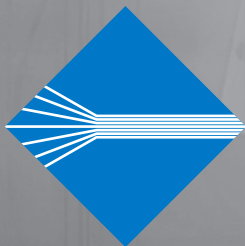


# Advanced Controls & Drives



**BENSHAW**

**CURTISS  
WRIGHT**  
Flow Control



# 2008 Product Catalog Index

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Full Voltage Starters and Motor  
Starter Protectors**

# Contactors, Overload Relays, Full Voltage Starters and Motor Starter Protectors

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# Contactors, Overload Relays, Full Voltage Starters and Motor Starter Protectors

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# Contactors - UL / IEC / NEMA

## RSC SERIES

660 VAC CONTACTORS

### RATINGS

NEMA:	Size 00 - 7
IEC:	9 - 800 AMP
UL:	1 - 600 HP

## IEC / NEMA contactor highlights:

Benshaw contactors are used for controlling single and three phase motors and for switching resistive or inductive loads up to 660 VAC.

The RediStart™ contactor line is built and tested to world leading electrical and mechanical standards.



### Standard features:

- ◆ Din rail mountable to 85 amps
- ◆ Full product family to 800 amps
- ◆ Direct mount overload relays
- ◆ Draw out cassette coils above 85 amps
- ◆ Integral coil surge suppression above 85 amps
- ◆ Low coil power consumption
- ◆ Phase barriers supplied standard
- ◆ Uni-directional mounting
- ◆ Extremely long lifespan
- ◆ Compact size
- ◆ Unit identification marker

### RSC-9~85

- ◆ Finger proof design
- ◆ DIN rail or screw mountable
- ◆ Top/side mount accessories
- ◆ Small physical size
- ◆ Dual auxiliary contacts above 22A
- ◆ Integral voltage barriers

### RSC-100~800

- ◆ Draw out cassette type coil
- ◆ Wide voltage range coils
- ◆ Integral coil surge suppression
- ◆ Dual auxiliary contacts

### Key Advantages:

- ◆ World's longest electrical and mechanical lifespan
- ◆ UL/CSA, IEC, NEMA, BS, EN, VDE ratings
- ◆ Direct mount thermal overload relays
- ◆ Full line of field installable, modularized accessories
- ◆ Device marking strip
- ◆ AC or DC coil options



## Guaranteed ... for two full years.

*Only Benshaw has a two year guarantee.*

Every Benshaw Contactor is guaranteed for two full years. Other manufacturers limit their warranties to just one year. But at Benshaw, we believe that, because we build them better, we can guarantee them longer. We call that "the Benshaw Promise."



# Contactor Technical Information

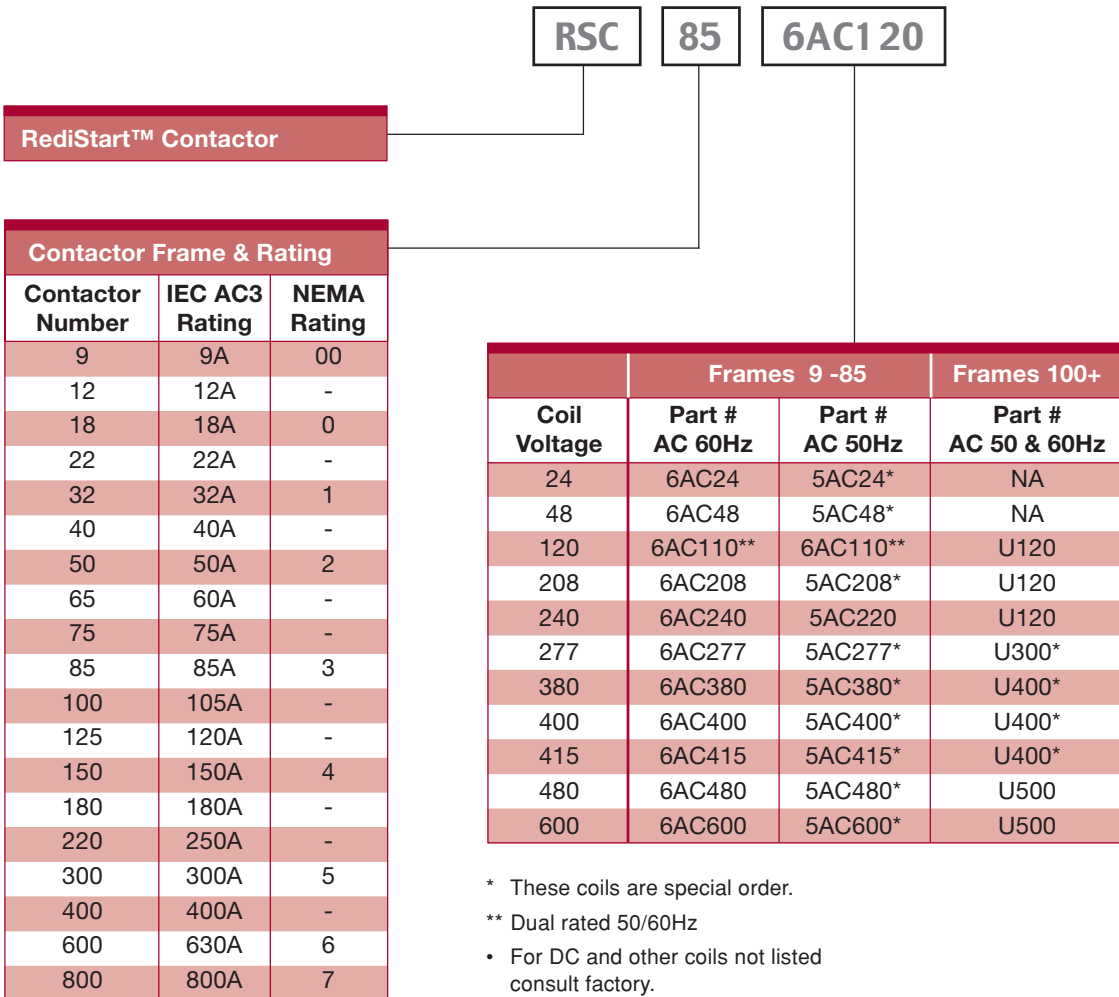


Specification		Contactor Type	RSC 9	RSC 12	RSC 18	RSC 22	RSC 32	RSC 40	RSC 50	RSC 65	RSC 75	RSC 85	RSC 100	RSC 125	RSC 150	RSC 180	RSC 220	RSC 300	RSC 400	RSC 600	RSC 800				
IEC-947	AC 1 Duty		20A	25A	30A	32A	50A	60A	80A	100A	110A	135A	160A	160A	210A	230A	275A	350A	450A	660A	840A				
	AC 2B Duty	200-240V	11A	13A	18A	22A	32A	40A	55A	65A	75A	85A	100A	125A	150A	180A	220A	300A	400A	630A	800A				
		380-440V	9A	12A	18A	22A	32A	40A	50A	60A	75A	85A	100A	120A	150A	180A	220A	300A	400A	630A	800A				
		500-550V	7A	12A	13A	22A	28A	32A	43A	60A	64A	75A	80A	90A	140A	180A	200A	250A	350A	500A	720A				
	AC 3 Duty	200-240V	11A	13A	18A	22A	32A	40A	55A	65A	75A	85A	105A	125A	150A	180A	250A	300A	400A	630A	800A				
		380-440V	9A	12A	18A	22A	32A	40A	50A	65A	75A	85A	105A	120A	150A	180A	250A	300A	400A	630A	800A				
		500-550V	7A	12A	13A	22A	28A	32A	43A	60A	64A	75A	85A	90A	140A	180A	200A	250A	350A	500A	720A				
	AC 4 Duty	200-220V	8A	11A	18A	18A	20A	25A	35A	50A	55A	65A	80A	93A	125A	150A	180A	220A	300A	400A	630A				
		380-440V	6A	9A	9A	13A	17A	24A	32A	47A	52A	62A	75A	90A	110A	150A	180A	220A	300A	400A	630A				
	UL-508	MAX. HP	115V (1PH)	0.5	0.5	1	2	2	3	3	5	5	7.5	7.5	10	15	15	15							
230V (1PH)			1	2	3	3	5	5	7.5	10	15	15	15	20	25	30	40								
208V (3PH)			2	3	5	7.5	7.5	10	10	15	20	25	30	40	40	60	60	100	125	150	200				
240V (3PH)			2	3	5	7.5	10	10	15	20	25	30	30	40	50	60	75	100	150	200	250				
480V (3PH)			5	7.5	10	10	20	25	30	40	50	50	60	75	100	125	150	200	300	400	600				
600V (3PH)			7.5	10	15	15	20	25	30	40	50	50	60	75	100	125	150	200	300	400	600				
UL (lth)			20A	25A	30A	32A	45A	50A	70A	80A	90A	100A	160A	160A	210A	230A	275A	350A	450A	660A	840A				
NEMA	SIZE		00		0	1	1P	2				3		4		5		6	7						
	MAX. HP	115V (1PH)	0.33		1		2	3	3			7.5													
		230V (1PH)	1		3		3	5	7.5			15													
		200V (3PH)	1.5		3		7.5		10			25			40			75		150	250				
		230V (3PH)	1.5		3		7.5		15			30			50			100		200	300				
		460/575V (3PH)	2		5		10		25			50			100			200		400	600				
LIGHTING DUTY	120-690V	11A	13A	18A	22A	32A	40A	50A	65A	75A	85A	105A	120A	150A	180A	250A	300A	400A	630A	800A					
RATED LIFE (X10,000)	ELECTRICAL	250	250	250	250	200	200	200	200	200	200	100	100	100	100	100	100	100	50	50	50				
	MECHANICAL	2500	2500	2500	2500	1500	1500	1000	1000	1000	1000	500	500	500	500	500	500	500	500	500	500				
INSULATION RATING		8000V																							
AMBIENT TEMPERATURE RANGE		-5 TO 50°C OPERATION, -40 TO 65°C STORAGE WITHOUT DERATING																							
OPERATING TIMES	CLOSING ms	10~18/50			11~20/50			16~25/25			30~50			37~60			45~60			45~68			66~70		
	OPENING ms	6~9/8~15			6~10/8~15			9~16/13~20			49~67			44~52			41~45			43~52			45~55		
RESISTANCE TO SHOCK		5g/ms OPERATION, 50g/ms MECHANICAL																							
CONDUCTOR SIZE (MAX.)		#10 AWG				#6 AWG			#4		#1 AWG				LIMITED ONLY BY CRIMP SIZE										
SWITCHING FREQUENCY (OP/HR) AC3		1800	1800	1800	1800	1800	1800	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200				
INTERRUPT CURR. @ 460 VAC		5KA	5KA	5KA	5KA	5KA	5KA	5KA	5KA	10KA	10KA	10KA	10KA	10KA	10KA	10KA	10KA	18KA	18KA	30KA	30KA				
MAXIMUM MAKE CURRENT (A)	240V, AC3	132	156	216	240	312	420	600	780	900	960	1050	1250	1500	1800	2500	3000	4000	6300	8000					
	480V, AC3	90	120	180	240	320	400	576	780	900	960	1050	1200	1500	1800	2500	3000	4000	6300	8000					
MAXIMUM BREAK CURRENT (A)	240V, AC3	110	130	180	200	260	350	500	650	750	800	1050	1250	1500	1800	2500	3000	4000	6300	8000					
	480V, AC3	70	90	130	200	250	320	480	650	750	800	1050	1200	1500	1800	2500	3000	4000	6300	8000					

# Contactors Coil Ratings

TYPE	NOMINAL VOLTAGE	COIL CONSUMPTION (VA)		HEAT DISSIPATION (W)	OPERATIONAL VOLTAGE		COIL CURRENT (MA)	OPERATING TIME	
		INRUSH	SEALED		PICK-UP	DROP-OUT		CLOSING (MS)	OPENING (MS)
					(V)	(V)			
RSC-9~22	110VAC	95	8	2	75~85	55~65	73	11~18	6~9
	220VAC	95	9	2	141~156	105~125	41	10~17	6~9
	110VDC	9	9	-	60~75	15~35	82	45~55	8~15
RSC-32~40	110VAC	95	8	2	75~85	55~65	73	13~20	6~9
	220VAC	95	9	2	150~165	110~130	41	11~19	6~10
	110VDC	9	9	-	60~75	15~35	82	45~55	8~15
RSC-50~85	110VAC	220	17	5.5	68~78	40~50	154	16~25	9~16
	220VAC	220	17	5	145~160	100~120	77	16~25	8~15
	110VDC	220	5	-	65~80	15~35	46	20~30	13~20
RSC-100~125	110VAC	162	9.8	3.1	77	48	89	46~50	49~53
	220VAC	298	12.3	4.4	77	48	56	37~41	47~52
RSC-150	110VAC	162	12.2	3	77	48	111	56~60	44~48
	220VAC	298	12.3	4.4	77	48	56	37~41	47~52
RSC-180~220	110VAC	220	9.1	3.4	77	48	83	60	41
	220VAC	380	11.6	4.7	77	48	53	45	45
RSC-300~400	110VAC	393	14	4.4	77	48	128	64~68	43~47
	220VAC	571	14	5	77	48	64	45~50	48~52
RSC-600~800	110VAC	1000	17	6.3	77	48	155	66~70	45~49
	220VAC	1000	29	7.8	150	91	132	66~69	55

# Contactors Part Number Assembler



- \* These coils are special order.
- \*\* Dual rated 50/60Hz
- For DC and other coils not listed consult factory.
- 60 hz coils may be de-rated by 16% for 50 hz operation.
- U120 coils are universal 100 - 240VAC / 100 - 220VDC (100 - 400A frames only).
- U500 coils are universal 440 - 600VAC.
- 600 and 800 frame coils are 100 - 127VAC for U120.
- For 600 and 800 contactors, 240V only, use U200.

# Contactors - Ratings and Pricing



## RSC SERIES

UL / IEC RATED													
MODEL NUMBER	AMP RATINGS				UL HP RATINGS						AUX CONTACT		LIST PRICE
					ONE-PHASE		THREE-PHASE						
	AC1	AC3	AC4	UL	115V	230V	200V	230V	460V	575V	NO	NC	AC COIL
☞ RSC-9-*	20	9	6	20	0.5	1	2	2	5	7.5	1	1	CF
☞ RSC-12-*	25	12	9	25	0.5	2	3	3	7.5	10	1	1	CF
☞ RSC-18-*	30	18	9	30	1	3	5	5	10	15	1	1	CF
☞ RSC-22-*	32	22	13	32	2	3	7.5	7.5	10	15	1	1	CF
☞ RSC-32-*	50	32	17	45	2	5	7.5	10	20	20	2	2	CF
☞ RSC-40-*	60	40	24	50	3	5	10	10	25	25	2	2	CF
☞ RSC-50-*	80	50	32	70	3	7.5	10	15	30	30	2	2	CF
☞ RSC-65-*	100	65	47	80	5	10	15	20	40	40	2	2	CF
☞ RSC-75-*	110	75	52	90	5	15	20	25	50	50	2	2	CF
☞ RSC-85-*	135	85	62	100	7.5	15	25	30	60	60	2	2	CF
☞ RSC-100-*	160	105	75	160	7.5	15	30	30	60	60	2	2	CF
☞ RSC-125-*	160	120	90	160	10	20	40	40	75	75	2	2	CF
☞ RSC-150-*	210	150	110	210	15	25	40	50	100	100	2	2	CF
☞ RSC-180-*	230	180	150	230	15	30	60	60	125	125	2	2	CF
☞ RSC-220-*	275	250	180	275	15	40	60	75	150	150	2	2	CF
☞ RSC-300-*	350	300	220	350	-	-	100	100	200	200	2	2	CF
☞ RSC-400-*	450	400	300	450	-	-	125	150	300	300	2	2	CF
☞ RSC-600-*	660	630	400	660	-	-	150	200	400	400	2	2	CF
☞ RSC-800-*	900	800	630	900	-	-	250	300	600	600	2	2	CF

NEMA RATED								
MODEL NUMBER	NEMA SIZE	NEMA HP RATING THREE PHASE				AUX CONTACTS		LIST PRICE
		200V	230V	460V	575V	N.O.	N.C.	
☞ RSC-9-*	00	1.5	1.5	2	2	1	1	CF
☞ RSC-18-*	0	3	3	5	5	1	1	CF
☞ RSC-32-*	1	7.5	7.5	10	10	2	2	CF
☞ RSC-50-*	2	10	15	25	25	2	2	CF
☞ RSC-85-*	3	25	30	50	50	2	2	CF
☞ RSC-150-*	4	40	50	100	100	2	2	CF
☞ RSC-300-*	5	75	100	200	200	2	2	CF
☞ RSC-600-*	6	150	200	400	400	2	2	CF
☞ RSC-800-*	7	250	300	600	600	2	2	CF

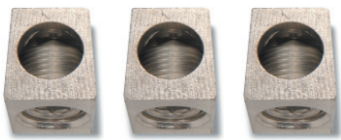
\* Add coil suffix. See page 1-7 for CONTACTOR part number assembler.

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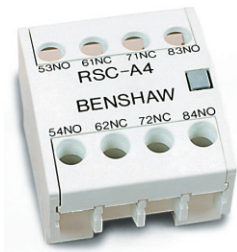
# Contactor Accessories



(RSC-BT50 &amp; RSC-BT85)



(RSC-BT150 THROUGH RSC-BT800)



## OPTIONAL CONTACTOR BOX LUG KITS

MODEL NUMBER	DESCRIPTION	CONTACTOR FRAME RSC	CONDUCTORS PER PHASE	WIRE SIZE	LIST PRICE
☞ RSC-BT50	1 KIT = 3 LUGS FOR LINE OR LOAD	50	1	4 AWG~16 AWG	CF
☞ RSC-BT85		65~85	1	2 AWG~14 AWG	CF
☞ RSC-BT150		100~150	1	6AWG~250MCM	CF
☞ RSC-BT220		180~400	1	1AWG~350MCM	CF
☞ RSC-BT400		180~400	2	4/0~500MCM	CF
☞ RSC-BT800		600~800	2	4/0~600MCM	CF

## AUXILIARY CONTACT BLOCKS

MODEL NUMBER	DESCRIPTION	CONTACTOR	POLES	LIST PRICE
☞ RSC-A2	TOP MOUNT (HEAD ON)	RSC-9~85	2 (1NO/1NC)	CF
☞ RSC-A4	TOP MOUNT (HEAD ON)	RSC-9~85	4 (2NO/2NC)	CF
☞ RSC-A1	SIDE MOUNT (SIDE ON)	RSC-9~85	2 (1NO/1NC)	CF
☞ RSC-A100	SIDE MOUNT (SIDE ON)	RSC-100~800	2 (1NO/1NC)	CF

## SURGE SUPPRESSORS

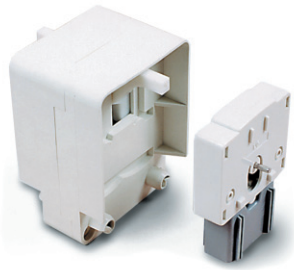
MODEL NUMBER	DESCRIPTION	COIL VOLTAGE	CONTACTOR RANGE	LIST PRICE
☞ RSC-M048	VARISTOR	AC 24-48V	RSC-9~800	CF
☞ RSC-M0125	VARISTOR	AC 100-125V	RSC-9~800	CF
☞ RSC-M0240	VARISTOR	AC 200-240V	RSC-9~800	CF
☞ RSC-AS48	RC + VARISTOR	AC 24-48V	RSC-9~85	CF
☞ RSC-AS125	RC + VARISTOR	AC 100-125V	RSC-9~85	CF
☞ RSC-AS240	RC + VARISTOR	AC 200-240V	RSC-9~85	CF

\* RSC-100- 800 contactors have built-in surge suppression.

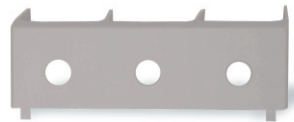
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# Contactor Accessories



MECHANICAL INTERLOCK UNITS			
MODEL NUMBER	DESCRIPTION	CONTACTOR RANGE	LIST PRICE
🖱️ RSC-M85	MECHANICAL INTERLOCK FOR TWO CONTACTORS. PREVENTS BOTH CONTACTORS FROM CLOSING SIMULTANEOUSLY.	RSC-9~85	CF
🖱️ RSC-M150		RSC-100~150	CF
🖱️ RSC-M400		RSC-180~400	CF
🖱️ RSC-M800		RSC-600~800	CF



CONTACTOR TERMINAL COVER KITS*		
MODEL NUMBER	APPLYING CONTACTOR	LIST PRICE
🖱️ RSC-AP100/125	RSC-100/125	CF
🖱️ RSC-AP150	RSC-150	CF
🖱️ RSC-AP180	RSC-180	CF
🖱️ RSC-AP220	RSC-220	CF
🖱️ RSC-AP300	RSC-300	CF
🖱️ RSC-AP400	RSC-400	CF
🖱️ RSC-AP600	RSC-600	CF
🖱️ RSC-AP800	RSC-800	CF



CAPACITOR UNIT				
MODEL NUMBER	DESCRIPTION	CONFIGURATION	CONTACTOR TYPE	LIST PRICE
🖱️ AC9	CAPACITOR UNIT	-	RSC9 - RSC32	CF
🖱️ AC50	CAPACITOR UNIT	-	RSC40 - RSC85	CF

\* Kits include line & load terminal covers.

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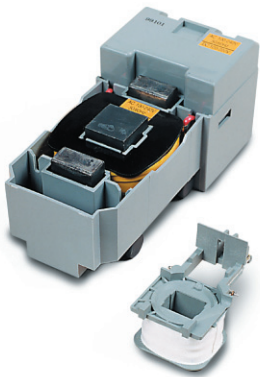
# Contactors Replacement Parts



REPLACEMENT CONTACT KITS			
MODEL NUMBER	DESCRIPTION	CONTACTOR	LIST PRICE
🔗 RSC-T100	EACH KIT INCLUDES: 3 STATIONARY AND 3 MOVABLE CONTACTS  (REPLACES ALL THREE PHASES OF ONE CONTACTOR)	RSC-100	CF
🔗 RSC-T125		RSC-125	CF
🔗 RSC-T150		RSC-150	CF
🔗 RSC-T180		RSC-180	CF
🔗 RSC-T220		RSC-220	CF
🔗 RSC-T300		RSC-300	CF
🔗 RSC-T400		RSC-400	CF
🔗 RSC-T600		RSC-600	CF
🔗 RSC-T800		RSC-800	CF



REPLACEMENT PHASE BARRIER KITS			
MODEL NUMBER	DESCRIPTION	FRAME	LIST PRICE
🔗 RSC-B125	EACH KIT INCLUDES: 2 PHASE BARRIERS FOR LINE OR LOAD SIDE OF ONE CONTACTOR	RSC-100-125	CF
🔗 RSC-B150		RSC-150	CF
🔗 RSC-B220		RSC-180-220	CF
🔗 RSC-B400		RSC-300-400	CF
🔗 RSC-B800		RSC-600-800	CF



CONTACTOR COILS			
MODEL NUMBER	COIL VOLTAGE	CONTACTOR RANGE	LIST PRICE
🔗 RSC-C40-*	AC	RSC-9~40	CF
🔗 RSC-C22-DC-*	DC	RSC-9~22	CF
🔗 RSC-C40-DC	DC	RSC-32~40	CF
🔗 RSC-C85-*	AC	RSC-50~85	CF
🔗 RSC-C85-DC*	DC	RSC-50~85	CF
🔗 RSC-C150-*	UNIVERSAL	RSC-100~125~150	CF
🔗 RSC-C220-*	UNIVERSAL	RSC-180~220	CF
🔗 RSC-C400-*	UNIVERSAL	RSC-300~400	CF
🔗 RSC-C800-*	AC	RSC-600~800	CF

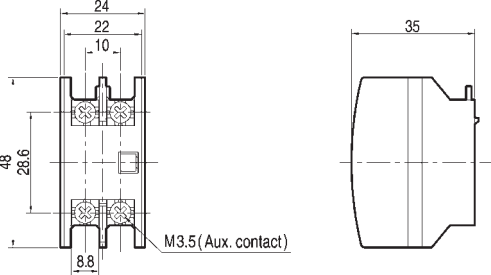
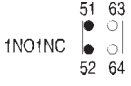
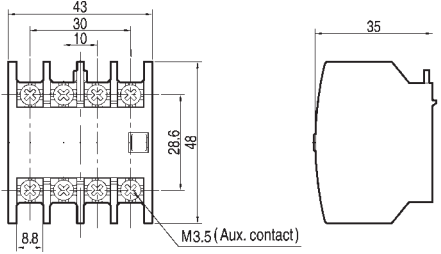
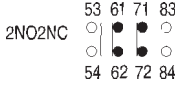
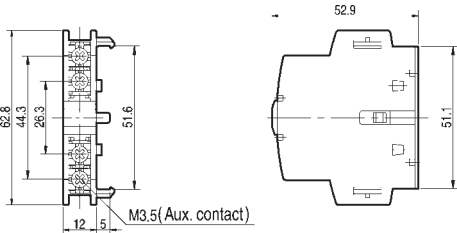
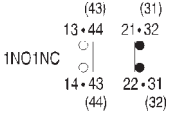
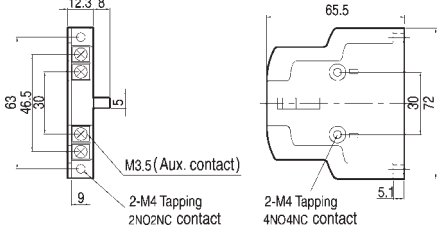
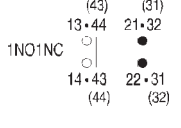
\* Refer to coil voltage page 1-7 for complete part number.

\* AC and DC coils are not interchangeable.

🔗 Web stocked

# RSC Mounting Dimensions

## RSC AUXILIARY CONTACTS

TYPE	DIMENSIONS	WIRING DIAGRAM
RSC-A2		<p>28 g</p> <p>1NO1NC</p> 
RSC-A4		<p>50 g</p> <p>2NO2NC</p> 
RSC-A1		<p>33 g</p> <p>1NO1NC</p> 
RSC-A100		<p>45 g</p> <p>1NO1NC</p> 

• Dimensions are in mm (1 inch = 25.4 mm).

# RSC Mounting Dimensions

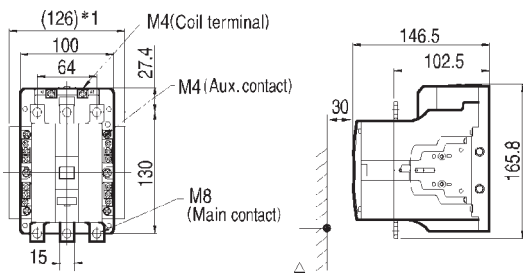
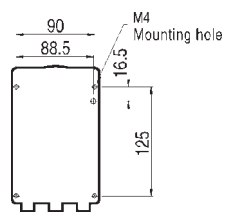
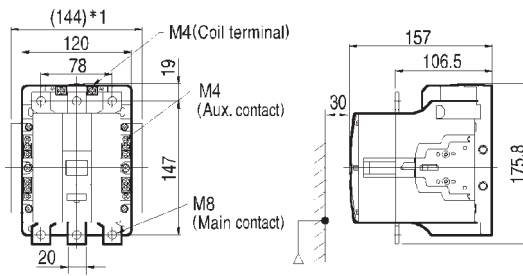
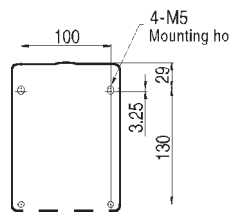
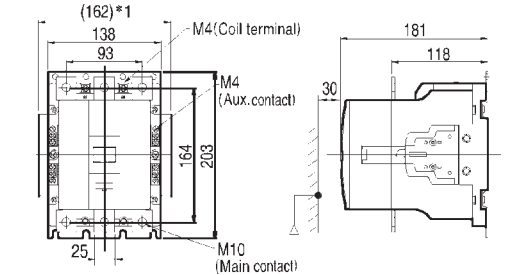
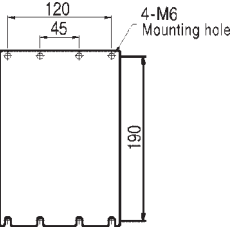
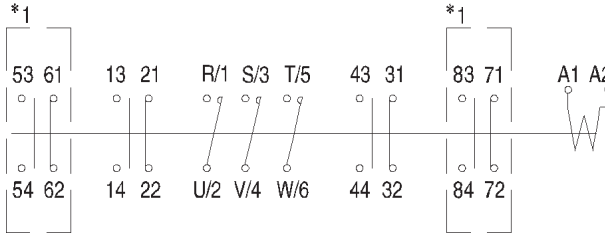
RSC-9~85 AC COILS

TYPE	EXTERNAL DIMENSIONS	DIMENSIONS
<p>RSC-9 RSC-12 RSC-18 RSC-22</p>		<p>RSC-9~12 : 0.33 kg RSC-18~22 : 0.37 kg</p>
<p>RSC-32 RSC-40</p>		<p>RSC-32~40 : 0.45 kg</p>
<p>RSC-50 RSC-65 RSC-75 RSC-85</p>		<p>RSC-50~85 : 1.00 kg</p>
<p>Circuit Diagram</p>	<p>RSC-9~22</p>	<p>RSC-32~85</p>

<sup>1</sup> With second auxiliary contact block  
• Dimensions are in mm (1 inch = 25.4 mm) .

# RSC Mounting Dimensions

## RSC-100~200 UNIVERSAL COILS

TYPE	EXTERNAL DIMENSIONS	DIMENSIONS
<b>RSC-100</b> <b>RSC-125</b>		<p>RSC-100~125 : 2.90 kg</p> 
<b>RSC-150</b>		<p>RSC-150 : 3.40 kg</p> 
<b>RSC-180</b> <b>RSC-220</b>		<p>RSC-180~220 : 5.40 kg</p> 
<b>Circuit Diagram</b>	<p><b>RSC-100~200</b></p>  <p>With four Aux. contact blocks</p>	

- <sup>1</sup> With second auxiliary contact block
- Dimensions are in mm (1 inch = 25.4 mm) .

# RSC Mounting Dimensions

RSC-300~800 UNIVERSAL COILS

TYPE	EXTERNAL DIMENSIONS	DIMENSIONS
<p>RSC-300 RSC-400</p>		<p>RSC-300~400 : 9.20kg</p>
<p>RSC-600 RSC-800</p>		<p>RSC-600~800 : 22.40kg</p>
<p>Circuit Diagram</p>	<p>(RSC-300~800)</p>	

- <sup>1</sup> With second auxiliary contact block
- Dimensions are in mm (1 inch = 25.4 mm).

# Modular 3-Pole Contactors

## RMSC SERIES

FOR MOTOR CONTROL UP TO 45KW AT 480V IN CATEGORY AC-3



*Snap together with an RMSP motor starter protector to make a complete electro-mechanical combination starter*



### Standard features:

- ◆ IEC AC-3 rated
- ◆ Durable, compact design
- ◆ DIN rail mountable
- ◆ Conforms to UL, CSA, IEC947-4-1
- ◆ Voltage rating 200-690VAC 50/60HZ
- ◆ Universal AC coils 50/60HZ rated
- ◆ Finger safe, screw clamp terminals
- ◆ Direct mount to RMSP for a complete motor starter
- ◆ High interrupt capacity when used with RMSP
- ◆ Full line of field installable, easy add-on accessories
- ◆ Direct mount to RMSO O/L

### RMSC contactor highlights:

IEC contactors can be used to control Benschaw's RMSP manual starters, or may be used in other continuous duty control applications where high durability in a compact design is important.

RMSC Series contactors are built and tested to world leading electrical and mechanical standards.

#### Key Advantages:

- ◆ Clip-on mounting on 35mm rail or screw fitting
- ◆ RMSC-65 to RMSC-95 types are mountable on 70mm DIN rail
- ◆ 60Hz units: 208, 277, 480, 600V in stock for immediate shipping
- ◆ 50/60Hz units: 24, 120, 240, 380, 415V in stock for immediate shipping
- ◆ Other units are available by special order

### *Guaranteed ... for two full years.*

*Only Benschaw has a two year guarantee.*

Every Benschaw contactor is guaranteed for two full years. Other manufacturers limit their warranties to just one year. But at Benschaw, we believe that, because we build them better, we can guarantee them longer. We call that "the Benschaw Promise."



Overloads to suit contactors can be found on page 1-42.

Accessories can be found on page 1-19.



# RMSC Contactor Specifications



Specification		Type	RMSC 9	RMSC 12	RMSC 18	RMSC 25	RMSC 32	RMSC 35	RMSC 40	RMSC 50	RMSC 63	RMSC 65	RMSC 75	RMSC 85	RMSC 95	
CONNECTION BY SCREW CLAMP TERMINAL			•	•	•	•	•	•	•	•	•	•	•	•	•	
CONNECTION BY LUGS			-	-	-	-	-	•	•	•	•	•	•	•	•	
NUMBER OF POLES			3	3	3	3	3	3	3	3	3	3	3	3	3	
RATED OPERATIONAL VOLTAGE, Ue			690V	690V	690V	690V	690V	690V	690V	690V	690V	690V	690V	690V	690V	
RATED INSULATION VOLTAGE, Ui		IEC947-4-1	1000V	1000V	1000V	1000V	1000V	1000V	1000V	1000V	1000V	1000V	1000V	1000V	1000V	
		UL, CSA	600V	600V	600V	600V	600V	600V	600V	600V	600V	600V	600V	600V	600V	600V
RATED IMPULSE WITHSTAND VOLTAGE, Uimp			8kV	8kV	8kV	8kV	8kV	8kV	8kV	8kV	8kV	8kV	8kV	8kV	8kV	
DEGREE OF POLLUTION (IEC60529)			IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP20	
RATED OPERATIONAL CURRENT (0 ≤ 55°C)		AC 1 Duty	Ue max. 690V	25A	25A	40A	40A	50A	55A	60A	70A	75A	100A	110A	135A	140A
		AC 3 Duty	200/240V	11A	13A	18A	25A	32A	35A	40A	55A	63A	65A	75A	85A	95A
			380/400V	9A	12A	18A	25A	32A	35A	40A	50A	63A	65A	75A	85A	95A
			415V	9A	12A	18A	25A	32A	35A	40A	50A	63A	65A	75A	85A	95A
			480V	9A	12A	18A	25A	32A	35A	40A	50A	63A	65A	75A	85A	95A
			500V	7A	12A	13A	22A	28A	30A	32A	43A	45A	60A	64A	75A	85A
690V	5A	9A	9A	18A	20A	21A	23A	28A	30A	35A	42A	45A	50A			
RATED OPERATIONAL POWER (0 ≤ 55°C)		AC 3 Duty	200/240V	2.5kW	3.5kW	4.5kW	5.5kW	7.5kW	11kW	11kW	15kW	15kW	18.5kW	22kW	25kW	25kW
			380/400V	4kW	5.5kW	7.5kW	11kW	15kW	18.5kW	18.5kW	22kW	25kW	30kW	37kW	45kW	45kW
			415V	4kW	5.5kW	7.5kW	11kW	15kW	18.5kW	18.5kW	22kW	25kW	30kW	37kW	45kW	45kW
			480V	4kW	5.5kW	7.5kW	11kW	15kW	18.5kW	18.5kW	22kW	25kW	30kW	37kW	45kW	45kW
			500V	4kW	7.5kW	7.5kW	15kW	18.5kW	22kW	22kW	30kW	30kW	33kW	37kW	45kW	50kW
			690V	4kW	7.5kW	7.5kW	15kW	18.5kW	22kW	22kW	30kW	30kW	33kW	37kW	45kW	45kW
IEC947-4-1 RATED MAKING CAPACITY [AC3 Duty]			250V	250V	250V	250V	250V	250V	250V	250V	250V	250V	250V	250V	250V	
IEC947-4-1 RATED BREAKING CAPACITY [AC3 Duty]			200V	200V	200V	200V	200V	200V	200V	200V	200V	200V	200V	200V	200V	
MECHANICAL DURABILITY (millions of cycles)			15	15	15	15	15	12	12	12	12	12	12	12	12	
MAXIMUM OPERATING RATE (cycles per hour)			1800	1800	1800	1800	1800	1200	1200	1200	1200	1200	1200	1200	1200	
ELECTRICAL DURABILITY (millions of cycles)			2.5	2.5	2.5	2.5	2.5	2	2	2	1.3	2	2	2	2	
BUILT-IN AUXILIARY CONTACT		NO	-	-	-	-	-	-	-	-	-	-	-	-	-	
		NC	-	-	-	-	-	-	-	-	-	-	-	-	-	
WEIGHT (KG)			0.45	0.45	0.45	0.45	0.45	0.94	0.94	0.94	0.94	1.82	1.82	1.82	1.82	
WIDTH (MM)			45	45	45	45	45	55	55	55	55	70	70	70	70	
HEIGHT (MM)			83	83	83	83	83	106	106	106	106	140	140	140	140	
DEPTH (MM)			93	93	93	93	93	122	122	122	122	137	137	137	137	

# Modular Contactor Pricing



## RMSC SERIES

MODEL NUMBER	RATED OPERATIONAL CURRENT	BUILT-IN AUXILIARY CONTACTS	TERMINAL TYPE	WGT	DIMENSIONS (mm)			LIST PRICE
					H	W	D	
☞ RMSC9*S	9	NONE	SCREW CLAMP	.45KG/1LBS	83	45	93	CF
☞ RMSC12*S	12	NONE	SCREW CLAMP	.45KG/1LBS	83	45	93	CF
☞ RMSC18*S	18	NONE	SCREW CLAMP	.45KG/1LBS	83	45	93	CF
☞ RMSC25*S	25	NONE	SCREW CLAMP	.45KG/1LBS	83	45	93	CF
☞ RMSC32*S	32	NONE	SCREW CLAMP	.45KG/1LBS	83	45	93	CF
☞ RMSC35*L	35	NONE	LUG	.94KG/2.1LBS	106	55	122	CF
☞ RMSC40*L	40	NONE	LUG	.94KG/2.1LBS	106	55	122	CF
☞ RMSC50*L	50	NONE	LUG	.94KG/2.1LBS	106	55	122	CF
☞ RMSC63*L	63	NONE	LUG	.94KG/2.1LBS	106	55	122	CF
☞ RMSC65*L	65	NONE	LUG	1.82KG/4LBS	140	70	137	CF
☞ RMSC75*L	75	NONE	LUG	1.82KG/4LBS	140	70	137	CF
☞ RMSC85*L	85	NONE	LUG	1.82KG/4LBS	140	70	137	CF
☞ RMSC95*L	95	NONE	LUG	1.82KG/4LBS	140	70	137	CF

Replace \* with coil suffix from the table on the right

See accessories on page 1-19

Dimensions are in mm (1 in. = 25.4 mm)

☞ Web stocked

Coil Voltage Table
A = 120VAC - 50 / 60HZ
B = 240VAC - 50 / 60HZ
C = 208VAC - 60HZ only
D = 480VAC - 60HZ only
E = 575VAC - 60HZ only
F = 24VAC - 50 / 60HZ
G = 277VAC - 60HZ only
H = 380VAC - 50HZ only
I = 400VAC - 50HZ only
J = 415VAC - 50HZ only
For other voltages & frequencies consult factory.



# Modular Contactor Accessories

## RMSC SERIES



### REPLACEMENT COILS

MODEL NUMBER	DESCRIPTION	CONFIGURATION	CONTACTOR TYPE	LIST PRICE
☞ RMSC32*	REPLACEMENT COIL	50/60HZ	RMSC9 - RMSC32	CF
☞ RMSC63*	REPLACEMENT COIL	50/60HZ	RMSC35 - RMSC63	CF
☞ RMSC95*	REPLACEMENT COIL	50/60HZ	RMSC65 - RMSC95	CF

Replace \* with coil voltage suffix from the table on page 1-18



### AUXILIARY CONTACTS

MODEL NUMBER	DESCRIPTION	CONFIGURATION	CONTACTOR TYPE	LIST PRICE
☞ RMSC1A	SIDE MOUNT	1 N.O./1 N.C.	RMSC65 - RMSC95	CF
☞ RSCA2	TOP MOUNT	2 N.O./2 N.C.	RMSC9 - RMSC32	CF
☞ RSCA4	TOP MOUNT	4 N.O./4 N.C.	RMSC35 - RMSC63	CF



### INTERLOCK UNIT

MODEL NUMBER	DESCRIPTION	CONFIGURATION	CONTACTOR TYPE	LIST PRICE
☞ RMSCUR02	REVERSING CONN.	REVERSING	RMSC9 - RMSC32	CF



### CAPACITOR UNIT

MODEL NUMBER	DESCRIPTION	CONFIGURATION	CONTACTOR TYPE	LIST PRICE
☞ AC9	CAPACITOR UNIT	-	RMSC9 - RMSC32	CF
☞ AC50	CAPACITOR UNIT	-	RMSC35 - RMSC95	CF



### WIRE ASSEMBLY

MODEL NUMBER	DESCRIPTION	CONFIGURATION	CONTACTOR TYPE	LIST PRICE
☞ RMSC-UW-32	WIRE CONNECTOR	REVERSING	RMSC32	CF
☞ RMSC-UW-63	WIRE CONNECTOR	REVERSING	RMSC63	CF
☞ RMSC-UW-95	WIRE CONNECTOR	REVERSING	RMSC95	CF

☞ Web stocked

# Modular Contactor Accessory Characteristics

## RMSC SERIES

### CONTROL CIRCUIT CHARACTERISTICS

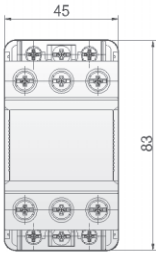
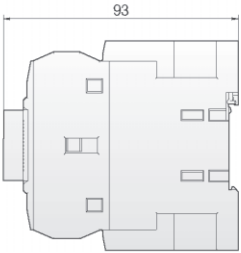
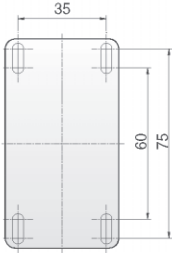
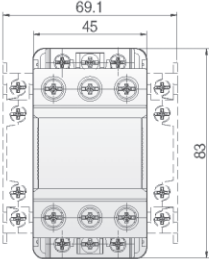
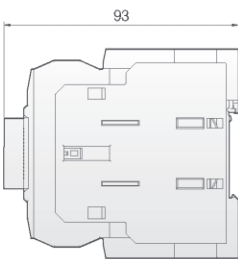
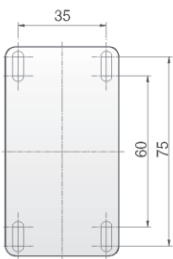

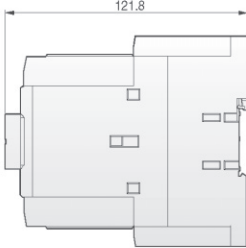
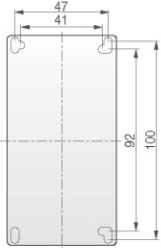
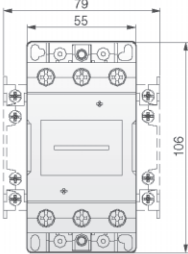
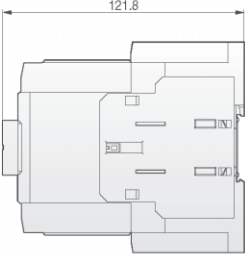
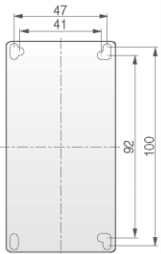
Characteristic		Type	RMSC 9	RMSC 12	RMSC 18	RMSC 25	RMSC 32	RMSC 35	RMSC 40	RMSC 50	RMSC 63	RMSC 65	RMSC 75	RMSC 85	RMSC 95
RATED CONTROL CIRCUIT VOLTAGE (Uc)	50Hz [V]	-	24, 32, 36, 42, 48, 80, 100, 110, 220, 230, 240, 380, 400, 415, 440, 500, 550V												
	60Hz [V]	-	24, 48, 100, 110, 120, 200, 208, 220, 230, 240, 277, 380, 440, 480, 600V												
	50/60Hz [V]	-	24, 48, 100, 110, 120, 200, 220, 230, 240, 380, 415, 440, 500, 550V												
CONTROL VOLTAGE LIMITS	Operational	-	0.8...1.1 Uc on 50Hz												
		-	0.85...1.1 Uc on 60Hz												
	Drop-Out	-	0.3...0.6 Uc												
COIL CONSUMPTION AT 20°C	Inrush [VA]	-	80	80	80	80	80	120	120	120	120	220	220	220	220
	Holding [VA]	-	9	9	9	9	9	11	11	11	11	16	16	16	16
HEAT DISSIPATION [W]		-	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	5.1	5.1	5.1	5.1
OPERATING TIME	Closing [ms]	-	12...22	12...22	12...22	12...22	12...22	12...22	12...22	12...22	12...22	15...30	15...30	15...30	15...30
	Opening [ms]	-	4...19	4...19	4...19	4...19	4...19	4...19	4...19	4...19	4...19	15...30	15...30	15...30	15...30
RATED CONTROL CIRC. VOLTAGE [Uc]		-	12, 20, 24, 48, 60, 80, 100, 110, 125, 200, 220, 250												
CONTROL VOLTAGE LIMITS	Operational	-	0.7...1.25 Uc												
	Drop-Out	-	0.1...0.3 Uc												
COIL CONSUMPTION AT 20°C	Inrush [W]	-	7	7	7	7	7	9	9	9	9	18	18	18	18
	Holding [W]	-	7	7	7	7	7	9	9	9	9	18	18	18	18
TIME CONSTANT (L/R) (ms)		-	28	28	28	28	28	65	65	65	65	75	75	75	75
OPERATING TIME	Closing [ms]	-	12...22	12...22	12...22	12...22	12...22	12...22	12...22	12...22	12...22	100...120	100...120	100...120	100...120
	Opening [ms]	-	4...19	4...19	4...19	4...19	4...19	4...19	4...19	4...19	4...19	10...25	10...25	10...25	10...25

### AUXILIARY CONTACT / CONTACT BLOCK CHARACTERISTICS

Characteristic		RMSC 9	RMSC 12	RMSC 18	RMSC 25	RMSC 32	RMSC 35	RMSC 40	RMSC 50	RMSC 63	RMSC 65	RMSC 75	RMSC 85	RMSC 95		
AUXILIARY CONTACTS	Normally Open [EA]	-	-	-	-	-	-	-	-	-	-	-	-	-		
	Normally Closed [E]	-	-	-	-	-	-	-	-	-	-	-	-	-		
OPTIONAL AUXILIARY CONTACT BLOCKS	Normally Open [EA]	2 1 0					4 3 2 1 0					1				
	Normally Closed [E]	0 1 2					0 1 2 3 4					1				
RATED OPERATIONAL VOLTAGE, Ue [V]		600														
RATED INSULATION VOLTAGE, Ui	IEC 947-1 [V]	600														
	UL, CSA [V]	600														
OPERATING CURRENT FREQUENCY [Hz]		25-400														
SHORT CIRCUIT PROTECTION		gLgG fuse: 16A (conforming to IEC EN947-5-1)														
THERMAL CURRENT, LTH [A]		16														
AC15 DUTY OPERATIONAL CURRENT (AC600)	120V [A]	6														
	240V [A]	3														
	480V [A]	1.5														
	600V [A]	1.2														
AC15 DUTY LIFETIME (MIL. OPERATIONS)	220V	0.5														
	440V	0.5														
OPERATING CYCLES PER HOUR		1800														

# Overall Dimensions

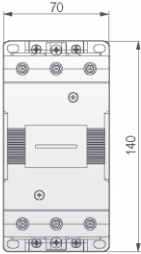
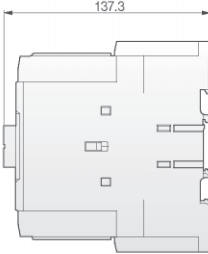
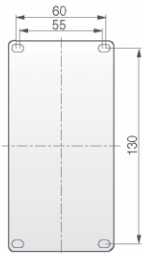
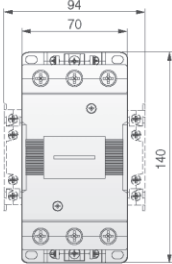
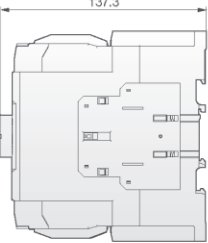
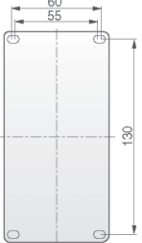
## RMSC SERIES MODULAR CONTACTORS

TYPE	DIMENSIONS		
<b>RMSC9-32 AC</b>			
<b>RMSC9-32 AC DIM WITH AUXILIARY CONTACT</b>			
<b>RMSC35-63 AC</b>			
<b>RMSC35-63 AC DIM WITH AUXILIARY CONTACT</b>			

• Dimensions are in mm (1 inch = 25.4 mm).

# Overall Dimensions

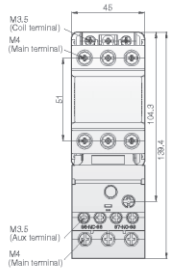
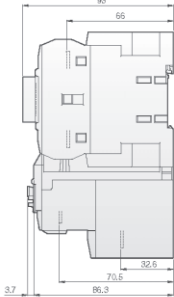
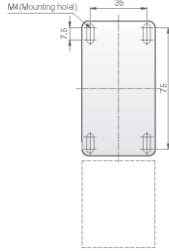
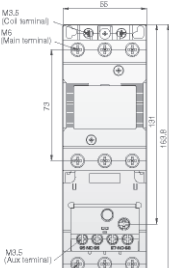
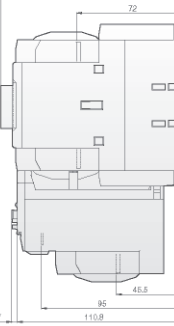

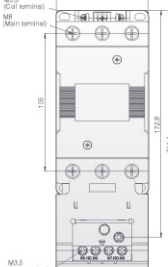
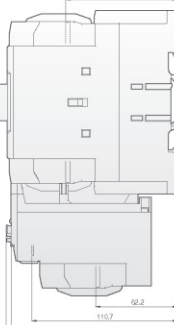
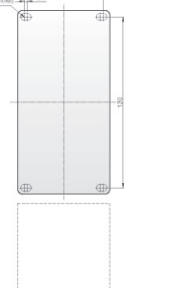
## RMSC SERIES MODULAR CONTACTORS

TYPE	DIMENSIONS		
<b>RMSC65-95 AC</b>			
<b>RMSC65-95 AC DIM WITH AUXILIARY CONTACT</b>			

• Dimensions are in mm (1 inch = 25.4 mm) .

# Overall Dimensions

## RMSC - RMSO MOTOR STARTERS (SCREW TYPE)

TYPE	DIMENSIONS		
<p>RMSC+RMSO-9                      RMSC+RMSO-12                      RMSC+RMSO-18                      RMSC+RMSO-25                      RMSC+RMSO-32</p>			
<p>RMSC+RMSO-35                      RMSC+RMSO-40                      RMSC+RMSO-50                      RMSC+RMSO-63</p>			
<p>RMSC+RMSO-65                      RMSC+RMSO-75                      RMSC+RMSO-85                      RMSC+RMSO-95</p>			

• Dimensions are in mm (1 inch = 25.4 mm) .



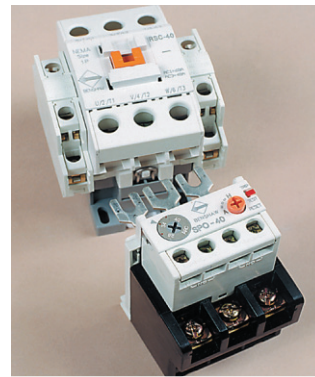
# Overload Relays - Bimetallic - CLASS 10 & 20

## SPO SERIES

*Simple, fully adjustable overload relays.*

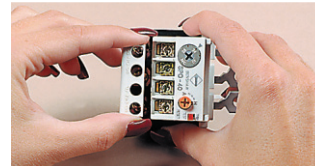
Extended Part No.	Setting Range Min (A) Max (A)	Overload Frame (Contactor Mount)
0.14	0.1 TO 0.16	SPO-22 (RSC-9 - 22)
0.21	0.16 TO 0.25	
0.33	0.25 TO 0.4	
0.52	0.4 TO 0.63	
0.82	0.63 TO 1	
1.3	1 TO 1.6	SPO-40 (RSC-32 - 40)
2.1	1.6 TO 2.5	
3.3	2.5 TO 4	
5	4 TO 6	
6.5	5 TO 8	
7.5	6 TO 9	SPO-85 (RSC-50 - 85)
8.5	7 TO 10	
11	9 TO 13	
15	12 TO 18	
19	16 TO 22	
22	18 TO 26	SPO-150 (RSC-150)
30	24 TO 36	
34	28 TO 40	
42	34 TO 50	
55	45 TO 65	
65	54 TO 75	SPO-220 (RSC-180 - 220)
74	63 TO 85	
80	65 TO 100	
107	85 TO 125	
130	100 TO 160	
150	120 TO 180	SPO-400 (RSC-300 - 400)
200	160 TO 240	
250	200 TO 300	
350	260 TO 400	
500	400 TO 600	
660	520 TO 800	SPO-800 (RSC-600 - 800)

Benshaw SP overload relays integrally mount to RS contactors and provide thermal overload protection.



### The SurProtex Overload Relay

The SurProtex overload relay can be mounted directly to the magnetic contactors without additional brackets.



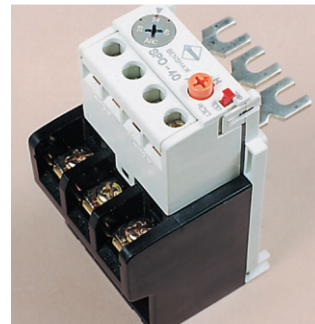
### Safety Cover

A "finger-proof" safety cover prevents any contact with live parts.



### Simple Adjustments

Overload adjustments are easy to access and straightforward to set.



### Trip/Reset Indicator

Each overload relay has a manual trip operator and indicator flag.

**NOTE:** Direct mount to RSC Series contactors only.



# Overload Relays - Bimetallic - CLASS 10

## PRICE AND SELECTION GUIDE

MODEL NUMBER	OVERLOAD RANGE	LIST PRICE
<b>FOR CONTACTORS RSC - 9, 12, 18 &amp; 22</b>		<b>SPO-22</b>
☞ SPO-22-A14	0.1 - 0.16	CF
☞ SPO-22-A21	0.16 - 0.2	CF
☞ SPO-22-A33	0.25 - 0.4	CF
☞ SPO-22-A52	0.4 - 0.63	CF
☞ SPO-22-A82	0.63 - 1	CF
☞ SPO-22-1A3	1 - 1.6	CF
☞ SPO-22-2A1	1.6 - 2.5	CF
☞ SPO-22-3A3	2.5 - 4	CF
☞ SPO-22-5A	4 - 6	CF
☞ SPO-22-6A5	5 - 8	CF
☞ SPO-22-7A5	6 - 9	CF
☞ SPO-22-8A5	7 - 10	CF
☞ SPO-22-11A	9 - 13	CF
☞ SPO-22-15A	12 - 18	CF
☞ SPO-22-19A	16 - 22	CF

<b>FOR CONTACTORS RSC - 32 &amp; 40</b>		<b>SPO-40</b>
☞ SPO-40-5A	4 - 6	CF
☞ SPO-40-6A5	5 - 8	CF
☞ SPO-40-7A5	6 - 9	CF
☞ SPO-40-8A5	7 - 10	CF
☞ SPO-40-11A	9 - 13	CF
☞ SPO-40-15A	12 - 18	CF
☞ SPO-40-19A	16 - 22	CF
☞ SPO-40-22A	18 - 26	CF
☞ SPO-40-30A	24 - 36	CF
☞ SPO-40-34A	28 - 40	CF

MODEL NUMBER	OVERLOAD RANGE	LIST PRICE
<b>FOR CONTACTORS RSC - 50, 65, 75, &amp; 85</b>		<b>SPO-85</b>
☞ SPO-85-8A5	7 - 10	CF
☞ SPO-85-11A	9 - 13	CF
☞ SPO-85-15A	12 - 18	CF
☞ SPO-85-19A	16 - 22	CF
☞ SPO-85-22A	18 - 26	CF
☞ SPO-85-30A	24 - 36	CF
☞ SPO-85-34A	28 - 40	CF
☞ SPO-85-42A	34 - 50	CF
☞ SPO-85-55A	45 - 65	CF
☞ SPO-85-65A	54 - 75	CF
☞ SPO-85-74A	63 - 85	CF



☞ Web stocked

# Overload Relays - Bimetallic - CLASS 10

## PRICE AND SELECTION GUIDE



MODEL NUMBER	OVERLOAD RANGE	LIST PRICE
<b>FOR CONTACTORS RSC - 100 &amp; 125</b>		<b>SPO-125</b>
☞ SPO-125-41A	34 - 50	CF
☞ SPO-125-48A	39 - 57	CF
☞ SPO-125-56A	45 - 65	CF
☞ SPO-125-67A	54 - 80	CF
☞ SPO-125-80A	65 - 100	CF
☞ SPO-125-107A	85 - 125	CF

<b>FOR CONTACTORS RSC - 150</b>		<b>SPO-150</b>
☞ SPO-150-41A	34 - 50	CF
☞ SPO-150-48A	39 - 57	CF
☞ SPO-150-56A	45 - 65	CF
☞ SPO-150-67A	54 - 80	CF
☞ SPO-150-80A	65 - 100	CF
☞ SPO-150-107A	85 - 125	CF
☞ SPO-150-130A	100 - 150	CF

<b>FOR CONTACTORS RSC - 180 &amp; 220</b>		<b>SPO-220</b>
☞ SPO-220-80A	65 - 100	CF
☞ SPO-220-107A	85 - 125	CF
☞ SPO-220-130A	100 - 160	CF
☞ SPO-220-150A	120 - 180	CF
☞ SPO-220-200A	160 - 240	CF

☞ Web stocked

MODEL NUMBER	OVERLOAD RANGE	LIST PRICE
<b>FOR CONTACTORS RSC - 300 &amp; 400</b>		<b>SPO-400</b>
☞ SPO-400-107A	85 - 125	CF
☞ SPO-400-130A	100 - 160	CF
☞ SPO-400-150A	120 - 180	CF
☞ SPO-400-200A	160 - 240	CF
☞ SPO-400-250A	200 - 300	CF
☞ SPO-400-350A	260 - 400	CF

<b>FOR CONTACTORS RSC - 600 &amp; 800</b>		<b>SPO-800</b>
☞ SPO-800-250A	200 - 300	CF
☞ SPO-800-350A	260 - 400	CF
☞ SPO-800-500A	400 - 600	CF
☞ SPO-800-660A	520 - 800	CF



# Overload Relays - Bimetallic - CLASS 20



## PRICE AND SELECTION GUIDE

MODEL NUMBER	OVERLOAD RANGE	LIST PRICE
<b>FOR CONTACTORS RSC - 9, 12, 18 &amp; 22 SPO-22</b>		
☞ SPO-22H-1A3	1 - 1.6	CF
☞ SPO-22H-2A1	1.6 - 2.5	CF
☞ SPO-22H-3A3	2.5 - 4	CF
☞ SPO-22H-5A	4 - 6	CF
☞ SPO-22H-7A5	6 - 9	CF
☞ SPO-22H-11A	9 - 13	CF
☞ SPO-22H-15A	12 - 18	CF
☞ SPO-22H-19A	16 - 22	CF

<b>FOR CONTACTORS RSC - 32 &amp; 40 SPO-40</b>		
☞ SPO-40H-11A	9 - 13	CF
☞ SPO-40H-15A	12 - 18	CF
☞ SPO-40H-22A	18 - 26	CF
☞ SPO-40H-30A	24 - 36	CF
☞ SPO-40H-34A	28 - 40	CF

<b>FOR CONTACTORS RSC - 50, 65, 75, &amp; 85 SPO-85</b>		
☞ SPO-85H-22A	18 - 26	CF
☞ SPO-85H-30A	24 - 36	CF
☞ SPO-85H-34A	28 - 40	CF
☞ SPO-85H-42A	34 - 50	CF
☞ SPO-85H-55A	45 - 65	CF
☞ SPO-85H-74A	63 - 85	CF

<b>FOR CONTACTORS RSC - 100 &amp; 125 SPO-125</b>		
☞ SPO-125H-41A	34 - 50	CF
☞ SPO-125H-56A	45 - 65	CF
☞ SPO-125H-80A	65 - 100	CF

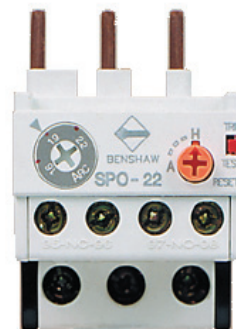
MODEL NUMBER	OVERLOAD RANGE	LIST PRICE
<b>FOR CONTACTORS RSC - 150 SPO-150</b>		
☞ SPO-150H-41A	34 - 50	CF
☞ SPO-150H-56A	43 - 65	CF
☞ SPO-150H-80A	65 - 100	CF
☞ SPO-150H-107A	85 - 125	CF
☞ SPO-150H-130A	100 - 150	CF

<b>FOR CONTACTOR RSC - 180 &amp; 220 SPO-220</b>		
☞ SPO-220H-80A	65 - 100	CF
☞ SPO-220H-130A	100 - 160	CF
☞ SPO-220H-200A	160 - 240	CF

<b>FOR CONTACTOR RSC - 300 &amp; 400 SPO-400</b>		
☞ SPO-400H-130A	100 - 160	CF
☞ SPO-400H-200A	160 - 240	CF
☞ SPO-400H-250A	200 - 300	CF
☞ SPO-400H-350A	260 - 400	CF

<b>FOR CONTACTOR RSC - 600 &amp; 800 SPO-800</b>		
☞ SPO-800H-250A	200 - 300	CF
☞ SPO-800H-350A	260 - 400	CF
☞ SPO-800H-500A	400 - 600	CF
☞ SPO-800H-660A	520 - 800	CF

☞ Web stocked



# Electronic Overload Relays

**SPE SERIES** / ELECTRONIC TYPE / CLASS 5 - 30



**SPE - 22 - 1A5, 5A, 22A**  
Direct mount on  
RSC- 9, 12, 18, 22



**SPE - B22 - 1A5, 5A, 22A**  
Separate mount  
with all contactors



**SPE - 40 - 40A**  
Direct mount on  
RSC- 32, 40



**SPE - B40 - 40**  
Separate mount  
with all contactors



**SPE - 80S**  
Separate mount  
with all contactors

## Description:

- ◆ Wide & adjustable current range
- ◆ Adjustable trip time class 5, 10, 15, 20, 30
- ◆ Direct mount to RSC 9 to 40 contactors
- ◆ Separate mount with SPE - B22 ,B40, S80
- ◆ Din rail mountable except SPE-80S
- ◆ Manual reset is standard

## Features:

- ◆ Operation status LED indicator
  - Normal operation
  - Overload
  - Phase imbalance
- ◆ Trip cause indication
  - Overcurrent
  - Phase loss
  - Reverse phase
- ◆ Test / Reset push button
- ◆ Trip time setting 0 - 30 sec @ 6 x set current
- ◆ Setting range 0.1 - 80 amps



# Electronic Overload Relays

## PRICE AND SELECTION GUIDE

MODEL NUMBER	OVERLOAD RANGE	LIST PRICE
<b>CONTACTOR RSC - 9, 12, 18 &amp; 22 - DIRECT MOUNT TO RSC CONTACTOR ONLY</b>		<b>SPE-22</b>
☞ SPE-22-1A5	.3~1.5	CF
☞ SPE-22-5A	1-5	CF
☞ SPE-22-22A	4.4~22	CF
<b>CONTACTOR RSC - 32 &amp; 40 - DIRECT MOUNT TO RSC CONTACTOR ONLY</b>		<b>SPE-40</b>
☞ SPE-40-40A	8~40	CF
<b>ALL CONTACTORS - SEPARATE MOUNT*</b>		<b>SPE-B22</b>
☞ SPE-B22-1A5	.3~1.5	CF
☞ SPE-B22-5A	1-5	CF
☞ SPE-B22-22A	4.4~22	CF
☞ SPE-B40-40A	8~40	CF
<b>ALL CONTACTORS - SEPARATE MOUNT*</b>		<b>SPE-80S</b>
☞ SPE-80S	16-80	CF

- Separate 120vac control source is required for operation.
- \* Optional CT's can be used for higher current ratings.
- ☞ Web stocked





# Digital Overload Relays

## SPD SERIES - CLASS 1 -60

MODEL NUMBER			SPD06-S	SPD60-S	SPD06-T	SPD60-T
WIRING			SCREW TYPE OR TUNNEL TYPE			
DISPLAY			UNIT MOUNT OR REMOTE MOUNT			
OPERATION TIME			SELECT EITHER REVERSE TIME OR DEFINITE TIME			
CHARACTERISTICS	PROTECTION		OVER CURRENT ADJUSTABLE			
	PHASE FAILURE		3 SEC.			
	REVERSE PHASE		WITHIN 0.1 SEC.			
	ASYMMETRY		5 SEC.			
	STALL		5 SEC.			
	LOCK		WITHIN 0.5 SEC.			
	UNDER CURRENT		3 SEC.			
	GROUND FAULT		WITHIN 0.05 - 1 SEC. SELECTABLE (0.05 - 1.0 SEC.) Z MODELS ONLY			
SHORT CIRCUIT			WITHIN 50MS			
ALARM			VARIABLE (60 - 110% OF THE SETTING CURRENT)			
CURRENT SETTING RANGE (A)			0.5 - 6	5 - 60	0.5 - 6	5 - 60
TIME SETTING RANGE (SEC.)	DEFINITE	DELAY IN STARTING	0 - 60 SEC.			
	TIME	DELAY IN OPERATING	0 - 30 SEC.			
	INVERSE TIME		0 - 60 SEC.			
	RESET		MANUAL RESET			
TOLERANCE	CURRENT		+ 5%			
	TIME		± 5% (OR ± 0.5% SEC.)			
OPERATING POWER			AC 120V			
			60HZ (50HZ)			
AUX. CONTACT	OL	2-SPST	3A/250VAC RESISTIVE LOAD			
	AL	SPST	3A/250VAC RESISTIVE LOAD			
INSULATION RESISTANCE			OVER DC500V 100 MΩ			
SURGE IMPULSE VOLTAGE (IEC1000 - 4-5)			1.2 X 50us 6KV (APPLY STANDARD WAVE FORM)			
FAST TRANSIENT BURST (IEC1000 - 4-4)			2.5KV/5MIN			
ENVIRONMENT	TEMPERATURE OPERATION		-25 - 70°C			
	STORAGE		-30 - 80°C			
	HUMIDITY		30 - 90% RH (NON-CONDENSING)			
DISPLAY			7 - SEGMENT			
			BAR-GRAPH			
MOUNTING TYPE			3MM DINRAIL OR PANEL MOUNT			



# Digital Overload Relays

## PRICE AND SELECTION GUIDE

### SEPARATE MOUNT - ALL CONTACTORS

MODEL NUMBER	GFI PROTECTION	SETTING RANGE	WIRE METHOD	LIST PRICE
SPD-06S	NO	0.5~6	CT TUNNEL OR SCREW	CF
SPD-06SZ	YES	0.5~6	CT TUNNEL OR SCREW	CF
SPD-60S	NO	5~60	CT TUNNEL OR SCREW	CF
SPD-60SZ	YES	5~60	CT TUNNEL OR SCREW	CF

- Separate 120VAC control source is required for operation. Operational CT's can be used for higher current rated contactors.
- Z Includes ground fault C.T. protection. See page 1-40 for ground fault C.T. information.

### OPTIONAL SPD DISPLAY DOOR MOUNT KIT

KIT PART NUMBER	DESCRIPTION	LIST PRICE
SPD-C1	NEMA 1 DISPLAY DOOR MOUNT KIT, 1M CABLE	CF

- Kit includes cable and mounting hardware

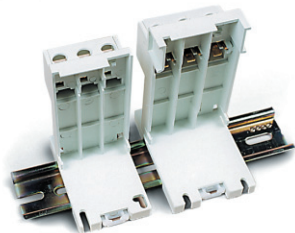


# Overload Accessories



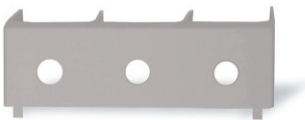
## RESET BUTTONS

MODEL NUMBER	DESCRIPTION	NEMA TYPE	OVERLOAD RANGE	LIST PRICE
🔗 PD35A8903A	Reset Button, 1-8in	N1	SPO-22~800	CF
🔗 PD35X3602	Reset Button Cover	N1, 12, 3R, 4, 4X	SPO-22~800	CF



## MOUNTING BASES FOR SPO OVERLOADS

MODEL NUMBER	DESCRIPTION	OVERLOAD FRAME	LIST PRICE
🔗 SPO-B22	MOUNTING BASE / SPO-22 OVERLOAD	SPO-22	CF
🔗 SPO-B40	MOUNTING BASE / SPO-40 OVERLOAD	SPO-40	CF
🔗 SPO-B85	MOUNTING BASE / SPO-85 OVERLOAD	SPO-85	CF



## SPO OVERLOAD TERMINAL COVERS

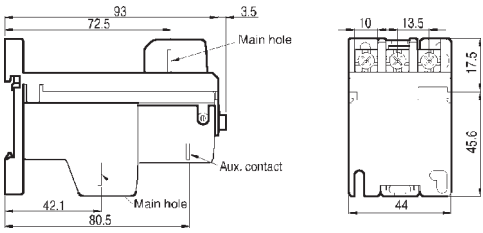
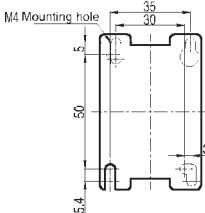
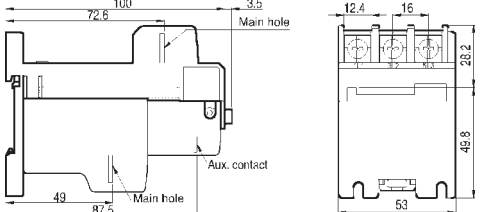
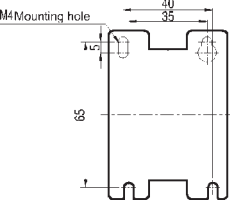
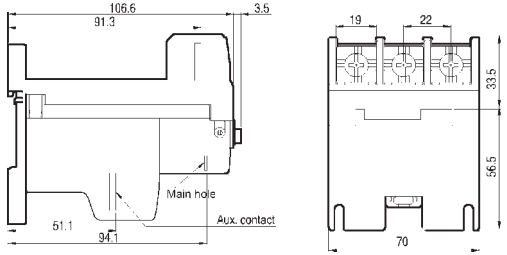
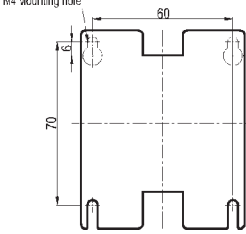
MODEL NUMBER	OVERLOAD FRAME	LIST PRICE
🔗 SPO-APT25	SPO-125	CF
🔗 SPO-APT150	SPO-150	CF
🔗 SPO-APT220	SPO-220	CF
🔗 SPO-APT400	SPO-400	CF
🔗 SPO-APT600	SPO-600	CF

- Kits include line and load terminal covers.

🔗 Web stocked

# Mounting Dimensions

## SPO CLASS 10 BIMETALLIC OVERLOAD RELAYS WITH MOUNTING BASE

TYPE	EXTERNAL DIMENSIONS	MOUNTING DIMENSIONS
<p><b>SPO-B22</b></p>		<p>44 g</p> 
<p><b>SPO-B40</b></p>		<p>72 g</p> 
<p><b>SPO-B85</b></p>		<p>144 g</p> 

- Dimensions are in mm (1 inch = 25.4 mm) .

# Mounting Dimensions

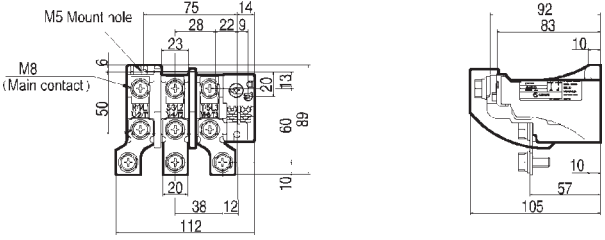
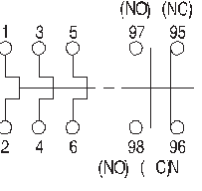
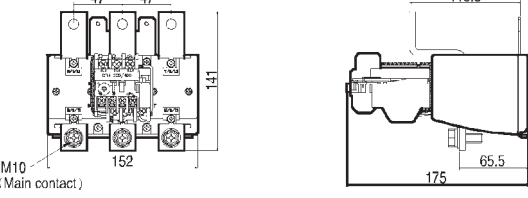
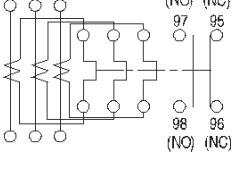
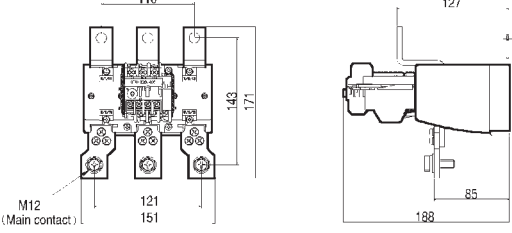
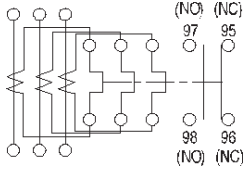
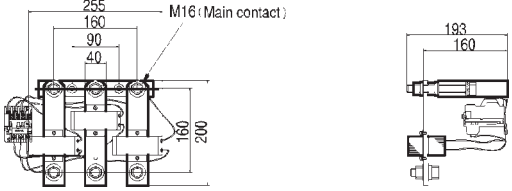
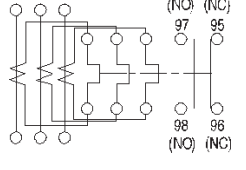
## SPO CLASS 10 BIMETALLIC DIRECT MOUNT OVERLOAD RELAYS

TYPE AVAILABLE	EXTERNAL DIMENSIONS	WIRING DIAGRAM
SPO-22		<p>0.11 Kg</p>
SPO-40		<p>0.17 Kg</p>
SPO-85		<p>0.3 Kg</p>
SPO-125		<p>0.48 Kg</p>

• Dimensions are in mm (1 inch = 25.4 mm) .

