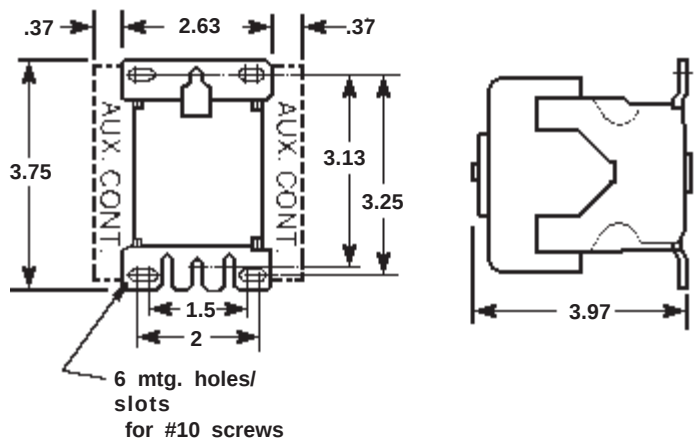
Dimensions (Approximate)



3 Pole Contactor - Type DP5

Coil Characteristics
Inrush VA 204
Sealed VA 36.5

Dimensions (Approximate)

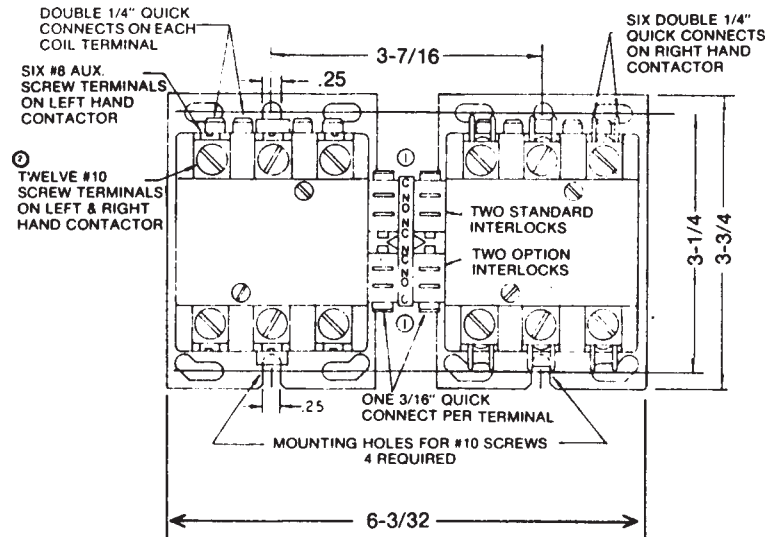


Approvals

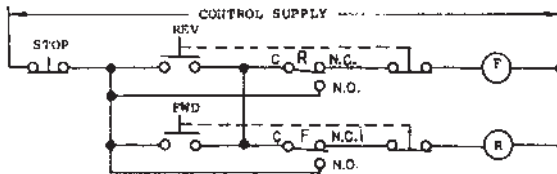
Underwriters Laboratories, Inc. recognized component for air conditioning, refrigeration, and resistance heating equipment. File Number #E6591. Guide Number NLDX2.

Canadian Standards Associations (CSA) Guide Number 361-E0.2, File Number LX18156-39.

Dimension - DP33 (Two 3-Pole Mechanically & Electrically Interlock Contactors)



Typical wiring diagram for Electrically held Reverser using Mechanically Interlocked Push Buttons.



Electrically Held Contactors and Mechanically Interlocked Pushbuttons Using Two SPDT Auxiliary Contacts.

Four additional auxiliary contacts may be factory added. Two may be field added.

Coil Characteristics

Coil Volts 50/60Hz	Inrush VA	Sealed VA	Pick-up Volts	D-C Resistance Ohms
24	48	8.4	16	6.5
120	48	8.4	80	170
208-240	48	8.4	160	680

Coil insulation - Class B

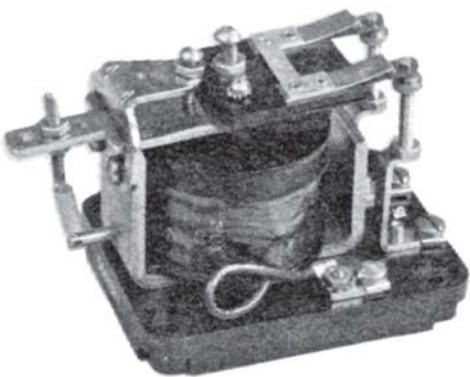
Coil connections - Double male 1/4" quick connect

Maximum ambient - 155°F

Approvals

Underwriters Laboratories, Inc. recognized component for air conditioning, refrigeration and resistance heating equipment. File number E6591. Guide number NLDX2.

Canadian Standard Association (CSA) Guide number 361-E0.2, File number LX18156-39.

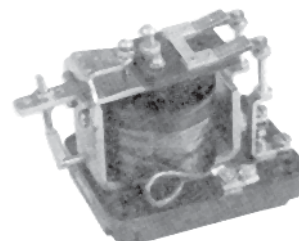


Description	Page Number
Index	J1
146 Field Loss Relay	J2
5 DP Series - General Information	J3
Contactors - 1, 2, 3 Pole	J4
Accessories	J5
Dimensions Data	J7
7400 Contactors	J8
7400 Accessories & Dimensions Data.....	J9
RHEOSTATS	J10



Series 146 Relays provide excellent protection against overspeeding on DC shunt or compound wound motors in the event of an open circuit in the field. The relay coil is connected in series with the shunt field while the re-lay motor contacts are in the motor control circuit. The relay coil is de-energized if the field opens and the relay contacts open to disconnect the motor from line. Where shunt or compound wound motors are operated at light loads or not rigidly connected to the load, field loss relays provide protection against motor and load damage from overspeeding. The Series 146 Relay is a UL recognized component.

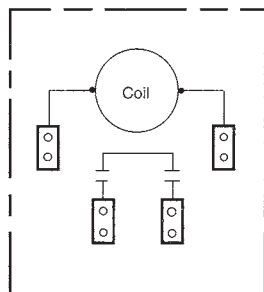
Coils are designed to carry maximum field current continuously. Relays are factory adjusted to pick-up at one tenth of the maximum field current amps. listed. Drop-out is approximately 62% of the pick-up value. Other pick-up values on special order.



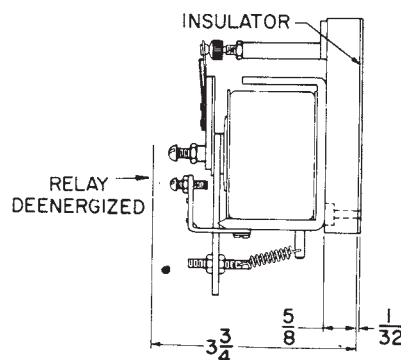
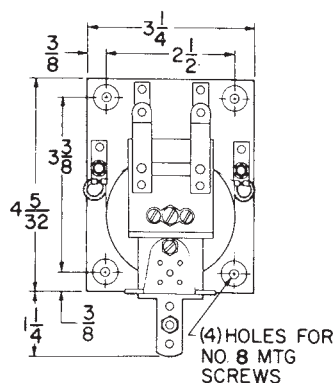
Field Loss Relays (DC) - 146 300V DC Max.

Max. Field Current Amps	Relay Pick-Up Amps	Relay Drop-Out Amps	Catalog No.	Price	Max. Field Current Amps	Relay Pick-Up Amps	Relay Drop-Out Amps	Catalog No.	Price
.25	.025	.0155	146-25	\$ 660.	8.0	.800	.496	146-800	\$ 660.
.5	.050	.031	146-50	660.	9.0	.900	.559	146-900	660.
1.0	.100	.062	146-100	660.	10.5	1.050	.651	146-1050	660.
1.5	.150	.093	146-150	660.	12.0	1.200	.744	146-1200	660.
2.0	.200	.124	146-200	660.	13.5	1.350	.836	146-1350	660.
2.5	.250	.155	146-250	660.	15.0	1.500	.930	146-1500	660.
3.0	.300	.186	146-300	660.	22	2.200	1.320	146-2200	764.
4.0	.400	.248	146-400	660.	27	2.700	1.620	146-2700	764.
5.0	.500	.310	146-500	660.	35	3.500	2.100	146-3500	764.
6.0	.600	.372	146-600	660.	65	6.500	4.000	146-6500	764.
7.0	.700	.434	146-700	660.	80	8	4.96	146-8000	1180.

Engineering Data:



Dimensions -Approximate



Ordering Information

- Use complete catalog number when ordering.
- Contact Rating: Single pole double break normally open contacts, rated at 0.7 amps., 250 V DC Max.

5DP Definite Purpose Contactors are designed for DC adjustable speed drive circuits using silicon controlled rectifier switching and other controls where a combination of normally open and normally closed power contacts are required. In all applications, reduced panel space for contactor mounting is made possible through a compact design and the built-in N.C. dynamic brake power contact feature.

In silicon controlled rectifier switching circuits, the SCR is normally phased back prior to contactor opening. Therefore, the N.O. contacts are not required to interrupt any appreciable current. Under abnormal conditions such as failure of the SCR or the control circuit, the

contactor may be required to interrupt up to 200% current. The N.O. contacts are equipped with permanent magnet blowouts to meet this requirement.

The dynamic brake N.C. contact is required to insert the dynamic brake resistor and therefore must make up to 200% of rated current each time the contactor is deenergized.

Jogging is accomplished at low voltage and current. Therefore, the dynamic brake contact is rated at $\frac{1}{3}$ of rated voltage and dynamic brake current. The permanent magnet blowouts provide this interrupting ability.



- 1. Normally Closed Double Break Power Contacts** - made of silver cadmium oxide furnish "anti-weld" protection under overload conditions. Generous size contacts are long lasting, and maintenance-free. All N.C. power contacts supplied with permanent magnet blowouts to lengthen contact life.
- 2. Normally Open Double Break Power Contacts** - incorporate the same design features as the normally closed power poles. Permanent magnet blowouts are also furnished on d.c. load applications.
- 3. Permanent Magnet Blowouts** - mounted to surround the power contacts, function to quickly quench the arc when breaking loads, thereby increasing contact life and assuring positive load circuit interruption. All normally closed poles are furnished with permanent magnet blowouts. Normally open poles can be supplied with or without blowouts as indicated in the circuit symbols shown on page J6.
- 4. Stainless Steel Springs** - maintain exact contact pressure and assure fast contact break (N.O.) and make (N.C.).
- 5. Molded Housing** - constructed of hot-molded, high impact, high arc resistant insulating material. This design totally encloses the contacts and operating magnet in separate compartments and functions to eliminate internal phase-to-phase short circuits.
- 6. Molded Coil** - is layer wound, designed for continuous duty service. Coil construction resists moisture; thermal and mechanical stress. Coil connections are made to pressure type terminals.
- 7. Free-Floating Armature-Magnet Frame** - provide quiet, low vibration, low friction operation. Precision ground pole faces achieve an absolute air gap which prevents "hanging-up". Magnet frame is sized for fast, powerful operation and self-seating extends operational life.
- 8. Auxiliary Contacts** - for 10/40 amp. contactors are available with either the front mounted snap action type with quick connect terminals or the side mounted type with pressure terminals. Contacts for larger sizes in standard or special make-before-break contact combinations feature either standard double break silver-to-silver contacts or low power gold alloy contacts.
- 9. Pressure Type Terminals** - accessible, up-front location permits modern straight-thru wiring. Terminals accept stripped, unplugged wires.

SCR Drive Contactors - N.O. or N.C. Power Poles

Drive Contactors Preferred Style 500 VDC Max

Type & Rating	Poles		Fig.No.	Open Type Catalog No.	Price
7001 40 amp.	0	1	7A	7001-5150- **	\$208.
	0	2	9	7001-5230- **	269.
	1	0	1	7001-6050- **	179.
	2	0	3	7001-7030- **	227.
	2	1	10	7001-7140- **	296.
5DP7 75 amp.	0	1	7A	5DP7-5150- **	756.
	0	2	9	5DP7-5230- **	1040.
	1	0	1	5DP7-6050- **	693.
	2	0	3	5DP7-7030- **	924.
	2	1	10	5DP7-7140- **	1210.
5DP3A 110 amp.	0	1	8	5DP3A4001- **	895.
	0	2	9	5DP3A3071- **	1323.
	1	0	1	5DP3A4011- **	857.
	2	0	3	5DP3A5021- **	1176.
	2	1	15	5DP3A5091- **	1502.
5DP4 180 amp.	0	1	8	5DP4-4001- **	1222.
	0	2	9	5DP4-3071- **	1812.
	1	0	1	5DP4-4011- **	1058.
	2	0	3	5DP4-5021- **	1533.
	2	1	15	5DP4-5091- **	2104.
5DP9 260 amp.	0	1	8	5DP9-4001- **	1676.
	0	2	9	5DP9-3071- **	2405.
	1	0	1	5DP9-4011- **	1481.
	2	0	3	5DP9-5021- **	2066.
	2	1	15	5DP9-5091- **	2793.
5DP5 360 amp.	0	1	8	5DP5-4001- **	3024.
	0	2	9	5DP5-3071- **	4788.
	1	0	1	5DP5-4011- **	2772.
	2	0	3	5DP5-5021- **	4410.
	2	1	15	5DP5-5091- **	6048.
5DP8 535 amp.	0	1	8	5DP8-4001- **	3402.
	0	2	9	5DP8-3071- **	5544.
	1	0	1	5DP8-4011- **	3150.
	2	0	3	5DP8-5021- **	5040.
	2	1	15	5DP8-5091- **	7497.
5DP6 700 amp.	0	1	8	5DP6-4001- **	5040.
	0	2	9	5DP6-3071- **	9576.
	1	0	1	5DP6-4011- **	4410.
	2	0	3	5DP6-5021- **	7938.
	2	1	15	5DP6-5051- **	11970.

Drive Contactors - Old Style

For New Installations Use Preferred Style

Type & Rating	Poles		Fig.No.	Open Type Catalog No.	Price
7000 10/40 amp.	0	1	7A	7000-5150- **	\$ 208.
	2	0	3	7000-7030- **	227.
	2	1	10	7000-7140- **	296.
5DP1 30 amp.	0	1	8	5DP1-01(*)00	416.
	0	2	9	5DP1-02(*)00	491.
	1	0	1	5DP1-10(*)00	378.
	1	1	5	5DP1-11(*)00	441.
	2	0	2	5DP1-20(*)00	403.
	2	1	6	5DP1-21(*)00	466.
	2	0	3	5DP1-5021- **	441.
	2	1	7	5DP1-5051- **	504.
5DP2 56 amp.	0	1	8	5DP2-01(*)00	630.
	0	2	9	5DP2-02(*)00	920.
	1	0	1	5DP2-10(*)00	605.
	1	1	5	5DP2-11(*)00	857.
	2	0	2	5DP2-20(*)00	794.
	2	1	6	5DP2-21(*)00	895.
	2	0	3	5DP2-5021- **	832.
	2	1	7	5DP2-5051- **	935.
5DP3 110 amp.	0	1	8	5DP3-01(*)00	895.
	0	2	9	5DP3-02(*)00	1323.
	1	0	1	5DP3-10(*)00	857.
	1	1	5	5DP3-11(*)00	1176.
	2	0	2	5DP3-20(*)00	1109.
	2	1	6	5DP3-21(*)00	1439.
	2	0	3	5DP3-5021- **	1172.
	2	1	7	5DP3-5051- **	1502.
5DP4 180 amp.	0	1	8	5DP4-01(*)00	1222.
	0	2	9	5DP4-02(*)00	1817.
	1	0	1	5DP4-10(*)00	1058.
	1	1	5	5DP4-11(*)00	1628.
	2	0	2	5DP4-20(*)00	1470.
	2	1	6	5DP4-21(*)00	2041.
	2	1	7	5DP4-5051- **	2104.
5DP9 260 amp.	0	1	8	5DP9-01(*)00	1676.
	0	2	9	5DP9-02(*)00	2405.
	1	0	1	5DP9-10(*)00	1481.
	1	1	5	5DP9-11(*)00	2192.
	2	0	2	5DP9-20(*)00	2003.
	2	1	6	5DP9-21(*)00	2730.
	2	1	7	5DP9-5051- **	2797.
5DP5 360 amp.	0	1	8	5DP5-01(*)00	3024.
	0	2	9	5DP5-02(*)00	4788.
	1	0	1	5DP5-10(*)00	2772.
	1	1	5	5DP5-11(*)00	4410.
	2	0	2	5DP5-20(*)00	4032.
	2	1	6	5DP5-21(*)00	5670.
	2	1	7	5DP5-5051- **	6048.
5DP8 535 amp.	0	1	8	5DP8-01(*)00	3402.
	0	2	9	5DP8-02(*)00	5544.
	1	1	5	5DP8-11(*)00	5040.
	2	0	2	5DP8-20(*)00	4662.
	2	1	6	5DP8-21(*)00	7119.
	2	1	7	5DP8-5051- **	7497.
5DP6 700 amp.	0	1	8	5DP6-01(*)00	5040.
	0	2	9	5DP6-02(*)00	9576.
	1	0	1	5DP6-10(*)00	4410.
	1	1	5	5DP6-11(*)00	8442.
	2	0	2	5DP6-20(*)00	7434.
	2	1	6	5DP6-21(*)00	11466.