# Mounting Dimensions

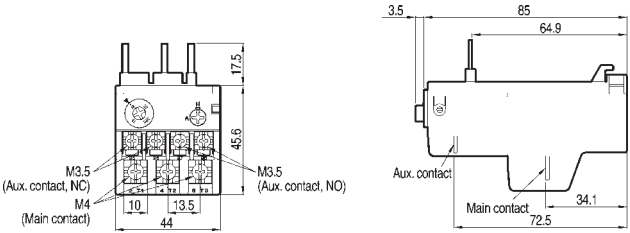
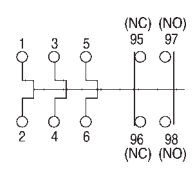
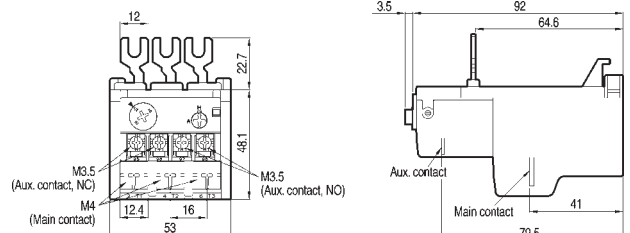
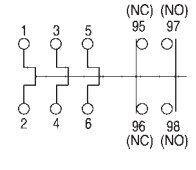
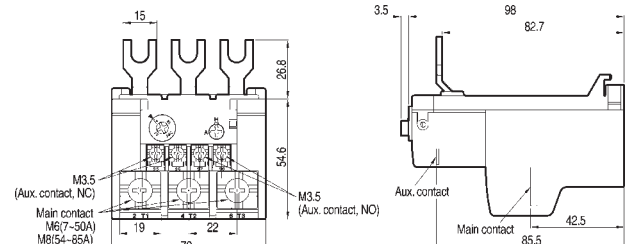
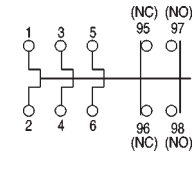
## SPO CLASS 20 BIMETALLIC DIRECT MOUNT OVERLOAD RELAYS

TYPE AVAILABLE	EXTERNAL DIMENSIONS	WIRING DIAGRAM
SPO-150		<p>0.6 Kg</p> 
SPO-220		<p>2.5 Kg</p> 
SPO-400		<p>2.6 Kg</p> 
SPO-800		<p>5.5 Kg</p> 

• Dimensions are in mm (1 inch = 25.4 mm) .

# Mounting Dimensions

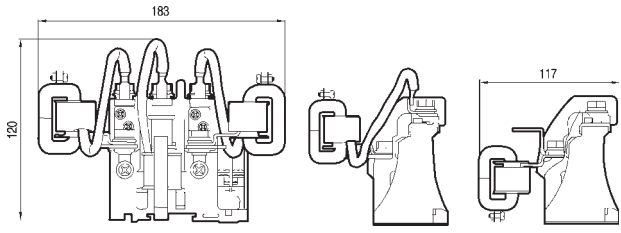
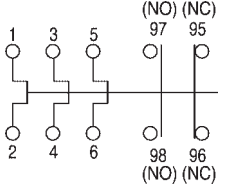
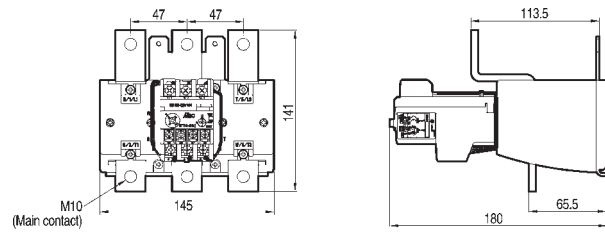
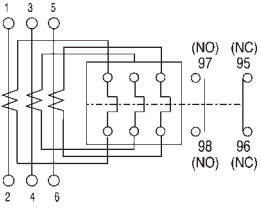
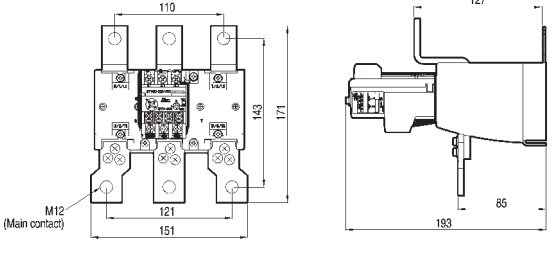
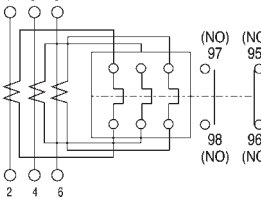
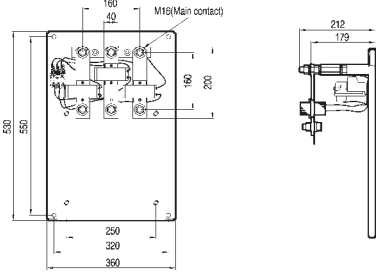
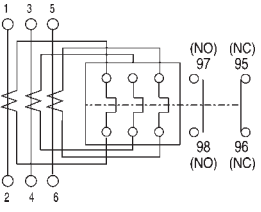
## SPO CLASS 20 BIMETALLIC DIRECT MOUNT OVERLOAD RELAYS

TYPE AVAILABLE	EXTERNAL DIMENSIONS	WIRING DIAGRAM
<b>SPO-22H</b>		0.11 kg 
<b>SPO-40H</b>		0.17 kg 
<b>SPO-85H</b>		0.3 kg 

- Dimensions are in mm (1 inch = 25.4 mm).

# Mounting Dimensions

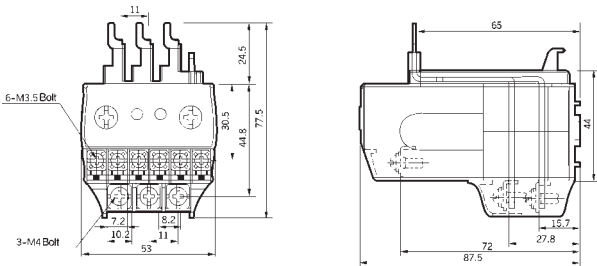
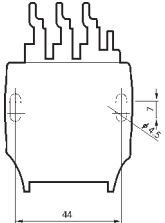
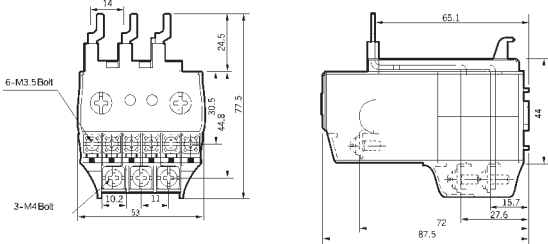
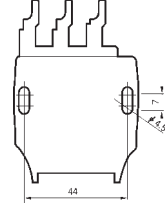
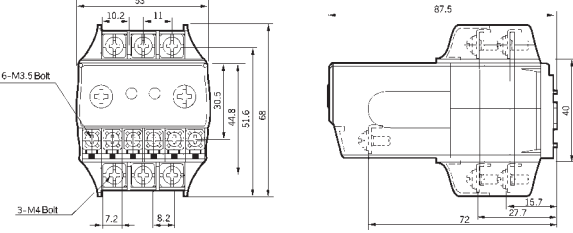
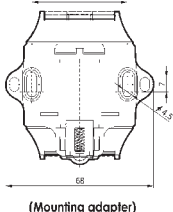
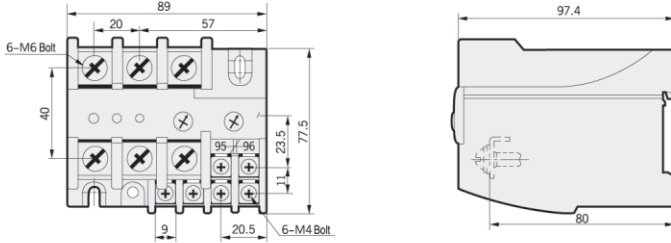
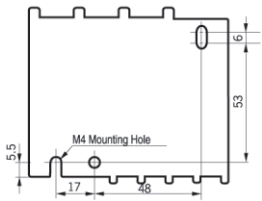
## SPO CLASS 20 BIMETALLIC DIRECT MOUNT OVERLOAD RELAYS

TYPE AVAILABLE	EXTERNAL DIMENSIONS	WIRING DIAGRAM
<p>SPO-125H SPO-150H</p>		<p>0.8Kg</p> 
<p>SPO-220H</p>		<p>2.5Kg</p> 
<p>SPO-400H</p>		<p>2.6Kg</p> 
<p>SPO-800H</p>		<p>11.5Kg</p> 

• Dimensions are in mm (1 inch = 25.4 mm).

# Mounting Dimensions

## SPE ELECTRONIC OVERLOAD RELAYS

TYPE AVAILABLE	EXTERNAL DIMENSIONS	MOUNTING DIMENSIONS
<b>SPE-22</b>	 <p>Terminal configuration: See Figure 1 on the next page</p>	0.18 kg 
<b>SPE-40</b>	 <p>Terminal configuration: See Figure 1 on the next page</p>	0.20 kg/0.22 kg 
<b>SPE-B22 SPE-B40</b>	 <p>Terminal configuration: See Figure 2 on the next page</p>	0.19 kg/0.21 kg  <p>(Mounting adapter)</p>
<b>SPE-80S</b>	 <p>Terminal configuration: See Figure 2 on the next page</p>	0.42 kg/0.46 kg 

• Dimensions are in mm (1 inch = 25.4 mm) .



# SPE80S Wiring Diagram

## TERMINAL CONFIGURATION

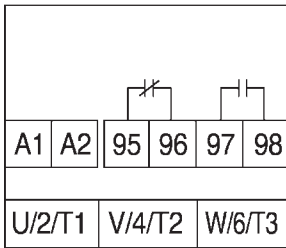


Fig. 1

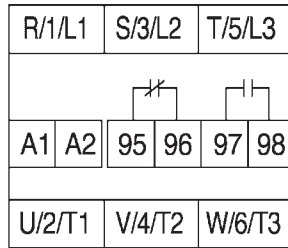


Fig. 2

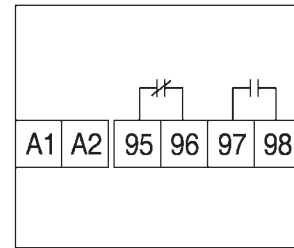
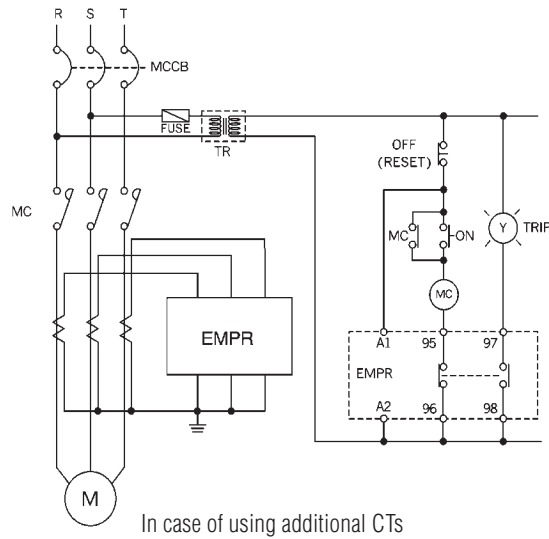
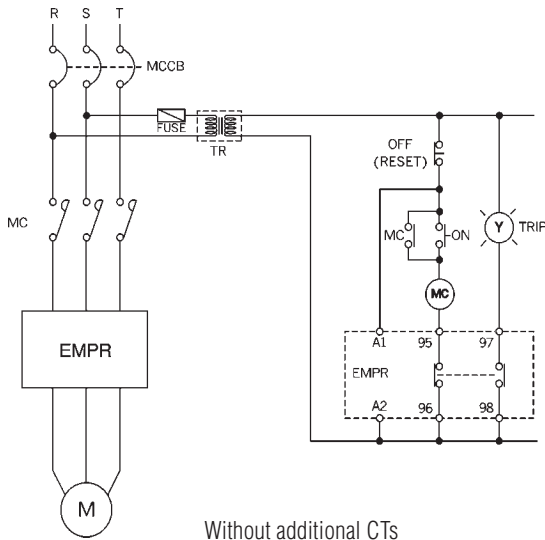


Fig. 3

## CIRCUIT DIAGRAM



# SPD GFI CT

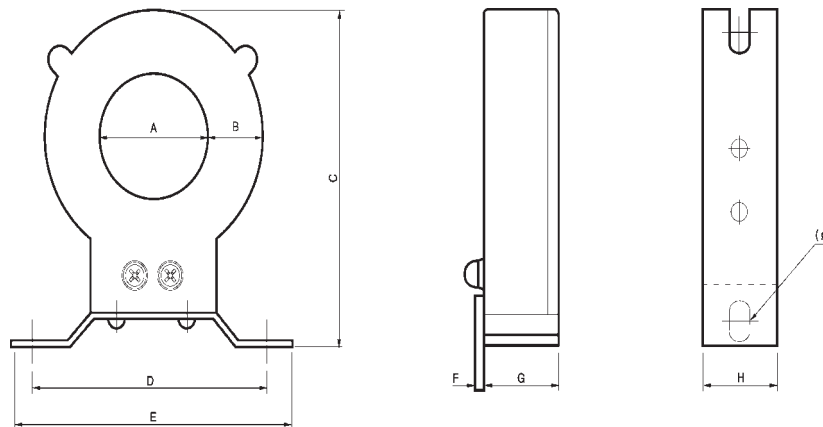
## ZCT ZERO PHASE SEQUENCE CURRENT TRANSFORMER

### RATINGS

TYPE	DIAMETER	RATIO	WEIGHT (KG)	MODEL
ZCT, D30, SPD-Z	30	200MA/100MV	0.5	LZT-030
ZCT, D50, SPD-Z	50	200MA/100MV	0.7	LZT-050
ZCT, D65, SPD-Z	65	200MA/100MV	0.9	LZT-065
ZCT, D80, SPD-Z	85	200MA/100MV	1.5	LZT-080

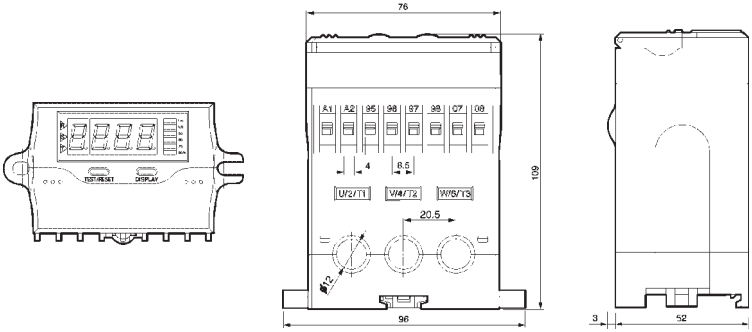
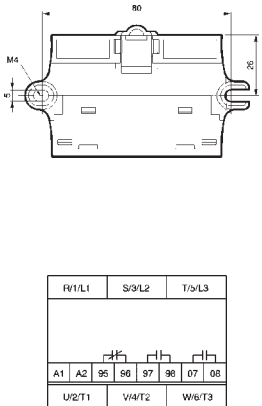
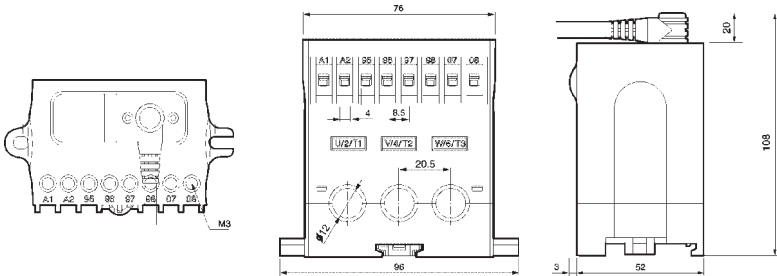
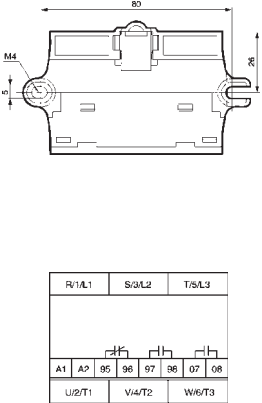
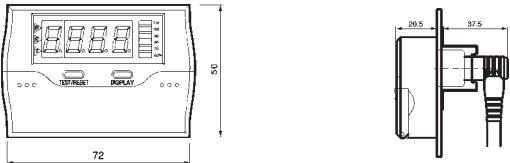
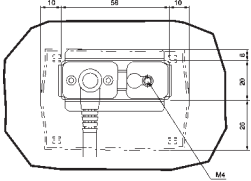
### DIMENSIONS

MODEL	A	B	C	D	E	F	G	H	I
LZT-030	30	25	108	100	114	7	32	32	6
LZT-030	50	25	131	100	122	7	32	36	6
LZT-030	65	26	143	114	133	7	39	37	6
LZT-030	80	34	174	160	180	7	40	40	6



# Mounting Dimensions

## SPD DIGITAL MOTOR PROTECTION RELAYS

TYPE AVAILABLE	EXTERNAL DIMENSIONS	MOUNTING DIMENSIONS
<p><b>SPD-06S</b> <b>SPD-06SZ</b></p>	<p>0.56Kg</p>  <p>*Wire size to penetrate a CT*: below 22[mm<sup>2</sup>]</p>	
<p><b>SPD-60S</b> <b>SPD-60SZ</b></p>	<p>0.5Kg</p> 	
		 <p>Panel cutting size</p>

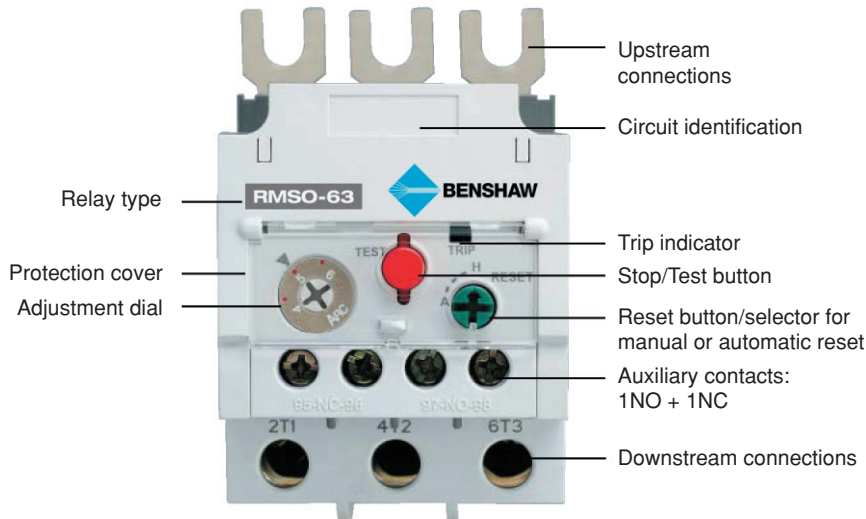
- Dimensions are in mm (1 inch = 25.4 mm).
- In extension type, the digital SPD is calibrated with combining the display unit and main body so, please be cautious not to combine the display unit and main body with different part numbers.
- The 07-08 contacts are the ZCT input terminal (Digital SPD with ground fault function).



# Modular Overload Relays

## RMSO SERIES

FOR MOTOR CONTROL UP TO 45KW AT 480V IN CATEGORY AC-3



	STOP	TEST/TRIP	RESET
NC 95-96			
NO 97-98			

## RMSO overload relay highlights:

RMSO Series overload relays are bimetallic-style and are designed to protect AC circuits and motors against overloads, phase failure, long starting times and prolonged stalling of the motor.

### Key Advantages:

- ◆ Meet EN 60947-1, EN 60947-4-1 standards
- ◆ CE, CSA, UL certified
- ◆ Trip indicator
- ◆ Reset button/selector for manual or auto reset
- ◆ Finger safe terminals
- ◆ Differential type phase failure protection
- ◆ Add-on accessories available
- ◆ Close couple to RMSC contactors (see page 1-16)

### Standard features:

- ◆ IP 20 protection (IEC 60 529)
- ◆ Trip indicator
- ◆ Reset button/selector for manual or auto reset
- ◆ Test trip device
- ◆ Finger safe terminals
- ◆ Overload adjustment dial cover
- ◆ 1 NO and 1 NC auxiliary contacts
- ◆ Identification labels
- ◆ Temperature compensation
- ◆ -60°C to +70°C storage temperature range
- ◆ -5°C to +55°C operating temperature range
- ◆ Differential type phase loss protection
- ◆ 6kV dielectric strength at 50HZ (IEC 25505)
- ◆ 6KV impulse withstand voltage (IEC 801-5)

## Guaranteed ... for two full years.

*Only Benschaw has a two year guarantee.*

Every Benschaw modular overload relay is guaranteed for two full years. Other manufacturers limit their warranties to just one year. But at Benschaw, we believe that, because we build them better, we can guarantee them longer. We call that "the Benschaw Promise."



# Modular Overload Relay Specifications

## RMSO SERIES

### ELECTRICAL CHARACTERISTICS OF POWER CIRCUIT

Specification	RMSO32	RMSO63	RMSO95
DIFFERENTIAL TYPE (Phase failure protection)	RMSO32/3K	RMSO63/3K	RMSO95/3K
TRIPPING CLASS (IEC 60947-4-1)	10A	10A	10A
TERMINAL TYPE	SCREW CLAMP	SCREW CLAMP	SCREW CLAMP
NUMBER OF POLES	3	3	3
RATED OPERATIONAL VOLTAGE (Ue)	UP TO 690V	UP TO 690V	UP TO 690V
RATED INSULATION VOLTAGE (Ui)	690V	690V	690V
RATED IMPULSE VOLTAGE (Uimp)	6kV	6kV	6kV
SETTING RANGE	0.1~32A	4~65A	7~95A
DEGREE OF PROTECTION (IEC 60 529)	IP20	IP20	IP20
TEMPERATURE COMPENSATION (°C)	-5 ~ +40	-5 ~ +40	-5 ~ +40
TRIP INDICATING FUNCTION	•	•	•
STOP FUNCTION	•	•	•
TEST FUNCTION	•	•	•
MANUAL/AUTOMATIC RESET FUNCTION	•	•	•
APPLIED CONTACTORS	RMSC-9, 12, 18, 25, 32	RMSC-35, 40, 50, 63	RMSC-65, 75, 85, 95

### DETAIL SETTING RANGE AND CONNECTION CABLE

10A	20A	10A, 20	10A, 20	CURRENT SETTING RANGE (A)	MM2	AWG	TYPE	CONDUCTORS	SHORT CIRCUIT "R"
•				0.1-0.16	1	18	65/75°C Cu-Wire only	2	-
•				0.16-0.25	1	18		2	-
•				0.25-0.4	1	18		2	-
•				0.4-0.63	1	18		2	-
•				0.63-1	1	18		2	-
•	•			1-1.6	1	18		2	1kA
•	•			1.6-2.5	1	18		2	1kA
•	•			2.5-4	1	18		2	1kA
•	•	•		4-6	1	18		2	1kA
•	•	•		5-8	1	18		2	1kA
•	•	•		6-9	1	18		2	1kA
•	•	•	•	7-10	1-1.5	18-16		2	1kA
•	•	•	•	9-13	1.5-2.5	16-14		2	3kA
•	•	•	•	12-18	2.5	14-12		2	3kA
•	•	•	•	16-22	2.5-4	12-10		2	3kA
•	•	•	•	18-25	2.5-4	12-10		2	3kA
•	•			22-32	4-6	10		2	3kA
		•	•	24-36	4-10	10-8		2	3kA
		•	•	28-40	6-10	10-8		2	3kA
		•	•	34-50	10	8		2	3kA
		•	•	45-65	10-16	8-6	2	5kA	
			•	54-75	16-25	6-4	2	5kA	
			•	63-85	16-25	6-4	2	5kA	
			•	70-95	25-35	4-3	2	5kA	

# Modular Overload Relay Pricing



## RMSO SERIES - BIMETALLIC - CLASS 10

RMSO32				
MODEL NUMBER	OVERLOAD RANGE	APPLIED CONTACTOR	SHIPPING WEIGHT	LIST PRICE
🔗 RMSO32014S	0.1 - 0.16	RMSC9 - RMSC32	.17KG/.38LBS	CF
🔗 RMSO32021S	0.16 - 0.25	RMSC9 - RMSC32	.17KG/.38LBS	CF
🔗 RMSO32033S	0.25 - 0.4	RMSC9 - RMSC32	.17KG/.38LBS	CF
🔗 RMSO32052S	0.4 - 0.63	RMSC9 - RMSC32	.17KG/.38LBS	CF
🔗 RMSO32082S	0.63 - 1	RMSC9 - RMSC32	.17KG/.38LBS	CF
🔗 RMSO32103S	1 - 1.6	RMSC9 - RMSC32	.17KG/.38LBS	CF
🔗 RMSO32201S	1.6 - 2.5	RMSC9 - RMSC32	.17KG/.38LBS	CF
🔗 RMSO32303S	2.5 - 4	RMSC9 - RMSC32	.17KG/.38LBS	CF
🔗 RMSO32500S	4 - 6	RMSC9 - RMSC32	.17KG/.38LBS	CF
🔗 RMSO32605S	5 - 8	RMSC9 - RMSC32	.17KG/.38LBS	CF
🔗 RMSO32705S	6 - 9	RMSC9 - RMSC32	.17KG/.38LBS	CF
🔗 RMSO32805S	7 - 10	RMSC9 - RMSC32	.17KG/.38LBS	CF
🔗 RMSO32110S	9 - 13	RMSC9 - RMSC32	.17KG/.38LBS	CF
🔗 RMSO32150S	12 - 18	RMSC9 - RMSC32	.17KG/.38LBS	CF
🔗 RMSO32190S	16 - 22	RMSC9 - RMSC32	.17KG/.38LBS	CF
🔗 RMSO32215S	18 - 25	RMSC9 - RMSC32	.17KG/.38LBS	CF
🔗 RMSO32270S	22 - 32	RMSC9 - RMSC32	.17KG/.38LBS	CF

RMSO63				
MODEL NUMBER	OVERLOAD RANGE	APPLIED CONTACTOR	SHIPPING WEIGHT	LIST PRICE
🔗 RMSO63500L	4 - 6	RMSC32 - RMSC63	.31KG/.68LBS	CF
🔗 RMSO63605L	5 - 8	RMSC32 - RMSC63	.31KG/.68LBS	CF
🔗 RMSO63705L	6 - 9	RMSC32 - RMSC63	.31KG/.68LBS	CF
🔗 RMSO63805L	7 - 10	RMSC32 - RMSC63	.31KG/.68LBS	CF
🔗 RMSO63110L	9 - 13	RMSC32 - RMSC63	.31KG/.68LBS	CF
🔗 RMSO63150L	12 - 18	RMSC32 - RMSC63	.31KG/.68LBS	CF
🔗 RMSO63190L	16 - 22	RMSC32 - RMSC63	.31KG/.68LBS	CF
🔗 RMSO63215L	18 - 25	RMSC32 - RMSC63	.31KG/.68LBS	CF
🔗 RMSO63300L	24 - 36	RMSC32 - RMSC63	.31KG/.68LBS	CF
🔗 RMSO63340L	28 - 40	RMSC32 - RMSC63	.31KG/.68LBS	CF
🔗 RMSO63420L	34 - 50	RMSC32 - RMSC63	.31KG/.68LBS	CF
🔗 RMSO63550L	45 - 65	RMSC32 - RMSC63	.31KG/.68LBS	CF

🔗 Web stocked



# Modular Overload Relay Pricing

## RMSO SERIES - BIMETALLIC - CLASS 10

RMSO95				
MODEL NUMBER	OVERLOAD RANGE	APPLIED CONTACTOR	SHIPPING WEIGHT	LIST PRICE
RMSO95805L	7 - 10	RMSC65 - RMSC95	.48KG/1LB	CF
RMSO95110L	9 - 13	RMSC65 - RMSC95	.48KG/1LB	CF
RMSO95150L	12 - 18	RMSC65 - RMSC95	.48KG/1LB	CF
RMSO95190L	16 - 22	RMSC65 - RMSC95	.48KG/1LB	CF
RMSO95215L	18 - 25	RMSC65 - RMSC95	.48KG/1LB	CF
RMSO95300L	24 - 36	RMSC65 - RMSC95	.48KG/1LB	CF
RMSO95340L	28 - 40	RMSC65 - RMSC95	.48KG/1LB	CF
RMSO95420L	34 - 50	RMSC65 - RMSC95	.48KG/1LB	CF
RMSO95550L	45 - 65	RMSC65 - RMSC95	.48KG/1LB	CF
RMSO95650L	54 - 75	RMSC65 - RMSC95	.48KG/1LB	CF
RMSO95740L	63 - 85	RMSC65 - RMSC95	.48KG/1LB	CF
RMSO95830L	70 - 95	RMSC65 - RMSC95	.48KG/1LB	CF

Web stocked




# Modular Overload Relay Accessories



## RMSO SERIES






### SEPARATE MOUNT ADAPTERS

MODEL NUMBER	DESCRIPTION	TERMINAL TYPE	OVERLOAD TYPE	LIST PRICE
 RMSOUZ32	OVERLOAD MOUNTING BASE	SCREW	RMSO32	CF
 RMSOUZ63L	OVERLOAD MOUNTING BASE	SCREW	RMSO63	CF
 RMSOUZ95L	OVERLOAD MOUNTING BASE	SCREW	RMSO95	CF



### REMOTE RESET DEVICE

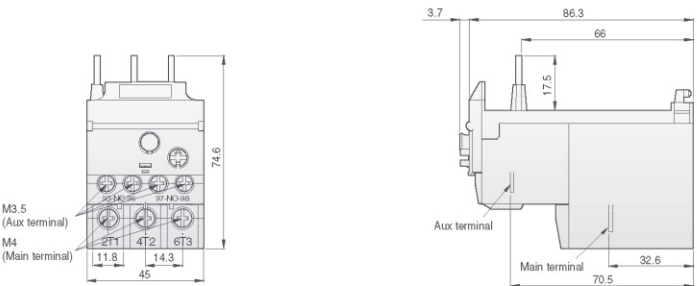
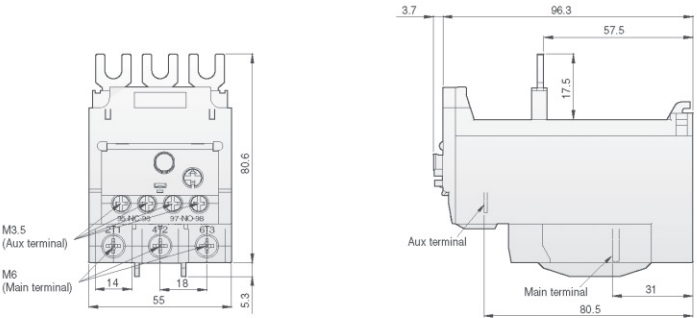
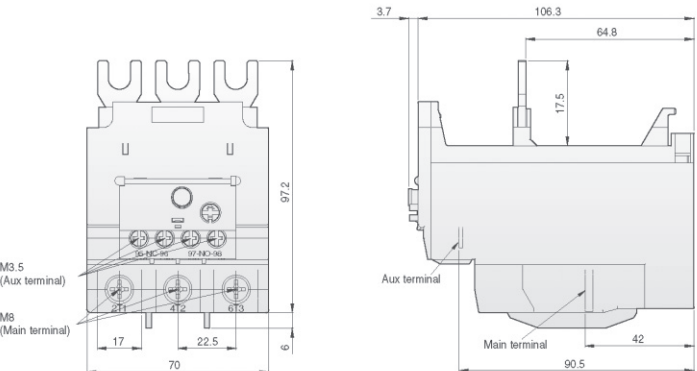
MODEL NUMBER	DESCRIPTION	OVERLOAD TYPE	LIST PRICE
 RMSOUM4R	400MM CABLE	RMSO32-RT95	CF
 RMSOUM5R	500MM CABLE	RMSO32-RT95	CF
 RMSOUM6R	600MM CABLE	RMSO32-RT95	CF

 Web stocked



# Overall Dimensions

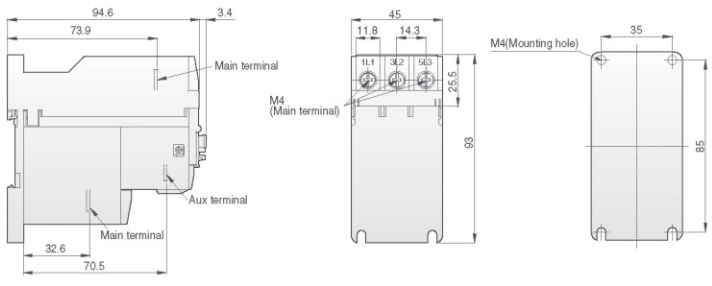
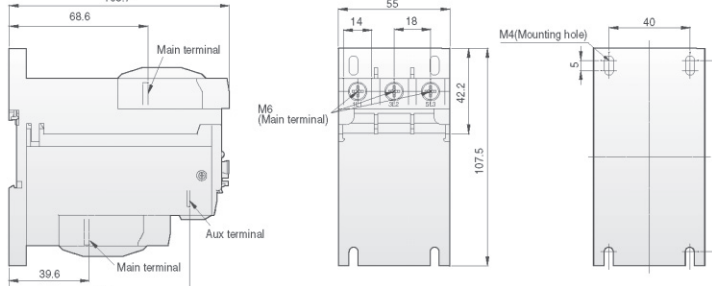
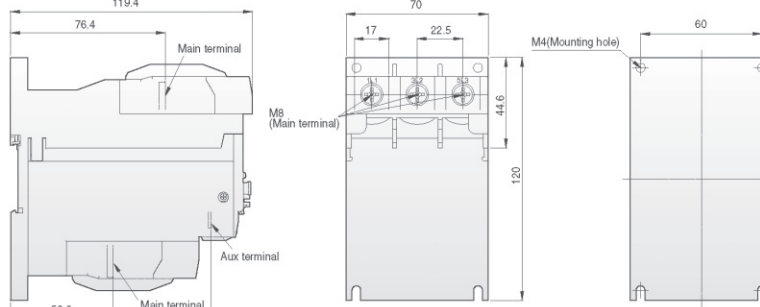
## RMSO SERIES MODULAR OVERLOAD RELAYS (SCREW TYPE)

TYPE	DIMENSIONS
<p><b>RMSO-32</b></p>	 <p>[mm]</p> <p>0.167kg</p>
<p><b>RMSO-63</b></p>	 <p>0.303kg</p>
<p><b>RMSO-95</b></p>	 <p>0.474kg</p>

• Dimensions are in mm (1 inch = 25.4 mm) .

# Overall Dimensions

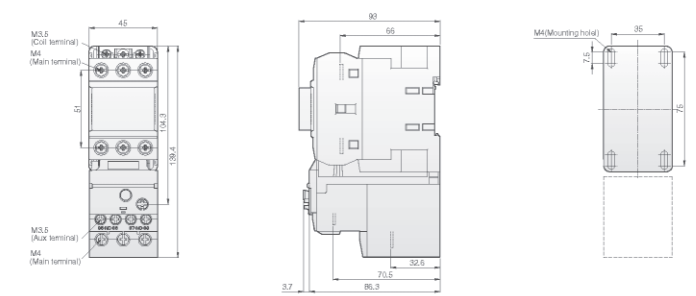
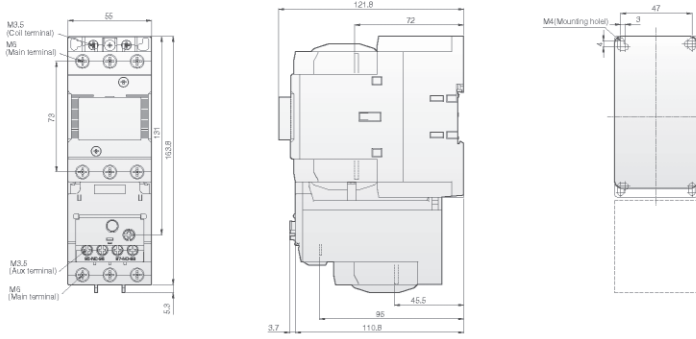

RMSO SERIES SEPARATE MOUNTING UNITS FOR IEC OVERLOAD RELAYS (SCREW TYPE)

TYPE	DIMENSIONS
<b>RMSOUZ-32</b>	 <p>[mm]</p> <p>0.068kg</p>
<b>RMSOUZ-63</b>	 <p>0.134kg</p>
<b>RMSOUZ-95</b>	 <p>0.230kg</p>

- Dimensions are in mm (1 inch = 25.4 mm) .

# Overall Dimensions

## RMSC+RMSO SERIES MOTOR STARTERS (SCREW TYPE)

TYPE	DIMENSIONS
<b>RMSC32+RMSO32</b>	 <p>Technical drawing of the RMSC32+RMSO32 motor starter. It includes three views: a front view showing terminal blocks (M3.5 Coil, M4 Main, M3.5 Aux, M4 Main) and dimensions (46, 51, 104.3, 138.4); a side view showing dimensions (93, 66, 3.7, 73.5, 86.3, 32.6); and a mounting view showing dimensions (35, 7.5, 75) and an M4 mounting hole. The weight is 0.61kg.</p>
<b>RMSC63+RMSO32</b>	 <p>Technical drawing of the RMSC63+RMSO32 motor starter. It includes three views: a front view showing terminal blocks (M3.5 Coil, M5 Main, M3.5 Aux, M5 Main) and dimensions (55, 75, 101.1, 103.9, 5.2); a side view showing dimensions (121.8, 72, 3.7, 95, 110.8, 45.5); and a mounting view showing dimensions (47, 3, 100) and an M4 mounting hole. The weight is 1.14kg.</p>
<b>RMSC95+RMSO95</b>	 <p>Technical drawing of the RMSC95+RMSO95 motor starter. It includes three views: a front view showing terminal blocks (M3.5 Coil, M5 Main, M3.5 Aux, M5 Main) and dimensions (70, 105, 127.8, 211.4, 40); a side view showing dimensions (137.3, 85, 3.7, 110.7, 126.5, 92.2); and a mounting view showing dimensions (60, 2.5, 100) and an M4 mounting hole. The weight is 2.19kg.</p>

• Dimensions are in mm (1 inch = 25.4 mm) .

# Motor Starter Protectors

**RMSP SERIES - EFFICIENT FUNCTIONALITY ... COMPACT DESIGN**



*Snap together with an RMSC contactor to make a complete electro-mechanical combination starter*



## Standard features:

- ◆ Front-mounted auxiliary contact
- ◆ Easy mounting onto DIN rail
- ◆ Large scale for current setting
- ◆ Auxiliaries snap on without tools
- ◆ Dial cover lock device
- ◆ Test trip device for checks of the trip mechanism
- ◆ Finger safe terminals
- ◆ Dial cover
- ◆ Handle lock device (off positions)
- ◆ Three position operator handle (ON-OFF-TRIP) (on 100AF only)
- ◆ Identification labels
- ◆ High interrupt capability

## RMSP Series motor starter protector highlights:

RMSP Series manual starters meet or exceed all universal standards and offer efficient motor starting functionality in a compact design.

Protection functions include protection of group installation, protection of circuits, motor protection, starter protection and phase failure protection. RMSP starters provide a wide range of ambient temperature compensation. Couples directly to RMSC Series contactors for a complete electro-mechanical combination starter.

### Key Advantages:

- ◆ 45mm width up to 32 amps
- ◆ 55mm width up to 63 amps
- ◆ 70mm width up to 100 amps
- ◆ Three position operator (ON-OFF-TRIP) (On 100AF only)
- ◆ Complete range of accessories
- ◆ Handle locks in the off position
- ◆ Class 10 overload trip characteristics
- ◆ Trip test
- ◆ Finger safe terminal
- ◆ DIN rail and screw mounting

## Guaranteed ... for two full years.

*Only Benschaw has a two year guarantee.*

Benschaw's RMSP Series motor starter protectors are guaranteed for two full years. Other manufacturers limit their warranties to just one year. But at Benschaw, we believe that, because we build them better, we can guarantee them longer. We call that "the Benschaw Promise."



# RMSP Manual Starter Specifications

Specification	RMSP-32H	RMSP-63H	RMSP-100H
FRAME	32AF	63AF	100AF
RATED OPERATIONAL VOLTAGE (Ue)	Up to 690V	Up to 690V	Up to 690V
RATED FREQUENCY	50/60Hz	50/60Hz	50/60Hz
RATED INSULATION VOLTAGE (Ui)	690V	1,000V	1,000V
RATED IMPULSE VOLTAGE (Uimp)	6kV	8kV	8kV
UTILIZATION CATEGORY	IEC 60 947-2 (Breaker)	Cat. A	Cat. A
	IEC 60 947-4 (Starter)	AC3	AC3
SHOCK RESISTANCE (IEC 68 Part 2-27)	25g	25g	25g
DEGREE OF PROTECTION (IEC 60 529)	IP20	IP20	IP20
INSTANTANEOUS SHORT CIRCUIT RELEASE	13 x Ie max.	13 x Ie max.	13 x Ie max.
MECHANICAL ENDURANCE (Operating)	100,000	50,000	50,000
ELECTRICAL ENDURANCE (Cycles)	100,000	25,000	25,000
MAX. OPERATING FREQUENCY PER HOUR	25	25	25
TEMPERATURE COMPENSATION (Operation) (°C)	-20 ~ +60-	20 ~ +60	-20 ~ +60
PHASE FAILURE FUNCTION	Yes	Yes	Yes
TRIP INDICATING FUNCTION	Yes	Yes	Yes
TEST FUNCTION	Yes	Yes	Yes



# RMSP Series UL/CSA Performance Data

## MOTOR PROTECTION FOR GROUP INSTALLATION

### RMSP-32H

Rated Operational Current Ie [A]		0.16	0.25	0.4	0.63	1	1.6	2.5	4	6	8	10	13	17	22	26	32	
MAX. SHORT-CIRCUIT CURRENT	240V [KA]	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	480Y/277V [KA]	65	65	65	65	65	65	65	65	65	65	65	65	30	30	30	30	30
	600Y/347V [KA]	25	25	25	25	25	25	25	25	25	25	25	25	10	10	10	10	10
MOTOR LOAD (1 Phase)	115V [HP]	-	-	-	-	-	-	-	1/8	1/4	1/3	1/2	1/2	1	2	2	2	2
	230V [HP]	-	-	-	-	-	1/10	1/6	1/3	3/4	1	1-1/2	2	3	3	5	5	5
MOTOR LOAD (3 Phase)	230V [HP]	-	-	-	-	-	1/3	1/2	1	1-1/2	2	3	3	5	7-1/2	7-1/2	10	10
	480V [HP]	-	-	-	-	1/2	3/4	1-1/2	2	5	5	7-1/2	7-1/2	10	15	15	20	20
	575V [HP]	-	-	-	-	1/2	1	1-1/2	3	5	5	10	10	15	20	20	30	30

### RMSP-63H



Rated Operational Current Ie [A]		10	13	17	22	26	32	40	50	63
MAX. SHORT-CIRCUIT CURRENT	240V [KA]	100	100	100	100	100	100	100	100	100
	480Y/277V [KA]	65	65	50	50	50	50	50	50	50
	600Y/347V [KA]	25	25	10	10	10	10	10	10	10
MOTOR LOAD (1 Phase)	115V [HP]	1/2	1/2	1	2	2	3	3	5	5
	230V [HP]	1-1/2	2	3	3	5	5	7-1/2	10	15
MOTOR LOAD (3 Phase)	230V [HP]	3	3	5	7-1/2	10	10	15	15	20
	480V [HP]	7-1/2	7-1/2	10	15	20	25	30	40	50
	575V [HP]	10	10	15	20	25	30	40	50	60
MAX. RATED CURRENT OF FUSE/BREAKER [A]		600	600	600	600	600	600	600	600	600

### RMSP-100H



Rated Operational Current Ie [A]		17	22	26	32	40	50	63	75	90	100
MAX. SHORT-CIRCUIT CURRENT	240V [KA]	100	100	100	100	100	100	100	100	100	100
	480Y/277V [KA]	65	65	65	65	65	65	50	50	50	50
	600Y/347V [KA]	25	25	25	20	20	20	10	10	10	10
MOTOR LOAD (1 Phase)	115V [HP]	1	1-1/2	2	3	3	5	5	7-1/2	10	10
	230V [HP]	3	3	5	5	7-1/2	10	15	15	20	20
MOTOR LOAD (3 Phase)	230V [HP]	5	7-1/2	10	10	15	15	20	25	30	40
	480V [HP]	10	15	20	25	30	40	50	60	75	75
	575V [HP]	15	20	25	30	40	50	60	75	100	100
MAX. RATED CURRENT OF FUSE/BREAKER [A]		1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

- Manual motor controller “group installation” or “Type E starter” (UL 508, CSA C22.2 No. 14, for group installation, in connection with a short-circuit protection device.

# RMSP Series UL/CSA Performance Data

## MOTOR PROTECTION

### RMSP-32H

Rated Operational Current $I_e$ [A]	Thermal Release Adjustment Range [A]	Magnetic Release Operating Current [A]	Switching of 3 Phase AC Motors, AC-2, AC-3					
			3-Phase [kW] (50/60Hz)			3-Phase HP (60Hz)		
			230V	400V	690V	230V	480V	575V
0.16	0.1...0.16	2.1	-	0.02	-	-	-	-
0.25	0.16...0.25	3.3	0.03	0.06	-	-	-	-
0.4	0.25...0.4	5.2	0.06	0.09	-	-	-	-
0.63	0.4...0.63	8.2	0.09	0.12	0.25	-	-	-
1	0.63...1.0	13	0.12	0.25	0.55	-	1/2	1/2
1.6	1.0...1.6	20.8	0.25	0.55	1.1	1/3	3/4	1
2.5	1.6...2.5	32.5	0.37	0.75	1.5	1/2	1-1/2	1-1/2
4	2.5...4.0	52	0.75	1.5	3	1	2	3
6	4...6	78	1.5	2.2	4	1-1/2	5	5
8	5...8	104	1.5	3	5.5	2	5	5
10	6...10	130	3	4	7.5	3	7-1/2	10
13	9...13	169	3	5.5	11	3	7-1/2	10
17	11...17	221	4	7.5	11	5	10	15
22	14...22	286	4	7.5	15	7-1/2	15	20
26	18...26	338	5.5	11	18.5	7-1/2	15	20
32	22...32	416	7.5	15	22	10	20	30

### RMSP-63H

10	6~10	130	3	4	7.5	3	7-1/2	10
13	9~13	169	3	5.5	11	3	7-1/2	10
17	11~17	221	4	7.5	11	5	10	15
22	14~22	286	4	7.5	15	7-1/2	15	20
26	18~26	338	5.5	11	18.5	10	20	25
32	22~32	416	7.5	15	22	10	25	30
40	28~40	520	7.5	18.5	30	15	30	40
50	34~50	650	11	22	45	15	40	50
63	45~63	819	15	30	55	20	50	60

### RMSP-100H

17	11~17	221	4	7.5	11	5	10	15
22	14~22	286	4	7.5	15	7-1/2	15	20
26	18~26	338	5.5	11	18.5	10	20	25
32	22~32	416	7.5	15	22	10	25	30
40	28~40	520	7.5	18.5	30	15	30	40
50	34~50	650	11	22	45	15	40	50
63	45~63	819	15	30	55	20	50	60
75	55~75	975	22	37	63	25	60	75
90	70~90	1170	30	45	75	30	75	100
100	80~100	1300	30	45	90	40	75	100

# Motor Starter Protector Pricing



## RMSP SERIES

### 32 AMP FRAME CLASS 10

MODEL NUMBER	RATED OPERATIONAL CURRENT	THERMAL RELEASE ADJ. RANGE	DISCONNECT TYPE	WGT	DIMENSIONS (IN)			LIST PRICE
					H	W	D	
☞ RMSP32HA16	0.16	.1-.16A	ROTARY	.36KG/1LB	3.7	1.7	3.9	CF
☞ RMSP32HA25	0.25	.16-.25A	ROTARY	.36KG/1LB	3.7	1.7	3.9	CF
☞ RMSP32HA4	0.4	.25-.4A	ROTARY	.36KG/1LB	3.7	1.7	3.9	CF
☞ RMSP32HA63	0.63	.4-.63A	ROTARY	.36KG/1LB	3.7	1.7	3.9	CF
☞ RMSP32H1A	1	.63-1A	ROTARY	.36KG/1LB	3.7	1.7	3.9	CF
☞ RMSP32H1A6	1.6	1-1.6A	ROTARY	.36KG/1LB	3.7	1.7	3.9	CF
☞ RMSP32H2A5	2.5	1.6-2.5A	ROTARY	.36KG/1LB	3.7	1.7	3.9	CF
☞ RMSP32H4A	4	2.5-4A	ROTARY	.36KG/1LB	3.7	1.7	3.9	CF
☞ RMSP32H6A	6	4-6A	ROTARY	.36KG/1LB	3.7	1.7	3.9	CF
☞ RMSP32H8A	8	5-8A	ROTARY	.36KG/1LB	3.7	1.7	3.9	CF
☞ RMSP32H10A	10	6-10A	ROTARY	.36KG/1LB	3.7	1.7	3.9	CF
☞ RMSP32H13A	13	9-13A	ROTARY	.36KG/1LB	3.7	1.7	3.9	CF
☞ RMSP32H17A	17	11-17A	ROTARY	.36KG/1LB	3.7	1.7	3.9	CF
☞ RMSP32H22A	22	14-22A	ROTARY	.36KG/1LB	3.7	1.7	3.9	CF
☞ RMSP32H26A	26	18-26A	ROTARY	.36KG/1LB	3.7	1.7	3.9	CF
☞ RMSP32H32A	32	22-32A	ROTARY	.36KG/1LB	3.7	1.7	3.9	CF

### 63 AMP FRAME CLASS 10

MODEL NUMBER	RATED OPERATIONAL CURRENT	THERMAL RELEASE ADJ. RANGE	DISCONNECT TYPE	WGT	DIMENSIONS (IN)			LIST PRICE
					H	W	D	
☞ RMSP63H10A	10	6-10A	ROTARY	1KG/2.2LBS	5.5	2.2	5.7	CF
☞ RMSP63H13A	13	9-13A	ROTARY	1KG/2.2LBS	5.5	2.2	5.7	CF
☞ RMSP63H17A	17	11-17A	ROTARY	1KG/2.2LBS	5.5	2.2	5.7	CF
☞ RMSP63H22A	22	14-22A	ROTARY	1KG/2.2LBS	5.5	2.2	5.7	CF
☞ RMSP63H26A	26	18-26A	ROTARY	1KG/2.2LBS	5.5	2.2	5.7	CF
☞ RMSP63H32A	32	22-32A	ROTARY	1KG/2.2LBS	5.5	2.2	5.7	CF
☞ RMSP63H40A	40	28-40A	ROTARY	1KG/2.2LBS	5.5	2.2	5.7	CF
☞ RMSP63H50A	50	34-50A	ROTARY	1KG/2.2LBS	5.5	2.2	5.7	CF
☞ RMSP63H63A	63	45-63A	ROTARY	1KG/2.2LBS	5.5	2.2	5.7	CF

☞ Web stocked















# Motor Starter Protector Pricing

## RMSP SERIES


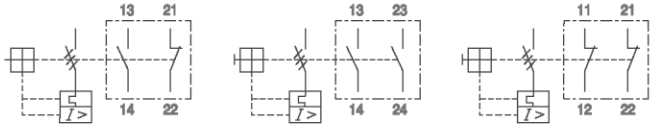

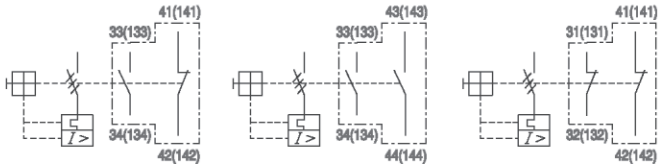

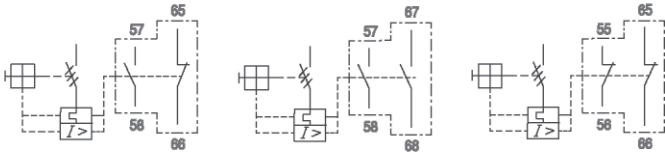

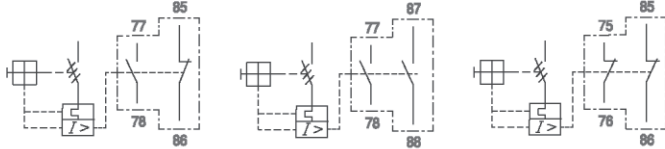
### 100 AMP FRAME CLASS 10

MODEL NUMBER	RATED OPERATIONAL CURRENT	THERMAL RELEASE ADJ. RANGE	DISCONNECT TYPE	WGT	DIMENSIONS (IN)			LIST PRICE
					H	W	D	
 RMSP100H17A	17	11-17A	ROTARY	2.2KG/5LBS	6.5	2.8	6.7	CF
 RMSP100H22A	22	14-22A	ROTARY	2.2KG/5LBS	6.5	2.8	6.7	CF
 RMSP100H26A	26	18-26A	ROTARY	2.2KG/5LBS	6.5	2.8	6.7	CF
 RMSP100H32A	32	22-32A	ROTARY	2.2KG/5LBS	6.5	2.8	6.7	CF
 RMSP100H40A	40	28-40A	ROTARY	2.2KG/5LBS	6.5	2.8	6.7	CF
 RMSP100H50A	50	34-50A	ROTARY	2.2KG/5LBS	6.5	2.8	6.7	CF
 RMSP100H63A	63	45-63A	ROTARY	2.2KG/5LBS	6.5	2.8	6.7	CF
 RMSP100H75A	75	55-75A	ROTARY	2.2KG/5LBS	6.5	2.8	6.7	CF
 RMSP100H90A	90	70-90A	ROTARY	2.2KG/5LBS	6.5	2.8	6.7	CF
 RMSP100H100A	100	80-100A	ROTARY	2.2KG/5LBS	6.5	2.8	6.7	CF

 Web stocked

# Motor Starter Protector Accessories

## RMSP SERIES


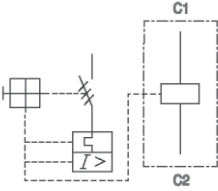

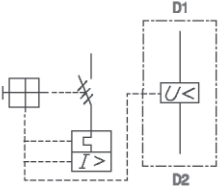

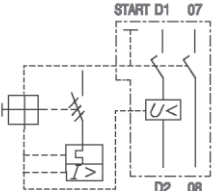
TYPE	DESCRIPTION	CONNECTION DIAGRAM
<p><b>RMSPFX11</b></p> 	<p><b>Auxiliary Switch</b></p> <ul style="list-style-type: none"> <li>• Front mounting</li> <li>• 2-pole</li> <li>• One front mounting module per circuit breaker</li> </ul>	<p>1NO1NC      2NO      2NC</p> 
<p><b>RMSPLX11</b></p> 	<p><b>Auxiliary Switch</b></p> <ul style="list-style-type: none"> <li>• Side mounting on the left</li> <li>• 2-pole</li> <li>• One side mounting module per circuit breaker</li> </ul>	<p>1NO1NC      2NO      2NC</p> 
<p><b>RMSPLA</b></p> 	<p><b>Any Trip Alarm Switch</b></p> <ul style="list-style-type: none"> <li>• Side mounting on the left</li> <li>• 2-pole</li> <li>• One side mounting module per circuit breaker (always directly fitted to the circuit breaker)</li> </ul>	
<p><b>RMSPLAM</b></p> 	<p><b>Magnetic Trip Alarm Switch</b></p> <ul style="list-style-type: none"> <li>• Side mounting on the left</li> <li>• 2-pole</li> <li>• One side mounting module per circuit breaker (directly fitted to circuit breaker except when using with any Trip Alarm Switch)</li> </ul>	

• Dimensions are in mm (1 inch = 25.4 mm) .

# Motor Starter Protector Accessories

## RMSP SERIES



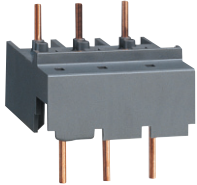


TYPE	DESCRIPTION	CONNECTION DIAGRAM
<p><b>RMSPRS120</b></p> 	<p><b>Shunt Release</b></p> <ul style="list-style-type: none"> <li>• Side mounting on the right</li> <li>• One side mounting module per circuit breaker (always directly fitted to the circuit breaker)</li> </ul>	 <ul style="list-style-type: none"> <li>• 120V 60Hz</li> </ul>
<p><b>RMSPRU120</b></p> 	<p><b>Undervoltage Release</b></p> <ul style="list-style-type: none"> <li>• Side mounting on the right</li> <li>• 2-pole</li> <li>• One side mounting module per circuit breaker (always directly fitted to the circuit breaker)</li> </ul>	 <ul style="list-style-type: none"> <li>• 120V 60Hz</li> </ul>
<p><b>RMSPRUX120</b></p> 	<p><b>Undervoltage Release with Switch (rotary handle only)</b></p> <ul style="list-style-type: none"> <li>• Side mounting on the right</li> <li>• Include 2NO auxiliary contact</li> <li>• One side mounting module per circuit breaker (always directly fitted to the circuit breaker)</li> </ul>	 <ul style="list-style-type: none"> <li>• 120V 60Hz</li> </ul>

- Dimensions are in mm (1 inch = 25.4 mm) .

# Motor Starter Protector Accessories

## RMSP SERIES

TYPE	DESCRIPTION	APPLIED TYPES
<p><b>RMSP PIL 32</b></p> 	<p><b>Push-In Lug</b></p> <ul style="list-style-type: none"> <li>For screwing the RMSP on to the mounting plates</li> </ul>	<p>RMSP-32H</p>
<p><b>RMSP IB 100</b></p> 	<p><b>Insulation Barriers</b></p> <ul style="list-style-type: none"> <li>Insulation barriers with increased creepage distances and clearances for UL</li> </ul>	<p>RMSP-100H</p>
<p><b>RMSP DA</b></p> 	<p><b>RMSC Contactor Adapter</b></p> <ul style="list-style-type: none"> <li>For direct connection of RMSP to RMSC contactor</li> </ul>	<p>RMSC contactors</p>

• Dimensions are in mm (1 inch = 25.4 mm) .

# Motor Starter Protector Accessories

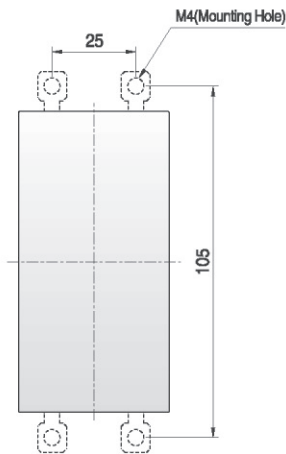
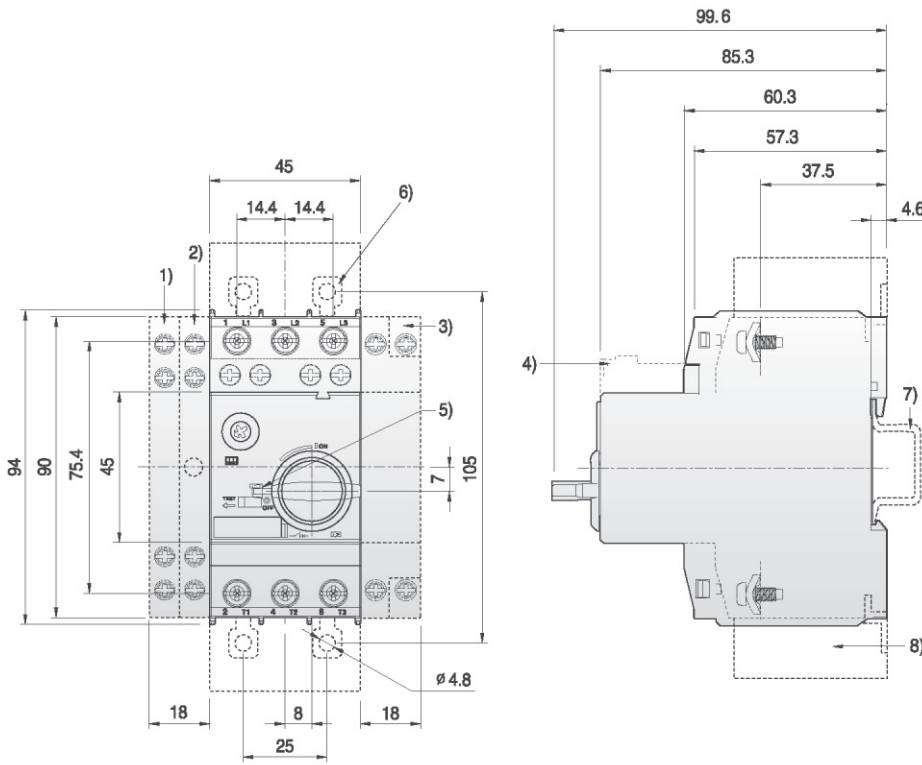
## RMSP SERIES

MODEL NUMBER	DESCRIPTION	CONFIGURATION	NO. OF UNITS PER RMSP	LIST PRICE
RMSP-FX11	FRONT MOUNT AUXILIARY CONTACT	INO / 1NC	1	CF
RMSP-LX11	SIDE MOUNT AUXILIARY CONTACT	INO / 1NC	1	CF
RMSP-LA	SIDE MOUNT ALARM SWITCH (1)	INO / 1NC	1	CF
RMSP-LAM	SIDE MOUNT ALARM SWITCH (2)	INO / 1NC	1	CF
RMSP-RS	SHUNT RELEASE 120V (3)	-	1	CF
RMSP-RU	UNDERVOLTAGE RELEASE 120V (3)	-	1	CF
RMSP-RUX	UNDERVOLTAGE RELEASE W/SWITCH 120V (3)	2NO	1	CF
RMSP-IB-100	INSULATION BARRIER (4)	-	4	CF
RMSP-DA-32HA	RMSC CONTACTOR ADAPTER RMSP32	-	1	CF
RMSP-DA-63A	RMSC CONTACTOR ADAPTER RMSP63	-	1	CF
RMSP-DA-95A	RMSC CONTACTOR ADAPTER RMSP95	-	1	CF
RMSP-PB-322	PHASE BUS PARALLEL CIRCUIT 63H	-	1	CF
RMSP-PB-362	PHASE BUS PARALLEL CIRCUIT 32H	-	1	CF
RMSP-MU45	MOUNTING UNIT 32H	-	1	CF
RMSP-MU55	MOUNTING UNIT 63H	-	1	CF
RMSP-MU70	MOUNTING UNIT 100H	-	1	CF
RMSP-PIL32	PUSH-IN LUG (for connection to mounting unit)	-	1	CF

- (1) RMSP-63 cannot accept LX and LA together
- (2) Magnetic units only
- (3) Cannot be used with RU or RUX
- (4) For RMSP-100 only

# Motor Starter Protector Dimensions

## RMSP 32H



### Height of arcing spaces (clearance from earthed parts)

[V]	240	415	460	525	690
[mm]	30	30	30	30	30

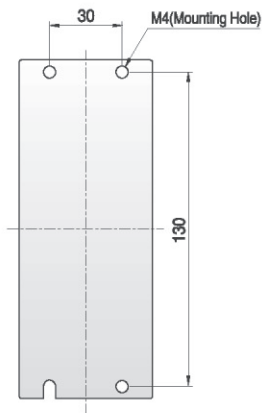
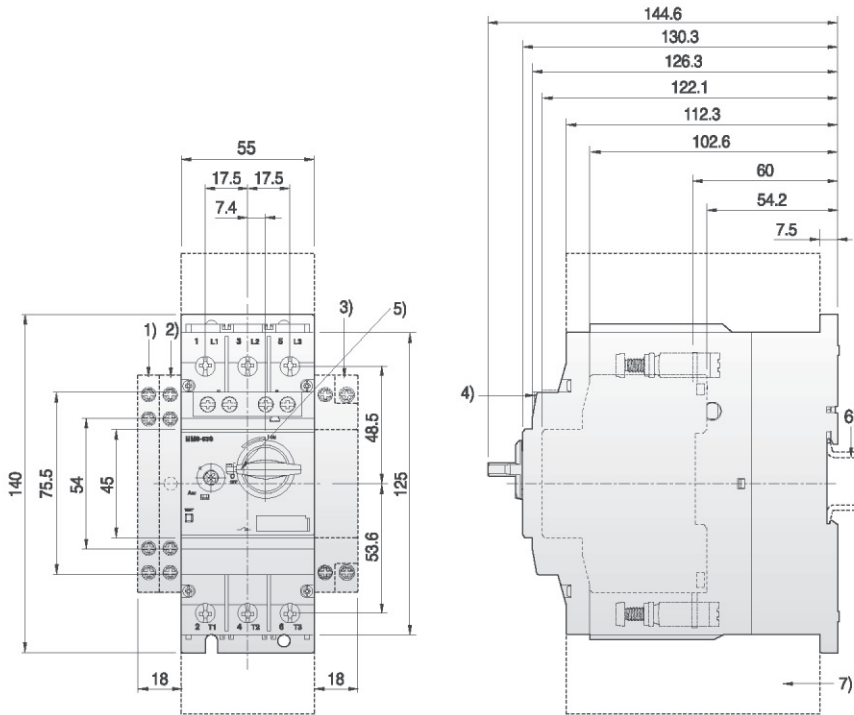
### Arcing spaces for limiter function

[V]	525		690	
	LEFT/RIGHT	TOP/BOTTOM	LEFT/RIGHT	TOP/BOTTOM
[mm]	10	40	30	50

- Dimensions are in mm (1 inch = 25.4 mm) .

# Motor Starter Protector Dimensions

## RMSP 63H



### Height of arcing spaces (clearance from earthed parts)

[M]	240	415	460	525	690
[mm]	50	50	50	50	50

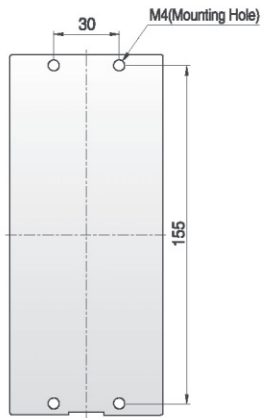
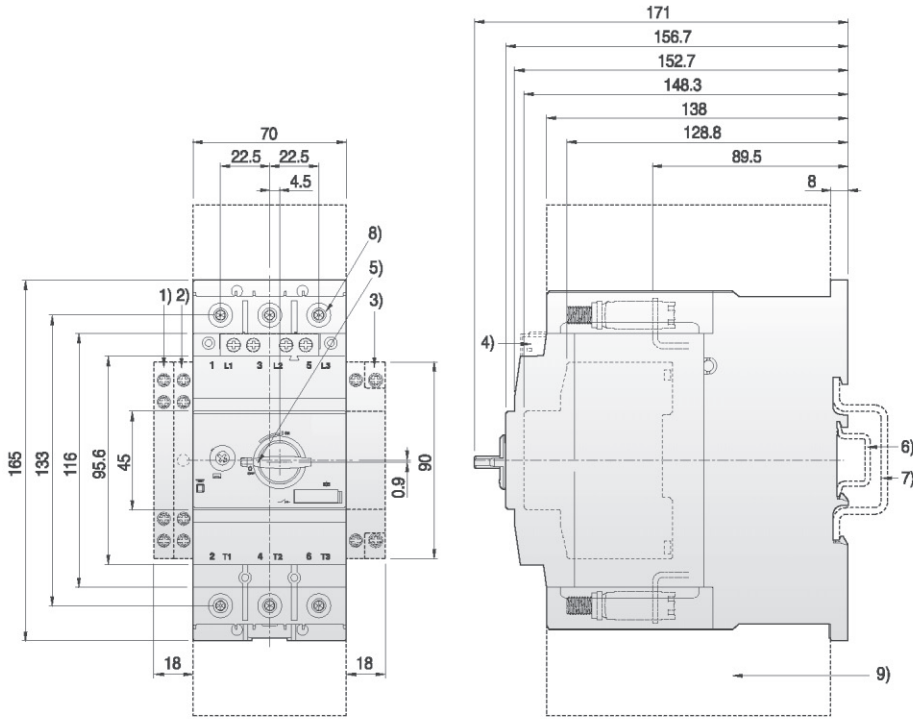
### Arcing spaces for limiter function

[M]	525		690	
	LEFT/RIGHT	TOP/BOTTOM	LEFT/RIGHT	TOP/BOTTOM
[mm]	10	50	10	50

- Dimensions are in mm (1 inch = 25.4 mm) .

# Motor Starter Protector Dimensions

## RMSP 100H



### Height of arcing spaces (clearance from earthed parts)

[M]	240	415	460	525	690
[mm]	50	70	70	110	150

### Arcing spaces for limiter function

[M]	525		690	
	LEFT/RIGHT	TOP/BOTTOM	LEFT/RIGHT	TOP/BOTTOM
[mm]	10	110	30	150

- Dimensions are in mm (1 inch = 25.4 mm) .

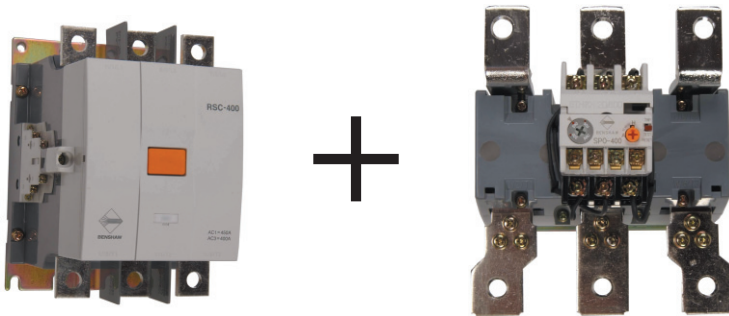


# Open Full Voltage Starters

## Full Voltage Non-Reversing



Web  
stocked



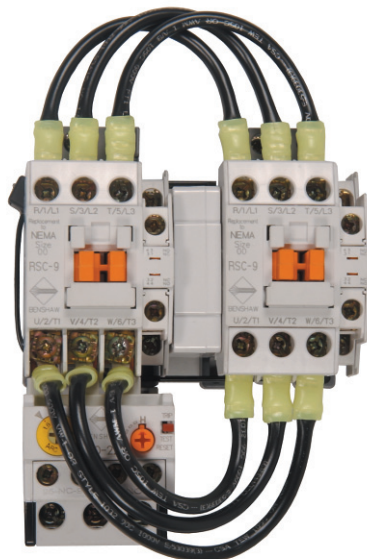
### Standard Features:

- ◆ NEMA rated contactor
- ◆ NEMA Size 00 - Size 7
- ◆ Direct mount overload relays
- ◆ Draw out cassette coils above 85 amps
- ◆ Bimetallic overload relay
- ◆ Integral coil surge suppression above 85 amps

## Full Voltage Reversing



Web  
stocked



### Standard Features:

- ◆ NEMA rated contactors
- ◆ NEMA Size 00 - Size 4
- ◆ Direct mount overload relays
- ◆ Mechanical interlock
- ◆ Draw out cassette coils above 85 amps
- ◆ Bimetallic overload relay
- ◆ Integral coil surge suppression above 85 amps

# Open Full Voltage Starters

NON-REVERSING / NEMA RATED



## NEMA SIZE 00

MODEL NUMBER	NEMA SIZE	OVERLOAD RANGE	COIL VOLTAGE	LIST PRICE
☞ NCFVNRN90136AC120	00	1 - 1.6	120	CF
☞ NCFVNRN90216AC120	00	1.6 - 2.5	120	CF
☞ NCFVNRN90336AC120	00	2.5 - 4	120	CF
☞ NCFVNRN9056AC120	00	4 - 6	120	CF
☞ NCFVNRN90756AC120	00	6 - 9	120	CF

## NEMA SIZE 0

MODEL NUMBER	NEMA SIZE	OVERLOAD RANGE	COIL VOLTAGE	LIST PRICE
☞ NCFVNRN18056AC120	0	4 - 6	120	CF
☞ NCFVNRN180756AC120	0	6 - 9	120	CF
☞ NCFVNRN180116AC120	0	9 - 13	120	CF
☞ NCFVNRN180156AC120	0	12 - 18	120	CF

## NEMA SIZE 1

MODEL NUMBER	NEMA SIZE	OVERLOAD RANGE	COIL VOLTAGE	LIST PRICE
☞ NCFVNRN320116AC120	1	9 - 13	120	CF
☞ NCFVNRN320156AC120	1	12 - 18	120	CF
☞ NCFVNRN320226AC120	1	18 - 26	120	CF

## NEMA SIZE 1P

MODEL NUMBER	NEMA SIZE	OVERLOAD RANGE	COIL VOLTAGE	LIST PRICE
☞ NCFVNRN400196AC120	1P	16 - 22	120	CF
☞ NCFVNRN400226AC120	1P	18 - 26	120	CF
☞ NCFVNRN400306AC120	1P	24 - 36	120	CF

1P = Single phase  
 Contactor and overload are shipped loose  
 ☞ Web stocked



# Open Full Voltage Starters

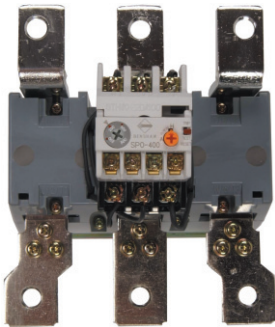
NON-REVERSING / NEMA RATED



NEMA SIZE 2				
MODEL NUMBER	NEMA SIZE	OVERLOAD RANGE	COIL VOLTAGE	LIST PRICE
☞ NCFVNRN500226AC120	2	18 - 26	120	CF
☞ NCFVNRN500306AC120	2	24 - 36	120	CF
☞ NCFVNRN500426AC120	2	34 - 50	120	CF



NEMA SIZE 3				
MODEL NUMBER	NEMA SIZE	OVERLOAD RANGE	COIL VOLTAGE	LIST PRICE
☞ NCFVNRN850306AC120	3	24 - 36	120	CF
☞ NCFVNRN850426AC120	3	34 - 50	120	CF
☞ NCFVNRN850556AC120	3	45 - 65	120	CF



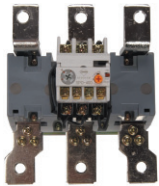
NEMA SIZE 4				
MODEL NUMBER	NEMA SIZE	OVERLOAD RANGE	COIL VOLTAGE	LIST PRICE
☞ NCFVNRN150056U120	4	43 - 65	120 - 230	CF
☞ NCFVNRN150080U120	4	65 - 100	120 - 230	CF
☞ NCFVNRN1500130U120	4	100 - 160	120 - 230	CF

NEMA SIZE 5				
MODEL NUMBER	NEMA SIZE	OVERLOAD RANGE	COIL VOLTAGE	LIST PRICE
☞ NCFVNRN3000130U120	5	100 - 160	120 - 230	CF
☞ NCFVNRN3000200U120	5	160 - 240	120 - 230	CF
☞ NCFVNRN3000250U120	5	200 - 300	120 - 230	CF

☞ Web stocked

# Open Full Voltage Starters

NON-REVERSING / NEMA RATED



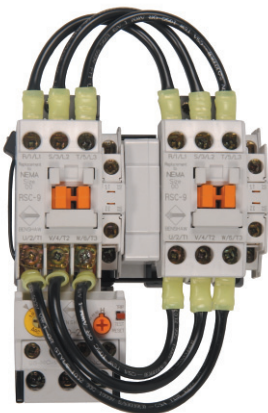
NEMA SIZE 6				
MODEL NUMBER	NEMA SIZE	OVERLOAD RANGE	COIL VOLTAGE	LIST PRICE
NCFVNRN6000250U120	6	200 - 300	120	CF
NCFVNRN6000350U120	6	260 - 400	120	CF
NCFVNRN6000500U120	6	400 - 600	120	CF

NEMA SIZE 7				
MODEL NUMBER	NEMA SIZE	OVERLOAD RANGE	COIL VOLTAGE	LIST PRICE
NCFVNRN8000500U120	7	400 - 600	120	CF
NCFVNRN8000660U120	7	520 - 800	120	CF

Web stocked

# Open Reversing Full Voltage Starters

REVERSING / NEMA RATED



REVERSING / OPEN / NEMA RATED				
MODEL NUMBER	NEMA SIZE	OVERLOAD RANGE	COIL VOLTAGE	LIST PRICE
NCFVRN902A16AC120	00	1.6 - 2.5	120	CF
NCFVRN1807A56AC120	0	6 - 9	120	CF
NCFVRN32011A6AC120	1	9 - 13	120	CF
NCFVRN50022A6AC120	2	18 - 26	120	CF
NCFVRN50034A6AC120	2	28 - 40	120	CF
NCFVRN85055A6AC120	3	45 - 65	120	CF
NCFVRN1500130AU120	4	100 - 160	120	CF

Web stocked



# Prepackaged Full Voltage Starters

NEMA RATED STARTERS - NEMA 12 ENCLOSED

## NON-REVERSING / ENCLOSED / NEMA RATED

MODEL NUMBER	NEMA SIZE	OVERLOAD RANGE	COIL VOLTAGE	LIST PRICE
☞ NCFVNRN9122A16AC120*	00	1.6 - 2.5	120	CF
☞ NCFVNRN18127A56AC120*	0	6 - 9	120	CF
☞ NCFVNRN321211A6AC120*	1	9 - 13	120	CF
☞ NCFVNRN501222A6AC120*	2	18 - 26	120	CF
☞ NCFVNRN501234A6AC120*	2	28 - 40	120	CF
☞ NCFVNRN851255A6AC120*	3	45 - 65	120	CF
☞ NCFVNRN15012130AU120*	4	120 - 180	120	CF

☞ Web stocked



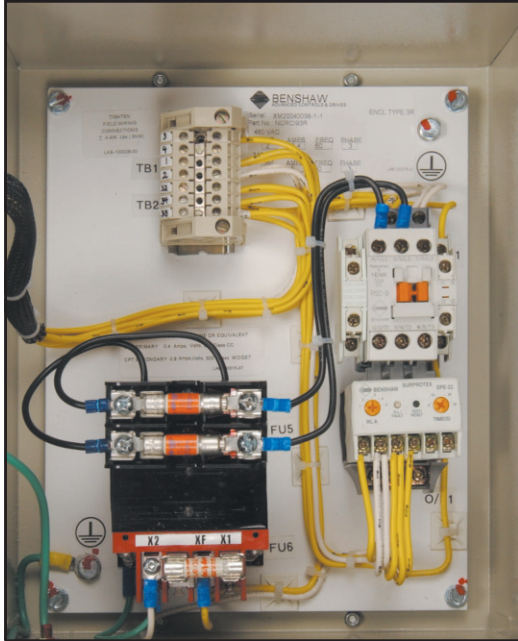
### *Standard features:*

- ◆ NEMA rated contactor
- ◆ NEMA size 00 - size 4
- ◆ NEMA 12 enclosure
- ◆ Draw out cassette coils above 85 amps
- ◆ Class 20 overload relay
- ◆ Overload reset push-button

# Prepackaged Full Voltage Starters With Door Mounted Controls



**RCI SERIES** - NON-COMBINATION / COMBINATION / NEMA 12/3R / ELECTRONIC OVERLOAD PROTECTION



**NCRCI-18-4-3R Full Voltage Starter**

- Control Terminal Block
- Fused Control Power Transformer
- Grounding Lug
- Circuit Breaker with Operator CBRCI (Type)
- NEMA Rated Contactor
- SPE Electronic Overload Relay

## *Provided with SPE Electronic Overload Relay*

SPE electronic overload relays provide field adjustable, precise motor protection, including:

- ◆ Adjustable overload class (1-30)
- ◆ Wide range of current adjustments
- ◆ 1 NO and 1 NC auxiliary contact
- ◆ Current imbalance detection
- ◆ Phase loss detection
- ◆ Phase reversal protection
- ◆ Trip free design
- ◆ Test function/trip indication
- ◆ Fault indication

## *RCI Series Product Highlights:*

RCI starters are NEMA Rated, cUL listed, completely integrated, full voltage/non-reversing starter packages. The rugged NEMA 12/3R design is ideal for Industrial Duty Applications such as pumps, compressors, conveyors, fans and any other continuous duty equipment. The “Three wires In/Out” design includes the Benschaw SPE, field adjustable electronic overload relay which enables quick installation and startup with precision motor protection ...standard.