* **Coil Table #1** Replace * with appropriate coil voltage digit.

60 Hz/Voltage	(*)	DC/Voltage	(*)
120	1	115	8
240	2	230	9

** **Coil Table #2** Replace ** with appropriate coil voltage suffix

60 Hz/Voltage	Suffix	DC/Voltage	Suffix
120	11	12	72
208/240	21	24	82
208	90	48	32
240	21	120	12
480	41	240	22
600	51		

For all DC Coils up to 260 Amp add \$202., for 360 & 535 Amp. add \$328., 700 Amp. deduct -\$504.00

The N.C. contact is short time rated for Dynamic Braking applications. Refer to table on page J7 for N.C. contact ratings.

Auxiliary Contact Blocks

Description	Factory Installed	Field Installation	
	Addition	Kit No.	Price
Front mtd. aux. 10/40 amp. Old Style & 40A.			
N.O. - N.C. right hand front mtg.	76.	5999-3504	38.
N.O. - N.C. left hand front mtg.	76.	5999-3604	38.
N.O. - N.C. for multiple front mtg.	76.	5999-3704 ¹	38.
For 10/40 amp. Old Style & 40-535 Amp.			
N.O.	101.	5M63	50.
N.C.	101.	5M64	50.
N.O. & N.C.	139.	5M65	88.
N.O. low power .	227.	5M63L	176.
N.C. low power.	227.	5M64L	176.
N.O. & N.C. low power.	353.	5M65L	302.
N.O. Standard & N.C. low power.	277.	5M66	227.
N.O. low power & N.C. standard.	277.	5M65LO	227.
N.C. late break.	101.	5M64E	50.
N.O. & N.C. late break.	139.	5M68 ⁴	88.
N.C. lower power late break.	227.	5M64LE	176.
N.O. & N.C. low power late break.	277.	5M67 ⁴	227.
N.O. low power & N.C. low power late break.	347.	5M69 ⁴	302.
Tandem mounting auxiliary. * *	38.	5M60DA ²	32.
For 700 amp.			
Bi-Pole (N.O. & N.C.).	416.	5999-3163 ³	151.
N.O. low power .	391.	5999-3361 ³	126.
N.C. low power .	391.	5999-3362 ³	126.
N.O. & N.C. late break.	416.	5M46	151.
Bracket for mounting two additional contact blocks.	391.	5999-3969	63.

* * NOT for 10/40A or 40A

NOTE:

1. Kit includes one N.O. - N.C. auxiliary plus mounting hardware for installing 3rd and 4th auxiliary.
2. Contains mounting hardware only. Order auxiliary separately.
3. Without mounting bracket. Bracket required for mounting more than

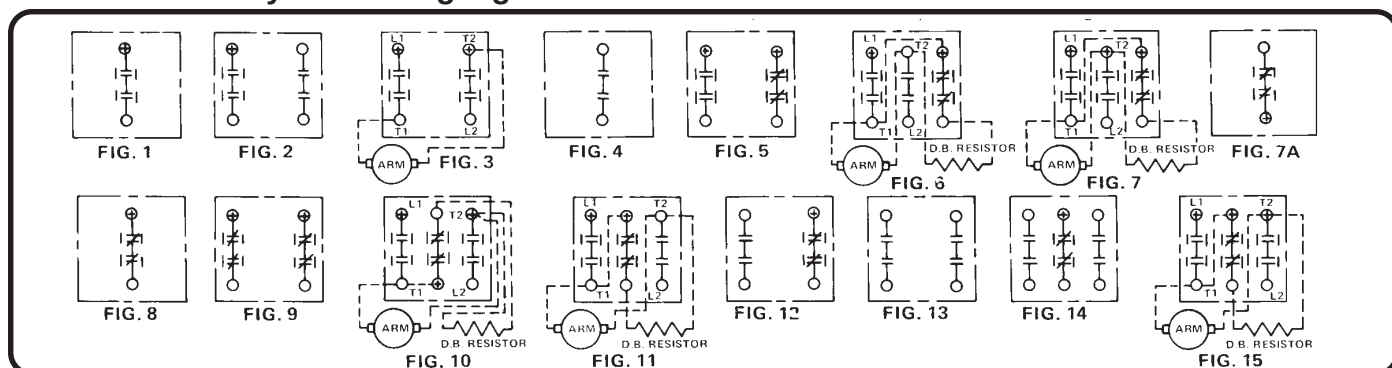
J

Auxiliary Contact Blocks contain 1 or 2 contact depending on the type ordered, the table below lists max. # of contact blocks for each contactor rating.

Amps	Front Mtd		Side Mtd		Maximum Aux. Contacts	N.O.	N.C.	Amps	Front Mtd		Side Mtd		Maximum Aux. Contacts	N.O.	N.C.
	LHS	RHS	LHS	RHS					LHS	RHS	LHS	RHS			
10/40 A	1 ⁵	1 ⁵ or 1	1	1	4=5	2	2	180 A	0	0	2	2	8 =	4	4
30 A	0	0	1	1	4=	2	2	260 A	0	0	2	2	8 =	4	4
40 A	1 ⁵	1 ⁵ or 1	1	1	4=5	2	2	360 A	0	0	2	2	8 =	4	4
56 A	0	0	2	2	8=	4	4	535 A	0	0	2	2	8 =	4	4
75 A	0	0	2	2	8=	4	4	700 A	0	0	2	1	6 =	3	3
110 A	0	0	2	2	8=	4	4								

4. Not for use on 10/40, 40 & 75 Amp.
5. If DC coil required then front Mtd Auxiliares not available & contact blocks restricted to 2 & max. aux. contacts 4. 1 contact listed also used to economise coil when DC operated.

Terminal Polarity and Wiring Figures:



Symbols: ---|--- N.O. Contact ---|---| Contact with Blowout ---|---/ N.C. Contact $\oplus$ Positive Polarity

Contacts without blowouts do not have any interrupting rating. Contactors with 2 N.O. contacts and blowouts will interrupt 200% current under abnormal conditions.

Contact Kits¹ - 5DP

Contactor Type	Rating	N.O. Contact Kit No.	Price	N.C. Contact Kit No.	Price
7000, 7001	10/40A 40A	5M19	\$83.	5M20	\$83.
5DP1	30A	5M55	83.	5M57	90.
5DP2	56A	5M52	173.	5M58	248.
5DP7	75A	5999-2521	131.	5M48	166.
5DP3A	110A	5M80A	207.	5M58	248.
5DP3	110A	5M53	207.	5M49	228.
5DP4	180A	5M54	386.	5M49	228.
5DP9	260A	5M56	552.	5M49	228.
5DP5	360A	5M-045	803.	5999-2461	580.
5DP8	535A	5999-2371	1012.	5999-2461	580.
5DP6	700A	5999-2381	1553.	5999-2481	1553.

DC Power Pack Kits⁵ - AC Coils

Rating	Volts 60Hz	Kit No.	Price
5DP6	120	5999-8061	\$621.
700amp.	240	5999-8062	621.
	480	5999-8063	621.

NOTE:

For all DC Coils up to 260 Amp add \$221., for 360 & 535 Amp. add \$359., 700 Amp. deduct - \$552.00

Auxiliary Contact Rating

AC Volts	10/40 Thru 100A Amperes	
	Continuous	Inrush
120	6	60
280	3	30
480	1.5	15
600	1.2	12

Contact Ratings

Coil Kits - 5DP (AC)

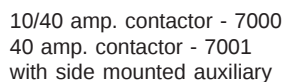
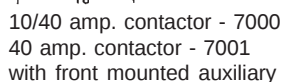
Rating	Volts 50/60Hz	V.A. -60Hz (Approx)		Kit No. ³	Price
		Inrush	Sealed		
7000	120	120	28	5ML25	\$ 53.
10/40 A	208	120	28	5ML26	53.
7001	240	120	28	5ML29	53.
40A	480	120	28	5ML27	53.
	600	120	28	5ML28	53.
5DP1 30A	120	234	36	5ML21	110.
5DP2 56A	240	264	41	5ML22	110.
5DP3A	480	245	37	5ML23	110.
110A	600	246	36.6	5ML24	110.
5DP7 75A	120	290	48	5999-1801	76.
	208	290	48	5999-1805	76.
	240	290	48	5999-1802	76.
	480	290	48	5999-1803	76.
	600	290	48	5999-1804	76.
5DP3 110A	120	672	62.4	5ML41	156.
5DP4 180A	208/240	672	69.6	5ML42	156.
5DP9 260A	480	672	67.2	5ML43	156.
	600	683	72	5ML44	156.
5DP5 360A	120	1725	151	5ML51	322.
	208/240	1750	138	5ML52	322.
	480	1776	144	5ML53	322.
5DP8 535A	600	1782	145	5ML54	322.
5DP6 700A	120	566	187	5999-1601	1656.
	208/220	530	156	5999-1604	2185.
	480	528	177	5999-1602	2185.
	120VDC			5999-1601	1656.
	240VDC (1-pole N.O.)			5999-1602	2185.
	240VDC (for 1-pole N.C.; 2-pole N.C.; 2-pole N.O.)			5999-1602	2185.
	2-pole N.C. & 1-pole N.C.)			5999-1602	2185.
				5999-1603	2185.

DC Contact Rating - Amperes⁷

Type & Rating	Poles	N.O. Contacts (duty)		N.C. Contacts (intermittent)		Type & Rating	Poles	N.O. Contacts (duty)		N.C. Contacts (intermittent)	
		240V	500V	Dynamic Brake Make Only - 500V Max.	Jogging Break Only - 160V Max.			240V	500V	Dynamic Brake Make Only - 500V Max.	Jogging Break Only - 160V Max.
7000	2	----	10	20	7	5DP4	1	180	----	315	105
10/40amp.	2	40	----	80(240V)	27(80V)	180amp.	2	180	180	----	----
7001	2	40	40	70	23	5DP9	1	----	----	387	135
40amp.						260amp.	2	260	260	----	----
5DP1	1	30	30	54	20	5DP5	1	360	360	720	240
30amp.	2	30	30	----	----	360amp.	2	360	360	----	----
5DP2	1	56	56	105	35	5DP8	1	----	----	1070	356
56amp.	2	56	56	----	----	535amp.	2	535	535	----	----
5DP7	2	75	75	150	50	5DP6	1	700	700	1400	466
75amp.						700amp.	2	700	700	----	----
5DP3	1	110	----	315	105						
5DP3A	2	110	110	----	----						
110amp.											

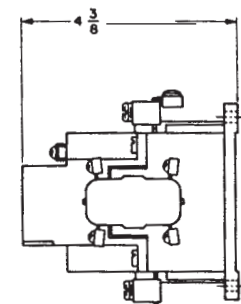
Note:

- Contact Kits for 1-pole include stationary contacts, movable contacts and contact spring except as noted for 700 amp. size.
- Assembled kit for 1-pole including yoke with movable contacts and springs; stationary contacts.
- For all pole combinations except 2-pole N.C.
- These coils are for exact replacement at operating voltage and frequency listed.
- Power pack assembly kit includes rectifier, economizing resistor and terminal block. Power Pack Kit must be used on all DC operated 5DP6 units
- Values measured at rectifier power pack input.
- It is necessary to phase back the SCR's so that contactor normally does not interrupt appreciable current. Contactors with blowouts and 2 N.O. contacts will interrupt 200% current under abnormal conditions.

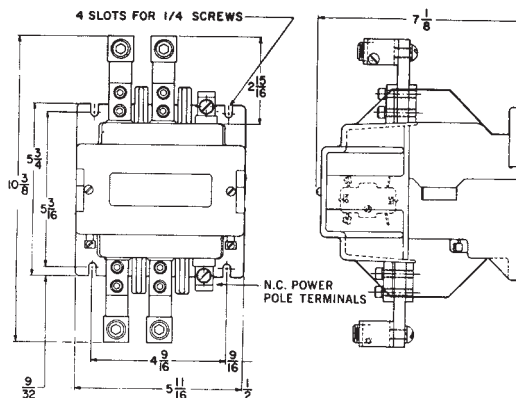


Dimensions - Approximate
(Contactor base mounted vertically)

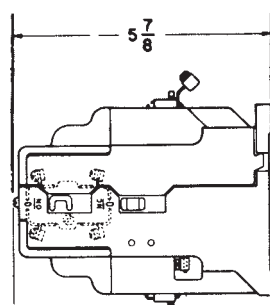
For side mounted auxiliary contact blocks add 1/2" per side to width dimension for all contactor sizes.



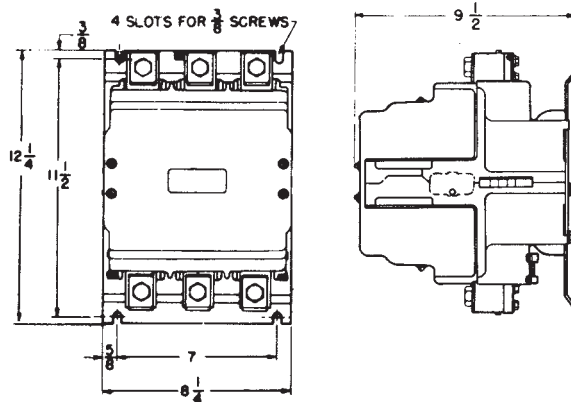
75 amp. contactor - 5DP7



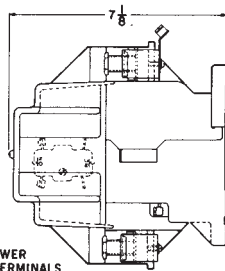
260 amp. contactor - 5DP9



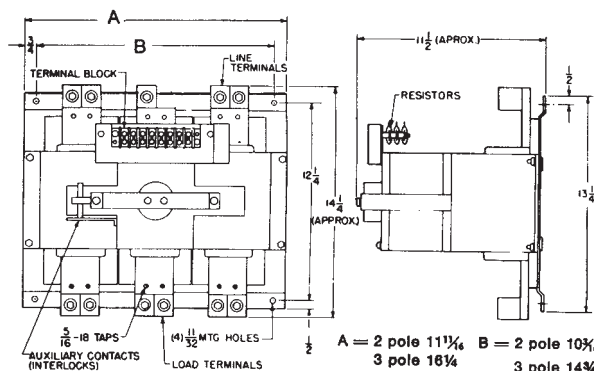
110 amp. contactor - 5DP3A
30 & 56 amp. contactor - 5DP1 & 5DP2



360 & 535 amp. contactor - 5DP5 & 5DP8



110 amp. contactor - 5DP3
180 amp. contactor - 5DP4



700 amp. contactor - 5DP6

DC Contactors in sizes 1 Thru 5 are for use as main line, reversing or accelerating contactors in DC motor starters and controllers. Other applications include switching resistive heating and battery loads.

Description

All DC Contactors are solenoid operated for fast, constant, long-life performance. Generous size double break silver cadmium oxide contacts in combination with built-in permanent magnet blowouts assure long contact life and positive circuit interruption. Terminal location makes the contactors ideal for straight-through wiring and for wire channel layouts. Accessible up-front pressure-type terminals are furnished as standard.

Auxiliary Contacts

All contactors can be furnished with N.O., N.C. or N.O. & N.C. auxiliary contact blocks. Each contactor can be supplied with a maximum of four auxiliary contact blocks. Kits are also available for field installation.

Operating Coils

Standard coils for DC operation are molded and equipped with pressure type terminals. The DC coils are furnished with late break auxiliary and economizing resistors as standard. AC coils can be furnished for applications requiring an AC control circuit.



250 Volts DC Max

Size	8-Hour Rating in Amps.		Open Type DC Coil 1 Pole N.O. Catalog No. ²	Price	Open Type DC Coil 2 Pole N.O. Catalog No. ²	Price	Open Type DC Coil 2 Pole N.O. & 1 Pole N.C. Catalog No. ²	Price
	Open	Enclosed						
1	25	22.5	74014010- *	\$ 580.	7401-1020- *	\$ 643.	7401-3050- *	\$ 706.
2	50	45	74024010- *	806.	7402-1020- *	1033.	7402-3050- *	1134.
3	100	90	-----1		7403-1020- *	1373.	7403-3050- *	1701.
4	150	135	-----1		7404-1020- *	1739.	7404-3050- *	2306.
5	300	270	7405-4010- *	3100.	7405-1020- *	4360.	7405-3050- *	5998.
Size	Open	Enclosed	1 Pole N.O. - AC Coil		2 Pole N.O. - AC Coil		2 Pole N.O. - 1 N.C. - AC Coil	
1	25	22.5	7441-4010- *	378.	7441-1020- *	441.	7441-3050- *	504.
2	50	45	7442-4010- *	605.	7442-1020- *	832.	7442-3050- *	932.
3	100	90	-----1		7443-1020- *	1172.	7443-3050- *	1499.
4	150	135	-----1		7444-1020- *	1537.	7444-3050- *	2104.
5	300	270	7445-4010- *	2772.	7445-1020- *	4032.	7445-3050- *	5670.

Auxiliary Contact Ratings

DC Volts	Amperes Normal	AC Volts	Amperes	
			Normal	Inrush
125	1.1	120	6.0	60
250	0.55	240	3.0	30
		480	1.5	15
		600	1.2	12

Note:

- On Sizes 3 & 4 only for single pole applications use two poles in series and for two pole applications use one pole in each line.
- Contactors furnished without auxiliary contact. See Modifications & Accessories.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from the coil table.

Coil Table

AC 60Hz/Voltage	Suffix	DC Voltage	Suffix
120	11	24	82
208/240	21	48	32
480	41	120	12
600	51	240	22

DC Coils³ Discount Schedule JC 27

Discount Schedule JC 27

NEMA Size	Voltage	Kit No. ¹	Price
1 & 2	120	5999A-2931	\$ 186.
	240	5999A-2932	186.
3 & 4	120	5999A-2941	232.
	240	5999A-2942	232.

AC Coils ³			
NEMA Size	50/60Hz Volts	Kit No.	Price
1 & 2	120	5ML21	\$ 110.
	240	5ML22	110.
	480	5ML23	110.
	600	5ML24	110.
3 & 4	120	5ML41	156.
	240	5ML42	156.
	480	5ML43	156.
	600	5ML44	156.
5	120	5ML51	276.
	240	5ML52	322.
	480	5ML53	322.
	600	5ML54	322.

Modification & Accessories

Discount Schedule JC 20

Description	Kit No.	Price
Kits For Field Installation:		
N.O. Aux.	5M63	\$ 50.
N.C. Aux	5M64	50.
N.O. & N.C. Aux	5M65	88.
N.C. Late Break Aux.	5M64E	50.
Mechanical Interlock - Size 1-4	5999-4737	76.
Size 5	5999-4757	252.
Reversing Base Plate:		
NEMA Sizes 1 & 2	23082.79-1	69.
NEMA Size 3 & 4	23083.30-1	88.
NEMA Size 5	23085.312-1	189.
N.O. or N.C. Aux. Contact Installed		101.
N.O. & N.C. Aux. Contact Installed		139.

Contact Kits - (For 1-Pole) Discount Schedule JC 27

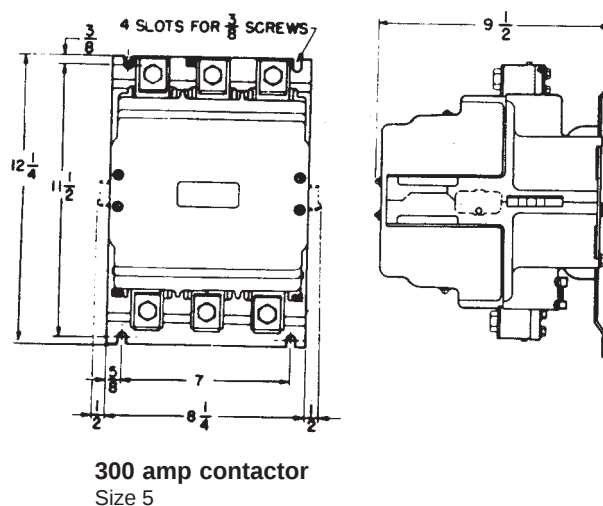
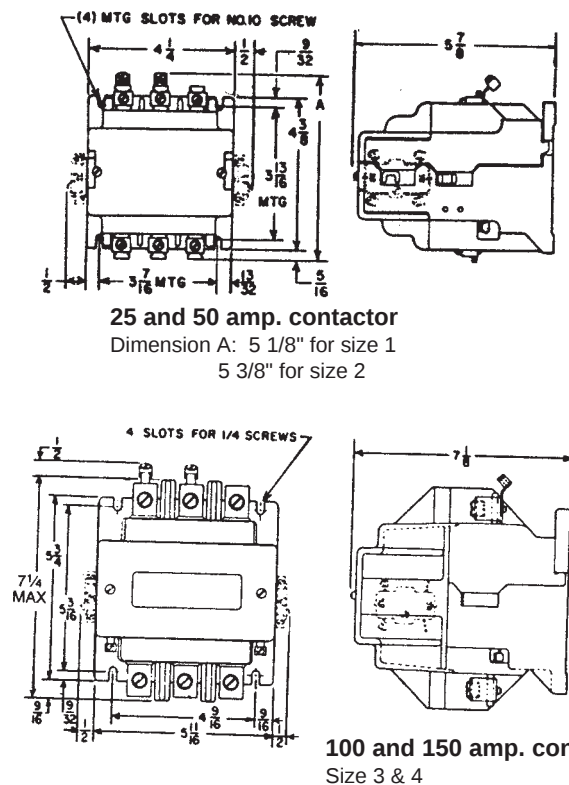
Discount Schedule JC 27

Size	N.O. Contacts		N.C. Contacts	
	Kit No. ²	Price	Kit No. ²	Price
1	5M55	\$ 83.	5M57	\$ 90.
2	5M52	173.	5M58	248.
3	5M53	207.	5M49	228.
4	5M54	386.	5M49	228.
5	5999-0045	803.	5999-2461	580.

Notes:

1. Coil Kits include economizing resistor and normally closed late break auxiliary.
2. Kits include stationary contacts, movable contacts and contact spring.
3. For special coils refer to factory.

DIMENSIONS - Approximate
(Contactor base must be mounted vertically)



Vitrohm plate type

100-2000 WATTS 600 VOLT SERVICE

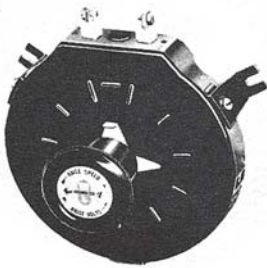


Fig. 1. Vitrohm pressed steel rheostat for front-of-board mounting.

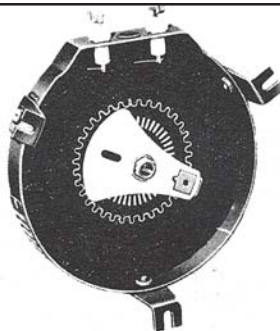


Fig. 2. 8" Vitrohm rheostat, Type S standard contacts, front-of-board mounting.



Fig. 3. 8" Vitrohm rheostat, Type M multi-step contacts, front-of-board mounting.

STANDARD SIZE RHEOSTATS - 6", 8", 13" TYPES S and M

APPLICATION

Vitrohm pressed steel rheostats furnish a simple, accurate and economical method of field control. They are universally applied for adjusting generator, alternator and exciter field currents to obtain variations in output voltage and for field control of adjustable speed D.C. and synchronous motors. Other typical applications include heater, furnace, battery charging and other controls.

4" RHEOSTATS-300 Volt Max. Service

APPLICATION

Vitrohm 4" rheostats for 300 volt max. service are specially designed for field and other control applications.

DANCER ROLL RHEOSTATS-6, 8, 13 inch Types S and M

APPLICATION

Series 60DR rheostats are for dancer roll service on multi-motor drives where relative speeds between the motors must be maintained within specified limits. Typical applications of these field control rheostats include textile, paper, steel mills and others in the process machinery field.

MOTOR DRIVE ACCESSORIES-Type SMD

APPLICATION

Type SMD Accessories are for use with 8" or 13" rheostats where motor driven operation is required. Standard assemblies can be applied to drive up to four plates simultaneously. For larger 15 1/2" and 18" rheostats as well as the 13" size, a Type LMD large motor drive is available on order.

TO ORDER RHEOSTATS

* Consult Factory for price and availability

* If replacing and existing unit have the "K" number or serial number available.

FOR GENERATOR FIELD CONTROL SPECIFY:

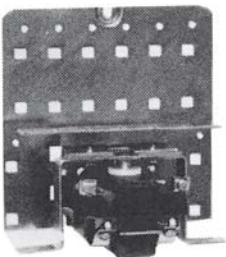
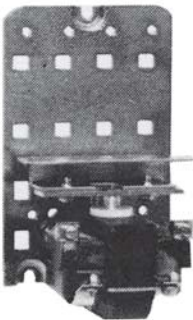
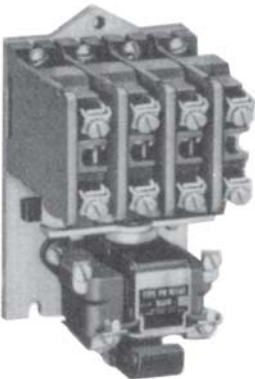
1. Whether self-or separately-excited. If separately excited give voltage, field resistance (hot or cold) and minimum field current. If self-excited state maximum field current and field resistance (cold) under no load conditions, or peak generator voltage and field current at peak voltage and minimum generator voltage with field current at minimum voltage. For special control requirements supply saturation curve.

2. Open or enclosed
3. Type contacts
4. Type accessory.
5. Manual or motor drive
6. Optional or special

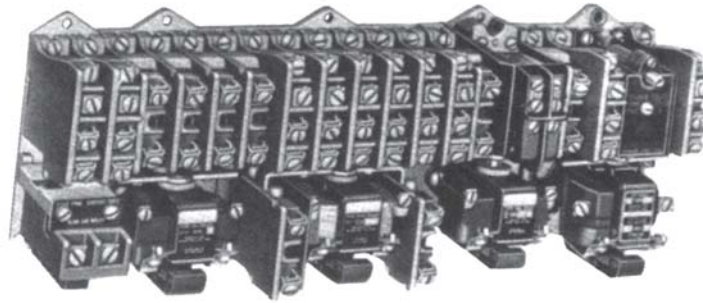
FOR OTHER APPLICATIONS SPECIFY:

1. Maximum and minimum current
2. Rheostat resistance.
3. Open or enclosed
4. Type contacts
5. Type accessory. If back-of-board mounting, state panel thickness
6. Manual or motor drive.
7. Optional or special features required.

Description	Page Number
General Information	K2
PM AC Relays	
PM Convertible, PMA, PMF, AC Relays.....	K4
PM Latching, PML, PMAL, AC Relays	K5
Pole Arrangement, Diagrams, PM, PMA, PMF	K6
Dimensional Data, PM, PML, PMA, PMAL, PMF	K7
PMS, Slim Jim AC Relays	K8
PMT, AC Pneumatic Timing Relays	K10
PM Relay Parts and Modification Kits	K11
PM DC Relays	
PM Convertible DC Relays.....	K12
PML Latching DC Relays	K13
PMT DC Pneumatic Timing Relays	K14
Dimensional Data DC Relays	K16
Engineering Data.....	K17
Series 447 Relays	K18



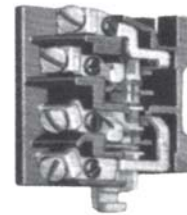
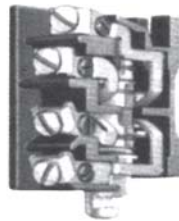
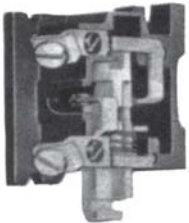
K



The Joslyn Clark PM Family of control relays provides flexibility, versatility and reliability. The exclusive design concept and rugged construction of the PM line offers many advantages for the designer and builder of today's complex control panels.

Features:

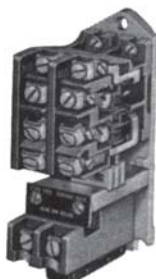
- **Modular Construction** -allows field addition, replacement or conversion of poles for unlimited flexibility.
- **Interchangeability of Parts** - reduces inventory requirements.
- **Uniformity of Design** -simplifies engineering, installation and maintenance.
- **Flexibility of Application** - provided by many modifications including noble metal, gold bonded, anti-weld and overlapping contacts.



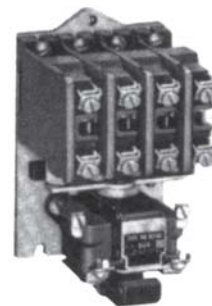
Convertible Poles contain one contact, either NO or NC and can be easily field converted from one to the other. Identified by WHITE operating rod.

Universal Poles contain two independent isolated contacts, one NO and one NC. Identified by RED operating rod.

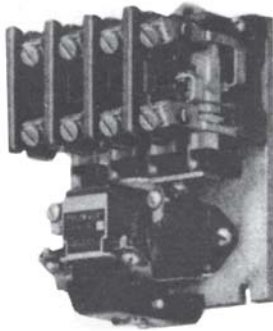
Duplex Poles contain two independent isolated contacts, both NO. Identified by GREEN operating rod.



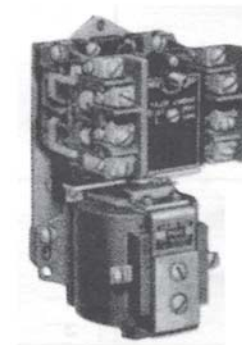
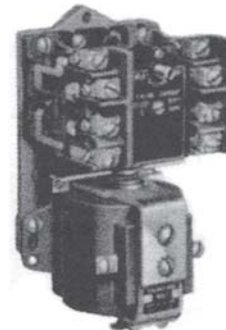
PMS Slim Jim Relays are 1 - 1 1/2" wide. They are the smallest members of the PM Family. Available with up to 4 contacts; they provide the reliability of heavy duty 600 Volt relays in the smallest possible space.



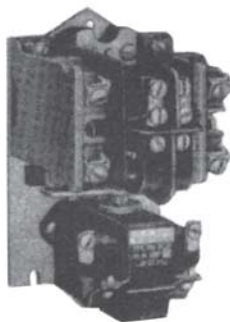
PM Convertible Pole Relays use white rod poles and are offered with up to 8 contacts in any combination of NO and NC contacts. Relays with up to 12 contacts using double deck bases can be supplied.



Type Relays, using universal poles have up to 12 contacts. Relays with up to 14 contacts are available, using some convertible poles. Type PMF Relays, combining several types of poles can have up to 14 contacts.



Type PMT Pneumatic Timing Relays, these relays are available for either "on-delay" operation (time delay after energization) or "off-delay" (time delay after de-energization). They may also be field converted from on to "off-delay" and vice versa, by merely inverting the operating magnet. Type PMT Time Delay relays are adjustable over a timing range from 0.2 seconds to 3 minutes with repetitive accuracy of $\pm 10\%$.



Latch Relays are available with either white rod convertible poles or red rod universal poles. The latching unit with continuous duty trip coil replaces the two pole modules directly above the relay magnet.



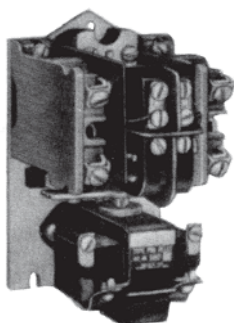
Type PM Convertible, PMA Universal, PMF Duplex

Total No. of Contacts ⁴	Normally Open Contacts	Normally Closed Contacts	Type PM Relays		Type PMA Relays		Type PMF Relays	
			Convertible Pole		Universal Pole		Duplex Pole	
			White	Operating Rod	Red	Operating Rod ¹	Green	Operating Rod ²
			Catalog Number	Price	Catalog Number	Price	Catalog Number	Price
2	2	0	5U2 *	\$ 180.	—	—	—	—
	1	1	5U2-1 *	216.	—	—	—	—
	0	2	5U2-2 *	216.	—	—	—	—
3	3	0	5U3 *	216.	—	—	—	—
	2	1	5U3-1 *	252.	—	—	—	—
	1	2	5U3-2 *	252.	—	—	—	—
	0	3	5U3-3 *	252.	—	—	—	—
4	4	0	5U4 *	240.	—	—	5UFK4 *	\$ 204.
	3	1	5U4-1 *	276.	—	—	5UFK4-1 *	240.
	2	2	5U4-2 *	276.	5UU2 **	\$ 216.	—	—
	1	3	5U4-3 *	276.	—	—	—	—
	0	4	5U4-4 *	276.	—	—	—	—
6	6	0	5U6 *	360.	—	—	5UF6 *	300.
	5	1	5U6-1 *	396.	—	—	5UF6-1 *	336.
	4	2	5U6-2 *	396.	—	—	5UF6-2 *	336.
	3	3	5U6-3 *	396.	5UU3 * *	252.	—	—
	2	4	5U6-4 *	396.	—	—	—	—
	1	5	5U6-5 *	420.	—	—	—	—
	0	6	5U6-6 *	420.	—	—	—	—
8	8	0	5U8 *	432.	—	—	5UF8 *	360.
	7	1	5U8-1 *	468.	—	—	5UF8-1 *	396.
	6	2	5U8-2 *	468.	—	—	5UF8-2 *	396.
	5	3	5U8-3 *	468.	—	—	5UF8-3 *	396.
	4	4	5U8-4 *	468.	5UU4 *	282.	—	—
	3	5	5U8-5 *	492.	—	—	—	—
	2	6	5U8-6 *	492.	—	—	—	—
	1	7	5U8-7 *	492.	—	—	—	—
	0	8	5U8-8 *	492.	—	—	—	—
10	10	0	—	—	—	—	5UF10 *	528.
	9	1	—	—	—	—	5UF10-1 *	528.
	8	2	—	—	—	—	5UF10-2 *	528.
	7	3	—	—	—	—	5UF10-3 *	528.
12	12	0	—	—	—	—	5UF12 *	664.
	11	1	—	—	—	—	5UF12-1 *	688.
	10	2	—	—	—	—	5UF12-2 *	688.
	9	3	—	—	—	—	5UF12-3 *	688.
	6	6	—	—	5UU6 *	628.	—	—
14	14	0	—	—	—	—	5UF14 *	736.
	13	1	—	—	—	—	5UF14-1 *	772.
	12	2	—	—	—	—	5UF14-2 *	772.
	11	3	—	—	—	—	5UF14-3 *	772.
	10	4	—	—	—	—	5UF14-4 *	772.
	9	5	—	—	—	—	5UF14-5 *	772.
	8	6	—	—	5UU86 *	700.	—	—
	7	7	—	—	5UU77 *	740.	—	—
	6	8	—	—	5UU68 *	740.	—	—
Alternate Layout 2	2	0	5UK2 *	180.	—	—	—	—
	1	1	5UK2-1 *	216.	—	—	—	—
Alternate Layout 4	4	0	5UK4 *	240.	—	—	—	—

¹ See notes 3,5 and 6 page K5 & K7² See note 2 page K5

Ordering Information

- Use complete catalog no. replace the (*) with suffix from coil Table, (Located on Page K5)



Latch Relays

The latch unit occupies the space of two poles directly above the magnet, and provides a means of holding the relay in the energized position after the coil of the main operating magnet is de-energized. Momentarily energizing the continuous duty coil of the latch unit allows the relay to return to the normal, de-energized position.