***Rugged. Reliable. Ready.***

- ◆ cUL listed
- ◆ NEMA rated, heavy duty contactors
- ◆ NEMA 12/3R enclosure
- ◆ Field adjustable SPE electronic overload relay
- ◆ Two year warranty - standard
- ◆ Complete door mounted operator control package
- ◆ 480/240: 120 fused control power transformer
- ◆ “Three wires in/out” installation & startup
- ◆ Combination or non-combination



**SPE Electronic Overload Relay**



# Prepackaged Full Voltage Starters With Door Mounted Controls



**RCI SERIES** - NON-COMBINATION / COMBINATION / NEMA 12/3R / ELECTRONIC  
OVERLOAD PROTECTION

Web  
stocked



## NCRCI Non-Combination Full Voltage Non-Reversing Starters

- ◆ NEMA 12/3R enclosure
- ◆ cUL listed
- ◆ NEMA rated contactor and separately mounted SPE overload relay
- ◆ 480/240:120 fused control power transformer
- ◆ Door-mounted start and stop push-buttons
- ◆ Door-mounted overload reset push-button
- ◆ Red run indicator light
- ◆ (2) Auxiliary contacts
- ◆ Hand off auto selector switch

### 240V or 480V

NEMA SIZE	MODEL NUMBER	DIMENSIONS
00	NCRCI-009-3R	12 x 10 x 6
0	NCRCI-018-3R	12 x 10 x 6
1	NCRCI-032-3R	12 x 10 x 8
2	NCRCI-050-3R	16 x 12 x 6
3	NCRCI-085-3R	16 x 12 x 6
4	NCRCI-150-3R	20 x 16 x 8

- Dual Primary Transformer 240 / 480
- Units are fused @ 480V

Web  
stocked



## CBRCI Combination Full Voltage 480V Non-Reversing Starters

- ◆ NEMA 12/3R enclosure
- ◆ cUL listed
- ◆ NEMA rated contactor and separately mounted SPE overload relay
- ◆ 480/240:120 fused control power transformer
- ◆ Door-mounted start and stop push-buttons
- ◆ Door-mounted overload reset push-button
- ◆ Red run indicator light
- ◆ (2) Auxiliary contacts
- ◆ Circuit breaker with door-mounted operating mechanism
- ◆ Hand off auto selector switch

### 480V

NEMA SIZE	MODEL NUMBER	DIMENSIONS
00	CBRCI-009-4-3R	20 x 16 x 8
0	CBRCI-018-4-3R	20 x 16 x 8
1	CBRCI-032-4-3R	24 x 12 x 8
2	CBRCI-050-4-3R	30 x 12 x 8
3	CBRCI-085-4-3R	36 x 16 x 8
4	CBRCI-150-4-3R	36 x 16 x 8
5	CBRCI-300-4-3R	48 x 24 x 12

## CBRCI Combination Full Voltage 240V Non-Reversing Starters

- ◆ Same features as above units

### 240V

NEMA SIZE	MODEL NUMBER	DIMENSIONS
00	CBRCI-009-2-3R	20 x 16 x 8
0	CBRCI-018-2-3R	20 x 16 x 8
1	CBRCI-032-5-2-3R	24 x 12 x 8
1	CBRCI-032-7-2-3R	24 x 12 x 8
2	CBRCI-050-2-3R	30 x 12 x 8
3	CBRCI-085-2-3R	36 x 16 x 8
4	CBRCI-150-2-3R	36 x 16 x 8

# Prepackaged Full Voltage Starters With Door Mounted Controls



**RCI SERIES** - NON-COMBINATION / COMBINATION / NEMA 12/3R /  
ELECTRONIC OVERLOAD PROTECTION

MODEL NUMBER	FOOT NOTE	NEMA SIZE	NEMA HORSEPOWER		DIMENSIONS (IN)			WGT	LIST PRICE
			240V	480V	H	W	D		

## NCRCI SERIES: NON-COMBINATION 240 & 480 VOLT

☞ NC-RCI-009-3R	1,2,4	00	1.5	2	12	10	6	30	CF
☞ NC-RCI-018-3R	1,2,4	0	3	5	12	10	6	30	CF
☞ NC-RCI-032-3R	1,2,4	1	7.5	10	12	10	8	32	CF
☞ NC-RCI-050-3R	1,2,4	2	15	25	16	12	6	32	CF
☞ NC-RCI-085-3R	1,2,4	3	30	50	16	12	6	60	CF
☞ NC-RCI-150-3R	1,2,4	4	50	100	20	16	8	60	CF

MODEL NUMBER	FOOT NOTE	NEMA SIZE	CB TRIP	NEMA HP	DIMENSIONS (IN)			WGT	LIST PRICE
					H	W	D		

## CBRCI SERIES: COMBINATION CIRCUIT BREAKER 480 VOLT

☞ CB-RCI-009-4-3R	1,4	00	15	2	20	16	8	48	CF
☞ CB-RCI-018-4-3R	1,4	0	20	5	20	16	8	48	CF
☞ CB-RCI-032-4-3R	1,4	1	30	10	24	12	8	63	CF
☞ CB-RCI-050-4-3R	1,4	2	70	25	30	12	8	63	CF
☞ CB-RCI-085-4-3R	3,4	3	100	50	36	16	8	125	CF
☞ CB-RCI-150-4-3R	3,4	4	200	100	36	16	8	125	CF
☞ CB-RCI-300-4-3R	3,4	5	400	200	48	24	12	250	CF

## CBRCI SERIES: COMBINATION CIRCUIT BREAKER 240 VOLT

CB-RCI-009-2-3R	1,5	00	15	1.5	20	16	8	48	CF
CB-RCI-018-2-3R	1,5	0	20	3	20	16	8	48	CF
CB-RCI-032-5-2-3R	1,5	1	40	5	24	12	8	63	CF
CB-RCI-032-7-2-3R	1,5	1	50	7.5	24	12	8	63	CF
CB-RCI-050-2-3R	3,5	2	70	15	30	12	8	63	CF
CB-RCI-085-2-3R	3,5	3	125	30	36	16	8	125	CF
CB-RCI-150-2-3R	3,5	4	200	50	36	16	8	125	CF

- 1) Units can be shipped via ups.
- 2) Units are built as 480V w/dual tap transformer and fusing for 240 volt.
- 3) Units cannot be shipped by UPS - they must ship by common carrier.
- 4) Units are in stock.
- 5) Units are not stocked - allow 2 weeks for shipping.

☞ Web stocked



# Engineered Packages

## PRODUCT OVERVIEW

Benshaw has developed advanced engineering, drafting, materials management and quality systems focused on designing and building customer solutions. This “Build to Order” capability combined with an extensive inventory of control components, protective relays, circuit breakers, contactors, enclosures and other electrical / electronic devices provides our customers with the quickest shipment of engineered products in the industry.

### Standard Ratings

- ◆ 1/2 - 600 HP
- ◆ 120 - 600V
- ◆ Single or 3 phase
- ◆ UL / CSA, IEC and NEMA

### Control Modifications - whatever you specify

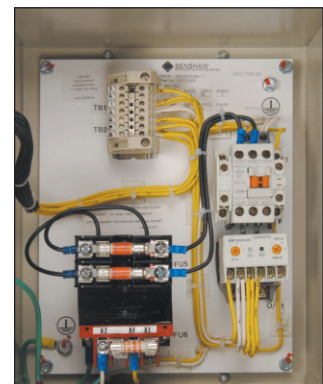
- ◆ Over 250 modifications and accessories are available
- ◆ Pilot devices, control power transformers, switches, meters, relays, space heaters, protective devices, etc.

### Combination Starters to meet your requirements

- ◆ 15 to 1200 amp circuit breakers
- ◆ 40 to 1200 amp non-fused disconnects
- ◆ 30 to 800 amp fusible disconnect
- ◆ Flange or rotary handle mechanism

### Enclosures to match your environment

- ◆ Standard designs - NEMA 1, 12, 4 chassis
- ◆ Custom enclosures
- ◆ Special enclosures - 3R, 4X, 7, 9, as specified
- ◆ Motor control centers



# For Any Application

## APPLICATION SPECIFIC STARTERS OVERVIEW

Benshaw is the trusted expert for any AC motor application. Benshaw provides a full line of application solutions for reversing motors, two speed motors, part winding motors, and Wye-Delta motors.

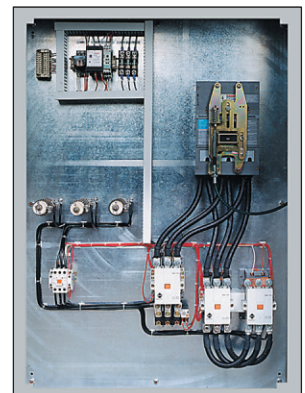
*Call for price and availability*

### Specialty Electromechanical Starters

- ◆ Full voltage, non-reversing
- ◆ Full voltage, reversing
- ◆ 2-Speed, one winding
- ◆ 2-Speed, two windings
- ◆ Part Winding
- ◆ Wye-Delta open transition
- ◆ Wye-Delta closed transition

### Industry Specific Solutions

- ◆ Pump control starters
- ◆ Compressor starters
- ◆ Chiller starters
- ◆ Motor-mounted starters
- ◆ VFD bypass units



# PREDATOR™ QuickShip Program

## FOR FULL VOLTAGE ELECTROMECHANICAL STARTERS



Benshaw's PREDATOR™ QuickShip program allows you to custom configure a wide range of full voltage electromechanical starters for shipment within five working days A.R.O. Simply choose a PREDATOR-QUALIFIED starter from the Engineered Products section of this catalog, then add PREDATOR-QUALIFIED options, as needed. Benshaw will build and ship your custom configured starter within five working days!

### QuickShip Starter Features:

- ◆ UL/IEC Rated 1-800 amps
- ◆ NEMA Rated size 00-7
- ◆ Line voltage 208-600V (60Hz only)
- ◆ NEMA 1, 12, 3R enclosed
- ◆ Non-combination or combination circuit breaker
- ◆ Non-reversing or reversing 120V control

### QuickShip Options:

- ◆ Start-Stop pushbutton
- ◆ Forward-Off-Reverse selector switch
- ◆ Hand-off auto selector switch
- ◆ Local off remote switch
- ◆ Control power transformer
- ◆ Run light
- ◆ Power on light
- ◆ Class 20 overload (NEMA rated starters)

## PRE-ENGINEERED REAL-TIME ENGINEERING DATABASE



## AUTOMATED TURNKEY ORDER RELEASE

### TYPICAL ENGINEERED PRODUCT WORKFLOW

AVERAGE 8-10 WORKING DAYS



ORDER ENTRY      ENGINEERING      PURCHAS-ING      MATERIAL CONTROL      MANUFACTURING      QA/ TESTING



### PREDATOR™ QUICK SHIP WORKFLOW

5 WORKING DAYS

# Engineered Part Number Assembler

## FULL VOLTAGE ELECTROMECHANICAL STARTERS

FV NR I 050 480 01 NC A O/L OP

### Starter Series

FV = Full voltage

### Configuration

NR = Non-reversing  
R = Reversing

### Starter Rating

N = NEMA HP rated (1)  
I = IEC HP rated

### Contactors Size

009 = RSC 9	100 = RSC 100
012 = RSC 12	125 = RSC 125
018 = RSC 18	150 = RSC 150
022 = RSC 22	180 = RSC 180
032 = RSC 32	220 = RSC 220
040 = RSC 40	300 = RSC 300
050 = RSC 50	400 = RSC 400
065 = RSC 65	600 = RSC 600
075 = RSC 75	800 = RSC 800
085 = RSC 85	

### Line Voltage

1PH= 120 vac single phase  
2PH= 240 vac single phase  
⌚ 208 = 208 vac 3 phase  
⌚ 240 = 240 vac 3 phase  
⌚ 480 = 480 vac 3 phase  
⌚ 575 = 575 vac 3 phase  
For other consult factory

### Options

OP = Options see page 1-93, 1-94  
ST = No options

### Overload Suffix

See table on page 1-91, 1-92, 1-94

### Coil Voltage

⌚ A = 120 vac  
B = 240 vac  
C = 208 vac  
D = 480 vac  
E = 575 vac  
F = 24 vac  
G = 277 vac  
H = 380 vac  
I = 400 vac  
J = 415 vac  
For other voltages and frequencies consult factory.

### Disconnect Option

⌚ NC = Non-combination  
⌚ CB = Circuit breaker  
NF = Non-fused disconnect  
CF = Fused disconnect

### Enclosure

⌚ 01 = NEMA 1  
⌚ 12 = NEMA 12  
04 = NEMA 4  
⌚ 3R = NEMA 3R  
For other enclosures consult factory.

(1) Must use NEMA rated contactor. See chart on page 1-7.

⌚ Qualifies for PREDATOR QuickShip program.

# Enclosed Starters Non-Combination / Non-Reversing



**UL/IEC RATED**  
NEMA 1

MODEL NUMBER	HORSEPOWER				DIMENSIONS			LIST PRICE
	200V	240V	480V	575V	H	W	D	
<b>NEMA 1</b>								
⌚ FV-NR-I-009-X-01-NC-*-OL-**	2	2	5	7.5	10	8	6	CF
⌚ FV-NR-I-012-X-01-NC-*-OL-**	3	3	7.5	10	10	8	6	CF
⌚ FV-NR-I-018-X-01-NC-*-OL-**	5	5	10	15	10	8	6	CF
⌚ FV-NR-I-022-X-01-NC-*-OL-**	7.5	7.5	10	15	10	8	6	CF
⌚ FV-NR-I-032-X-01-NC-*-OL-**	7.5	10	20	20	12	10	8	CF
⌚ FV-NR-I-040-X-01-NC-*-OL-**	10	10	25	25	12	10	8	CF
⌚ FV-NR-I-050-X-01-NC-*-OL-**	10	15	30	30	14	12	8	CF
⌚ FV-NR-I-065-X-01-NC-*-OL-**	15	20	40	40	14	12	8	CF
⌚ FV-NR-I-075-X-01-NC-*-OL-**	20	25	50	50	14	12	8	CF
⌚ FV-NR-I-085-X-01-NC-*-OL-**	25	30	60	60	14	12	8	CF
⌚ FV-NR-I-100-X-01-NC-*-OL-**	30	30	60	60	16	12	8	CF
⌚ FV-NR-I-125-X-01-NC-*-OL-**	40	40	75	75	16	12	8	CF
⌚ FV-NR-I-150-X-01-NC-*-OL-**	40	50	100	100	24	12	8	CF
⌚ FV-NR-I-180-X-01-NC-*-OL-**	60	60	125	125	30	24	10	CF
⌚ FV-NR-I-220-X-01-NC-*-OL-**	60	75	150	150	30	24	10	CF
⌚ FV-NR-I-300-X-01-NC-*-OL-**	100	100	200	200	48	24	12	CF
⌚ FV-NR-I-400-X-01-NC-*-OL-**	125	150	300	300	48	24	12	CF

- X Line voltage
- \* Coil voltage
- OL Overload suffix (See pages 1-91 - 1-92)
- \*\* Options (See pages 1-93 - 1-94)
- ⌚ Qualifies for PREDATOR QuickShip program.

Coil Voltage Table - 60Hz	
⌚	A = 120 vac
	B = 240 vac
	C = 208 vac
	D = 480 vac
	E = 575 vac
	F = 24 vac
	G = 277 vac
	H = 380 vac
	I = 400 vac
	J = 415 vac
For other voltages & frequencies consult factory.	

Line Voltage Table	
⌚	1PH = 120 vac single phase
⌚	2PH = 240 vac single phase
⌚	208 = 208 vac 3 phase
⌚	240 = 240 vac 3 phase
⌚	480 = 480 vac 3 phase
⌚	575 = 575 vac 3 phase
For other consult factory	

# Enclosed Starters Non-Combination / Non-Reversing



**UL/IEC RATED**  
NEMA 12, NEMA 3R

MODEL NUMBER	HORSEPOWER				DIMENSIONS			LIST PRICE
	200V	240V	480V	575V	H	W	D	
<b>NEMA 12, NEMA 3R*</b>								
⌚ FV-NR-I-009-X-12-NC-* -OL-**	2	2	5	7.5	10	8	6	CF
⌚ FV-NR-I-012-X-12-NC-* -OL-**	3	3	7.5	10	10	8	6	CF
⌚ FV-NR-I-018-X-12-NC-* -OL-**	5	5	10	15	10	8	6	CF
⌚ FV-NR-I-022-X-12-NC-* -OL-**	7.5	7.5	10	15	10	8	6	CF
⌚ FV-NR-I-032-X-12-NC-* -OL-**	7.5	10	20	20	12	10	8	CF
⌚ FV-NR-I-040-X-12-NC-* -OL-**	10	10	25	25	12	10	8	CF
⌚ FV-NR-I-050-X-12-NC-* -OL-**	10	15	30	30	14	12	8	CF
⌚ FV-NR-I-065-X-12-NC-* -OL-**	15	20	40	40	14	12	8	CF
⌚ FV-NR-I-075-X-12-NC-* -OL-**	20	25	50	50	14	12	8	CF
⌚ FV-NR-I-085-X-12-NC-* -OL-**	25	30	60	60	14	12	8	CF
⌚ FV-NR-I-100-X-12-NC-* -OL-**	30	30	60	60	16	12	8	CF
⌚ FV-NR-I-125-X-12-NC-* -OL-**	40	40	75	75	16	12	8	CF
⌚ FV-NR-I-150-X-12-NC-* -OL-**	40	50	100	100	24	12	8	CF
⌚ FV-NR-I-180-X-12-NC-* -OL-**	60	60	125	125	30	24	10	CF
⌚ FV-NR-I-220-X-12-NC-* -OL-**	60	75	150	150	30	24	10	CF
⌚ FV-NR-I-300-X-12-NC-* -OL-**	100	100	200	200	48	24	12	CF
⌚ FV-NR-I-400-X-12-NC-* -OL-**	125	150	300	300	48	24	12	CF

- \* For NEMA 3R change enclosure code from 12 to 3R.
- X Line voltage
- \* Coil voltage
- OL Overload Suffix (See pages 1-91 - 1-92)
- \*\* Options (See pages 1-93 - 1-94)
- ⌚ Qualifies for PREDATOR QuickShip program.

Coil Voltage Table -60Hz	
⌚	A = 120 vac
	B = 240 vac
	C = 208 vac
	D = 480 vac
	E = 575 vac
	F = 24 vac
	G = 277 vac
	H = 380 vac
	I = 400 vac
	J = 415 vac
For other voltages & frequencies consult factory.	

Line Voltage Table	
	1PH = 120 vac single phase
	2PH = 240 vac single phase
⌚	208 = 208 vac 3 phase
⌚	240 = 240 vac 3 phase
⌚	480 = 480 vac 3 phase
⌚	575 = 575 vac 3 phase
For other consult factory	

# Enclosed Starters Non-Combination / Non-Reversing

**UL/IEC RATED**  
NEMA 4

MODEL NUMBER	HORSEPOWER				DIMENSIONS			LIST PRICE
	200V	240V	480V	575V	H	W	D	
<b>NEMA 4</b>								
FV-NR-I-009-X-04-NC-* -OL-**	2	2	5	7.5	10	8	6	CF
FV-NR-I-012-X-04-NC-* -OL-**	3	3	7.5	10	10	8	6	CF
FV-NR-I-018-X-04-NC-* -OL-**	5	5	10	15	10	8	6	CF
FV-NR-I-022-X-04-NC-* -OL-**	7.5	7.5	10	15	10	8	6	CF
FV-NR-I-032-X-04-NC-* -OL-**	7.5	10	20	20	12	10	8	CF
FV-NR-I-040-X-04-NC-* -OL-**	10	10	25	25	12	10	8	CF
FV-NR-I-050-X-04-NC-* -OL-**	10	15	30	30	14	12	8	CF
FV-NR-I-065-X-04-NC-* -OL-**	15	20	40	40	14	12	8	CF
FV-NR-I-075-X-04-NC-* -OL-**	20	25	50	50	14	12	8	CF
FV-NR-I-085-X-04-NC-* -OL-**	25	30	60	60	14	12	8	CF
FV-NR-I-100-X-04-NC-* -OL-**	30	30	60	60	16	12	8	CF
FV-NR-I-125-X-04-NC-* -OL-**	40	40	75	75	16	12	8	CF
FV-NR-I-150-X-04-NC-* -OL-**	40	50	100	100	24	12	8	CF
FV-NR-I-180-X-04-NC-* -OL-**	60	60	125	125	30	24	10	CF
FV-NR-I-220-X-04-NC-* -OL-**	60	75	150	150	30	24	10	CF
FV-NR-I-300-X-04-NC-* -OL-**	100	100	200	200	48	24	12	CF
FV-NR-I-400-X-04-NC-* -OL-**	125	150	300	300	48	24	12	CF

X Line voltage

\* Coil voltage

OL Overload suffix (See pages 1-91 - 1-92)

\*\* Options (See pages 1-93 - 1-94)

Coil Voltage Table - 60 Hz
A = 120 vac
B = 240 vac
C = 208 vac
D = 480 vac
E = 575 vac
F = 24 vac
G = 277 vac
H = 380 vac
I = 400 vac
J = 415 vac
For other voltages & frequencies consult factory.

Line Voltage Table
1PH = 120 vac single phase
2PH = 240 vac single phase
208 = 208 vac 3 phase
240 = 240 vac 3 phase
480 = 480 vac 3 phase
575 = 575 vac 3 phase
For other consult factory



# Enclosed Starters Non-Combination / Non-Reversing



## NEMA RATED

NEMA 1, 12, 3R, 4

MODEL NUMBER	NEMA SIZE	HORSEPOWER				DIMENSIONS			LIST PRICE
		200V	240V	480V	575V	H	W	D	
<b>NEMA 1</b>									
⌚ FV-NR-N-009-X-01-NC-* -OL-**	00	1.5	1.5	2	2	10	8	6	CF
⌚ FV-NR-N-018-X-01-NC-* -OL-**	0	3	3	5	5	10	8	6	CF
⌚ FV-NR-N-032-X-01-NC-* -OL-**	1	7.5	7.5	10	10	12	10	8	CF
⌚ FV-NR-N-050-X-01-NC-* -OL-**	2	10	15	25	25	14	12	8	CF
⌚ FV-NR-N-085-X-01-NC-* -OL-**	3	25	30	50	50	14	12	8	CF
⌚ FV-NR-N-150-X-01-NC-* -OL-**	4	40	50	100	100	24	12	8	CF
⌚ FV-NR-N-300-X-01-NC-* -OL-**	5	75	100	200	200	48	24	12	CF

<b>NEMA 12, NEMA 3R*</b>									
⌚ FV-NR-N-009-X-12-NC-* -OL-**	00	1.5	1.5	2	2	10	8	6	CF
⌚ FV-NR-N-018-X-12-NC-* -OL-**	0	3	3	5	5	10	8	6	CF
⌚ FV-NR-N-032-X-12-NC-* -OL-**	1	7.5	7.5	10	10	12	10	8	CF
⌚ FV-NR-N-050-X-12-NC-* -OL-**	2	10	15	25	25	14	12	8	CF
⌚ FV-NR-N-085-X-12-NC-* -OL-**	3	25	30	50	50	14	12	8	CF
⌚ FV-NR-N-150-X-12-NC-* -OL-**	4	40	50	100	100	24	12	8	CF
⌚ FV-NR-N-300-X-12-NC-* -OL-**	5	75	100	200	200	48	24	12	CF

<b>NEMA 4</b>									
FV-NR-N-009-X-04-NC-* -OL-**	00	1.5	1.5	2	2	10	8	6	CF
FV-NR-N-018-X-04-NC-* -OL-**	0	3	3	5	5	10	8	6	CF
FV-NR-N-032-X-04-NC-* -OL-**	1	7.5	7.5	10	10	12	10	8	CF
FV-NR-N-050-X-04-NC-* -OL-**	2	10	15	25	25	14	12	8	CF
FV-NR-N-085-X-04-NC-* -OL-**	3	25	30	50	50	14	12	8	CF
FV-NR-N-150-X-04-NC-* -OL-**	4	40	50	100	100	24	12	8	CF
FV-NR-N-300-X-04-NC-* -OL-**	5	75	100	200	200	48	24	12	CF

- \* For NEMA 3R change enclosure code from 12 to 3R.
- X Line voltage
- \* Coil voltage
- OL Overload Suffix (See pages 1-91 - 1-92)
- \*\* Options (See pages 1-93 - 1-94)
- ⌚ Qualifies for PREDATOR QuickShip program.

Coil Voltage Table - 60 Hz	
⌚ A = 120 vac	
B = 240 vac	
C = 208 vac	
D = 480 vac	
E = 575 vac	
F = 24 vac	
G = 277 vac	
H = 380 vac	
I = 400 vac	
J = 415 vac	
For other voltages & frequencies consult factory.	

Line Voltage Table	
1PH = 120 vac single phase	
2PH = 240 vac single phase	
⌚ 208 = 208 vac 3 phase	
⌚ 240 = 240 vac 3 phase	
⌚ 480 = 480 vac 3 phase	
⌚ 575 = 575 vac 3 phase	
For other consult factory	





# Enclosed Starters Combination Circuit Breaker / Non-Reversing

**UL/IEC RATED**  
NEMA 1

MODEL NUMBER	HORSEPOWER				DIMENSIONS			LIST PRICE
	200V	240V	480V	575V	H	W	D	
<b>NEMA 1</b>								
⌚ FV-NR-I-009-X-01-CB-*-OL-**	2	2	5	7.5	16	12	8	CF
⌚ FV-NR-I-012-X-01-CB-*-OL-**	3	3	7.5	10	16	12	8	CF
⌚ FV-NR-I-018-X-01-CB-*-OL-**	5	5	10	15	16	12	8	CF
⌚ FV-NR-I-022-X-01-CB-*-OL-**	7.5	7.5	10	15	16	12	8	CF
⌚ FV-NR-I-032-X-01-CB-*-OL-**	7.5	10	20	20	24	12	8	CF
⌚ FV-NR-I-040-X-01-CB-*-OL-**	10	10	25	25	24	12	8	CF
⌚ FV-NR-I-050-X-01-CB-*-OL-**	10	15	30	30	30	12	8	CF
⌚ FV-NR-I-065-X-01-CB-*-OL-**	15	20	40	40	30	12	8	CF
⌚ FV-NR-I-075-X-01-CB-*-OL-**	20	25	50	50	30	12	8	CF
⌚ FV-NR-I-085-X-01-CB-*-OL-**	25	30	50	50	30	12	8	CF
⌚ FV-NR-I-100-X-01-CB-*-OL-**	30	30	60	60	30	12	8	CF
⌚ FV-NR-I-125-X-01-CB-*-OL-**	40	40	75	75	30	12	8	CF
⌚ FV-NR-I-150-X-01-CB-*-OL-**	40	50	100	100	36	16	8	CF
⌚ FV-NR-I-180-X-01-CB-*-OL-**	60	60	125	125	48	24	12	CF
⌚ FV-NR-I-220-X-01-CB-*-OL-**	60	75	150	150	48	24	12	CF
⌚ FV-NR-I-300-X-01-CB-*-OL-**	100	100	200	200	48	24	12	CF
⌚ FV-NR-I-400-X-01-CB-*-OL-**	125	150	300	300	48	24	12	CF

X Line voltage

\* Coil voltage

OL Overload suffix (See pages 1-91 - 1-92)

\*\* Options (See pages 1-93 - 1-94)

Unit includes thermal magnetic circuit breaker.



### Coil Voltage Table - 60Hz

A = 120 vac
B = 240 vac
C = 208 vac
D = 480 vac
E = 575 vac
F = 24 vac
G = 277 vac
H = 380 vac
I = 400 vac
J = 415 vac

For other voltages & frequencies consult factory.

### Line Voltage Table

1PH = 120 vac single phase
2PH = 240 vac single phase
⌚ 208 = 208 vac 3 phase
⌚ 240 = 240 vac 3 phase
⌚ 480 = 480 vac 3 phase
⌚ 575 = 575 vac 3 phase

For other consult factory

# Enclosed Starters Combination Circuit Breaker / Non-Reversing



**UL/IEC RATED**  
NEMA 12, 3R

MODEL NUMBER	HORSEPOWER				DIMENSIONS			LIST PRICE
	200V	240V	480V	575V	H	W	D	
<b>NEMA 12, NEMA 3R*</b>								
⌚ FV-NR-I-009-X-12-CB-* -OL-**	2	2	5	7.5	16	12	8	CF
⌚ FV-NR-I-012-X-12-CB-* -OL-**	3	3	7.5	10	16	12	8	CF
⌚ FV-NR-I-018-X-12-CB-* -OL-**	5	5	10	15	16	12	8	CF
⌚ FV-NR-I-022-X-12-CB-* -OL-**	7.5	7.5	10	15	16	12	8	CF
⌚ FV-NR-I-032-X-12-CB-* -OL-**	7.5	10	20	20	24	12	8	CF
⌚ FV-NR-I-040-X-12-CB-* -OL-**	10	10	25	25	24	12	8	CF
⌚ FV-NR-I-050-X-12-CB-* -OL-**	10	15	30	30	30	12	8	CF
⌚ FV-NR-I-065-X-12-CB-* -OL-**	15	20	40	40	30	12	8	CF
⌚ FV-NR-I-075-X-12-CB-* -OL-**	20	25	50	50	30	12	8	CF
⌚ FV-NR-I-085-X-12-CB-* -OL-**	25	30	50	50	30	12	8	CF
⌚ FV-NR-I-100-X-12-CB-* -OL-**	30	30	60	60	30	12	8	CF
⌚ FV-NR-I-125-X-12-CB-* -OL-**	40	40	75	75	30	12	8	CF
⌚ FV-NR-I-150-X-12-CB-* -OL-**	40	50	100	100	36	16	8	CF
⌚ FV-NR-I-180-X-12-CB-* -OL-**	60	60	125	125	48	24	12	CF
⌚ FV-NR-I-220-X-12-CB-* -OL-**	60	75	150	150	48	24	12	CF
⌚ FV-NR-I-300-X-12-CB-* -OL-**	100	100	200	200	48	24	12	CF
⌚ FV-NR-I-400-X-12-CB-* -OL-**	125	150	300	300	48	24	12	CF

- \* For NEMA 3R change enclosure code from 12 to 3R.
- X Line voltage
- \* Coil voltage
- OL Overload Suffix (See pages 1-91 - 1-92)
- \*\* Options (See pages 1-93 - 1-94)
- ⌚ Qualifies for PREDATOR QuickShip program.

Coil Voltage Table - 60Hz	
⌚	A = 120 vac
	B = 240 vac
	C = 208 vac
	D = 480 vac
	E = 575 vac
	F = 24 vac
	G = 277 vac
	H = 380 vac
	I = 400 vac
	J = 415 vac
For other voltages & frequencies consult factory.	

Line Voltage Table	
⌚	1PH = 120 vac single phase
	2PH = 240 vac single phase
⌚	208 = 208 vac 3 phase
⌚	240 = 240 vac 3 phase
⌚	480 = 480 vac 3 phase
	575 = 575 vac 3 phase
For other consult factory	

# Enclosed Starters Combination Circuit Breaker / Non-Reversing

**UL/IEC RATED**  
NEMA 4

MODEL NUMBER	HORSEPOWER				DIMENSIONS			LIST PRICE
	200V	240V	480V	575V	H	W	D	
<b>NEMA 4</b>								
FV-NR-I-009-X-04-CB-* -OL-**	2	2	5	7.5	16	12	8	CF
FV-NR-I-012-X-04-CB-* -OL-**	3	3	7.5	10	16	12	8	CF
FV-NR-I-018-X-04-CB-* -OL-**	5	5	10	15	16	12	8	CF
FV-NR-I-022-X-04-CB-* -OL-**	7.5	7.5	10	15	16	12	8	CF
FV-NR-I-032-X-04-CB-* -OL-**	7.5	10	20	20	24	12	8	CF
FV-NR-I-040-X-04-CB-* -OL-**	10	10	25	25	24	12	8	CF
FV-NR-I-050-X-04-CB-* -OL-**	10	15	30	30	30	12	8	CF
FV-NR-I-065-X-04-CB-* -OL-**	15	20	40	40	30	12	8	CF
FV-NR-I-075-X-04-CB-* -OL-**	20	25	50	50	30	12	8	CF
FV-NR-I-085-X-04-CB-* -OL-**	25	30	50	50	30	12	8	CF
FV-NR-I-100-X-04-CB-* -OL-**	30	30	60	60	30	12	8	CF
FV-NR-I-125-X-04-CB-* -OL-**	40	40	75	75	30	12	8	CF
FV-NR-I-150-X-04-CB-* -OL-**	40	50	100	100	36	16	8	CF
FV-NR-I-180-X-04-CB-* -OL-**	60	60	125	125	48	24	12	CF
FV-NR-I-220-X-04-CB-* -OL-**	60	75	150	150	48	24	12	CF
FV-NR-I-300-X-04-CB-* -OL-**	100	100	200	200	48	24	12	CF
FV-NR-I-400-X-04-CB-* -OL-**	125	150	300	300	48	24	12	CF

- X Line voltage
  - \* Coil voltage
  - OL Overload suffix (See pages 1-91 - 1-92)
  - \*\* Options (See pages 1-93 - 1-94)
- Unit includes thermal magnetic circuit breaker.

Coil Voltage Table - 60Hz	
A	= 120 vac
B	= 240 vac
C	= 208 vac
D	= 480 vac
E	= 575 vac
F	= 24 vac
G	= 277 vac
H	= 380 vac
I	= 400 vac
J	= 415 vac
For other voltages & frequencies consult factory.	

Line Voltage Table	
1PH	= 120 vac single phase
2PH	= 240 vac single phase
208	= 208 vac 3 phase
240	= 240 vac 3 phase
480	= 480 vac 3 phase
575	= 575 vac 3 phase
For other consult factory	

# Enclosed Starters Combination Circuit Breaker / Non-Reversing



## NEMA RATED

NEMA 1, 12, 3R, 4

MODEL NUMBER	NEMA SIZE	HORSEPOWER				DIMENSIONS			LIST PRICE
		200V	240V	480V	575V	H	W	D	
<b>NEMA 1</b>									
⌚ FV-NR-N-009-X-01-CB-* -OL-**	00	1.5	1.5	2	2	16	12	8	CF
⌚ FV-NR-N-018-X-01-CB-* -OL-**	0	3	3	5	5	16	12	8	CF
⌚ FV-NR-N-032-X-01-CB-* -OL-**	1	7.5	7.5	10	10	24	12	8	CF
⌚ FV-NR-N-050-X-01-CB-* -OL-**	2	10	15	25	25	30	12	8	CF
⌚ FV-NR-N-085-X-01-CB-* -OL-**	3	25	30	50	50	30	12	8	CF
⌚ FV-NR-N-150-X-01-CB-* -OL-**	4	40	50	100	100	36	16	8	CF
⌚ FV-NR-N-300-X-01-CB-* -OL-**	5	75	100	200	200	48	24	12	CF

<b>NEMA 12, NEMA 3R*</b>									
⌚ FV-NR-N-009-X-12-CB-* -OL-**	00	1.5	1.5	2	2	16	12	8	CF
⌚ FV-NR-N-018-X-12-CB-* -OL-**	0	3	3	5	5	16	12	8	CF
⌚ FV-NR-N-032-X-12-CB-* -OL-**	1	7.5	7.5	10	10	24	12	8	CF
⌚ FV-NR-N-050-X-12-CB-* -OL-**	2	10	15	25	25	30	12	8	CF
⌚ FV-NR-N-085-X-12-CB-* -OL-**	3	25	30	50	50	30	12	8	CF
⌚ FV-NR-N-150-X-12-CB-* -OL-**	4	40	50	100	100	36	16	8	CF
⌚ FV-NR-N-300-X-12-CB-* -OL-**	5	75	100	200	200	48	24	12	CF

<b>NEMA 4</b>									
FV-NR-N-009-X-04-CB-* -OL-**	00	1.5	1.5	2	2	16	12	8	CF
FV-NR-N-018-X-04-CB-* -OL-**	0	3	3	5	5	16	12	8	CF
FV-NR-N-032-X-04-CB-* -OL-**	1	7.5	7.5	10	10	24	12	8	CF
FV-NR-N-050-X-04-CB-* -OL-**	2	10	15	25	25	30	12	8	CF
FV-NR-N-085-X-04-CB-* -OL-**	3	25	30	50	50	30	12	8	CF
FV-NR-N-150-X-04-CB-* -OL-**	4	40	50	100	100	36	16	8	CF
FV-NR-N-300-X-04-CB-* -OL-**	5	75	100	200	200	48	24	12	CF

\* For NEMA 3R change enclosure code from 12 to 3R.

X Line voltage

\* Coil voltage

OL Overload Suffix (See pages 1-91 - 1-92)

\*\* Options (See pages 1-93 - 1-94)

⌚ Qualifies for PREDATOR QuickShip program.

Unit includes thermal magnetic circuit breaker

### Coil Voltage Table - 60Hz

⌚ A = 120 vac
B = 240 vac
C = 208 vac
D = 480 vac
E = 575 vac
F = 24 vac
G = 277 vac
H = 380 vac
I = 400 vac
J = 415 vac

For other voltages & frequencies consult factory.

### Line Voltage Table

1PH = 120 vac single phase
2PH = 240 vac single phase
⌚ 208 = 208 vac 3 phase
⌚ 240 = 240 vac 3 phase
⌚ 480 = 480 vac 3 phase
⌚ 575 = 575 vac 3 phase

For other consult factory



# Enclosed Starters Non-Combination / Reversing

**UL/IEC RATED**  
NEMA 1

MODEL NUMBER	HORSEPOWER				DIMENSIONS			LIST PRICE
	200V	240V	480V	575V	H	W	D	
<b>NEMA 1</b>								
⌚ FV-R-I-009-X-01-NC-* -OL-**	2	2	5	7.5	12	12	6	CF
⌚ FV-R-I-012-X-01-NC-* -OL-**	3	3	7.5	10	12	12	6	CF
⌚ FV-R-I-018-X-01-NC-* -OL-**	5	5	10	15	12	12	6	CF
⌚ FV-R-I-022-X-01-NC-* -OL-**	7.5	7.5	10	15	12	12	6	CF
⌚ FV-R-I-032-X-01-NC-* -OL-**	7.5	10	20	20	12	12	6	CF
⌚ FV-R-I-040-X-01-NC-* -OL-**	10	10	25	25	12	12	6	CF
⌚ FV-R-I-050-X-01-NC-* -OL-**	10	15	30	30	16	12	6	CF
⌚ FV-R-I-065-X-01-NC-* -OL-**	15	20	40	40	16	12	6	CF
⌚ FV-R-I-075-X-01-NC-* -OL-**	20	25	50	50	16	12	6	CF
⌚ FV-R-I-085-X-01-NC-* -OL-**	25	30	60	60	16	12	6	CF
⌚ FV-R-I-100-X-01-NC-* -OL-**	30	30	60	60	20	16	12	CF
⌚ FV-N-I-125-X-01-NC-* -OL-**	40	40	75	75	20	16	12	CF
⌚ FV-N-I-150-X-01-NC-* -OL-**	40	50	100	100	20	16	12	CF
⌚ FV-N-I-180-X-01-NC-* -OL-**	60	65	125	125	30	24	10	CF
⌚ FV-N-I-220-X-01-NC-* -OL-**	60	75	150	150	30	24	10	CF
⌚ FV-N-I-300-X-01-NC-* -OL-**	100	100	200	200	48	24	12	CF
⌚ FV-N-I-400-X-01-NC-* -OL-**	125	150	300	300	48	24	12	CF

X Line voltage

\* Coil voltage

OL Overload suffix (See pages 1-91 - 1-92)

\*\* Options (See pages 1-93 - 1-94)



Coil Voltage Table - 60Hz	
⌚ A	= 120 vac
B	= 240 vac
C	= 208 vac
D	= 480 vac
E	= 575 vac
F	= 24 vac
G	= 277 vac
H	= 380 vac
I	= 400 vac
J	= 415 vac
For other voltages & frequencies consult factory.	



Line Voltage Table	
1PH	= 120 vac single phase
2PH	= 240 vac single phase
⌚ 208	= 208 vac 3 phase
⌚ 240	= 240 vac 3 phase
⌚ 480	= 480 vac 3 phase
⌚ 575	= 575 vac 3 phase
For other consult factory	

# Enclosed Starters Non-Combination / Reversing



**UL/IEC RATED**  
NEMA 12, 3R

MODEL NUMBER	HORSEPOWER				DIMENSIONS			LIST PRICE
	200V	240V	480V	575V	H	W	D	
<b>NEMA 12, NEMA 3R*</b>								
⌚ FV-R-I-009-X-12-NC-* -OL-**	2	2	5	7.5	12	12	6	CF
⌚ FV-R-I-012-X-12-NC-* -OL-**	3	3	7.5	10	12	12	6	CF
⌚ FV-R-I-018-X-12-NC-* -OL-**	5	5	10	15	12	12	6	CF
⌚ FV-R-I-022-X-12-NC-* -OL-**	7.5	7.5	10	15	12	12	6	CF
⌚ FV-R-I-032-X-12-NC-* -OL-**	7.5	10	20	20	12	12	6	CF
⌚ FV-R-I-040-X-12-NC-* -OL-**	10	10	25	25	12	12	6	CF
⌚ FV-R-I-050-X-12-NC-* -OL-**	10	15	30	30	16	12	6	CF
⌚ FV-R-I-065-X-12-NC-* -OL-**	15	20	40	40	16	12	6	CF
⌚ FV-R-I-075-X-12-NC-* -OL-**	20	25	50	50	16	12	6	CF
⌚ FV-R-I-085-X-12-NC-* -OL-**	25	30	60	60	16	12	6	CF
⌚ FV-R-I-100-X-12-NC-* -OL-**	30	30	60	60	20	16	12	CF
⌚ FV-R-I-125-X-12-NC-* -OL-**	40	40	75	75	20	16	12	CF
⌚ FV-R-I-150-X-12-NC-* -OL-**	40	50	100	100	20	16	12	CF
⌚ FV-R-I-180-X-12-NC-* -OL-**	60	65	125	125	30	24	10	CF
⌚ FV-R-I-220-X-12-NC-* -OL-**	60	75	150	150	30	24	10	CF
⌚ FV-R-I-300-X-12-NC-* -OL-**	100	100	200	200	48	24	12	CF
⌚ FV-R-I-400-X-12-NC-* -OL-**	125	150	300	300	48	24	12	CF

\* For NEMA 3R change enclosure code from 12 to 3R.

X Line voltage

\* Coil voltage

OL Overload Suffix (See pages 1-91 - 1-92)

\*\* Options (See pages 1-93 - 1-94)

⌚ Qualifies for PREDATOR QuickShip program.

### Coil Voltage Table - 60Hz

⌚ A = 120 vac
B = 240 vac
C = 208 vac
D = 480 vac
E = 575 vac
F = 24 vac
G = 277 vac
H = 380 vac
I = 400 vac
J = 415 vac

For other voltages & frequencies consult factory.

### Line Voltage Table

1PH = 120 vac single phase
2PH = 240 vac single phase
⌚ 208 = 208 vac 3 phase
⌚ 240 = 240 vac 3 phase
⌚ 480 = 480 vac 3 phase
⌚ 575 = 575 vac 3 phase

For other consult factory

# Enclosed Starters Non-Combination / Reversing

**UL/IEC RATED**  
NEMA 4

MODEL NUMBER	HORSEPOWER				DIMENSIONS			LIST PRICE
	200V	240V	480V	575V	H	W	D	
<b>NEMA 4</b>								
FV-R-I-009-X-04-NC-* -OL-**	2	2	5	7.5	12	12	6	CF
FV-R-I-012-X-04-NC-* -OL-**	3	3	7.5	10	12	12	6	CF
FV-R-I-018-X-04-NC-* -OL-**	5	5	10	15	12	12	6	CF
FV-R-I-022-X-04-NC-* -OL-**	7.5	7.5	10	15	12	12	6	CF
FV-R-I-032-X-04-NC-* -OL-**	7.5	10	20	20	12	12	6	CF
FV-R-I-040-X-04-NC-* -OL-**	10	10	25	25	12	12	6	CF
FV-R-I-050-X-04-NC-* -OL-**	10	15	30	30	16	12	6	CF
FV-R-I-065-X-04-NC-* -OL-**	15	20	40	40	16	12	6	CF
FV-R-I-075-X-04-NC-* -OL-**	20	25	50	50	16	12	6	CF
FV-R-I-085-X-04-NC-* -OL-**	25	30	60	60	16	12	6	CF
FV-R-I-100-X-04-NC-* -OL-**	30	30	60	60	20	16	12	CF
FV-R-I-125-X-04-NC-* -OL-**	40	40	75	75	20	16	12	CF
FV-R-I-150-X-04-NC-* -OL-**	40	50	100	100	20	16	12	CF
FV-R-I-180-X-04-NC-* -OL-**	60	65	125	125	30	24	10	CF
FV-R-I-220-X-04-NC-* -OL-**	60	75	150	150	30	24	10	CF
FV-R-I-300-X-04-NC-* -OL-**	100	100	200	200	48	24	12	CF
FV-R-I-400-X-04-NC-* -OL-**	125	150	300	300	48	24	12	CF

X Line voltage

\* Coil voltage

OL Overload suffix (See pages 1-91 - 1-92)

\*\* Options (See pages 1-93 - 1-94)

Coil Voltage Table - 60Hz	
A	= 120 vac
B	= 240 vac
C	= 208 vac
D	= 480 vac
E	= 575 vac
F	= 24 vac
G	= 277 vac
H	= 380 vac
I	= 400 vac
J	= 415 vac
For other voltages & frequencies consult factory.	

Line Voltage Table	
1PH	= 120 vac single phase
2PH	= 240 vac single phase
208	= 208 vac 3 phase
240	= 240 vac 3 phase
480	= 480 vac 3 phase
575	= 575 vac 3 phase
For other consult factory	

# Enclosed Starters Non-Combination / Reversing



## NEMA RATED

NEMA 1, 12, 3R, 4

MODEL NUMBER	NEMA SIZE	HORSEPOWER				DIMENSIONS			LIST PRICE
		200V	240V	480V	575V	H	W	D	
<b>NEMA 1</b>									
⌚ FV-R-N-009-X-01-NC-* -OL-**	00	1.5	1.5	2	2	12	12	6	CF
⌚ FV-R-N-018-X-01-NC-* -OL-**	0	3	3	5	5	12	12	6	CF
⌚ FV-R-N-032-X-01-NC-* -OL-**	1	7.5	7.5	10	10	12	12	6	CF
⌚ FV-R-N-050-X-01-NC-* -OL-**	2	10	15	25	25	16	12	8	CF
⌚ FV-R-N-085-X-01-NC-* -OL-**	3	25	30	50	50	16	12	6	CF
⌚ FV-R-N-150-X-01-NC-* -OL-**	4	40	50	100	100	20	16	12	CF
⌚ FV-R-N-300-X-01-NC-* -OL-**	5	75	100	200	200	40	24	12	CF

<b>NEMA 12, NEMA 3R*</b>									
⌚ FV-R-N-009-X-12-NC-* -OL-**	00	1.5	1.5	2	2	12	12	6	CF
⌚ FV-R-N-018-X-12-NC-* -OL-**	0	3	3	5	5	12	12	6	CF
⌚ FV-R-N-032-X-12-NC-* -OL-**	1	7.5	7.5	10	10	12	12	6	CF
⌚ FV-R-N-050-X-12-NC-* -OL-**	2	10	15	25	25	16	12	8	CF
⌚ FV-R-N-085-X-12-NC-* -OL-**	3	25	30	50	50	16	12	6	CF
⌚ FV-R-N-150-X-12-NC-* -OL-**	4	40	50	100	100	20	16	12	CF
⌚ FV-R-N-300-X-12-NC-* -OL-**	5	75	100	200	200	40	24	12	CF

<b>NEMA 4</b>									
FV-R-N-009-X-04-NC-* -OL-**	00	1.5	1.5	2	2	12	12	6	CF
FV-R-N-018-X-04-NC-* -OL-**	0	3	3	5	5	12	12	6	CF
FV-R-N-032-X-04-NC-* -OL-**	1	7.5	7.5	10	10	12	12	6	CF
FV-R-N-050-X-04-NC-* -OL-**	2	10	15	25	25	16	12	8	CF
FV-R-N-085-X-04-NC-* -OL-**	3	25	30	50	50	16	12	6	CF
FV-R-N-150-X-04-NC-* -OL-**	4	40	50	100	100	20	16	12	CF
FV-R-N-300-X-04-NC-* -OL-**	5	75	100	200	200	40	24	12	CF

\* For NEMA 3R change enclosure code from 12 to 3R.

X Line voltage

\* Coil voltage

OL Overload Suffix (See pages 1-91 - 1-92)

\*\* Options (See pages 1-93 - 1-94)

⌚ Qualifies for PREDATOR QuickShip program.

### Coil Voltage Table - 60Hz

⌚ A = 120 vac
B = 240 vac
C = 208 vac
D = 480 vac
E = 575 vac
F = 24 vac
G = 277 vac
H = 380 vac
I = 400 vac
J = 415 vac

For other voltages & frequencies consult factory.

### Line Voltage Table

⌚ 1PH = 120 vac single phase
2PH = 240 vac single phase
⌚ 208 = 208 vac 3 phase
⌚ 240 = 240 vac 3 phase
⌚ 480 = 480 vac 3 phase
⌚ 575 = 575 vac 3 phase

For other consult factory



# Enclosed Starters Combination Circuit Breaker / Reversing



**UL/IEC RATED**  
NEMA 1

MODEL NUMBER	HORSEPOWER				DIMENSIONS			LIST PRICE
	200V	240V	480V	575V	H	W	D	
<b>NEMA 1</b>								
⌚ FV-R-I-009-X-01-CB-* -OL-**	2	2	5	7.5	16	12	6	CF
⌚ FV-R-I-012-X-01-CB-* -OL-**	3	3	7.5	10	16	12	6	CF
⌚ FV-R-I-018-X-01-CB-* -OL-**	5	5	10	15	16	12	6	CF
⌚ FV-R-I-022-X-01-CB-* -OL-**	7.5	7.5	10	15	24	12	8	CF
⌚ FV-R-I-032-X-01-CB-* -OL-**	7.5	10	20	20	24	12	8	CF
⌚ FV-R-I-040-X-01-CB-* -OL-**	10	10	25	25	30	12	8	CF
⌚ FV-R-I-050-X-01-CB-* -OL-**	10	15	30	30	30	12	8	CF
⌚ FV-R-I-065-X-01-CB-* -OL-**	15	20	40	40	30	12	8	CF
⌚ FV-R-I-075-X-01-CB-* -OL-**	20	25	50	50	30	12	8	CF
⌚ FV-R-I-085-X-01-CB-* -OL-**	25	30	60	60	30	12	8	CF
⌚ FV-R-I-100-X-01-CB-* -OL-**	30	30	60	60	30	24	10	CF
⌚ FV-R-I-125-X-01-CB-* -OL-**	40	40	75	75	30	24	10	CF
⌚ FV-R-I-150-X-01-CB-* -OL-**	40	50	100	100	30	24	10	CF
⌚ FV-R-I-180-X-01-CB-* -OL-**	60	65	125	125	48	24	12	CF
⌚ FV-R-I-220-X-01-CB-* -OL-**	60	75	150	150	48	24	12	CF
⌚ FV-R-I-300-X-01-CB-* -OL-**	100	100	200	200	48	24	12	CF
⌚ FV-R-I-400-X-01-CB-* -OL-**	125	150	300	300	48	24	12	CF

- X Line voltage
- \* Coil voltage
- OL Overload Suffix (See pages 1-91 - 1-92)
- \*\* Options (See pages 1-93 - 1-94)
- ⌚ Qualifies for PREDATOR QuickShip program.

Coil Voltage Table - 60Hz	
⌚	A = 120 vac
	B = 240 vac
	C = 208 vac
	D = 480 vac
	E = 575 vac
	F = 24 vac
	G = 277 vac
	H = 380 vac
	I = 400 vac
	J = 415 vac
For other voltages & frequencies consult factory.	

Line Voltage Table	
	1PH = 120 vac single phase
	2PH = 240 vac single phase
⌚	208 = 208 vac 3 phase
⌚	240 = 240 vac 3 phase
⌚	480 = 480 vac 3 phase
⌚	575 = 575 vac 3 phase
For other consult factory	

# Enclosed Starters Combination Circuit Breaker / Reversing



**UL/IEC RATED**  
NEMA 12, 3R

MODEL NUMBER	HORSEPOWER				DIMENSIONS			LIST PRICE
	200V	240V	480V	575V	H	W	D	
<b>NEMA 12, NEMA 3R*</b>								
⌚ FV-R-I-009-X-12-CB-*-OL-**	2	2	5	7.5	16	12	6	CF
⌚ FV-R-I-012-X-12-CB-*-OL-**	3	3	7.5	10	16	12	6	CF
⌚ FV-R-I-018-X-12-CB-*-OL-**	5	5	10	15	16	12	6	CF
⌚ FV-R-I-022-X-12-CB-*-OL-**	7.5	7.5	10	15	24	12	8	CF
⌚ FV-R-I-032-X-12-CB-*-OL-**	7.5	10	20	20	24	12	8	CF
⌚ FV-R-I-040-X-12-CB-*-OL-**	10	10	25	25	30	12	8	CF
⌚ FV-R-I-050-X-12-CB-*-OL-**	10	15	30	30	30	12	8	CF
⌚ FV-R-I-065-X-12-CB-*-OL-**	15	20	40	40	30	12	8	CF
⌚ FV-R-I-075-X-12-CB-*-OL-**	20	25	50	50	30	12	8	CF
⌚ FV-R-I-085-X-12-CB-*-OL-**	25	30	60	60	30	12	8	CF
⌚ FV-R-I-100-X-12-CB-*-OL-**	30	30	60	60	30	24	10	CF
⌚ FV-R-I-125-X-12-CB-*-OL-**	40	40	75	75	30	24	10	CF
⌚ FV-R-I-150-X-12-CB-*-OL-**	40	50	100	100	30	24	10	CF
⌚ FV-R-I-180-X-12-CB-*-OL-**	60	65	125	125	48	24	12	CF
⌚ FV-R-I-220-X-12-CB-*-OL-**	60	75	150	150	48	24	12	CF
⌚ FV-R-I-300-X-12-CB-*-OL-**	100	100	200	200	48	24	12	CF
⌚ FV-R-I-400-X-12-CB-*-OL-**	125	150	300	300	48	24	12	CF

- \* For NEMA 3R change enclosure code from 12 to 3R.
- X Line voltage
- \* Coil voltage
- OL Overload Suffix (See pages 1-91 - 1-92)
- \*\* Options (See pages 1-93 - 1-94)
- ⌚ Qualifies for PREDATOR QuickShip program.

Coil Voltage Table - 60Hz	
⌚	A = 120 vac
	B = 240 vac
	C = 208 vac
	D = 480 vac
	E = 575 vac
	F = 24 vac
	G = 277 vac
	H = 380 vac
	I = 400 vac
	J = 415 vac
For other voltages & frequencies consult factory.	

Line Voltage Table	
	1PH = 120 vac single phase
	2PH = 240 vac single phase
⌚	208 = 208 vac 3 phase
⌚	240 = 240 vac 3 phase
⌚	480 = 480 vac 3 phase
⌚	575 = 575 vac 3 phase
For other consult factory	

# Enclosed Starters Combination Circuit Breaker / Reversing

**UL/IEC RATED**  
NEMA 4

MODEL NUMBER	HORSEPOWER				DIMENSIONS			LIST PRICE
	200V	240V	480V	575V	H	W	D	
<b>NEMA 4</b>								
FV-R-I-009-X-04-CB-* -OL-**	2	2	5	7.5	16	12	6	CF
FV-R-I-012-X-04-CB-* -OL-**	3	3	7.5	10	16	12	6	CF
FV-R-I-018-X-04-CB-* -OL-**	5	5	10	15	16	12	6	CF
FV-R-I-022-X-04-CB-* -OL-**	7.5	7.5	10	15	24	12	8	CF
FV-R-I-032-X-04-CB-* -OL-**	7.5	10	20	20	24	12	8	CF
FV-R-I-040-X-04-CB-* -OL-**	10	10	25	25	30	12	8	CF
FV-R-I-050-X-04-CB-* -OL-**	10	15	30	30	30	12	8	CF
FV-R-I-065-X-04-CB-* -OL-**	15	20	40	40	30	12	8	CF
FV-R-I-075-X-04-CB-* -OL-**	20	25	50	50	30	12	8	CF
FV-R-I-085-X-04-CB-* -OL-**	25	30	60	60	30	12	8	CF
FV-R-I-100-X-04-CB-* -OL-**	30	30	60	60	30	24	10	CF
FV-R-I-125-X-04-CB-* -OL-**	40	40	75	75	30	24	10	CF
FV-R-I-150-X-04-CB-* -OL-**	40	50	100	100	30	24	10	CF
FV-R-I-180-X-04-CB-* -OL-**	60	65	125	125	48	24	12	CF
FV-R-I-220-X-04-CB-* -OL-**	60	75	150	150	48	24	12	CF
FV-R-I-300-X-04-CB-* -OL-**	100	100	200	200	48	24	12	CF
FV-R-I-400-X-04-CB-* -OL-**	125	150	300	300	48	24	12	CF

X Line voltage

\* Coil voltage

OL Overload suffix (See page 1-91 - 1-92)

\*\* Options (See pages 1-93 - 1-94)

Unit Includes thermal magnetic circuit breaker

### Coil Voltage Table - 60Hz

A = 120 vac
B = 240 vac
C = 208 vac
D = 480 vac
E = 575 vac
F = 24 vac
G = 277 vac
H = 380 vac
I = 400 vac
J = 415 vac

For other voltages & frequencies consult factory.

### Line Voltage Table

1PH = 120 vac single phase
2PH = 240 vac single phase
208 = 208 vac 3 phase
240 = 240 vac 3 phase
480 = 480 vac 3 phase
575 = 575 vac 3 phase

For other consult factory

# Enclosed Starters Combination Circuit Breaker / Reversing



## NEMA RATED

NEMA 1, 12, 3R, 4

MODEL NUMBER	NEMA SIZE	HORSEPOWER				DIMENSIONS			LIST PRICE
		200V	240V	480V	575V	H	W	D	
<b>NEMA 1</b>									
⌚ FV-R-N-009-X-01-CB-* -OL-**	00	1.5	1.5	2	2	16	12	6	CF
⌚ FV-R-N-018-X-01-CB-* -OL-**	0	3	3	5	5	16	12	6	CF
⌚ FV-R-N-032-X-01-CB-* -OL-**	1	7.5	7.5	10	10	24	12	8	CF
⌚ FV-R-N-050-X-01-CB-* -OL-**	2	10	15	25	25	30	12	8	CF
⌚ FV-R-N-085-X-01-CB-* -OL-**	3	25	30	50	50	30	12	8	CF
⌚ FV-R-N-150-X-01-CB-* -OL-**	4	40	50	100	100	30	24	10	CF
⌚ FV-R-N-300-X-01-CB-* -OL-**	5	75	100	200	200	48	24	12	CF

<b>NEMA 12, NEMA 3R*</b>									
⌚ FV-R-N-009-X-12-CB-* -OL-**	00	1.5	1.5	2	2	16	12	6	CF
⌚ FV-R-N-018-X-12-CB-* -OL-**	0	3	3	5	5	16	12	6	CF
⌚ FV-R-N-032-X-12-CB-* -OL-**	1	7.5	7.5	10	10	24	12	8	CF
⌚ FV-R-N-050-X-12-CB-* -OL-**	2	10	15	25	25	30	12	8	CF
⌚ FV-R-N-085-X-12-CB-* -OL-**	3	25	30	50	50	30	12	8	CF
⌚ FV-R-N-150-X-12-CB-* -OL-**	4	40	50	100	100	30	24	10	CF
⌚ FV-R-N-300-X-12-CB-* -OL-**	5	75	100	200	200	48	24	12	CF

<b>NEMA 4</b>									
FV-R-N-009-X-04-CB-* -OL-**	00	1.5	1.5	2	2	16	12	6	CF
FV-R-N-018-X-04-CB-* -OL-**	0	3	3	5	5	16	12	6	CF
FV-R-N-032-X-04-CB-* -OL-**	1	7.5	7.5	10	10	24	12	8	CF
FV-R-N-050-X-04-CB-* -OL-**	2	10	15	25	25	30	12	8	CF
FV-R-N-085-X-04-CB-* -OL-**	3	25	30	50	50	30	12	8	CF
FV-R-N-150-X-04-CB-* -OL-**	4	40	50	100	100	30	24	10	CF
FV-R-N-300-X-04-CB-* -OL-**	5	75	100	200	200	48	24	12	CF

- \* For NEMA 3R change enclosure code from 12 to 3R.
- X Line voltage
- \* Coil voltage
- OL Overload Suffix (See pages 1-91 - 1-92)
- \*\* Options (See pages 1-93 - 1-94)
- ⌚ Qualifies for PREDATOR QuickShip program.

Coil Voltage Table - 60Hz	
⌚ A	= 120 vac
B	= 240 vac
C	= 208 vac
D	= 480 vac
E	= 575 vac
F	= 24 vac
G	= 277 vac
H	= 380 vac
I	= 400 vac
J	= 415 vac
For other voltages & frequencies consult factory.	

Line Voltage Table	
1PH	= 120 vac single phase
2PH	= 240 vac single phase
⌚ 208	= 208 vac 3 phase
⌚ 240	= 240 vac 3 phase
⌚ 480	= 480 vac 3 phase
⌚ 575	= 575 vac 3 phase
For other consult factory	

# SPO Bimetallic Overloads - CLASS 10

## SELECTION GUIDE



### SPO-22 Series Use on Contactors RSC 9, 12, 18, 22

Overload Suffix	Setting Range
⌚ A14	0.1 - 0.16
⌚ A21	0.16 - 0.2
⌚ A33	0.25 - 0.4
⌚ A52	0.4 - 0.63
⌚ A82	0.63 - 1
⌚ 1A3	1 - 1.6
⌚ 2A1	1.6 - 2.5
⌚ 3A3	2.5 - 4
⌚ 5A	4 - 6
⌚ 6A5	5 - 8
⌚ 7A5	6 - 9
⌚ 8A5	7 - 10
⌚ 11A	9 - 13
⌚ 15A	12 - 18
⌚ 19A	16 - 22

### SPO-40 Series Use on Contactors RSC 32, 40

Overload Suffix	Setting Range
⌚ 5A	4 - 6
⌚ 6A5	5 - 8
⌚ 7A5	6 - 9
⌚ 8A5	7 - 10
⌚ 11A	9 - 13
⌚ 15A	12 - 18
⌚ 19A	16 - 22
⌚ 22A	18 - 26
⌚ 30A	24 - 36
⌚ 34A	28 - 40

### SPO-85 Series Use on Contactors RSC 50, 65, 75 & 85

Overload Suffix	Setting Range
⌚ 8A5	7 - 10
⌚ 11A	9 - 13
⌚ 15A	12 - 18
⌚ 19A	16 - 22
⌚ 22A	18 - 26
⌚ 30A	24 - 36
⌚ 34A	28 - 40
⌚ 42A	34 - 50
⌚ 55A	45 - 65
⌚ 65A	54 - 75
⌚ 74A	63 - 85

### SPO-125 Series Use on Contactors RSC - 100 & 125

Overload Suffix	Setting Range
⌚ 42A	34 - 50
⌚ 48A	39 - 57
⌚ 56A	45 - 65
⌚ 67A	54 - 80
⌚ 80A	65 - 100
⌚ 107A	85 - 125

### SPO-150 Series Use on Contactor RSC - 150

Overload Suffix	Setting Range
⌚ 42A	34 - 50
⌚ 48A	39 - 57
⌚ 56A	45 - 65
⌚ 67A	54 - 80
⌚ 80A	65 - 100
⌚ 107A	85 - 125
⌚ 130A	100 - 150

### SPO-220 Series Use on Contactors RSC - 180 & 220

Overload Suffix	Setting Range
⌚ 80A	65 - 100
⌚ 107A	85 - 125
⌚ 130A	100 - 160
⌚ 150A	120 - 180
⌚ 200A	160 - 240

### SPO-400 Series Contactor RSC - 300 & 400

Overload Suffix	Setting Range
⌚ 107A	85 - 125
⌚ 130A	100 - 160
⌚ 150A	120 - 180
⌚ 200A	160 - 240
⌚ 250A	200 - 300
⌚ 350A	260 - 400

### SPO-800 Series Contactor RSC - 600 & 800

Overload Suffix	Setting Range
⌚ 250A	200 - 300
⌚ 350A	260 - 400
⌚ 500A	400 - 600
⌚ 660A	520 - 800

\* For electronic overload see page 1-94

⌚ Qualifies for PREDATOR QuickShip program.

# SPO Bimetallic Overloads - CLASS 20

## SELECTION GUIDE



<b>SPO-22H Series</b> Use on Contactors RSC 9, 12, 18, 22	
Overload Suffix	Setting Range
🕒 H1A3	1 - 1.6
🕒 H2A1	1.6 - 2.5
🕒 H3A3	2.5 - 4
🕒 H5A	4 - 6
🕒 H7A5	6 - 9
🕒 H11A	9 - 13
🕒 H15A	12 - 18
🕒 H19A	16 - 22

<b>SPO-40H Series</b> Use on Contactor RSC - 32 & 40	
Overload Suffix	Setting Range
🕒 H5A	4 - 6
🕒 H7A5	6 - 9
🕒 H11A	9 - 13
🕒 H15A	12 - 18
🕒 H22A	18 - 26
🕒 H30A	24 - 36
🕒 H34A	28 - 40

<b>SPO-85H Series</b> Use on Contactors Frames 50, 65, 75 & 85	
Overload Suffix	Setting Range
🕒 H8A5	7 - 10
🕒 H11A	9 - 13
🕒 H19A	16 - 22
🕒 H22A	18 - 26
🕒 H30A	24 - 36
🕒 H42A	34 - 50
🕒 H55A	45 - 65
🕒 H74A	63 - 85

<b>SPO-125H Series</b> Use on Contactors RSC - 100 & 125	
Overload Suffix	Setting Range
🕒 H42A	34 - 50
🕒 H56A	45 - 65
🕒 H80A	65 - 100

<b>SPO-150H Series</b> Use on Contactor RSC - 150	
Overload Suffix	Setting Range
🕒 H42A	34 - 50
🕒 H56A	43 - 65
🕒 H80A	65 - 100
🕒 H100A	85 - 125
🕒 H130A	100 - 150

<b>SPO-220H Series</b> Use on Contactors RSC - 180 & 220	
Overload Suffix	Setting Range
🕒 H80A	65 - 100
🕒 H130A	100 - 160
🕒 H200A	160 - 240

<b>SPO-400H Series</b> Use on Contactors RSC - 300 & 400	
Overload Suffix	Setting Range
🕒 H107A	85 - 125
🕒 H130A	100 - 160
🕒 H200A	160 - 240
🕒 H250A	200 - 300
🕒 H350A	260 - 400

<b>SPO-800H Series</b> Use on Contactor RSC - 600 & 800	
Overload Suffix	Setting Range
🕒 H250A	200 - 300
🕒 H350A	260 - 400
🕒 H500A	400 - 600
🕒 H660A	520 - 800

\* For electronic overload see page 1-94

🕒 Qualifies for PREDATOR QuickShip program.



# Factory Options

## CONTROL POWER TRANSFORMERS

Factory modifications are available for all Benshaw enclosed starters. The prices listed for modifications are not to be used as component prices. To order modifications, add the desired catalog suffix to any enclosed magnetic starter catalog number.

CONTROL TRANSFORMER	CATALOG NUMBER SUFFIX		STARTER FRAME	
	24 VOLT SECONDARY	120 VOLT SECONDARY	9~85	100~400

STANDARD CAPACITY				
208V PRIMARY	TL-208-S	🕒 TH-208-S	CF	CF
240V PRIMARY	TL-240-S	🕒 TH-240-S	CF	CF
277V PRIMARY	TL-270-S	🕒 TH-277-S	CF	CF
480V PRIMARY	TL-480-S	🕒 TH-480-S	CF	CF
575V PRIMARY	TL-575-S	🕒 TH-575-S	CF	CF

75VA EXTRA CAPACITY				
208V PRIMARY	TL-208-M	TH-208-M	CF	CF
240V PRIMARY	TL-240-M	TH-240-M	CF	CF
277V PRIMARY	TL-277-M	TH-277-M	CF	CF
480V PRIMARY	TL-480-M	TH-480-M	CF	CF
575V PRIMARY	TL-575-M	TH-575-M	CF	CF

150VA EXTRA CAPACITY				
208V PRIMARY	TL-208-L	TH-208-L	CF	CF
240V PRIMARY	TL-240-L	TH-240-L	CF	CF
277V PRIMARY	TL-277-L	TH-277-L	CF	CF
480V PRIMARY	TL-480-L	TH-480-L	CF	CF
575V PRIMARY	TL-575-L	TH-575-L	CF	CF

- For voltage or VA not listed, please consult factory.
- Modifications do not apply to open starters.
- All control transformers include primary and secondary fuses.
- Catalog suffix for control transformer must match contactor coil voltage. If control is to differ from coil, please consult factory.
- 🕒 Qualifies for PREDATOR QuickShip program.

# Factory Options



MODIFICATION DESCRIPTION	CATALOG SUFFIX	ENCLOSURE TYPE	LIST PRICE
--------------------------	----------------	----------------	------------

## PILOT DEVICES

🕒 START PUSH-BUTTON	A001	ALL	CF
🕒 STOP PUSH-BUTTON	A002	ALL	CF
START/STOP SELECTOR SWITCH	A048	ALL	CF
ON/OFF PUSH-BUTTON	A010	ALL	CF
🕒 HAND-OFF-AUTO SELECTOR SWITCH	A041	ALL	CF
🕒 LOCAL OFF REMOTE	A042	ALL	CF
🕒 FORWARD-OFF-REVERSE SELECTOR SWITCH	A049	ALL	CF
FORWARD-REVERSE SELECTOR SWITCH	A050	ALL	CF
🕒 RUN PILOT LIGHT (RED)	A021	ALL	CF
🕒 RUN PILOT LIGHT (GREEN)	A032	ALL	CF
🕒 ON PILOT LIGHT (RED)	A033	ALL	CF
🕒 ON PILOT LIGHT (GREEN)	A034	ALL	CF
OFF PILOT LIGHT (GREEN)	A035	ALL	CF
OFF PILOT LIGHT (RED)	A036	ALL	CF
OL TRIP PILOT LIGHT (YELLOW)	A037	ALL	V
🕒 OL TRIP RESET BUTTON	A011	ALL	CF

## EXTRA AUXILIARY CONTACT BLOCKS

FACTORY INSTALLED 1NO AND 1NC	A128	ALL	CF
FACTORY INSTALLED 2NO AND 2NC	A129	ALL	CF

## METERS

ANALOG AMMETER	A061	N1,12	CF
ANALOG AMMETER (3 PHASE WITH SELECTOR)	A062	N1,12	CF
ANALOG VOLTMETER	A063	N1,12	CF
ANALOG VOLTMETER (3 PHASE WITH SELECTOR)	A064	N1,12	CF
ELAPSED TIMER METER (ANALOG, NON-RESETTABLE)	A065	N1,12	CF

## ADVANCED MOTOR PROTECTION

ELECTRONIC OVERLOAD (CLASS 1~30)*	SPE	ALL	CF
DIGITAL MOTOR PROTECTION (CLASS 1~60)*	SPD*	N1	CF
DIGITAL MOTOR PROTECTION WITH GROUND FAULT*	SPDG	N1	CF

- \* Requires 120V control power.
- Modifications do not apply to open starters.
- Pilot lights are full voltage supplied at same voltage as contactor coil.
- 🕒 Qualifies for PREDATOR QuickShip program.