Type PM Latch Relays, PML Convertible, PMAL Universal

Total No. of Contacts	Normally Open Contacts	Normally Closed Contacts	Type PML		Type PMAL	
			Convertible Pole		Universal Pole	
			White	Operating Rod	Red	Operating Rod
			Catalog Number	Price	Catalog Number	Price
2	2	0	5UH2	* \$350.	—	—
	1	1	5UH2-1	* 384.	—	—
	0	2	5UH2-2	* 384.	—	—
3	3	0	5UH3	* 384.	—	—
	2	1	5UH3-1	* 420.	—	—
	1	2	5UH3-2	* 420.	—	—
	0	3	5UH3-3	* 420.	—	—
4	4	0	5UH4	* 408.	—	—
	3	1	5UH4-1	* 444.	—	—
	2	2	5UH4-2	* 444.	5UUh2	* \$384.
	1	3	5UH4-3	* 444.	—	—
	0	4	5UH4-4	* 444.	—	—
6	6	0	5UH6	* 528.	—	—
	5	1	5UH6-1	* 564.	—	—
	4	2	5UH6-2	* 564.	—	—
	3	3	5UH6-3	* 564.	5UUh3	* 420.
	2	4	5UH6-4	* 564.	—	—
	1	5	5UH6-5	* 588.	—	—
	0	6	5UH6-6	* 588.	—	—
8	4	4	—	—	5UUh4	* 450.
10	6	4	—	—	5UUh64	* 688.
	5	5	—	—	5UUh55	* 724.
	4	6	—	—	5UUh46	* 724.

¹ Maximum of 8 contacts only on 25 hz.

² PMF relays with N.C. contacts have universal red rod & duplex green rod poles. Maximum of 8 contacts only on 25 hz.

³ Price includes open type relay complete with operating coil. Latching relays include latch unit with continuous duty trip coil.

⁴ Overlapping contacts are available at \$120.00 list per pair. Specify when ordering.

⁵ For Dimensions, refer to page K7 For modification Kits, refer to page K11.

⁶ Additional relays with alternate pole configurations available.

Relay Enclosure P6E-01 \$80.00

5U4B - * 4 pole base only \$114
5U8B - * 8 pole base only \$144

Ordering Information

- Use complete catalog number. Replace the (*) with suffix coil table.
Ex. 4 Pole Relay with 120V, 60Hz. coil; 5UH4-76.
- Latch Relays are supplied with main coil and latch coil of the same voltage. For variations, consult factory.

* Suffix Coil Table

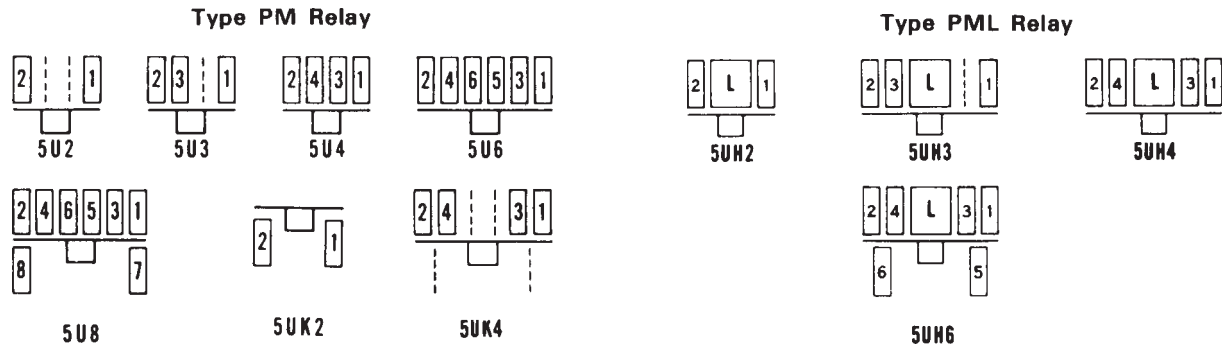
Volts	Hertz		
	60	50	25
24	—96	—95	—92
110-120	—76	—75	—72
220-240	—26	—25	—22
380	—36	—35	—32
440-480	—46	—45	—42
550-600	—56	—55	—52



Contact Arrangement

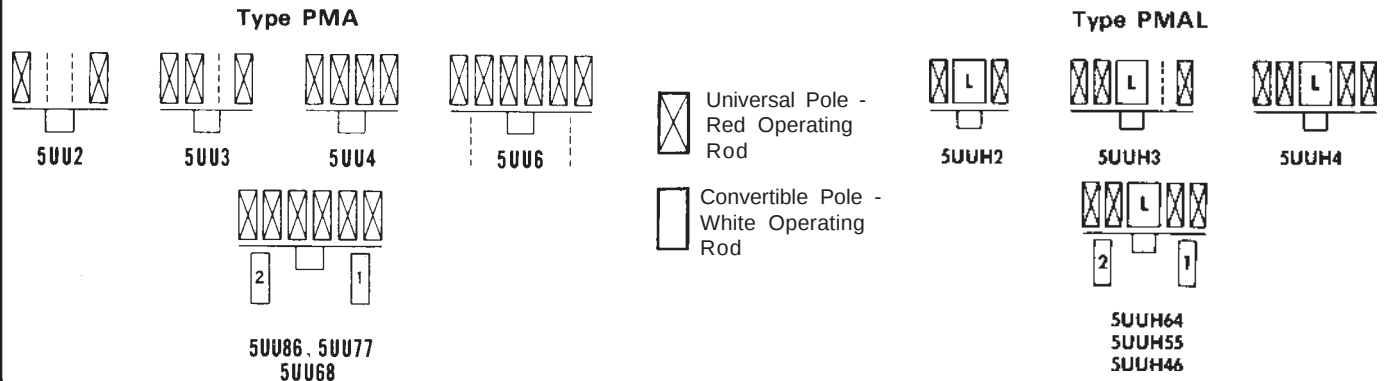
Type PM Convertible Pole Relays

Numbers in pole locations indicate the sequence in which normally closed poles are mounted when required.



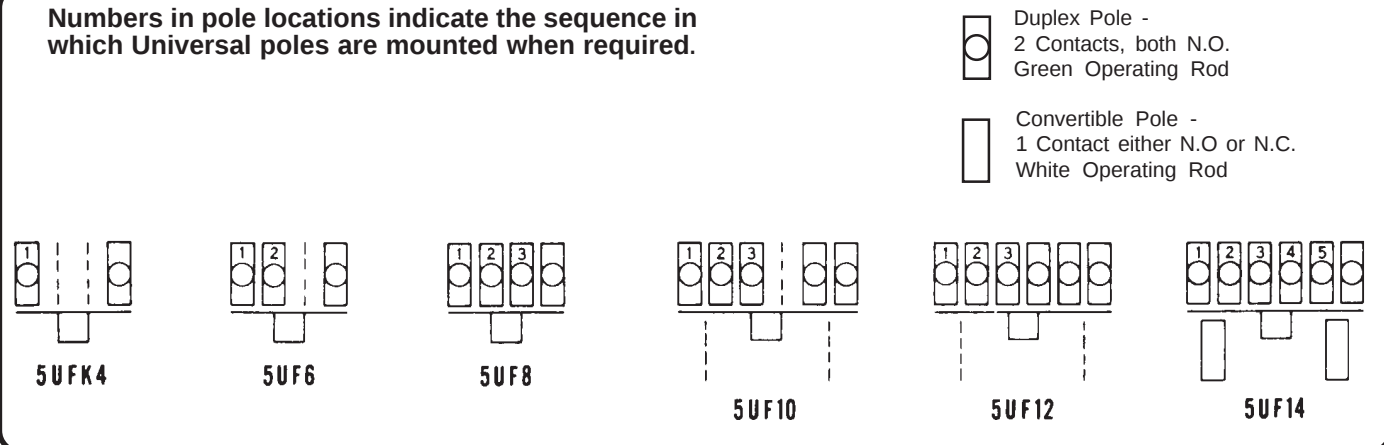
Type PMA Universal Pole Relays

Numbers in pole locations indicate the sequence in which normally closed convertible poles are mounted when required.

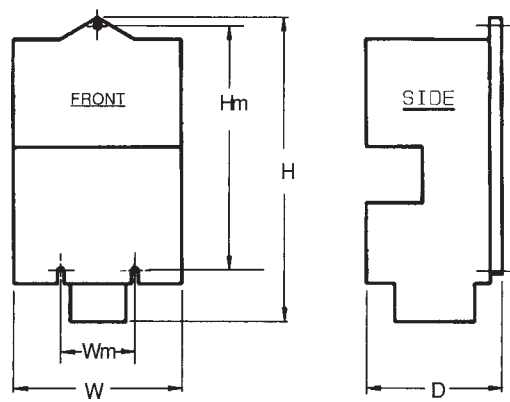


Type PMF Duplex Pole Relays

Numbers in pole locations indicate the sequence in which Universal poles are mounted when required.



Dimensional Data



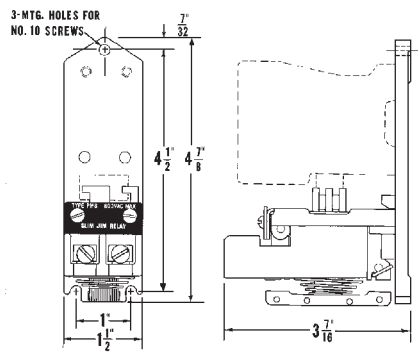


AC Relays - Slim Jim Type PMS - Bulletin 7305

Pole ‡ Arrangement	Contacts		Description	Rod Color	Open Type Cat. No.	Price
	N.O.	N.C.				
	1	0	1 Convertible Pole	White	5SW *	\$ 144.
	2	0	2 Convertible Poles	White	5SWW *	180.
	2	0	1 Duplex Pole	Green	5SG *	156.
	4	0	2 Duplex Poles	Green	5SGG *	204.
	1	1	1 Universal Pole	Red	5SR *	168.
	2	2	2 Universal Poles	Red	5SRR *	216.
	3	1	1 Universal Pole and 1 Duplex Pole	Red Green	5SRG *	228.

Relay Enclosure P6E-01 \$80.00

Approximate Dimensions In Inches



‡ Pole Symbols

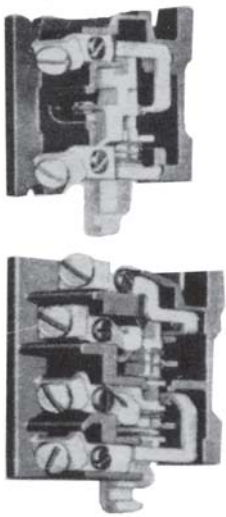
-
- Represents one Convertible Pole, which includes one normally open contact.
-
- Represents one Duplex Pole, which includes two normally open contacts.
-
- Represents one Universal Pole, which includes two contacts, one normally open and one normally closed.
-
- Represents one space where a Convertible, Duplex or Universal Pole may be added.

Ordering Information		Coil Table				
● Use complete catalog number. Replace the (*) with the suffix from Coil Table. ● Example: Cat. No. 5SRR-76 (110-120 Volt, 60 Hertz).	● Engineering Data ● Modification page K9	<u>60Hz Voltage</u>		Suffix	60 Hz Voltage	Suffix
		24 Separate Control		-96	200-240	-26
		120 Separate Control		-76	440-480	-46
					550-600	-56



Pole Assemblies

Contacts		Rod	Pole	Kit	Price
N.O.	N.C.	Color	Description	Cat. No.	
1	0	White	Convertible Pole	KPM-1A	\$ 36.
0	1	White	Convertible Pole	KPM-2A	36.
1	1	Red	Universal Pole	KPMA-1	54.
2	0	Green	Duplex Pole	KPMF-1	54.
1	0	Black	Convertible Pole — Overlap Contacts	KPM-21A	60.
0	1	Black	Convertible Pole — Overlap Contacts	KPM-22A	60.
1	0	White	Convertible Pole — Anti-Weld Contacts	KPM-31A	48.
0	1	White	Convertible Pole — Anti-Weld Contacts	KPM-32A	48.
1	1	Orange	Overlap Contact	KPMA-21	108.
1	1	Red	Universal Pole — Anti-Weld Contacts	KPMA-2	78.
2	0	Green	Duplex Pole — Anti-Weld Contacts	KPMF-2	78.
1	1	Orange	Universal Pole — Overlap. Anti-Weld Contacts	KPMA-22	132.



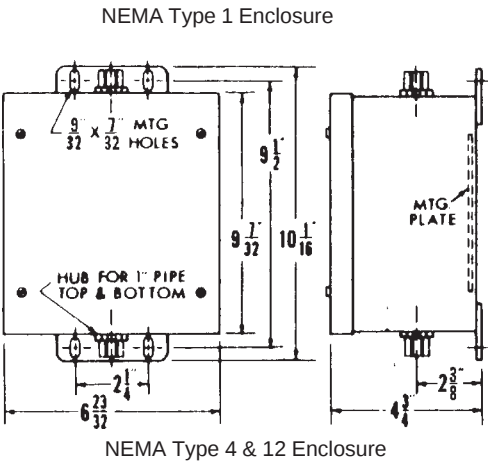
Relay Bases Only

Coil		Base	Price
Voltage	Hertz	Catalog Number	
24	60	5S-96	\$120.
110-120	60	5S-76	
110	50	5S-75	
220-240	60	5S-26	
220	50	5S-25	
380	50	5S-46	
440-480	60	5S-46	
550-600	60	5S-56	

¹ Price listed for relay base includes magnet coil and mounting plate, less poles.

Enclose P6E-01 \$80.00

Approximate Dimensions In Inches



K

4
3
0

Ordering Information	Coil Data	Coil Table	
● Use complete catalog number.	Inrush volt-amperes (at 60 hertz) <u>61</u> Holding volt-amperes (at 60 hertz) <u>16</u>	60Hz Voltage	Suffix
		24 Separate Control	-96
		120 Separate Control	-76
		60 Hz Voltage	Suffix
		200-240	-26
		440-480	-46
		550-600	-56



AC Pneumatic Time Delay Relays - Type PMT Bulletin 7313

Timing Range Adjustable From 0.2 Second To 3 Minutes - Accuracy + 10%

Oper'ng Mode	No. of Univ. Poles	Contacts				Universal Pole ⁶ Arrangement	Open Type Relays			
		Time Delay		Instan.Aux.						
		N.O.	N.C.	N.O.	N.C.		Catalog No	Price		
On Delay Off Delay	1	1	1	None	None		713UP *	\$600.		
		1	1	None	None		713UPD *			
On Delay Off Delay	2	1	1	1	1		713UPA *	660.		
			1	1	1	1			713UPDA *	
On Delay Off Delay		2	2	None	None		713UPE *	780.		
			2	2	None	None			713UPDE *	
On Delay Off Delay	3	1	1	2	2		713UPB *	720.		
			1	1	2	2			713UPDB *	
On Delay Off Delay		2	2	1	1		713UPF *	840.		
			2	2	1	1			713UPDF *	
On Delay Off Delay	4	1	1	3	3		713UPC *	780.		
			1	1	3	3			713UPDC *	
On Delay Off Delay		2	2	2	2		713UPG *	900.		
			2	2	2	2			713UPDG *	

Notes

- Price includes open type relay complete with timing head and operating coil. To complete Cat. No., add coil suffix.
- On Delay** - Timed interval occurs between **energization** of the coil and actuation of timed contact.
- Off Delay** - Timed interval occurs between **de-energization** of the coil and actuation of timed contact.
- Each universal pole consists of two independent isolated contacts suitable for 600 volts at opposite polarity.
- Relays may be converted in the field from **On Delay to Off Delay** and vice versa, using only a screwdriver. When this conversion is made, normally open contacts become normally closed contacts and vice versa.
- On sketches showing universal pole arrangements:
Letters T indicate locations of time delay poles.
Letters I indicate locations of instantaneous poles.
Dotted lines indicated locations where universal poles may be added. Class A relays may have two timed poles maximum.