**Section 2 | Variable Frequency Drives**



# Variable Frequency Drives

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## 2.1 STANDARD PRODUCTS

<b>RSI GX SERIES</b>	GENERAL PURPOSE MICRO DRIVES PROTECTED CHASSIS 1 - 5 HP, 230V, 460V RATED	2-4
<b>RSI SG SERIES</b>	SENSORLESS VECTOR DRIVES NEMA 1 5 - 700 HP, 230V, 460V	2-7
<b>SGP SERIES</b>	QUICKSHIP PACKAGED DRIVES NEMA 12 VENTILATED 5-125 HP, 230V, 460V	2-11
<b>RSI S4 SERIES</b>	WASHDOWN SENSORLESS VECTOR DRIVES NEMA 4X / NEMA 12 1 - 200 HP, 110V, 230V, 460V	2-17
<b>VFD ACCESSORIES</b>	NON-ENGINEERED ACCESSORIES LINE REACTORS LONG LEAD FILTERS DYNAMIC BRAKING RESISTORS SG, S4 ACCESSORIES	2-22

## 2.2 ENGINEERED PRODUCTS

<b>SG SERIES</b>	PACKAGED SENSORLESS VECTOR DRIVES NEMA 1/NEMA 12V FAN AND FILTERED ENCLOSURES 7.5 - 700 HP, 230V, 460V RATED NON-COMBINATION PACKAGES COMBINATION CIRCUIT BREAKER PACKAGES	2-34
<b>S4 SERIES</b>	PACKAGED SEVERE DUTY SENSORLESS VECTOR DRIVES NEMA 12/NEMA 3R 1 - 200 HP, 230V, 460V, 600V RATED NON-COMBINATION PACKAGES COMBINATION CIRCUIT BREAKER PACKAGES	2-40
<b>VFD OPTIONS</b>	ENGINEERED OPTIONS PILOT DEVICES CONTROL OPTIONS INSTALLED REACTORS FILTERS	2-48

# General Purpose Micro Drives



**GX SERIES** - PROTECTED CHASSIS / NEMA 1  
1-5 HP, 230/460V

## RATINGS

**Constant Torque:** 1 to 5HP @ 460V  
1 to 5HP @ 230V

**Chassis VFD converts to NEMA 1  
with conduit kit**



## RSI GX Series Product Highlights:

The GX series is a compact, economical chassis drive designed for low horsepower applications.

The GX series has a powerful set of parameters with a simple, easy to use keypad. The menu driven programming structure provides quick, simple setup.

Although small in size, the GX series provides a large amount of digital I/O for custom applications.

### Key Advantages:

- ◆ Small, compact design
- ◆ Integral PID control
- ◆ Sensorless vector control or V/Hz control
- ◆ Adjustable carrier frequency
- ◆ Flexible, programmable I/O
- ◆ Economical, compact design
- ◆ Standard dynamic braking transistor
- ◆ Windows based software

## Guaranteed ... for two full years.

**Only Beshaw has a two year guarantee.**

Every Beshaw variable frequency drive is guaranteed for two full years. Other manufacturers limit their warranties to just one year. But at Beshaw, we believe that, because we build them better, we can guarantee them longer. We call that "the Beshaw Promise."



## Standard Features:

- ◆ **Standard I/O:**  
8 digital inputs, 2 analog inputs, 1 analog output, 1 relay output
- ◆ **Digital metering:**  
Output current, output frequency, DC link voltage, motor RPM, output power, output torque
- ◆ **Protection:**  
Over current, ground fault, over voltage, current limit, motor overload, output phase loss, over heat, loss of signal, and more
- ◆ **Communications:**  
ModBus standard
- ◆ **Voltage tolerance:**  
 $\pm 10\%$
- ◆ **Control method:**  
Open loop V/Hz, sensorless vector control
- ◆ **V/Hz patterns:**  
Linear, quadratic, sensorless vector
- ◆ **Analog output functions:**  
1 analog output 0-10VDC
- ◆ **Analog inputs:**  
4-20mA, 0-10Vdc -10 - +10VDC
- ◆ **Relay outputs:**  
1 Form C relay output, programmable to running, faulted, stopped, ready, at speed, high or low frequency levels, loss of signal, and more
- ◆ **Digital inputs:**  
8 digital inputs configurable to forward run, reverse run, reset, jog, preset speeds, motorized pot function, emergency stop, alternate ramp selections, and more
- ◆ **User interface:**  
4 digit LED display
- ◆ **Braking functions:**  
Coast, decel, DC injection braking, and optional dynamic braking

# GX Series

## CONTROL TERMINAL LAYOUT



T/M	DESCRIPTION	
MO	Multi-function open collector output	
MG	MO common	
24	24V output	
P1	MF input terminal (factory setting)	1FX: Forward run
P2		RX: Reverse run
CM	Input signal common	
P3	MF input terminal (factory setting)	BX: Emergency stop
P4		RST: Trip reset
P5		JOG: Jog operation
CM	Input signal common	
P6	MF input terminal (factory setting)	Multi-step freq.-Low
P7		Multi-step freq.-Middle
P8		Multi-step freq.-High
VR	10V power supply for potentiometer	
V1	Freq. setting voltage signal input: -0~10V	
I	Freq. setting current signal input: 0~20mA	
AM	Multi-function analog output signal: 0~10V	
3A	Multi-function relay output terminal	A contact output
3B		B contact output
3C		2 A/B contact common
S+	RS485 communication terminal	
S-		



# General Purpose Micro Drives

## GX SERIES

1-5 HP / PROTECTED CHASSIS / NEMA 1

230 VOLT									
MODEL NUMBER	CONSTANT TORQUE		VARIABLE TORQUE		DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	HP	AMPS	HP	AMPS	H	W	D		
☞ RSI-001-GX-2	1	4.2	-	-	5.0	2.8	5.1	5	CF
☞ RSI-002-GX-2	2	6.8	-	-	5.0	3.8	5.1	5	CF
☞ RSI-003-GX-2	3	9.6	-	-	5.0	5.5	6.1	6	CF
☞ RSI-005-GX-2	5	15.2	-	-	5.0	5.5	6.1	6	CF

460 VOLT									
MODEL NUMBER	CONSTANT TORQUE		VARIABLE TORQUE		DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	HP	AMPS	HP	AMPS	H	W	D		
☞ RSI-001-GX-4	1	2.1	-	-	5.0	2.8	5.1	5	CF
☞ RSI-002-GX-4	2	3.4	-	-	5.0	3.8	5.1	5	CF
☞ RSI-003-GX-4	3	4.8	-	-	5.0	5.5	6.1	6	CF
☞ RSI-005-GX-4	5	7.6	-	-	5.0	5.5	6.1	6	CF

NEMA 1 CONDUIT KITS		
☞ GX-NEMA1KIT-A	CONDUIT KIT FOR 1 HP GX DRIVE	CF
☞ GX-NEMA1KIT-B	CONDUIT KIT FOR 2 HP GX DRIVE	CF
☞ GX-NEMA1KIT-C	CONDUIT KIT FOR 3 HP AND 5 HP GX DRIVE	CF

REMOTE KEYPAD		
☞ VFD-2M-GX-KEYPAD	REMOTE MOUNT KEYPAD AND 2 METER CABLE	CF

- Units are stocked as protected chassis. If NEMA 1 enclosed is required, add NEMA 1 conduit kit. Conduit kits will need to be installed by customer.

☞ Web stocked



# Sensorless Vector Drives

## SG SERIES

VARIABLE TORQUE / STANDARD DUTY / HEAVY DUTY

### RATINGS

#### Variable Torque:

7.5 to 700HP @ 460V  
7.5 to 40HP @ 230V

#### Standard Duty:

7.5 to 600HP @ 460V  
7.5 to 40HP @ 230V

#### Heavy Duty:

5 to 500HP @ 460V  
5 to 30HP @ 230V



### Standard Features:

- ◆ Standard I/O:  
8 digital inputs, 2 analog inputs,  
2 analog outputs, 5 relay outputs
- ◆ Digital metering:  
Output current, output frequency,  
DC link voltage, motor RPM
- ◆ Protection:  
Over current, ground fault, over  
voltage, current limit, motor overload,  
phase loss, over heat, loss of signal,  
and more
- ◆ Communications:  
ModBus standard, optional DeviceNet,  
Profibus and other fieldbus available
- ◆ Voltage tolerance:  
+/- 10%
- ◆ Control method:  
Open loop V/Hz
- ◆ V/Hz patterns:  
Linear, quadratic, sensorless vector
- ◆ Analog output functions:  
2 analog outputs 0-10VDC  
configurable to motor speed, output  
current, output voltage, DC link  
voltage, PID follower
- ◆ Analog inputs:  
4-20mA, 0-10VDC -10 - +10VDC
- ◆ Relay outputs:  
1 Form C relay output, 4 Form A  
relay outputs configurable to running,  
faulted, ready, at speed, high or low  
frequency levels, loss of signal,  
ready, and more
- ◆ Digital inputs:  
8 digital inputs configurable to  
forward run, reverse run, jog, preset  
speeds, motorized pot function,  
emergency stop, alternate ramp  
selections, HOA, and more
- ◆ User interface:  
2 line, 16 character per line  
LCD display
- ◆ Braking functions:  
Coast, decel, DC injection  
braking, flux braking and optional  
dynamic braking

## RSI SG Series Product Highlights:

The SG series is a compact, economical drive designed for the most demanding applications. The flexible power stack allows the user to apply it to heavy duty loads (150% for 60 secs), standard duty loads (120% for 60 secs), or variable torque loads (110% for 60 secs).

With over 250 programmable parameters, Beshaw's SG series drives are configurable to meet the needs of almost any industrial application, yet remain simple and easy to use.

### Key Advantages:

- ◆ Standard and heavy duty ratings
- ◆ Integral PID Control
- ◆ Sensorless vector control or V/Hz control
- ◆ Integral multiple motor control for pumping applications
- ◆ Uploadable / downloadable keypad
- ◆ Flexible, programmable I/O
- ◆ Economical, compact design
- ◆ Simple, easy to use LCD interface
- ◆ Standard ModBus port
- ◆ Windows-based software

### Guaranteed ... for two full years.

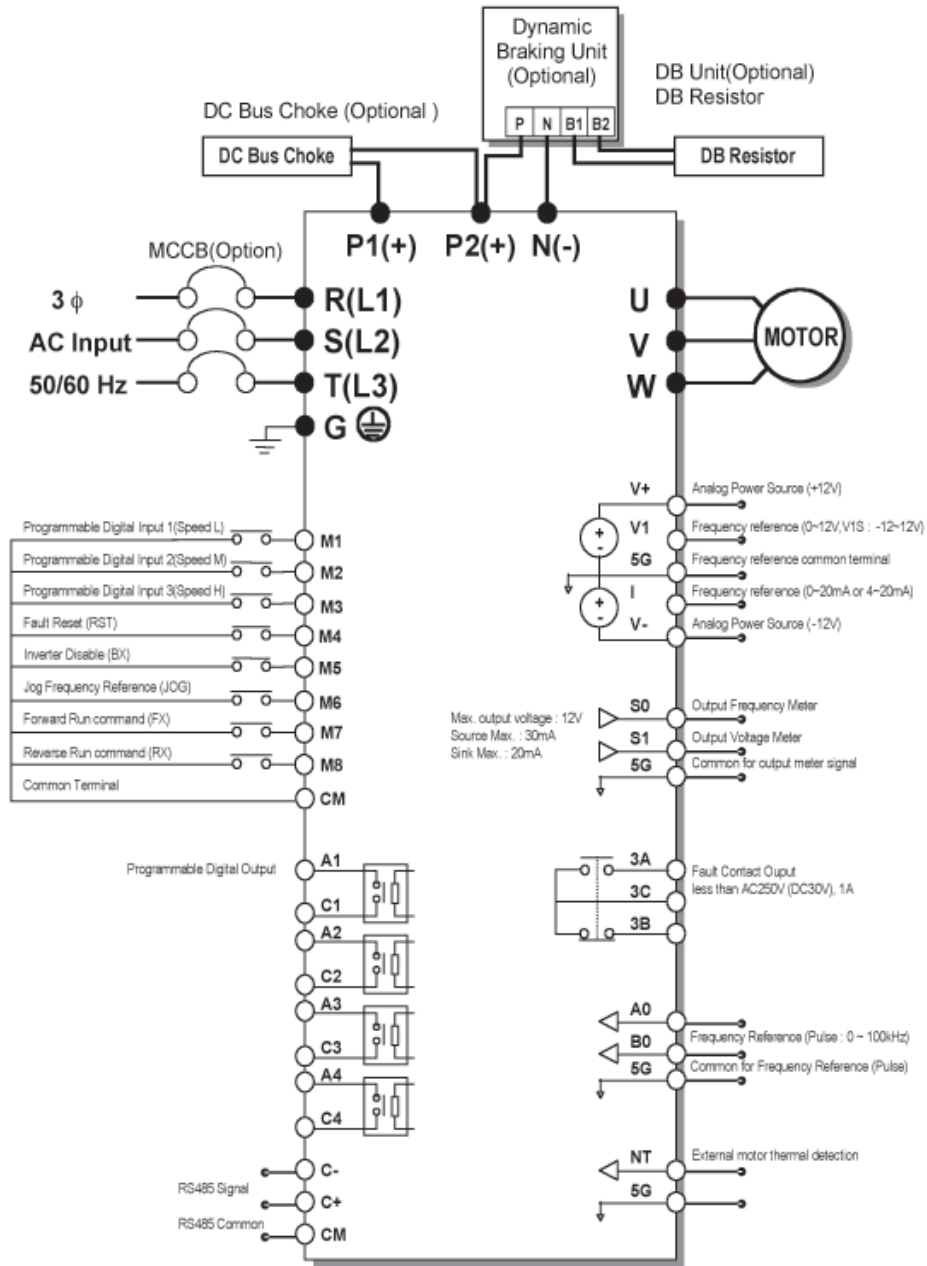
*Only Beshaw has a two year guarantee.*

Every Beshaw variable frequency drive is guaranteed for two full years. Other manufacturers limit their warranties to just one year. But at Beshaw, we believe that, because we build them better, we can guarantee them longer. We call that "the Beshaw Promise."



# SG Series Wiring Diagram

## BASIC WIRING DIAGRAM










Note : 1) 5G is Common Ground for Analog Input/Output.  
 2) Use terminal V1 for V1, V1S (0-12V, -12 ~ 12V) input.





# Sensorless Vector Drives 230V

SG SERIES / NEMA 1

MODEL NUMBER	VARIABLE TORQUE		STANDARD DUTY		HEAVY DUTY		DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	HP	AMPS	HP	AMPS	HP	AMPS	H	W	D		
 RSI-007-SG-2-B	7.5	24	7.5	22	5	17	11.2	5.9	6.2	8	CF
 RSI-010-SG-2-B	10	32	10	29	7.5	23	11.2	7.9	7.2	11	CF
 RSI-015-SG-2-B	15	46	15	42	10	33	11.2	7.9	7.2	17	CF
 RSI-020-SG-2-B	20	60	20	55	15	44	17.9	9.8	7.9	22	CF
 RSI-025-SG-2-B	25	74	25	67	20	54	17.9	9.8	7.9	28	CF
 RSI-030-SG-2-B	30	88	30	80	25	68	23.6	12	9.2	34	CF
 RSI-040-SG-2-B	40	115	40	105	30	84	23.6	12	9.2	44	CF

VARIABLE TORQUE = 110% current for 1 minute

STANDARD DUTY = 120% current for 1 minute

HEAVY DUTY = 150% current for 1 minute

For standard drive accessories refer to pages 2-22 - 2-30.

 Web stocked



# Sensorless Vector Drives 460V

## SG SERIES

NEMA 1 / PROTECTED CHASSIS

MODEL NUMBER	VARIABLE TORQUE		STANDARD DUTY		HEAVY DUTY		DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	HP	AMPS	HP	AMPS	HP	AMPS	H	W	D		
☞ RSI-007-SG-4-B	7.5	12	7.5	11	5	8	11.2	5.9	6.2	8	CF
☞ RSI-010-SG-4-B	10	16	10	14	7.5	11	11.2	7.9	7.2	11	CF
☞ RSI-015-SG-4-B	15	24	15	22	10	17	11.2	7.9	7.2	17	CF
☞ RSI-020-SG-4-B	20	30	20	27	15	22	17.9	9.8	7.9	22	CF
☞ RSI-025-SG-4-B	25	39	25	35	20	28	17.9	9.8	7.9	28	CF
☞ RSI-030-SG-4-B	30	45	30	41	25	34	23.6	12	9.2	34	CF
☞ RSI-040-SG-4-B	40	61	40	55	30	44	23.6	12	9.2	44	CF
☞ RSI-050-SG-4-B	50	75	50	68	40	55	25.3	12.1	10.5	60	CF
☞ RSI-060-SG-4-B	60	91	60	83	50	66	25.3	12.1	10.5	60	CF
☞ RSI-075-SG-4-B	75	110	75	100	60	80	25.3	12.1	11.2	64	CF
☞ RSI-100-SG-4-B	100	152	100	139	75	111	30.2	14.5	12.1	95	CF
☞ RSI-125-SG-4-B	125	183	125	167	100	134	30.2	14.5	12.1	95	CF
☞ RSI-150-SG-4 •	150	223	150	204	125	164	30.3	20.1	16.6	225	CF
☞ RSI-200-SG-4 •	200	264	200	242	150	194	30.3	20.1	16.6	225	CF
☞ RSI-250-SG-4 •	250	325	250	302	200	240	32.3	20.1	16.6	255	CF
☞ RSI-350-SG-4 •	350	432	300	396	250	317	40.5	27.2	17.3	450	CF
☞ RSI-400-SG-4 •	400	547	400	501	300	401	40.5	27.2	17.3	450	CF
☞ RSI-500-SG-4 •	500	613	450	562	350	450	43.7	30.8	17.4	540	CF
☞ RSI-600-SG-4 •	600	731	500	670	400	536	51.3	36.3	19.5	840	CF
☞ RSI-700-SG-4 •	700	877	600	804	500	643	51.3	36.3	19.5	840	CF

VARIABLE TORQUE = 110% current for 1 minute

STANDARD DUTY = 120% Current for 1 Minute

HEAVY DUTY = 150% Current for 1 Minute

For Standard Drive Accessories refer to pages 2-22 - 2-30.

Units ending in a "B" designate NEMA 1. Units not ending in a "B" are protected chassis units.

- Protected chassis only (no cover on control or power terminals).

☞ Web stocked





# QuickShip Packaged Drives

## SGP SERIES

STANDARD DUTY / HEAVY DUTY

### RATINGS

#### Standard Duty:

7.5 to 40HP @ 230V  
7.5 to 125HP @ 460V

#### Heavy Duty:

5 to 30HP @ 230V  
5 to 100HP @ 460V

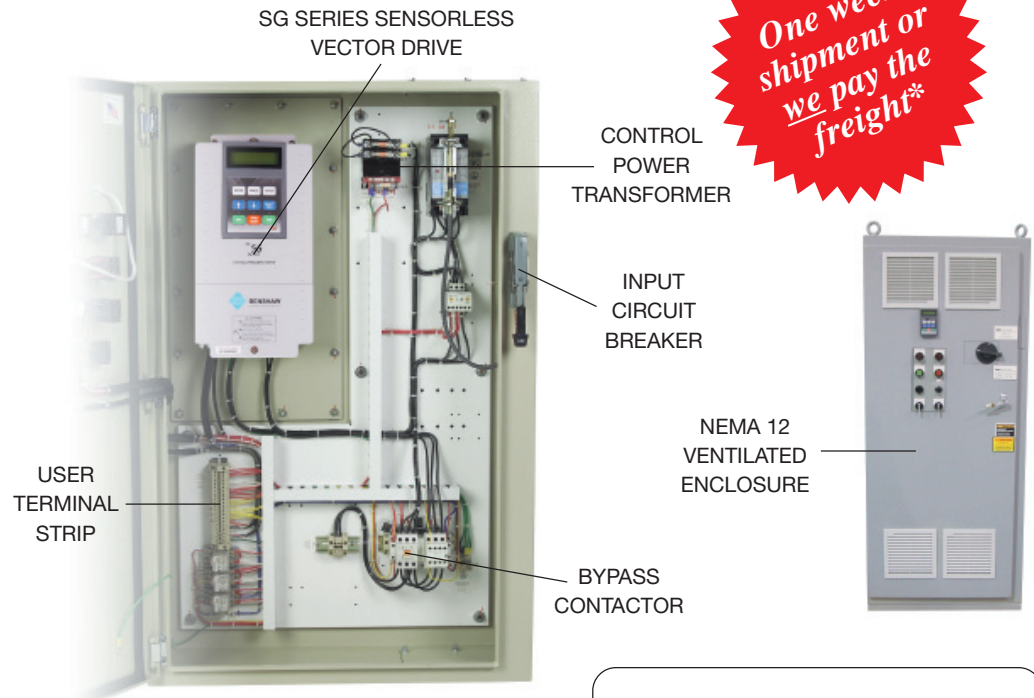
### OPERATING CONDITIONS

**Operating Temperature:**  
-10°C to 40°C

**Storage Temperature:**  
-20°C to 65°C

**Humidity:**  
Less than 90% RH max  
(non-condensing)

**Altitude:**  
3,300 ft. max.



## Program Highlights:

Benshaw's QuickShip packaged drives meet UL and CE approvals and are available with standard (7.5 to 125HP) and heavy duty (5 to 100HP) ratings to meet your drive requirements.

\*QuickShip drives are guaranteed to ship on time—as acknowledged—or we pay standard freight.

### Key Advantages:

- ◆ Standard and heavy duty ratings
- ◆ UL and CE approvals
- ◆ One week shipment
- ◆ Built to your specifications
- ◆ Door mounted keypad

### Standard Features:

- ◆ NEMA 12 ventilated enclosure with fans and filters
- ◆ SG Series Sensorless Vector Drive
- ◆ User terminal strip
- ◆ Door mounted keypad
- ◆ Control power transformer
- ◆ User input and output power connections
- ◆ -10° C to 40° C operating environment temperature range
- ◆ -20° C to 65° C storage temperature

### Options:

- ◆ Circuit breaker
- ◆ Disconnect fused or unfused
- ◆ Input line reactor
- ◆ Output line reactor
- ◆ 3 contactor bypass
- ◆ Door mounted operator station (6 configurations)

## Guaranteed ... for two full years.

*Only Benshaw has a two year guarantee.*

Every Benshaw variable frequency drive is guaranteed for two full years. Other manufacturers limit their warranties to just one year. But at Benshaw, we believe that, because we build them better, we can guarantee them longer. We call that “the Benshaw Promise.”



# QuickShip Part Number Assembler

SGP 005 2 SD NC A 3B 1 12

## SG QuickShip Packaged Drives

### Horsepower

005 = 5hp  
 007 = 7.5hp  
 010 = 10hp  
 015 = 15hp  
 020 = 20hp  
 025 = 25hp  
 030 = 30hp  
 040 = 40hp  
 050 = 50hp  
 060 = 60hp  
 075 = 75hp  
 125 = 125hp

### Voltage

2 = 230V  
 4 = 460

### Duty Type

SD = 120% 1 min std duty  
 HD = 150% 1 min heavy duty

### Disconnect Option

NC = Non-combination  
 CB = Circuit breaker  
 FD = Fusible disconnect  
 CF = Non-fused disconnect  
 IF = Inline fuse

## Enclosure

12 = NEMA 12V

## Door Mounted Devices

1 = None  
 2 = Start/stop PB, reset PB, HOA switch, speed pot  
 3 = Option 2 plus power ON, VFD running, VFD fault light  
 4 = Start/stop PB, fault reset PB, HOA switch, speed pot, jog PB, fwd/rev switch, VFD fault light  
 5 = VFD/Off/bypass switch, bypass running light  
 6 = Start/stop PB, reset PB, HOA switch, speed pot, VFD running light, VFD/off/bypass switch, bypass running light

## Bypass Type

NN = None  
 3B = 3 Contactor bypass

## Reactor Options

A = No reactors  
 B = Input reactor  
 C = Output reactor  
 D = Input and output reactor

# QuickShip Cube Enclosure



QuickShip  
packaged  
drives

## SGP SERIES

STANDARD DUTY RATED 120% O/L FOR 1 MINUTE

### 230VAC, 3-PHASE INPUT AND OUTPUT, 50/60HZ INPUT, NEMA 12 VENTILATED

MODEL NUMBER	HP	AMPS	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
			H	W	D		
SGP0072SDXXXXXX12	7.5	22	30	24	16	90	CF
SGP0102SDXXXXXX12	10	28	30	24	16	93	CF
SGP0152SDXXXXXX12	15	42	36	30	16	99	CF
SGP0202SDXXXXXX12	20	54	36	30	16	104	CF
SGP0252SDXXXXXX12	25	68	36	30	16	110	CF
SGP0302SDXXXXXX12	30	80	36	30	16	148	CF
SGP0402SDXXXXXX12	40	104	36	30	16	158	CF

### 460VAC, 3-PHASE INPUT AND OUTPUT, 50/60HZ INPUT, NEMA 12 VENTILATED

MODEL NUMBER	HP	AMPS	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
			H	W	D		
SGP0074SDXXXXXX12	7.5	11	30	24	16	90	CF
SGP0104SDXXXXXX12	10	14	30	24	16	93	CF
SGP0154SDXXXXXX12	15	21	30	24	16	99	CF
SGP0204SDXXXXXX12	20	27	30	24	16	104	CF
SGP0254SDXXXXXX12	25	34	30	24	16	110	CF
SGP0304SDXXXXXX12	30	40	36	30	16	148	CF
SGP0404SDXXXXXX12	40	52	36	30	16	158	CF
SGP0504SDXXXXXX12	50	65	36	30	16	174	CF
SGP0604SDXXXXXX12	60	77	36	30	16	174	CF
SGP0754SDXXXXXX12	75	96	36	30	16	178	CF
SGP1004SDXXXXXX12*	100	125	46	30	16	259	CF
SGP1254SDXXXXXX12*	125	156	46	30	16	259	CF

\* Dimensions will increase to 70x30x18 for units with three contactor bypass.

# QuickShip Cube Enclosure



## SGP SERIES

HEAVY DUTY RATED 150% O/L FOR 1 MINUTE

### 230VAC, 3-PHASE INPUT AND OUTPUT, 50/60HZ INPUT, NEMA 12 VENTILATED

MODEL NUMBER	HP	AMPS	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
			H	W	D		
SGP0052HDXXXXXX12	5	17	30	24	16	90	CF
SGP0072HDXXXXXX12	7.5	23	30	24	16	90	CF
SGP0102HDXXXXXX12	10	33	30	24	16	93	CF
SGP0152HDXXXXXX12	15	44	36	30	16	99	CF
SGP0202HDXXXXXX12	20	54	36	30	16	104	CF
SGP0252HDXXXXXX12	25	68	36	30	16	110	CF
SGP0302HDXXXXXX12	30	84	36	30	16	148	CF

### 460VAC, 3-PHASE INPUT AND OUTPUT, 50/60HZ INPUT, NEMA 12 VENTILATED

MODEL NUMBER	HP	AMPS	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
			H	W	D		
SGP0054HDXXXXXX12	5	8	30	24	16	90	CF
SGP0074HDXXXXXX12	7.5	11	30	24	16	90	CF
SGP0104HDXXXXXX12	10	14	30	24	16	93	CF
SGP0154HDXXXXXX12	15	21	30	24	16	99	CF
SGP0204HDXXXXXX12	20	27	30	24	16	104	CF
SGP0254HDXXXXXX12	25	34	36	30	16	110	CF
SGP0304HDXXXXXX12	30	40	36	30	16	148	CF
SGP0404HDXXXXXX12	40	52	36	30	16	158	CF
SGP0504HDXXXXXX12	50	65	36	30	16	174	CF
SGP0604HDXXXXXX12	60	77	36	30	16	174	CF
SGP0754HDXXXXXX12*	75	96	46	30	16	178	CF
SGP1004HDXXXXXX12*	100	125	46	30	16	259	CF

\* Dimensions will increase to 70x30x18 for units with three contactor bypass.



# QuickShip Options

MODULAR CONTROL OPTIONS TO CUSTOMIZE YOUR APPLICATION

OPTIONS	1	2	3	4	5	6
KEYPAD	1	1	1	1	1	1
START PB		1	1	1		1
STOP PB		1	1	1		1
RESET PB		1	1	1		1
HOA SWITCH		1	1	1		1
SPEED POT		1	1	1		1
RUN LIGHT			1			1
FAULT LIGHT			1	1		
POWER ON LIGHT			1			
JOG PB				1		
FWD/REV SWITCH				1		
VFD/OFF BYPASS SWITCH					1	1
BYPASS RUNNING LIGHT					1	1
	\$100.00	\$341.00	\$300.00	\$494.00	\$200.00	\$450.00

- If selecting a unit with bypass, you must select either option 5 or 6.
- Door mounted keypad is standard

# SG QuickShip Options

MODULAR POWER OPTIONS TO CUSTOMIZE YOUR APPLICATION



230VAC DRIVE ADDER							
HP	CB	N-F DISC	FSD-DISC	INPUT FUSE	IN-REACT	OUT-REACT	3-CNT BY
5	CF	CF	CF	CF	CF	CF	CF
7.5	CF	CF	CF	CF	CF	CF	CF
10	CF	CF	CF	CF	CF	CF	CF
15	CF	CF	CF	CF	CF	CF	CF
20	CF	CF	CF	CF	CF	CF	CF
25	CF	CF	CF	CF	CF	CF	CF
30	CF	CF	CF	CF	CF	CF	CF
40	CF	CF	CF	CF	CF	CF	CF

460VAC DRIVE ADDER							
HP	CB	N-F DISC	FSD-DISC	INPUT FUSE	IN-REACT	OUT-REACT	3-CNT BY
5	CF	CF	CF	CF	CF	CF	CF
7.5	CF	CF	CF	CF	CF	CF	CF
10	CF	CF	CF	CF	CF	CF	CF
15	CF	CF	CF	CF	CF	CF	CF
20	CF	CF	CF	CF	CF	CF	CF
25	CF	CF	CF	CF	CF	CF	CF
30	CF	CF	CF	CF	CF	CF	CF
40	CF	CF	CF	CF	CF	CF	CF
50	CF	CF	CF	CF	CF	CF	CF
60	CF	CF	CF	CF	CF	CF	CF
75	CF	CF	CF	CF	CF	CF	CF
100	CF	CF	CF	CF	CF	CF	CF
125	CF	CF	CF	CF	CF	CF	CF



# NEMA 4X Washdown / NEMA 12

## Sensorless Vector Drives



### S4 SERIES

STANDARD DUTY / HEAVY DUTY



#### RATINGS

##### Constant Torque:

1HP @ 115V  
1 to 20HP @ 230V  
1 to 200HP @  
460V/600V



#### Standard Features:

- ◆ NEMA 4X washdown enclosure
- ◆ Standard I/O:  
10 digital inputs, 2 analog inputs,  
2 analog outputs, 2 relay outputs
- ◆ Digital metering:  
Output current, output volts, power,  
MWh meter, run time, power on time,  
bus voltage, output frequency
- ◆ Communications:  
ModBus standard, optional  
other fieldbus
- ◆ Voltage tolerance  $\pm 10\%$
- ◆ Sensorless vector control
- ◆ V/ Hz Pattern:  
Linear, quadratic
- ◆ Analog output functions:  
Output voltage, output current,  
drive load, drive temp, stator  
frequency, output power
- ◆ Analog inputs:  
0-10VDC, 4-20mA, -10VDC to  
10VDC, Pulse train input
- ◆ Relay outputs:  
Running, forward, reverse, ready,  
faulted, at speed, keypad control,  
adjustable torque levels, adjustable  
current levels, PID limits, loss of  
reference, timers
- ◆ 10 digital inputs configurable:  
Run, preset speeds, jogging, PID  
disable, fault reset, drive enable,  
timers, motorized pot
- ◆ User interface:  
20 character LCD display, infrared  
programming port
- ◆ Braking functions:  
Decel, coast, DC injection,  
dynamic braking

### RSI S4 Series Product Highlights:

The S4 Series is a line of high performance NEMA 4X washdown variable frequency drives. Benshaw's S4 variable frequency drives are built to withstand the harshest environments and hold up under your most demanding pressure washing applications. All S4 Series drives combine a simple user interface with an array of features and are suited to almost any indoor environment.

S4 variable frequency drives come standard with over 180 configurable parameters to match specific application and interface requirements. A standard dynamic braking transistor and resistor are also included for regenerative applications.

#### Key Advantages:

- ◆ NEMA 4X washdown duty enclosure
- ◆ Sensorless vector control
- ◆ Standard braking transistor and resistor
- ◆ Infrared programming port
- ◆ Standard and Heavy Duty ratings
- ◆ LCD plain English display
- ◆ Simple, easy-to-use interface
- ◆ Standard ModBus communication port
- ◆ Integral PI control

### Guaranteed ... for two full years.

**Only Benshaw has a two year guarantee.**

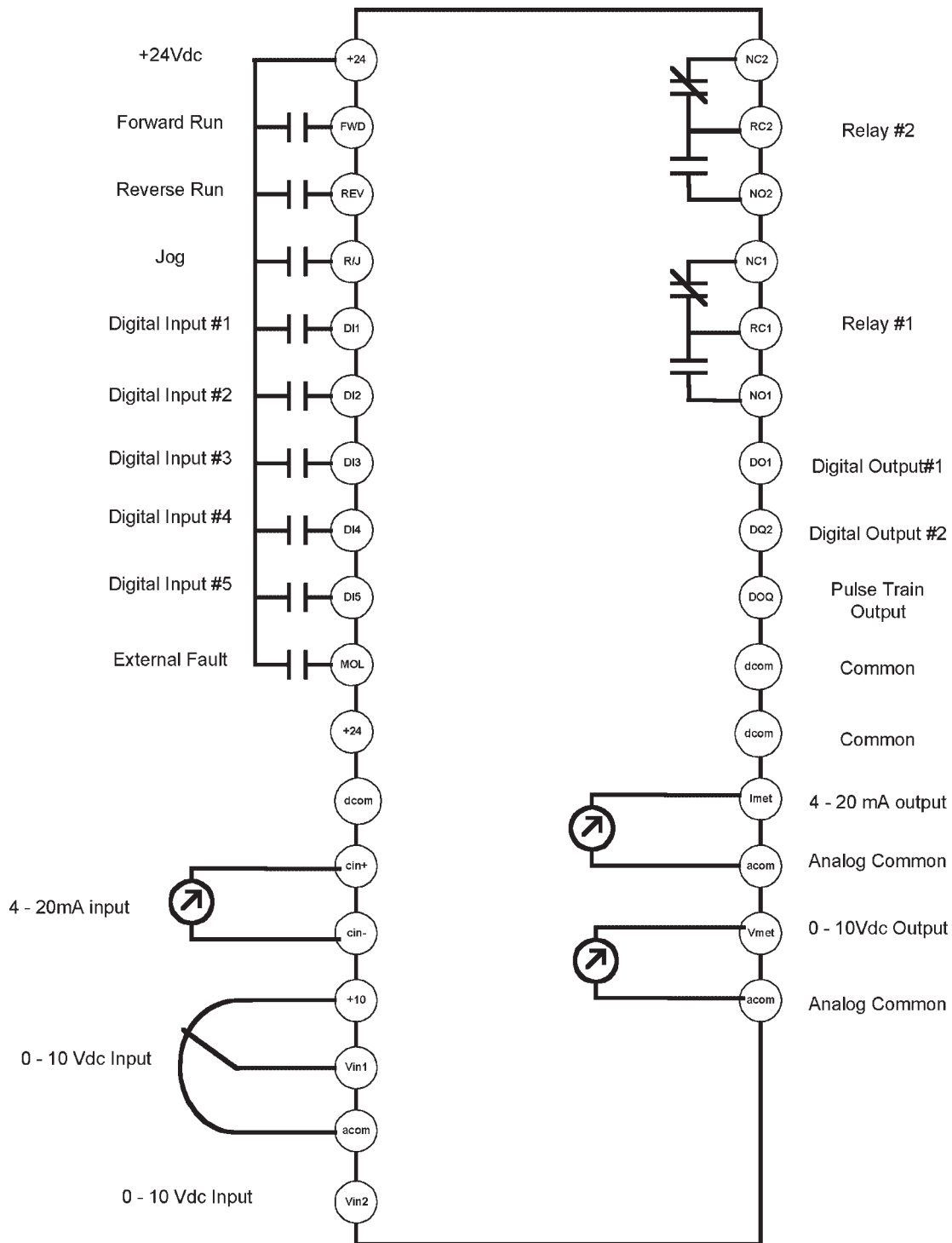
Every Benshaw variable frequency drive is guaranteed for two full years. Other manufacturers limit their warranties to just one year. But at Benshaw, we believe that, because we build them better, we can guarantee them longer. We call that "the Benshaw Promise."



\* Units 1-100HP are NEMA 4X. Units 125-200HP are NEMA 12.

# S4 Series Wiring Diagram

## BASIC WIRING DIAGRAM



# Washdown Sensorless Vector Drives 230V



## S4 SERIES NEMA 4X

MODEL NUMBER	STANDARD DUTY		HEAVY DUTY		DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	HP	AMPS	HP	AMPS	H	W	D		
RSI-001-S4-2W	1	4.2	0.5	2.5	9.5	6.5	6.1	9	CF
RSI-002-S4-2W	2	6.8	1	4.8	9.5	6.5	6.1	9	CF
RSI-003-S4-2W	3	9.6	2	7.8	9.5	6.5	8.5	9	CF
RSI-005-S4-2W	5	15.2	3	11	12	8.7	6.5	14	CF
RSI-007-S4-2W	7.5	22	5	17.5	12	8.7	6.5	14	CF
RSI-010-S4-2W	10	28	7.5	25.3	17.4	10.8	7.9	30	CF
RSI-015-S4-2W	15	42	10	37.2	17.4	10.8	7.9	30	CF
RSI-020-S4-2W	20	54	15	48.3	20.2	11.3	11.7	50	CF
RSI-025-S4-2W	25	68	20	62.1	20.2	11.3	11.7	50	CF

## 110V INPUT / 230V OUTPUT

MODEL NUMBER	STANDARD DUTY		HEAVY DUTY		DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	HP	AMPS	HP	AMPS	H	W	D		
RSI-001-S4-1SW •	1	4.2	0.5	2.5	9.5	6.5	6.1	9	CF

- Single phase 110V input / 3 phase 230V output.

Web stocked



# Washdown Sensorless Vector Drives 460V



## S4 SERIES

NEMA 4X / NEMA 12

MODEL NUMBER	STANDARD DUTY		HEAVY DUTY		DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	HP	AMPS	HP	AMPS	H	W	D		
☞ RSI-001-S4-4W	1	2.1	0.5	1.1	9.5	6.5	6.1	9	CF
☞ RSI-002-S4-4W	2	3.4	1	2.1	9.5	6.5	6.1	9	CF
☞ RSI-003-S4-4W	3	4.8	2	3.4	9.5	6.5	8.5	9	CF
☞ RSI-005-S4-4W	5	7.6	3	4.8	12	8.7	6.5	14	CF
☞ RSI-007-S4-4W	7.5	11	5	7.6	12	8.7	6.5	14	CF
☞ RSI-010-S4-4W	10	14	7.5	11	12	8.7	6.5	14	CF
☞ RSI-015-S4-4W	15	21	10	14	17.4	10.8	7.9	30	CF
☞ RSI-020-S4-4W	20	27	15	21	17.4	10.8	7.9	30	CF
☞ RSI-025-S4-4W	25	34	20	27	17.4	10.8	7.9	30	CF
☞ RSI-030-S4-4W	30	40	25	34	17.4	10.8	7.9	30	CF
☞ RSI-040-S4-4W	40	52	30	40	20.2	11.3	11.7	50	CF
☞ RSI-050-S4-4W	50	65	40	52	20.2	11.3	11.7	50	CF
☞ RSI-060-S4-4W	60	77	50	65	29.4	12.9	13.8	110	CF
☞ RSI-075-S4-4W	75	96	60	77	29.4	12.9	13.8	110	CF
☞ RSI-100-S4-4W	100	124	75	96	29.4	12.9	13.8	110	CF
☞ RSI-125-S4-4D*	125	156	100	124	50.5	16.5	18	354	CF
☞ RSI-150-S4-4D*	150	180	125	156	50.5	16.5	18	354	CF
☞ RSI-200-S4-4D*	200	240	150	180	50.5	16.5	18	354	CF

☞ Web stocked

\* Units ending in "D" are NEMA 12 and not washdown



# Washdown Sensorless Vector Drives 600V

## S4 SERIES

NEMA 4X / NEMA 12

MODEL NUMBER	STANDARD DUTY		HEAVY DUTY		DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	HP	AMPS	HP	AMPS	H	W	D		
RSI-001-S4-6W	1	1.7	0.5	0.9	12	8.7	6.5	14	CF
RSI-002-S4-6W	2	2.7	1	1.7	12	8.7	6.5	14	CF
RSI-003-S4-6W	3	3.9	2	2.7	12	8.7	6.5	14	CF
RSI-005-S4-6W	5	6.1	3	3.9	12	8.7	6.5	14	CF
RSI-007-S4-6W	7.5	9	5	6.1	12	8.7	6.5	14	CF
RSI-010-S4-6W	10	11	7.5	9	12	8.7	6.5	14	CF
RSI-015-S4-6W	15	17	10	11	17.4	10.8	7.9	30	CF
RSI-020-S4-6W	20	22	15	17	17.4	10.8	7.9	30	CF
RSI-025-S4-6W	25	27	20	22	17.4	10.8	7.9	30	CF
RSI-030-S4-6W	30	32	25	27	17.4	10.8	7.9	30	CF
RSI-040-S4-6W	40	41	30	32	20.2	11.3	11.7	50	CF
RSI-050-S4-6W	50	52	40	41	20.2	11.3	11.7	50	CF
RSI-060-S4-6W	60	68	50	52	29.4	12.9	13.8	110	CF
RSI-075-S4-6W	75	82	60	62	29.4	12.9	13.8	110	CF
RSI-100-S4-6W	100	107	75	77	29.4	12.9	13.8	110	CF
RSI-125-S4-6D*	125	125	100	99	50.5	16.5	18	354	CF
RSI-150-S4-6D*	150	144	125	125	50.5	16.5	18	354	CF
RSI-200-S4-6D*	200	192	150	140	50.5	16.5	18	354	CF

\* Units ending in "D" are NEMA 12 and not washdown





# Input Line Reactors 230V / 460V

NEMA 1 ENCLOSED

3% IMPEDANCE @ 460V - 5% IMPEDANCE @ 230V									
MODEL NUMBER	AMPS	230 VOLT		460 VOLT		DIMENSIONS (IN)			LIST PRICE
		VOLT	HP	VOLT	HP	H	W	D	
☞ REA-KDRA1L-C1	3.4	230	-	480	2	6.5	8	6	CF
☞ REA-KDRA2L-C1	4.8	230	1	480	3	6.5	8	6	CF
☞ REA-KDRA3L-C1	7.6	230	2	480	5	6.5	8	6	CF
☞ REA-KDRA4L-C1	11	230	3	480	7.5	6.5	8	6	CF
☞ REA-KDRA5L-C1	14	230	-	480	10	6.5	8	6	CF
☞ REA-KDRB2L-C1	21	230	5	480	15	6.5	8	6	CF
☞ REA-KDRB1L-C1	27	230	7.5	480	20	6.5	8	6	CF
☞ REA-KDRD1L-C2	34	230	10	480	25	7.5	10	7	CF
☞ REA-KDRD2L-C2	40	230	10	480	30	7.5	10	7	CF
☞ REA-KDRC1L-C2	52	230	15	480	40	7.5	10	7	CF
☞ REA-KDRF2L-C3	65	230	20	480	50	9	12	8	CF
☞ REA-KDRF4L-C3	77	230	25	480	60	9	12	8	CF
☞ REA-KDRF3L-C4	96	230	30	480	75	9	12	8	CF
☞ REA-KDRH3L-C4	124	230	40	480	100	9	12	8	CF
☞ REA-KDRH2L-C4	156	230	50	480	125	16	15	13	CF
☞ REA-KDRH1L-C4	180	-	-	480	150	16	15	13	CF
☞ REA-KDRG3L-C4	240	-	-	480	200	16	15	13	CF
☞ REA-KDRG1L-C4	302	-	-	480	250	16	15	13	CF
☞ REA-KDRG2L-C4	361	-	-	480	300	16	15	13	CF
☞ REA-KDRJ2L-C5	414	-	-	480	350	19	20	16	CF
☞ REA-KDRJ1L-C5	477	-	-	480	400	19	20	16	CF

\* Line reactors reduce harmonics and protect the variable frequency drive from input power quality problems. They are also recommended on applications where the transformer impedance exceeds 10 times the KVA rating of the drive.

\* For installed line reactors - see pages 2-50 thru 2-52.

☞ Web stocked

# Input Line Reactors 460V

NEMA 1 ENCLOSED

## 5% IMPEDANCE @ 460V

MODEL NUMBER	AMPS	460 VOLT		DIMENSIONS (IN)			LIST PRICE
		VOLT	HP	H	W	D	
REA-KDRA1H-C1	3.4	460	2	6.5	8	6	CF
REA-KDRA2H-C1	4.8	460	3	6.5	8	6	CF
REA-KDRA3H-C1	7.6	460	5	6.5	8	6	CF
REA-KDRA4H-C1	11	460	7.5	6.5	8	6	CF
REA-KDRA5H-C1	14	460	10	6.5	8	6	CF
REA-KDRB2H-C1	21	460	15	6.5	8	6	CF
REA-KDRC3H-C2	27	460	20	7.5	10	7	CF
REA-KDRC1H-C2	34	460	25	7.5	10	7	CF
REA-KDRE2H-C2	40	460	30	7.5	10	7	CF
REA-KDRF4H-C3	52	460	40	9	12	8	CF
REA-KDRF1H-C3	65	460	50	9	12	8	CF
REA-KDRF2H-C3	77	460	60	9	12	8	CF
REA-KDRH2H-C4	96	460	75	16	15	13	CF
REA-KDRI2H-C4	124	460	100	16	15	13	CF
REA-KDRG3H-C4	156	460	125	16	15	13	CF
REA-KDRG1H-C4	180	460	150	16	15	13	CF
REA-KDRJ1H-C5	240	460	200	19	20	16	CF
REA-KDRL1H-C5	302	460	250	19	20	16	CF
REA-KDRL2H-C5	361	460	300	19	20	16	CF
REA-KDRL3H-C5	414	460	350	19	20	16	CF
REA-KDRL4H-C5	477	460	400	19	20	16	CF
REA-KDRL6H-C5	590	460	500	19	20	16	CF
REA-KDRS1H-C5	720	460	600	19	20	16	CF
REA-KDRS2H-C5	840	460	700	19	20	16	CF

\* Line reactors reduce harmonics and protect the variable frequency drive from input power quality problems. They are also recommended on applications where the transformer impedance exceeds 10 times the KVA rating of the drive.

\* For installed line reactors - see pages 2-50 thru 2-52.

# Long Lead Filters 460V

NEMA 1 ENCLOSED

460 VOLT LONG LEAD FILTERS						
CATALOG NUMBER	HP	VOLT	DIMENSIONS (IN)			LIST PRICE
			H	W	D	
FLTR-KLCUL-2-A1	1	480	12.3	12.5	6.8	CF
FLTR-KLCUL-4-A1	2	480	12.3	12.5	6.8	CF
FLTR-KLCUL-6-A1	3	480	12.3	12.5	6.8	CF
FLTR-KLCUL-8-A1	5	480	12.3	12.5	6.8	CF
FLTR-KLCUL-12-A1	7.5	480	12.3	12.5	6.8	CF
FLTR-KLCUL-16-A1	10	480	12.3	12.5	6.8	CF
FLTR-KLCUL-21-A1	15	480	12.3	12.5	6.8	CF
FLTR-KLCUL-27-A1	20	480	12.3	12.5	6.8	CF
FLTR-KLCUL35-A1	25	480	12.3	12.5	6.8	CF
FLTR-KLCUL-45-A1	30	480	12.3	12.5	6.8	CF
FLTR-KLCUL-55-A1	40	480	12.3	12.5	6.8	CF
FLTR-KLCUL-80-A2	50 - 60	480	19.1	15.5	15.5	CF
FLTR-KLCUL-110-A2	75	480	19.1	15.5	15.5	CF
FLTR-KLCUL-130-A2	100	480	19.1	15.5	15.5	CF
FLTR-KLCUL-160-A2	125	480	19.1	15.5	15.5	CF
FLTR-KLCUL-200-A3	150	480	22.1	20.5	24.4	CF
FLTR-KLCUL-250-A3	200	480	22.1	20.5	24.4	CF
FLTR-KLCUL-300-A3	250	480	22.1	20.5	24.4	CF
FLTR-KLCUL-360-A3	300	480	22.1	20.5	24.4	CF
FLTR-KLCUL-420-A3	350	480	22.1	20.5	24.4	CF
FLTR-KLCUL-480-A3	400	480	22.1	20.5	24.4	CF

- Long lead filters should be considered on applications where the cable distance between the motor and the variable frequency drive exceeds 150 feet. Long lead filters protect the motor from high DV/DT.  
For installed long lead filters - see page 2-53.



# Dynamic Braking Resistors 230V

## SCREENED ENCLOSURE

### 5% DUTY - 230 VOLT DYNAMIC BRAKING RESISTORS

MODEL NUMBER	HP	VOLT	WATT	OHMS	DIMENSIONS (IN)			LIST PRICE
					H	W	D	
RES-001-230-DBR-05	1	230	400	190	5	12	5	CF
RES-002-230-DBR-05	2	230	400	95	5	12	5	CF
RES-003-230-DBR-05	3	230	400	63	5	12	5	CF
RES-005-230-DBR-05	5	230	400	38	5	12	5	CF
RES-007-230-DBR-05	7.5	230	400	30	5	12	5	CF
RES-010-230-DBR-05	10	230	400	30	5	12	5	CF
RES-015-230-DBR-05	15	230	800	13	5	12	7	CF
RES-020-230-DBR-05	20	230	800	13	5	12	7	CF
RES-025-230-DBR-05	25	230	1,200	7.5	5	12	10	CF
RES-030-230-DBR-05	30	230	1,200	6.3	5	12	10	CF

- Braking resistors are used to eliminate nuisance over voltage trips and to help decrease stopping times. It is required to include a braking transistor to use these brake resistors. The braking resistors are standard on the S4 series drive. Braking transistors for SG series drives can be found on page 2-30.
- All units include NC temperature switch.



# Dynamic Braking Resistors 460V

SCREENED ENCLOSURE

## 5% DUTY - 460 VOLT DYNAMIC BRAKING RESISTORS

MODEL NUMBER	HP	VOLT	WATT	OHMS	DIMENSIONS (IN)			LIST PRICE
					H	W	D	
RES-001-460-DBR-05	1	460	400	750	5	12	5	CF
RES-002-460-DBR-05	2	460	400	375	5	12	5	CF
RES-003-460-DBR-05	3	460	400	250	5	12	5	CF
RES-005-460-DBR-05	5	460	400	150	5	12	5	CF
RES-007-460-DBR-05	7.5	460	400	100	5	12	5	CF
RES-010-460-DBR-05	10	460	400	75	5	12	5	CF
RES-015-460-DBR-05	15	460	800	50	5	12	7	CF
RES-020-460-DBR-05	20	460	800	38	5	12	7	CF
RES-025-460-DBR-05	25	460	1,200	30	5	12	10	CF
RES-030-460-DBR-05	30	460	1,200	25	5	12	10	CF
RES-040-460-DBR-05	40	460	1,200	25	5	12	10	CF
RES-050-460-DBR-05	50	460	2,000	15	5	12	16	CF
RES-060-460-DBR-05	60	460	2,400	12.6	5	19	10	CF
RES-075-460-DBR-05	75	460	2,822	10	5	27	10	CF
RES-100-460-DBR-05	100	460	3,763	7.5	5	27	10	CF
RES-125-460-DBR-05	125	460	4,704	6	5	27	13	CF
RES-150-460-DBR-05	150	460	4,704	6	5	27	13	CF

- Braking resistors are used to eliminate nuisance over voltage trips and to help decrease stopping times. It is required to include a braking transistor to use these brake resistors. The braking transistors are standard on the S4 series drive. Braking transistors for SG series drives can be found on page 2-30.

- All units include NC temperature switch.



# Dynamic Braking Resistors 230V

## SCREENED ENCLOSURE

### 20% DUTY - 230 VOLT DYNAMIC BRAKING RESISTORS

MODEL NUMBER	HP	VOLT	WATT	OHMS	DIMENSIONS (IN)			LIST PRICE
					H	W	D	
RES-001-230-DBR-20	1	230	400	190	5	12	5	CF
RES-002-230-DBR-20	2	230	400	95	5	12	5	CF
RES-003-230-DBR-20	3	230	400	63	5	12	5	CF
RES-005-230-DBR-20	5	230	800	38	5	12	7	CF
RES-007-230-DBR-20	7.5	230	800	30	5	12	7	CF
RES-010-230-DBR-20	10	230	800	30	5	12	7	CF
RES-015-230-DBR-20	15	230	1,600	13	5	12	13	CF
RES-020-230-DBR-20	20	230	2,000	13	5	12	16	CF
RES-025-230-DBR-20	25	230	2,539	7.5	5	19	10	CF
RES-030-230-DBR-20	30	230	3,023	6.3	5	27	10	CF

- Braking resistors are used to eliminate nuisance over voltage trips and to help decrease stopping times. It is required to include a braking transistor to use these brake resistors. The braking transistors are standard on the S4 series drive. Braking transistors for SG series drives can be found on page 2-30.
- All units include NC temperature switch.



# Dynamic Braking Resistors 460V

## SCREENED ENCLOSURE

### 20% DUTY - 460 VOLT DYNAMIC BRAKING RESISTORS

MODEL NUMBER	HP	VOLT	WATT	OHMS	DIMENSIONS (IN)			LIST PRICE
					H	W	D	
RES-001-460-DBR-20	1	460	400	750	5	12	5	CF
RES-002-460-DBR-20	2	460	400	375	5	12	5	CF
RES-003-460-DBR-20	3	460	400	250	5	12	5	CF
RES-005-460-DBR-20	5	460	800	150	5	12	7	CF
RES-007-460-DBR-20	7.5	460	800	100	5	12	7	CF
RES-010-460-DBR-20	10	460	1,200	75	5	12	10	CF
RES-015-460-DBR-20	15	460	1,600	50	5	12	13	CF
RES-020-460-DBR-20	20	460	2,000	38	5	12	16	CF
RES-025-460-DBR-20	25	460	2,800	30	5	19	13	CF
RES-030-460-DBR-20	30	460	3,200	25	5	19	13	CF
RES-040-460-DBR-20	40	460	3,200	25	5	9	13	CF
RES-050-460-DBR-20	50	460	5,079	15	5	27	10	CF
RES-060-460-DBR-20	60	460	6,046	12.6	5	27	13	CF
RES-075-460-DBR-20	75	460	7,618	10	5	27	13	CF
RES-100-460-DBR-20	100	460	10,158	7.5	10	28	10	CF
RES-125-460-DBR-20	125	460	12,697	6	10	28	13	CF
RES-150-460-DBR-20	150	460	12,697	6	10	28	13	CF

- Braking resistors are used to eliminate nuisance over voltage trips and to help decrease stopping times. It is required to include a braking transistor to use these brake resistors. The braking transistors are standard on the S4 series drive. Braking transistors for SG series drives can be found on page 2-30.
- All units include NC temperature switch.



# S4 Series Options

## S4 SERIES

CATALOG NUMBER	STANDARD OPTIONS	LIST PRICE
VFD-RSI-S4-REMOTEKEYPAD	Extra standard keypad for S4 series drive	CF
VFD-2M-RE-CABLE-S4	2 meter keypad cable for S4 drive	CF
BRKT-100646-00	Fins out mounting kit - 40 - 50 HP @ 460V	CF
BRKT-100645-00	Fins out mounting kit - 60 - 100 HP @ 460V	CF

# SG Series Options

## SG SERIES

CATALOG NUMBER	STANDARD OPTIONS	LIST PRICE
VFD-RSI-DBU-020-2	230V Dynamic braking transistor for 1 - 20 HP VFD	CF
VFD-RSI-DBU-030-2	230V Dynamic braking transistor for 25 - 30 HP VFD	CF
VFD-RSI-DBU-050-2	230V Dynamic braking transistor for 40 - 50 HP VFD	CF
VFD-RSI-DBU-020-4	460V Dynamic braking transistor for 1 - 20 HP VFD	CF
VFD-RSI-DBU-030-4	460V Dynamic braking transistor for 25 - 30 HP VFD	CF
VFD-RSI-DBU-050-4	460V Dynamic braking transistor for 40 - 50 HP VFD	CF
VFD-RSI-DBU-075-4	460V Dynamic braking transistor for 60 - 75 HP VFD	CF
VFD-RSI-DBU-100-4	460V Dynamic braking transistor for 100 HP VFD	CF
VFD-RSI-SG-4-20-MA	4-20MA Output card for SG drive (adds [2] 4-20MA outputs)	CF
VFD-2M-RE-CABLE-SG	2 Meter keypad cable for SG	CF
VFD-3M-RE-CABLE-SG	3 Meter keypad cable for SG	CF
VFD-SG-COM-PROFIBUS	Communication module for Profibus	CF
VFD-SG-COM-ETHERNET	Communication module for Ethernet	CF
VFD-SG-COM-DEVICENET	Communication module for DeviceNet	CF
VFD-SG-COM-LONWORKS	Communication module for LONWorks	CF

# Engineered Packages

## PRODUCT OVERVIEW

Benshaw is the recognized industry leader in quick shipment of engineered drives with a state-of-the-art factory, dedicated engineering teams, and a complete inventory of the components necessary to build any engineered solution you require. Select the enclosure, pilot devices control strategy, and magnetics required to meet your most demanding application.

### Control Modifications - Whatever You Specify

- ◆ Over 250 modifications and accessories are available, including: pilot devices, PLC's, control power transformers, switches, meters, relays, space heaters, and protective devices.

### Combination Drive Packages to Meet Your Requirements

- ◆ 15 to 2000 amp circuit breakers
- ◆ 40 to 2000 amp non-fused disconnects
- ◆ 30 to 800 amp fusible disconnect
- ◆ Flange or rotary handle mechanism

### Bypass Packages

- ◆ Two contactor
- ◆ Three contactor
- ◆ Reduced voltage solid state starters

### Enclosures to Match Your Environment

- ◆ Standard designs - NEMA 1, 12, 3R
- ◆ Custom enclosures
- ◆ Special enclosures - 4, 4X, air conditioned
- ◆ Motor control centers

### Filters for Your Unique Application

- ◆ Line reactors 3% and 5%
- ◆ Long lead filters
- ◆ Active and passive harmonic filters
- ◆ 18 pulse systems



For additional options - contact factory

# For Any Application

ENGINEERED SOLUTIONS FOR YOUR MOST DEMANDING APPLICATIONS

*Call for price and availability*

## Typical Solutions



*18 Pulse Systems*



*NEMA 3R Packages*



*Bypass Systems*

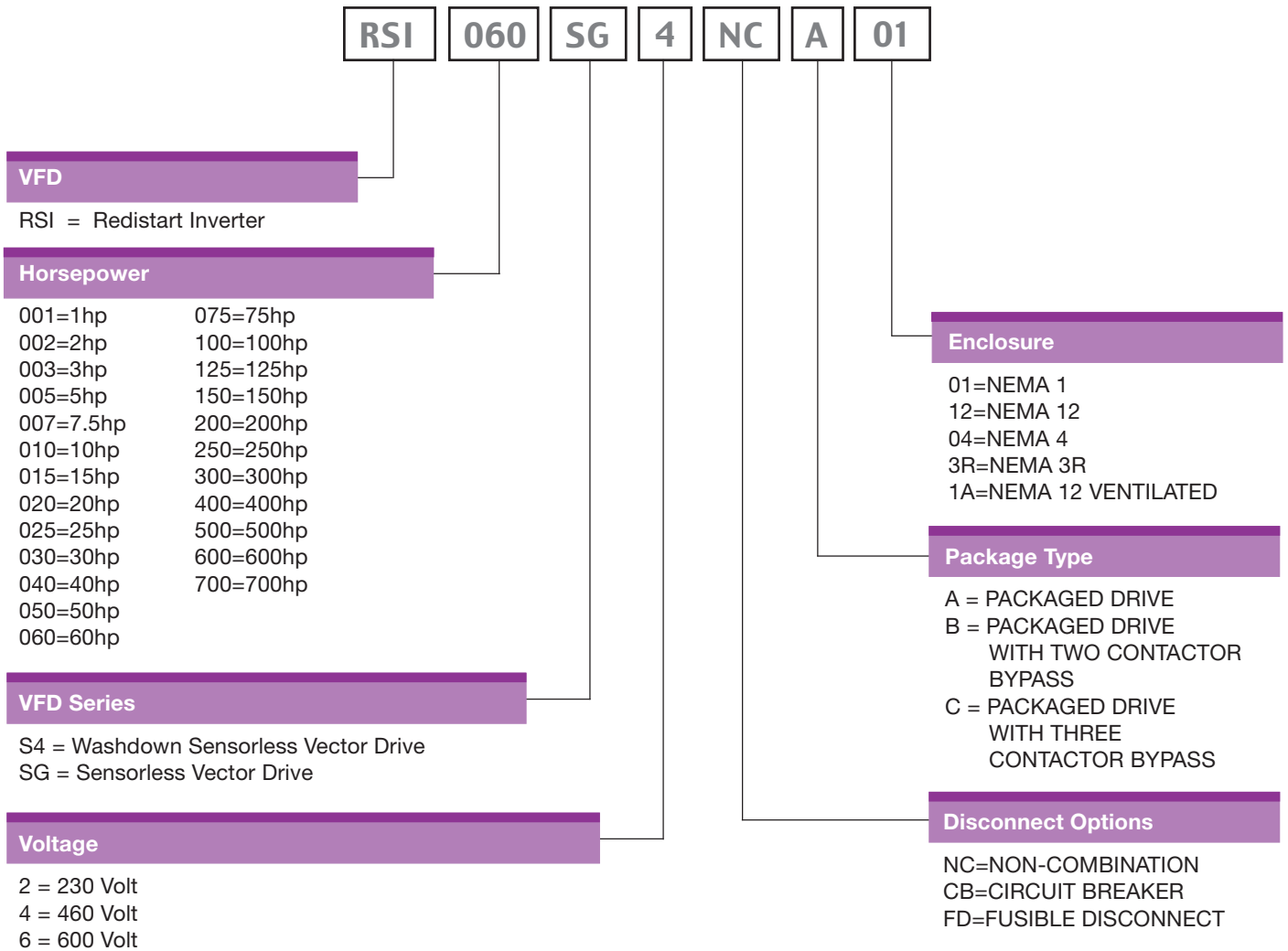


*Custom Solutions*



# Engineered VFD Part Number Assembler

## VARIABLE FREQUENCY DRIVES



# Enclosed Drives - Non-Combination Sensorless Vector Drives 230V

## SG SERIES

7.5 - 40 HP / NEMA 1 / NEMA 12V

MODEL	VARIABLE TORQUE		STANDARD DUTY		HEAVY DUTY		LIST PRICE NEMA 12V		
	HP	AMPS	HP	AMPS	HP	AMPS	A-1A	B-1A	C-1A
RSI007SG2-NC-X-XX	7.5	22	7.5	22	5	15.2	CF	CF	CF
RSI010SG2-NC-X-XX	10	29	10	29	7.5	22	CF	CF	CF
RSI015SG2-NC-X-XX	15	42	15	42	10	28	CF	CF	CF
RSI020SG2-NC-X-XX	20	54	20	54	15	42	CF	CF	CF
RSI025SG2-NC-X-XX	25	68	25	68	20	54	CF	CF	CF
RSI030SG2-NC-X-XX	30	80	30	80	25	68	CF	CF	CF
RSI040SG2-NC-X-XX	40	104	40	104	30	80	CF	CF	CF

- A-1A = VFD in fan and filtered enclosure
- B-1A = VFD in fan and filtered enclosure with two contactor bypass circuit
- C-1A = VFD in fan and filtered enclosure with three contactor bypass circuit
- For dimensions refer to page 2-46.
- For options refer to pages 2-48 thru 2-54.

VARIABLE TORQUE = 110% current for 1 minute

STANDARD DUTY = 120% current for 1 minute

HEAVY DUTY = 150% current for 1 minute

# Enclosed Drives - Non-Combination Sensorless Vector Drives 460V

## SG SERIES

7.5 - 700 HP / NEMA 1 / NEMA 12V

MODEL	VARIABLE TORQUE		STANDARD DUTY		HEAVY DUTY		LIST PRICE NEMA 12V		
	HP	AMPS	HP	AMPS	HP	AMPS	A-1A	B-1A	C-1A
RSI007SG4-NC-X-XX	7.5	11	7.5	11	5	8	CF	CF	CF
RSI010SG4-NC-X-XX	10	14	10	14	7.5	11	CF	CF	CF
RSI015SG4-NC-X-XX	15	21	15	21	10	14	CF	CF	CF
RSI020SG4-NC-X-XX	20	27	20	27	15	21	CF	CF	CF
RSI025SG4-NC-X-XX	25	34	25	34	20	27	CF	CF	CF
RSI030SG4-NC-X-XX	30	40	30	40	25	34	CF	CF	CF
RSI040SG4-NC-X-XX	40	52	40	52	30	40	CF	CF	CF
RSI050SG4-NC-X-XX	50	65	50	65	40	52	CF	CF	CF
RSI060SG4-NC-X-XX	60	77	60	77	50	65	CF	CF	CF
RSI075SG4-NC-X-XX	75	96	75	96	60	77	CF	CF	CF
RSI100SG4-NC-X-XX	100	125	100	125	75	96	CF	CF	CF
RSI125SG4-NC-X-XX	125	156	125	156	100	125	CF	CF	CF
RSI150SG4-NC-X-XX	150	180	150	180	125	156	CF	CF	CF
RSI200SG4-NC-X-XX	200	240	200	240	150	180	CF	CF	CF
RSI250SG4-NC-X-XX	250	302	250	302	200	240	CF	CF	CF
RSI350SG4-NC-X-XX	350	414	300	361	250	302	CF	CF	CF
RSI400SG4-NC-X-XX	400	477	400	477	300	361	CF	CF	CF
RSI500SG4-NC-X-XX	500	590	450	515	350	414	CF	CF	CF
RSI600SG4-NC-X-XX	600	731	500	590	400	477	CF	CF	CF
RSI700SG4-NC-X-XX	700	877	600	804	500	590	CF	CF	CF

- A-1A = VFD in fan and filtered enclosure
- B-1A = VFD in fan and filtered enclosure with two contactor bypass circuit
- C-1A = VFD in fan and filtered enclosure with three contactor bypass circuit
- For dimensions refer to page 2-46.
- For options refer to pages 2-48 thru 2-54.

VARIABLE TORQUE = 110% current for 1 minute

STANDARD DUTY = 120% current for 1 minute

HEAVY DUTY = 150% current for 1 minute

# Enclosed Drives - Combination Circuit Breaker Sensorless Vector Drives 230V

## SG SERIES

7.5 - 40 HP / NEMA 1 / NEMA 12V

MODEL	VARIABLE TORQUE		STANDARD DUTY		HEAVY DUTY		LIST PRICE NEMA 12V		
	HP	AMPS	HP	AMPS	HP	AMPS	A-1A	B-1A	C-1A
RSI007SG2-CB-X-XX	7.5	22	7.5	22	5	15.2	CF	CF	CF
RSI010SG2-CB-X-XX	10	28	10	28	7.5	22	CF	CF	CF
RSI015SG2-CB-X-XX	15	42	15	42	10	28	CF	CF	CF
RSI020SG2-CB-X-XX	20	54	20	54	15	42	CF	CF	CF
RSI025SG2-CB-X-XX	25	68	25	68	20	54	CF	CF	CF
RSI030SG2-CB-X-XX	30	80	30	80	25	68	CF	CF	CF
RSI040SG2-CB-X-XX	40	104	40	104	30	80	CF	CF	CF

- A-1A = VFD in fan and filtered enclosure
- B-1A = VFD in fan and filtered enclosure with two contactor bypass circuit
- C-1A = VFD in fan and filtered enclosure with three contactor bypass circuit
- For dimensions refer to page 2-46.
- For options refer to pages 2-48 thru 2-54.

VARIABLE TORQUE = 110% current for 1 minute

STANDARD DUTY = 120% current for 1 minute

HEAVY DUTY = 150% current for 1 minute

# Enclosed Drives - Combination Circuit Breaker Sensorless Vector Drives 460V

## SG SERIES

7.5 - 700 HP / NEMA 1 / NEMA 12V

MODEL	VARIABLE TORQUE		STANDARD DUTY		HEAVY DUTY		LIST PRICE NEMA 12V		
	HP	AMPS	HP	AMPS	HP	AMPS	A-1A	B-1A	C-1A
RSI007SG4-CB-X-XX	7.5	11	7.5	11	5	8	CF	CF	CF
RSI010SG4-CB-X-XX	10	14	10	14	7.5	11	CF	CF	CF
RSI015SG4-CB-X-XX	15	21	15	21	10	14	CF	CF	CF
RSI020SG4-CB-X-XX	20	27	20	27	15	21	CF	CF	CF
RSI025SG4-CB-X-XX	25	34	25	34	20	27	CF	CF	CF
RSI030SG4-CB-X-XX	30	40	30	40	25	34	CF	CF	CF
RSI040SG4-CB-X-XX	40	52	40	52	30	40	CF	CF	CF
RSI050SG4-CB-X-XX	50	65	50	65	40	52	CF	CF	CF
RSI060SG4-CB-X-XX	60	77	60	77	50	65	CF	CF	CF
RSI075SG4-CB-X-XX	75	96	75	96	60	77	CF	CF	CF
RSI100SG4-CB-X-XX	100	125	100	125	75	96	CF	CF	CF
RSI125SG4-CB-X-XX	125	156	125	156	100	125	CF	CF	CF
RSI150SG4-CB-X-XX	150	180	150	180	125	156	CF	CF	CF
RSI200SG4-CB-X-XX	200	240	200	240	150	180	CF	CF	CF
RSI250SG4-CB-X-XX	250	302	250	302	200	240	CF	CF	CF
RSI350SG4-CB-X-XX	350	414	300	361	250	302	CF	CF	CF
RSI400SG4-CB-X-XX	400	477	400	477	300	361	CF	CF	CF
RSI500SG4-CB-X-XX	500	590	450	515	350	414	CF	CF	CF
RSI600SG4-CB-X-XX	600	731	500	590	400	477	CF	CF	CF
RSI700SG4-CB-X-XX	700	877	600	804	500	590	CF	CF	CF

- A-1A = VFD in fan and filtered enclosure
- B-1A = VFD in fan and filtered enclosure with two contactor bypass circuit
- C-1A = VFD in fan and filtered enclosure with three contactor bypass circuit
- For dimensions refer to page 2-46.

VARIABLE TORQUE = 110% current for 1 minute

STANDARD DUTY = 120% current for 1 minute

HEAVY DUTY = 150% current for 1 minute

# Enclosed Drives - Combination Circuit Breaker Sensorless Vector Drives 230V

## SG SERIES

7.5 - 40 HP / NEMA 3R

MODEL	VARIABLE TORQUE		STANDARD DUTY		HEAVY DUTY		LIST PRICE NEMA 3R		
	HP	AMPS	HP	AMPS	HP	AMPS	A-3R	B-3R	C-3R
RSI007SG2-CB-X-3R	7.5	22	7.5	22	5	15.2	CF	CF	CF
RSI010SG2-CB-X-3R	10	28	10	28	7.5	22	CF	CF	CF
RSI015SG2-CB-X-3R	15	42	15	42	10	28	CF	CF	CF
RSI020SG2-CB-X-3R	20	54	20	54	15	42	CF	CF	CF
RSI025SG2-CB-X-3R	25	68	25	68	20	54	CF	CF	CF
RSI030SG2-CB-X-3R	30	80	30	80	25	68	CF	CF	CF
RSI040SG2-CB-X-3R	40	104	40	104	30	80	CF	CF	CF

- Units should be mounted out of direct sunlight
- For dimensions consult factory
- A-3R = VFD in fan and filtered enclosure
- B-3R = VFD in fan and filtered enclosure with two contactor bypass circuit
- C-3R = VFD in fan and filtered enclosure with three contactor bypass circuit

VARIABLE TORQUE = 110% current for 1 minute

STANDARD DUTY = 120% current for 1 minute

HEAVY DUTY = 150% current for 1 minute



# Enclosed Drives - Combination Circuit Breaker Sensorless Vector Drives 460V

## SG SERIES

7.5 - 700 HP / NEMA 3R

MODEL	VARIABLE TORQUE		STANDARD DUTY		HEAVY DUTY		LIST PRICE NEMA 3R		
	HP	AMPS	HP	AMPS	HP	AMPS	A-3R	B-3R	C-3R
RSI007SG4-CB-X-3R	7.5	11	7.5	11	5	8	CF	CF	CF
RSI010SG4-CB-X-3R	10	14	10	14	7.5	11	CF	CF	CF
RSI015SG4-CB-X-3R	15	21	15	21	10	14	CF	CF	CF
RSI020SG4-CB-X-3R	20	27	20	27	15	21	CF	CF	CF
RSI025SG4-CB-X-3R	25	34	25	34	20	27	CF	CF	CF
RSI030SG4-CB-X-3R	30	40	30	40	25	34	CF	CF	CF
RSI040SG4-CB-X-3R	40	52	40	52	30	40	CF	CF	CF
RSI050SG4-CB-X-3R	50	65	50	65	40	52	CF	CF	CF
RSI060SG4-CB-X-3R	60	77	60	77	50	65	CF	CF	CF
RSI075SG4-CB-X-3R	75	96	75	96	60	77	CF	CF	CF
RSI100SG4-CB-X-3R	100	125	100	125	75	96	CF	CF	CF
RSI125SG4-CB-X-3R	125	156	125	156	100	125	CF	CF	CF
RSI150SG4-CB-X-3R	150	180	150	180	125	156	CF	CF	CF
RSI200SG4-CB-X-3R*	200	240	200	240	150	180	CF	CF	CF
RSI250SG4-CB-X-3R*	250	302	250	302	200	240	CF	CF	CF
RSI350SG4-CB-X-3R*	350	414	300	361	250	302	CF	CF	CF
RSI400SG4-CB-X-3R*	400	477	400	477	300	361	CF	CF	CF
RSI500SG4-CB-X-3R*	500	590	450	515	350	414	CF	CF	CF
RSI600SG4-CB-X-3R*	600	731	500	590	400	477	CF	CF	CF
RSI700SG4-CB-X-3R*	700	877	600	804	500	590	CF	CF	CF

- \* Includes A/C
- Units should be mounted out of direct sunlight
- For dimensions consult factory
- A-3R = VFD in fan and filtered enclosure
- B-3R = VFD in fan and filtered enclosure with two contactor bypass circuit
- C-3R = VFD in fan and filtered enclosure with three contactor bypass circuit

VARIABLE TORQUE = 110% current for 1 minute

STANDARD DUTY = 120% current for 1 minute

HEAVY DUTY = 150% current for 1 minute



# Enclosed Drives - Non-Combination Severe Duty Sensorless Vector Drives 230V

## S4 SERIES

1 - 20 HP / NEMA 12 / NEMA 3R

MODEL NUMBER	STANDARD DUTY		HEAVY DUTY		LIST PRICE					
	HP	AMPS	HP	AMPS	A-12	B-12	C-12	A-3R	B-3R	C-3R
					NEMA12	NEMA12	NEMA12	NEMA 3R	NEMA 3R	NEMA 3R
RSI001S42-NC-X-XX	1	7.6	-	-	CF	CF	CF	CF	CF	CF
RSI002S42-NC-X-XX	2	11	1	7.6	CF	CF	CF	CF	CF	CF
RSI003S42-NC-X-XX	3	14	2	11	CF	CF	CF	CF	CF	CF
RSI005S42-NC-X-XX	5	21	3	14	CF	CF	CF	CF	CF	CF
RSI007S42-NC-X-XX	7.5	27	5	21	CF	CF	CF	CF	CF	CF
RSI010S42-NC-X-XX	10	34	7.5	27	CF	CF	CF	CF	CF	CF
RSI020S42-NC-X-XX	15	40	10	34	CF	CF	CF	CF	CF	CF
RSI020S42-NC-X-XX	20	52	15	40	CF	CF	CF	CF	CF	CF

- A-12 = VFD in NEMA 1 enclosure
- B-12 = VFD in NEMA 1 enclosure with two contactor bypass circuit
- C-12 = VFD in NEMA 1 enclosure with three contactor bypass circuit
- A-3R = VFD in fan and filtered enclosure
- B-3R = VFD in fan and filtered enclosure with two contactor bypass circuit
- C-3R = VFD in fan and filtered enclosure with three contactor bypass circuit
- For dimensions refer to page 2-47.
- For options refer to pages 2-48 thru 2-54.