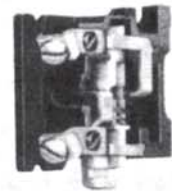
Enclose P6E-01 \$80.00

K

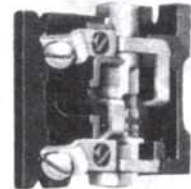
Ordering Information		Coil Table			
- Use complete catalog number. Replace the (*) with the suffix from Coil Table. - Example: Cat. No. 713UPA (110-120 Volt, 60 Hertz). - Overlapping contacts are available in the same contact block at \$120. per pair.	- Engineering Data - Modification page K11	60Hz Voltage	Suffix	60 Hz Voltage	Suffix
		24 Separate Control	-96	200-240	-26
		120 Separate Control	-76	440-480	-46
				550-600	-56

Modification Kits for Type PM Family - Discount Schedule JC55

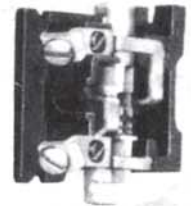
Description	Catalog Number	Price
Kits for BUL. 7305 Type PM Convertible Pole Relays		
Pole Kits (All are convertible)		
N.O. Non-Overlap Contacts, Closed Top	KPM-1A	\$ 36.
N.C. Non-Overlap Contacts, Closed Top	KPM-2A	36.
N.O. Non-Overlap Contacts, Open Top	KPM-3A	36.
N.C. Non-Overlap Contacts, Open Top	KPM-4A	36.
N.O. Non-Overlap Contacts, Open Top, Double Ended Carrier	KPM-5A	36.
N.C. Non-Overlap Contacts, Open Top, Double Ended Carrier	KPM-6A	36.
N.O. Overlapping Contacts, Closed Top	KPM-21A	60.
N.C. Overlapping Contacts, Closed Top	KPM-22A	60.
N.O. Overlapping Contacts, Open Top	KPM-23A	60.
N.C. Overlapping Contacts, Open Top	KPM-24A	60.
N.O. Overlapping Contacts, Open Top, Double Ended Carrier	KPM-25A	60.
N.C. Overlapping Contacts, Open Top, Double Ended Carrier	KPM-26A	60.
N.O. Non-Overlap Anti-Weld Contacts, Closed Top	KPM-31A	48.
N.C. Non-Overlap Anti-Weld Contacts, Closed Top	KPM-32A	48.
N.O. Non-Overlap Anti-Weld Contacts, Open Top	KPM-33A	48.
N.C. Non-Overlap Anti-Weld Contacts, Open Top	KPM-34A	48.
N.O. Non-Overlap Anti-Weld Contacts, Open Top, Double Ended Carrier	KPM-35	48.
N.C. Non-Overlap Anti-Weld Contacts, Open Top, Double Ended Carrier	KPM-36	48.
N.O. Non-Overlap Gold Bonded Contacts, Closed Top	KPM-41	90.
N.C. Non-Overlap Gold Bonded Contacts, Closed Top	KPM-42	90.
N.O. Non-Overlap Gold Bonded Contacts, Open Top	KPM-43	90.
N.C. Non-Overlap Gold Bonded Contacts, Open Top	KPM-44	90.
N.O. Non-Overlap Gold Bonded Contacts, Double Ended Carrier	KPM-45	90.
N.C. Non-Overlap Gold Bonded Contacts, Double Ended Carrier	KPM-46	90.
Adapter Plate (to add 13th or 14th pole)	KPM-15	18.
Kits for BUL. 7305 Type PMA Universal Pole Relays		
Pole Kit - N.O. & N.C. Non-Overlap Contacts, Closed Top	KPMA-1	54.
N.O. & N.C. Non-Overlap Anti-Weld Contacts, Closed Top	KPMA-2	78.
N.O. & N.C. Overlapping Contacts, Closed Top	KPMA-21	108.
N.O. & N.C. Overlapping Anti-Weld Contacts, Closed Top	KPMA-22	132.
Kits for BUL. 7305 Type PMF Duplex-Pole Relays		
Pole Kits - 2 N.O. Non-Overlap Contacts, Closed Top	KPMF-1	54.
2 N.O. Non-Overlap Anti-Weld Contacts, Closed Top	KPMF-2	78.
Kit for BUL. 7305 Type PML or PMAL Latch Relays		
Latch Kit, with coil - Specify trip coil voltage suffix: - 76 (110-120v 60hz). —26 (220-240v 60hz), - 46 (440-480v 60hz). Specify other voltages	KPMH-12	168.
Kits for BUL. 7313 Type PMT Timing Relays		
Contact Operating Link for R.H. Timed Pole	KPMT-1	18.
Contact Operating Link for Instantaneous Pole	KPMT-2	18.
Contact Mounting Bracket and Arm Assembly (R.H.)	KPMT-3	36.
Contact Mounting Bracket and Arm Assembly (L.H.)	KPMT-4	36.



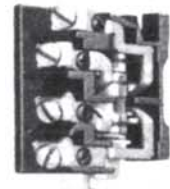
Kit KPM-2A



Kit KPM-4A



Kit KPM-6A



Kit KPMA-1



Kit KPMH-12



Kit KPMT-12

K

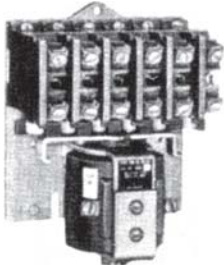
Renewal Parts Kits -

Discount Schedule JC80

Renewal Parts Kits for BUL. 7305 Type PM Convertible Pole Relays	Cat. No.	Price
Contact Arm, Short (4 Pole) with screws	KPM-7	23.
Contact Arm, Long (6 Pole) with screws	KPM-8	32.
Assembled Magnet and Rod (Straight-End Bracket) A-c Relays	KPM-9	152.
Assembled Magnet and Rod (Hooked-End Bracket) A-c Relays	KPM-10	152.
Assembled Magnet and Core. 2,3 & 4 Pole D-c Relays (Includes Rod, Bracket & Contact Arm)	KPM-16	173.
Assembled Magnet and Core, 6 & 8 Pole D-c Relays (Includes Rod, Bracket & Contact Arm)	KPM-17	179.
Renewal Parts for BUL. 7313 Type PMT Timing Relays		
Assembled Magnet and Rod (Folio 2 Relays)	KPMT-10	301.
Timing Head (without dial) (Folio 2 Relays)	KPMT-12	524.



DC Relays - Type PM Bulletin 7304

**General Description**

Bulletin 7304, Type PM, D-C Convertible Pole Relays feature many of the same

time-proven advantages offered by the highly successful Bulletin 7305 Type PM A-C Relay. For example, normally open poles are quickly and easily convertible to normally closed and vice versa. Each pole is contained in its own molded housing mounted by a single screw. Thus, each pole may be removed, installed or replaced individually without disturbing the others.

The large double-break contacts are made of fine silver alloy, and are rated for both inductive and resistive loads. The contacts are designed with wipe action to assure

maximum reliability.

For long trouble-free relay life, the D-C coil on Bulletin 7304 Relays is molded with tough epoxy resin to keep out dirt and moisture, and to prevent physical damage. The magnet used is a vertical lift type with no springs that require adjustment. It is designed with pull-in characteristics that keep magnet slam to a minimum.

Extra wide pressure terminals are front mounted for ready accessibility. As many as three lugs for No. 12 wire can be connected to each terminal.

Bulletin 7304 Relays are available in 2,3,4,6 and 8-pole arrangements.

Total Number Of Poles	Contact Arrangement	Poles ² Normally Open	Normally Closed	Open Type Catalog Number	Price ³
2		2	0	4U2 *	\$348.
		1	1	4U2-1 *	384.
		0	2	4U2-2 *	384.
3		3	0	4U3 *	396.
		2	1	4U3-1 *	432.
		1	2	4U3-2 *	432.
		0	3	4U3-3 *	432.
4		4	0	4U4 *	420.
		3	1	4U4-1 *	456.
		2	2	4U4-2 *	456.
		1	3	4U4-3 *	456.
		0	4	4U4-4 *	456.
6		6	0	4U6 *	594.
		5	1	4U6-1 *	630.
		4	2	4U6-2 *	630.
		3	3	4U6-3 *	630.
		2	4	4U6-4 *	630.
		1	5	4U6-5 *	666.
		0	6	4U6-6 *	666.
8		8	0	4U8 *	666.
		7	1	4U8-1 *	708.
		6	2	4U8-2 *	708.
		5	3	4U8-3 *	708.
		4	4	4U8-4 *	708.
		3	5	4U8-5 *	744.
		2	6	4U8-6 *	744.

Contact Ratings - 10 Amps Continuous

D-C Applications			
Volts	Ampere Interrupting Rating		
	Resistive Load		Inductive Load
	Non-Inductive		
	N.O.	N.C.	N.O. or N.C.
64 or less	10	10	2.2
120	8	6	1.1
240	2	1	.55
A-C Applications			
Volts	Make	Break	
110	60	6	
220	30	3	
440	15	1.5	
550	12	1.2	

4U4B - * 4 pole base only \$276

4U8B - * 8 pole base only \$378

Note:

- Numbers in pole locations shown in sketches indicate the sequence in which normally closed poles are mounted when required.
- Normally open contacts may be changed in the field to normally closed and vice versa, using only a screw driver.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from Coil Table.
- Overlapping contacts are available in the same contact block at \$108 per pair
- Enclosures supplied separately

- Price addition of \$30 per relay. For 32 & 64 volt coils, use coil suffix 32 or 64.

*** Coil Table DC Voltage**

DC Voltage	Suffix	DC Voltage	Suffix
12	012	95	095
24	024	120	120
48	048	240	240



DC Latch Relays - Type PML Bulletin 7305

Bulletin 7305, Type PML, D-C Latch Relays are identical in design, construction and dimension to the Type PML, A-C Convertible Pole Latch Relays except they incorporate the use of one "universal" pole on the relay to permit continuous application of voltage to the relay "Close" coil and latch "Trip" coil. The schematic diagram below illustrates how

this is accomplished. Up to 8 convertible poles in any combination of N.O. and N.C. contact arrangement are available for circuit use. The contacts can be readily converted in the field from N.O. to N.C. operation, and vice versa. The latch mechanism is the same rugged unit used on Type PML-A-C latch relays.

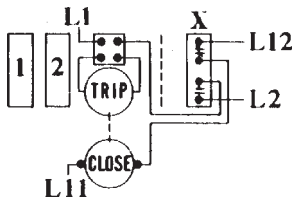


Contact Ratings - 10 Amps Continuous

D-C Applications			
Volts	Amperes Interrupting Rating		
	Resistive Load		Inductive Load
	N.O.	N.C.	
64 or less	10	10	2.2
120	8	6	1.1
240	2	1	.55
A-C Applications			
Volts	Make	Break	
110	60	6	
220	30	3	
440	15	1.5	
550	12	1.2	

Typical Circuit

 Universal Pole (Kit Catalog No. KPMA-21). Normally closed contact connected in series with relay "Close" coil. Normally open contact connected in series with relay "Trip" coil as shown below. Permits continuous application of voltage to the coil circuits.



Total Number Of Poles	Contact Arrangement	Poles ² Normally Open	Normally Closed	Open Type Catalog Number	Price ³
2		2	0	5UHD2 *	\$492.
		1	1	5UHD2-1 *	528.
		0	2	5UHD2-2 *	528.
3		3	0	5UHD3 *	538.
		2	1	5UHD3-1 *	564.
		1	2	5UHD3-2 *	564.
		0	3	5UHD3-3 *	564.
4		4	0	5UHD4 *	552.
		3	1	5UHD4-1 *	588.
		2	2	5UHD4-2 *	588.
		1	3	5UHD4-3 *	588.
		0	4	5UHD4-4 *	588.
6		6	0	5UHD6 *	684.
		5	1	5UHD6-1 *	720.
		4	2	5UHD6-2 *	720.
		3	3	5UHD6-3 *	720.
		2	4	5UHD6-4 *	720.
		1	5	5UHD6-5 *	744.
		0	6	5UHD6-6 *	744.
8		8	0	5UHD8 *	768.
		7	1	5UHD8-1 *	804.
		6	2	5UHD8-2 *	804.
		5	3	5UHD8-3 *	804.
		4	4	5UHD8-4 *	804.
		3	5	5UHD8-5 *	828.
		2	6	5UHD8-6 *	828.
		1	7	5UHD8-7 *	828.
		0	8	5UHD8-8 *	828.

Note:

- Numbers in pole locations shown in sketches indicate the sequence in which normally closed poles are mounted when required.
- Normally open contacts may be changed in the field to normally closed and vice versa, using only a screw driver.

‡ Relay pole cannot be located here.

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from Coil Table.
- Overlapping contacts are available in the same contact block at \$108 per pair
- Enclosures supplied separately

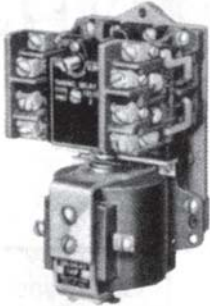
- Price addition of \$30 per relay. For 32 & 64 volt coils, use coil suffix 32 or 64. \$150 set up charge for 5 or less units.

Coil Table DC Voltage

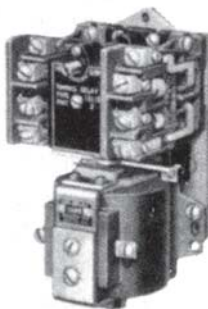
DC Voltage	Suffix	DC Voltage	Suffix
12	12	095	095
24	24	120	120
48	48	240	240



DC Pneumatic Time Delay Relays - Type PMT Bulletin 7314 (.2 seconds to 3minutes)



"On-Delay"
Operation



"Off-Delay"
Operation

Bulletin 7314 D-C Time Delay Relays are identical in construction to the Bulletin 7313 Timing Relays except for the use of a conventional 2 lead operating coil rather than a tapped (3-lead) coil. They feature the same accurate piston-type timing head as used on all other timing relays in the PM family.

Universal poles, with two electrically isolated contacts per pole-one normally open and one normally closed-are also used. These timing relays are available for either On Delay or Off Delay operation in three basic models: (1) with timed pole; (2) with one timed and one instantaneous pole or (3) with two timed poles.

Timing range adjustable from 0.2 seconds to 3 minutes

Accuracy + 10%

Type Oper'n Plus Delay	No. of Univ. Poles	Contacts				Universal Pole Arrangement	Open Type Relays	
		Time Delay		Instan. Aux.			Without Dial	
		N.O.	N.C.	N.O.	N.C.		Catalog No	Price
On Delay Off Delay	1	1	1				714UP	\$726.
		1	1				714UPD	
On Delay Off Delay	2	1	1	1	1		714UPA	792.
		1	1	1	1		714UPDA	
On Delay Off Delay	2	2	2				714UPE	924.
		2	2				714UPDE	

Coil Burden 17.2 watts

Note:

- On Delay - timed interval occurs between energization of the coil and actuation of timed contact.
Off Delay - timed interval occurs between de-energization of the coil and actuation of timed contact.
Field conversion of relays from On Delay to Off Delay operation, or vice-versa, is not recommended because a special technique is required.
- Each universal pole consists of 1 N.O. & 1 N.C. independent isolated contacts suitable for 600 volts at opposite polarity, a-c or d-c.
- Letter T on relay sketches indicated location of time delay poles. Letter I on relay sketches indicates location of instantaneous poles. Dotted lines indicate where universal poles may be added.

Contact Ratings - 10 Amps Continuous

D-C Applications			
Volts	Amperes Interrupting Rating		
	Resistive Load		Inductive Load
	N.O.	N.C.	
64 or less	10	10	2.2
120	8	6	1.1
240	2	1	.55
A-C Applications			
Volts	Make	Break	
110	60	6	
220	30	3	
440	15	1.5	
550	12	1.2	

Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from Coil Table.
- Overlapping contacts are available in the same contact block at \$108 per pair
- For timer with dial, specify "with dial." Add (each) \$60.
- Price addition of \$30 per relay. For 95 volt coils, use coil suffix 95. \$150 set up charge for 5 or less units

Coil Table DC Voltage

DC Voltage	Suffix
120	120
240	240

DC Pneumatic Time Delay Relays - Type PMT Bulletin 7313
(.2 seconds to 3 minutes)

Bulletin 7313, Type PMT, D-C Time Delay Relays are identical in construction and size to the A-C timing relays except they incorporate a tapped (3-lead) d-c operating coil and, hence, require the use of one N.C.

contact in a universal pole to economize the coil (see sketches below. However, the N.O. contact in that pole remains available for customer use. Timing relays with conventional 2-lead coils can also be supplied. Refer to Bulletin 7314-PMT.