# Enclosed Drives - Combination Circuit Breaker Severe Duty Sensorless Vector Drives 230V

## S4 SERIES

1 - 20 HP / NEMA 12 / NEMA 3R

MODEL NUMBER	STANDARD DUTY		HEAVY DUTY		LIST PRICE					
	HP	AMPS	HP	AMPS	A-12	B-12	C-12	A-3R	B-3R	C-3R
					NEMA12	NEMA12	NEMA12	NEMA 3R	NEMA 3R	NEMA 3R
RSI001S42-CB-X-XX	1	7.6	-	-	CF	CF	CF	CF	CF	CF
RSI002S42-CB-X-XX	2	11	1	7.6	CF	CF	CF	CF	CF	CF
RSI003S42-CB-X-XX	3	14	2	11	CF	CF	CF	CF	CF	CF
RSI005S42-CB-X-XX	5	21	3	14	CF	CF	CF	CF	CF	CF
RSI007S42-CB-X-XX	7.5	27	5	21	CF	CF	CF	CF	CF	CF
RSI010S42-CB-X-XX	10	34	7.5	27	CF	CF	CF	CF	CF	CF
RSI015S42-CB-X-XX	15	40	10	34	CF	CF	CF	CF	CF	CF
RSI020S42-CB-X-XX	20	52	15	40	CF	CF	CF	CF	CF	CF

- A-12 = VFD in NEMA 12 enclosure
- B-12 = VFD in NEMA 12 enclosure with two contactor bypass circuit
- C-12 = VFD in NEMA 12 enclosure with three contactor bypass circuit
- A-3R = VFD in NEMA 3R enclosure
- B-3R = VFD in NEMA 3R enclosure with two contactor bypass circuit
- C-3R = VFD in NEMA 3R enclosure with three contactor bypass circuit
- For dimensions refer to page 2-47.
- For options refer to pages 2-48 thru 2-54.



# Enclosed Drives - Non-Combination Severe Duty Sensorless Vector Drives 460V

## S4 SERIES

1 - 200 HP / NEMA 12 / NEMA 3R

MODEL NUMBER	STANDARD DUTY		HEAVY DUTY		LIST PRICE					
	HP	AMPS	HP	AMPS	A-12	B-12	C-12	A-3R	B-3R	C-3R
					NEMA12	NEMA12	NEMA12	NEMA 3R	NEMA 3R	NEMA 3R
RSI001S44-NC-X-XX	1	2.1	-	-	CF	CF	CF	CF	CF	CF
RSI002S44-NC-X-XX	2	3.4	1	2.1	CF	CF	CF	CF	CF	CF
RSI003S44-NC-X-XX	3	4.8	2	3.4	CF	CF	CF	CF	CF	CF
RSI005S44-NC-X-XX	5	7.6	3	4.8	CF	CF	CF	CF	CF	CF
RSI007S44-NC-X-XX	7.5	11	5	7.6	CF	CF	CF	CF	CF	CF
RSI010S44-NC-X-XX	10	14	7.5	11	CF	CF	CF	CF	CF	CF
RSI015S44-NC-X-XX	15	21	10	14	CF	CF	CF	CF	CF	CF
RSI020S44-NC-X-XX	20	27	15	21	CF	CF	CF	CF	CF	CF
RSI025S44-NC-X-XX	25	34	20	27	CF	CF	CF	CF	CF	CF
RSI030S44-NC-X-XX	30	40	25	34	CF	CF	CF	CF	CF	CF
RSI040S44-NC-X-XX	40	52	30	40	CF	CF	CF	CF	CF	CF
RSI050S44-NC-X-XX	50	65	40	52	CF	CF	CF	CF	CF	CF
RSI060S44-NC-X-XX	60	77	50	65	CF	CF	CF	CF	CF	CF
RSI075S44-NC-X-XX	75	96	60	77	CF	CF	CF	CF	CF	CF
RSI100S44-NC-X-XX	100	124	75	96	CF	CF	CF	CF	CF	CF
RSI125S44-NC-X-XX	125	156	100	124	CF	CF	CF	CF	CF	CF
RSI150S44-NC-X-XX	150	180	125	156	CF	CF	CF	CF	CF	CF
RSI200S44-NC-X-XX	200	240	150	180	CF	CF	CF	CF	CF	CF

- A-12 = VFD in NEMA 12 enclosure
- B-12 = VFD in NEMA 12 enclosure with two contactor bypass circuit
- C-12 = VFD in NEMA 12 enclosure with three contactor bypass circuit
- A-3R = VFD in NEMA 3R enclosure
- B-3R = VFD in NEMA 3R enclosure with two contactor bypass
- C-3R = VFD in NEMA 3R enclosure with three contactor bypass circuit
- For dimensions refer to page 2-47.
- For options refer to pages 2-48 thru 2-54.

# Enclosed Drives - Combination Circuit Breaker Severe Duty Sensorless Vector Drives 460V

## S4 SERIES

1 - 200 HP / NEMA 12 / NEMA 3R

MODEL NUMBER	STANDARD DUTY		HEAVY DUTY		LIST PRICE					
	HP	AMPS	HP	AMPS	A-12	B-12	C-12	A-3R	B-3R	C-3R
					NEMA12	NEMA12	NEMA12	NEMA 3R	NEMA 3R	NEMA 3R
RSI001S44-CB-X-XX	1	2.1	-	-	CF	CF	CF	CF	CF	CF
RSI002S44-CB-X-XX	2	3.4	1	2.1	CF	CF	CF	CF	CF	CF
RSI003S44-CB-X-XX	3	4.8	2	3.4	CF	CF	CF	CF	CF	CF
RSI005S44-CB-X-XX	5	7.6	3	4.8	CF	CF	CF	CF	CF	CF
RSI007S44-CB-X-XX	7.5	11	5	7.6	CF	CF	CF	CF	CF	CF
RSI010S44-CB-X-XX	10	14	7.5	11	CF	CF	CF	CF	CF	CF
RSI015S44-CB-X-XX	15	21	10	14	CF	CF	CF	CF	CF	CF
RSI020S44-CB-X-XX	20	27	15	21	CF	CF	CF	CF	CF	CF
RSI025S44-CB-X-XX	25	34	20	27	CF	CF	CF	CF	CF	CF
RSI030S44-CB-X-XX	30	40	25	34	CF	CF	CF	CF	CF	CF
RSI040S44-CB-X-XX	40	52	30	40	CF	CF	CF	CF	CF	CF
RSI050S44-CB-X-XX	50	65	40	52	CF	CF	CF	CF	CF	CF
RSI060S44-CB-X-XX	60	77	50	65	CF	CF	CF	CF	CF	CF
RSI075S44-CB-X-XX	75	96	60	77	CF	CF	CF	CF	CF	CF
RSI100S44-CB-X-XX	100	124	75	96	CF	CF	CF	CF	CF	CF
RSI125S44-CB-X-XX	125	156	100	124	CF	CF	CF	CF	CF	CF
RSI150S44-CB-X-XX	150	180	125	156	CF	CF	CF	CF	CF	CF
RSI200S44-CB-X-XX	200	240	150	180	CF	CF	CF	CF	CF	CF

- Dashes are shown for clarity.
- A-12 = VFD in NEMA 12 enclosure
- B-12 = VFD in NEMA 12 enclosure with two contactor bypass circuit
- C-12 = VFD in NEMA 12 enclosure with three contactor bypass circuit
- A-3R = VFD in NEMA 3R enclosure
- B-3R = VFD in NEMA 3R enclosure with two contactor bypass circuit
- C-3R = VFD in NEMA 3R enclosure with three contactor bypass circuit
- For dimensions refer to page 2-47.
- For options refer to pages 2-48 thru 2-54.

# Enclosed Drives - Non-Combination Severe Duty Sensorless Vector Drives 600V

## S4 SERIES

1 - 200 HP / NEMA 12 / NEMA 3R

MODEL NUMBER	STANDARD DUTY		HEAVY DUTY		LIST PRICE					
	HP	AMPS	HP	AMPS	A-12	B-12	C-12	A-3R	B-3R	C-3R
					NEMA12	NEMA12	NEMA12	NEMA 3R	NEMA 3R	NEMA 3R
RSI001S46-NC-X-XX	1	1.7	-	-	CF	CF	CF	CF	CF	CF
RSI002S46-NC-X-XX	2	2.7	1	1.7	CF	CF	CF	CF	CF	CF
RSI003S46-NC-X-XX	3	3.9	2	2.7	CF	CF	CF	CF	CF	CF
RSI005S46-NC-X-XX	5	6.1	3	3.9	CF	CF	CF	CF	CF	CF
RSI007S46-NC-X-XX	7.5	9	5	6.1	CF	CF	CF	CF	CF	CF
RSI010S46-NC-X-XX	10	11	7.5	9	CF	CF	CF	CF	CF	CF
RSI015S46-NC-X-XX	15	17	10	11	CF	CF	CF	CF	CF	CF
RSI020S46-NC-X-XX	20	22	15	17	CF	CF	CF	CF	CF	CF
RSI025S46-NC-X-XX	25	27	20	22	CF	CF	CF	CF	CF	CF
RSI030S46-NC-X-XX	30	32	25	27	CF	CF	CF	CF	CF	CF
RSI040S46-NC-X-XX	40	41	30	32	CF	CF	CF	CF	CF	CF
RSI050S46-NC-X-XX	50	52	40	41	CF	CF	CF	CF	CF	CF
RSI060S46-NC-X-XX	60	62	50	52	CF	CF	CF	CF	CF	CF
RSI075S46-NC-X-XX	75	77	60	62	CF	CF	CF	CF	CF	CF
RSI100S46-NC-X-XX	100	99	75	77	CF	CF	CF	CF	CF	CF
RSI125S46-NC-X-XX	125	125	100	99	CF	CF	CF	CF	CF	CF
RSI150S46-NC-X-XX	150	144	125	125	CF	CF	CF	CF	CF	CF
RSI200S46-NC-X-XX	200	192	150	144	CF	CF	CF	CF	CF	CF

- Dashes are shown for clarity.
- A-12 = VFD in NEMA 12 enclosure
- B-12 = VFD in NEMA 12 enclosure with two contactor bypass circuit
- C-12 = VFD in NEMA 12 enclosure with three contactor bypass circuit
- A-3R = VFD in NEMA 3R enclosure
- B-3R = VFD in NEMA 3R enclosure with two contactor bypass circuit
- C-3R = VFD in NEMA 3R enclosure with three contactor bypass circuit
- For dimensions refer to page 2-47.
- For options refer to pages 2-48 thru 2-54.

# Enclosed Drives - Combination Circuit Breaker Severe Duty Sensorless Vector Drives 600V

## S4 SERIES

1 - 200 HP / NEMA 12 / NEMA 3R

MODEL NUMBER	STANDARD DUTY		HEAVY DUTY		LIST PRICE					
	HP	AMPS	HP	AMPS	A-12	B-12	C-12	A-3R	B-3R	C-3R
					NEMA12	NEMA12	NEMA12	NEMA 3R	NEMA 3R	NEMA 3R
RSI001S46-CB-X-XX	1	1.7	-	-	CF	CF	CF	CF	CF	CF
RSI002S46-CB-X-XX	2	2.7	1	1.7	CF	CF	CF	CF	CF	CF
RSI003S46-CB-X-XX	3	3.9	2	2.7	CF	CF	CF	CF	CF	CF
RSI005S46-CB-X-XX	5	6.1	3	3.9	CF	CF	CF	CF	CF	CF
RSI007S46-CB-X-XX	7.5	9	5	6.1	CF	CF	CF	CF	CF	CF
RSI010S46-CB-X-XX	10	11	7.5	9	CF	CF	CF	CF	CF	CF
RSI015S46-CB-X-XX	15	17	10	11	CF	CF	CF	CF	CF	CF
RSI020S46-CB-X-XX	20	22	15	17	CF	CF	CF	CF	CF	CF
RSI025S46-CB-X-XX	25	27	20	22	CF	CF	CF	CF	CF	CF
RSI030S46-CB-X-XX	30	32	25	27	CF	CF	CF	CF	CF	CF
RSI040S46-CB-X-XX	40	41	30	32	CF	CF	CF	CF	CF	CF
RSI050S46-CB-X-XX	50	52	40	41	CF	CF	CF	CF	CF	CF
RSI060S46-CB-X-XX	60	62	50	52	CF	CF	CF	CF	CF	CF
RSI075S46-CB-X-XX	75	77	60	62	CF	CF	CF	CF	CF	CF
RSI100S46-CB-X-XX	100	99	75	77	CF	CF	CF	CF	CF	CF
RSI125S46-CB-X-XX	125	125	100	99	CF	CF	CF	CF	CF	CF
RSI150S46-CB-X-XX	150	144	125	125	CF	CF	CF	CF	CF	CF
RSI200S46-CB-X-XX	200	192	150	144	CF	CF	CF	CF	CF	CF

- Dashes are shown for clarity.
- A-12 = VFD in NEMA 12 enclosure
- B-12 = VFD in NEMA 12 enclosure with two contactor bypass circuit
- C-12 = VFD in NEMA 12 enclosure with three contactor bypass circuit
- A-3R = VFD in NEMA 3R enclosure
- B-3R = VFD in NEMA 3R enclosure with two contactor bypass circuit
- C-3R = VFD in NEMA 3R enclosure with three contactor bypass circuit
- For dimensions refer to page 2-47.
- For options refer to pages 2-48 thru 2-54.



# RediStart™ SG Series Dimensions

	DRIVE HP	NO OPTIONS	WITH CIRCUIT BREAKER OR LINE REACTOR	WITH (BREAKER AND 2 CONTACTOR BYPASS) OR (2 REACTORS) OR (3 CONTACTOR BYPASS)	WITH (BREAKER AND 3 CONTACTOR BYPASS) OR (LINE REACTOR AND 3 CONTACTOR BYPASS)
230 VOLT	7.5	30x24x16	30x24x16	30x24x16	30x24x16
	10	30x24x16	30x24x16	30x24x16	30x24x16
	15	30x24x16	30x24x16	30x24x16	30x24x16
	20	30x24x16	30x24x16	30x24x16	30x24x16
	25	30x24x16	30x24x16	30x24x16	30x24x16
	30	30x24x16	30x24x16	36x30x16	36x30x16
	40	36x30x16	36x30x16	36x30x16	36x30x16
	460 VOLT	7.5	30x24x16	30x24x16	30x24x16
10		30x24x16	30x24x16	30x24x16	30x24x16
15		30x24x16	30x24x16	30x24x16	30x24x16
20		30x24x16	30x24x16	30x24x16	30x24x16
25		30x24x16	30x24x16	30x24x16	30x24x16
30		30x24x16	30x24x16	30x24x16	30x24x16
40		36x30x16	36x30x16	36x30x16	36x30x16
50		36x30x16	36x30x16	36x30x16	36x30x16
60		36x30x16	36x30x16	36x30x16	36x30x16
75		36x30x16	36x30x16	36x30x16	36x30x16
100		36x30x16	36x30x16	70x30x24	70x30x24
125		46x30x16	46x30x16	70x30x24	70x30x24
150		90x31x30	87x31x24	90x48x30	90x48x30
200		90x31x30	87x31x24	90x48x30	90x48x30
250		90x31x30	87x37x24	90x48x30	90x48x30
300		90x31x30	87x37x24	90x48x30	90x48x30
350		90x48x30	87x48x24	90x48x30	90x48x30
400		90x48x30	87x48x24	90x48x30	90x48x30
500		90x48x30	87x48x24	90x60x30	90x60x30
600		90x48x30	87x72x24	90x60x30	90x60x30
700	90x48x30	87x72x24	☎	☎	

- Dimensions shown are NEMA 1 or NEMA 12 ventilated enclosures.
  - Dimensions are for reference only. Actual dimensions may vary. Please contact Benschaw for actual dimensions on your specific package.
- ☎ Consult factory

# RediStart™ S4 Series Dimensions

	DRIVE HP	NO OPTIONS	WITH CIRCUIT BREAKER OR LINE REACTOR	WITH (BREAKER AND 2 CONTACTOR BYPASS) OR (2 REACTORS) OR (3 CONTACTOR BYPASS)	WITH (BREAKER AND 3 CONTACTOR BYPASS) OR (LINE REACTOR AND 3 CONTACTOR BYPASS)
<b>230 VOLT</b>	3	30x24x18	30x24x18	30x24x18	30x24x18
	5	30x24x18	30x24x18	30x24x18	30x24x18
	7	30x24x18	30x24x18	46x30x18	46x30x18
	10	30x24x18	30x24x18	46x30x18	46x30x18
	15	30x24x18	30x24x18	46x30x18	46x30x18
	20	46x30x18	46x30x18	46x30x18	46x30x18
	<b>460 VOLT</b>	3	30x24x18	30x24x18	30x24x18
5		30x24x18	30x24x18	30x24x18	30x24x18
7.5		30x24x18	30x24x18	30x24x18	30x24x18
10		30x24x18	30x24x18	30x24x18	30x24x18
15		30X24X18	30X24X18	46x30x18	46x30x18
20		30X24X18	30X24X18	46x30x18	46x30x18
25		30X24X18	30X24X18	46x30x18	46x30x18
30		30X24X18	30X24X18	46x30x18	46x30x18
40		46X30X18	46X30X18	46x30x18	46x30x18
50		48X36X18	48X36X18	48X36X18	48X36X18
60		48X36X18	48X36X18	48X36X18	48X36X18
75		48X36X18	48X36X18	48X36X18	48X36X18
100		70X30X20	70X30X20	70X30X20	70X30X20
125		70X30X20	70X30X20	70X30X20	70X30X20
150		70X30X20	70X30X20	70X30X20	70X30X20
200*		70X30X20	70X30X20	70X30X20	70X30X20

\* Dimensions shown are for Standard Duty.

# Variable Frequency Drive Options



## PILOT DEVICES

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>PUSH-BUTTONS</b>		
A001	RAISED STOP PUSH-BUTTON - RED	CF
A002	FLUSH START PUSH-BUTTON - GREEN	CF
A003	JOG PUSH-BUTTON - YELLOW	CF
A004	OL RESET PUSH-BUTTON - (FOR EXTERNAL OL RELAY) - BLACK	CF
A005	VFD RESET PUSH-BUTTON - BLACK	CF
A006	RAISED PUSH-BUTTON - SPECIFY COLOR AND FUNCTION	CF
A007	FLUSH PUSH-BUTTON - SPECIFY COLOR AND FUNCTION	CF
A008	MUSHROOM HEAD STOP PUSH-BUTTON - RED	CF
A009	ILLUMINATED PUSH-BUTTON - SPECIFY COLOR AND FUNCTION	CF
<b>PILOT LIGHTS</b>		
A021	RED RUN LIGHT	CF
A022	GREEN STOP LIGHT	CF
A023	AMBER FAULT LIGHT	CF
A024	GREEN READY LIGHT	CF
A025	AMBER BYPASS LIGHT	CF
A026	RED LIGHT - SPECIFY FUNCTION	CF
A027	GREEN LIGHT - SPECIFY FUNCTION	CF
A028	AMBER LIGHT - SPECIFY FUNCTION	CF
A029	WHITE LIGHT - SPECIFY FUNCTION	CF
A030	BLUE LIGHT - SPECIFY FUNCTION	CF
A031	PUSH TO TEST CONTACT ASSEMBLY	CF
A032	POWER ON LIGHT - WHITE	CF
<b>SELECTOR SWITCHES</b>		
A041	HAND - OFF - AUTO SELECTOR SWITCH	CF
A042	LOCAL - OFF - REMOTE SELECTOR SWITCH	CF
A043	KEY OPERATED HAND - OFF - AUTO SELECTOR SWITCH	CF
A045	TWO POSITION SELECTOR SWITCH - SPECIFY FUNCTION	CF
A046	THREE POSITION SELECTOR SWITCH - SPECIFY FUNCTION	CF
A047	OTHER SELECTOR SWITCH - SPECIFY FUNCTION AND TYPE	CF



# Variable Frequency Drive Options



## PILOT DEVICES

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>METERS</b>		
A070	ANALOG AMMETER -UTILIZES VFD'S ANALOG OUTPUT	CF
A071	ANALOG VOLTMETER - UTILIZES VFD'S ANALOG OUTPUT	CF
A065	ELAPSED TIME METER	CF
A069	OTHER POWER METERING - SPECIFY FUNCTION	CF
<b>POTENTIOMETERS</b>		
A490	1 TURN POTENTIOMETER - NEMA 12	CF
A491	10 TURN POTENTIOMETER - NEMA 12	CF
A492	1 TURN POTENTIOMETER - NEMA 4	CF
A493	10 TURN POTENTIOMETER - NEMA 4	CF
<b>SPACE HEATERS</b>		
A171	SPACE HEATER WITH THERMOSTAT	CF

# Variable Frequency Drive Options



## LINE REACTORS (INSTALLED)

230 VOLT - INPUT 3% AC LINE REACTORS			
MODEL NUMBER	HP	VOLT	LIST PRICE
A500	1	230	CF
A501	2	230	CF
A502	3	230	CF
A503	5	230	CF
A504	7.5	230	CF
A505	10	230	CF
A506	15	230	CF
A507	20	230	CF
A508	25	230	CF
A509	30	230	CF

230 VOLT - INPUT 5% AC LINE REACTORS			
MODEL NUMBER	HP	VOLT	LIST PRICE
A570	1	230	CF
A571	2	230	CF
A572	3	230	CF
A573	5	230	CF
A574	7.5	230	CF
A575	10	230	CF
A576	15	230	CF
A577	20	230	CF
A578	25	230	CF
A579	30	230	CF

- Line reactors reduce harmonics and protect the variable frequency drive from input power quality problems. They are also recommended on applications where the transformer impedance exceeds 10 times the KVA rating of the drive.

# Variable Frequency Drive Options



## LINE REACTORS (INSTALLED)

460 VOLT - INPUT 3% AC LINE REACTORS			
MODEL NUMBER	HP	VOLT	LIST PRICE
A520	2	480	CF
A521	3	480	CF
A522	5	480	CF
A523	7.5	480	CF
A524	10	480	CF
A525	15	480	CF
A526	20	480	CF
A527	25	480	CF
A528	30	480	CF
A529	40	480	CF
A530	50	480	CF
A531	60	480	CF
A532	75	480	CF
A533	100	480	CF
A534	125	480	CF
A535	150	480	CF
A536	200	480	CF
A537	250	480	CF
A538	300	480	CF
A539	350	480	CF
A540	400	480	CF
A541	500	480	CF
A542	600	480	CF
A543	700	480	CF

- Line reactors reduce harmonics and protect the variable frequency drive from input power quality problems. They are also recommended on applications where the transformer impedance exceeds 10 times the KVA rating of the drive.

# Variable Frequency Drive Options

## LINE REACTORS (INSTALLED)



460 VOLT - INPUT 5% AC LINE REACTORS			
MODEL NUMBER	HP	VOLT	LIST PRICE
A600	2	480	CF
A601	3	480	CF
A602	5	480	CF
A603	7.5	480	CF
A604	10	480	CF
A605	15	480	CF
A606	20	480	CF
A607	25	480	CF
A608	30	480	CF
A609	40	480	CF
A610	50	480	CF
A611	60	480	CF
A612	75	480	CF
A613	100	480	CF
A614	125	480	CF
A615	150	480	CF
A616	200	480	CF
A617	250	480	CF
A618	300	480	CF
A619	350	480	CF
A620	400	480	CF
A621	500	480	CF
A622	600	480	CF
A623	700	480	CF

- Line reactors reduce harmonics and protect the variable frequency drive from input power quality problems. They are also recommended on applications where the transformer impedance exceeds 10 times the KVA rating of the drive.

# Variable Frequency Drive Options



## LONG LEAD FILTERS (INSTALLED)

460 VOLT LONG LEAD FILTERS (INSTALLED)			
MODEL NUMBER	HP	VOLT	LIST PRICE
A640	1	480	CF
A641	2	480	CF
A642	3	480	CF
A643	5	480	CF
A644	7.5	480	CF
A645	10	480	CF
A646	15	480	CF
A647	20	480	CF
A648	25	480	CF
A649	30	480	CF
A650	40	480	CF
A651	50 - 60	480	CF
A652	75	480	CF
A653	100	480	CF
A654	125	480	CF
A655	150	480	CF
A656	200	480	CF
A657	250	480	CF
A658	300	480	CF
A659	350	480	CF
A660	400	480	CF
A661	500	480	CF
A662	600	480	CF
A663	700	480	CF

- Long lead filters should be considered on applications where the cable distance between the motor and the variable frequency drive exceeds 150 feet. Long lead filters protect the motor from high DV/DT.

# Variable Frequency Drive Options



## FAST ACTING SEMICONDUCTOR FUSES

FAST ACTING SEMICONDUCTOR FUSES					
MODEL NUMBER	DESCRIPTION				LIST PRICE
	208V	240V	460V	575V	
A670	2	3	5	7.5	CF
A671	3	-	7.5	10	CF
A672	-	5	10	15	CF
A673	5	7.5	15	20	CF
A674	7.5	10	20	25	CF
A675	10	-	25	30	CF
A676	-	15	30	40	CF
A677	15	20	40	50	CF
A678	20	25	50	60	CF
A679	25	30	60	75	CF
A680	30	40	75	100	CF
A681	40	50	100	125	CF
A682	40	60	125	150	CF
A683	60	75	150	200	CF
A684	75	100	200	250	CF
A685	100	125	250	300	CF
A686	125	150	300	400	CF
A686	150	200	400	500	CF
A687	200	250	500	600	CF
A688	250	300	600	700	CF
A689	300	350	700	-	CF

**NOTE:** This option adds fast acting semiconductor fuses to the input of the VFD.



# Section 3 | Pump Control Panels

# Pump Control Panels

---

## 3.1 STANDARD PRODUCTS

### MODULAR PUMP CONTROL STARTERS - PREPACKAGED

MODULAR PUMP CONTROL PANEL OVERVIEW	3-3
FMPP SERIES COMBINATION FULL VOLTAGE / NEMA 3R	3-4
CMPP SERIES COMBINATION CIRCUIT BREAKER / NEMA 3R	3-5
FACTORY OPTIONS	3-6

## 3.2 ENGINEERED PRODUCTS (BUILT-TO-ORDER)

### PUMP CONTROL PANELS - ENGINEERED

ENGINEERED PUMP CONTROL PANEL OVERVIEW	3-8
ENGINEERED PUMP CONTROL PANELS - 208VAC	3-10
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ENGINEERED PUMP CONTROL PANELS - 480VAC	3-12
ENGINEERED OPTIONS	3-13



# Modular Prepackaged Pump Control Starters



## FMPP AND CMPP SERIES - COMBINATION FULL VOLTAGE STARTERS / NEMA 3R

NEMA SIZE 1-6 / NEMA 3R ENCLOSED  
(WITH SOLID STATE OVERLOAD PROTECTION)



### Standard Features:

- ◆ 240/480 volt, three phase
- ◆ Heavy duty fusible switch or circuit breaker (low profile)\*
- ◆ Class R fuse clip\*\*
- ◆ Flange operated disconnect
- ◆ Solid state overload and pump protection (Class 10)
- ◆ HOA switch
- ◆ Start push button
- ◆ Outdoor rated NEMA 3R enclosure
- ◆ Oversized panel
- ◆ Defeatable disconnect
- ◆ UL listed panel
- ◆ Ground lug
- ◆ Service entrance rated

### Factory Modified Options:

- ◆ Pre-wired motor and pump protector relay
- ◆ Power surge lightning protection
- ◆ Pre-wired time clock (24hr)
- ◆ Pre-wired control transformer (120V)
- ◆ Electronic overload phase protection relay
- ◆ Pre-wired panel heater
- ◆ Disconnect switch interlock
- ◆ Circuit breaker shunt trip
- ◆ Back spin protection
- ◆ Elapsed time meter
- ◆ Power, run and fault indicator lights
- ◆ Extra capacity CPT 100 or 150va

## FMPP/CMPP Series Product Highlights:

Benshaw's FMPP and CMPP Series prepackaged pump control panels are UL listed and are available as NEMA HP rated. A NEMA 3R enclosure design makes these panels ideal for a wide range of heavy duty pumping and irrigation applications.

All prepackaged panels are service entrance "SUSE" rated and backed by Benshaw's unmatched quality and 24/7 service.

Heavy duty performance, low cost and configurability make these pump control panels an exceptional value. Choose a standard configuration or select options from the list of factory modifications beginning on page 3-6.

- \* 240V units are built to order. Please allow two weeks for shipment.  
\*\* Fuse not provided. Recommend Class R type, dual element delay.

# Modular Prepackaged Pump Control Starters

**FMPP SERIES - COMBINATION FUSIBLE FULL VOLTAGE STARTER / NEMA 3R**  
 SOLID STATE OVERLOAD PROTECTION  
 NEMA RATED



240V									
MODEL NUMBER	DISC (AMP)	NEMA SIZE	HP	OL TRIP	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	FRAME			AMPS	H	W	D		
✂ FMPP323R*	30	1	3	9-18	24	20	8	50	CF
✂ FMPP523R*	30	1	5	9-18	24	20	8	52	CF
✂ FMPP723R*	30	2	7.5	13-27	24	20	8	54	CF
✂ FMPP1023R*	60	2	10	20-40	24	20	8	56	CF
✂ FMPP1523R*	60	2	15	30-60	24	20	8	58	CF
✂ FMPP3023R*	100	3	30	45-90	24	20	8	60	CF
✂ FMPP5023R*	200	4	50	100-200	36	24	10	85	CF
✂ FMPP10023R*	400	5	100	150-300	70	30	18	CF	CF

Note: All units supplied with 240V coil.

480V									
MODEL NUMBER	DISC (AMP)	NEMA SIZE	HP	OL TRIP	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	FRAME			AMPS	H	W	D		
🔌 FMPP543R**	30	1	5	2.5-10	24	20	8	50	CF
🔌 FMPP1043R**	30	1	10	9-18	24	20	8	52	CF
🔌 FMPP1543R**	30	2	15	13-27	24	20	8	54	CF
🔌 FMPP2043R**	60	2	20	20-40	24	20	8	56	CF
🔌 FMPP2543R**	60	2	25	22-45	24	20	8	58	CF
🔌 FMPP3043R**	60	3	30	30-60	24	20	8	60	CF
🔌 FMPP5043R**	100	3	50	45-90	36	24	10	80	CF
🔌 FMPP6043R**	200	4	60	45-90	36	24	10	85	CF
🔌 FMPP7543R**	200	4	75	57-115	36	24	10	90	CF
🔌 FMPP10043R**	200	4	100	100-200	36	24	10	100	CF
🔌 FMPP20043R**	400	5	200	150-300	70	30	18	CF	CF
✂ FMPP40043R**	600	6	400	300-600	70	30	18	CF	CF

Note: All units supplied with 480V coil.

- \* Fuses not supplied
- \*\* Fuse clip for Class R
- ✂ Built-to-order: Please allow two weeks for shipment.
- 🔌 Web stocked

# Modular Prepackaged Pump Control Starters

**CMPP SERIES - COMBINATION CIRCUIT BREAKER FULL VOLTAGE STARTER / NEMA 3R**  
 SOLID STATE OVERLOAD PROTECTION  
 NEMA RATED

Available  
 Summer 2008  
 Call for  
 Availability

## 240V

MODEL NUMBER	CB	NEMA SIZE	HP	OL TRIP	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	AMPS			AMPS	H	W	D		
✘ CMPP323R	30	1	3	9-18	24	20	8	50	CF
✘ CMPP523R	40	1	5	9-18	24	20	8	52	CF
✘ CMPP723R	50	2	7.5	13-27	24	20	8	54	CF
✘ CMPP1023R	60	2	10	20-40	24	20	8	56	CF
✘ CMPP1523R	70	2	15	30-60	24	20	8	58	CF
✘ CMPP3023R	125	3	30	45-90	36	24	10	60	CF
✘ CMPP5023R	250	4	50	100-200	36	24	10	85	CF
✘ CMPP10023R	400	5	100	150-300	70	30	18	CF	CF

Note: All units supplied with 240V coil.

## 480V

MODEL NUMBER	CB	NEMA SIZE	HP	OL TRIP	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	AMPS			AMPS	H	W	D		
✘ CMPP543R	20	1	5	2.5-10	24	20	8	50	CF
✘ CMPP1043R	30	1	10	9-18	24	20	8	52	CF
✘ CMPP1543R	50	2	15	13-27	24	20	8	54	CF
✘ CMPP2043R	60	2	20	20-40	24	20	8	56	CF
✘ CMPP2543R	70	2	25	22-45	24	20	8	58	CF
✘ CMPP3043R	80	3	30	30-60	24	20	8	60	CF
✘ CMPP5043R	125	3	50	45-90	36	24	10	80	CF
✘ CMPP6043R	150	4	60	45-90	36	24	10	85	CF
✘ CMPP7543R	200	4	75	57-115	36	24	10	90	CF
✘ CMPP10043R	250	4	100	100-200	36	24	10	100	CF
✘ CMPP20043R	400	5	200	150-300	70	30	18	CF	CF
✘ CMPP40043R	800	6	400	300-600	70	30	18	CF	CF

Note: All units supplied with 480V coil.

✘ Built-to-order: Please allow two weeks for shipment.

# Factory Options



Factory modifications are available for all Benshaw pump panels. The prices listed for modifications are not to be used as component prices. To order modifications, add the desired catalog suffix to any enclosed pump panel catalog number.

OPTION DESCRIPTION	CATALOG SUFFIX	PUMP PANEL TYPE	LIST PRICE
<b>PILOT DEVICES</b>			
RUN PILOT LIGHT (RED)	A021	FMPP, CMPP	CF
RUN PILOT LIGHT (GREEN)	A032	FMPP, CMPP	CF
OFF PILOT LIGHT (GREEN)	A035	FMPP, CMPP	CF
OFF PILOT LIGHT (RED)	A036	FMPP, CMPP	CF
OL TRIP PILOT LIGHT (YELLOW)	A037	FMPP, CMPP	CF
ON PILOT LIGHT (RED)	A033	FMPP, CMPP	CF
ON PILOT LIGHT (GREEN)	A034	FMPP, CMPP	CF
<b>EXTRA AUXILIARY CONTACT BLOCKS</b>			
FACTORY INSTALLED 1NO AND 1NC	A128	FMPP, CMPP	CF
FACTORY INSTALLED 2NO AND 2NC	A129	FMPP, CMPP	CF
<b>METERS</b>			
ELAPSED TIME METER (ANALOG, NON-RESETTABLE)*	A065	FMPP, CMPP	CF
<b>ADVANCED MOTOR PROTECTION</b>			
ELECTRONIC OVERLOAD (CLASS 1-30)*	SPE	FMPP, CMPP	CF
DIGITAL OVERLOAD (CLASS 1-60)*	SPD	FMPP, CMPP	CF
PUMP SAVER 777 - VOLTAGE CURRENT PROTECTION	777A	FMPP, CMPP	CF
PUMP SAVER 777 - LR - KW PROTECTION	777B	FMPP, CMPP	CF
<b>ENCLOSURE MOUNTED OPTIONS</b>			
LIGHTNING SURGE PROTECTOR	A252	FMPP, CMPP	CF
TIME CLOCK 24HR.	A282	FMPP, CMPP	CF
SPACE HEATER*	A171	FMPP, CMPP	CF
DISCONNECT SWITCH INTERLOCK	A283	FMPP, CMPP	CF
BACK SPIN PROTECTION*	A284	FMPP, CMPP	CF

\* Requires 120V control power.

• Pilot lights are full voltage supplied at same voltage as contactor coil.



# Factory Options

OPTION DESCRIPTION	CATALOG SUFFIX	PUMP PANEL TYPE	LIST PRICE
<b>STANDARD CAPACITY</b>			
240V PRIMARY	TL-240-S, TH-240-S	FMPP, CMPP	CF
480V PRIMARY	TL-480-S, TH-480-S	FMPP, CMPP	CF
<b>150VA EXTRA CAPACITY</b>			
240V PRIMARY	TL-240-L, TH-240-L	FMPP, CMPP	CF
480V PRIMARY	TL-480-L, TH-480-L	FMPP, CMPP	CF

# Engineered Pump Control Panels

## EPP SERIES

### Features

- ◆ Simplex, Duplex, Triplex
- ◆ NEMA 1 - NEMA 4XSS
- ◆ 2-year limited warranty
- ◆ 208 - 480VAC
- ◆ 5 - 60HP, 208 - 230VAC
- ◆ 10 - 125HP, 480VAC

### Standard Specifications

- ◆ NEMA 1 enclosure
- ◆ IEC rated starter/electronic overload (Simplex only)
- ◆ Disconnect switch
- ◆ Hand-OFF-Auto selector switch
- ◆ "Pump ON" pilot light
- ◆ Alarm light
- ◆ Horn
- ◆ Alarm silence pushbutton
- ◆ Alternation (Duplex and Triplex)

### Options Available

- ◆ NEMA 12, 3R, 4, 4X stainless steel enclosures
- ◆ Deadfront enclosure
- ◆ Automatic enclosure temperature control
- ◆ Autodialer
- ◆ 24VAC float power circuit
- ◆ Float level power circuit
- ◆ Float level pilot lights
- ◆ Elapsed time meter
- ◆ Power on light
- ◆ Voltage/phase monitor relay
- ◆ Variable speed control
- ◆ Lead lag (Duplex and Triplex)
- ◆ Solid state control



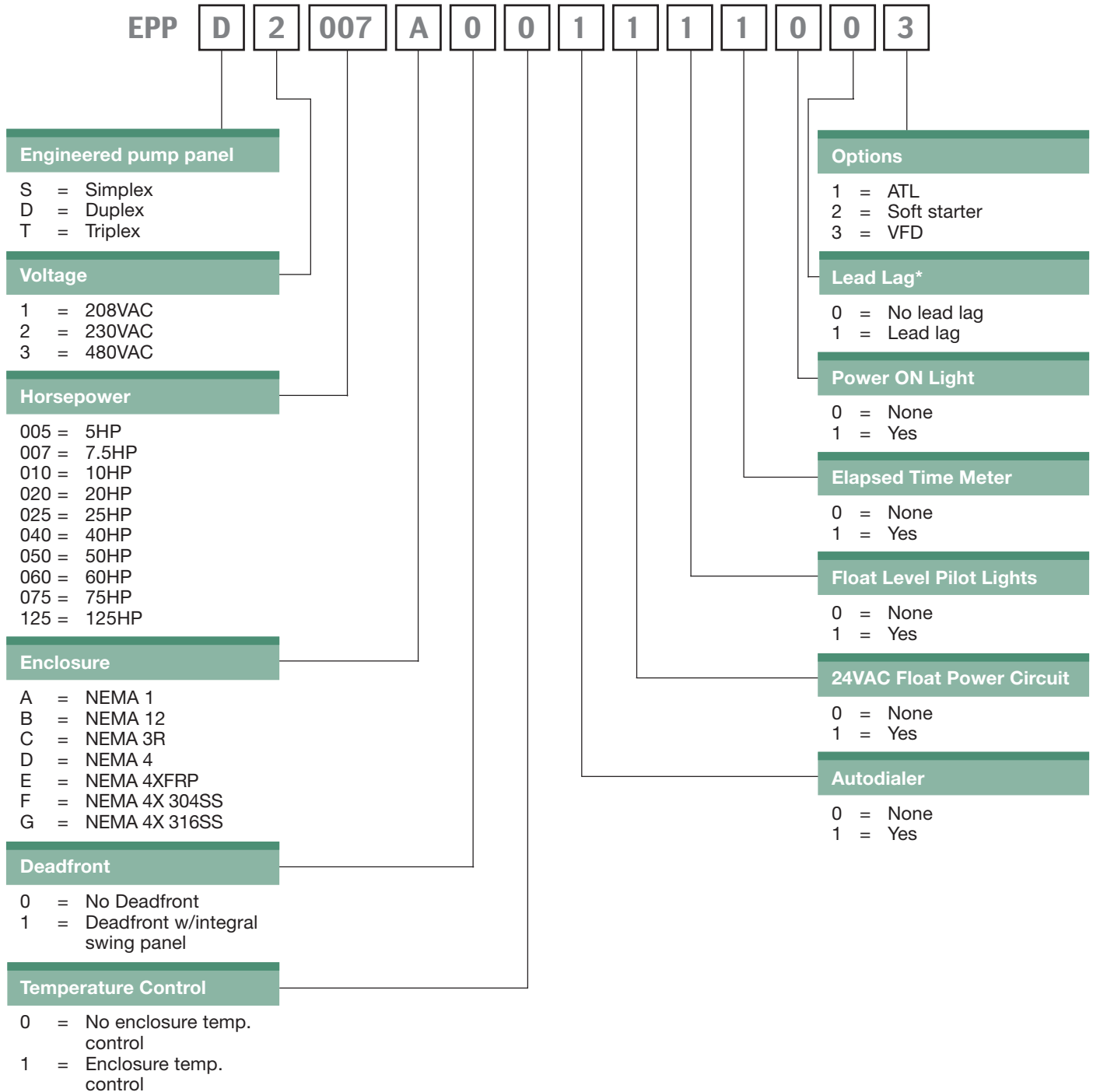
### *Guaranteed ... for two full years.*

*Only Benshaw has a two year guarantee.*

Benshaw pump controls are guaranteed for two full years. Other manufacturers limit their warranties to just one year. But at Benshaw, we believe that, because we build them better, we can guarantee them longer. We call that "the Benshaw Promise."



# Engineered Part Number Assembler



\* Duplex and Triplex only

# Engineered EPP Pump Panels 208V

## EPP SIMPLEX 208VAC

HP	LIST PRICE						
	NEMA 1	NEMA 12	NEMA 3R	NEMA 4	NEMA 4X POLYCARB.	NEMA 4X 304SS	NEMA 4X 316SS
5	CF	CF	CF	CF	CF	CF	CF
10	CF	CF	CF	CF	CF	CF	CF
20	CF	CF	CF	CF	CF	CF	CF
40	CF	CF	CF	CF	CF	CF	CF
60	CF	CF	CF	CF	CF	CF	CF

## EPP DUPLEX 208VAC

HP	LIST PRICE						
	NEMA 1	NEMA 12	NEMA 3R	NEMA 4	NEMA 4X POLYCARB.	NEMA 4X 304SS	NEMA 4X 316SS
5	CF	CF	CF	CF	CF	CF	CF
10	CF	CF	CF	CF	CF	CF	CF
20	CF	CF	CF	CF	CF	CF	CF
40	CF	CF	CF	CF	CF	CF	CF
60	CF	CF	CF	CF	CF	CF	CF

## EPP TRIPLEX 208VAC

HP	LIST PRICE						
	NEMA 1	NEMA 12	NEMA 3R	NEMA 4	NEMA 4X POLYCARB.	NEMA 4X 304SS	NEMA 4X 316SS
5	CF	CF	CF	CF	CF	CF	CF
10	CF	CF	CF	CF	CF	CF	CF
20	CF	CF	CF	CF	CF	CF	CF
40	CF	CF	CF	CF	CF	CF	CF
60	CF	CF	CF	CF	CF	CF	CF



# Engineered EPP Pump Panels 230V

EPP SIMPLEX 230VAC							
HP	LIST PRICE						
	NEMA 1	NEMA 12	NEMA 3R	NEMA 4	NEMA 4X POLYCARB.	NEMA 4X 304SS	NEMA 4X 316SS
5	CF	CF	CF	CF	CF	CF	CF
10	CF	CF	CF	CF	CF	CF	CF
20	CF	CF	CF	CF	CF	CF	CF
40	CF	CF	CF	CF	CF	CF	CF
60	CF	CF	CF	CF	CF	CF	CF

EPP DUPLEX 230VAC							
HP	LIST PRICE						
	NEMA 1	NEMA 12	NEMA 3R	NEMA 4	NEMA 4X POLYCARB.	NEMA 4X 304SS	NEMA 4X 316SS
5	CF	CF	CF	CF	CF	CF	CF
10	CF	CF	CF	CF	CF	CF	CF
20	CF	CF	CF	CF	CF	CF	CF
40	CF	CF	CF	CF	CF	CF	CF
60	CF	CF	CF	CF	CF	CF	CF

EPP TRIPLEX 230VAC							
HP	LIST PRICE						
	NEMA 1	NEMA 12	NEMA 3R	NEMA 4	NEMA 4X POLYCARB.	NEMA 4X 304SS	NEMA 4X 316SS
5	CF	CF	CF	CF	CF	CF	CF
10	CF	CF	CF	CF	CF	CF	CF
20	CF	CF	CF	CF	CF	CF	CF
40	CF	CF	CF	CF	CF	CF	CF
60	CF	CF	CF	CF	CF	CF	CF

# Engineered EPP Pump Panels 480V

## EPP SIMPLEX 480VAC

HP	LIST PRICE						
	NEMA 1	NEMA 12	NEMA 3R	NEMA 4	NEMA 4X POLYCARB.	NEMA 4X 304SS	NEMA 4X 316SS
10	CF	CF	CF	CF	CF	CF	CF
25	CF	CF	CF	CF	CF	CF	CF
50	CF	CF	CF	CF	CF	CF	CF
75	CF	CF	CF	CF	CF	CF	CF
125	CF	CF	CF	CF	CF	CF	CF

## EPP DUPLEX 480VAC

HP	LIST PRICE						
	NEMA 1	NEMA 12	NEMA 3R	NEMA 4	NEMA 4X POLYCARB.	NEMA 4X 304SS	NEMA 4X 316SS
10	CF	CF	CF	CF	CF	CF	CF
25	CF	CF	CF	CF	CF	CF	CF
50	CF	CF	CF	CF	CF	CF	CF
75	CF	CF	CF	CF	CF	CF	CF
125	CF	CF	CF	CF	CF	CF	CF

## EPP TRIPLEX 480VAC

HP	LIST PRICE						
	NEMA 1	NEMA 12	NEMA 3R	NEMA 4	NEMA 4X POLYCARB.	NEMA 4X 304SS	NEMA 4X 316SS
10	CF	CF	CF	CF	CF	CF	CF
25	CF	CF	CF	CF	CF	CF	CF
50	CF	CF	CF	CF	CF	CF	CF
75	CF	CF	CF	CF	CF	CF	CF
125	CF	CF	CF	CF	CF	CF	CF

# Engineered Pump Panel Options

DESCRIPTION	LIST PRICE
AUTOMATIC TEMPERATURE CONTROL -- HEATER	CF
24VAC FLOAT POWER CIRCUIT	CF
FLOAT LEVEL POWER CIRCUIT	CF
FLOAT LEVEL PILOT LIGHTS (EACH)	CF
ELAPSED TIME METER	CF
POWER ON LIGHT	CF
VOLTAGE PHASE MONITOR RELAY	CF
LEAD/LAG DUPLEX AND TRIPLEX	CF
DEADFRONT	CF
AUTODIALER	CF
VARIABLE SPEED DRIVES	CF
REDUCED VOLTAGE SOFT STARTS	CF





**Section 4 | Power Factor Correction Products**

# Power Factor Correction

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## DEFINITION

Commercial and industrial power consumers typically seek to control power factor deviations in order to achieve more efficient utilization of purchased electrical energy. Power factor is a measure of the effective conversion of current into work output and is calculated as the ratio between the actual load power and the apparent load power. In any supply and distribution system, losses will occur as part of the normal transmission of electrical power through the system. Under ideal circumstances, a power factor of 1.0 represents the most efficient utilization of the distributed electrical energy. As loss is accumulated in the supply system, the power factor drops below unity and is typically measured as a percentage of this ideal situation.

A relatively poor power factor is typically generated by a significant phase difference between the voltage waveform and the current waveform at the load. It is most typically observed in the presence of an inductive load, such as an induction motor, a power transformer, ballast and the like. These are typically found in great numbers in industrial and commercial facilities. Moreover, in many industrial settings, the utilization of multiple inductive motors which are continuously being cycled on and off, in a random pattern, may cause unique discontinuities or phase differences between the voltage and current at the various loads. As a matter of efficiency and cost-savings, the increase of power factor, as close as possible to unity, represents not only a more efficient utilization of power, but a reduced cost of operation. In many situations, power companies apply premium charges to users who exhibit poor power factor characteristics.

Power factor correction is typically done in the form of the addition of capacitance to circuits which include induction motors. These are applied to reduce the inductive component of the current and, subsequently, reduce losses. In a typical motor load, a portion of the total current drawn by the motor represents the magnetizing current, which establishes the flux in the magnetic field required for motor operation. The magnetizing current is necessary for the motor's operation, but does not contribute to the work output of the motor. In many cases, power factor correction is applied to reduce the effect of the magnetizing current of the motor.

# Power Factor Correction Products

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## 4.1 STANDARD PRODUCTS

### IPFUSION

IPFUSION PRODUCT FAMILY OVERVIEW	4-4
NON-FUSED 240/480VAC NEMA 1 ENCLOSED	4-6
NON-FUSED 240/480VAC NEMA 12 ENCLOSED	4-7
NON-FUSED 240/480VAC NEMA 3R ENCLOSED	4-8
FUSED 480VAC NEMA 1 ENCLOSED	4-9
FUSED 480VAC NEMA 12 ENCLOSED (WEB STOCKED)	4-10
FUSED 480VAC NEMA 3R ENCLOSED	4-11

## 4.2 ENGINEERED PRODUCTS

### APFUSION

APFUSION PRODUCT FAMILY OVERVIEW	4-12
PART NUMBER ASSEMBLER	4-13
MAIN LUG NEMA 1 ENCLOSED	4-14
CIRCUIT BREAKER NEMA 1 ENCLOSED	4-15
FACTORY OPTIONS	4-16

# IPFusion

## INTEGRATED POWER FACTOR CORRECTION PRODUCTS 240 & 480V / 7.5 - 120KVAR



### Standard Features:

- ◆ Non-fusible and fusible configurations
- ◆ Blown fuse indicator
- ◆ Control terminal block
- ◆ PFCC control contactor
- ◆ KVAR rated capacitors
- ◆ UL listed
- ◆ NEMA 1, 12 and 3R enclosures available
- ◆ Contact factory for 600V configurations

## IPFusion Power Factor Correction Product Highlights:

IPFusion is a patented, integrated power factor correction product family that contains presized, preselected components within a modular housing structure. Benshaw's IPFusion units have been pre-engineered and pre-assembled for simple plug and play power factor correction.

IPFusion power factor correction units are also designed to mate easily to your load—both electrically and physically. They occupy a minimum amount of space for ease of mounting near the load. Each unit includes the housing, terminal blocks, capacitor, precharge control and a contactor. Integrated fuse protection is optional.

IPFusion units can be manually or automatically engaged and may be remotely monitored for status.

### Safety. Precision. Convenience.

The components of each integrated power factor correction unit are sized and selected to precisely match the ampacity of a load, ensuring optimum performance and reliability at the lowest possible cost.

In addition, all IPFusion power factor correction units are UL Listed for assurance of safe operation.

### RSC Capacitor Switching Contactors

Benshaw's RSC Series contactors include auxiliary contacts to provide a second set of switches that close prior to the main contacts. These auxiliary contacts are connected to high resistance wire that precharges the circuit. A second auxiliary contact is also provided to indicate the closed and open status of the main contact. The second auxiliary contact is physically connected to the main contact and is closed and opened simultaneously.

Use of auxiliary contacts in the power factor correction unit reduces voltage spikes at the time of initial contact by allowing a certain amount of voltage to pass to components prior to the main voltage surge. This reduces wear and maintenance and prolongs the life of the contactor and other components.

Power factor correction capacitors are typically wired in parallel with the motor load at various points in the distribution system. In situations where a variety of inductive motors or loads are being switched on and off independently, it is desirable to apply the capacitance to the individual load. For that reason, it is important that power factor correction be specifically matched to the inductive load with which it is associated.

In an ideal system, a motor is corrected when its inductive reactance equals the capacitive reactance at the line frequency ... over or under correction of the load will result in poor performance and possible damage to the capacitors and motors. Over correction occurs when the resonance frequency is less than the line frequency.



## IPFusion, continued

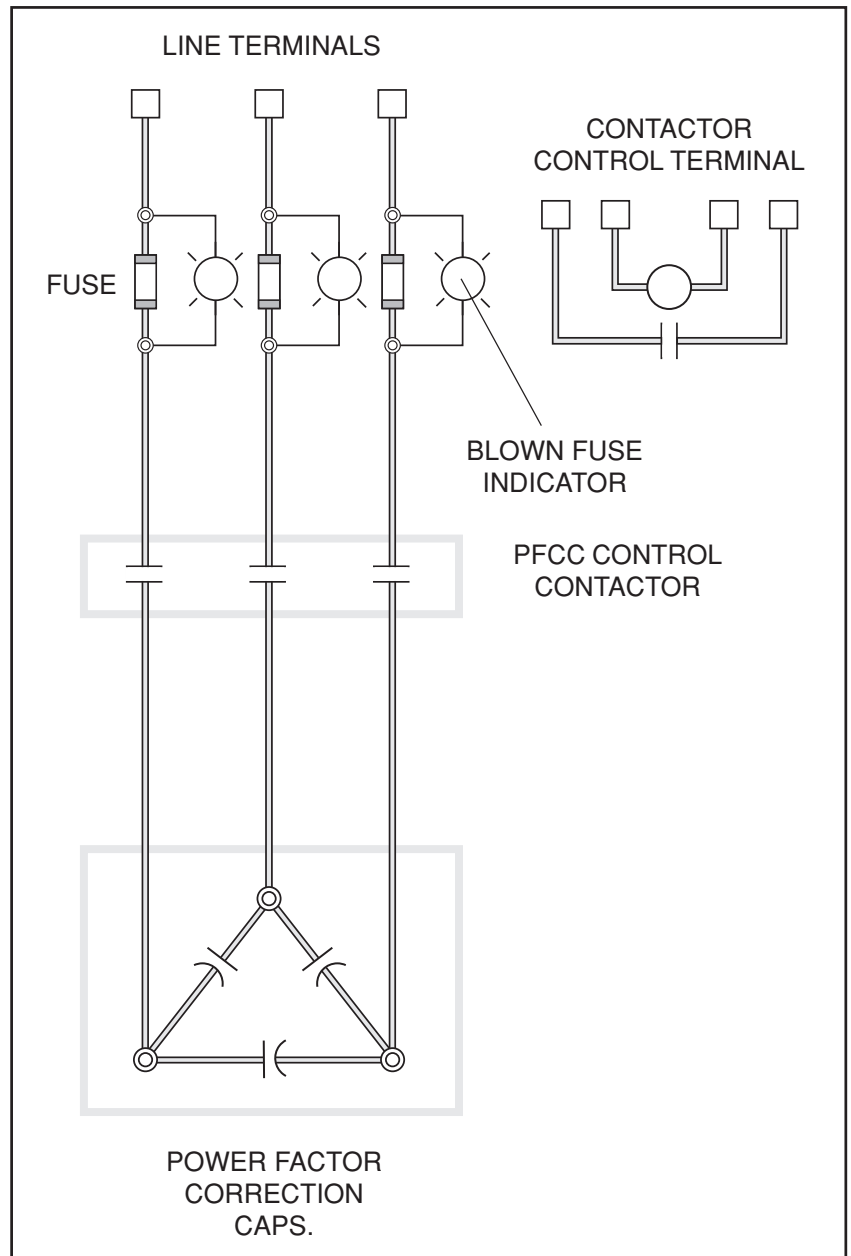
Each inductive load—especially electric motors—requires a properly sized power factor correction capacitor. While a helpful starting point may be found in standard look-up tables or other theoretical predictors of optimum capacitance, the better practice is to specifically match the capacitance to the measured characteristics of the particular motor design.

### IPFusion Packages

An IPFusion package includes a housing—which supports at least one capacitor—control and power terminal blocks, precharge controls, all interconnecting wires, and a contactor for selective engagement of the capacitor into the load circuitry.

The capacitor and contactor are electrically connected to the load, and are not engaged during the initial phase of load activation.

IPFusion units are constructed to the KVAC of the specific capacitor and therefore to the ampacity of the associated load. Both criteria are used to determine the appropriate contactor and selection of fuses which are able to accept the given level of current.



IPFusion - Outside Delta Schematic

# Integrated Power Factor Correction System 240/480V

## IPF SERIES - NON-FUSED NEMA 1 ENCLOSED



NON-FUSED										
MODEL NUMBER	240V		480V		AMPS	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	KVAR	VOLTS	KVAR	VOLTS		H	W	D		
✂ IPF741NF*	2	240	7.5	480	9	16.26	15.5	7	15	CF
✂ IPF841NF*	2	240	8.33	480	10	16.26	15.5	7	15	CF
✂ IPF1041NF*	3	240	10	480	12	16.26	15.5	7	15	CF
✂ IPF1241NF*	3	240	12.5	480	15	16.26	15.5	7	15	CF
✂ IPF1541NF*	4	240	15	480	18	16.26	15.5	7	15	CF
✂ IPF1641NF*	4	240	16.7	480	20	16.26	15.5	7	15	CF
✂ IPF2041NF*	5	240	20	480	24	16.26	15.5	7	15	CF
✂ IPF2541NF*	6	240	25	480	30	21	26	9	40	CF
✂ IPF3041NF*	8	240	30	480	36	21	26	9	40	CF
✂ IPF3541NF*	9	240	35	480	42	21	26	9	40	CF
✂ IPF4041NF*	10	240	40	480	48	21	26	9	40	CF
✂ IPF4541NF*	11	240	45	480	54	21	26	9	40	CF
✂ IPF5041NF*	13	240	50	480	60	21	26	9	40	CF
✂ IPF5541NF*	14	240	55	480	66	21	26	9	40	CF
✂ IPF6041NF*	15	240	60	480	72	21	26	9	40	CF
✂ IPF6541NF**	16	240	65	480	78	28	25	21	85	CF
✂ IPF7041NF**	18	240	70	480	84	28	25	21	85	CF
✂ IPF7541NF**	19	240	75	480	90	28	25	21	85	CF
✂ IPF8041NF**	20	240	80	480	96	28	25	21	85	CF
✂ IPF8541NF**	21	240	85	480	102	28	25	21	85	CF
✂ IPF9041NF**	23	240	90	480	108	28	25	21	85	CF
✂ IPF9541NF**	24	240	95	480	114	28	25	21	85	CF
✂ IPF10041NF**	25	240	100	480	120	28	25	21	85	CF
✂ IPF12541NF**	31	240	125	480	150	28	26	32	125	CF
✂ IPF13041NF**	33	240	130	480	156	28	26	32	125	CF
✂ IPF15041NF**	38	240	150	480	180	28	26	32	125	CF

- \* Unit is supplied with wall mount kit.
- \*\* Unit is supplied with floor mount kit.
- Power factor correction capacitors should not be used with variable speed drives.
- Units are dual rated and labeled 240/480.
- ✂ Built-to-order: Ships 1 week A.R.O.

# Integrated Power Factor Correction System 240/480V

## IPF SERIES - NON-FUSED NEMA 12 ENCLOSED



NON-FUSED										
MODEL NUMBER	240V		480V		AMPS	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	KVAR	VOLTS	KVAR	VOLTS		H	W	D		
✂ IPF7412NF*	2	240	7.5	480	9	16.26	15.5	7	15	CF
✂ IPF8412NF*	2	240	8.33	480	10	16.26	15.5	7	15	CF
✂ IPF10412NF*	3	240	10	480	12	16.26	15.5	7	15	CF
✂ IPF12412NF*	3	240	12.5	480	15	16.26	15.5	7	15	CF
✂ IPF15412NF*	4	240	15	480	18	16.26	15.5	7	15	CF
✂ IPF16412NF*	4	240	16.7	480	20	16.26	15.5	7	15	CF
✂ IPF20412NF*	5	240	20	480	24	16.26	15.5	7	15	CF
✂ IPF25412NF*	6	240	25	480	30	21	26	9	40	CF
✂ IPF30412NF*	8	240	30	480	36	21	26	9	40	CF
✂ IPF35412NF*	9	240	35	480	42	21	26	9	40	CF
✂ IPF40412NF*	10	240	40	480	48	21	26	9	40	CF
✂ IPF45412NF*	11	240	45	480	54	21	26	9	40	CF
✂ IPF50412NF*	13	240	50	480	60	21	26	9	40	CF
✂ IPF55412NF*	14	240	55	480	66	21	26	9	40	CF
✂ IPF60412NF*	15	240	60	480	72	21	26	9	40	CF
✂ IPF65412NF**	16	240	65	480	78	28	25	21	85	CF
✂ IPF70412NF**	18	240	70	480	84	28	25	21	85	CF
✂ IPF75412NF**	19	240	75	480	90	28	25	21	85	CF
✂ IPF80412NF**	20	240	80	480	96	28	25	21	85	CF
✂ IPF85412NF**	21	240	85	480	102	28	25	21	85	CF
✂ IPF90412NF**	23	240	90	480	108	28	25	21	85	CF
✂ IPF95412NF**	24	240	95	480	114	28	25	21	85	CF
✂ IPF100412NF**	25	240	100	480	120	28	25	21	85	CF
✂ IPF125412NF**	31	240	125	480	150	28	26	32	125	CF
✂ IPF130412NF**	33	240	130	480	156	28	26	32	125	CF
✂ IPF150412NF**	38	240	150	480	180	28	26	32	125	CF

- \* Unit is supplied with wall mount kit.
- \*\* Unit is supplied with floor mount kit.
- Power factor correction capacitors should not be used with variable speed drives.
- Units are dual rated and labeled 240/480.
- ✂ Built-to-order: Ships 1 week A.R.O.

# Integrated Power Factor Correction System 240/480V

IPF SERIES - NON-FUSED NEMA 3R ENCLOSED



## NON-FUSED

MODEL NUMBER	240V		480V		AMPS	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	KVAR	VOLTS	KVAR	VOLTS		H	W	D		
✂ IPF743RNF*	2	240	7.5	480	9	16.26	15.5	7	15	CF
✂ IPF843RNF*	2	240	8.33	480	10	16.26	15.5	7	15	CF
✂ IPF1043RNF*	3	240	10	480	12	16.26	15.5	7	15	CF
✂ IPF1243RNF*	3	240	12.5	480	15	16.26	15.5	7	15	CF
✂ IPF1543RNF*	4	240	15	480	18	16.26	15.5	7	15	CF
✂ IPF1643RNF*	4	240	16.7	480	20	16.26	15.5	7	15	CF
✂ IPF2043RNF*	5	240	20	480	24	16.26	15.5	7	15	CF
✂ IPF2543RNF*	6	240	25	480	30	21	26	9	40	CF
✂ IPF3043RNF*	8	240	30	480	36	21	26	9	40	CF
✂ IPF3543RNF*	9	240	35	480	42	21	26	9	40	CF
✂ IPF4043RNF*	10	240	40	480	48	21	26	9	40	CF
✂ IPF4543RNF*	11	240	45	480	54	21	26	9	40	CF
✂ IPF5043RNF*	13	240	50	480	60	21	26	9	40	CF
✂ IPF5543RNF*	14	240	55	480	66	21	26	9	40	CF
✂ IPF6043RNF*	15	240	60	480	72	21	26	9	40	CF
✂ IPF6543RNF**	16	240	65	480	78	28	25	21	85	CF
✂ IPF7043RNF**	18	240	70	480	84	28	25	21	85	CF
✂ IPF7543RNF**	19	240	75	480	90	28	25	21	85	CF
✂ IPF8043RNF**	20	240	80	480	96	28	25	21	85	CF
✂ IPF8543RNF**	21	240	85	480	102	28	25	21	85	CF
✂ IPF9043RNF**	23	240	90	480	108	28	25	21	85	CF
✂ IPF9543RNF**	24	240	95	480	114	28	25	21	85	CF
✂ IPF10043RNF**	25	240	100	480	120	28	25	21	85	CF
✂ IPF12543RNF**	31	240	125	480	150	28	26	32	125	CF
✂ IPF13043RNF**	33	240	130	480	156	28	26	32	125	CF
✂ IPF15043RNF**	38	240	150	480	180	28	26	32	125	CF

- \* Unit is supplied with wall mount kit.
- \*\* Unit is supplied with floor mount kit.
- Power factor correction capacitors should not be used with variable speed drives.
- Units are dual rated and labeled 240/480.
- ✂ Built-to-order: Ships 1 week A.R.O.

# Integrated Power Factor Correction System 240/480V

IPF SERIES - FUSED NEMA 1 ENCLOSED - WITH BLOWN FUSE INDICATORS



FUSED										
MODEL NUMBER	240V		480V		AMPS	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	KVAR	VOLTS	KVAR	VOLTS		H	W	D		
✂ IPF741F*	2	240	7.5	480	9	16.26	15.5	7	15	CF
✂ IPF841F*	2	240	8.33	480	10	16.26	15.5	7	15	CF
✂ IPF1041F*	3	240	12.5	480	15	16.26	15.5	7	15	CF
✂ IPF1241F*	3	240	12.5	480	15	16.26	15.5	7	15	CF
✂ IPF1541F*	4	240	15	480	18	16.26	15.5	7	15	CF
✂ IPF1641F*	4	240	16.7	480	20	16.26	15.5	7	15	CF
✂ IPF2041F*	5	240	20	480	24	16.26	15.5	7	15	CF
✂ IPF2541F*	6	240	25	480	30	21	26	9	40	CF
✂ IPF3041F*	8	240	30	480	36	21	26	9	40	CF
✂ IPF3541F*	9	240	35	480	42	21	26	9	40	CF
✂ IPF4041F*	10	240	40	480	48	21	26	9	40	CF
✂ IPF4541F*	11	240	45	480	54	21	26	9	40	CF
✂ IPF5041F*	13	240	50	480	60	21	26	9	40	CF
✂ IPF5541F*	14	240	55	480	66	21	26	9	40	CF
✂ IPF6041F*	15	240	60	480	72	21	26	9	40	CF
✂ IPF6541F**	16	240	65	480	78	28	25	21	85	CF
✂ IPF7041F**	18	240	70	480	84	28	25	21	85	CF
✂ IPF7541F**	19	240	75	480	90	28	25	21	85	CF
✂ IPF8041F**	20	240	80	480	96	28	25	21	85	CF
✂ IPF8541F**	21	240	85	480	102	28	25	21	85	CF
✂ IPF9041F**	23	240	90	480	108	28	25	21	85	CF
✂ IPF9541F**	24	240	95	480	114	28	25	21	85	CF
✂ IPF10041F**	25	240	100	480	120	28	25	21	85	CF
✂ IPF12541F**	31	240	125	480	150	28	26	32	125	CF
✂ IPF13041F**	33	240	130	480	156	28	26	32	125	CF
✂ IPF15041F**	38	240	150	480	180	28	26	32	125	CF

- \* Unit is supplied with wall mount kit.
- \*\* Unit is supplied with floor mount kit.
- Power factor correction capacitors should not be used with variable speed drives.
- Units are dual rated and labeled 240/480.
- ✂ Built-to-order: Ships 1 week A.R.O.

# Integrated Power Factor Correction System 240/480V

IPF SERIES - FUSED NEMA 12 ENCLOSED - WITH BLOWN FUSE INDICATORS



FUSED										
MODEL NUMBER	240V		480V		AMPS	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	KVAR	VOLTS	KVAR	VOLTS		H	W	D		
🔌 IPF7412F*	2	240	7.5	480	9	16.26	15.5	7	15	CF
🔌 IPF8412F*	2	240	8.33	480	10	16.26	15.5	7	15	CF
🔌 IPF10412F*	3	240	10	480	12	16.26	15.5	7	15	CF
🔌 IPF12412F*	3	240	12.5	480	15	16.26	15.5	7	15	CF
🔌 IPF15412F*	4	240	15	480	18	16.26	15.5	7	15	CF
🔌 IPF16412F*	4	240	16.7	480	20	16.26	15.5	7	15	CF
🔌 IPF20412F*	5	240	20	480	24	16.26	15.5	7	15	CF
🔌 IPF25412F*	6	240	25	480	30	21	26	9	40	CF
🔌 IPF30412F*	8	240	30	480	36	21	26	9	40	CF
🔌 IPF35412F*	9	240	35	480	42	21	26	9	40	CF
🔌 IPF40412F*	10	240	40	480	48	21	26	9	40	CF
🔌 IPF45412F*	11	240	45	480	54	21	26	9	40	CF
🔌 IPF50412F*	13	240	50	480	60	21	26	9	40	CF
🔌 IPF55412F*	14	240	55	480	66	21	26	9	40	CF
🔌 IPF60412F*	15	240	60	480	72	21	26	9	40	CF
🔌 IPF65412F**	16	240	65	480	78	28	25	21	85	CF
🔌 IPF70412F**	18	240	70	480	84	28	25	21	85	CF
🔌 IPF75412F**	19	240	75	480	90	28	25	21	85	CF
🔌 IPF80412F**	20	240	80	480	96	28	25	21	85	CF
🔌 IPF85412F**	21	240	85	480	102	28	25	21	85	CF
🔌 IPF90412F**	23	240	90	480	108	28	25	21	85	CF
🔌 IPF95412F**	24	240	95	480	114	28	25	21	85	CF
🔌 IPF100412F**	25	240	100	480	120	28	25	21	85	CF
🔌 IPF125412F**	31	240	125	480	150	28	26	32	125	CF
🔌 IPF130412F**	33	240	130	480	156	28	26	32	125	CF
🔌 IPF150412F**	38	240	150	480	180	28	26	32	125	CF

- \* Unit is supplied with wall mount kit.
- \*\* Unit is supplied with floor mount kit.
- Power factor correction capacitors should not be used with variable speed drives.
- Units are dual rated and labeled 240/480.
- 🔌 Web stocked.

# Integrated Power Factor Correction System 240/480V

IPF SERIES - FUSED NEMA 3R ENCLOSED - WITH BLOWN FUSE INDICATION



FUSED										
MODEL NUMBER	240V		480V		AMPS	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
	KVAR	VOLTS	KVAR	VOLTS		H	W	D		
🖱 IPF743RF*	2	240	7.5	480	9	16.26	15.5	7	15	CF
🖱 IPF843RF*	2	240	8.33	480	10	16.26	15.5	7	15	CF
🖱 IPF1043RF*	3	240	10	480	12	16.26	15.5	7	15	CF
🖱 IPF1243RF*	3	240	12.5	480	15	16.26	15.5	7	15	CF
🖱 IPF1543RF*	4	240	15	480	18	16.26	15.5	7	15	CF
🖱 IPF1643RF*	4	240	16.7	480	20	16.26	15.5	7	15	CF
🖱 IPF2043RF*	5	240	20	480	24	16.26	15.5	7	15	CF
🖱 IPF2543RF*	6	240	25	480	30	21	26	9	40	CF
🖱 IPF3043RF*	8	240	30	480	36	21	26	9	40	CF
🖱 IPF3543RF*	9	240	35	480	42	21	26	9	40	CF
🖱 IPF4043RF*	10	240	40	480	48	21	26	9	40	CF
🖱 IPF4543RF*	11	240	45	480	54	21	26	9	40	CF
🖱 IPF5043RF*	13	240	50	480	60	21	26	9	40	CF
🖱 IPF5543RF*	14	240	55	480	66	21	26	9	40	CF
🖱 IPF6043RF*	15	240	60	480	72	21	26	9	40	CF
🖱 IPF6543RF**	16	240	65	480	78	28	25	21	85	CF
🖱 IPF7043RF**	18	240	70	480	84	28	25	21	85	CF
🖱 IPF7543RF**	19	240	75	480	90	28	25	21	85	CF
🖱 IPF8043RF**	20	240	80	480	96	28	25	21	85	CF
🖱 IPF8543RF**	21	240	85	480	102	28	25	21	85	CF
🖱 IPF9043RF**	23	240	90	480	108	28	25	21	85	CF
🖱 IPF9543RF**	24	240	95	480	114	28	25	21	85	CF
🖱 IPF10043RF**	25	240	100	480	120	28	25	21	85	CF
🖱 IPF12543RF**	31	240	125	480	150	28	26	32	125	CF
🖱 IPF13043RF**	33	240	130	480	156	28	26	32	125	CF
🖱 IPF15043RF**	38	240	150	480	180	28	26	32	125	CF

- \* Unit is supplied with wall mount kit.
- \*\* Unit is supplied with floor mount kit.
- Power factor correction capacitors should not be used with variable speed drives.
- Units are dual rated and labeled 240/480.
- 🖱 Web stocked.

# APFusion

## AUTOMATIC POWER FACTOR CORRECTION PRODUCTS 240 & 480V / 100 - 700KVAR



### APFusion Power Factor Correction Product Highlights:

APFusion—Benshaw’s latest line of power factor correction products—provides automatic power factor correction for applications where harmonic generating loads are less than 15% of the total connection load.

Benshaw APFusion units provide simple plug and play power factor correction, with automatic 12 step power factor control and an intuitive, programmable, door mounted user interface. Units are available in 240V and 480V configurations, with a main lug or circuit breaker disconnect.

APFusion units incorporate Benshaw’s patented power factor correction technology, with presized, preselected terminals, capacitors, precharge controls and contactors enclosed in a compact, modular housing structure that mates easily to your load.

Controller functions include an over voltage alarm, over temperature protection, harmonic overload protection, a power factor correction fault alarm and “no voltage” protection.