Timing Range Adjustable From 0.2 Second to 3 Minutes - Accuracy $\pm 10\%$

Oper'ng Mode	No. of Univ. Poles	Contacts				Universal Pole Arrangement	Open Type Relays				
		Time Delay		Instan.Aux.			Without Dial				
		N.O.	N.C.	N.O.	N.C.		Catalog No	Price			
On	1	1	1	None	None		713UP-DC	*	\$726.		
Delay Off		1	1	None	None		713UPD-DC	*			
Delay	2	1	1	1	1		713UPA-DC	*	792.		
On		1	1	1	1		713UPDA-DC	*			
Delay Off		2	2	2	None		None		713UPE-DC	*	924.
Delay			2	2	None		None		713UPDE-DC	*	
On	3	1	1	2	2		713UPB-DC	*	858.		
Delay Off		1	1	2	2		713UPDB-DC	*			
Delay		2	2	2	1		1		713UPF-DC	*	990.
On			2	2	1		1		713UPDF-DC	*	



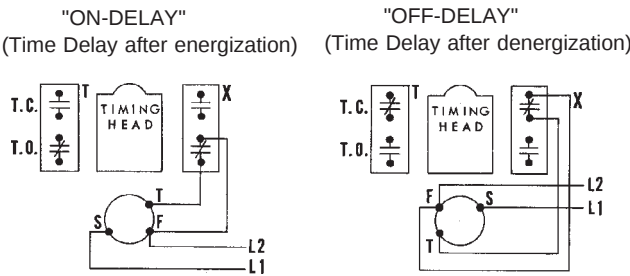
Coil Burden: Inrush 350 Watts
Sealed 5 Watts

Contact Ratings - 10 Amps Continuous

D-C Applications			
Volts	Amperes Interrupting Rating		
	Resistive Load		Inductive Load
	N.O.	N.C.	N.O. or N.C.
64 or less	10	10	2.2
120	8	6	1.1
240	2	1	.55
A-C Applications			
Volts	Make	Break	
110	60	6	
220	30	3	
440	15	1.5	
550	12	1.2	

Functioning of Economizing Interlock Pole On D-C Relays

X - Economizing electrical interlock (used in coil circuit) is one contact of standard universal pole.
Typical connection of three terminal coil is shown.



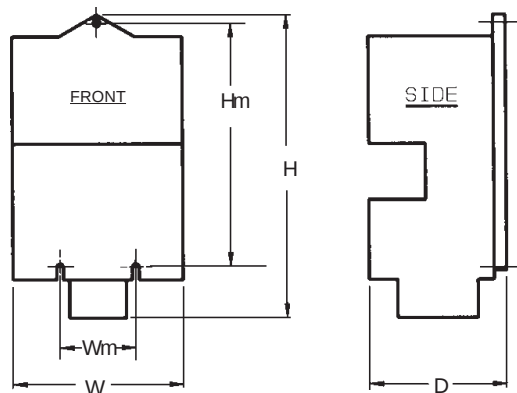
Ordering Information

- Use complete catalog number. Replace the (*) with the suffix from Coil Table.
- Overlapping contacts are available in the same contact block at \$108 per pair
- For timer with dial, specify "with dial" Add (each) \$60.

- Price addition of \$30 per relay. For 32 & 64 volt coils, use coil suffix 32 or 64. \$150 set up charge for 5 or less units

Coil Table DC Voltage

DC Voltage	Suffix	DC Voltage	Suffix
12	12	95	095
24	24	120	120
48	48	240	240



DC Contact Rating - P600

Volts	Amperes		Volt Amperes ²		Continuous Amperes
	Make	Break	Make	Break	
125	1.1	1.1	138	138	5
250	0.55	0.55	138	138	5
600	0.20	0.20	138 ²	138 ²	5

² 300 Volts or Less

All relays require a minimum of $\frac{7}{8}$ in. clearance below magnet for coil change.

A horizontal space of $\frac{1}{8}$ in. between relays is recommended.

Mounting Holes For #10 Screws

Relay Type	Open Relay Cat. Number	H	W	D	Hm	Wm
PM-DC	4U2,4U3,4U4	6 ¹ / ₈	3	3 ¹ / ₄	4 ¹ / ₂	2
	4U6,4U8	6 ¹ / ₈	4 ¹ / ₂	3 ¹ / ₄	4 ¹ / ₂	2
PML-DC	5UHD2	5 ⁵ / ₁₆	3	3 ⁵ / ₈	4 ¹ / ₂	2
	5UHD3, 5UHD4	5 ⁵ / ₁₆	4 ¹ / ₂	3 ⁵ / ₈	4 ¹ / ₂	2
PMT-DC	714UP	6 ¹ / ₈	3	3 ¹ / ₈	4 ¹ / ₂	2 ¹ / ₂
	713UP-DC 1,2-Pole	5 ¹ / ₂	3	3 ³ / ₈	4 ¹ / ₂	2
	713UP-DC 3 Pole	5 ¹ / ₂	3 ³ / ₄	3 ³ / ₈	4 ¹ / ₂	2
	713UP-DC 4 Pole	5 ¹ / ₂	4 ¹ / ₂	3 ³ / ₈	4 ¹ / ₂	2

Standard catalog listed AC relays ordered will have the proper coils as determined by the voltage and frequency suffix to the catalog number. Changing the circuit arrangement on a relay also changes the mechanical load on the magnet and may require a change of operating coil to assure proper operation. The information on this page will enable you to select the correct operating coil for any circuit arrangement required. Voltage-ampere requirements are provided to help in designing your panels. To select the proper operating coil for all

basic and latch relays except the Slim Jim, first determine the mechanical load on the magnet simply by totalling the load represented by the individual components operated by the magnet, using the mechanical load factors shown below. Select the proper coil from Table 1. When selecting the proper coil for Slim Jim Relays and Time Delay Relays, it is not necessary to determine the mechanical load

factor. As shown in Table 1, one coil for each voltage and frequency will operate all pole combinations.

For Example:

Table 1 indicates that the proper coil number for 110 volts, 60 hertz application is TB113-61, since the load factor of 168 falls within the Mechanical Load Range of 145 to 192.

Mechanical Load Factors:

Convertible Pole - Normally Open	10
Convertible Pole - Normally Closed	12
Double Contact Pole - Universal or Duplex	36
Latch Mechanism	20

Example:

A relay with 1 N.O. and 9 N.C. convertible poles and a latch mechanism will have a mechanical load factor as follows:

1 N.O. Convertible Pole	10
9 N.C. Convertible Poles	108
Accumulation Factor ¹	30
1 Latch Mechanism	20
Total Mechanical Load Factor	168

Coil Application Tables - Type PM Relay Family

Table 1

AC Volts	Hertz	Basic And Latch Relays						Time Delay Relays
		Mechanical Load Range (Does Not Apply To Slim Jim Relays)				Slim Jim Relays All Pole Combi- nations	Trip Coil on Latch Relays, All Pole Com- binations	Class A All Pole Combinations
		20-72	73-144	145-192	193-240			
Coil Catalog Numbers - Bulletin 7303 & 7305 PM & PML								
24	60	TB113-36	TB113-37	TB113-60	---	TB139-10	TB127-14	TB135-16
110-120	60	TB113-1	TB113-3	TB113-61	TB130-13	TB139-1	TB127-20	TB135-1
110	50							
110	25	TB113-20	TB113-20	---	---	---	TB127-23	TB135-14
220-240	60	TB113-4	TB113-6	TB113-62	TB130-14	TB139-2	TB127-21	TB135-2
220	50							
220	25	TB113-8	TB113-8	---	---	---	TB127-5	TB135-15
380	60	TB113-65	TB113-64	TB113-63	TB130-3	TB139-3	TB127-3	TB135-3
	50	TB113-7	TB113-28	TB113-64	TB130-9	TB139-4	TB127-4	TB135-9
	25	TB113-22	TB113-22	---	---	---	TB127-12	---
440-480	60	TB113-7	TB113-9	TB113-64	TB130-9	TB139-4	TB127-11	TB135-4
440	50							
440	25	TB113-33	TB11-33	---	---	---	---	TB135-17
550-600	60	TB113-16	TB113-11	TB113-66	TB130-6	TB139-6	TB127-6	TB135-6
550	50							
550	25	TB113-34	TB113-34	---	---	---	---	---
Volt -Amperes								
INRUSH SEALED	60	67	108	141	161	61	16	215
		23	36	47	53	16	8	35
INRUSH SEALED	50	51	93	124	180	51	Refer to	180
		18	33	45	49	13	Sales Office	30
INRUSH SEALED		39	50	---	---	---	Refer to	70
		15	22	---	---	---	Sales Office	15

¹ For relays with 9 or more normally closed convertible poles, an accumulation factor of 30 must be added to the total mechanical load factor for the relay

Description

Series 447 relays are designed for AC and DC circuits where high reliability, versatility of contact and operating coil combinations, compact size, and high speed operation are required. The 447 relays are available up to 8 convertible poles, current ratings to 30 amps AC and 20 amps DC.

Components (Table 1)

Baseand Coil Voltage	Cat. No.	Price
4 Pole Base- 120 VAC Coil ¹	447-9402-11	\$ 144.
208 VAC Coil	447-9402-21	144.
240 VAC Coil	447-9402-21	144.
480 VAC Coil	447-9402-31	144.
8 Pole Base- 120 VAC Coil ²	447-9801-11	210.
208 VAC Coil	447-9801-21	210.
240 VAC Coil	447-9801-21	210.
4 Pole Base- 115 VDC Coil ¹	447-9405-13	276.
230 VDC Coil	447-9405-23	276.
8 Pole Base- 115 VDC Coil ²	447-9805-13	380.
230 VDC Coil	447-9805-23	380.

¹ Heavy Duty Coil, Suitable For Up To 4 Circuits

² Heavy Duty Coil, Suitable For Up To 8 Circuits

Note: Other AC and DC coil voltages are available. Please contact factory.

Rules to Select and Install Contacts

- A. When installing "AC" or "DC" contacts you should balance the mechanical load on the coil magnet preferably by placing the contacts together in the center and working your way out.
- For a 4-pole contact **install the contacts in sequence** per the diagram listed below.

3 2 1 4

- For an 8-pole contact install the contacts per this diagram.

5 3 2 1 4 6
8 7

- B. **When installing DC contacts**, using the contact sequence above, the last contact on the left must have two blowouts. All others will have only one.

Example: If you have four contacts on the 4-pole base (table 1), number 3 must have two blowouts. If you have only two contacts, then number 2 must have two blowouts.

If you have six contacts on the 8-pole base (table 1), number 5 must have two blowouts.

Contacts seven and eight on the 8-pole base must have two blowouts.

**4-Pole Base****8-Pole Base****Unit Poles - AC Load (Table 2)
460VAC Max**

Description	Cat. No.	Price
10A, N.O.	447-9046	\$44.
10A, N.C.	447-9047	44.
20A, N.O.	447-9048	54.
20A, N.C.	447-9049	54.
30A ³ N.O.	447-9071	66.
30A ³ N.C.	447-9072	66.

³ Tungsten or Resistive Loads, 277 VAC Max.

**Unit Poles - DC Load (Table 3)
250VDC Max**

Description ⁴	Cat. No.	Price
20A, N.O. 1-Blowout	447-9019	\$66.
20A, N.O. 2-Blowout	447-9020	72.
20A, N.C. 1-Blowout	447-9021	66.
20A, N.C. 2-Blowout	447-9022	72.

⁴ All DC contacts require a "Blowout Mechanism" to extinguish the "arc" during contact opening. See Rule "B" below.

Ordering Information

- Select and Price Base and Power Plant and Unit Poles Separately.
- Example: 120 VAC 4 Pole relay with 2 N.O., 2 N.C., 10 Amp Poles.

Dimensions: See Section L Page 6.

1 - 447-9402-11	\$ 144.
2 - 447-9046	88.
2 - 447-9047	<u>88.</u>
	\$320.

Photoelectric Sensors & Controls

MEK 90 : User Selectable M2

Accessories M4

Operating Mode Index

Photoelectric Control

Operation Mode	Description	Catalog No.	Range	Page
Retroreflective	User Selectable	MEK90-LU __	18 ft.	M2
	User Selectable	MEK90-U __	18 ft.	M2
Polarized Retroreflective	High Performance	MEK90-P __	27 ft.	M2
Thru-Beam	User Selectable	MEK90-LU __	200 ft.	M2
	User Selectable	MEK90-U __	200 ft.	M2
Diffuse	User Selectable	MEK90-LU __	78 in.	M2
	User Selectable	MEK90-U __	78 in.	M2
Fiber-optic Controls	User Selectable *	MEK90-(L)U __		M2

M

MEK 90 Universal and High Performance Series



MEK 90 Dedicated Controls



MEK 90 Universal and High Performance Series



User Programmable or Dedicated Controls:
Thru-Beam, Retroreflective, Diffuse Reflective,
Convergent, Fiberoptic Thru-Beam, Fiberoptic Diffuse
Two Built-In Timers

- Plug-In control may be replaced without rewiring
User configurable as a Retro, Diffuse, Light Source or
Light Receiver (Thru-Beam)
- Two timers included: On Delay, Off Delay, One Shot or
Delayed One Shot may be selected or combined
- Two selectable timing ranges: 0-1.5 sec. and 1-15 sec.
- Large capacity 6A SPDT Relays, AC FET outputs and
NPN Open Collector outputs are available
- Wide range of supply voltages
- Optional lens kits for conversion to Convergent Beam or
Fiberoptic in the field
- Dedicated factory assembled controls: Polarized Retro,
Fiber Optic, and Dedicated Light Source (Emitter)
- Housing environmental integrity is 1, 4, 4X, 12, and 13
- Mounting Brackets on page M24

Selection Chart

Universal Control: Provide Retro, Diffuse and Thru-Beam					
Output	Supply voltage	Max. Load	Range (Using standard test targets)	Catalog No.	Price
Relay	102-132 VAC	6A / 240 VAC (res)	Retro: 18 ft. Diffuse: 78 in. T-B: 200 ft.	MEK90-LUAR ^{1,3}	\$ 348.00
Relay	105-264 VAC	6A / 240 VAC (res)	Retro: 18 ft. Diffuse: 30 in. T-B: 200 ft.	MEK90-UAR	348.00
NPN	10-36 VDC	200 mA / 30 VDC	Retro: 18 ft. Diffuse: 30 in. T-B: 200 ft.	MEK90-UDC	348.00
Relay	10-36 VDC	6A / 120 VAC	Retro: 18 ft. Diffuse: 30 in. T-B: 200 ft.	MEK90-UDR	348.00
Dedicated High Performance Series: Polarized Retroreflective					
Relay	105-264 VAC	6A / 240 VAC (res)	High Gain: 27 ft. Low Gain: 10 ft.	MEK90-PAR ⁴	\$ 366.00
NPN	10-30 VDC	200 mA / 30 VDC	High Gain: 27 ft. Low Gain: 10 ft.	MEK90-PDC ⁴	366.00
Relay	10-30 VDC	6A / 240 VAC	High Gain: 27 ft. Low Gain: 10 ft.	MEK90-PDR ⁴	366.00
Visual Relay Petro Reflective					
Relay	102-132 VAC, 50/60 HZ 204-264VAC, 50/60 HZ	6A / 240 VAC (res)	6 ft. - 35 ft.	MEK90-VRAR	\$ 366.00

Specifications

Output	Response Time
Relay: SPDT 6A 240VAC (resistive) 28 VDC	<10ms. ON, <8ms. OFF
FET: SPNO Solid State AC Output 1A @ 25° C, 0.5A @ 60° C (<10uA OFF State Leakage)	<13ms. ON, 13ms. OFF
Open Collector: NPN (sinking) 200 mA 30VDC	<5ms. ON, <5ms. OFF

Specifications

Power Consumption	2VA, 50mA
Materials	(Housing) Corrosion Resistant, Fire Retardant ABS (Lens) Polycarbonate
Environmental Ratings	NEMA 3,4,4X,12, and 13
Temperature Range	-40° to 158° F -40° to 70° C
Approvals	U.L. Recognized C.S.A.

¹ 90% White Card.

² Reflective Targets refer to page M4.

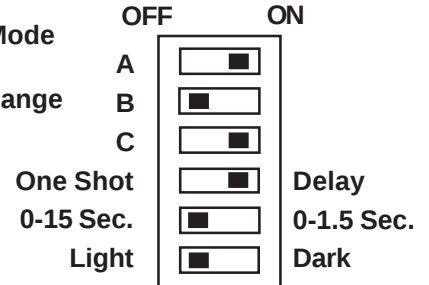
Mode Selection Switch Settings

Operating Mode	Switch Positions		
	A	B	C
Retroreflective	OFF	OFF	ON
Thru-Beam Source	OFF	OFF	ON
Thru-Beam Receiver (Standard)	OFF	ON	ON
Thru-Beam Receiver (Long Range)	ON	ON	ON
Proximity	ON	OFF	ON
Converging Beam Proximity ¹	ON	OFF	ON
Fiberoptic (All Modes) ²	ON	OFF	ON

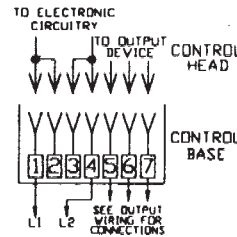
- ¹ Refer to page M58 for accessory Converging Beam Lens Kits.
² Refer to page M58 for accessory Fiberoptic Adaptors. Refer to page M33 for MEK901 Glass Fiberoptic Light Guides.

Example: Proximity Mode
 Delay³
 0-15 Sec. Timing Range
 Light Operate

3. The actual delay mode depends on where timing adjustments T1 and T2 are set. When both are set to minimum (0) the unit operates in the NO DELAY Mode.

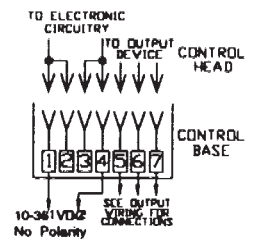


AC

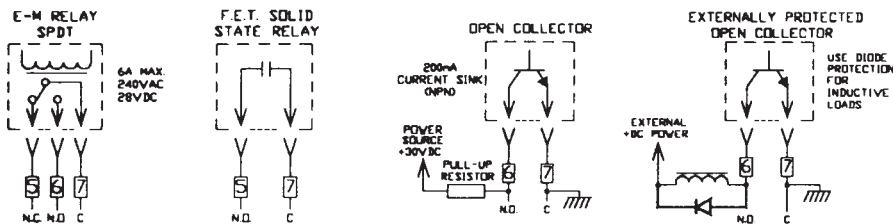


Wiring

DC

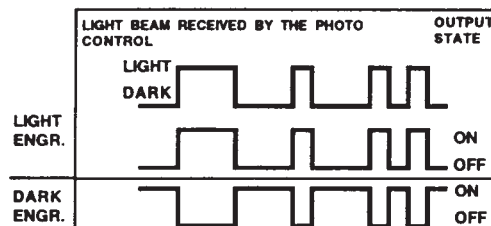


Outputs

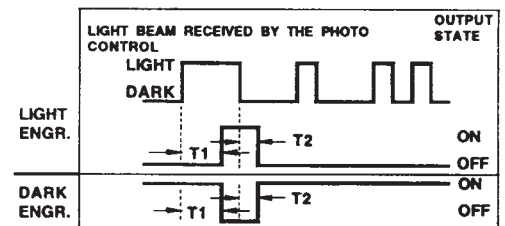


Timer Functions

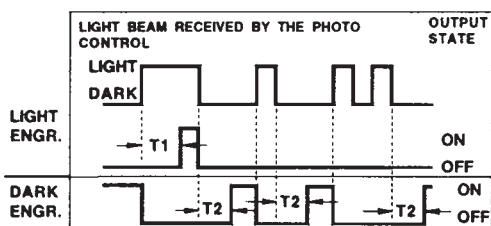
NO DELAY (ON/OFF)



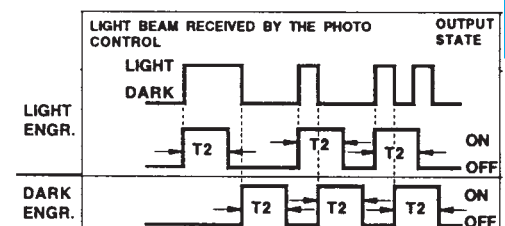
DUAL DELAY



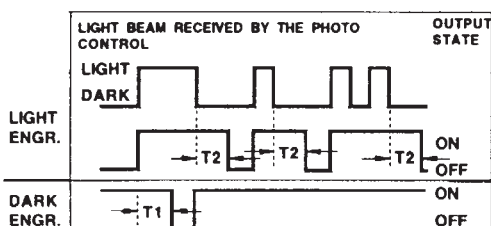
ON DELAY



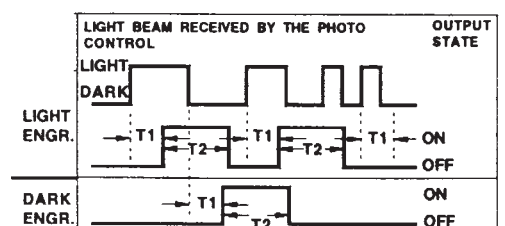
ONE SHOT



OFF DELAY



DELAYED ONE SHOT



NOTE: NOT SUPPORTED IN THRU-BEAM MODE!
 T2: ON DELAY, OFF DELAY, DUAL DELAY

T1: DELAYED ONE SHOT - DARK ENERGIZED

Plastic Corner Cube Reflectors

Catalog No.	Dimensions	Range	Use With:
K-3567	3 in. dia.	Long	Any Retroreflective, Polarized or Reflective Fiberoptic control
K-3568	1.5 in. dia.	Middle	Any Retroreflective, Polarized or Reflective Fiberoptic control
K-4305	0.625 in. dia.	Short	Any Retroreflective, Polarized or Reflective Fiberoptic control

Retroreflective Targets

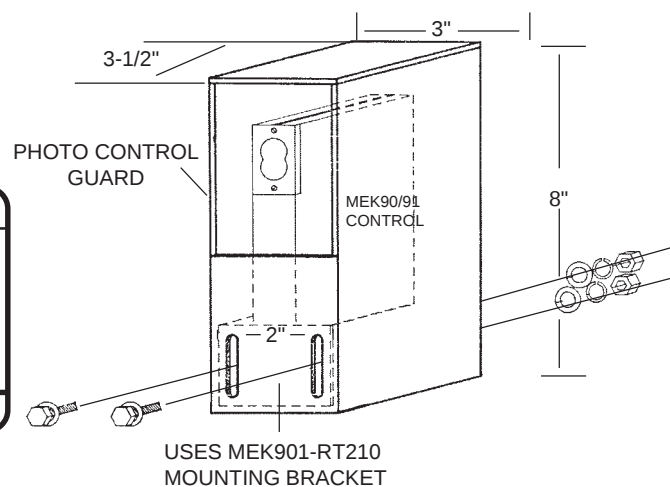
Description	Catalog No.	Price
Corner Cube Reflector 3" DIA.	K-3567	\$ 14.
Corner Cube Reflector 1.5" DIA.	K-3568	8.
Corner Cube Reflector .625" DIA.	K-4305	8.

Control Guard For MEK90/91

MEK901-RT230

Note:
Provides effective protection from
physical damage.

Description	Catalog No.	Price
Parallel Mount for MEK 90/91	MEK901-RT100	\$ 16.
Universal Mount for MEK 90/91	MEK901-RT150	34.
Right Angle Mount for MEK 90/91	MEK901-RT200	16.
Right Angle/360 Deg. Mount for MEK 90/91	MEK901-RT210	16.
Flex-Mount for MEK 90/91	MEK901-RT220	58.
MEK 90/91 Guard	MEK901-RT230	76.
For MEK 55 Series	MEK55-RT123	\$ 24.

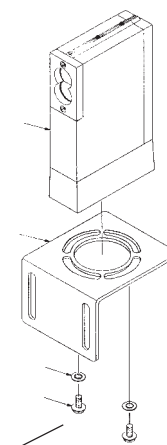


Mounting Brackets For MEK90

MEK901-RT210

#10 INTERNAL
TOOTH
LOCKWASHER
(2 INCL.)

#10-32 SLOTTED
HEX WASHER
HEAD SCREWS
(2 INCL.)



M

0
1
6

Index

Replacement Coils

Description	Coil Prefix	Page Number
PM Magnetic Relays, DC Operated	TB137-	3
PM, PMA, PMF, PML, PMAL Magnetic Relays	TB113-	2
PMA, PMF, PMAL Magnetic Relays	TB130-	2
PMS Magnetic Relays	TB139-	3
PML, PMAL Magnetic Latch Relays	TB127-	2
PMT Pneumatic Timing Relays, Class A, Folio 2	TB135-	3
PMT Pneumatic Timing Relays, Class A, (non-Folio 2) and Class B	TB130-	2
PMT Pneumatic Timing Relays, DC Operated (3 Lead)	TB140-	3
PMT Pneumatic Timing Relays, DC Operated (2 Lead)	TB137-	3
TM-00-2 Magnetic Magnetic Starters & Contactors	TB159-	4
HP & HPF-00-2 & 1 Magnetic Starters & Contactors	TB174-	3
TM-3 & TM-4 Magnetic Starters & Contactors	TB162-	4
TM-5 Magnetic Starters & Contactors	TB161-	4
TM-6 Magnetic Starters & Contactors	TB163-	4
U-5 Magnetic Starters & Contactors	335L-	4
DP-3 Definite Purpose Contactors, DPS Starters	TB175-	3
447 Magnetic Relays, DC Operated	TB137-	3
447 Magnetic Relays, AC Operated	TB113-	2
LC20, LC30, Lighting Contactors	TB113-	2
LCL20, LCL30, Lighting Contactors	TB113 (Main), TB127 (Trip)	2
5000A, Size 00-1 Contactor & Starters	344L	5
5000A, Size 2 Contactor & Starters	343L	5
5000A, Size 3 Contactor & Starters	319L	5
5000-, Size 4 Contactor & Starters	320L	5
5000-, Size 5 Contactor & Starters	335L	5
5000-, Size 2 Contactor & Starters	319L	5
5000-, Size 3 Contactor & Starters	320L	5
7000, 7001 DC Contactor, AC Operation	344L	5
5DP1, 5DP2, 5DP3A DC Contactors AC Operated	319L	5
5DP7 DC Contactors AC Operation	343L	5
5DP3-, 5DP4, 5DP9 DC Contactors AC Operation	320L	5
5DP5, 5DP8 DC Contactors AC Operation	335L	5
5DP6 DC Contactors AC & DC Operation	347L	5

Replacement Coils

Numerical Coil Data

Description	Coil	Volts	Hertz	Load Factor	Price
For Use With Series: 447, LC20, LC30, PM, PMA, PMF, PMAL	TB113-1	110-120	60	20-72	\$99.00
	TB113-3	110-120	60	73-144	99.00
	TB113-3	110-120	50	145-192	99.00
	TB113-4	220-240	60	20-72	99.00
	TB113-4	277	60	73-144	99.00
	TB113-6	277	60	145-192	99.00
	TB113-6	220-240	60	73-144	99.00
	TB113-6	220-240	50	145-192	99.00
	TB113-7	380	50	20-72	99.00
	TB113-7	440-480	60	20-72	99.00
	TB113-7	550	60	73-144	99.00
	TB113-7	550	50	145-192	99.00
	TB113-8	220-240	25	20-96	99.00
	TB113-9	440-480	60	73-144	99.00
	TB113-9	440-480	50	145-192	99.00
	TB113-10	550	60	20-72	99.00
	TB113-11	600	60	73-144	99.00
	TB113-11	600	50	145-192	99.00
	TB113-13	440-480	50	73-144	99.00
	TB113-15	277	60	20-72	99.00
	TB113-16	600	60	20-72	99.00
	TB113-18	110-120	50	20-72	99.00
	TB113-19	110-120	50	73-144	99.00
	TB113-20	110-120	25	20-96	99.00
	TB113-20	220-240	50	73-144	99.00
	TB113-21	440-480	50	20-72	99.00
	TB113-21	600	50	73-144	99.00
	TB113-22	550	40	20-72	99.00
	TB113-22	380	25	20-96	99.00
	TB113-23	550	50	73-144	99.00
	TB113-24	600	50	20-72	99.00
	TB113-28	380	50	73-144	99.00
	TB113-32	600	25	20-96	99.00
	TB113-33	440-480	25	20-96	99.00
	TB113-34	550	25	20-96	99.00
	TB113-36	24	60	20-72	99.00
	TB113-37	24	60	73-144	99.00
	TB113-39	12	60	20-72	99.00
	TB113-40	12	60	73-144	99.00
	TB113-47	48	60	20-72	99.00
	TB113-48	48	60	73-144	99.00
	TB113-51	6	60	20-72	99.00
	TB113-51	8	60	145-192	99.00
	TB113-53	8	60	20-72	99.00
	TB113-55	8	60	73-144	99.00
	TB113-60	24	60	145-192	99.00
	TB113-61	110-120	60	145-192	99.00
	TB113-62	220-240	60	145-192	99.00
	TB113-63	220-240	50	20-72	99.00
	TB113-63	380	60	145-192	99.00
	TB113-64	380	60	73-144	99.00
	TB113-64	380	50	145-192	99.00
	TB113-64	440-480	60	145-192	99.00
	TB113-65	380	60	20-72	99.00
	TB113-65	550	60	145-192	99.00
	TB113-66	600	60	145-192	99.00
	TB113-71	48	60	145-192	99.00
	TB113-76	12	60	145-192	99.00
	TB113-76	6	60	73-144	99.00
	TB113-77	6	60	145-192	99.00

Description	Coil	Volts	Hertz	Price
For Use With Series: LCL20, LCL30, PML, PMAL (Trip Coil)	TB127-1	110	60	\$69.00
	TB127-2	220	60	69.00
	TB127-2	115-230	DC	69.00
	TB127-3	180	DC	69.00
	TB127-3	380	60	115.00
	TB127-4	380	50	115.00
	TB127-4	440	60	115.00
	TB127-5	220-240	25	276.00
	TB127-5	440	50	276.00
	TB127-5	550	60	276.00
	TB127-6	440-480	50	276.00
	TB127-6	550-600	60	276.00
	TB127-7	110	50	276.00
	TB127-8	110	25	276.00
	TB127-8	220	50	276.00
	TB127-9	550	50	276.00
	TB127-10	550-600	50	276.00
	TB127-11	220	25	115.00
	TB127-11	440-480	60	115.00
	TB127-12	380	25	276.00
	TB127-13	440	25	276.00
	TB127-14	24	60	69.00
	TB127-15	12	60	69.00
	TB127-19	110	40	276.00
	TB127-20	110-120	60	69.00
	TB127-21	220-240	60	69.00
	TB127-22	110-120	50	276.00
	TB127-23	110-120	25	69.00
	TB127-23	220-240	50	69.00

Description	Coil	Volts	Hertz	Load Factor	Price
For Use With Series: PMT*, PMA, PMF, PMAL	TB130-1	110	60		230.00
	TB130-2	208-220	60		230.00
	TB130-3	380	60		230.00
	TB130-3	380	60	193-240	230.00
	TB130-4	400	60		230.00
	TB130-5	550	60		230.00
	TB130-5	440	50		230.00
	TB130-5	440-480	50	193-240	230.00
	TB130-5	550	60	193-240	230.00
	TB130-6	600	60		230.00
	TB130-6	600	60	193-240	230.00
	TB130-7	110	50		230.00
	TB130-7	110-120	50	193-240	230.00
	TB130-8	208-220	50		230.00
	TB130-8	220-240	50	193-240	230.00
	TB130-9	380	50		230.00
	TB130-9	380	50	193-240	230.00
	TB130-9	440-480	60	193-240	230.00
	TB130-9	480	60		230.00
	TB130-10	550	50		230.00
	TB130-10	550	50	193-240	230.00
	TB130-11	600	50		230.00
	TB130-11	600	50	193-240	230.00
	TB130-12	24	60		230.00
	TB130-13	120	60		230.00
	TB130-13	110-120	60	193-240	230.00
	TB130-14	240	60		230.00
	TB130-14	220-240	60	193-240	230.00
	TB130-17	42	50		230.00

*NOTE:

TB130 coils are used on Bul. 7313 Timing Relays not marked "Folio2". This includes original Class A timers and all Class B timers. See TB135 coils for Class A, Folio 2 timers.

Numerical Coil Data

Description	Coil	Volts	Hertz	Price
For Use With Series: PMT * Discount Schedule JC80	TB135-1	110	60	\$108.00
	TB135-2	208-220	60	108.00
	TB135-3	380	60	108.00
	TB135-4	440	60	108.00
	TB135-5	550	60	108.00
	TB135-6	600	60	108.00
	TB135-7	110	50	108.00
	TB135-8	208-220	50	108.00
	TB135-9	380	50	108.00
	TB135-10	440	50	108.00
	TB135-11	550	50	108.00
	TB135-12	600	50	108.00
	TB135-13	120	60	108.00
	TB135-14	110	25	108.00
	TB135-15	240	60	108.00
	TB135-15	220	25	108.00
	TB135-15	480	60	108.00
	TB135-16	24	60	108.00
	TB135-17	440	25	108.00
	TB135-18	110	40	108.00
	TB135-19	12	60	108.00
	TB135-20	120	50	108.00
	TB135-21	240	50	108.00
	TB135-22	480	50	108.00
	TB135-23	12	50	108.00
	TB135-24	24	50	108.00
	TB135-25	208	60	108.00

* NOTE:

TB135 coils are used on Bul. 7313 Timing Relays marked "Folio 2". See TB130 coils for timers not marked "Folio 2".