### Standard Features:

- ◆ Automatic multi-step power factor control (up to 12 steps)
- ◆ Door mounted, intuitive, programmable user interface
- ◆ KVAR rated capacitors
- ◆ Fused circuit protection for capacitors
- ◆ Main lug or circuit breaker
- ◆ Terminal blocks for control
- ◆ Power lugs included
- ◆ 240-480 volt, 50/60HZ
- ◆ 100-700KVAR
- ◆ UL labeled
- ◆ Contact factory for 600V configurations

### Controller Functions:

- ◆ Performs measurement and protective functions
- ◆ Over volt alarm
- ◆ Over temperature protection
- ◆ Harmonic overload protection
- ◆ Power factor correction fault alarm
- ◆ No voltage protection

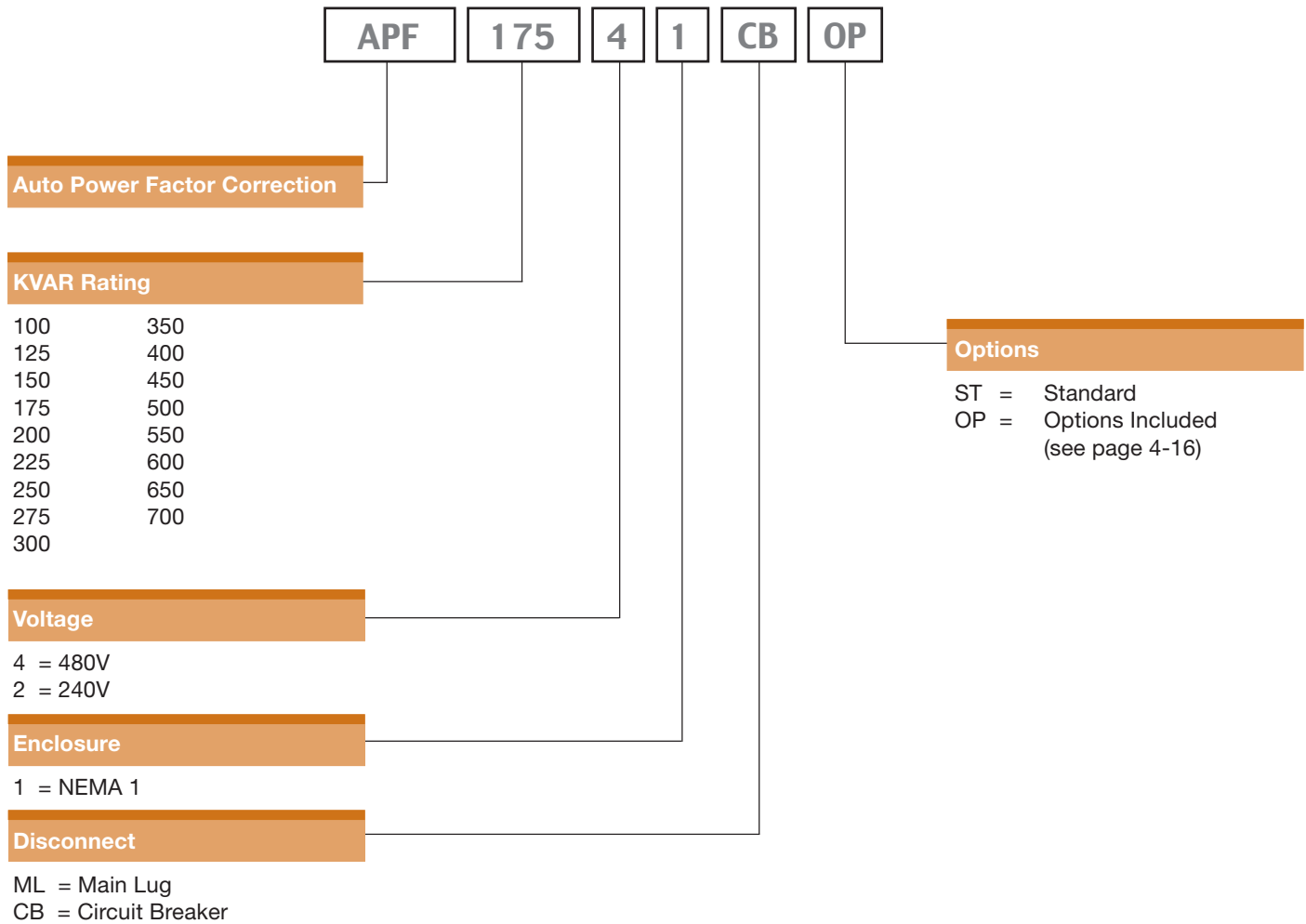
### Controller Displays:

- ◆ Line cosine
- ◆ Line current
- ◆ Main voltage
- ◆ Line active power
- ◆ Line reactive power
- ◆ CT current crest factor (THD)
- ◆ Output relay operation counter
- ◆ Number of alarm conditions
- ◆ Powers of individual steps
- ◆ Internal panel temperature



# APFusion Part Number Assembler

## AUTOMATIC POWER FACTOR CORRECTION



\* All units include 120V control power transformer

# Automatic Power Factor Correction System

## APF SERIES - MAIN LUG - NEMA 1 ENCLOSED

### MAIN LUG ONLY

#### MAIN LUG 240V

MODEL NUMBER	KVAR RATING	STEPS (QTY X KVAR)	STANDARD LUGS PROVIDED	ENCLOSURE SIZE	LIST PRICE
APF10021ML**	100	4 x 25	2 x 500 MCM	CF	CF
APF12521ML**	125	2 x 12.5, 4 x 25		CF	CF
APF15021ML**	150	6 x 25		CF	CF
APF17521ML**	175	1 x 25, 3 x 50		CF	CF
APF20021ML**	200	2 x 25, 3 x 50	4 x 500 MCM	CF	CF
APF22521ML**	225	3 x 25, 4 x 50		CF	CF
APF25021ML**	250	5 x 50		CF	CF
APF27521ML**	270	1 x 25, 5 x 50		CF	CF
APF30021ML**	300	6 x 50		CF	CF

#### MAIN LUG 480V

MODEL NUMBER	KVAR RATING	STEPS (QTY X KVAR)	STANDARD LUGS PROVIDED	ENCLOSURE SIZE	LIST PRICE
APF10041ML**	100	4 x 25	2 x 500 MCM	CF	CF
APF12541ML**	125	5 x 25		CF	CF
APF15041ML**	150	6 x 25		CF	CF
APF17541ML**	175	7 x 25		CF	CF
APF20041ML**	200	4 x 50	4 x 500 MCM	CF	CF
APF22541ML**	225	1 x 25, 4 x 50		CF	CF
APF25041ML**	250	5 x 50		CF	CF
APF27541ML**	270	1 x 25, 5 x 50		CF	CF
APF30041ML**	300	6 x 50		CF	CF
APF35041ML**	350	1 x 50, 3 x 100		CF	CF
APF40041ML**	400	2 x 50, 3 x 100		CF	CF
APF45041ML**	450	1 x 50, 4 x 100		CF	CF
APF50041ML**	500	2 x 50, 4 x 100		CF	CF
APF55041ML**	550	1 x 50, 5 x 100		CF	CF
APF60041ML**	600	6 x 100	CF	CF	
APF65041ML**	650	1 x 50, 6 x 100	CF	CF	
APF70041ML**	700	7 x 100	CF	CF	

\*\* Insert option code. Enter ST if no options are required. See page 4-16 for options.

# Automatic Power Factor Correction System

## APF SERIES - CIRCUIT BREAKER - NEMA 1 ENCLOSED

### CIRCUIT BREAKER ONLY

#### CIRCUIT BREAKER 240V

MODEL NUMBER	KVAR RATING	STEPS (QTY X KVAR)	STANDARD LUGS PROVIDED	ENCLOSURE SIZE	LIST PRICE
APF10021CB**	100	4 x 25	2 x 500 MCM	CF	CF
APF12521CB**	125	2 x 12.5, 4 x 25		CF	CF
APF15021CB**	150	6 x 25		CF	CF
APF17521CB**	175	1 x 25, 3 x 50		CF	CF
APF20021CB**	200	2 x 25, 3 x 50	4 x 500 MCM	CF	CF
APF22521CB**	225	3 x 25, 4 x 50		CF	CF
APF25021CB**	250	5 x 50		CF	CF
APF27521CB**	270	1 x 25, 5 x 50		CF	CF
APF30021CB**	300	6 x 50		CF	CF

#### CIRCUIT BREAKER 480V

MODEL NUMBER	KVAR RATING	STEPS (QTY X KVAR)	STANDARD LUGS PROVIDED	ENCLOSURE SIZE	LIST PRICE
APF10041CB**	100	4 x 25	2 x 500 MCM	CF	CF
APF12541CB**	125	5 x 25		CF	CF
APF15041CB**	150	6 x 25		CF	CF
APF17541CB**	175	7 x 25		CF	CF
APF20041CB**	200	4 x 50	4 x 500 MCM	CF	CF
APF22541CB**	225	1 x 25, 4 x 50		CF	CF
APF25041CB**	250	5 x 50		CF	CF
APF27541CB**	270	1 x 25, 5 x 50		CF	CF
APF30041CB**	300	6 x 50		CF	CF
APF35041CB**	350	1 x 50, 3 x 100		CF	CF
APF40041CB**	400	2 x 50, 3 x 100		CF	CF
APF45041CB**	450	1 x 50, 4 x 100		CF	CF
APF50041CB**	500	2 x 50, 4 x 100		CF	CF
APF55041CB**	550	1 x 50, 5 x 100		CF	CF
APF60041CB**	600	6 x 100	CF	CF	
APF65041CB**	650	1 x 50, 6 x 100	CF	CF	
APF70041CB**	700	7 x 100	CF	CF	

\*\* Insert option code. Enter ST if no options are required. See page 4-16 for options.

# Factory Options



OPTION DESCRIPTION	CATALOG SUFFIX	LIST PRICE
<b>ENCLOSURE OPTIONS</b>		
COOLING FAN	F1	CF
KEY INTERLOCK SYSTEM	KK	CF
OUTDOOR CONSTRUCTION	3R	CF
<b>PILOT DEVICES AND ALARM</b>		
FAULT PILOT LIGHT (AMBER)	A023	CF
ON / OFF / AUTO SWITCHES	A039	CF
OUT OF KVAR ALARM	A020	CF
OUT OF KVAR LIGHT	A019	CF
POWER ON PILOT LIGHT (RED)	A021	CF
POWER ON PILOT LIGHT (GREEN)	A032	CF
POWER OFF PILOT LIGHT (RED)	A036	CF
POWER OFF PILOT LIGHT (GREEN)	A035	CF
<b>METERS</b>		
AMMETER WITH THREE PHASE SELECTOR SWITCH	A062	CF
VOLTMETER WITH THREE PHASE SELECTOR SWITCH	A064	CF
SPIT CORE C.T.	CTI	CF

## **Section 5 | Low Voltage Solid State Starters**



# Low Voltage Solid State Starters

## PART NUMBER CROSS REFERENCE SHEET

Description	Old	New
Open Chassis / Non Bypassed	RCX	RC2 or RC3
Open Chassis / Bypassed	RBX	RB2 or RB3
Prepackaged Severe Duty Starter	RSE6	RX3E
Prepackaged Severe Duty Starter	RXE6	RX2E or RX3E
Prepackaged Starters / Non Bypassed	MXPC	MX2PC
Prepackaged Starters / Bypassed	MXPB	MX2PB
Starters with Separate / Run Duty Bypass	RBX2	RB2-2 or RB3-2
Starters with Separate / Starting Duty Bypass	RBX3	RB2-3 or RB3-3
Starters with DC Injection Brake / Non Bypassed	RSM7	See page 5-79
Starters with DC Injection Brake / Bypassed	RSM7SB	See page 5-79
Reversing Starters	RSM10	RC2, RC3, RB2, RB3 w/ reversing contactor option

Please see Engineered Starter Part Number Assembler for complete engineered product part numbers (page 5-32).

# Low Voltage Solid State Starters

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## 5.1 STANDARD PRODUCTS

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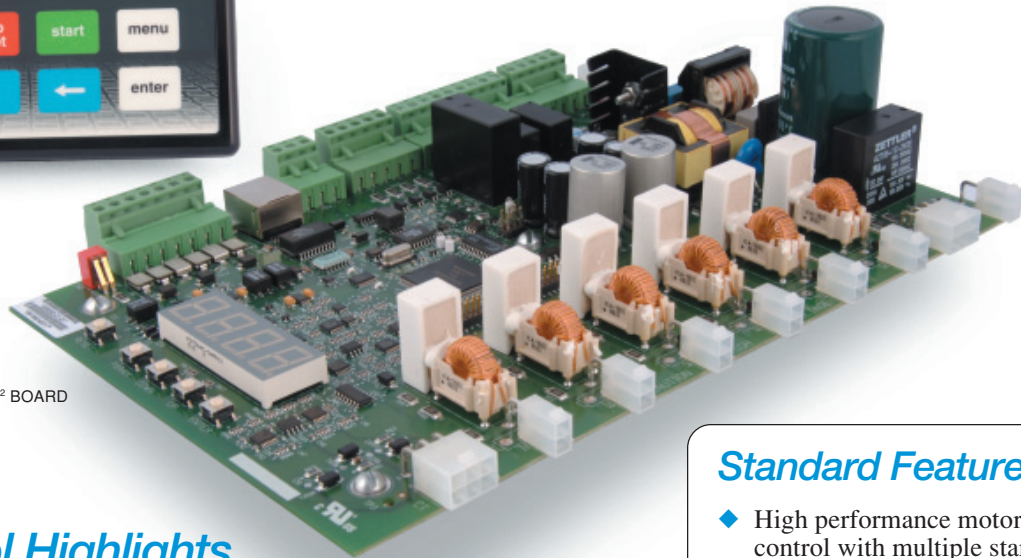
ENGINEERED OPTIONS	5-72
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# New MX<sup>2</sup> Control Technology

NE<sup>X</sup>T GENERATION INTELLIGENT MOTOR CONTROL



OPTIONAL  
KEYPAD



MX<sup>2</sup> BOARD

## MX<sup>2</sup> Control Highlights

The new MX<sup>2</sup> control technology from Benshaw provides a powerful, flexible, intelligent low voltage motor control platform. MX<sup>2</sup>-based controls offer multiple, user selectable starting modes, an increased selection of configurable digital and analog I/O's, comprehensive built-in metering capabilities, unprecedented onboard protection and an easy to use, intuitive user interface.

The new control board terminal configuration—coupled with programmable burden CT settings—makes Benshaw's MX<sup>2</sup> technology an excellent choice for a wide range of intelligent, soft start motor control applications.

With more built-in starting modes ... more built-in protection features ... additional communications capabilities ... improved noise immunity ... a more complete user I/O and CE compliance, Benshaw's new MX<sup>2</sup>-based low voltage motor controls raise the bar for intelligent, low-cost, soft start motor control.

When you factor in our unique three-year factory warranty and 24/7 comprehensive technical support, we think you'll find Benshaw's MX<sup>2</sup>-based controls to be the best value on the planet.

### Standard Features:

- ◆ High performance motor control with multiple starting modes built-in
- ◆ Jogging 7 and 14% speed
- ◆ 3 user configurable digital inputs
- ◆ 2 fixed inputs for start and bypass confirm
- ◆ 3 user configurable output relays and 1 fixed bypass confirm
- ◆ User configurable analog I/O
- ◆ Programmable burden CT settings
- ◆ Residual ground fault
- ◆ Advanced line / motor metering
- ◆ DC braking light duty
- ◆ Power stack thermistor
- ◆ Data snapshot of each fault
- ◆ Power up on start
- ◆ 1000V capable
- ◆ Energy saver
- ◆ Remote keypad ready
- ◆ CE, UL, CUL, NEMA compliance
- ◆ Built-in self-testing (BIST)
- ◆ ModBus 485 plus expanded communications capabilities with optional bridges



# MX<sup>2</sup> Control Features

## Multiple Starting Modes:

- ◆ Voltage ramp
- ◆ Current ramp
  - Adjustable initial current
  - Adjustable maximum current
  - Adjustable ramp time
- ◆ Torque ramp (True Torque)
  - Adjustable initial torque
  - Adjustable maximum torque
  - Adjustable ramp time
- ◆ Power ramp
  - Adjustable initial torque
  - Adjustable maximum torque
  - Adjustable ramp time
- ◆ Linear/tach feedback control
- ◆ Jogging 7 and 14% speed

## Motor Protection:

- ◆ Motor thermal overload
- ◆ Independent starting and running OL's
- ◆ Up to speed timer exceeded
- ◆ Low line voltage
- ◆ Low line frequency
- ◆ High line frequency
- ◆ Phase reversal
- ◆ Phase loss
- ◆ Instantaneous overcurrent
- ◆ Overcurrent
- ◆ Undercurrent
- ◆ Current imbalance
- ◆ Ground fault residual
- ◆ Shorted SCR
- ◆ Disconnect fault
- ◆ Inline contactor fault
- ◆ Control power low
- ◆ Stack over temperature

## Metering:

- ◆ +/- 2% accuracy
- ◆ Average current
- ◆ L1 current
- ◆ L2 current
- ◆ L3 current
- ◆ Current imbalance %
- ◆ Ground fault amps/residual
- ◆ Average volts

## Metering, continued:

- ◆ L1 - L2 voltage
- ◆ L2 - L3 voltage
- ◆ L3 - L1 voltage
- ◆ Overload %
- ◆ Power factor
- ◆ Watts
- ◆ VA
- ◆ VARS
- ◆ KW hours
- ◆ MW hours
- ◆ Phase order
- ◆ Line frequency
- ◆ Analog input
- ◆ Analog output
- ◆ Run time - days
- ◆ Run time - hours
- ◆ # of starts
- ◆ Tru Torque %
- ◆ Power %
- ◆ Peak starting current
- ◆ Last starting duration

## 3 Digital Inputs Configurable to:

- ◆ Stop
- ◆ Fault
- ◆ Fault reset
- ◆ Bypass/confirmation & inline
- ◆ OL reset
- ◆ Local/remote selection
- ◆ Heater enable
- ◆ Heater disable
- ◆ Dual ramp selection
- ◆ 1 dedicated start input
- ◆ 1 dedicated bypass

## 3 Relay Outputs Configurable to:

- ◆ Starter off
- ◆ Faulted fail safe and non fail safe
- ◆ Running
- ◆ Up to speed
- ◆ Alarm condition
- ◆ Ready condition
- ◆ Locked out
- ◆ Over current trip
- ◆ Under current trip
- ◆ OL alarm
- ◆ Shunt trip fail safe and non fail safe
- ◆ Ground fault

## Relay Outputs, continued:

- ◆ Energy saver indication
- ◆ Heating indication
- ◆ Slow speed forward/reverse
- ◆ DC braking
- ◆ Cooling fan
- ◆ 1 fixed bypass

## 1 Analog 4-20mA / 0-10Vdc Input Configurable to:

- ◆ Trip high level
- ◆ Trip low level

## 1 Analog 4-20mA / 0-10Vdc Output Configurable to:

- ◆ Current (0-200%/0-800%)
- ◆ Voltage (0-150%)
- ◆ OL (0-150%)
- ◆ KW (0-10 Kw/0-100 Kw)
- ◆ MW (0-1 Mw)
- ◆ Analog input (0-100%)
- ◆ Firing (0-100%)
- ◆ Calibration

## User Interface:

- ◆ Standard board-mounted LED interface
- ◆ Optional remote mount LCD display
  - Set/examine operating parameters
  - View status information
  - View line current, voltage and frequency in real time
  - Start and stop the solid state starter

## 1 Communication Port:

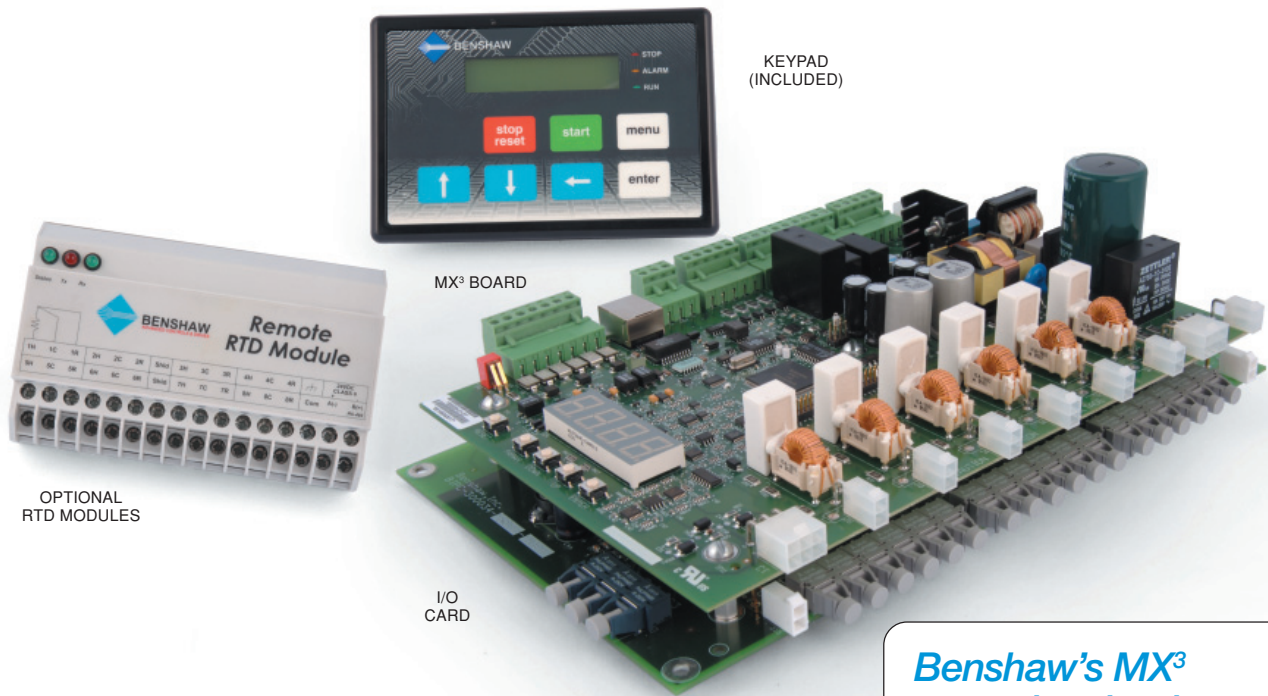
- ◆ ModBus
- ◆ RS485

## Advanced Functionality:

- ◆ Dual ramp selection
- ◆ Adjustable kick current
- ◆ Programmable decel modes
- ◆ LV BIST test (built-in self test)

# New MX<sup>3</sup> Control Technology

NEXT GENERATION INTELLIGENT MOTOR CONTROL



## MX<sup>3</sup> Control Highlights

Benschaw's next generation MX<sup>3</sup> technology propels low voltage motor control to even greater levels of performance and functionality. With its real-time clock, enhanced programming capabilities, ease of use, and a unique, flexible architecture—Benschaw's MX<sup>3</sup> controller delivers advanced motor control and protection with all of the rugged, dependable performance you've come to expect from the world leader in advanced controls and drives.

MX<sup>3</sup> controllers, power components, software and sensors are all designed, built and tested to perform as an integrated control system, eliminating the coordination and performance problems inherent in other forms of reduced voltage starting.

With more built-in features, more configurable options, greater expandability and a broader communications capability than any other motor control on the market, Benschaw's next generation MX<sup>3</sup> technology will shorten your commissioning times, improve motor performance and protection, enhance diagnostic capability and streamline electrical system monitoring and maintenance tasks.

### *Benschaw's MX<sup>3</sup> control technology provides all MX<sup>2</sup> features, plus:*

- ◆ 8 user configurable inputs
- ◆ 2 fixed inputs for start and bypass confirm
- ◆ 6 user configurable relay outputs
- ◆ 1 fixed output for bypass confirm
- ◆ Real-time clock
- ◆ Motor PTC input
- ◆ Zero Sequence Ground Fault
- ◆ RTD module support
- ◆ Full DC braking with add-on SCR
- ◆ Event log (99 events)
- ◆ Start per hour limiter
- ◆ Back spin timer
- ◆ Time between starts limiter
- ◆ Zero speed switch input
- ◆ Power outage ride through (PORT)
- ◆ Power factor trip
- ◆ Patented CYCLO control (0-40% speed)

# MX<sup>3</sup> Control Features

## Multiple Starting Modes:

- ◆ Voltage ramp
- ◆ Current ramp
  - Adjustable initial current
  - Adjustable maximum current
  - Adjustable ramp time
- ◆ Torque ramp (True Torque)
  - Adjustable initial torque
  - Adjustable maximum torque
  - Adjustable ramp time
- ◆ Power ramp
  - Adjustable initial torque
  - Adjustable maximum torque
  - Adjustable ramp time
- ◆ Linear/tach feedback control
- ◆ CYCLO converter control

## Motor Protection:

- ◆ Motor thermal overload
- ◆ Independent starting and running OL's
- ◆ Up to speed timer exceeded
- ◆ Low line voltage
- ◆ Low line frequency
- ◆ High line frequency
- ◆ Phase reversal
- ◆ Phase loss
- ◆ Instantaneous overcurrent
- ◆ Overcurrent
- ◆ Undercurrent
- ◆ Current imbalance
- ◆ Ground fault (residual or zero sequence)
- ◆ Shorted SCR
- ◆ Disconnect fault
- ◆ Inline contactor fault
- ◆ Control power low
- ◆ Stack over temperature
- ◆ Motor PTC input
- ◆ RTD modules

## Metering:

- ◆ +/- 2% accuracy
- ◆ Average current
- ◆ L1 current
- ◆ L2 current
- ◆ L3 current
- ◆ Current imbalance %
- ◆ Ground fault amps/residual
- ◆ Average volts

## Metering, continued:

- ◆ L1 - L2 voltage
- ◆ L2 - L3 voltage
- ◆ L3 - L1 voltage
- ◆ Overload %
- ◆ Power factor
- ◆ Watts
- ◆ VA
- ◆ VARS
- ◆ KW hours
- ◆ MW hours
- ◆ Phase order
- ◆ Line frequency
- ◆ Analog input
- ◆ Analog output
- ◆ Run time - days
- ◆ Run time - hours
- ◆ # of starts
- ◆ Tru Torque %
- ◆ Power %
- ◆ Peak starting current
- ◆ Last starting duration
- ◆ Real-time clock

## 8 Digital Inputs Configurable to:

- ◆ Stop
- ◆ Fault
- ◆ Fault reset
- ◆ Bypass/confirmation & inline
- ◆ OL reset
- ◆ Local/remote selection
- ◆ Heater enable
- ◆ Heater disable
- ◆ Dual ramp selection
- ◆ 1 dedicated start input
- ◆ 1 dedicated bypass

## 6 Relay Outputs Configurable to:

- ◆ Starter off
- ◆ Faulted fail safe and non fail safe
- ◆ Running
- ◆ Up to speed
- ◆ Alarm condition
- ◆ Ready condition
- ◆ Locked out
- ◆ Over current trip
- ◆ Under current trip
- ◆ OL alarm
- ◆ Shunt trip fail safe and non fail safe
- ◆ Ground fault

## Relay Outputs, continued:

- ◆ Energy saver indication
- ◆ Heating indication
- ◆ Slow speed forward/reverse
- ◆ DC braking
- ◆ Cooling fan
- ◆ 1 fixed bypass

## 1 Analog 4-20mA / 0-10Vdc Input Configurable to:

- ◆ Trip high level
- ◆ Trip low level

## 1 Analog 4-20mA / 0-10Vdc Output Configurable to:

- ◆ Current (0-200%/0-800%)
- ◆ Voltage (0-150%)
- ◆ OL (0-150%)
- ◆ KW (0-10 Kw/0-100 Kw)
- ◆ MW (0-1 Mw)
- ◆ Analog input (0-100%)
- ◆ Firing (0-100%)
- ◆ Calibration

## User Interface:

- ◆ Standard board-mounted LED interface
- ◆ Optional remote mount LCD display
  - Set/examine operating parameters
  - View status information
  - View line current, voltage and frequency in real time
  - Start and stop the solid state starter

## 1 Communication Port:

- ◆ ModBus
- ◆ RS485

## Advanced Functionality:

- ◆ Dual ramp selection
- ◆ Adjustable kick current
- ◆ Programmable decel modes
- ◆ LV BIST test (built-in self test)
- ◆ Event log (99 events)

## CONTROL FEATURE COMPARISON

FUNCTION	MICRO II	NEW MX <sup>2</sup>	NEW MX <sup>3</sup>
<b>SOFT STARTING AND STOPPING</b>			
Voltage Ramp		✓	✓
Current Ramp	✓	✓	✓
TruTorque Ramp	✓	✓	✓
Power Ramp	✓	✓	✓
Tach/Speed Control Ramp	✓		✓
Linear Ramp Profiles	✓	✓	✓
Squared and S Ramp Profiles			✓
Dual Ramps	✓	✓	✓
Kicking	✓	✓	✓
Voltage Decel	✓	✓	✓
TruTorque Decel	✓	✓	✓
DC Braking	✓	✓	✓
Heater/Antiwindmill	✓	✓	✓
Jogging 7-14% Speed	✓	✓	✓
Slow Speed CYCLO Operation 0-40% speed		✓	✓
Inside Delta	✓	✓	✓
Wye-Delta/Electromechanical Control		✓	✓
Phase Controller		✓	✓
Current Follower		✓	✓
ATL	✓	✓	✓

<b>PROTECTION</b>			
Separate Starting/Running Overload Classes		✓	✓
Adj. Hot/Cold Ratio		✓	✓
Adj. Cooling Time		✓	✓
Intelligent Start Lockout			✓
Adj. OL Lockout Level			✓
Over/Under Current Protection	✓	✓	✓
Retained OL When Power Lost	✓	✓	✓
Current Imbalance Protection	✓	✓	✓
IOC (Instantaneous Over Current)	✓	✓	✓
Open/Shorted SCR Detection	✓	✓	✓
Overcurrent/Shear Pin	✓	✓	✓
Undercurrent/Load Loss	✓	✓	✓
Residual Ground Fault Protection	✓	✓	✓
Zero Sequence Ground Fault Protection			✓
Starts Per Hour	✓		✓
RTD Monitoring	✓		✓
Motor PTC			✓
Stack OT Switch	✓	✓	✓
Stack Thermistor Input		✓	✓
Backspin Timer	✓		✓
Time Between Starts	✓		✓
Phase Rotation	✓	✓	✓
Overvoltage	✓	✓	✓
Undervoltage	✓	✓	✓
Phase Loss	✓	✓	✓
UTS/Stall Timer	✓	✓	✓

## CONTROL FEATURE COMPARISON

FUNCTION	MICRO II	NEW MX <sup>2</sup>	NEW MX <sup>3</sup>
<b>PROTECTION, continued</b>			
Zero Speed Switch	✓		✓
PF Trip	✓		✓
PORT (Power Outage Ride Through)	✓		✓
Keypad Fault Reset		✓	✓
Adj. Auto Fault Reset Timer		✓	✓
Adj. Number of Auto Resets Before Lockout	✓	✓	✓
Decel After Fault		✓	✓
Fault Log	✓	✓	✓
Time and Date Stamp	✓		✓
9 Data Snapshots of Each Fault		✓	✓
Event Log (last 99 events)	✓		✓
Fault Classes	✓		
<b>USER I/O</b>			
Programmable Digital Inputs	✓	✓	✓
Programmable Digital Outputs	✓	✓	✓
User Analog Input		✓	✓
Programmable User Analog Output		✓	✓
Local/Remote Source Input		✓	✓
Power Up Start	✓	✓	✓
<b>METERING</b>			
Full Voltage and Current Metering	✓	✓	✓
True RMS Calculation		✓	✓
Factory Menu Calibration	✓	✓	✓
Current Imbalance Meter	✓	✓	✓
Ground Fault Meter	✓	✓	✓
Watt Meters	✓	✓	✓
KVA Meters	✓	✓	✓
VAR Meter	✓	✓	✓
Watt Hour Meters	✓	✓	✓
Line Frequency Meter	✓	✓	✓
Power Factor Meter	✓	✓	✓
% OL Meter	✓	✓	✓
Time Until OL Lockout Release Meter		✓	✓
Phase Rotation Meter		✓	✓
& Power and % TruTorque Meter	✓	✓	✓
Run Time Meter	✓	✓	✓
Number of Starts Meter	✓	✓	✓
Peak Current of Last Start Meter		✓	✓
Last Starting Time Meter		✓	✓
Analog Input Meter		✓	✓
Real Time Clock	✓		✓
RTD Meters			✓
<b>MISCELLANEOUS</b>			
LV BIST		✓	✓
MV BIST	✓	✓	✓
LV Powered BIST		✓	✓



# Open Chassis Starters Non Bypassed / Continuous Duty

Also  
available  
with MX<sup>3</sup>  
control



**RC SERIES WITH NEW MX<sup>2</sup> OR MX<sup>3</sup> TECHNOLOGY**  
RUGGED INDUSTRIAL SOLID STATE STARTERS  
1 - 1200 HP / 208 - 600 VAC

## RC Series Product Highlights:

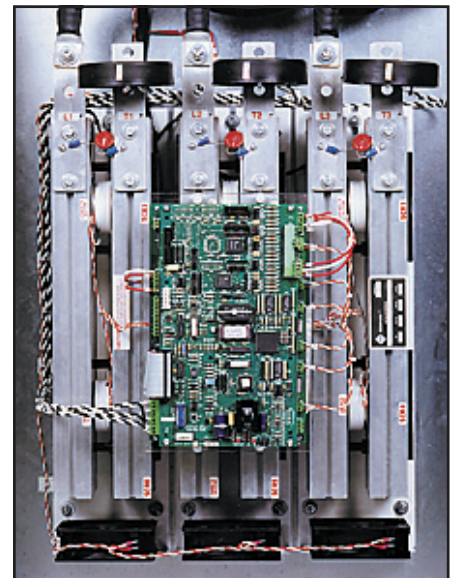
The RC Series Solid State Starter combines the high performance MX<sup>2</sup> or MX<sup>3</sup> control with the rugged, continuous duty, fan cooled RC stack.

The MX<sup>2</sup> or MX<sup>3</sup> series control provides users with a powerful group of programming parameters, designed for flexibility in industrial applications. The MX<sup>2</sup> and MX<sup>3</sup> both provide simple setup and commissioning via the Quick Start Menu.

The RC power section is a rugged non-bypassed section. It is an economical solution at low horsepower. In addition, the fan cooled stack provides high duty cycle and high inertia starting and energy saver operation.

### Key Advantages:

- ◆ Economical at low horsepower
- ◆ High duty cycle starting
- ◆ Long starting times
- ◆ Suitable for jogging applications
- ◆ Fan cooled stack
- ◆ Energy saver applications
- ◆ Integrated motor protection
- ◆ ModBus standard / Profibus, Ethernet, DeviceNet, LON Works, Ethernet IP web addressable communication protocols are available via optional communication bridges
- ◆ 1.25 service factor
- ◆ Integrated metering and diagnostics
- ◆ Multiple starting ramps for various applications



## Guaranteed ... for three full years.

**Only Benshaw has a three year guarantee.**

Every Benshaw solid state starter is guaranteed for three full years. Other manufacturers limit their warranties to just one year. But at Benshaw, we believe that, because we build them better, we can guarantee them longer. We call that "the Benshaw Promise."



- See pages 5-8 and 5-9 for MX<sup>2</sup> and MX<sup>3</sup> control feature comparison

# Open Chassis Starters

## Non-Bypassed / Continuous Duty



### RC2 SERIES WITH NEW MX<sup>2</sup> TECHNOLOGY

OPEN CHASSIS / NON-BYPASSED

500% CURRENT FOR 30 SEC / 125% CONTINUOUS RATED

MODEL NUMBER	AMPS	HORSEPOWER				DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
		208V	240V	480V	575V	H	W	D		
✂ RC2-0-S-027A-31C	27	7.5	10	20	25	14	9.9	7.9	15	CF
✂ RC2-0-S-040A-31C	40	10	15	30	40	14	9.9	7.9	15	CF
✂ RC2-0-S-052A-31C	52	15	20	40	50	14	9.9	7.9	18	CF
✂ RC2-0-S-065A-32C	65	20	25	50	60	18	10	9.6	18	CF
✂ RC2-0-S-077A-32C	77	25	30	60	75	18	10	9.6	18	CF
✂ RC2-0-S-096A-33C	96	30	-	75	100	27	10	9.6	19	CF
✂ RC2-0-S-125A-34C	125	40	50	100	125	27	10	9.6	45	CF
✂ RC2-0-S-156A-34C	156	50	60	125	150	24	22	10.1	45	CF
✂ RC2-0-S-180A-34C	180	60	75	150	200	24	22	10.1	45	CF
✂ RC2-0-S-240A-35C	240	75	100	200	250	26	22	10.1	55	CF
✂ RC2-0-S-302A-35C	302	100	125	250	300	26	22	10.1	55	CF
✂ RC2-0-S-361A-35C	361	125	150	300	400	26	22	10.1	60	CF
✂ RC2-0-S-414A-35C	414	150	-	350	-	26	22	10.1	150	CF
✂ RC2-0-S-477A-35C	477	-	200	400	500	26	22	10.1	150	CF
✂ RC2-0-S-515A-36C	515	200	-	450	-	36.8	29	10.7	150	CF
✂ RC2-0-S-590A-36C	590	-	250	500	600	36.8	29	10.7	160	CF

- Unit requires separate 120V control power.
  - Unit includes standard board-mounted LED interface. The optional LCD interface is shown. The keypad is shipped loose.
  - The above starters include the new MX<sup>2</sup> technology.
- ✂ Built-to-order: Please allow one week for shipment.
- ☎ Consult factory

PART NUMBER	DESCRIPTION	LIST PRICE
KPMX3CBL2M	NEMA 12/3R Remote Keypad w/ 2 Meter cable	CF
A340D	Chassis Mounted Display MX <sup>2</sup>	CF



# Open Chassis Starters Non-Bypassed / Continuous Duty



## RC3 SERIES WITH MX<sup>3</sup> TECHNOLOGY

OPEN CHASSIS / NON-BYPASSED

500% CURRENT FOR 30 SEC / 125% CONTINUOUS RATED

MODEL NUMBER	AMPS	HORSEPOWER				DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
		208V	240V	480V	575V	H	W	D		
✂ RC3-0-S-027A-31C	27	7.5	10	20	25	14	9.9	8.7	15	CF
✂ RC3-0-S-040A-31C	40	10	15	30	40	14	9.9	8.7	15	CF
✂ RC3-0-S-052A-31C	52	15	20	40	50	14	9.9	8.7	18	CF
✂ RC3-0-S-065A-32C	65	20	25	50	60	18	10	10.4	18	CF
✂ RC3-0-S-077A-32C	77	25	30	60	75	18	10	10.4	18	CF
✂ RC3-0-S-096A-33C	96	30	-	75	100	27	10	10.4	19	CF
✂ RC3-0-S-125A-34C	125	40	50	100	125	27	10	10.4	45	CF
✂ RC3-0-S-156A-34C	156	50	60	125	150	24	22	10.9	45	CF
✂ RC3-0-S-180A-34C	180	60	75	150	200	24	22	10.9	45	CF
✂ RC3-0-S-240A-35C	240	75	100	200	250	26	22	10.9	55	CF
✂ RC3-0-S-302A-35C	302	100	125	250	300	26	22	10.9	55	CF
✂ RC3-0-S-361A-35C	361	125	150	300	400	26	22	10.9	60	CF
✂ RC3-0-S-414A-35C	414	150	-	350	-	26	22	10.9	150	CF
✂ RC3-0-S-477A-35C	477	-	200	400	500	26	22	10.9	150	CF
✂ RC3-0-S-515A-36C	515	200	-	450	-	36.8	29	11.5	150	CF
✂ RC3-0-S-590A-36C	590	-	250	500	600	36.8	29	11.5	160	CF

- Unit requires separate 120V control power.
  - Unit includes remote mountable LCD keypad (KPMX3CBL2M) with 2 meter cable. Please order part number, KPMX3CBL2M, with chassis. The keypad is shipped loose.
  - The above starters include the new MX<sup>3</sup> technology.
- ✂ Built-to-order: Please allow one week for shipment.
- ☎ Consult factory

PART NUMBER	DESCRIPTION	LIST PRICE
KPMX3CBL2M	NEMA 12/3R Remote Keypad w/ 2 Meter cable	CF
A340D	Chassis Mounted Display MX <sup>2</sup>	CF

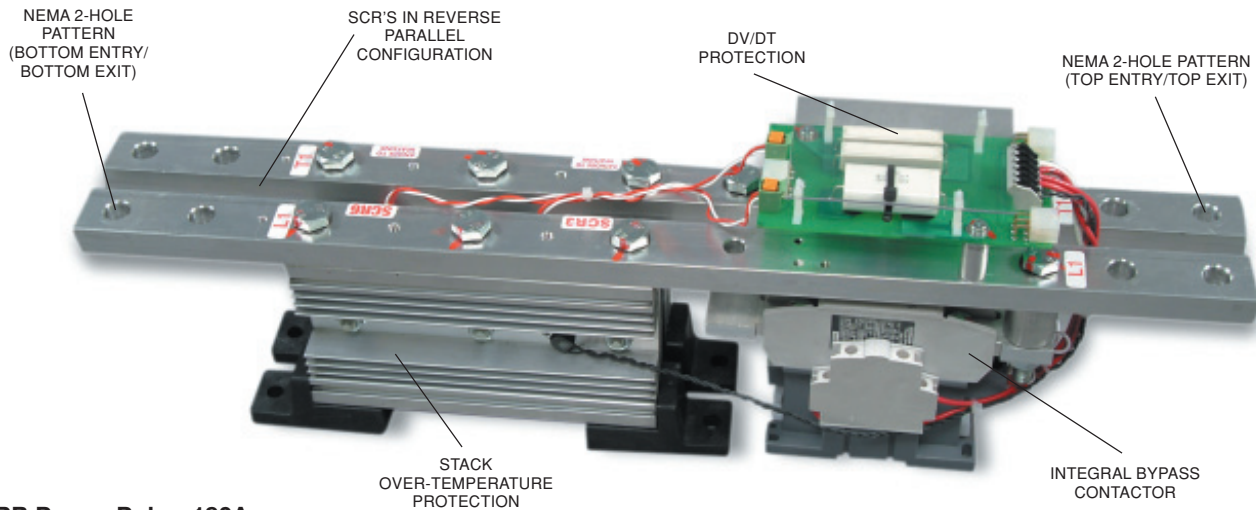






# Open Chassis Starters with Integral Bypass

**RB SERIES WITH NEW MX<sup>2</sup> TECHNOLOGY (ALSO AVAILABLE WITH MX<sup>3</sup> TECHNOLOGY)**  
RUGGED INDUSTRIAL SOLID STATE STARTERS WITH INTEGRAL BYPASS



**RB Power Pole - 180A**

## RB Series Product Highlights:

Benshaw's RB series solid state starter combines the high performance MX<sup>2</sup> or MX<sup>3</sup> technology with a rugged, compact, integral bypass RB series power section.

The MX<sup>2</sup> or MX<sup>3</sup> technology provides users with a powerful group of programming parameters, designed for flexibility in across a wide range of industrial applications. Both MX<sup>2</sup> and MX<sup>3</sup> controls provide simple setup and commissioning via the Quick Start Menu.

The RB power section is a rugged, heavy duty solid state starter section designed with integral bypass contactors for a compact, efficient profile. The modular design includes separate poles for each phase for ease of maintenance.

### Key Advantages:

- ◆ Small, compact design
- ◆ Modular power stack assembly for ease of maintenance
- ◆ ModBus standard / other Fieldbus optional
- ◆ Multiple starting ramps for various applications
- ◆ Integrated metering system diagnostics
- ◆ Integral bypass contactors for efficient operation, eliminating the need for external fans
- ◆ Integrated motor protection
- ◆ Dual ramp capability for loaded / unloaded applications
- ◆ Power stack has multiple ratings for application flexibility

### Guaranteed ... for three full years.

**Only Benshaw has a three year guarantee.**

Every Benshaw open chassis low voltage starter is guaranteed for three full years. Other manufacturers limit their warranties to just one year. But at Benshaw, we believe that, because we build them better, we can guarantee them longer. We call that "the Benshaw Promise."



- See pages 5-8 and 5-9 for MX<sup>2</sup> and MX<sup>3</sup> control feature comparison

# Open Chassis Starters with Integral Bypass

## RB2 SERIES

### PRODUCT SELECTION GUIDE

	MODEL NUMBER	HORSEPOWER				DIMENSIONS (IN)		
		208V	240V	480V	575V	H	W	D
<b>STANDARD DUTY</b> 350% for 30 sec 115% continuous	RB2-1-S-027A-11C	7.5	10	20	25	14	10	6.9
	RB2-1-S-040A-11C	10	15	30	40	14	10	6.9
	RB2-1-S-052A-12C	15	20	40	50	14	10	6.9
	RB2-1-S-065A-12C	20	25	50	60	14	10	6.9
	RB2-1-S-077A-13C	25	30	60	75	15	10	7.7
	RB2-1-S-096A-13C	30	40	75	100	15	10	7.7
	RB2-1-S-125A-14C	40	50	100	125	19.5	12.3	9.6
	RB2-1-S-156A-14C	50	60	125	150	21.3	12.3	9.6
	RB2-1-S-180A-14C	60	75	150	200	21.3	12.3	9.6
	RB2-1-S-240A-15C	75	100	200	250	22.8	12.5	9.6
	RB2-1-S-302A-15C	100	125	250	300	22.8	12.5	9.6
	RB2-1-S-361A-16C	125	150	300	400	24.6	13.4	9.6
	RB2-1-S-414A-17C	150	-	350	-	27.6	18.5	10.9
	RB2-1-S-477A-17C	-	200	400	500	27.6	18.5	10.9
	RB2-1-S-515A-17C	200	-	450	-	27.6	18.5	10.9
	RB2-1-S-590A-18C	-	250	500	600	27.6	18.5	10.9
RB2-1-S-720A-19C	250	300	600	700	29.4	18.5	10.9	
RB2-1-S-838A-20C	300	350	700	800	27.8	26.6	12.5	
<b>HEAVY DUTY</b> 500% for 30 sec 125% continuous	RB2-1-S-027A-11C	7.5	10	20	25	14	10	6.9
	RB2-1-S-040A-11C	10	15	30	40	14	10	6.9
	RB2-1-S-052A-12C	15	20	40	50	14	10	6.9
	RB2-1-S-096A-13C	30	40	75	100	15	10	7.7
	RB2-1-S-156A-14C	40	50	100	125	21.3	12.3	9.6
	RB2-1-S-180A-15C	60	75	150	200	21.3	12.3	9.6
	RB2-1-S-361A-16C	75	100	200	250	24.6	13.4	9.6
	RB2-1-S-414A-17C	125	150	300	400	27.6	18.5	10.9
	RB2-1-S-590A-18C	200	200	450	500	27.6	18.5	10.9
	RB2-1-S-720A-19C	-	250	500	600	29.4	18.5	10.9
<b>SEVERE DUTY</b> 600% for 30 sec 125% continuous	RB2-1-S-027A-11C	5	7.5	15	20	14	10	6.9
	RB2-1-S-040A-11C	10	10	30	40	14	10	6.9
	RB2-1-S-052A-12C	-	15	-	-	14	10	6.9
	RB2-1-S-096A-13C	25	30	60	75	15	10	7.7
	RB2-1-S-180A-15C	30	40	75	100	21.3	12.3	9.6
	RB2-1-S-180A-15C	50	60	125	150	21.3	12.3	9.6
	RB2-1-S-361A-16C	60	75	150	200	24.6	13.4	9.6
	RB2-1-S-414A-17C	100	125	250	300	27.6	18.5	10.9
RB2-1-S-590A-18C	150	200	450	500	27.6	18.5	10.9	

# Open Chassis Starters with Integral Bypass Standard Duty 200 - 600V



## RB2 SERIES

350% FOR 30 SECONDS

115% CONTINUOUS RATED

MODEL NUMBER	AMPS	HORSEPOWER				DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
		208V	240V	480V	575V	H	W	D		
🖱️ RB2-1-S-027A-11C	27	7.5	10	20	25	14	10	6.9	14	CF
🖱️ RB2-1-S-040A-11C	40	10	15	30	40	14	10	6.9	14	CF
🖱️ RB2-1-S-052A-12C	52	15	20	40	50	14	10	6.9	17	CF
🖱️ RB2-1-S-065A-12C	65	20	25	50	60	14	10	6.9	17	CF
🖱️ RB2-1-S-077A-13C	77	25	30	60	75	15	10	7.7	17	CF
🖱️ RB2-1-S-096A-13C	96	30	40	75	100	15	10	7.7	18	CF
🖱️ RB2-1-S-125A-14C	125	40	50	100	125	19.5	12.3	9.6	43	CF
🖱️ RB2-1-S-156A-14C	156	50	60	125	150	21.3	12.3	9.6	43	CF
🖱️ RB2-1-S-180A-14C	180	60	75	150	200	21.3	12.3	9.6	43	CF
🖱️ RB2-1-S-240A-15C	240	75	100	200	250	22.8	12.5	9.6	51	CF
🖱️ RB2-1-S-302A-15C	302	100	125	250	300	22.8	12.5	9.6	51	CF
🖱️ RB2-1-S-361A-16C	361	125	150	300	400	24.6	13.4	9.6	56	CF
🖱️ RB2-1-S-414A-17C	414	150	-	350	-	27.6	18.5	10.9	151	CF
🖱️ RB2-1-S-477A-17C	477	-	200	400	500	27.6	18.5	10.9	155	CF
🖱️ RB2-1-S-515A-17C	515	200	-	450	-	27.6	18.5	10.9	155	CF
🖱️ RB2-1-S-590A-18C	590	-	250	500	600	27.6	18.5	10.9	159	CF
🖱️ RB2-1-S-720A-19C	720	250	300	600	700	29.4	18.5	10.9	159	CF
🖱️ RB2-1-S-838A-20C	838	300	350	700	800	27.8	26.6	12.5	160	CF

- Unit requires separate 120V control power.
- Unit includes standard board-mounted LED interface. The optional LCD interface is shown. The keypad is shipped loose.
- The above starters include the new MX<sup>2</sup> technology. For MX<sup>3</sup> technology, see pages 5-6 through 5-7.

🖱️ Web stocked

☎️ Consult factory

PART NUMBER	DESCRIPTION	LIST PRICE
KPMX3CBL2M	NEMA 12/3R Remote Keypad w/ 2 Meter cable	CF
A340D	Chassis Mounted Display MX <sup>2</sup>	CF



# Open Chassis Starters with Integral Bypass Standard Duty 200 - 600V



## RB3 SERIES WITH NEW MX<sup>3</sup> TECHNOLOGY

350% FOR 30 SECONDS

115% CONTINUOUS RATED

MODEL NUMBER	AMPS	HORSEPOWER				DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
		208V	240V	480V	575V	H	W	D		
✂ RB3-1-S-027A-11C	27	7.5	10	20	25	14	10	7.7	14	CF
✂ RB3-1-S-040A-11C	40	10	15	30	40	14	10	7.7	14	CF
✂ RB3-1-S-052A-12C	52	15	20	40	50	14	10	7.7	17	CF
✂ RB3-1-S-065A-12C	65	20	25	50	60	14	10	7.7	17	CF
✂ RB3-1-S-077A-13C	77	25	30	60	75	15	10	8.5	17	CF
✂ RB3-1-S-096A-13C	96	30	40	75	100	15	10	8.5	18	CF
✂ RB3-1-S-125A-14C	125	40	50	100	125	19.5	12.3	10.2	43	CF
✂ RB3-1-S-156A-14C	156	50	60	125	150	21.3	12.3	10.2	43	CF
✂ RB3-1-S-180A-14C	180	60	75	150	200	21.3	12.3	10.2	43	CF
✂ RB3-1-S-240A-15C	240	75	100	200	250	22.8	12.5	10.4	51	CF
✂ RB3-1-S-302A-15C	302	100	125	250	300	22.8	12.5	10.4	51	CF
✂ RB3-1-S-361A-16C	361	125	150	300	400	24.6	13.4	10.4	56	CF
✂ RB3-1-S-414A-17C	414	150	-	350	-	27.5	18.5	11.7	151	CF
✂ RB3-1-S-477A-17C	477	-	200	400	500	27.6	18.5	11.7	155	CF
✂ RB3-1-S-515A-17C	515	200	-	450	-	27.6	18.5	11.7	155	CF
✂ RB3-1-S-590A-18C	590	-	250	500	600	27.6	18.5	11.7	159	CF
✂ RB3-1-S-720A-19C	720	250	300	600	700	29.4	18.5	11.7	159	CF
✂ RB3-1-S-838A-20C	838	300	350	700	800	27.8	26.6	13.3	160	CF

- Unit requires separate 120V control power.
  - Unit includes remote mountable LCD keypad (KPMX3CBL2M) with 2 meter cable. Please order part number, KPMX3CBL2M, with chassis. The keypad is shipped loose.
  - The above starters include the new MX<sup>3</sup> technology.
- ✂ Built-to-order: Please allow one week for shipment.
- ☎ Consult factory

PART NUMBER	DESCRIPTION	LIST PRICE
KPMX3CBL2M	NEMA 12/3R Remote Keypad w/ 2 Meter cable	CF
A340D	Chassis Mounted Display MX <sup>2</sup>	CF



# Open Chassis Starters with Integral Bypass Heavy Duty 200 - 600V



## RB2 SERIES WITH MX<sup>2</sup> TECHNOLOGY

500% FOR 30 SECONDS

125% CONTINUOUS RATED

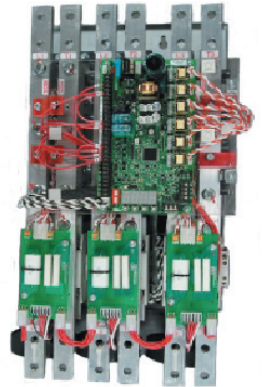
MODEL NUMBER	AMPS	HORSEPOWER				DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
		208V	240V	480V	575V	H	W	D		
🖱️ RB2-1-S-027A-11C	24	7.5	10	20	25	14	10	6.9	14	CF
🖱️ RB2-1-S-040A-11C	40	10	15	30	40	14	10	6.9	14	CF
🖱️ RB2-1-S-052A-12C	52	15	20	40	50	14	10	6.9	17	CF
🖱️ RB2-1-S-096A-13C	96	30	40	75	100	15	10	7.7	18	CF
🖱️ RB2-1-S-156A-14C	125	40	50	100	125	21.3	12.3	9.6	43	CF
🖱️ RB2-1-S-180A-15C	204	60	75	150	200	21.3	12.3	9.6	51	CF
🖱️ RB2-1-S-361A-16C	252	75	100	200	250	24.6	13.4	9.6	56	CF
🖱️ RB2-1-S-414A-17C	372	125	150	300	400	27.6	18.5	10.9	151	CF
🖱️ RB2-1-S-590A-18C	551	200	200	450	500	27.6	18.5	10.9	159	CF
🖱️ RB2-1-S-720A-19C	623	-	250	500	600	29.4	18.5	10.9	160	CF

- Unit requires separate 120V control power.
- Unit includes standard board-mounted LED interface. The optional LCD interface is shown. The keypad is shipped loose.
- The above starters include the new MX<sup>2</sup> technology. For MX<sup>3</sup> technology, see pages 5-6 through 5-7.

🖱️ Web stocked

☎️ Consult factory

PART NUMBER	DESCRIPTION	LIST PRICE
KPMX3CBL2M	NEMA 12/3R Remote Keypad w/ 2 Meter cable	CF
A340D	Chassis Mounted Display MX <sup>2</sup>	CF



# Open Chassis Starters with Integral Bypass Heavy Duty 200 - 600V

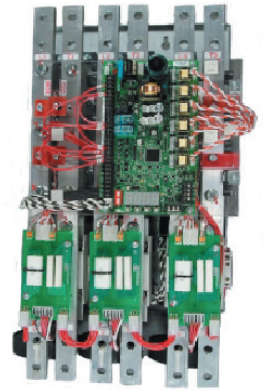


## RB3 SERIES WITH NEW MX<sup>3</sup> TECHNOLOGY

500% FOR 30 SECONDS  
125% CONTINUOUS RATED

MODEL NUMBER	AMPS	HORSEPOWER				DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
		208V	240V	480V	575V	H	W	D		
🖱️ RB3-1-S-027A-11C	24	7.5	10	20	25	14	10	7.7	14	CF
🖱️ RB3-1-S-040A-11C	40	10	15	30	40	14	10	7.7	14	CF
🖱️ RB3-1-S-052A-12C	52	15	20	40	50	14	10	7.7	17	CF
🖱️ RB3-1-S-096A-13C	96	30	40	75	100	15	10	8.5	18	CF
🖱️ RB3-1-S-125A-14C	125	40	50	100	125	19.5	12.3	10.2	43	CF
🖱️ RB3-1-S-180A-15C	204	60	75	150	200	21.3	12.3	10.2	51	CF
🖱️ RB3-1-S-361A-16C	252	75	100	200	250	24.6	13.4	10.4	56	CF
🖱️ RB3-1-S-414A-17C	372	125	150	300	400	27.6	18.5	11.7	151	CF
🖱️ RB3-1-S-590A-18C	551	200	200	450	500	27.6	18.5	11.7	159	CF
🖱️ RB3-1-S-720A-19C	623	-	250	500	600	29.4	18.5	11.7	160	CF

- Unit requires separate 120V control power.
- Unit includes remote mountable LCD keypad (KPMX3CBL2M) with 2 meter cable. Please order part number, KPMX3CBL2M, with chassis. The keypad is shipped loose.
- The above starters include the new MX<sup>3</sup> technology.
- 🖱️ Web stocked
- ☎️ Consult factory



PART NUMBER	DESCRIPTION	LIST PRICE
KPMX3CBL2M	NEMA 12/3R Remote Keypad w/ 2 Meter cable	CF
A340D	Chassis Mounted Display MX <sup>2</sup>	CF





# Prepackaged Starters with ATL Bypass Severe Duty 480V



## REDISTART RX2E SERIES + RX3E

NEMA 12 / COMBINATION / DUAL REDUNDANT



### Standard Features:

- ◆ NEMA 12, dual redundant, combination/circuit breaker
- ◆ Shunt trip on main circuit breaker
- ◆ 500% - 30 seconds rated solid state starter, UL certified and listed
- ◆ 1800 PIV rated SCRs, UL certified and listed
- ◆ 125% continuous duty rated solid state starter, UL certified and listed
- ◆ Selector switch for selecting solid state or full voltage operation mounted inside enclosure
- ◆ Full HP rated bypass contactor with a 1.15 service factor, wired for normal bypass operation and full voltage start and run operation, with normally open auxiliary contact.
- ◆ Separately mounted "SPE" series overload relay wired for full voltage start and run operation.
- ◆ 110 volt control power transformer with primary and secondary fuses
- ◆ Door mounted start and stop push-buttons
- ◆ Door mounted keypad
- ◆ Door mounted run indicating light
- ◆ Door mounted local-off remote switch
- ◆ Door mounted overload reset
- ◆ Terminal strip mounted inside enclosure for remote start/stop connection
- ◆ Auxiliary relay with (2) Form C run contacts
- ◆ Benshaw MX<sup>2</sup> programmable motor controller with soft start, soft stop and motor protection capabilities
- ◆ RS485 ModBus communications
- ◆ Analog I/O
- ◆ Available with MX<sup>3</sup> technology

### RX2E Series Product Highlights:

RX2E starters provide solid state reduced voltage starting for normal operation and full voltage emergency backup starting with complete electronic motor protection at the flip of a switch. This unique dual redundant design is the ideal solution for critical applications where downtime is extremely disruptive to production operations and cannot

be tolerated. Benshaw's MX solid state controls provide precise digital starting and stopping, motor protection, metering, diagnostics and communications ... standard.

Units are stocked with MX<sup>2</sup> technology, but are also available with MX<sup>3</sup> technology.

**Rugged. Reliable. Ready.**

### Guaranteed ... for three full years.

**Only Benshaw has a three year guarantee.**

Every Benshaw solid state starter is guaranteed for three full years. Other manufacturers limit their warranties to just one year. But at Benshaw, we believe that, because we build them better, we can guarantee them longer. We call that "the Benshaw Promise."



# Prepackaged Starters with ATL Bypass Severe Duty 480V



PREPACKAGED WITH CIRCUIT BREAKER  
EMERGENCY ACROSS-THE-LINE BYPASS / NEMA 12 / NEMA 3R

RX2E SERIES WITH MX <sup>2</sup> TECHNOLOGY										
MODEL NUMBER NEMA 12	LIST PRICE NEMA 12	MODEL NUMBER NEMA 3R*	LIST PRICE NEMA 3R	AMPS	HP	CB	DIMENSIONS (IN)			WGT (LBS)
					480V		TRIP	H	W	
🖱️ RX2E-050-480-12KP	CF	✂️ RX2E-050-480-3RKP	CF	65	50	100	48	24	13	240
🖱️ RX2E-075-480-12KP	CF	✂️ RX2E-075-480-3RKP	CF	96	75	225	48	24	13	245
🖱️ RX2E-100-480-12KP	CF	✂️ RX2E-100-480-3RKP	CF	124	100	225	48	24	17	255
🖱️ RX2E-125-480-12KP	CF	✂️ RX2E-125-480-3RKP	CF	156	125	225	48	36	17	355
🖱️ RX2E-150-480-12KP	CF	✂️ RX2E-150-480-3RKP	CF	180	150	300	48	36	17	360
🖱️ RX2E-200-480-12KP	CF	✂️ RX2E-200-480-3RKP	CF	240	200	400	48	36	17	370
🖱️ RX2E-250-480-12KP	CF	✂️ RX2E-250-480-3RKP	CF	302	250	400	70	30	18	565
🖱️ RX2E-300-480-12KP	CF	✂️ RX2E-300-480-3RKP	CF	361	300	600	70	30	18	570
🖱️ RX2E-400-480-12KP	CF	✂️ RX2E-400-480-3RKP	CF	477	400	800	87	37	20	850
🖱️ RX2E-500-480-12KP	CF	✂️ RX2E-500-480-3RKP	CF	590	500	1200	87	37	20	875
🖱️ RX2E-600-480-12KP	CF	✂️ RX2E-600-480-3RKP	CF	720	600	1200	87	37	20	905

RX3E SERIES WITH MX <sup>3</sup> TECHNOLOGY										
MODEL NUMBER NEMA 12	LIST PRICE NEMA 12	MODEL NUMBER NEMA 3R*	LIST PRICE NEMA 3R	AMPS	HP	CB	DIMENSIONS (IN)			WGT (LBS)
					480V		TRIP	H	W	
✂️ RX3E-050-480-12KP	CF	✂️ RX3E-050-480-3RKP	CF	65	50	100	48	24	13	240
✂️ RX3E-075-480-12KP	CF	✂️ RX3E-075-480-3RKP	CF	96	75	225	48	24	13	245
✂️ RX3E-100-480-12KP	CF	✂️ RX3E-100-480-3RKP	CF	124	100	225	48	24	17	255
✂️ RX3E-125-480-12KP	CF	✂️ RX3E-125-480-3RKP	CF	156	125	225	48	36	17	355
✂️ RX3E-150-480-12KP	CF	✂️ RX3E-150-480-3RKP	CF	180	150	300	48	36	17	360
✂️ RX3E-200-480-12KP	CF	✂️ RX3E-200-480-3RKP	CF	240	200	400	48	36	17	370
✂️ RX3E-250-480-12KP	CF	✂️ RX3E-250-480-3RKP	CF	302	250	400	70	30	18	565
✂️ RX3E-300-480-12KP	CF	✂️ RX3E-300-480-3RKP	CF	361	300	600	70	30	18	570
✂️ RX3E-400-480-12KP	CF	✂️ RX3E-400-480-3RKP	CF	477	400	800	87	37	20	850
✂️ RX3E-500-480-12KP	CF	✂️ RX3E-500-480-3RKP	CF	590	500	1200	87	37	20	875
✂️ RX3E-600-480-12KP	CF	✂️ RX3E-600-480-3RKP	CF	720	600	1200	87	37	20	905

- 50-600 HP units are service entrance rated.
- \* NEMA 3R units are available in 2 weeks. RX3E units are available in 2 weeks.
- \* RX2E and RX3E units include door mounted keypad.
- 🖱️ Web stocked
- ✂️ Built-to-order: Please allow two weeks for shipment.



# Prepackaged Starters Non-Bypassed / Continuous Duty and Integral Bypass

## MX2PB / MX2PC SERIES

PREPACKAGED STARTERS WITH NEW MX<sup>2</sup> TECHNOLOGY  
MODIFIED FOR NEXT DAY SHIPMENT



*Configure the MX2PB / MX2PC to fit your application ...*

To choose a stock starter, simply select a unit from the following price pages. To modify a starter, select a unit from the following price pages, then add an alpha board and/or other options as needed from the *Options* section ... Benschaw will modify the stock unit for next day shipment.

- 1. Select a starter type:**
  - MX2PC modular non-bypass or
  - MX2PB modular bypassed
- 2. Select a horsepower rating**
- 3. Select a voltage**
- 4. Select an enclosure**
- 5. Select a circuit breaker (or none)**
- 6. Select your options**

- See page 5-22 for part number assembler
- See pages 5-26 and 5-28 for stock units
- Price pages start on page 5-23
- See options on page 5-29

*MX2PB / MX2PC configurable solid state starters are stocked as:*

- ◆ Non-combination
- ◆ Combination circuit breaker
- ◆ Rotary disconnect operator
- ◆ Non-bypass
- ◆ Bypass contactor
- ◆ NEMA 4 or 12 enclosure
- ◆ Modular operator station
- ◆ 480 volt
- ◆ Standard 120V control power transformer
- ◆ Service entrance rated with circuit breaker

*Configurable to:*

- ◆ Options shown on page 5-29



(STOCK UNIT SHOWN)

+

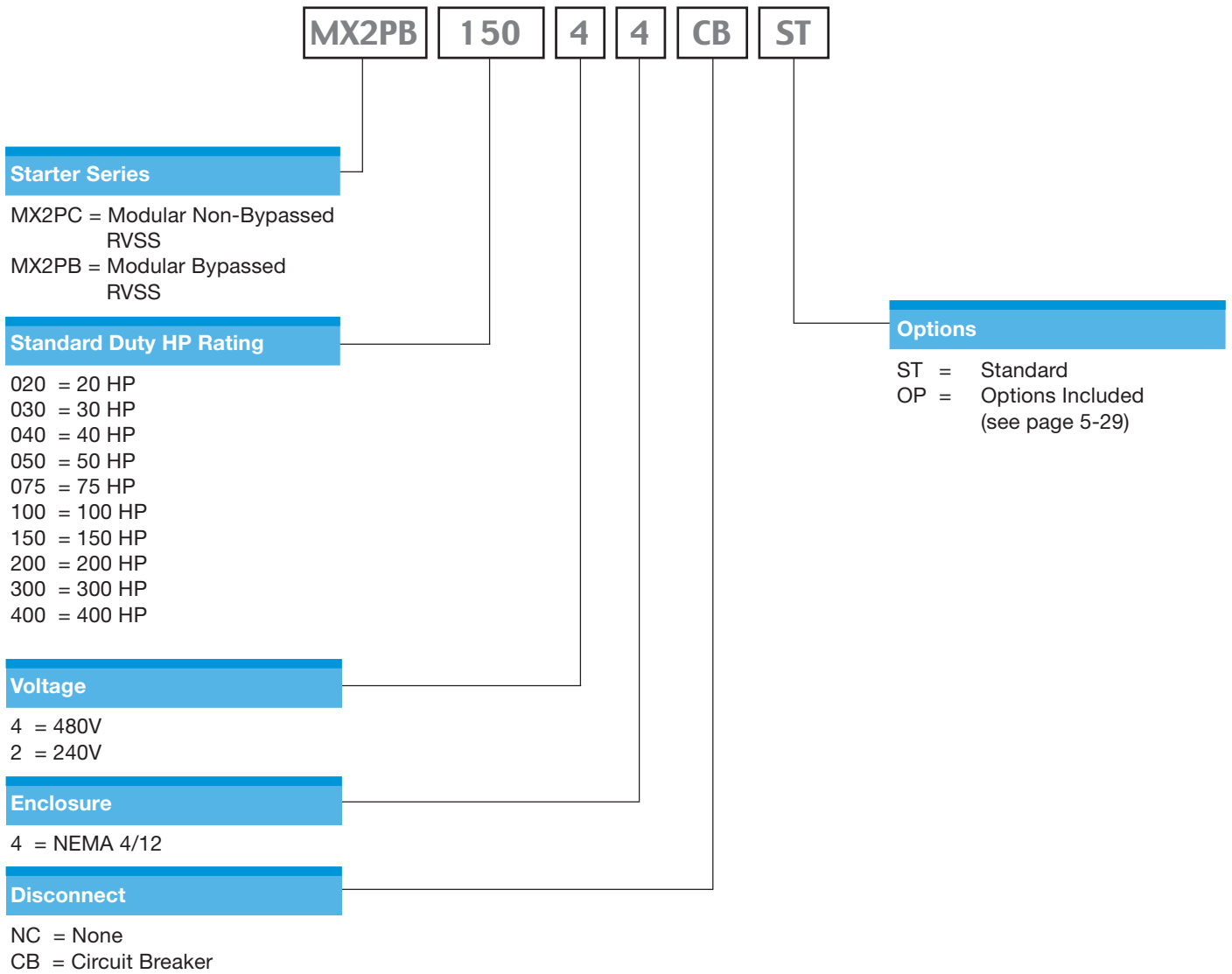


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# MX2PB / MX2PC Part Number Assembler

## CONFIGURABLE SOLID STATE STARTERS



\* All units include 120V control power transformer

# Prepackaged Starters Non-Bypassed / Continuous Duty Non-Combination 240V

## MX2PC SERIES

NEMA 4/12

### NON-COMBINATION

MODEL NUMBER	AMPS	HP	VOLT	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
				H	W	D		
MX2PC-010-2-4-NC-**	27	10	240	24	16	15	110	CF
MX2PC-015-2-4-NC-**	40	15	240	24	16	15	110	CF
MX2PC-020-2-4-NC-**	52	20	240	24	16	15	110	CF
MX2PC-025-2-4-NC-**	65	25	240	24	16	15	110	CF
MX2PC-030-2-4-NC-**	77	30	240	24	16	15	110	CF
MX2PC-040-2-4-NC-**	96	40	240	30	16	16	140	CF
MX2PC-050-2-4-NC-**	124	50	240	30	16	16	140	CF

\*\* Insert option code as shown below.  
See page 5-29 for a list of available options.

ST = No options  
OP = Options included

#### LEAD TIME:

- Available for next day shipment.

# Prepackaged Starters Non-Bypassed / Continuous Duty Non-Combination 480V



## MX2PC SERIES

NEMA 4/12

### NON-COMBINATION

MODEL NUMBER	AMPS	HP	VOLT	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
				H	W	D		
✂ MX2PC-020-4-4-NC-**	27	20	480	24	16	15	110	CF
✂ MX2PC-030-4-4-NC-**	40	30	480	24	16	15	110	CF
✂ MX2PC-040-4-4-NC-**	52	40	480	24	16	15	110	CF
✂ MX2PC-050-4-4-NC-**	65	50	480	24	16	15	110	CF
✂ MX2PC-060-4-4-NC-**	77	60	480	24	16	15	110	CF
✂ MX2PC-075-4-4-NC-**	96	75	480	30	16	16	140	CF
✂ MX2PC-100-4-4-NC-**	124	100	480	30	16	16	140	CF

\*\* Insert option code as shown below.  
See page 5-29 for a list of available options.  
ST = No options  
OP = Options included

#### LEAD TIME:

✂ Built-to-order: Available for next day shipment.

# Prepackaged Starters with Integral Bypass Non-Combination 240V



## MX2PB SERIES

NEMA 4/12

NON-COMBINATION								
MODEL NUMBER	STD DUTY <sup>1</sup> HP	HEAVY DUTY <sup>2</sup> HP	VOLT	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
				H	W	D		
✘ MX2PB-015-2-4-NC-**	15	15	240	24	16	15	110	CF
✘ MX2PB-020-2-4-NC-**	20/25	20	240	24	16	15	110	CF
✘ MX2PB-030-2-4-NC-**	30/40	30/40	240	36	16	15	150	CF
✘ MX2PB-050-2-4-NC-**	50	50	240	36	20	15	150	CF
✘ MX2PB-075-2-4-NC-**	60/75	60/75	240	48	20	15	180	CF
✘ MX2PB-100-2-4-NC-**	100	–	240	48	20	15	180	CF
✘ MX2PB-150-2-4-NC-**	150	100	240	48	20	15	180	CF
✘ MX2PB-200-2-4-NC-**	200	150	240	78	30	20	350	CF

\*\* Insert option code as shown below.  
See page 5-29 for a list of available options.

ST = No options  
OP = Options included

<sup>1</sup> Standard duty = 350% current for 30 seconds, 1.15 S.F.

<sup>2</sup> Heavy duty = 500% current for 30 seconds, 1.25 S.F.

### LEAD TIME:

✘ Built-to-order: Available for next day shipment.

# Prepackaged Starters with Integral Bypass Non-Combination 480V



## MX2PB SERIES

NEMA 4/12

### NON-COMBINATION

MODEL NUMBER	STD DUTY <sup>1</sup> HP	HEAVY DUTY <sup>2</sup> HP	VOLT	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
				H	W	D		
MX2PB-030-4-4-NC- <sup>**2</sup>	30	30	480	24	16	15	110	CF
MX2PB-050-4-4-NC- <sup>**2</sup>	50	40	480	24	16	15	110	CF
MX2PB-075-4-4-NC- <sup>**2</sup>	75	75	480	36	16	15	150	CF
MX2PB-100-4-4-NC- <sup>**2</sup>	100	–	480	36	20	15	150	CF
MX2PB-150-4-4-NC- <sup>**2</sup>	150	150	480	48	20	15	180	CF
MX2PB-200-4-4-NC- <sup>**2</sup>	200	–	480	48	20	15	180	CF
MX2PB-300-4-4-NC- <sup>**2</sup>	300	200	480	48	20	15	180	CF
MX2PB-400-4-4-NC- <sup>**2</sup>	400	300	480	78	30	20	350	CF

<sup>\*\*</sup> Insert option code as shown below.  
See page 5-29 for a list of available options.

ST = No options  
OP = Options included

<sup>1</sup> Standard duty = 350% current for 30 seconds, 1.15 S.F.

<sup>2</sup> Heavy duty = 500% current for 30 seconds, 1.25 S.F.

#### LEAD TIME:

In stock for same day shipment ... or modified for next day shipment.

Web stocked

# Prepackaged Starters with Integral Bypass Combination Circuit Breaker 240V



## MX2PB SERIES

NEMA 4/12

CIRCUIT BREAKER								
MODEL NUMBER	STD DUTY <sup>1</sup> HP	HEAVY DUTY <sup>2</sup> HP	VOLT	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
				H	W	D		
✂ MX2PB-020-2-4-CB- <sup>**</sup>	20/25	20	240	36	16	15	175	CF
✂ MX2PB-030-2-4-CB- <sup>**</sup>	30/40	30/40	240	42	20	15	200	CF
✂ MX2PB-050-2-4-CB- <sup>**</sup>	50	–	240	48	24	15	220	CF
✂ MX2PB-075-2-4-CB- <sup>**</sup>	60/75	60/75	240	48	24	15	220	CF
✂ MX2PB-100-2-4-CB- <sup>**</sup>	100	–	240	48	24	15	220	CF
✂ MX2PB-150-2-4-CB- <sup>**</sup>	150	100	240	48	24	15	220	CF
✂ MX2PB-200-2-4-CB- <sup>**</sup>	200	150	240	78	30	24	400	CF

<sup>\*\*</sup> Insert option code as shown below.  
See page 5-29 for a list of available options.

ST = No options  
OP = Options included

<sup>1</sup> Standard duty = 350% current for 30 seconds, 1.15 S.F.

<sup>2</sup> Heavy duty = 500% current for 30 seconds, 1.25 S.F.

### LEAD TIME:

✂ Built-to-order: Available for next day shipment.

# Prepackaged Starters with Integral Bypass Combination Circuit Breaker 480V

## MX2PB SERIES

NEMA 4/12



### CIRCUIT BREAKER

MODEL NUMBER	STD DUTY <sup>1</sup> HP	HEAVY DUTY <sup>2</sup> HP	VOLT	DIMENSIONS (IN)			WGT (LBS)	LIST PRICE
				H	W	D		
🖱️ MX2PB-050-4-4-CB-**2	50	40	480	36	16	15	175	CF
🖱️ MX2PB-075-4-4-CB-**2	75	75	480	42	20	15	200	CF
🖱️ MX2PB-100-4-4-CB-**2	100	–	480	48	24	15	220	CF
🖱️ MX2PB-150-4-4-CB-**2	150	150	480	48	30	15	220	CF
🖱️ MX2PB-200-4-4-CB-**2	200	–	480	48	30	15	220	CF
🖱️ MX2PB-300-4-4-CB-**2	300	200	480	48	30	15	220	CF
🖱️ MX2PB-400-4-4-CB-**2	400	300	480	78	30	24	400	CF

\*\* Insert option code as shown below.  
See page 5-29 for a list of available options.