Description	Coil	Volts		Price
For Use With Series: PM, 447, PMT (DC 2 Lead) Discount Schedule JC80	TB137-1	120	DC	\$248.00
	TB137-2	240	DC	248.00
	TB137-3	180	DC	248.00
	TB137-4	90	DC	248.00
	TB137-5	64	DC	248.00
	TB137-6	48	DC	248.00
	TB137-7	32	DC	248.00
	TB137-8	24	DC	248.00
	TB137-9	12	DC	248.00
	TB137-10	6	DC	248.00
	TB137-11	300	DC	248.00
	TB137-12	120	DC	248.00
	TB137-13	240	DC	248.00
	TB137-14	95	DC	248.00
Timers Only				

Description	Coil	Volts	Hertz	Price
For Use With Series: PMS Discount Schedule JC80	TB139-1	110-120	60	\$99.00
	TB139-2	220-240	60	99.00
	TB139-3	380	60	99.00
	TB139-4	440-480	60	99.00
	TB139-4	380	50	99.00
	TB139-6	550-600	60	99.00
	TB139-7	64	60	99.00
	TB139-8	48	60	99.00
	TB139-9	32	60	99.00
	TB139-10	24	60	99.00
	TB139-11	12	60	99.00
	TB139-12	6	60	99.00
	TB139-13	110-120	50	99.00
	TB139-14	220-240	50	99.00

Replacement Coils

Description	Coil	Volts		Price
For Use With Series: PMT (DC) Folio 2 Discount Schedule JC80	TB140-1	115-120	DC	\$221.00
	TB140-2	230-250	DC	281.00
	TB140-3	260	DC	281.00
	TB140-4	12	DC	432.00
	TB140-5	24	DC	432.00
	TB140-6	72	DC	432.00
	TB140-7	48	DC	432.00
	TB140-8	32	DC	432.00

Substitute TB135-4 for 460V 60 Hz.

Description	Coil	Volts	Hertz	Poles	Price
For Use With Series: DP (Size DP-3) Discount Schedule JC53	TB170-1	120	50/60	2, 3, 4	\$48.00
	TB170-2	208-240	50/60	2, 3, 4	48.00
	TB170-3	24	50/60	2, 3, 4	48.00
	TB170-4	277	50/60	2, 3, 4	48.00
	TB170-5	480	50/60	2, 3, 4	48.00
	TB170-6	600	50/60	2, 3, 4	48.00

Description	Coil	Volts	Hertz	Poles	Price
For Use With Series: HP/HPF (Size 00-2) Discount Schedule JC53	TB174-1	120	50/60	2, 3	\$97.00
	TB174-2	208-240	50/60	2, 3	97.00
	TB174-3	24	50/60	2, 3	97.00
	TB174-4	277	50/60	2, 3	97.00
	TB174-5	480	50/60	2, 3	97.00
	TB174-6	600	50/60	2, 3	97.00
	TB174-7	380	50/60	2, 3	97.00

Numerical Coil Data

Description	Coil	Volts	Hertz	Price
For Use With: TM -5 (TM Series Only)	TB161-1	110-120	60	\$483.00
	TB161-1	110	50	483.00
	TB161-2	220-240	60	483.00
	TB161-2	220	50	483.00
	TB161-3	440-480	60	483.00
	TB161-3	440	50	483.00
	TB161-4	550-600	60	483.00
	TB161-4	550	50	483.00
	TB161-5	200-208	60	483.00
	TB161-6	110	25	483.00
Discount Schedule JC80	TB161-7	220	25	483.00
	TB161-8	440	25	483.00
	TB161-9	550	25	483.00
	TB161-10	380	50	483.00
	TB161-10	380	50	483.00

Replacement Coils

Description	Coil	Volts	Hertz	Poles	Price
For Use With: U5 (U Series Only) Discount Schedule JC27	335L1	110-120	60	2, 3	\$322.00
	335L1	110	50	2, 3	322.00
	335L2	220-240	60	2, 3	322.00
	335L3	440-480	60	2, 3	322.00
	335L3	440	50	2, 3	322.00
	335L4	550-600	60	2, 3	322.00
	335L4	550	50	2, 3	322.00
	335L7	200-208	60	2, 3	322.00
	335L7	200-208	60	2, 3	322.00
	335L7	200-208	60	2, 3	322.00

NOTE:

These size 5's are not interchangeable

Description	Coil	Volts	Hertz	Size	Price
For Use With Series: TM -3,4	TB162-1	110-120	60	4	\$248.00
	TB162-1	110	50	4	248.00
	TB162-2	220-240	60	4	248.00
	TB162-2	220	50	4	248.00
	TB162-3	440-480	60	4	248.00
	TB162-3	440	50	4	248.00
	TB162-4	550-600	60	4	248.00
	TB162-4	550	50	4	248.00
	TB162-5	110	25	4	248.00
	TB162-6	440-480	25	3	248.00
Discount Schedule JC80	TB162-7	110-120	60	3	207.00
	TB162-7	110	50	3	207.00
	TB162-8	220-240	60	3	207.00
	TB162-8	220	50	3	207.00
	TB162-9	440-480	60	3	207.00
	TB162-9	440	50	3	207.00
	TB162-10	550-600	60	3	207.00
	TB162-10	550	50	3	207.00
	TB162-11	440-480	60	4	207.00
	TB162-12	24	60	3	207.00
	TB162-13	277	60	3	207.00
	TB162-14	200-208	60	3	207.00
	TB162-14	110-120	25	3	207.00
	TB162-15	380	50	3	207.00
	TB162-15	220-240	25	3	248.00
	TB162-16	200-208	60	4	248.00
	TB162-16	110-120	25	4	248.00
	TB162-17	380	50	4	248.00
	TB162-17	220-240	25	4	248.00
	TB162-19	110	60	4	248.00

Description	Coil	Volts	Hertz	Poles	Price
For Use With Series: TM (Size 00, 0, 1, 2)	TB159-1	110-120	60	2, 3, 4	\$124.00
	TB159-1	110	50	2, 3, 4	124.00
	TB159-2	220-240	60	2, 3, 4	124.00
	TB159-2	220	50	2, 3, 4	124.00
	TB159-3	440-480	60	2, 3, 4	124.00
	TB159-3	440	50	2, 3, 4	124.00
	TB159-4	550-600	60	2, 3, 4	124.00
	TB159-4	550	50	2, 3, 4	124.00
	TB159-5	110	25	2, 3, 4	124.00
	TB159-6	220	25	2, 3, 4	124.00
Discount Schedule JC80	TB159-7	400	25	2, 3, 4	124.00
	TB159-8	550	25	2, 3, 4	124.00
	TB159-9	24	60	2, 3, 4	124.00
	TB159-10	200-208	60	2, 3, 4	124.00
	TB159-11	380	50	2, 3, 4	124.00
	TB159-11	380	50	2, 3, 4	124.00
	TB159-13	277	60	2, 3, 4	124.00
	TB159-13	277	60	2, 3, 4	124.00

Description	Coil	Volts	Hertz	Price
For Use With Series: TM (Size 6)	TB163-1	110-120	60	\$573.00
	TB163-1	110	50	573.00
	TB163-2	220-240	60	573.00
	TB163-2	220	50	573.00
	TB163-3	440-480	60	573.00
	TB163-3	440	50	573.00
	TB163-4	550-600	60	573.00
	TB163-4	550	50	573.00
	TB163-5	200-208	60	573.00
	TB163-6	380	50	573.00
Discount Schedule JC80	TB163-7	277	30	573.00
	TB163-7	277	30	573.00

N

0
2
6

Numerical Coil Data

Description	Coil	Volts	Hertz	Price
For Use	344L1	110-120	60	\$53.00
With Series:	344L1	110	50	53.00
5000A*, 7000,	344L5	220-240	60	53.00
7001, 8000B	344L3	440-480	60	53.00
(Size 00, 0, 1,	344L3	440	50	53.00
10/40 Amp,	344L4	550-600	60	53.00
40 Amp)	344L4	550	50	53.00
	344L6	24	60	53.00
	344L2	200-208	60	53.00

Description	Coil	Volts	Hertz	Price
For Use	343L1	110-120	60	\$76.00
With Series:	343L2	220-240	60	76.00
5000A*, 5DP7,	343L2	220	50	76.00
8000B	343L3	440-480	60	76.00
(Size 2	343L3	440	50	76.00
75 Amp)	343L4	550-600	60	76.00
	343L4	550	50	76.00
	343L5	208	60	76.00

Description	Coil	Volts	Hertz	Price
For Use	319L1	110-120	60	\$110.00
With Series:	319L1	110	50	110.00
5000A*, 5DP1,	319L2	220-240	60	110.00
5DP2, 8000B,	319L3	440-480	60	110.00
5DP3A*	319L3	440	50	110.00
(Size 3	319L4	550-600	60	110.00
30, 56,	319L4	550	50	110.00
110 * Amp)	319L5	24	60	110.00
	319L2	200-208	60	110.00

* NOTE:

Series 5DP3A 110 Amp., and 5DP3- 110 Amp., are **not** interchangeable
 Series 5000A and 5000- are not interchangeable

Replacement Coils

Description	Coil	Volts	Hertz	Price
For Use	335L1	110-120	60	\$322.00
With Series:	335L1	110	50	322.00
5000-*, 5DP5,	335L2	220-240	60	322.00
5DP8	335L2	220	50	322.00
(Size 5	335L3	440-480	60	322.00
360,535 Amp)	335L3	440	50	322.00
	335L4	550-600	60	322.00
	335L7	208	60	322.00

Description	Coil	Volts	Hertz	Price
For Use	347L1	110-120	60	\$1656.
With Series:	347L4	220-240	60	2185.
5DP6	347L2	440-480	60	2185.
700 Amp				

NOTE:

For further information on Power Pack Kits
 (AC Coil) see page J6

Description	Coil	Volts	Hertz	Price
For Use	320L1	110-120	60	\$156.00
With Series:	320L1	110	50	156.00
5000-*,	320L2	220-240	60	156.00
5DP3-*,	320L3	440-480	60	156.00
5DP4, 5DP9,	320L3	440	50	156.00
8000B	320L4	550-600	60	156.00
(Size 4 110*,	320L4	550	50	156.00
180,260 Amp)	320L2	200-208	60	156.00

Bulletin	Page	Description
----------	------	-------------

Pilot Devices-Pushbutton Controls

100T	D1	30MM Heavy Duty
STAK-LITE	D22	Status Indicator

Pushbutton Stations

100-RN	G15	Mill Type, Form RN,RNG
100-C	G16	Power Press Type C
100T	D15	Heavy Duty Type 4&13 Enclosed

Remote Switches

101-FS	G9	Foot Switches
--------	----	---------------

Master Switches

101-SD	G13	Mill Master, Jr.
--------	-----	------------------

Limit Switches

102-BST	G8	Belt Side Travel
102-HL	G2	Hatchway, Type HL,HLD
102-TL	G4	Track Type

AC Contactors Magnetic & Vacuum

7707TM	B5	Type TM, Magnetic General Purpose
7707VC	A11	LV USAVAC Vacuum General Purpose
7707VC	A30	MV USAVAC Vacuum General Purpose
5000	B65	Series 5000 Magnetic General Purpose
7707HP	C4	Type HP Magnetic General Purpose

AC Full Voltage Magnetic & Vacuum Starters

6013TM	B7	Type TM Starters
6013VS	A15	USAVAC Starters
6013HP	C4	Type HP Starters
6018TM	B13	Type TM Combination Disconnect Switch
6018VS	A17	USAVAC Combination Disconnect Switch
6018HP	C6	Type HP Combination Discount Switch
6020TM	B16	TM Combination Circuit Breaker
6030TM	B8	TM Reversing
6030VS	A16	VS Reversing
6030HP	C5	HP Reversing
6038TM	B18	Type TM Reversing Combination - With Disconnect Switch
6040TM	B19	Type TM Reversing Combination - With Circuit Breaker Disconnect
6050TM	B9	Type TM Two Speed Non Combination
6058TM	B20	Type TM Two Speed Combination F/S
6060TM	B23	Type TM Two Speed Combination C.B.
6018MVS	A37	Type USAVAC Med. Voltage Starters

AC Reversing Contactors

6031TM	B6	Type TM General Purpose
6031VC	A14	USAVAC General Purpose
6031VC	A31	MV USAVAC General Purpose
6031HP	C4	Type HP General Purpose
USAVAC	A13	Mechanically Interlocked for Two Speed & Reduced Voltage Applications

Time Delay Relays

7313	K10	Type PMT A-C Pneumatic
7314	K14	Type PMT DC Pneumatic

Bulletin	Page	Description
----------	------	-------------

AC Reduced Voltage Starters

6082TM	B26	Type TM Autotransformer Non Combo
6082VS	A19	USAVAC Autotransformer A/T Non Combo
6083VS	A19	USAVAC Autotransformer A/T Combo
6084VS	A19	USAVAC Autotransformer A/T Combo
6090TM	B27	Type TM Part Winding Non Combo
6083MVS	A38	RVAT Med. Voltage Starters

Pump Control Panels

HP	E2	Duplex & Triplex Pump Controllers
----	----	-----------------------------------

Control Relays

7304	K12	Type PM, D-C Convertible Pole
7305	K2	Type PM Relay Family
447	K18	Series 447

Overload Relays

7324	B31	Type TM, Panel Mounting
------	-----	-------------------------

Lighting Contactors

7707-LC	L2	Type PM
7707-LC	L5	Type TM
447	L4	Type 447

A-C Definite Purpose Control

7735-A77	H3	Type DP Contactors
----------	----	--------------------

Fire Pump Controllers

10600	F3	Electric Motor Control
10710	F4	Diesel Engine Control
10664	F6	Residential Controller

DC Control

146	J2	Field Loss Relay
5000DP	J3	DC Definite Purpose Contactors
7000-7001	J4	DC Magnetic Contactors
7400	J9	DC Magnetic Contactors
7700	J11	DC Contactors for Vehicles

Photoelectric Sensors & Controls

MEK90	M2	User Selectable
-------	----	-----------------

Alpha-Numerical Index of Catalog Number Prefixes

Prefix	Page	Prefix	Page	Prefix	Page
A60	B40,B42	MEK90	M2	VC	A11 - A14
A63	B30,C7	MVC	A30,A31	VCL	A12
A77	B41, B3, H3, A17, A8, A26, A6	MVCL	A32	VK	B28
A100	G16	MVS	A37, A38	VS	A15 - A18
AK	A6, A8	SH	M23	VJ	A16
A101	G3, G10, G11 - G13	SL	D23,D24	VW	
A102	G2, G3, G5, G6, G7 - G13	SK	D25,D26	VCSK	A26
C18	B13, B14, B15	SVC	A11, A20, A30,A33		
CV	A17, A19	*		1A	D21
C20	B16, B17	T13	B7	1RN	G15
CR101	C15	T18	B13 - B15	100T	D2-D20
CV	A2,A3,A5,A6,A8,A9	T20	B16, B17	4A12	G16
DD	E2	T30	B8		
D713U	K10	T31	B6	4U	K12
DFP	F6	T38	B18	5DP	J4 - J5
DP	H3, H4, H6	T40	B19	5M	B66, J6, J7,J9,J10
DS	E2	T50	B9	5S	K8,K9
E18	B13, B14, B15	T58	B20 - B22	5U	K4, K5, K13
DFP	F6	T60	B23, B24		
E20	B16, B17	T77	B5,L5	100T	D1-D20
EPM	K9	T82	B26	146	J2
ETM	B40, B41	T90	B27	319L	Section N
FH	C17	T95	B26	320L	Section N
H	C20, G2	TB	Section N	335L	Section N
HLD	G3	TS	E2	343L	Section N
HP	C5	TT	E2	344L	Section N
HPC	C4	U	A5,A8,A6,A9	347L	Section N
HPS	C6	U82	B26	447	K18, L4
HPR	C5	U77	B5		
K18	B28	U13	B7	713U	K10, K15
K20	B29	U30	B8	714UP	K14
KHP	C7, C8, H5	*SPF	F6	2411-2460	B32 - B34
KLC	L3			2514-2541	B34
KPM	K9, K11, L2, L3			5000	B65
KPMT	K11			5999	B66, J6, J7,J9,J10
KTB	C8, H5			7000&7001	J4
KTM	B31, B33, B39 - B42			7400	J8
KTMA	B30,B31, B33, B44				
KTR	B30, B32, C8			7M	J12,J13
KUM	B40, B42			9	H5
KVC	A6,A8,A9,A26				
KS	D23,D24,D26				
LC	L2, L3				
KR	D24,D26				