ST = No options  
OP = Options included

<sup>1</sup> Standard duty = 350% current for 30 seconds, 1.15 S.F.

<sup>2</sup> Heavy duty = 500% current for 30 seconds, 1.25 S.F.

#### LEAD TIME:

In stock for same day shipment ... or modified for next day shipment.

🖱️ Web stocked

☎️ Consult factory

PART NUMBER	DESCRIPTION	LIST PRICE
KPMX3CBL2M	NEMA 4 Remote Keypad w/ 2 Meter cable	CF
A340D	Chassis Mounted Display MX <sup>2</sup>	CF





# MX2PC / MX2PB Series Modular Options

BENSHAW MXPC/MXPB SERIES SOLID STATE STARTERS  
CAN BE MODIFIED WITH THE FOLLOWING OPTIONS:

OPTION CODE	DOOR MOUNTED DISPLAY OPTIONS	LIST PRICE
A340A	MX3/MX2 LCD DISPLAY	CF

OPTION CODE	SPACE HEATER OPTION	LIST PRICE
A171	SPACE HEATER W / THERMOSTAT	CF

OPTION CODE	CONTROL OPTIONS (only one code can be selected)	LIST PRICE
A021	RUN LIGHT	CF
A005	RESET PUSH-BUTTON	CF
A080	START / STOP PUSH-BUTTONS	CF
A081	START / STOP PUSH-BUTTONS AND RUN LIGHT	CF
A082	START / STOP PUSH-BUTTONS, RUN LIGHT, FAULT LIGHT AND RESET PUSH-BUTTON	CF
A023	FAULT LIGHT	CF
A083	FAULT LIGHT AND RESET PUSH-BUTTON	CF
A084	RUN LIGHT, FAULT LIGHT, AND RESET PUSH-BUTTON	CF
A085	H-O-A AND START / STOP PUSH-BUTTONS	CF
A086	H-O-A, START / STOP PUSH-BUTTONS, AND RUN LIGHT	CF
A087	H-O-A, START / STOP PUSH-BUTTONS, RUN LIGHT, FAULT LIGHT, AND RESET PUSH-BUTTON	CF

OPTION CODE	COMMUNICATIONS OPTIONS	LIST PRICE
A343	PROFIBUS	CF
A344	DEVICENET	CF
A345	ETHERNET	CF
A346	LON WORKS	CF
A347	IP INTERNET WEB ADDRESSABLE	CF
A254	RS232 CONNECTOR - ALLOWS USER TO CONNECT TO THE STARTER REMOTELY WITHOUT OPENING THE ENCLOSURE DOOR. INCLUDES CARDS FOR THE MICRO II.	CF

**LEAD TIME:** Available for next day shipment.

 Consult factory

# Engineered Packages

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## PRODUCT OVERVIEW

Benshaw has developed advanced engineering, drafting, materials management and quality systems focused on designing and building customer solutions. This “Build to Order” capability combined with an extensive inventory of control components, protective relays, circuit breakers, contactors, enclosures and other electrical / electronic devices provides our customers with the quickest shipment of engineered products in the industry.

### *Control Modifications - Whatever You Specify*

- ◆ Over 250 modifications and accessories are available, including: pilot devices, PLC's, control power transformers, switches, meters, relays, space heaters, and protective devices.

### *Combination Starters to Meet Your Requirements*

- ◆ 15 to 2000 amp circuit breakers
- ◆ 40 to 2000 amp non-fused disconnects
- ◆ 30 to 800 amp fusible disconnect
- ◆ Flange or rotary handle mechanism

### *Power Stacks to Fit Your Application*

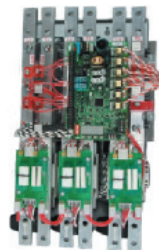
- ◆ Continuous duty / non-bypassed
- ◆ Integral bypass
- ◆ Standard, heavy, and severe duty
- ◆ Emergency across-the-line bypass

### *Enclosures to Match Your Environment*

- ◆ Standard designs - NEMA 1, 12, 4 chassis
- ◆ Custom enclosures
- ◆ Special enclosures - 3R, 4X, 7, 9, as specified
- ◆ Motor control centers

### *Communication*

- ◆ ModBus / RS485



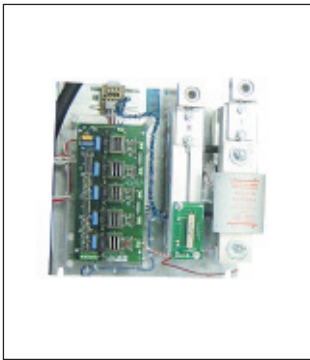
For additional options - contact factory

# For Any Application

## APPLICATION SPECIFIC STARTERS OVERVIEW

Benshaw is the trusted expert for any AC motor application. Benshaw provides a full line of application solutions for reversing motors, DC injection braking, wound rotor motors, two speed motors, synchronous motors and more.

*Call for price and availability*



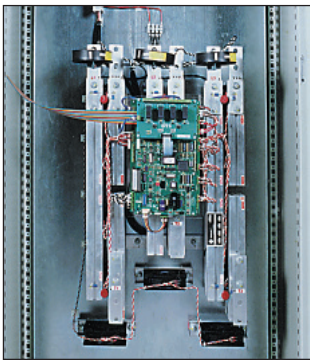
SOLID STATE STARTERS WITH DC INJECTION BRAKING



REVERSING SOLID STATE STARTERS



SYNCHRONOUS SOLID STATE STARTERS



TWO SPEED SOLID STATE STARTERS



SOLID STATE STARTERS FOR WOUND ROTOR MOTORS

# Engineered Part Number Assembler

**R B 2 1 S 100 480 S 04 NC ST**

## Starter Series

R = RediStart

## Configuration

B = Bypass Contactor  
C = Continuous

## Control

2 = MX<sup>2</sup> Technology  
3 = MX<sup>3</sup> Technology  
DC Injection Braking  
See page 5-79

## Type of Bypass

0 = None  
1 = Integral  
2 = Separate, definite purpose\*  
3 = Separate ATL IEC Rated  
4 = Separate ATL NEMA Rated\*

## Interrupt rating

S = Standard  
H = High / Consult Factory

## Horsepower

001 = 1 HP	030 = 30 HP	250 = 250 HP
002 = 2 HP	040 = 40 HP	300 = 300 HP
003 = 3 HP	050 = 50 HP	400 = 400 HP
005 = 5 HP	060 = 60 HP	500 = 500 HP
007 = 7.5 HP	075 = 75 HP	600 = 600 HP
010 = 10 HP	100 = 100 HP	700 = 700 HP
015 = 15 HP	125 = 125 HP	800 = 800 HP
020 = 20 HP	150 = 150 HP	900 = 900 HP
025 = 25 HP	200 = 200 HP	1000 = 1000 HP

## Options

ST = STANDARD  
OP = OPTIONS INCLUDED  
See page 5-72

## Disconnect Option

NC = Non-Combination  
CB = Circuit Breaker  
FD = Fusible Disconnect\*

## Enclosure

OC = Open Chassis\*  
01 = NEMA 1  
12 = NEMA 12  
04 = NEMA 4  
3R = NEMA 3R

## Power Stack Rating

S = 350% 30 Seconds  
H = 500% 30 Seconds  
V = 600% 30 Seconds\*

## Voltage

208 = 208V  
240 = 240V  
480 = 480V  
575 = 575V

\* Consult factory

# Enclosed Starters Non-Bypassed / Continuous Duty Non-Combination 208V

**RC2 SERIES** - 500% FOR 30 SECONDS  
NEMA 1 / NEMA 4

MODEL NUMBER	AMP	HP	VOLTS	LIST PRICE NEMA 1	LIST PRICE NEMA 4	DIMENSIONS			WGT (LBS)
						H	W	D	
RC20S002-208H-04-NC-**	7.6	2	208	NEMA 4 ENCLOSURE IS STANDARD	CF	16	12	11	
RC20S003-208H-04-NC-**	11	3	208		CF	16	12	11	
RC20S005-208H-04-NC-**	21	5	208		CF	16	12	11	
RC20S007-208H-04-NC-**	27	7.5	208		CF	16	12	11	
RC20S010-208H-04-NC-**	34	10	208		CF	16	12	11	
RC20S015-208H-04-NC-**	52	15	208		CF	16	12	11	
RC20S020-208H-04-NC-**	65	20	208		CF	24	12	13	
RC20S025-208H-04-NC-**	77	25	208		CF	24	12	13	
RC20S030-208H-04-NC-**	96	30	208		CF	30	12	13	
RC20S040-208H-04-NC-**	124	40	208		CF	30	12	13	
RC20S050-208H-01-NC-**	156	50	208	CF	SEE BYPASS PRICE PAGE 41	46	30	18	
RC20S060-208H-01-NC-**	180	60	208	CF		46	30	18	
RC20S075-208H-01-NC-**	240	75	208	CF		70	30	18	
RS20S100-208H-01-NC-**	302	100	208	CF		70	30	18	
RC20S125-208H-01-NC-**	361	125	208	CF		70	30	18	
RC20S150-208H-01-NC-**	477	150	208	CF		70	30	18	
RC20S200-208H-01-NC-**	590	200	208	CF		70	30	18	
RC20S250-208H-01-NC-**	720	250	208	CF		70	30	18	
RC20S300-208H-01-NC-**	840	300	208	CF					

- \*\* Insert option code. See page 5-72 for a list of available options.
- NEMA 1 units will have ventilated enclosures. For NEMA 3R units see integral bypass section that starts on page 5-41. For other enclosure types please consult factory.
- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For other enclosure types please consult factory.
- For door mounted LCD display, refer to page 5-81.

Consult factory

# Enclosed Starters Non-Bypassed / Continuous Duty Non-Combination 240V

**RC2 SERIES** - 500% FOR 30 SECONDS  
NEMA 1 / NEMA 4

MODEL NUMBER	AMP	HP	VOLTS	LIST PRICE NEMA 1	LIST PRICE NEMA 4	DIMENSIONS			WGT (LBS)
						H	W	D	
RC20S003-240H-04-NC-**	9.6	3	240	NEMA 4 ENCLOSURE IS STANDARD	CF	16	12	11	
RC20S005-240H-04-NC-**	14	5	240		CF	16	12	11	
RC20S007-240H-04-NC-**	21	7.5	240		CF	16	12	11	
RC20S010-240H-04-NC-**	27	10	240		CF	16	12	11	
RC20S015-240H-04-NC-**	40	15	240		CF	16	12	11	
RC20S020-240H-04-NC-**	52	20	240		CF	16	12	11	
RC20S025-240H-04-NC-**	65	25	240		CF	24	12	13	
RC20S030-240H-04-NC-**	77	30	240		CF	24	12	13	
RC20S040-240H-04-NC-**	96	40	240		CF	30	12	13	
RC20S050-240H-04-NC-**	124	50	240		CF	30	12	13	
RC20S060-240H-01-NC-**	156	60	240	CF	SEE BYPASS PRICE PAGE 42	46	30	16	
RC20S075-240H-01-NC-**	180	75	240	CF		46	30	16	
RC20S100-240H-01-NC-**	240	100	240	CF		70	30	18	
RC20S125-240H-01-NC-**	302	125	240	CF		70	30	18	
RC20S150-240H-01-NC-**	361	150	240	CF		70	30	18	
RC20S200-240H-01-NC-**	477	200	240	CF		70	30	18	
RC20S250-240H-01-NC-**	590	250	240	CF		70	30	18	
RC20S300-240H-01-NC-**	720	300	240	CF		70	30	18	
RC20S400-240H-01-NC-**	960	400	240	CF					
RC20S500-240H-01-NC-**	1200	500	240	CF					

\*\* Insert option code. See page 5-72 for a list of available options.

- NEMA 1 units will have ventilated enclosures. For NEMA 3R units see integral bypass section that starts on page 5-41. For other enclosure types please consult factory.
- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For other enclosure types please consult factory.
- For door mounted LCD display, refer to page 5-81.

Consult factory

# Enclosed Starters Non-Bypassed / Continuous Duty Non-Combination 480V

**RC2 SERIES** - 500% FOR 30 SECONDS  
NEMA 1 / NEMA 4

MODEL NUMBER	AMP	HP	VOLTS	LIST PRICE NEMA 1	LIST PRICE NEMA 4	DIMENSIONS			WGT (LBS)
						H	W	D	
RC20S005-480H-04-NC-**	7.6	5	480	NEMA 4 ENCLOSURE IS STANDARD	CF	16	12	11	
RC20S007-480H-04-NC-**	11	7.5	480		CF	16	12	11	
RC20S010-480H-04-NC-**	14	10	480		CF	16	12	11	
RC20S015-480H-04-NC-**	21	15	480		CF	16	12	11	
RC20S020-480H-04-NC-**	27	20	480		CF	16	12	11	
RC20S025-480H-04-NC-**	34	25	480		CF	16	12	11	
RC20S030-480H-04-NC-**	40	30	480		CF	16	12	11	
RC20S040-480H-04-NC-**	52	40	480		CF	16	12	11	
RC20S050-480H-04-NC-**	65	50	480		CF	24	12	13	
RC20S060-480H-04-NC-**	77	60	480		CF	24	12	13	
RC20S075-480H-04-NC-**	96	75	480		CF	30	12	13	
RC20S100-480H-04-NC-**	124	100	480	CF	30	12	13		
RC20S125-480H-01-NC-**	156	125	480	CF	SEE BYPASS PRICE PAGE 43	46	30	16	
RC20S150-480H-01-NC-**	180	150	480	CF		46	30	16	
RC20S200-480H-01-NC-**	240	200	480	CF		46	30	18	
RC20S250-480H-01-NC-**	302	250	480	CF		46	30	18	
RC20S300-480H-01-NC-**	361	300	480	CF		70	30	18	
RC20S400-480H-01-NC-**	477	400	480	CF		70	30	18	
RC20S500-480H-01-NC-**	590	500	480	CF		70	30	18	
RC20S600-480H-01-NC-**	720	600	480	CF					
RC20S700-480H-01-NC-**	840	700	480	CF					
RC20S800-480H-01-NC-**	960	800	480	CF					
RC20S900-480H-01-NC-**	1080	900	480	CF					
RC20S1000-480H-01-NC-**	1200	1000	480	CF					

\*\* Insert option code. See page 5-72 for a list of available options.

- NEMA 1 units will have ventilated enclosures. For NEMA 3R units see integral bypass section that starts on page 5-41. For other enclosure types please consult factory.
- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For other enclosure types please consult factory.
- For door mounted LCD display, refer to page 5-81.

Consult factory

# Enclosed Starters Non-Bypassed / Continuous Duty Non-Combination 600V

**RC2 SERIES** - 500% FOR 30 SECONDS  
NEMA 1 / NEMA 4

MODEL NUMBER	AMP	HP	VOLTS	LIST PRICE NEMA 1	LIST PRICE NEMA 4	DIMENSIONS			WGT (LBS)
						H	W	D	
RC20S007-600H-04-NC-**	11	10	600	NEMA 4 ENCLOSURE IS STANDARD	CF	16	12	11	
RC20S010-600H-04-NC-**	14	15	600		CF	16	12	11	
RC20S015-600H-04-NC-**	21	20	600		CF	16	12	11	
RC20S020-600H-04-NC-**	27	25	600		CF	16	12	11	
RC20S025-600H-04-NC-**	34	30	600		CF	16	12	11	
RC20S030-600H-04-NC-**	40	40	600		CF	16	12	11	
RC20S040-600H-04-NC-**	52	50	600		CF	16	12	11	
RC20S050-600H-04-NC-**	65	60	600		CF	24	12	13	
RC20S060-600H-04-NC-**	77	75	600		CF	24	12	13	
RC20S075-600H-04-NC-**	96	100	600		CF	30	12	13	
RC20S100-600H-04-NC-**	124	125	600	CF	30	12	13		
RC20S125-600H-01-NC-**	156	150	600	CF	SEE BYPASS PRICE PAGE 44	46	30	18	
RC20S150-600H-01-NC-**	180	200	600	CF		46	30	18	
RC20S200-600H-01-NC-**	240	250	600	CF		70	30	18	
RC20S250-600H-01-NC-**	302	300	600	CF		70	30	18	
RC20S300-600H-01-NC-**	361	400	600	CF		70	30	18	
RC20S400-600H-01-NC-**	477	500	600	CF		70	30	18	
RC20S500-600H-01-NC-**	590	600	600	CF		70	30	18	
RC20S600-600H-01-NC-**	720	700	600	CF		70	30	18	
RC20S700-600H-01-NC-**	840	800	600	CF					
RC20S800-600H-01-NC-**	960	900	600	CF					

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
OP = Options included

- NEMA 1 units will have ventilated enclosures. For NEMA 3R units see integral bypass section that starts on page 5-41. For other enclosure types please consult factory.
- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.

Consult factory



# Enclosed Starters Non-Bypassed / Continuous Duty Combination Circuit Breaker 208V

**RC2 SERIES** - 500% FOR 30 SECONDS  
NEMA 1 / NEMA 4

MODEL NUMBER	AMP	HP	VOLTS	LIST PRICE NEMA 1	LIST PRICE NEMA 4	DIMENSIONS			WGT (LBS)
						H	W	D	
RC20S002-208H-04-CB-**	7.6	2	208	NEMA 4 ENCLOSURE IS STANDARD	CF	30	24	12	
RC20S003-208H-04-CB-**	11	3	208		CF	30	24	12	
RC20S005-208H-04-CB-**	21	5	208		CF	30	24	12	
RC20S007-208H-04-CB-**	27	7.5	208		CF	30	24	12	
RC20S010-208H-04-CB-**	34	10	208		CF	30	24	12	
RC20S015-208H-04-CB-**	52	15	208		CF	30	24	12	
RC20S020-208H-04-CB-**	65	20	208		CF	30	24	12	
RC20S025-208H-04-CB-**	77	25	208		CF	30	24	12	
RC20S030-208H-04-CB-**	96	30	208		CF	30	24	12	
RC20S040-208H-04-CB-**	124	40	208		CF	30	24	12	
RC20S050-208H-01-CB-**	156	50	208	CF	SEE BYPASS PRICE PAGE 49	48	36	16	
RC20S060-208H-01-CB-**	180	60	208	CF		48	36	16	
RC20S075-208H-01-CB-**	240	75	208	CF		48	36	16	
RS20S100-208H-01-CB-**	302	100	208	CF		48	36	16	
RC20S125-208H-01-CB-**	361	125	208	CF		70	30	18	
RC20S150-208H-01-CB-**	477	150	208	CF		70	30	18	
RC20S200-208H-01-CB-**	590	200	208	CF		70	30	18	
RC20S250-208H-01-CB-**	720	250	208	CF		87	37	20	
RC20S300-208H-01-CB-**	840	300	208	CF		87	37	20	

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
OP = Options included

- NEMA 1 units will have ventilated enclosures. For NEMA 3R units see integral bypass section that starts on page 5-41. For other enclosure types please consult factory.
- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.

Consult factory

# Enclosed Starters Non-Bypassed / Continuous Duty Combination Circuit Breaker 240V

**RC2 SERIES** - 500% FOR 30 SECONDS  
NEMA 1 / NEMA 4

MODEL NUMBER	AMP	HP	VOLTS	LIST PRICE NEMA 1	LIST PRICE NEMA 4	DIMENSIONS			WGT (LBS)
						H	W	D	
RC20S003-240H-04-CB-**	9.6	3	240	NEMA 4 ENCLOSURE IS STANDARD	CF	30	24	12	
RC20S005-240H-04-CB-**	14	5	240		CF	30	24	12	
RC20S007-240H-04-CB-**	21	7.5	240		CF	30	24	12	
RC20S010-240H-04-CB-**	27	10	240		CF	30	24	12	
RC20S015-240H-04-CB-**	40	15	240		CF	30	24	12	
RC20S020-240H-04-CB-**	52	20	240		CF	30	24	12	
RC20S025-240H-04-CB-**	65	25	240		CF	30	24	12	
RC20S030-240H-04-CB-**	77	30	240		CF	30	24	12	
RC20S040-240H-04-CB-**	96	40	240		CF	30	24	12	
RC20S050-240H-04-CB-**	124	50	240		CF	30	24	12	
RC20S060-240H-01-CB-**	156	60	240	CF	SEE BYPASS PRICE PAGE 50	48	36	16	
RC20S075-240H-01-CB-**	180	75	240	CF		48	36	16	
RC20S100-240H-01-CB-**	240	100	240	CF		48	36	16	
RC20S125-240H-01-CB-**	302	125	240	CF		48	36	16	
RC20S150-240H-01-CB-**	361	150	240	CF		70	30	18	
RC20S200-240H-01-CB-**	477	200	240	CF		70	30	18	
RC20S250-240H-01-CB-**	590	250	240	CF		70	30	18	
RC20S300-240H-01-CB-**	720	300	240	CF		70	30	18	
RC20S400-240H-01-CB-**	960	400	240	CF		87	37	20	
RC20S500-240H-01-CB-**	1200	500	240	CF		87	37	20	

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
OP = Options included

- NEMA 1 units will have ventilated enclosures. For NEMA 3R units see integral bypass section that starts on page 5-41. For other enclosure types please consult factory.
- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.

Consult factory

# Enclosed Starters Non-Bypassed / Continuous Duty Combination Circuit Breaker 480V

**RC2 SERIES** - 500% FOR 30 SECONDS  
NEMA 1 / NEMA 4

MODEL NUMBER	AMP	HP	VOLTS	LIST PRICE NEMA 1	LIST PRICE NEMA 4	DIMENSIONS			WGT (LBS)
						H	W	D	
RC20S005-480H-04-CB-**	7.6	5	480	NEMA 4 ENCLOSURE IS STANDARD	CF	30	24	12	
RC20S007-480H-04-CB-**	11	7.5	480		CF	30	24	12	
RC20S010-480H-04-CB-**	14	10	480		CF	30	24	12	
RC20S015-480H-04-CB-**	21	15	480		CF	30	24	12	
RC20S020-480H-04-CB-**	27	20	480		CF	30	24	12	
RC20S025-480H-04-CB-**	34	25	480		CF	30	24	12	
RC20S030-480H-04-CB-**	40	30	480		CF	30	24	12	
RC20S040-480H-04-CB-**	52	40	480		CF	30	24	12	
RC20S050-480H-04-CB-**	65	50	480		CF	30	24	12	
RC20S060-480H-04-CB-**	77	60	480		CF	30	24	12	
RC20S075-480H-04-CB-**	96	75	480		CF	30	24	12	
RC20S100-480H-04-CB-**	124	100	480		CF	30	24	12	
RC20S125-480H-04-CB-**	156	125	480	CF	SEE BYPASS PRICE PAGE 51	48	36	16	
RC20S150-480H-04-CB-**	180	150	480	CF		48	36	16	
RC20S200-480H-04-CB-**	240	200	480	CF		48	36	16	
RC20S250-480H-04-CB-**	302	250	480	CF		70	30	18	
RC20S300-480H-04-CB-**	361	300	480	CF		70	30	18	
RC20S400-480H-04-CB-**	477	400	480	CF		70	30	18	
RC20S500-480H-04-CB-**	590	500	480	CF		70	30	18	
RC20S600-480H-04-CB-**	720	600	480	CF		70	30	18	
RC20S700-480H-04-CB-**	840	700	480	CF		87	37	20	
RC20S800-480H-04-CB-**	960	800	480	CF		87	37	20	
RC20S900-480H-04-CB-**	1080	900	480	CF	87	37	20		
RC20S1000-480H-04-CB-**	1200	1000	480	CF	87	37	20		

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
OP = Options included

- NEMA 1 units will have ventilated enclosures. For NEMA 3R units see integral bypass section that starts on page 5-41. For other enclosure types please consult factory.
- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.

Consult factory

# Enclosed Starters Non-Bypassed / Continuous Duty Combination Circuit Breaker 600V

**RC2 SERIES** - 500% FOR 30 SECONDS  
NEMA 1 / NEMA 4

MODEL NUMBER	AMP	HP	VOLTS	LIST PRICE NEMA 1	LIST PRICE NEMA 4	DIMENSIONS			WGT (LBS)
						H	W	D	
RC20S007-600H-04-CB**	7.6	7.5	600	NEMA 4 ENCLOSURE IS STANDARD	CF	30	24	12	
RC20S010-600H-04-CB**	11	10	600		CF	30	24	12	
RC20S015-600H-04-CB**	14	15	600		CF	30	24	12	
RC20S020-600H-04-CB**	21	20	600		CF	30	24	12	
RC20S025-600H-04-CB**	27	25	600		CF	30	24	12	
RC20S030-600H-04-CB**	34	30	600		CF	30	24	12	
RC20S040-600H-04-CB**	40	40	600		CF	30	24	12	
RC20S050-600H-04-CB**	52	50	600		CF	30	24	12	
RC20S060-600H-04-CB**	65	60	600		CF	30	24	12	
RC20S075-600H-04-CB**	77	75	600		CF	30	24	12	
RC20S100-600H-04-CB**	96	100	600		CF	30	24	12	
RC20S125-600H-04-CB**	124	125	600		CF	30	24	12	
RC20S150-600H-04-CB**	156	150	600	CF	SEE BYPASS PRICE PAGE 52	48	36	16	
RC20S200-600H-04-CB**	180	200	600	CF		48	36	16	
RC20S250-600H-04-CB**	240	250	600	CF		48	36	16	
RC20S300-600H-04-CB**	302	300	600	CF		48	36	16	
RC20S400-600H-04-CB**	361	400	600	CF		70	30	18	
RC20S500-600H-04-CB**	477	500	600	CF		70	30	18	
RC20S600-600H-04-CB**	590	600	600	CF		70	30	18	
RC20S700-600H-04-CB**	720	700	600	CF		70	30	18	
RC20S800-600H-04-CB**	840	800	600	CF		87	37	20	
RC20S1000-600H-04-CB**	960	1000	600	CF		87	37	20	
RC20S1125-600H-04-CB**	1080	1125	600	CF	87	37	20		

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
OP = Options included

- NEMA 1 units will have ventilated enclosures. For NEMA 3R units see integral bypass section that starts on page 5-41. For other enclosure types please consult factory.
- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.

Consult factory

# Enclosed Starters with Integral Bypass

## Non-Combination Standard Duty 208V

**RB21 SERIES** - 350% FOR 30 SECONDS

RUNNING DUTY INTEGRAL BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB21S003-208-S-XX-NC-**	3	10.6	30	24	12	CF	CF	30	24	12	CF
RB21S005-208-S-XX-NC-**	5	16.7	30	24	12	CF	CF	30	24	12	CF
RB21S007-208-S-XX-NC-**	7.5	24.2	30	24	12	CF	CF	30	24	12	CF
RB21S010-208-S-XX-NC-**	10	30.8	30	24	12	CF	CF	30	24	12	CF
RB21S015-208-S-XX-NC-**	15	46.2	30	24	12	CF	CF	30	24	12	CF
RB21S020-208-S-XX-NC-**	20	59.4	30	24	12	CF	CF	30	24	12	CF
RB21S025-208-S-XX-NC-**	25	74.8	30	24	12	CF	CF	30	24	12	CF
RB21S030-208-S-XX-NC-**	30	88	30	24	12	CF	CF	30	24	12	CF
RB21S040-208-S-XX-NC-**	40	114	48	24	12	CF	CF	48	24	12	CF
RB21S050-208-S-XX-NC-**	50	143	48	24	12	CF	CF	48	24	12	CF
RB21S060-208-S-XX-NC-**	60	169	48	24	12	CF	CF	48	24	12	CF
RB21S075-208-S-XX-NC-**	75	211	48	36	16	CF	CF	48	36	16	CF
RB21S100-208-S-XX-NC-**	100	273	48	36	16	CF	CF	48	36	16	CF
RB21S125-208-S-XX-NC-**	125	343	48	36	16	CF	CF	48	36	16	CF
RB21S150-208-S-XX-NC-**	150	396	70	30	18	CF	CF	70	30	18	CF
RB21S200-208-S-XX-NC-**	200	528	70	30	18	CF	CF	70	30	18	CF
RB21S250-208-S-XX-NC-**	250	720	70	30	18	CF	CF	70	30	18	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12      NEMA 4 enclosure suffix = 04  
NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with Integral Bypass

## Non-Combination Standard Duty 240V

**RB21 SERIES** - 350% FOR 30 SECONDS  
 RUNNING DUTY INTEGRAL BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB21S003-240-S-XX-NC-**	3	9.6	30	24	12	CF	CF	30	24	12	CF
RB21S005-240-S-XX-NC-**	5	15.2	30	24	12	CF	CF	30	24	12	CF
RB21S007-240-S-XX-NC-**	7.5	22	30	24	12	CF	CF	30	24	12	CF
RB21S010-240-S-XX-NC-**	10	28	30	24	12	CF	CF	30	24	12	CF
RB21S015-240-S-XX-NC-**	15	42	30	24	12	CF	CF	30	24	12	CF
RB21S020-240-S-XX-NC-**	20	54	30	24	12	CF	CF	30	24	12	CF
RB21S025-240-S-XX-NC-**	25	68	30	24	12	CF	CF	30	24	12	CF
RB21S030-240-S-XX-NC-**	30	80	30	24	12	CF	CF	30	24	12	CF
RB21S040-240-S-XX-NC-**	40	104	30	24	12	CF	CF	30	24	12	CF
RB21S050-240-S-XX-NC-**	50	130	48	24	12	CF	CF	48	24	12	CF
RB21S060-240-S-XX-NC-**	60	154	48	24	12	CF	CF	48	24	12	CF
RB21S075-240-S-XX-NC-**	75	192	48	24	12	CF	CF	48	24	12	CF
RB21S100-240-S-XX-NC-**	100	258	48	36	16	CF	CF	48	36	16	CF
RB21S125-240-S-XX-NC-**	125	312	48	36	16	CF	CF	48	36	16	CF
RB21S150-240-S-XX-NC-**	150	360	48	36	16	CF	CF	48	36	16	CF
RB21S200-240-S-XX-NC-**	200	480	70	30	18	CF	CF	70	30	18	CF
RB21S250-240-S-XX-NC-**	250	590	70	30	18	CF	CF	70	30	18	CF
RB21S300-240-S-XX-NC-**	300	720	70	30	18	CF	CF	70	30	18	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.  
 NEMA 12 enclosure suffix = 12      NEMA 4 enclosure suffix = 04  
 NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
 OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with Integral Bypass

## Non-Combination Standard Duty 480V

**RB21 SERIES** - 350% FOR 30 SECONDS

RUNNING DUTY INTEGRAL BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB21S003-480-S-XX-NC-**	3	4.8	30	24	12	CF	CF	30	24	12	CF
RB21S005-480-S-XX-NC-**	5	7.6	30	24	12	CF	CF	30	24	12	CF
RB21S007-480-S-XX-NC-**	7.5	11	30	24	12	CF	CF	30	24	12	CF
RB21S010-480-S-XX-NC-**	10	14	30	24	12	CF	CF	30	24	12	CF
RB21S015-480-S-XX-NC-**	15	21	30	24	12	CF	CF	30	24	12	CF
RB21S020-480-S-XX-NC-**	20	27	30	24	12	CF	CF	30	24	12	CF
RB21S025-480-S-XX-NC-**	25	34	30	24	12	CF	CF	30	24	12	CF
RB21S030-480-S-XX-NC-**	30	40	30	24	12	CF	CF	30	24	12	CF
RB21S040-480-S-XX-NC-**	40	52	30	24	12	CF	CF	30	24	12	CF
RB21S050-480-S-XX-NC-**	50	65	30	24	12	CF	CF	30	24	12	CF
RB21S060-480-S-XX-NC-**	60	77	30	24	12	CF	CF	30	24	12	CF
RB21S075-480-S-XX-NC-**	75	96	30	24	12	CF	CF	30	24	12	CF
RB21S100-480-S-XX-NC-**	100	124	48	24	12	CF	CF	48	24	12	CF
RB21S125-480-S-XX-NC-**	125	156	48	24	12	CF	CF	48	24	12	CF
RB21S150-480-S-XX-NC-**	150	180	48	24	12	CF	CF	48	24	12	CF
RB21S200-480-S-XX-NC-**	200	240	48	24	16	CF	CF	48	36	16	CF
RB21S250-480-S-XX-NC-**	250	302	48	36	16	CF	CF	48	36	16	CF
RB21S300-480-S-XX-NC-**	300	361	48	36	16	CF	CF	48	36	16	CF
RB21S350-480-S-XX-NC-**	350	414	70	30	18	CF	CF	70	30	18	CF
RB21S400-480-S-XX-NC-**	400	477	70	30	18	CF	CF	70	30	18	CF
RB21S500-480-S-XX-NC-**	500	590	70	30	18	CF	CF	70	30	18	CF
RB21S600-480-S-XX-NC-**	600	720	70	30	18	CF	CF	70	30	18	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12      NEMA 4 enclosure suffix = 04  
NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with Integral Bypass

## Non-Combination Standard Duty 600V

**RB21 SERIES** - 350% FOR 30 SECONDS  
 RUNNING DUTY INTEGRAL BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB21S003-600-S-XX-NC-**	3	3.9	30	24	12	CF	CF	30	24	12	CF
RB21S005-600-S-XX-NC-**	5	6.1	30	24	12	CF	CF	30	24	12	CF
RB21S007-600-S-XX-NC-**	7.5	9	30	24	12	CF	CF	30	24	12	CF
RB21S010-600-S-XX-NC-**	10	11	30	24	12	CF	CF	30	24	12	CF
RB21S015-600-S-XX-NC-**	15	17	30	24	12	CF	CF	30	24	12	CF
RB21S020-600-S-XX-NC-**	20	22	30	24	12	CF	CF	30	24	12	CF
RB21S025-600-S-XX-NC-**	25	27	30	24	12	CF	CF	30	24	12	CF
RB21S030-600-S-XX-NC-**	30	32	30	24	12	CF	CF	30	24	12	CF
RB21S040-600-S-XX-NC-**	40	41	30	24	12	CF	CF	30	24	12	CF
RB21S050-600-S-XX-NC-**	50	52	30	24	12	CF	CF	30	24	12	CF
RB21S060-600-S-XX-NC-**	60	62	30	24	12	CF	CF	30	24	12	CF
RB21S075-600-S-XX-NC-**	75	77	30	24	12	CF	CF	30	24	12	CF
RB21S100-600-S-XX-NC-**	100	99	30	24	12	CF	CF	30	24	12	CF
RB21S125-600-S-XX-NC-**	125	125	48	24	12	CF	CF	48	24	12	CF
RB21S150-600-S-XX-NC-**	150	144	48	24	12	CF	CF	48	24	12	CF
RB21S200-600-S-XX-NC-**	200	192	48	24	12	CF	CF	48	24	12	CF
RB21S250-600-S-XX-NC-**	250	242	48	36	16	CF	CF	48	36	16	CF
RB21S300-600-S-XX-NC-**	300	289	48	36	16	CF	CF	48	36	16	CF
RB21S350-600-S-XX-NC-**	350	336	48	36	16	CF	CF	48	36	16	CF
RB21S400-600-S-XX-NC-**	400	382	48	36	16	CF	CF	48	36	16	CF
RB21S500-600-S-XX-NC-**	500	472	70	30	18	CF	CF	70	30	18	CF
RB21S600-600-S-XX-NC-**	600	590	70	30	18	CF	CF	70	30	18	CF
RB21S700-600-S-XX-NC-**	700	720	70	30	18	CF	CF	70	30	18	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12      NEMA 4 enclosure suffix = 04  
 NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
 OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- The 3R units include a space heater and control power transformer.



# Enclosed Starters with Integral Bypass

## Non-Combination Heavy Duty 208V

**RB21 SERIES** - 500% FOR 30 SECONDS

RUNNING DUTY INTEGRAL BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB21S003-208-H-XX-NC-**	3	10.6	30	24	12	CF	CF	30	24	12	CF
RB21S005-208-H-XX-NC-**	5	16.7	30	24	12	CF	CF	30	24	12	CF
RB21S007-208-H-XX-NC-**	7.5	24.2	30	24	12	CF	CF	30	24	12	CF
RB21S010-208-H-XX-NC-**	10	30.8	30	24	12	CF	CF	30	24	12	CF
RB21S015-208-H-XX-NC-**	15	46.2	30	24	12	CF	CF	30	24	12	CF
RB21S020-208-H-XX-NC-**	20	59.4	30	24	12	CF	CF	30	24	12	CF
RB21S025-208-H-XX-NC-**	25	74.8	30	24	12	CF	CF	30	24	12	CF
RB21S030-208-H-XX-NC-**	30	88	30	24	12	CF	CF	30	24	12	CF
RB21S040-208-H-XX-NC-**	40	114	48	24	12	CF	CF	48	24	12	CF
RB21S050-208-H-XX-NC-**	50	143	48	24	12	CF	CF	48	24	12	CF
RB21S060-208-H-XX-NC-**	60	169	48	24	12	CF	CF	48	24	12	CF
RB21S075-208-H-XX-NC-**	75	211	48	36	16	CF	CF	48	36	16	CF
RB21S100-208-H-XX-NC-**	100	273	70	30	18	CF	CF	70	30	18	CF
RB21S125-208-H-XX-NC-**	125	343	70	30	18	CF	CF	70	30	18	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12      NEMA 4 enclosure suffix = 04  
NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with Integral Bypass

## Non-Combination Heavy Duty 240V

**RB21 SERIES** - 500% FOR 30 SECONDS

RUNNING DUTY INTEGRAL BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB21S003-240-H-XX-NC-**	3	9.6	30	24	12	CF	CF	30	24	12	CF
RB21S005-240-H-XX-NC-**	5	15.2	30	24	12	CF	CF	30	24	12	CF
RB21S007-240-H-XX-NC-**	7.5	22	30	24	12	CF	CF	30	24	12	CF
RB21S010-240-H-XX-NC-**	10	28	30	24	12	CF	CF	30	24	12	CF
RB21S015-240-H-XX-NC-**	15	42	30	24	12	CF	CF	30	24	12	CF
RB21S020-240-H-XX-NC-**	20	54	30	24	12	CF	CF	30	24	12	CF
RB21S025-240-H-XX-NC-**	25	68	30	24	12	CF	CF	30	24	12	CF
RB21S030-240-H-XX-NC-**	30	80	30	24	12	CF	CF	30	24	12	CF
RB21S040-240-H-XX-NC-**	40	104	30	24	12	CF	CF	30	24	12	CF
RB21S050-240-H-XX-NC-**	50	130	48	24	12	CF	CF	48	24	12	CF
RB21S060-240-H-XX-NC-**	60	154	48	36	16	CF	CF	48	36	16	CF
RB21S075-240-H-XX-NC-**	75	192	48	36	16	CF	CF	48	36	16	CF
RB21S100-240-H-XX-NC-**	100	258	48	36	16	CF	CF	48	36	16	CF
RB21S125-240-H-XX-NC-**	125	312	70	30	18	CF	CF	70	30	18	CF
RB21S150-240-H-XX-NC-**	150	360	70	30	18	CF	CF	70	30	18	CF
RB21S200-240-H-XX-NC-**	200	480	70	30	18	CF	CF	70	30	18	CF
RB21S250-240-H-XX-NC-**	250	590	70	30	18	CF	CF	70	30	18	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12      NEMA 4 enclosure suffix = 04  
 NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
 OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with Integral Bypass

## Non-Combination Heavy Duty 480V

**RB21 SERIES** - 500% FOR 30 SECONDS

RUNNING DUTY INTEGRAL BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB21S003-480-H-XX-NC-**	3	4.8	30	24	12	CF	CF	30	24	12	CF
RB21S005-480-H-XX-NC-**	5	7.6	30	24	12	CF	CF	30	24	12	CF
RB21S007-480-H-XX-NC-**	7.5	11	30	24	12	CF	CF	30	24	12	CF
RB21S010-480-H-XX-NC-**	10	14	30	24	12	CF	CF	30	24	12	CF
RB21S015-480-H-XX-NC-**	15	21	30	24	12	CF	CF	30	24	12	CF
RB21S020-480-H-XX-NC-**	20	27	30	24	12	CF	CF	30	24	12	CF
RB21S025-480-H-XX-NC-**	25	34	30	24	12	CF	CF	30	24	12	CF
RB21S030-480-H-XX-NC-**	30	40	30	24	12	CF	CF	30	24	12	CF
RB21S040-480-H-XX-NC-**	40	52	30	24	12	CF	CF	30	24	12	CF
RB21S050-480-H-XX-NC-**	50	65	30	24	12	CF	CF	30	24	12	CF
RB21S060-480-H-XX-NC-**	60	77	30	24	12	CF	CF	30	24	12	CF
RB21S075-480-H-XX-NC-**	75	96	30	24	12	CF	CF	30	24	12	CF
RB21S100-480-H-XX-NC-**	100	124	48	24	12	CF	CF	48	24	12	CF
RB21S125-480-H-XX-NC-**	125	156	48	36	16	CF	CF	48	36	16	CF
RB21S150-480-H-XX-NC-**	150	180	48	36	16	CF	CF	48	36	16	CF
RB21S200-480-H-XX-NC-**	200	240	48	36	16	CF	CF	48	36	16	CF
RB21S250-480-H-XX-NC-**	250	302	70	30	18	CF	CF	70	30	18	CF
RB21S300-480-H-XX-NC-**	300	361	70	30	18	CF	CF	70	30	18	CF
RB21S350-480-H-XX-NC-**	350	414	70	30	18	CF	CF	70	30	18	CF
RB21S400-480-H-XX-NC-**	400	477	70	30	18	CF	CF	70	30	18	CF
RB21S500-480-H-XX-NC-**	500	590	70	30	18	CF	CF	70	30	18	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12      NEMA 4 enclosure suffix = 04  
NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with Integral Bypass

## Non-Combination Heavy Duty 600V

**RB21 SERIES** - 500% FOR 30 SECONDS

RUNNING DUTY INTEGRAL BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB21S003-600-H-XX-NC-**	3	3.9	30	24	12	CF	CF	30	24	12	CF
RB21S005-600-H-XX-NC-**	5	6.1	30	24	12	CF	CF	30	24	12	CF
RB21S007-600-H-XX-NC-**	7.5	9	30	24	12	CF	CF	30	24	12	CF
RB21S010-600-H-XX-NC-**	10	11	30	24	12	CF	CF	30	24	12	CF
RB21S015-600-H-XX-NC-**	15	17	30	24	12	CF	CF	30	24	12	CF
RB21S020-600-H-XX-NC-**	20	22	30	24	12	CF	CF	30	24	12	CF
RB21S025-600-H-XX-NC-**	25	27	30	24	12	CF	CF	30	24	12	CF
RB21S030-600-H-XX-NC-**	30	32	30	24	12	CF	CF	30	24	12	CF
RB21S040-600-H-XX-NC-**	40	41	30	24	12	CF	CF	30	24	12	CF
RB21S050-600-H-XX-NC-**	50	52	30	24	12	CF	CF	30	24	12	CF
RB21S060-600-H-XX-NC-**	60	62	30	24	12	CF	CF	30	24	12	CF
RB21S075-600-H-XX-NC-**	75	77	30	24	12	CF	CF	30	24	12	CF
RB21S100-600-H-XX-NC-**	100	99	30	24	12	CF	CF	30	24	12	CF
RB21S125-600-H-XX-NC-**	125	125	48	24	12	CF	CF	48	24	12	CF
RB21S150-600-H-XX-NC-**	150	144	48	36	16	CF	CF	48	36	16	CF
RB21S200-600-H-XX-NC-**	200	192	48	36	16	CF	CF	48	36	16	CF
RB21S250-600-H-XX-NC-**	250	242	48	36	16	CF	CF	48	36	16	CF
RB21S300-600-H-XX-NC-**	300	289	70	30	18	CF	CF	70	30	18	CF
RB21S350-600-H-XX-NC-**	350	336	70	30	18	CF	CF	70	30	18	CF
RB21S400-600-H-XX-NC-**	400	382	70	30	18	CF	CF	70	30	18	CF
RB21S500-600-H-XX-NC-**	500	472	70	30	18	CF	CF	70	30	18	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12      NEMA 4 enclosure suffix = 04  
 NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
 OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with Integral Bypass Combination Circuit Breaker Standard Duty 208V

**RB21 SERIES** - 350% FOR 30 SECONDS  
RUNNING DUTY INTEGRAL BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB21S003-208-S-XX-CB-**	3	10.6	30	24	12	CF	CF	30	24	12	CF
RB21S005-208-S-XX-CB-**	5	16.7	30	24	12	CF	CF	30	24	12	CF
RB21S007-208-S-XX-CB-**	7.5	24.2	30	24	12	CF	CF	30	24	12	CF
RB21S010-208-S-XX-CB-**	10	30.8	30	24	12	CF	CF	30	24	12	CF
RB21S015-208-S-XX-CB-**	15	46.2	48	24	12	CF	CF	48	24	12	CF
RB21S020-208-S-XX-CB-**	20	59.4	48	24	12	CF	CF	48	24	12	CF
RB21S025-208-S-XX-CB-**	25	74.8	48	24	12	CF	CF	48	24	12	CF
RB21S030-208-S-XX-CB-**	30	88	48	24	12	CF	CF	48	24	12	CF
RB21S040-208-S-XX-CB-**	40	114	48	24	12	CF	CF	48	24	12	CF
RB21S050-208-S-XX-CB-**	50	143	48	24	12	CF	CF	48	24	12	CF
RB21S060-208-S-XX-CB-**	60	169	48	36	16	CF	CF	48	36	16	CF
RB21S075-208-S-XX-CB-**	75	211	48	36	16	CF	CF	48	36	16	CF
RB21S100-208-S-XX-CB-**	100	273	48	36	16	CF	CF	48	36	16	CF
RB21S125-208-S-XX-CB-**	125	343	48	36	16	CF	CF	48	36	16	CF
RB21S150-208-S-XX-CB-**	150	396	87	30	20	CF	CF	87	37	20	CF
RB21S200-208-S-XX-CB-**	200	528	87	37	20	CF	CF	87	37	20	CF
RB21S250-208-S-XX-CB-**	250	720	87	37	20	CF	CF	87	37	20	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12      NEMA 4 enclosure suffix = 04  
NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- Unit includes thermal magnetic circuit breaker.
- For CB Trip Amps - refer to page 5-83.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with Integral Bypass Combination Circuit Breaker Standard Duty 240V

**RB21 SERIES** - 350% FOR 30 SECONDS  
RUNNING DUTY INTEGRAL BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB21S003-240-S-XX-CB-**	3	9.6	30	24	12	CF	CF	30	24	12	CF
RB21S005-240-S-XX-CB-**	5	15.2	30	24	12	CF	CF	30	24	12	CF
RB21S007-240-S-XX-CB-**	7.5	22	30	24	12	CF	CF	30	24	12	CF
RB21S010-240-S-XX-CB-**	10	28	30	24	12	CF	CF	30	24	12	CF
RB21S015-240-S-XX-CB-**	15	42	30	24	12	CF	CF	30	24	12	CF
RB21S020-240-S-XX-CB-**	20	54	48	24	12	CF	CF	48	24	12	CF
RB21S025-240-S-XX-CB-**	25	68	48	24	12	CF	CF	48	24	12	CF
RB21S030-240-S-XX-CB-**	30	80	48	24	12	CF	CF	48	24	12	CF
RB21S040-240-S-XX-CB-**	40	104	48	24	12	CF	CF	48	24	12	CF
RB21S050-240-S-XX-CB-**	50	130	48	24	12	CF	CF	48	24	12	CF
RB21S060-240-S-XX-CB-**	60	154	48	24	12	CF	CF	48	24	12	CF
RB21S075-240-S-XX-CB-**	75	192	48	36	16	CF	CF	48	36	16	CF
RB21S100-240-S-XX-CB-**	100	258	48	36	16	CF	CF	48	36	16	CF
RB21S125-240-S-XX-CB-**	125	312	48	36	16	CF	CF	48	36	16	CF
RB21S150-240-S-XX-CB-**	150	360	48	36	16	CF	CF	48	36	16	CF
RB21S200-240-S-XX-CB-**	200	480	87	37	20	CF	CF	87	37	20	CF
RB21S250-240-S-XX-CB-**	250	590	87	37	20	CF	CF	87	37	20	CF
RB21S300-240-S-XX-CB-**	300	720	87	37	20	CF	CF	87	37	20	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12      NEMA 4 enclosure suffix = 04  
NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- Unit includes thermal magnetic circuit breaker.
- For CB Trip Amps - refer to page 5-83.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with Integral Bypass Combination Circuit Breaker Standard Duty 480V

**RB21 SERIES** - 350% FOR 30 SECONDS

RUNNING DUTY INTEGRAL BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB21S003-480-S-XX-CB-**	3	4.8	30	24	12	CF	CF	30	24	12	CF
RB21S005-480-S-XX-CB-**	5	7.6	30	24	12	CF	CF	30	24	12	CF
RB21S007-480-S-XX-CB-**	7.5	11	30	24	12	CF	CF	30	24	12	CF
RB21S010-480-S-XX-CB-**	10	14	30	24	12	CF	CF	30	24	12	CF
RB21S015-480-S-XX-CB-**	15	21	30	24	12	CF	CF	30	24	12	CF
RB21S020-480-S-XX-CB-**	20	27	30	24	12	CF	CF	30	24	12	CF
RB21S025-480-S-XX-CB-**	25	34	30	24	12	CF	CF	30	24	12	CF
RB21S030-480-S-XX-CB-**	30	40	30	24	12	CF	CF	30	24	12	CF
RB21S040-480-S-XX-CB-**	40	52	48	24	12	CF	CF	48	24	12	CF
RB21S050-480-S-XX-CB-**	50	65	48	24	12	CF	CF	48	24	12	CF
RB21S060-480-S-XX-CB-**	60	77	48	24	12	CF	CF	48	24	12	CF
RB21S075-480-S-XX-CB-**	75	96	48	24	12	CF	CF	48	24	12	CF
RB21S100-480-S-XX-CB-**	100	124	48	24	12	CF	CF	48	24	12	CF
RB21S125-480-S-XX-CB-**	125	156	48	24	12	CF	CF	48	24	12	CF
RB21S150-480-S-XX-CB-**	150	180	48	36	16	CF	CF	48	36	16	CF
RB21S200-480-S-XX-CB-**	200	240	48	36	16	CF	CF	48	36	16	CF
RB21S250-480-S-XX-CB-**	250	302	48	36	16	CF	CF	48	36	16	CF
RB21S300-480-S-XX-CB-**	300	361	48	36	16	CF	CF	48	36	16	CF
RB21S350-480-S-XX-CB-**	350	414	87	37	20	CF	CF	87	37	20	CF
RB21S400-480-S-XX-CB-**	400	477	87	37	20	CF	CF	87	37	20	CF
RB21S500-480-S-XX-CB-**	500	590	87	37	20	CF	CF	87	37	20	CF
RB21S600-480-S-XX-CB-**	600	720	87	37	20	CF	CF	87	37	20	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12      NEMA 4 enclosure suffix = 04  
NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- Unit includes thermal magnetic circuit breaker.
- For CB Trip Amps - refer to page 5-83.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with Integral Bypass

## Combination Circuit Breaker Standard Duty 600V

**RB21 SERIES** - 350% FOR 30 SECONDS  
 RUNNING DUTY INTEGRAL BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB21S003-600-S-XX-CB-**	3	3.9	30	24	12	CF	CF	30	24	12	CF
RB21S005-600-S-XX-CB-**	5	6.1	30	24	12	CF	CF	30	24	12	CF
RB21S007-600-S-XX-CB-**	7.5	9	30	24	12	CF	CF	30	24	12	CF
RB21S010-600-S-XX-CB-**	10	11	30	24	12	CF	CF	30	24	12	CF
RB21S015-600-S-XX-CB-**	15	17	30	24	12	CF	CF	30	24	12	CF
RB21S020-600-S-XX-CB-**	20	22	30	24	12	CF	CF	30	24	12	CF
RB21S025-600-S-XX-CB-**	25	27	30	24	12	CF	CF	30	24	12	CF
RB21S030-600-S-XX-CB-**	30	32	30	24	12	CF	CF	30	24	12	CF
RB21S040-600-S-XX-CB-**	40	41	30	24	12	CF	CF	30	24	12	CF
RB21S050-600-S-XX-CB-**	50	52	48	24	12	CF	CF	48	24	12	CF
RB21S060-600-S-XX-CB-**	60	62	48	24	12	CF	CF	48	24	12	CF
RB21S075-600-S-XX-CB-**	75	77	48	24	12	CF	CF	48	24	12	CF
RB21S100-600-S-XX-CB-**	100	99	48	24	12	CF	CF	48	24	12	CF
RB21S125-600-S-XX-CB-**	125	125	48	24	12	CF	CF	48	24	12	CF
RB21S150-600-S-XX-CB-**	150	144	48	24	12	CF	CF	48	24	12	CF
RB21S200-600-S-XX-CB-**	200	192	48	36	16	CF	CF	48	36	16	CF
RB21S250-600-S-XX-CB-**	250	242	48	36	16	CF	CF	48	36	16	CF
RB21S300-600-S-XX-CB-**	300	289	48	36	16	CF	CF	48	36	16	CF
RB21S350-600-S-XX-CB-**	350	336	48	36	16	CF	CF	48	36	16	CF
RB21S400-600-S-XX-CB-**	400	382	48	36	16	CF	CF	48	36	16	CF
RB21S500-600-S-XX-CB-**	500	472	87	37	20	CF	CF	87	37	20	CF
RB21S600-600-S-XX-CB-**	600	590	87	37	20	CF	CF	87	37	20	CF
RB21S700-600-S-XX-CB-**	700	838	87	37	20	CF	CF	87	37	20	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12 NEMA 4 enclosure suffix = 04 NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
 OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- Unit includes thermal magnetic circuit breaker.
- For CB Trip Amps - refer to page 5-83.
- The 3R units include a space heater and control power transformer.



# Enclosed Starters with Integral Bypass Combination Circuit Breaker Heavy Duty 208V

**RB21 SERIES** - 500% FOR 30 SECONDS

RUNNING DUTY INTEGRAL BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB21S003-208-H-XX-CB-**	3	10.6	30	24	12	CF	CF	30	24	12	CF
RB21S005-208-H-XX-CB-**	5	16.7	30	24	12	CF	CF	30	24	12	CF
RB21S007-208-H-XX-CB-**	7.5	24.2	30	24	12	CF	CF	30	24	12	CF
RB21S010-208-H-XX-CB-**	10	30.8	30	24	12	CF	CF	30	24	12	CF
RB21S015-208-H-XX-CB-**	15	46.2	48	24	12	CF	CF	48	24	12	CF
RB21S020-208-H-XX-CB-**	20	59.4	48	24	12	CF	CF	48	24	12	CF
RB21S025-208-H-XX-CB-**	25	74.8	48	24	12	CF	CF	48	24	12	CF
RB21S030-208-H-XX-CB-**	30	88	48	24	12	CF	CF	48	24	12	CF
RB21S040-208-H-XX-CB-**	40	114	48	24	12	CF	CF	48	24	12	CF
RB21S050-208-H-XX-CB-**	50	143	48	36	16	CF	CF	48	36	16	CF
RB21S060-208-H-XX-CB-**	60	169	48	36	16	CF	CF	48	36	16	CF
RB21S075-208-H-XX-CB-**	75	211	48	36	16	CF	CF	48	36	16	CF
RB21S100-208-H-XX-CB-**	100	273	70	30	18	CF	CF	70	30	18	CF
RB21S125-208-H-XX-CB-**	125	343	70	30	18	CF	CF	70	30	18	CF
RB21S150-208-H-XX-CB-**	150	396	79	40	20	CF	CF	79	40	20	CF
RB21S200-208-H-XX-CB-**	200	528	79	40	20	CF	CF	79	40	20	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12      NEMA 4 enclosure suffix = 04  
NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- Unit includes thermal magnetic circuit breaker.
- For CB Trip Amps - refer to page 5-83.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with Integral Bypass Combination Circuit Breaker Heavy Duty 240V

**RB21 SERIES** - 500% FOR 30 SECONDS  
RUNNING DUTY INTEGRAL BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB21S003-240-H-XX-CB-**	3	9.6	30	24	12	CF	CF	30	24	12	CF
RB21S005-240-H-XX-CB-**	5	15.2	30	24	12	CF	CF	30	24	12	CF
RB21S007-240-H-XX-CB-**	7.5	22	30	24	12	CF	CF	30	24	12	CF
RB21S010-240-H-XX-CB-**	10	28	30	24	12	CF	CF	30	24	12	CF
RB21S015-240-H-XX-CB-**	15	42	30	24	12	CF	CF	30	24	12	CF
RB21S020-240-H-XX-CB-**	20	54	48	24	12	CF	CF	48	24	12	CF
RB21S025-240-H-XX-CB-**	25	68	48	24	12	CF	CF	48	24	12	CF
RB21S030-240-H-XX-CB-**	30	80	48	24	12	CF	CF	48	24	12	CF
RB21S040-240-H-XX-CB-**	40	104	48	24	12	CF	CF	48	24	12	CF
RB21S050-240-H-XX-CB-**	50	130	48	24	12	CF	CF	48	24	12	CF
RB21S060-240-H-XX-CB-**	60	154	48	24	12	CF	CF	48	24	12	CF
RB21S075-240-H-XX-CB-**	75	192	48	36	16	CF	CF	48	36	16	CF
RB21S100-240-H-XX-CB-**	100	258	48	36	16	CF	CF	48	36	16	CF
RB21S125-240-H-XX-CB-**	125	312	48	36	16	CF	CF	48	36	16	CF
RB21S150-240-H-XX-CB-**	150	360	48	36	16	CF	CF	48	36	16	CF
RB21S200-240-H-XX-CB-**	200	480	87	37	20	CF	CF	87	37	20	CF
RB21S250-240-H-XX-CB-**	250	590	87	37	20	CF	CF	87	37	20	CF
RB21S300-240-H-XX-CB-**	300	720	87	37	20	CF	CF	87	37	20	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12      NEMA 4 enclosure suffix = 04  
NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- Unit includes thermal magnetic circuit breaker.
- For CB Trip Amps - refer to page 5-83.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with Integral Bypass Combination Circuit Breaker Heavy Duty 480V

**RB21 SERIES** - 500% FOR 30 SECONDS

RUNNING DUTY INTEGRAL BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB21S003-480-H-XX-CB-**	3	4.8	30	24	12	CF	CF	30	24	12	CF
RB21S005-480-H-XX-CB-**	5	7.6	30	24	12	CF	CF	30	24	12	CF
RB21S007-480-H-XX-CB-**	7.5	11	30	24	12	CF	CF	30	24	12	CF
RB21S010-480-H-XX-CB-**	10	14	30	24	12	CF	CF	30	24	12	CF
RB21S015-480-H-XX-CB-**	15	21	30	24	12	CF	CF	30	24	12	CF
RB21S020-480-H-XX-CB-**	20	27	30	24	12	CF	CF	30	24	12	CF
RB21S025-480-H-XX-CB-**	25	34	30	24	12	CF	CF	30	24	12	CF
RB21S030-480-H-XX-CB-**	30	40	30	24	12	CF	CF	30	24	12	CF
RB21S040-480-H-XX-CB-**	40	52	48	24	12	CF	CF	48	24	12	CF
RB21S050-480-H-XX-CB-**	50	65	48	24	12	CF	CF	48	24	12	CF
RB21S060-480-H-XX-CB-**	60	77	48	24	12	CF	CF	48	24	12	CF
RB21S075-480-H-XX-CB-**	75	96	48	24	12	CF	CF	48	24	12	CF
RB21S100-480-H-XX-CB-**	100	124	48	24	12	CF	CF	48	24	12	CF
RB21S125-480-H-XX-CB-**	125	156	48	36	16	CF	CF	48	36	16	CF
RB21S150-480-H-XX-CB-**	150	180	48	36	16	CF	CF	48	36	16	CF
RB21S200-480-H-XX-CB-**	200	240	48	36	16	CF	CF	48	36	16	CF
RB21S250-480-H-XX-CB-**	250	302	70	30	18	CF	CF	70	30	18	CF
RB21S300-480-H-XX-CB-**	300	361	70	30	18	CF	CF	70	30	18	CF
RB21S350-480-H-XX-CB-**	350	414	87	37	20	CF	CF	87	37	20	CF
RB21S400-480-H-XX-CB-**	400	477	87	37	20	CF	CF	87	37	20	CF
RB21S500-480-H-XX-CB-**	500	590	87	37	20	CF	CF	87	37	20	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12      NEMA 4 enclosure suffix = 04  
NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options  
OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- Unit includes thermal magnetic circuit breaker.
- For CB Trip Amps - refer to page 5-83.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with Integral Bypass Combination Circuit Breaker Heavy Duty 600V

**RB21 SERIES** - 500% FOR 30 SECONDS  
RUNNING DUTY INTEGRAL BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB21S003-600-H-XX-CB-**	3	3.9	30	24	12	CF	CF	30	24	12	CF
RB21S005-600-H-XX-CB-**	5	6.1	30	24	12	CF	CF	30	24	12	CF
RB21S007-600-H-XX-CB-**	7.5	9	30	24	12	CF	CF	30	24	12	CF
RB21S010-600-H-XX-CB-**	10	11	30	24	12	CF	CF	30	24	12	CF
RB21S015-600-H-XX-CB-**	15	17	30	24	12	CF	CF	30	24	12	CF
RB21S020-600-H-XX-CB-**	20	22	30	24	12	CF	CF	30	24	12	CF
RB21S025-600-H-XX-CB-**	25	27	30	24	12	CF	CF	30	24	12	CF
RB21S030-600-H-XX-CB-**	30	32	30	24	12	CF	CF	30	24	12	CF
RB21S040-600-H-XX-CB-**	40	41	30	24	12	CF	CF	30	24	12	CF
RB21S050-600-H-XX-CB-**	50	52	48	24	12	CF	CF	48	24	12	CF
RB21S060-600-H-XX-CB-**	60	62	48	24	12	CF	CF	48	24	12	CF
RB21S075-600-H-XX-CB-**	75	77	48	24	12	CF	CF	48	24	12	CF
RB21S100-600-H-XX-CB-**	100	99	48	24	12	CF	CF	48	24	12	CF
RB21S125-600-H-XX-CB-**	125	125	48	24	12	CF	CF	48	24	12	CF
RB21S150-600-H-XX-CB-**	150	144	48	24	12	CF	CF	48	24	12	CF
RB21S200-600-H-XX-CB-**	200	192	48	36	16	CF	CF	48	36	16	CF
RB21S250-600-H-XX-CB-**	250	242	70	30	18	CF	CF	70	30	18	CF
RB21S300-600-H-XX-CB-**	300	289	70	30	18	CF	CF	70	30	18	CF
RB21S350-600-H-XX-CB-**	350	336	70	30	18	CF	CF	70	30	18	CF
RB21S400-600-H-XX-CB-**	400	382	79	40	20	CF	CF	79	40	20	CF
RB21S500-600-H-XX-CB-**	500	472	87	37	20	CF	CF	87	37	20	CF
RB21S600-600-H-XX-CB-**	600	590	87	37	20	CF	CF	87	37	20	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12 NEMA 4 enclosure suffix = 04 NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options

OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- Unit includes thermal magnetic circuit breaker.
- For CB Trip Amps - refer to page 5-83.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with ATL Duty Bypass

## Non-Combination Heavy Duty 208V

**RB23 SERIES** - 500% FOR 30 SECONDS  
ACROSS THE LINE BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB23S003-208-H-XX-NC-**	3	10.6	30	24	12	CF	CF	30	24	12	CF
RB23S005-208-H-XX-NC-**	5	16.7	30	24	12	CF	CF	30	24	12	CF
RB23S007-208-H-XX-NC-**	7.5	24.2	30	24	12	CF	CF	30	24	12	CF
RB23S010-208-H-XX-NC-**	10	30.8	30	24	12	CF	CF	30	24	12	CF
RB23S015-208-H-XX-NC-**	15	46.2	30	24	12	CF	CF	30	24	12	CF
RB23S020-208-H-XX-NC-**	20	59.4	30	24	12	CF	CF	30	24	12	CF
RB23S025-208-H-XX-NC-**	25	74.8	30	24	12	CF	CF	30	24	12	CF
RB23S030-208-H-XX-NC-**	30	88	30	24	12	CF	CF	30	24	12	CF
RB23S040-208-H-XX-NC-**	40	114	30	24	12	CF	CF	30	24	12	CF
RB23S050-208-H-XX-NC-**	50	143	48	36	16	CF	CF	48	36	16	CF
RB23S060-208-H-XX-NC-**	60	169	48	36	16	CF	CF	48	36	16	CF
RB23S075-208-H-XX-NC-**	75	211	48	36	16	CF	CF	48	36	16	CF
RB23S100-208-H-XX-NC-**	100	273	48	36	16	CF	CF	48	36	16	CF
RB23S125-208-H-XX-NC-**	125	343	48	36	16	CF	CF	48	36	16	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12    NEMA 4 enclosure suffix = 04    NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options

OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- ATL units include panel mounted selector switch and door mounted start / stop push-buttons.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with ATL Duty Bypass

## Non-Combination Heavy Duty 240V

**RB23 SERIES** - 500% FOR 30 SECONDS  
ACROSS THE LINE BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB23S003-240-H-XX-NC-**	3	9.6	30	24	12	CF	CF	30	24	12	CF
RB23S005-240-H-XX-NC-**	5	15.2	30	24	12	CF	CF	30	24	12	CF
RB23S007-240-H-XX-NC-**	7.5	22	30	24	12	CF	CF	30	24	12	CF
RB23S010-240-H-XX-NC-**	10	28	30	24	12	CF	CF	30	24	12	CF
RB23S015-240-H-XX-NC-**	15	42	30	24	12	CF	CF	30	24	12	CF
RB23S020-240-H-XX-NC-**	20	54	30	24	12	CF	CF	30	24	12	CF
RB23S025-240-H-XX-NC-**	25	68	30	24	12	CF	CF	30	24	12	CF
RB23S030-240-H-XX-NC-**	30	80	30	24	12	CF	CF	30	24	12	CF
RB23S040-240-H-XX-NC-**	40	104	30	24	12	CF	CF	30	24	12	CF
RB23S050-240-H-XX-NC-**	50	130	30	24	12	CF	CF	30	24	12	CF
RB23S060-240-H-XX-NC-**	60	154	48	36	16	CF	CF	48	36	16	CF
RB23S075-240-H-XX-NC-**	75	192	48	36	16	CF	CF	48	36	16	CF
RB23S100-240-H-XX-NC-**	100	258	48	36	16	CF	CF	48	36	16	CF
RB23S125-240-H-XX-NC-**	125	312	48	36	16	CF	CF	48	36	16	CF
RB23S150-240-H-XX-NC-**	150	360	48	36	16	CF	CF	48	36	16	CF
RB23S200-240-H-XX-NC-**	200	480	70	30	18	CF	CF	70	30	18	CF
RB23S250-240-H-XX-NC-**	250	590	70	30	18	CF	CF	70	30	18	CF
RB23S300-240-H-XX-NC-**	300	720	70	30	18	CF	CF	70	30	18	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12 NEMA 4 enclosure suffix = 04 NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options

OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- ATL units include panel mounted selector switch and door mounted start / stop push-buttons.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with ATL Duty Bypass

## Non-Combination Heavy Duty 480V

**RB23 SERIES** - 500% FOR 30 SECONDS

ACROSS THE LINE BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB23S003-480-H-XX-NC-**	3	4.8	30	24	12	CF	CF	30	24	12	CF
RB23S005-480-H-XX-NC-**	5	7.6	30	24	12	CF	CF	30	24	12	CF
RB23S007-480-H-XX-NC-**	7.5	11	30	24	12	CF	CF	30	24	12	CF
RB23S010-480-H-XX-NC-**	10	14	30	24	12	CF	CF	30	24	12	CF
RB23S015-480-H-XX-NC-**	15	21	30	24	12	CF	CF	30	24	12	CF
RB23S020-480-H-XX-NC-**	20	27	30	24	12	CF	CF	30	24	12	CF
RB23S025-480-H-XX-NC-**	25	34	30	24	12	CF	CF	30	24	12	CF
RB23S030-480-H-XX-NC-**	30	44	30	24	12	CF	CF	30	24	12	CF
RB23S040-480-H-XX-NC-**	40	51	30	24	12	CF	CF	30	24	12	CF
RB23S050-480-H-XX-NC-**	50	66	30	24	12	CF	CF	30	24	12	CF
RB23S060-480-H-XX-NC-**	60	77	30	24	12	CF	CF	30	24	12	CF
RB23S075-480-H-XX-NC-**	75	96	30	24	12	CF	CF	30	24	12	CF
RB23S100-480-H-XX-NC-**	100	124	48	36	16	CF	CF	48	24	12	CF
RB23S125-480-H-XX-NC-**	125	156	48	36	16	CF	CF	48	36	16	CF
RB23S150-480-H-XX-NC-**	150	180	48	36	16	CF	CF	48	36	16	CF
RB23S200-480-H-XX-NC-**	200	240	48	36	16	CF	CF	48	36	16	CF
RB23S250-480-H-XX-NC-**	250	302	48	36	16	CF	CF	48	36	16	CF
RB23S300-480-H-XX-NC-**	300	361	48	36	16	CF	CF	48	36	16	CF
RB23S350-480-H-XX-NC-**	350	414	70	30	18	CF	CF	70	30	18	CF
RB23S400-480-H-XX-NC-**	400	477	70	30	18	CF	CF	70	30	18	CF
RB23S500-480-H-XX-NC-**	500	590	70	30	18	CF	CF	70	30	18	CF
RB23S600-480-H-XX-NC-**	600	720	70	30	18	CF	CF	70	30	18	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12 NEMA 4 enclosure suffix = 04 NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options

OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- ATL units include panel mounted selector switch and door mounted start / stop push-buttons.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with ATL Duty Bypass

## Non-Combination Heavy Duty 600V

**RB23 SERIES** - 500% FOR 30 SECONDS  
ACROSS THE LINE BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB23S003-600-H-XX-NC-**	3	3.9	30	24	12	CF	CF	30	24	12	CF
RB23S005-600-H-XX-NC-**	5	6.1	30	24	12	CF	CF	30	24	12	CF
RB23S007-600-H-XX-NC-**	7.5	9	30	24	12	CF	CF	30	24	12	CF
RB23S010-600-H-XX-NC-**	10	11	30	24	12	CF	CF	30	24	12	CF
RB23S015-600-H-XX-NC-**	15	17	30	24	12	CF	CF	30	24	12	CF
RB23S020-600-H-XX-NC-**	20	22	30	24	12	CF	CF	30	24	12	CF
RB23S025-600-H-XX-NC-**	25	27	30	24	12	CF	CF	30	24	12	CF
RB23S030-600-H-XX-NC-**	30	32	30	24	12	CF	CF	30	24	12	CF
RB23S040-600-H-XX-NC-**	40	41	30	24	12	CF	CF	30	24	12	CF
RB23S050-600-H-XX-NC-**	50	52	30	24	12	CF	CF	30	24	12	CF
RB23S060-600-H-XX-NC-**	60	62	30	24	12	CF	CF	30	24	12	CF
RB23S075-600-H-XX-NC-**	75	77	30	24	12	CF	CF	30	24	12	CF
RB23S100-600-H-XX-NC-**	100	99	30	24	12	CF	CF	30	24	12	CF
RB23S125-600-H-XX-NC-**	125	125	30	24	12	CF	CF	30	24	12	CF
RB23S150-600-H-XX-NC-**	150	144	48	36	16	CF	CF	48	36	16	CF
RB23S200-600-H-XX-NC-**	200	192	48	36	16	CF	CF	48	36	16	CF
RB23S250-600-H-XX-NC-**	250	242	48	36	16	CF	CF	48	36	16	CF
RB23S300-600-H-XX-NC-**	300	289	48	36	16	CF	CF	48	36	16	CF
RB23S350-600-H-XX-NC-**	350	336	48	36	16	CF	CF	48	36	16	CF
RB23S400-600-H-XX-NC-**	400	382	70	30	18	CF	CF	70	30	18	CF
RB23S500-600-H-XX-NC-**	500	472	70	30	18	CF	CF	70	30	18	CF
RB23S600-600-H-XX-NC-**	600	590	70	30	18	CF	CF	70	30	18	CF
RB23S700-600-H-XX-NC-**	700	838	70	30	18	CF	CF	70	30	18	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12 NEMA 4 enclosure suffix = 04 NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options

OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- ATL units include panel mounted selector switch and door mounted start / stop push-buttons.
- The 3R units include a space heater and control power transformer.



# Enclosed Starters with ATL Duty Bypass Combination Circuit Breaker Heavy Duty 208V

**RB23 SERIES** - 500% FOR 30 SECONDS  
ACROSS THE LINE BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB23S003-208-H-XX-CB-**	3	10.6	30	24	12	CF	CF	30	24	12	CF
RB23S005-208-H-XX-CB-**	5	16.7	30	24	12	CF	CF	30	24	12	CF
RB23S007-208-H-XX-CB-**	7.5	24.2	30	24	12	CF	CF	30	24	12	CF
RB23S010-208-H-XX-CB-**	10	30.8	30	24	12	CF	CF	30	24	12	CF
RB23S015-208-H-XX-CB-**	15	46.2	48	24	12	CF	CF	30	24	12	CF
RB23S020-208-H-XX-CB-**	20	59.4	48	24	12	CF	CF	48	24	12	CF
RB23S025-208-H-XX-CB-**	25	74.8	48	24	12	CF	CF	48	24	12	CF
RB23S030-208-H-XX-CB-**	30	88	48	24	12	CF	CF	48	24	12	CF
RB23S040-208-H-XX-CB-**	40	114	48	24	12	CF	CF	48	24	12	CF
RB23S050-208-H-XX-CB-**	50	143	48	36	16	CF	CF	48	36	16	CF
RB23S060-208-H-XX-CB-**	60	169	48	36	16	CF	CF	48	36	16	CF
RB23S075-208-H-XX-CB-**	75	211	48	36	16	CF	CF	48	36	16	CF
RB23S100-208-H-XX-CB-**	100	273	70	30	18	CF	CF	70	30	18	CF
RB23S125-208-H-XX-CB-**	125	343	70	30	18	CF	CF	70	30	18	CF
RB23S150-208-H-XX-CB-**	150	396	87	37	20	CF	CF	87	37	20	CF
RB23S200-208-H-XX-CB-**	200	528	87	37	20	CF	CF	87	37	20	CF
RB23S250-208-H-XX-CB-**	250	720	87	37	20	CF	CF	87	37	20	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12 NEMA 4 enclosure suffix = 04 NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options

OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- ATL units include panel mounted selector switch and door mounted start / stop push-buttons.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with ATL Duty Bypass Combination Circuit Breaker Heavy Duty 240V

**RB23 SERIES** - 500% FOR 30 SECONDS  
ACROSS THE LINE BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB23S003-240-H-XX-CB-**	3	9.6	30	24	12	CF	CF	30	24	12	CF
RB23S005-240-H-XX-CB-**	5	15.2	30	24	12	CF	CF	30	24	12	CF
RB23S007-240-H-XX-CB-**	7.5	22	30	24	12	CF	CF	30	24	12	CF
RB23S010-240-H-XX-CB-**	10	28	30	24	12	CF	CF	30	24	12	CF
RB23S015-240-H-XX-CB-**	15	42	30	24	12	CF	CF	30	24	12	CF
RB23S020-240-H-XX-CB-**	20	54	48	24	12	CF	CF	48	24	12	CF
RB23S025-240-H-XX-CB-**	25	68	48	24	12	CF	CF	48	24	12	CF
RB23S030-240-H-XX-CB-**	30	80	48	24	12	CF	CF	48	24	12	CF
RB23S040-240-H-XX-CB-**	40	104	48	24	12	CF	CF	48	24	12	CF
RB23S050-240-H-XX-CB-**	50	130	48	24	12	CF	CF	48	24	12	CF
RB23S060-240-H-XX-CB-**	60	154	48	36	16	CF	CF	48	36	16	CF
RB23S075-240-H-XX-CB-**	75	192	48	36	16	CF	CF	48	36	16	CF
RB23S100-240-H-XX-CB-**	100	258	48	36	16	CF	CF	48	36	16	CF
RB23S125-240-H-XX-CB-**	125	312	70	30	18	CF	CF	70	30	18	CF
RB23S150-240-H-XX-CB-**	150	360	70	30	18	CF	CF	70	30	18	CF
RB23S200-240-H-XX-CB-**	200	480	87	37	20	CF	CF	87	37	20	CF
RB23S250-240-H-XX-CB-**	250	590	87	37	20	CF	CF	87	37	20	CF
RB23S300-240-H-XX-CB-**	300	720	87	37	20	CF	CF	87	37	20	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12 NEMA 4 enclosure suffix = 04 NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options

OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- ATL units include panel mounted selector switch and door mounted start / stop push-buttons.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with ATL Duty Bypass Combination Circuit Breaker Heavy Duty 480V

**RB23 SERIES** - 500% FOR 30 SECONDS  
ACROSS THE LINE BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB23S003-480-H-XX-CB-**	3	4.8	30	24	12	CF	CF	30	24	12	CF
RB23S005-480-H-XX-CB-**	5	7.6	30	24	12	CF	CF	30	24	12	CF
RB23S007-480-H-XX-CB-**	7.5	11	30	24	12	CF	CF	30	24	12	CF
RB23S010-480-H-XX-CB-**	10	14	30	24	12	CF	CF	30	24	12	CF
RB23S015-480-H-XX-CB-**	15	21	30	24	12	CF	CF	30	24	12	CF
RB23S020-480-H-XX-CB-**	20	27	30	24	12	CF	CF	30	24	12	CF
RB23S025-480-H-XX-CB-**	25	34	30	24	12	CF	CF	30	24	12	CF
RB23S030-480-H-XX-CB-**	30	40	30	24	12	CF	CF	30	24	12	CF
RB23S040-480-H-XX-CB-**	40	52	48	24	12	CF	CF	48	24	12	CF
RB23S050-480-H-XX-CB-**	50	65	48	24	12	CF	CF	48	24	12	CF
RB23S060-480-H-XX-CB-**	60	77	48	24	12	CF	CF	48	24	12	CF
RB23S075-480-H-XX-CB-**	75	96	48	24	12	CF	CF	48	24	12	CF
RB23S100-480-H-XX-CB-**	100	124	48	24	12	CF	CF	48	24	12	CF
RB23S125-480-H-XX-CB-**	125	156	48	36	16	CF	CF	48	36	16	CF
RB23S150-480-H-XX-CB-**	150	180	48	36	16	CF	CF	48	36	16	CF
RB23S200-480-H-XX-CB-**	200	240	48	36	16	CF	CF	48	36	16	CF
RB23S250-480-H-XX-CB-**	250	302	70	30	18	CF	CF	70	30	18	CF
RB23S300-480-H-XX-CB-**	300	361	70	30	18	CF	CF	70	30	18	CF
RB23S350-480-H-XX-CB-**	350	414	87	37	20	CF	CF	87	37	20	CF
RB23S400-480-H-XX-CB-**	400	477	87	37	20	CF	CF	87	37	20	CF
RB23S500-480-H-XX-CB-**	500	590	87	37	20	CF	CF	87	37	20	CF
RB23S600-480-H-XX-CB-**	600	720	87	37	20	CF	CF	87	37	20	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12 NEMA 4 enclosure suffix = 04 NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options

OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- ATL units include panel mounted selector switch and door mounted start / stop push-buttons.
- The 3R units include a space heater and control power transformer.

# Enclosed Starters with ATL Duty Bypass Combination Circuit Breaker Heavy Duty 600V

**RB23 SERIES** - 500% FOR 30 SECONDS  
ACROSS THE LINE BYPASS / NEMA 12 / 3R / 4

MODEL NUMBER	HP	AMPS	NEMA 12 / 4 DIMENSIONS			LIST PRICE NEMA 12	LIST PRICE NEMA 4	NEMA 3R DIMENSIONS			LIST PRICE NEMA 3R
			H	W	D			H	W	D	
RB23S003-600-H-XX-CB-**	3	3.9	30	24	12	CF	CF	30	24	12	CF
RB23S005-600-H-XX-CB-**	5	6.1	30	24	12	CF	CF	30	24	12	CF
RB23S007-600-H-XX-CB-**	7.5	9	30	24	12	CF	CF	30	24	12	CF
RB23S010-600-H-XX-CB-**	10	11	30	24	12	CF	CF	30	24	12	CF
RB23S015-600-H-XX-CB-**	15	17	30	24	12	CF	CF	30	24	12	CF
RB23S020-600-H-XX-CB-**	20	22	30	24	12	CF	CF	30	24	12	CF
RB23S025-600-H-XX-CB-**	25	27	30	24	12	CF	CF	30	24	12	CF
RB23S030-600-H-XX-CB-**	30	32	30	24	12	CF	CF	30	24	12	CF
RB23S040-600-H-XX-CB-**	40	41	30	24	12	CF	CF	30	24	12	CF
RB23S050-600-H-XX-CB-**	50	52	30	24	12	CF	CF	30	24	12	CF
RB23S060-600-H-XX-CB-**	60	62	48	24	12	CF	CF	48	24	12	CF
RB23S075-600-H-XX-CB-**	75	77	48	24	12	CF	CF	48	24	12	CF
RB23S100-600-H-XX-CB-**	100	99	48	24	12	CF	CF	48	24	12	CF
RB23S125-600-H-XX-CB-**	125	125	48	24	12	CF	CF	48	24	12	CF
RB23S150-600-H-XX-CB-**	150	144	48	36	16	CF	CF	48	36	16	CF
RB23S200-600-H-XX-CB-**	200	192	48	36	16	CF	CF	48	36	16	CF
RB23S250-600-H-XX-CB-**	250	242	48	36	16	CF	CF	48	36	16	CF
RB23S300-600-H-XX-CB-**	300	289	70	30	18	CF	CF	70	30	18	CF
RB23S350-600-H-XX-CB-**	350	336	70	30	18	CF	CF	70	30	18	CF
RB23S400-600-H-XX-CB-**	400	382	70	30	18	CF	CF	70	30	18	CF
RB23S500-600-H-XX-CB-**	500	472	87	37	20	CF	CF	87	37	20	CF
RB23S600-600-H-XX-CB-**	600	590	87	37	20	CF	CF	87	37	20	CF
RB23S700-600-H-XX-CB-**	700	838	87	37	20	CF	CF	87	37	20	CF

XX = Enclosure type. Please insert appropriate suffix as shown below.

NEMA 12 enclosure suffix = 12 NEMA 4 enclosure suffix = 04 NEMA 3R enclosure suffix = 3R

\*\* Insert option code as shown below. See page 5-72 for a list of available options.

ST = No options

OP = Options included

- The above starters include MX<sup>2</sup> technology. For MX<sup>3</sup> technology, change the 2 designator to 3 and add \$1,175.00 to the list price. This price includes door mounted keypad. See page 5-81 for keypad option code.
- For door mounted LCD display, refer to page 5-81.
- For higher HP, please consult factory.
- ATL units include panel mounted selector switch and door mounted start / stop push-buttons.
- The 3R units include a space heater and control power transformer.

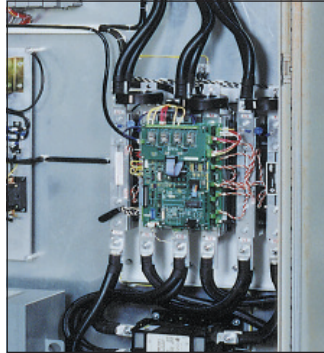
# Wound Rotor Starter

## WITH MX<sup>3</sup> TECHNOLOGY

### SOLID STATE STARTER WITH WOUND ROTOR CONTROL

#### RATINGS

<b>Horsepower:</b>	<b>20 - 1500HP</b>
<b>Overload:</b>	<b>500% for 30 seconds 125% continuous</b>
<b>Starting Torque:</b>	<b>0 - 100%</b>
<b>Voltage:</b>	<b>200 - 1000Vac</b>
<b>Typical Resistance Steps:</b>	<b>1-2</b>



## Wound Rotor Starter Product Highlights:

Wound rotor motors are typically used in applications requiring high starting torques, a limited number of operating speeds, or a stepped acceleration to achieve a soft start. Typical existing applications utilize an electromechanical starter on the stator and introduce multiple stages of resistance in the rotor via contactor arrangements to achieve a soft ramp.

With the RediStart MX<sup>3</sup>, wound rotor control is greatly simplified. The RediStart consists of two major sections: 1) A solid-state stator control, and 2) a single step of resistance into the rotor circuit from a separate 3-phase resistor bank. This achieves the high torque required by the application—with low inrush—while providing a smooth stepless start. This greatly

reduces the maintenance cost of the typical electromechanical control.

#### Single Step Rotor Control

The solid-state starter is wired to the motor stator circuit, and the resistor and shorting contactor are wired to the motor rotor circuit. The solid state starter accelerates the motor to slip speed (determined by the resistance value) and then activates the contactor to short the rotor. This allows the motor to accelerate to full speed.

#### Multiple Step Rotor Circuit

RBW series starters can be supplied with multiple stages of rotor resistor and contactor combinations. This arrangement may be necessary for multiple step starting of extremely high inertia loads, or for continuous operation at multiple speeds. Multiple steps

#### Key Advantages:

- ◆ Benshaw MX<sup>3</sup> technology
- ◆ Single step rotor control
- ◆ Modular power stack design for ease of maintenance
- ◆ Integral bypass contactor design
- ◆ Advanced MX<sup>3</sup> motor protection
- ◆ Advanced MX<sup>3</sup> metering function
- ◆ Real time clock
- ◆ 99 event log history
- ◆ Modbus capable
- ◆ Configurable output relays
- ◆ Multistep & variable speed rotor control available
- ◆ Reduced maintenance
- ◆ Reduced in size and number of resistors needed
- ◆ Stepless control
- ◆ Reduces inrush while maintaining torque

of rotor resistance can be coordinated to achieve this.

#### Variable Speed Control

Variable speed control of wound rotor motors can be accomplished with the RediStart series control. By maintaining full output voltage of the control going to the stator of the wound rotor motor, and varying the resistance in the rotor, variable speed is accomplished.

Resistors must be rated for continuous duty operations. Variable loads (pumps and fans) only.

- See standard MX<sup>3</sup> control features on page 5-6
- See wound rotor checklist on page 5-66
- Contact Benshaw for pricing

## Guaranteed ... for three full years.

*Only Benshaw has a three year guarantee.*

Every Benshaw solid state starter is guaranteed for three full years. Other manufacturers limit their warranties to just one year. But at Benshaw, we believe that, because we build them better, we can guarantee them longer. We call that “the Benshaw Promise.”





# Wound Rotor Motor Checklist

---

## Present Starting Method

Across-the-line     Other (please specify) \_\_\_\_\_  
\_\_\_\_\_

## Rotor Circuit Information

Present number of steps of resistance \_\_\_\_\_

Total starting ohm value \_\_\_\_\_ ohms

## Current Method of Resistance Shorting

Step one \_\_\_\_\_ sec.

Step two \_\_\_\_\_ sec.

Step three \_\_\_\_\_ sec.

Step four \_\_\_\_\_ sec.

Step five \_\_\_\_\_ sec.

The present number of steps may be more  
or less than listed above (please specify)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Motor Information

Primary voltage \_\_\_\_\_ Secondary voltage \_\_\_\_\_

Primary amps \_\_\_\_\_ Secondary amps \_\_\_\_\_

RPM \_\_\_\_\_ Service factor \_\_\_\_\_

Size of utility supply transformer \_\_\_\_\_ Kva

Present time to accelerate to full speed (approximate) \_\_\_\_\_ sec.

Starts required per hour \_\_\_\_\_

# Synchronous Starter

## MX<sup>2</sup> SEP SERIES - SOLID STATE STARTER WITH SYNCHRONOUS CONTROL

### RATINGS

<b>Horsepower:</b>	<b>20 - 1500HP</b>
<b>Overload:</b>	<b>500% for 30 seconds 125% continuous</b>
<b>Starting Torque:</b>	<b>0 - 100%</b>
<b>Voltage:</b>	<b>200 - 1000Vac</b>
<b>Includes discharge resistor and synchronous excitation package for brush type and brushless motor.</b>	
<b>Exciter Ratings:</b>	<b>125 - 250Vdc 30 - 120A</b>



### Key Advantages:

- ◆ Benshaw synchronous technology
- ◆ Solid state synchronous rotor control
- ◆ Modular power stack design for ease of maintenance
- ◆ Integral bypass contactor design
- ◆ Advanced synchronous motor protection
- ◆ Can be added to existing equipment
- ◆ Can be supplied with MX<sup>2</sup> or MX<sup>3</sup> starter control
- ◆ Modbus communication
- ◆ Configurable output relays
- ◆ Reduced maintenance
- ◆ Reduction in size compared to existing field control
- ◆ Stepless control
- ◆ Reduces inrush while maintaining torque
- ◆ Brush type and brushless control

### Synchronous Starter Product Highlights:

The sync motor functions as an induction motor during start up. Once the motor approaches full synchronous speed, the Redistart DC exciter induces a constant polarity to the rotor causing the motor to lock into sync. Because the rotor's field is constant and separately excited there is no slip required to produce torque, as with an induction motor. This allows the motor to run at synchronous speed.

The Benshaw synchronous package consists of a solid state starter portion connected to the stator and an SEP (synchronous excitation package) that is connected to the rotor section in

conjunction with a discharge resistor. This SEP is supplied for brush type and brushless exciters.

#### Synchronous Benefits

The RediStart series solid state starter provides reduced voltage stepless acceleration and automatic synchronization of three phase AC synchronous motors. Synchronous motors are utilized for a number of reasons. They are used in applications that require precise motor speed. They are used to obtain greater efficiencies, and they are used for facility power factor correction.

Since synchronous motors can be

operated at leading power factor, they are used to correct a facility's lagging power factor created by all the other induction motors being operated.

This correction reduces the penalty a customer pays the utility company for creating poor power factor.

Synchronous motors are not sensitive to electrical harmonic problems.

### Guaranteed ... for three full years.

*Only Benshaw has a three year guarantee.*

Every Benshaw solid state starter is guaranteed for three full years. Other manufacturers limit their warranties to just one year. But at Benshaw, we believe that, because we build them better, we can guarantee them longer. We call that "the Benshaw Promise."



- See synchronous rotor checklist on page 5-68
- Contact Benshaw for pricing



# Synchronous Motor Checklist

---

## Present Starting Method

Across-the-line     Other (please specify) \_\_\_\_\_

Application \_\_\_\_\_

Field discharge resistor value \_\_\_\_\_ ohms

## Motor Information

Motor horsepower \_\_\_\_\_ Motor frequency \_\_\_\_\_ Hz

Field voltage \_\_\_\_\_ Max field current \_\_\_\_\_

Full load current \_\_\_\_\_ Motor LRA \_\_\_\_\_ Motor voltage \_\_\_\_\_

RPM \_\_\_\_\_ Service factor \_\_\_\_\_

Motor Wk2 \_\_\_\_\_ Load Wk2 \_\_\_\_\_ Motor speed \_\_\_\_\_ RPM \_\_\_\_\_

Size of utility supply transformer \_\_\_\_\_ Kva

Present time to accelerate to full speed (approximate) \_\_\_\_\_ sec.

Starts required per hour \_\_\_\_\_

Brushless exciter    or     Brush type exciter

## Options

Circuit breaker     Fusible switch     No disconnect needed

Bypass contactor run duty only

120 control power by Benshaw

Start/Stop push-button

Hand off auto     Local off remote     2 wire control     3 wire control

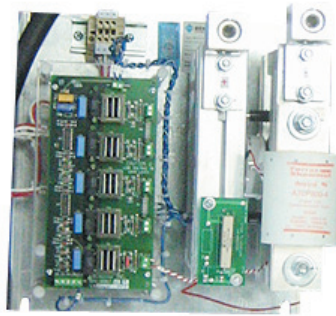


# RB2/RB3 Series Starter with DC Injection Brake

SOLID STATE STARTER WITH DC INJECTION CONTROL

## RATINGS

<b>Horsepower:</b>	20 - 1500HP
<b>Overload:</b>	500% for 30 seconds 125% continuous
<b>Starting Torque:</b>	0 - 100%
<b>Voltage:</b>	200 - 1000VAC
<b>Standard Duty:</b>	300% braking current for 30 seconds
<b>Heavy Duty:</b>	300% braking current for 60 seconds



## Key Advantages:

- ◆ Benshaw MX<sup>3</sup> technology
- ◆ Standard and heavy duty DC injection brake configurations available
- ◆ Modular power stack design for ease of maintenance
- ◆ Solid state starter and DC brake integrated in one package
- ◆ Integral bypass contactor design
- ◆ Advanced Micro motor protection
- ◆ Advanced MX<sup>3</sup> metering function
- ◆ Real time clock
- ◆ 99 event log history
- ◆ ModBus communication
- ◆ Configurable output relays
- ◆ Reduced maintenance
- ◆ Reversing capabilities are also available

## DC Injection Braking Starter Product Highlights:

Benshaw offers a microprocessor controlled solid state reduced voltage starter with D.C. injection braking for three phase induction motors. The starter provides a closed loop current ramp for smooth stepless motor acceleration.

The RediStart starter with DC injection brake consists of the Benshaw 3 phase SCR power stack for the soft start, with an integrated SCR power block

power fuse and control logic for the DC injection circuit.

The RediStart DC injection brake SCR system allows a free wheeling path for the DC current that circulates in the motor windings. When the DC current is applied to the AC motor windings, braking action is achieved as the circulating motor rotor tries to align itself with the stationary DC field, thus giving the motor smooth electronic braking action.

## Guaranteed ... for three full years.

*Only Benshaw has a three year guarantee.*

Every Benshaw solid state starter is guaranteed for three full years. Other manufacturers limit their warranties to just one year. But at Benshaw, we believe that, because we build them better, we can guarantee them longer. We call that "the Benshaw Promise."



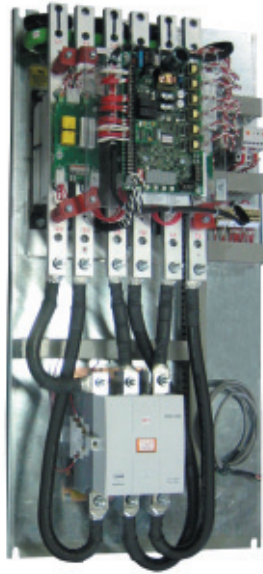
- See standard MX<sup>3</sup> technology features on page 5-6
- Contact Benshaw for pricing

# RB2/RB3 Series Reversing Starter

SOLID STATE STARTER WITH REVERSING CONTROL

## RATINGS

Horsepower:	20 - 1500HP
Overload:	500% for 30 seconds 125% continuous
Starting Torque:	0 - 100%
Voltage:	200 - 1000Vac



## Key Advantages:

- ◆ Benschaw MX<sup>2</sup> or MX<sup>3</sup> technology with reversing contactor control
- ◆ Available with DC injection brake
- ◆ Modular power stack design for ease of maintenance
- ◆ Integral bypass contactor design
- ◆ Advanced MX<sup>2</sup> or MX<sup>3</sup> motor protection
- ◆ Advanced MX<sup>2</sup> or MX<sup>3</sup> metering function
- ◆ Real time clock (MX<sup>3</sup> only)
- ◆ 99 event log history (MX<sup>3</sup> only)
- ◆ ModBus communication
- ◆ Configurable output relays
- ◆ Reduced maintenance

## Reversing Starter Product Highlights:

Benschaw also offers a microprocessor controlled solid state reduced voltage reversing starter for three phase induction motors. This starter provides a closed loop current ramp for smooth stepless motor acceleration.

The RediStart reversing starter is offered with a reversing contactor set.

Sold as RC or RB unit in the Engineered Products section with reversing contactor option.

## Guaranteed ... for three full years.

*Only Benschaw has a three year guarantee.*

Every Benschaw solid state starter is guaranteed for three full years. Other manufacturers limit their warranties to just one year. But at Benschaw, we believe that, because we build them better, we can guarantee them longer. We call that “the Benschaw Promise.”



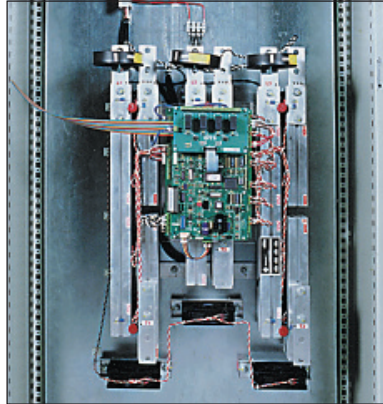
- See MX<sup>2</sup> features on page 5-4
- See standard MX<sup>3</sup> control features on page 5-6
- Contact Benschaw for pricing

# MX2/MX3 Series Two Speed Starter

SOLID STATE STARTER WITH TWO SPEED CONTROL

## RATINGS

<b>Horsepower:</b>	<b>20 - 1500HP</b>
<b>Overload:</b>	<b>500% for 30 seconds 125% continuous</b>
<b>Starting Torque:</b>	<b>0 - 100%</b>
<b>Voltage:</b>	<b>200 - 1000VAC</b>
<b>Two Speed Two Winding</b>	
<b>Two Speed One Winding</b>	



## Key Advantages:

- ◆ Benshaw MX<sup>2</sup> or MX<sup>3</sup> series control
- ◆ Two speed one winding or two speed two winding available
- ◆ Modular power stack design for ease of maintenance
- ◆ Reversing available
- ◆ Integral bypass contactor design
- ◆ Advanced MX<sup>2</sup> or MX<sup>3</sup> motor protection
- ◆ Advanced MX<sup>2</sup> or MX<sup>3</sup> metering function
- ◆ Real time clock (MX<sup>3</sup> only)
- ◆ 99 event log history (MX<sup>3</sup> only)
- ◆ ModBus communication
- ◆ Configurable output relays
- ◆ Reduced maintenance

## Two Speed Starter Product Highlights:

These RediStart solid state starters provide reduced voltage stepless control of two speed three phase AC induction motors.

The two speed starter can be used with two speed, two winding motors. It contains a ten SCR power section or it can be used with two speed, single winding motors.

The logic control incorporates MX<sup>2</sup> or MX<sup>3</sup> technology with all the circuitry required to drive the power semiconductors located in the power section.

Benshaw RediStart two speed starters are electronically interlocked so that a start cannot be initiated at one speed if the starter is already running in another.

## Guaranteed ... for three full years.

*Only Benshaw has a three year guarantee.*

Every Benshaw solid state starter is guaranteed for three full years. Other manufacturers limit their warranties to just one year. But at Benshaw, we believe that, because we build them better, we can guarantee them longer. We call that “the Benshaw Promise.”



- See standard MX<sup>3</sup> control features on page 5-6
- See standard MX<sup>2</sup> control features on page 5-4
- Contact Benshaw for pricing

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# Engineered Options



## PILOT DEVICES

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>PUSH-BUTTONS</b>		
A001	RAISED STOP PUSH-BUTTON - RED	CF
A002	FLUSH START PUSH-BUTTON - GREEN	CF
A003	JOG PUSH-BUTTON - YELLOW	CF
A004	OL RESET PUSH-BUTTON - BLACK	CF
A005	SOLID STATE STARTER RESET PUSH-BUTTON - BLACK	CF
A006	RAISED PUSH-BUTTON - SPECIFY COLOR AND FUNCTION	CF
A007	FLUSH PUSH-BUTTON - SPECIFY COLOR AND FUNCTION	CF
A008	MUSHROOM HEAD STOP PUSH-BUTTON - RED	CF
A009	ILLUMINATED PUSH-BUTTON - SPECIFY COLOR AND FUNCTION	CF
<b>PILOT LIGHTS</b>		
A021	RED RUN LIGHT	CF
A022	GREEN STOP LIGHT	CF
A023	AMBER FAULT LIGHT	CF
A024	GREEN READY LIGHT	CF
A025	AMBER BYPASS LIGHT	CF
A026	RED LIGHT - SPECIFY FUNCTION	CF
A027	GREEN LIGHT - SPECIFY FUNCTION	CF
A028	AMBER LIGHT - SPECIFY FUNCTION	CF
A029	WHITE LIGHT - SPECIFY FUNCTION	CF
A030	BLUE LIGHT - SPECIFY FUNCTION	CF
A031	PUSH TO TEST CONTACT ASSEMBLY	CF
<b>SELECTOR SWITCHES</b>		
A041	HAND - OFF - AUTO SELECTOR SWITCH	CF
A042	LOCAL - OFF - REMOTE SELECTOR SWITCH	CF
A043	KEY OPERATED HAND - OFF - AUTO SELECTOR SWITCH	CF
A044	DUAL RAMPS SELECTOR SWITCH	CF
A045	TWO POSITION SELECTOR SWITCH - SPECIFY FUNCTION	CF
A046	THREE POSITION SELECTOR SWITCH - SPECIFY FUNCTION	CF
A047	OTHER SELECTOR SWITCH - SPECIFY FUNCTION AND TYPE	CF


 Consult factory

# Engineered Options

PILOT DEVICES



CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>METERS</b>		
A061	ANALOG AMMETER - INCLUDES CT'S	CF
A062	ANALOG AMMETER WITH THREE PHASE SELECTOR SWITCH	CF
A063	ANALOG VOLTMETER	CF
A064	ANALOG VOLTMETER WITH THREE PHASE SELECTOR SWITCH	CF
A065	ELAPSED TIME METER	CF
A066	OPERATIONS COUNTER	CF
A067	AC WATTMETER	CF
A068	AC WATT HOUR METER	CF
A069	OTHER POWER METERING - SPECIFY FUNCTION	CF


 Consult factory

# Engineered Options

## CONTROL OPTIONS



CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>CONTROL POWER TRANSFORMERS</b>		
A101	120V CONTROL POWER TRANSFORMER - PROVIDES CONTROL POWER TO THE STARTER CONTROL BOARD	CF
A102	75VA ADDITIONAL CONTROL POWER	CF
A103	150VA ADDITIONAL CONTROL POWER	CF
A104	250VA ADDITIONAL CONTROL POWER	CF
A105	500VA ADDITIONAL CONTROL POWER	CF
A106	1000VA ADDITIONAL CONTROL POWER	CF
A107	SPECIFY CONTROL POWER AMOUNT	CF
<b>RELAYS</b>		
A121	THREE POLE RELAY - SPECIFY FUNCTION	CF
A122	FOUR POLE RELAY - SPECIFY FUNCTION	CF
A123	OTHER RELAYS - SPECIFY FUNCTION AND TYPE	CF
A124	ON DELAY TIMER - SPECIFY FUNCTION AND TIME	CF
A125	OFF DELAY TIMER - SPECIFY FUNCTION AND TIME	CF
A126	OTHER TIMERS - SPECIFY FUNCTION AND TIME	CF
A127	GROUND FAULT RELAY - FOR EQUIPMENT PROTECTION ONLY	CF
<b>TRANSDUCERS</b>		
A141	TRANSDUCER OUTPUT 0-5Vdc BASED ON MOTOR FLA	CF
A142	TRANSDUCER OUTPUT 4 - 20ma BASED ON MOTOR FLA	CF
A143	TRANSDUCER OUTPUT 4 - 20ma BASED ON MOTOR VOLTAGE	CF

 Consult factory

# Engineered Options



AUXILIARY MOTOR STARTERS					
CATALOG NUMBER	DESCRIPTION				LIST PRICE
	208V	240V	480V	575V	
A151	2	2	5	7.5	CF
A152	3	3	7.5	10	CF
A153	7.5	7.5	10	15	CF
A154	7.5	10	20	20	CF
A155	10	10	25	25	CF
A156	10	15	30	30	CF
A157	15	20	40	40	CF
A158	25	30	50	50	CF
A159	30	30	60	60	CF
A160	40	40	75	75	CF
A161	40	50	100	100	CF

**NOTE:** This option will add a three phase electromechanical contactor, motor OL relay and fuses. Customer must provide two wire start command for starting and stopping the starter unless otherwise specified.

MULTIPLE MOTOR STARTING					
CATALOG NUMBER	DESCRIPTION				LIST PRICE
	208V	240V	480V	575V	
A181	7.5	10	20	25	CF
A182	10	15	30	40	CF
A183	15	20	40	50	CF
A184	20	25	50	60	CF
A185	25	30	60	75	CF
A186	30	40	75	100	CF
A187	40	50	100	125	CF
A188	50	60	125	150	CF
A189	60	75	150	200	CF
A190	75	100	200	250	CF
A191	100	125	250	300	CF
A192	125	150	300	350	CF
A193	-	-	350	400	CF
A194	150	200	400	500	CF

**NOTE:** The Benshaw Redistart Solid State Starter can be used to start multiple motors. The starter should be sized to meet or exceed the amps of the total connected load. This option provides fusing and motor protection for each motor connected. Add for each motor connected excluding the smallest.



# Engineered Options

## REVERSING CONTACTORS



CATALOG NUMBER	DESCRIPTION				LIST PRICE
	208V	240V	480V	575V	
A225	2	2	5	7.5	CF
A226	3	3	7.5	10	CF
A227	5	5	10	15	CF
A228	7.5	7.5	10	15	CF
A229	7.5	10	20	20	CF
A230	10	10	25	25	CF
A231	10	15	30	30	CF
A232	15	20	40	40	CF
A233	20	25	50	50	CF
A234	25	30	60	60	CF
A235	30	30	60	60	CF
A236	40	40	75	75	CF
A237	40	50	100	100	CF
A238	60	60	125	125	CF
A239	60	75	150	150	CF
A240	100	100	200	200	CF
A241	125	150	300	300	CF
A242	150	200	400	400	CF
A243	250	300	600	600	CF

**NOTE:** Reversing contactors are used for reversing control of any starter from the engineered products section of the catalog. Please consult Benschaw for dimensions.

# Engineered Options



## INLINE CONTACTORS

CATALOG NUMBER	DESCRIPTION				LIST PRICE
	208V	240V	480V	575V	
A201	2	2	5	7.5	CF
A202	3	3	7.5	10	CF
A203	5	5	10	15	CF
A204	7.5	7.5	10	15	CF
A205	7.5	10	20	20	CF
A206	10	10	25	25	CF
A207	10	15	30	30	CF
A208	15	20	40	40	CF
A209	20	25	50	50	CF
A210	25	30	60	60	CF
A211	30	30	60	60	CF
A212	40	40	75	75	CF
A213	40	50	100	100	CF
A214	60	60	125	125	CF
A215	60	75	150	150	CF
A216	100	100	200	200	CF
A217	125	150	300	300	CF
A218	150	200	400	400	CF
A219	250	300	600	600	CF

**NOTE:** An inline contactor is used to isolate the power from the starter during stopped conditions. Very useful in protecting the starter and motor where high voltage transients are present, i.e. lightning. Please consult Benschaw for dimensions.



# Engineered Options

## POWER OPTIONS

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>SPACE HEATERS</b>		
A171	SPACE HEATER WITH THERMOSTAT	CF
<b>ENCLOSURE OPTIONS</b>		
A251	DOOR INTERLOCK SWITCH	CF
A252	LIGHTNING SURGE PROTECTOR NOTE: STARTERS UNDER 52A REQUIRE ADDITIONAL \$250 DUE TO ENCLOSURE UPSIZING	CF
A253	PRINT POCKET - INSIDE DOOR TO HOLD DRAWINGS	CF
<b>CIRCUIT BREAKER OPTIONS</b>		
A261	SHUNT TRIP - MECHANISM TO AUTOMATICALLY OPEN BREAKER IN CASE OF SHORTED SCR, CURRENT IMBALANCE, GROUND FAULT, ETC.	CF
<b>ENTRY OPTIONS</b>		
A271	BOTTOM ENTRY, BOTTOM EXIT	CF
A272	TOP ENTRY, BOTTOM EXIT	CF
A273	BOTTOM ENTRY, TOP EXIT	CF
A274	SUSE SERVICE ENTRY LABIE BELOW 400 HP / 480V	CF
A275	SUSE SERVICE ENTRY LABIE ABOVE 400 HP / 480V*	CF
<b>DC BRAKING OPTIONS</b>		
A280	DC INJECTION BRAKE - STD DUTY - 250% BRAKING CURRENT**	CF
A281	DC INJECTION BRAKE - HEAVY DUTY - 400% BRAKING CURRENT**	CF

\* This will require ground fault protection for disconnect @ 1000 amp or more

\*\* This option can be added to RC2, RC3, RB2, RB3 products

Consult factory


# Engineered Options



## CLASS J FUSES

CATALOG NUMBER	DESCRIPTION				LIST PRICE
	208V	240V	480V	575V	
A302	2	3	5	7.5	CF
A303	3	-	7.5	10	CF
A304	-	5	10	15	CF
A305	5	7.5	15	20	CF
A306	7.5	10	20	25	CF
A307	10	-	25	30	CF
A308	-	15	30	40	CF
A309	15	20	40	50	CF
A310	20	25	50	60	CF
A311	25	30	60	75	CF
A312	30	40	75	100	CF
A313	40	50	100	125	CF
A314	40	60	125	150	CF
A315	60	75	150	200	CF
A316	75	100	200	250	CF
A317	100	125	250	300	CF
A318	125	150	300	400	CF
A319	150	200	400	500	CF
A320	200	250	500	600	CF
A321	250	300	600	700	CF
A322	300	350	700	-	CF

**NOTE:** This option adds fuses to the input of the solid state starter.


 Consult factory



# Engineered Options

## RVSS CONTROL OPTIONS

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>MX OPTIONS</b>		
A340B	LARGE DOOR MOUNTED KEYPAD	CF
A340A	SMALL DOOR MOUNTED KEYPAD	CF
<b>COMMUNICATIONS</b>		
A343	PROFIBUS	CF
A344	DEVICENET	CF
A345	ETHERNET	CF
A346	LON WORKS	CF
A347	IP INTERNET WEB ADDRESSABLE	CF
<b>MOTOR MONITORING</b>		
A406	RTD MODULE - UNIT WILL ACCEPT 8 INPUT RTD'S. RTD'S MUST BE 100 OHM PLATINUM. (AVAILABLE FOR REMOTE MOUNTING. CONSULT FACTORY FOR DETAILS) (MX <sup>3</sup> ONLY)	CF
A407	RTD MODULE - UNIT WILL ACCEPT 16 INPUT RTD'S. RTD'S MUST BE 100 OHM PLATINUM. (AVAILABLE FOR REMOTE MOUNTING. CONSULT FACTORY FOR DETAILS) (MX <sup>3</sup> ONLY)	CF

 Consult factory

# Engineered Options

## POWER FACTOR CORRECTION CAPACITORS

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>UL LABELED</b>		
A1001	PFCC, 7.5KVAR	CF
A1002	PFCC, 8.3KVAR	CF
A1003	PFCC, 10KVAR	CF
A1004	PFCC, 12.5KVAR	CF
A1005	PFCC, 15KVAR	CF
A1006	PFCC, 16.7KVAR	CF
A1007	PFCC, 20KVAR	CF
A1008	PFCC, 30KVAR	CF
A1009	PFCC, 35KVAR	CF
A1010	PFCC, 40KVAR	CF
A1011	PFCC, 45KVAR	CF
A1012	PFCC, 50KVAR	CF
A1013	PFCC, 55KVAR	CF
A1014	PFCC, 60KVAR	CF
A1015	PFCC, 65KVAR	CF
A1016	PFCC, 70KVAR	CF
A1017	PFCC, 75KVAR	CF
A1018	PFCC, 80KVAR	CF
A1019	PFCC, 85KVAR	CF
A1020	PFCC, 90KVAR	CF
A1021	PFCC, 95KVAR	CF
A1022	PFCC, 100KVAR	CF
A1023	PFCC, 120KVAR	CF

- Please consult factory for capacitor requirements above 120KVAR.

# Circuit Breaker Trip Ratings

## REDUCED VOLTAGE SOLID STATE STARTERS

BREAKER TYPE	HORSEPOWER				CB AMPS
	208V	240V	480V	575V	
THERMAL MAGNETIC	2	3	5	7.5	20
THERMAL MAGNETIC	3	-	7.5	10	30
THERMAL MAGNETIC	-	5	10	15	40
THERMAL MAGNETIC	5	7.5	15	20	60
THERMAL MAGNETIC	7.5	10	20	25	70
THERMAL MAGNETIC	10	-	25	30	90
THERMAL MAGNETIC	-	15	30	40	100
THERMAL MAGNETIC	15	20	40	50	125
THERMAL MAGNETIC	20	25	50	60	125
THERMAL MAGNETIC	25	30	60	75	150
THERMAL MAGNETIC	30	40	75	100	175
THERMAL MAGNETIC	40	50	100	125	225
THERMAL MAGNETIC	40	60	125	150	250
THERMAL MAGNETIC	60	75	150	200	300
THERMAL MAGNETIC	75	100	200	250	400
THERMAL MAGNETIC	100	125	250	300	500
THERMAL MAGNETIC	125	150	300	400	600
THERMAL MAGNETIC	150	200	400	500	800
THERMAL MAGNETIC	200	250	500	600	1000
THERMAL MAGNETIC	250	300	600	700	1200
THERMAL MAGNETIC	300	350	700	800	1400







**Section 6 | Medium Voltage Motor Controls**

# Medium Voltage Solid State Starters

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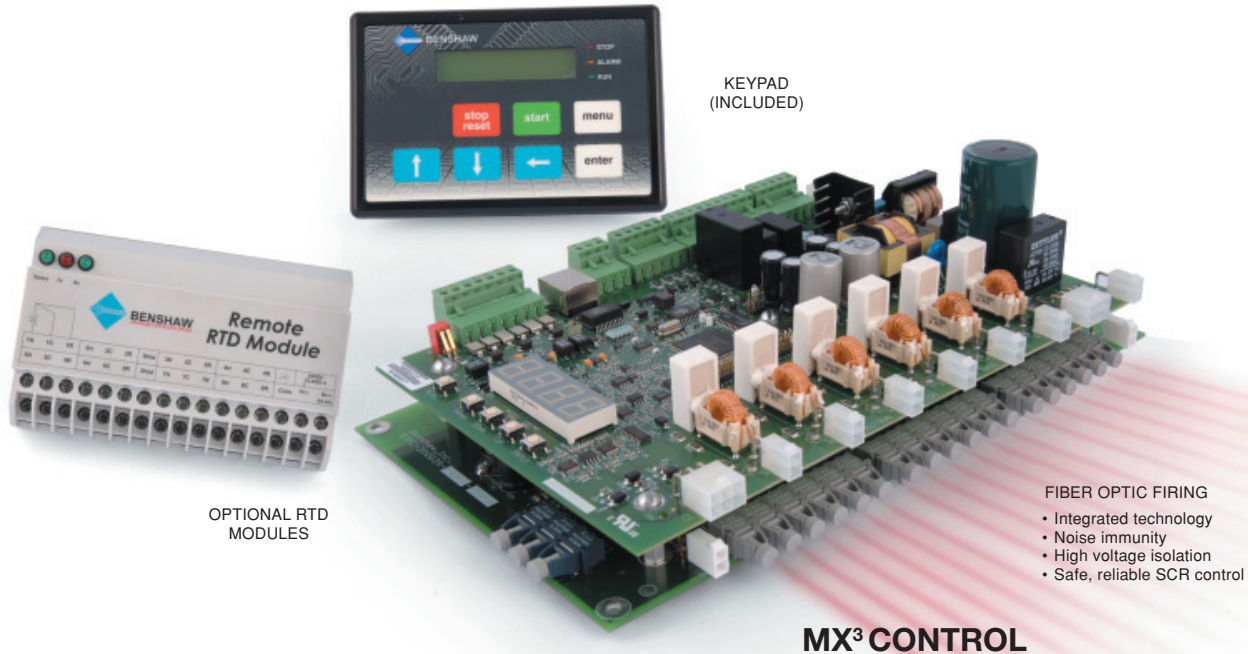
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# MX<sup>3</sup> Controller

NE<sup>X</sup>T GENERATION INTELLIGENT MOTOR CONTROL



## MX<sup>3</sup> Controller Highlights

Next generation MX<sup>3</sup> technology forms the backbone of Benshaw's entire line of intelligent medium voltage motor controls. With fiber optic firing, enhanced programming capabilities, ease of use, and a unique, flexible architecture—Benshaw's MX<sup>3</sup> controller delivers unprecedented functionality and all of the rugged, dependable performance you've come to expect from the world leader in solid state motor controls and drives.

MX<sup>3</sup> controllers, power components, software and sensors are all designed, built and tested to perform as an integrated control system, eliminating the coordination and performance problems inherent in other forms of reduced voltage starting.

With more built-in features, more configurable options, greater expandability and a broader communications capability than any other motor control on the market, Benshaw's next generation MX<sup>3</sup> technology will shorten your commissioning times, improve motor performance and protection, enhance diagnostic capability and streamline many electrical system monitoring and maintenance tasks.

### Key Features:

- ◆ High performance motor control with multiple starting modes built-in
- ◆ Patented CYCLO Converter control from 1 to 40% speed
- ◆ Flexible, programmable I/O
- ◆ Integrated motor protection
- ◆ Line and motor metering
- ◆ Diagnostic capabilities with event log and real-time clock
- ◆ CE, UL, CUL, NEC, NEMA compliance
- ◆ Built-in remote self-testing (BIST)
- ◆ Expanded communications capabilities
- ◆ Intelligent SCR power poles
- ◆ Intelligent MV MCC integration

# Medium Voltage MX<sup>3</sup> Control Features

## Multiple Starting Modes:

- ◆ Voltage ramp
- ◆ Current ramp
  - Adjustable initial current
  - Adjustable maximum current
  - Adjustable ramp time
- ◆ Torque ramp (TruTorque)
  - Adjustable initial torque
  - Adjustable maximum torque
  - Adjustable ramp time
- ◆ Power ramp
  - Adjustable initial torque
  - Adjustable maximum torque
  - Adjustable ramp time
- ◆ Linear/tach feedback control
- ◆ CYCLO converter control

## Motor Protection:

- ◆ Motor thermal overload
- ◆ Independent starting and running OL's
- ◆ Up to speed timer exceeded
- ◆ Low line voltage
- ◆ Low line frequency
- ◆ High line frequency
- ◆ Phase reversal
- ◆ Phase loss
- ◆ Instantaneous overcurrent
- ◆ Overcurrent
- ◆ Undercurrent
- ◆ Current imbalance
- ◆ Ground fault (residual or zero sequence)
- ◆ Shorted or open SCR
- ◆ Disconnect fault
- ◆ Inline contactor fault
- ◆ Control power low
- ◆ Stack over temperature
- ◆ Motor PTC input
- ◆ RTD modules

## Metering:

- ◆ Accuracy:
  - 3% out-of-box
  - 2% factory calibrated
- ◆ Average current
- ◆ L1 current
- ◆ L2 current

## Metering, continued:

- ◆ L3 current
- ◆ Current imbalance %
- ◆ Ground fault current
- ◆ Average volts
- ◆ L1 - L2 voltage
- ◆ L2 - L3 voltage
- ◆ L3 - L1 voltage
- ◆ Overload %
- ◆ Power factor
- ◆ Watts
- ◆ VA
- ◆ VARS
- ◆ KW hours
- ◆ MW hours
- ◆ Phase order
- ◆ Line frequency
- ◆ Analog input
- ◆ Analog output
- ◆ Run time - days
- ◆ Run time - hours
- ◆ # of starts
- ◆ Tru Torque %
- ◆ Power %
- ◆ Peak starting current
- ◆ Last starting duration
- ◆ RTD temperatures
- ◆ Real-time clock

## 8 Digital Inputs Configurable to:

- ◆ Stop
- ◆ Fault
- ◆ Fault reset
- ◆ Bypass / inline confirm
- ◆ OL reset
- ◆ Local/remote selection
- ◆ Heater enable
- ◆ Heater disable
- ◆ Dual ramp selection
- ◆ 1 dedicated start input
- ◆ Disconnect
- ◆ Slow speed
- ◆ Brake enable
- ◆ Brake disable

## 6 Relay Outputs Configurable to:

- ◆ Faulted
- ◆ Running
- ◆ Up to speed
- ◆ Alarm condition

## Relay Outputs, continued:

- ◆ Ready condition
- ◆ Locked out
- ◆ Over current
- ◆ Under current
- ◆ OL alarm
- ◆ Shunt trip
- ◆ Ground fault
- ◆ Energy saver indication
- ◆ Heating indication
- ◆ Slow speed forward/reverse
- ◆ DC braking
- ◆ Cooling fan

## 1 Analog 4-20mA / 0-10Vdc Input Configurable to:

- ◆ Trip high level
- ◆ Trip low level

## 1 Analog 4-20mA / 0-10Vdc Output Configurable to:

- ◆ Current (0-200%/0-800%)
- ◆ Voltage (0-150%)
- ◆ OL (0-150%)
- ◆ KW (0-10 Kw/0-100 Kw)
- ◆ MW (0-1 Mw)
- ◆ Analog input (0-100%)
- ◆ Firing (0-100%)
- ◆ Calibration

## User Interface:

- ◆ Event log (99 events)
- ◆ Door mounted LCD display
  - Set/examine operating parameters
  - View status information, line current, voltage and frequency
  - Start and stop the solid state starter

## 1 Communication Port:

- ◆ ModBus / RS485

## Advanced Functionality:

- ◆ Dual ramp selection
- ◆ Adjustable kick current
- ◆ Programmable decel modes
- ◆ MV BIST test (built-in self test)

# Prepackaged Solid State Starters with ATL Bypass



## MVRXE SERIES

SEVERE DUTY WITH ACROSS THE LINE BYPASS

**MVRXE STARTER  
WITH LOAD BREAK  
FUSIBLE DISCONNECT  
AND EMERGENCY  
ATL BYPASS**

## MVRXE Series Product Highlights:

The Benshaw Medium Voltage Starter is a microprocessor controlled solid state reduced voltage starter for three phase induction motors. The starter provides a closed-loop current ramp for smooth stepless motor acceleration. Supplied in a free standing enclosure.

Enclosures are available in NEMA 12 or NEMA 3R configurations. The medium voltage enclosure consists of two distinct compartments. The medium voltage or power pole section is located in the main body of the enclosure, whereas the low voltage section containing the control logic is located behind the door as an isolated compartment.

Each starter is supplied with a load break isolation switch, Class "R" motor fuses, inline vacuum contactor, solid state power poles, and a vacuum bypass contactor, which is used to bypass the SCR power poles once the motor is up to full speed.

The logic control incorporates the MX<sup>3</sup> computer that has all the circuitry required to drive the power semiconductors, which are located in the power section.



MVRXE starters provide solid state reduced voltage starting for normal operation and full voltage emergency back-up starting, with complete electronic motor protection at the flip of a switch.

This unique redundant design is ideal for critical applications where downtime is extremely disruptive and cannot be tolerated.

MX<sup>3</sup> solid state controls provide precise digital starting and stopping, motor protection, metering, diagnostics and communications ... standard.

## Standard Features:

- ◆ NEMA 12, solid state starter, UL347 listed, Class E-2.
- ◆ 45KV BIL
- ◆ 200MVA (2300VAC)/350MVA (4160VAC) short circuit fault rated.
- ◆ 500% - 30 seconds rated solid state starter – UL347 certified and listed.
- ◆ 8,000 PIV – UL347 certified and listed at 2.4KV
- ◆ 12,000 PIV – UL347 certified and listed at 4.2KV
- ◆ Fiber optic firing
- ◆ Selectable solid state or emergency full voltage operation via selector switch mounted inside of LV compartment
- ◆ Load matched Class R fusing with blown fuse indication
- ◆ 400A load break, 600A continuous, 5KV rated disconnect switch, with viewing window, grounding assembly and lockable handle mechanism. Mechanically interlocked for safety.
- ◆ Fixed mounted, start duty rated vacuum contactors for isolation and SCR bypass, wired for normal bypass operation and full voltage start operation, with (2) N/O and (2) N/C auxiliary contacts.
- ◆ Separately mounted "SPE" series electronic overload device has the following standard features:
  - Class 10-30 adjustable
  - Phase imbalance protection
  - 1 NO/1 NC trip contact
  - Phase reversal protection
  - "Trip free" design
  - Phase loss protection
- ◆ Built-in self test (BIST) features for "quick commissioning"
- ◆ 120VAC, 1000VA CPT with primary and secondary fusing, with 500VA available for customer use
- ◆ Door-mounted start and stop push-buttons.
- ◆ Door-mounted LCD keypad

## Guaranteed ... for three full years.

*Only Benshaw has a three year guarantee.*

Every Benshaw solid state starter is guaranteed for three full years\*. Other manufacturers limit their warranties to just one year. But at Benshaw, we believe that, because we build them better, we can guarantee them longer. We call that "the Benshaw Promise."



\*3 year warranty requires authorized startup - 1 year warranty without authorized startup



# Prepackaged Solid State Starters with ATL Bypass

## MVRXE SERIES

SEVERE DUTY WITH ACROSS THE LINE BYPASS

### Standard Features, continued:

- ◆ Door-mounted run indication light
- ◆ Door-mounted local-off-remote switch
- ◆ Door-mounted reset button
- ◆ Terminal strip mounted inside LV compartment for:
  - Remote start/stop control
  - Remote up-to-speed indication
  - Remote run indication
  - Remote fault indication
- ◆ Benschaw MX<sup>3</sup> controller with complete soft start, soft stop and motor protection capabilities
- ◆ 485 communications capabilities – local through door connection or remote from starter (optional)
- ◆ ModBus communications standard



### Key Advantages:

- ◆ NEMA 12, UL 347 listed
- ◆ 45KV BIL
- ◆ Service entrance labeled (optional)
- ◆ Built-in self test (BIST) features for “quick commissioning”
- ◆ Solid state reduced voltage starting - normal operations
- ◆ 400 amp load break/ 600 amp continuous fused disconnect switch
- ◆ Switch selectable emergency back-up full voltage starter
- ◆ MX<sup>3</sup>-embedded digital control
- ◆ Fiber optic firing
- ◆ Advanced motor protection
- ◆ Advanced metering
- ◆ Power quality protection
- ◆ Diagnostics and ModBus RTU485 communications ... standard

### Benschaw MVRXE -vs- any autotransformer starter

MOTOR CONTROL & PROTECTION FUNCTIONS	ANY AUTO TRANSFORMER	BENSCHAW MVRXE
SOFT START	YES	YES
SOFT STOP	NO	YES
FULL VOLTAGE BYPASS STARTING	NO	YES
LOAD BREAK DISCONNECT SWITCH	NO	YES
BUILT-IN SELF TEST	NO	YES
UL 347/SERVICE ENTRANCE RATED (OPTIONAL)	NO	YES
3 YEAR WARRANTY	NO	YES
PLAIN ENGLISH DIGITAL DISPLAY	NO	YES
ELECTRONIC OL PROTECTION	NO	YES
ELECTRONIC POWER QUALITY	NO	YES
DIGITAL METERING	NO	YES
EMBEDDED PLAIN ENGLISH DIAGNOSTICS	NO	YES
EMBEDED RS485	NO	YES
INCOMING LINE LANDING PAD	NO	YES
INTEGRATED CONTROL & PROTECTION	NO	YES
UL ZERO SEQUENCE GROUND FAULT*	NO	YES

\* Optional ground fault CT required

# Prepackaged Solid State Starters with ATL Bypass



## MVRXE SERIES

SEVERE DUTY WITH ACROSS THE LINE BYPASS

MVRXE12 - 2300 VOLT								
MODEL	HP	FLA AMPS	DIMENSIONS (IN)			WGT. LBS	LIST PRICE	
			H	W	D		NEMA 12	NEMA 3R
MVRXE12-650-2300-**	650	160	92	36	32	1,800	CF	CF
MVRXE12-750-2300-**	750	180	92	36	32	1,800	CF	CF
MVRXE12-1500-2300-**	1500	360	92	36	32	1,800	CF	CF

MVRXE18 - 4160 VOLT								
MODEL	HP	FLA AMPS	DIMENSIONS (IN)			WGT. LBS	LIST PRICE	
			H	W	D		NEMA 12	NEMA 3R
MVRXE18-1000-4160-**	1000	133	92	36	32	2,000	CF	CF
MVRXE18-1500-4160-**	1500	200	92	36	32	2,000	CF	CF
MVRXE18-3000-4160-**	3000	360	92	36	32	2,000	CF	CF

- Starters are top entry / bottom exit - top exit available upon request.
- Dimensions and weights are approximate.
- \*\* Insert appropriate option code as shown below:

NEMA 12 = 12  
NEMA 3R = 3R

- Web stocked
- Built-to-order: 4 week A.R.O.

**NOTE:** Power fuses ship loose. Please provide motor full load amps at time of order for proper fuse sizing.



# Modular Options

## MVRXE SERIES

MODEL	STANDARD OPTIONS	LIST PRICE
✂ A171	SPACE HEATER WITH THERMOSTAT (INCLUDED IN NEMA 3R OPTION)	CF
✂ A008	E-STOP PUSH-BUTTON, MUSHROOM HEAD, RED	CF
✂ A406	8 CHANNEL RTD MODULE, 100 OHM PLATINUM (ALSO AVAILABLE FOR REMOTE MOUNTING, CALL FACTORY FOR DETAILS)	CF
✂ A407	16 CHANNEL RTD MODULE(S), 100 OHM PLATINUM (ALSO AVAILABLE FOR REMOTE MOUNTING, CALL FACTORY FOR DETAILS)	CF
✂ A408*	TOP HAT ENCLOSURE MODULE FOR TOP ENTRY (18"H X 30"W X 24"D), TOP LEFT OR TOP RIGHT MOUNTING. ACCOMODATES STRESS CONES.	CF
✂ A409	SERVICE ENTRANCE LABELED	CF
✂ A406	ADDITIONAL 1000VA CONTROL POWER TRANSFORMER	CF

The MVRXE series was designed as an integrated package. Listed above are the available modular options. For systems requiring more extensive requirements, please refer to the engineered section of the MV catalog.

\* Top hat will ship loose for customer installation.

### LEAD TIME:

✂ Built-to-order: Please allow 1-2 weeks for shipment of complete MVRXE unit when ordering these options to a stock starter.



# Medium Voltage Engineered Products

## PRODUCT OVERVIEW

Benshaw has developed advanced engineering, drafting, materials management and quality systems focused on designing and building customer solutions. This “Build to Order” capability combined with an extensive inventory of control components, protective relays, circuit breakers, contactors, enclosures and other electrical / electronic devices provides our customers with the quickest shipment of engineered products in the industry.

### *Control Modifications - whatever you specify*

- ◆ Over 250 modifications and accessories are available, including: pilot devices, PLC's, control power transformers, switches, meters, relays, space heaters, protective devices, power factor correction capacitors, surge arrestors, and line reactors.

### *Combination Starters to meet your requirements*

- ◆ Solid State Reduced Voltage
- ◆ Standard Full Voltage
- ◆ Smart Full Voltage
- ◆ Solid State w/ Full Voltage Bypass

### *Power ratings to fit your application*

- ◆ 5 KV Class to 10,000 HP
- ◆ 7.2 KV Class to 10,000 HP
- ◆ 15 KV Class to 22,000 HP

### *Enclosures to match your environment*

- ◆ Standard Designs - NEMA 1, 12, 3R
- ◆ Custom enclosures
- ◆ Motor Control Centers

### *Communication*

- ◆ ModBus / RS48



# Solid State Reduced Voltage Starters

## MVRMX SERIES

5KV / 7.2KV / 15KV ... TO 22,000 HP



## MVRMX Series Product Highlights

Only Benshaw has designed, built and supports more than 40,000 solid state starters, from 2,300 volts to 15KV, for applications ranging from pumps, compressors and chillers to fans and blowers, crushers, chippers and conveyors; for every motor type: induction, synchronous, two-speed, reversing and wound rotor.

The RediStart CFMVRMX series with MX<sup>3</sup> technology is a fully integrated, programmable family of Class E2 load break/combination solid state starters. This integrated design includes control and power electronics, bypass and isolation contactors that reduce maintenance and operating costs when compared to other methods.

### Key Advantages:

**Protect machinery** from failure and excessive maintenance caused by mechanical shock during starting or stopping. The RediStart MVRMX provides smooth, stepless acceleration and controlled deceleration.

**Protect electrical systems** from disruptive voltage drops and power outages caused by motor locked rotor inrush current. The RediStart MVRMX starter precisely controls the current ramp during start up.

**Protect mission critical motors** from failure or unscheduled outages caused by machine or electrical system faults. The RediStart MVRMX starter provides complete, high performance, coordinated line monitoring, motor control and protection.

### Precision Engineered Products from Benshaw:

**Rugged enclosures to match your environment:**

- ◆ NEMA 1
- ◆ NEMA 12
- ◆ NEMA 12V
- ◆ NEMA 3R
- ◆ Marine duty
- ◆ Lineups

**Specified bus configurations:**

- ◆ Tin plated copper
- ◆ 800/1200/2000 amp
- ◆ Top or center mount
- ◆ Environmentally or electrically insulated
- ◆ Custom arrangements
- ◆ Higher BIL ratings available
- ◆ Front access copper ground bus

**Specified control and protective devices:**

- ◆ Protective relays
- ◆ RTD monitors
- ◆ Custom control/interface configuration
- ◆ Pilot devices/PLCs

**Specified surge capacitors and lightning arrestors:**

Benshaw will design and mount (as an integrated unit) surge capacitors and lightning arrestors to match your electrical system and lightning protection requirements.

**Load engineered power factor capacitors and controls:**

- ◆ Start/run sequencing
- ◆ Load matching

## Guaranteed ... for three full years.

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Every Benshaw solid state starter is guaranteed for three full years\*. Other manufacturers limit their warranties to just one year. But at Benshaw, we believe that, because we build them better, we can guarantee them longer. We call that "the Benshaw Promise."



\*3 year warranty requires authorized startup - 1 year warranty without authorized startup

# MVRMX Series Specifications

## MEDIUM VOLTAGE SOLID STATE REDUCED VOLTAGE STARTER

### Power Section Features:

DESCRIPTION	SPECIFICATION
STARTER TYPE	CLOSED LOOP CURRENT CONTROL RAMP TORQUE RAMP POWER RAMP (KW) VOLTAGE RAMP LINEAR ACCEL / TACH FEEDBACK
POWER RATINGS	500% FLA FOR 30 SEC 125% CONT.
CONTROL INPUT	120 VAC OR DRY CONTACT, 2 OR 3 WIRE
STANDARD INSULATION TEST	2X RATED V + 2,000V
NOMINAL VOLTAGE RATINGS	2.3 KV TO 13.8 KV
AMBIENT TEMPERATURE	0 - 40° C AT SEA LEVEL
FREQUENCY RANGE	23 TO 72 HZ ON CONTROL BOARD
OVERALL EFFICIENCY (W/ BYPASS)	99.5%
METERING FUNCTIONS	47 PARAMETERS
RELAY OUTPUTS	24 FUNCTIONS
OVER/UNDER VOLTAGE PROTECTION	10 TO 30%
POWER LOSS (W/ BYPASS)	<1.0 WATT/AMP/PHASE
TRANSIENT PROTECTION	DV/DT CIRCUITS/PHASE
PIV RATINGS	2.4KV:8000V, 4.2KV:12000V 7.2KV:18000V, 13.8KV:34500
SCR FIRING TECHNIQUE	CONTINUOUS BLOCK GATE FIBER OPTIC FIRING



### Status Display and Indicators:

#### LCD STATUS DISPLAY

Each starter will have a keypad/display assembly designed to:

- ◆ Set or examine operating parameters
- ◆ Provide status information
- ◆ Provide real-time information about line current, voltage, and frequency
- ◆ Provide a means to start and stop the solid state starter

#### LED INDICATORS

The following LED indicators are provided for advisory status and fault annunciation.

- ◆ Power ON
- ◆ CPU heart beat
- ◆ Communications
- ◆ RTD module
- ◆ Fiber optic firing

# Medium Voltage MX<sup>3</sup> Control Features

## Multiple Starting Modes:

- ◆ Voltage ramp
- ◆ Current ramp
  - Adjustable initial current
  - Adjustable maximum current
  - Adjustable ramp time
- ◆ Torque ramp (TruTorque)
  - Adjustable initial torque
  - Adjustable maximum torque
  - Adjustable ramp time
- ◆ Power ramp
  - Adjustable initial torque
  - Adjustable maximum torque
  - Adjustable ramp time
- ◆ Linear/tach feedback control
- ◆ CYCLO converter control

## Motor Protection:

- ◆ Motor thermal overload
- ◆ Independent starting and running OL's
- ◆ Up to speed timer exceeded
- ◆ Low line voltage
- ◆ Low line frequency
- ◆ High line frequency
- ◆ Phase reversal
- ◆ Phase loss
- ◆ Instantaneous overcurrent
- ◆ Overcurrent
- ◆ Undercurrent
- ◆ Current imbalance
- ◆ Ground fault (residual or zero sequence)
- ◆ Shorted or open SCR
- ◆ Disconnect fault
- ◆ Inline contactor fault
- ◆ Control power low
- ◆ Stack over temperature
- ◆ Motor PTC input
- ◆ RTD modules

## Metering:

- ◆ Accuracy:
  - 3% out-of-box
  - 2% factory calibrated
- ◆ Average current
- ◆ L1 current
- ◆ L2 current

## Metering, continued:

- ◆ L3 current
- ◆ Current imbalance %
- ◆ Ground fault current
- ◆ Average volts
- ◆ L1 - L2 voltage
- ◆ L2 - L3 voltage
- ◆ L3 - L1 voltage
- ◆ Overload %
- ◆ Power factor
- ◆ Watts
- ◆ VA
- ◆ VARS
- ◆ KW hours
- ◆ MW hours
- ◆ Phase order
- ◆ Line frequency
- ◆ Analog input
- ◆ Analog output
- ◆ Run time - days
- ◆ Run time - hours
- ◆ # of starts
- ◆ Tru Torque %
- ◆ Power %
- ◆ Peak starting current
- ◆ Last starting duration
- ◆ RTD temperatures
- ◆ Real-time clock

## 8 Digital Inputs Configurable to:

- ◆ Stop
- ◆ Fault
- ◆ Fault reset
- ◆ Bypass / inline confirm
- ◆ OL reset
- ◆ Local/remote selection
- ◆ Heater enable
- ◆ Heater disable
- ◆ Dual ramp selection
- ◆ 1 dedicated start input
- ◆ Disconnect
- ◆ Slow speed
- ◆ Brake enable
- ◆ Brake disable

## 6 Relay Outputs Configurable to:

- ◆ Faulted
- ◆ Running
- ◆ Up to speed
- ◆ Alarm condition

## Relay Outputs, continued:

- ◆ Ready condition
- ◆ Locked out
- ◆ Over current
- ◆ Under current
- ◆ OL alarm
- ◆ Shunt trip
- ◆ Ground fault
- ◆ Energy saver indication
- ◆ Heating indication
- ◆ Slow speed forward/reverse
- ◆ DC braking
- ◆ Cooling fan

## 1 Analog 4-20mA / 0-10Vdc Input Configurable to:

- ◆ Trip high level
- ◆ Trip low level

## 1 Analog 4-20mA / 0-10Vdc Output Configurable to:

- ◆ Current (0-200%/0-800%)
- ◆ Voltage (0-150%)
- ◆ OL (0-150%)
- ◆ KW (0-10 Kw/0-100 Kw)
- ◆ MW (0-1 Mw)
- ◆ Analog input (0-100%)
- ◆ Firing (0-100%)
- ◆ Calibration

## User Interface:

- ◆ Event log (99 events)
- ◆ Door mounted LCD display
  - Set/examine operating parameters
  - View status information, line current, voltage and frequency
  - Start and stop the solid state starter

## 1 Communication Port:

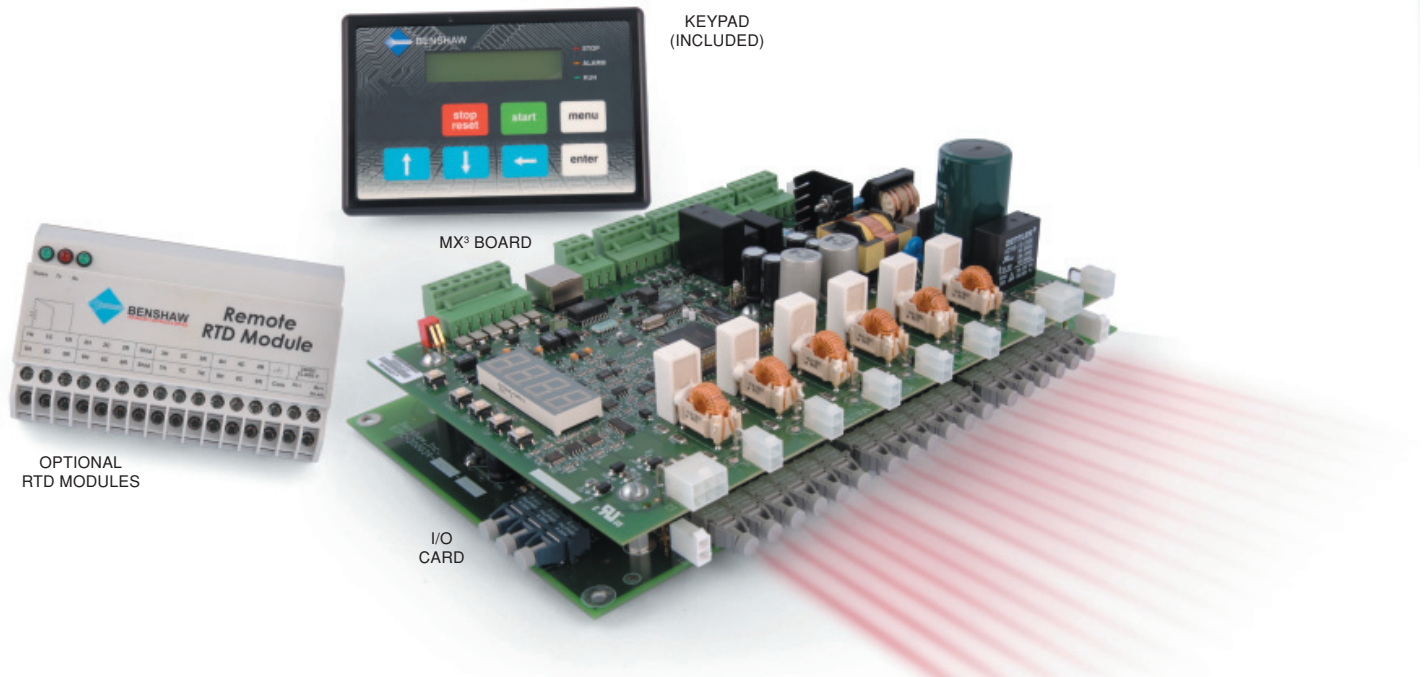
- ◆ ModBus / RS485

## Advanced Functionality:

- ◆ Dual ramp selection
- ◆ Adjustable kick current
- ◆ Programmable decel modes
- ◆ MV BIST test (built-in self test)



# Medium Voltage MX<sup>3</sup> Control Features

KEYPAD  
(INCLUDED)MX<sup>3</sup> BOARDOPTIONAL  
RTD MODULESI/O  
CARD

## Conforms to ANSI Motor Protection Standards:




- ◆ 51 - Electronic motor overload, Class 1 to 40
- ◆ 86 - Overload lockout
- ◆ 48 - Adjustable up-to-speed timer (off; 0 to 300 seconds)
- ◆ 59/27 - Adjustable over/under voltage protection
- ◆ 46 - Adjustable line to average current imbalance
- ◆ 81 - Adjustable high and low frequency protection
- ◆ Single phase protection
- ◆ 66 - Adjustable starts per hour (off or 1 to 20 starts)
- ◆ Adjustable time between starts (off or 1 to 600 minutes)
- ◆ Backspin timer (off or 1 to 200 minutes)
- ◆ 51 - Overcurrent detection (off or 50 to 800%) and time (0.1 to 90.0 sec. in 0.1 sec. intervals)

## Conforms to ANSI Motor Protection Standards, continued:

- ◆ 37 - Undercurrent detection (off or 10 to 100% and time (0.1 to 90.0 sec. in 0.1 sec. intervals)
- ◆ 51G - Ground fault detection (off or 1 to 100 amps) and time (0.1 to 90.0 sec. in 0.1 sec. intervals)
- ◆ Overcurrent, undercurrent, and ground fault can each be set to trip or activate a relay
- ◆ 50 - Instantaneous electronic overcurrent trip
- ◆ 47 - Phase rotation selectable ABC, CBA, or Ins (insensitive)
- ◆ 38/49 - Remote mountable RTD protection package, 8 or 16 RTD inputs (optional)

# Combination Solid State Starters 2300V


## MVRMX SERIES - MEDIUM VOLTAGE STARTERS

CFMVRMX12								
MODEL NUMBER	VOLT	HP	FLA	DIMENSIONS (IN)			LIST PRICE NEMA 1/12	LIST PRICE NEMA 3R
				H	W	D		
CFMVRMX12-150-2300-**	2300	150	36	92	36	32	CF	CF
CFMVRMX12-500-2300-**	2300	500	120	92	36	32	CF	CF
CFMVRMX12-750-2300-**	2300	750	180	92	36	32	CF	CF
CFMVRMX12-1000-2300-**	2300	1000	240	92	36	32	CF	CF
CFMVRMX12-1250-2300-**	2300	1250	300	92	36	32	CF	CF
CFMVRMX12-1500-2300-**	2300	1500	360	92	45	32	CF	CF
CFMVRMX12-HP-2300-**	2300	>1500	>360				CF	CF

- CFMVRMX series starters are complete combination E2 controllers. They include a load break/fault make disconnect switch, R rated current limiting motor fuses, vacuum inline isolation contactor, SCR power stacks and microprocessor controls, CPT, and vacuum bypass contactor.
- MVRMX non-combination starters are available. Please contact the factory for pricing and application assistance.

\*\* Insert appropriate option code as shown below:




NEMA 1 = 1  
 NEMA 12 = 12  
 NEMA 3R = 3R

 Consult factory

# Combination Solid State Starters 3300V

## MVRMX SERIES - MEDIUM VOLTAGE STARTERS

### CFMVRMX12

MODEL NUMBER	VOLT	HP	FLA	DIMENSIONS (IN)			LIST PRICE NEMA 1/12	LIST PRICE NEMA 3R
				H	W	D		
CFMVRMX12-300-3300-**	3300	300	51	92	36	32	CF	CF
CFMVRMX12-750-3300-**	3300	750	127	92	36	32	CF	CF
CFMVRMX12-1000-3300-**	3300	1000	169	92	36	32	CF	CF
CFMVRMX12-1250-3300-**	3300	1250	211	92	36	32	CF	CF
CFMVRMX12-1500-3300-**	3300	1500	254	92	36	32	CF	CF
CFMVRMX12-2000-3300-**	3300	2000	338	92	36	32	CF	CF
CFMVRMX12-HP-3300-**	3300	>2000	>338				CF	CF

- CFMVRMX series starters are complete combination E2 controllers. They include a load break/fault make disconnect switch, R rated current limiting motor fuses, vacuum inline isolation contactor, SCR power stacks and microprocessor controls, CPT, and vacuum bypass contactor.
- MVRMX non-combination starters are available. Please contact the factory for pricing and application assistance.

\*\* Insert appropriate option code as shown below:

NEMA 1 = 1  
NEMA 12 = 12  
NEMA 3R = 3R



Consult factory

# Combination Solid State Starters 4160V

## MVRMX SERIES - MEDIUM VOLTAGE STARTERS

CFMVRMX18								
MODEL NUMBER	VOLT	HP	FLA	DIMENSIONS (IN)			LIST PRICE NEMA 1/12	LIST PRICE NEMA 3R
				H	W	D		
CFMVRMX18-300-4160-**	4160	300	40	92	36	32	CF	CF
CFMVRMX18-750-4160-**	4160	750	99	92	36	32	CF	CF
CFMVRMX18-1000-4160-**	4160	1000	133	92	36	32	CF	CF
CFMVRMX18-1250-4160-**	4160	1250	166	92	36	32	CF	CF
CFMVRMX18-1500-4160-**	4160	1500	200	92	36	32	CF	CF
CFMVRMX18-2000-4160-**	4160	2000	266	92	36	32	CF	CF
CFMVRMX18-2500-4160-**	4160	2500	333	92	36	32	CF	CF
CFMVRMX18-3000-4160-**	4160	3000	360	92	45	32	CF	CF
CFMVRMX18-3500-4160-**	4160	3500	466	92	96	36	CF	CF
CFMVRMX18-4000-4160-**	4160	4000	532	92	96	36	CF	CF
CFMVRMX18-4500-4160-**	4160	4500	600	92	96	36	CF	CF
CFMVRMX18-5000-4160-**	4160	5000	666	92	96	36	CF	CF
CFMVRMX18-5500-4160-**	4160	5500	734	92	96	36	CF	CF

- CFMVRMX series starters are complete combination E2 controllers. They include a load break/fault make disconnect switch, R rated current limiting motor fuses, vacuum inline isolation contactor, SCR power stacks and microprocessor controls, CPT, and vacuum bypass contactor.

- MVRMX non-combination starters are available. Please contact the factory for pricing and application assistance.

\*\* Insert appropriate option code as shown below:

NEMA 1 = 1  
 NEMA 12 = 12  
 NEMA 3R = 3R



# Combination Solid State Starters 6900V

## MVRMX SERIES - MEDIUM VOLTAGE STARTERS

CFMVRMX18								
MODEL NUMBER	VOLT	HP	FLA	DIMENSIONS (IN)			LIST PRICE	LIST PRICE
				H	W	D	NEMA 1/12	NEMA 3R
CFMVRMX18-500-6900-**	6900	500	42	92	45	36	CF	CF
CFMVRMX18-750-6900-**	6900	750	63	92	45	36	CF	CF
CFMVRMX18-1000-6900-**	6900	1000	84	92	45	36	CF	CF
CFMVRMX18-1250-6900-**	6900	1250	105	92	45	36	CF	CF
CFMVRMX18-1500-6900-**	6900	1500	126	92	45	36	CF	CF
CFMVRMX18-2000-6900-**	6900	2000	168	92	45	36	CF	CF
CFMVRMX18-2500-6900-**	6900	2500	210	92	45	36	CF	CF
CFMVRMX18-3000-6900-**	6900	3000	252	92	45	36	CF	CF
CFMVRMX18-3500-6900-**	6900	3500	294†	92	45	36	CF	CF
CFMVRMX18-4000-6900-**	6900	4000	336†	92	45	36	CF	CF
CFMVRMX18-4500-6900-**	6900	4500	378	92	81	36	CF	CF
CFMVRMX18-5000-6900-**	6900	5000	420	92	81	36	CF	CF
CFMVRMX18-5500-6900-**	6900	5500	462	92	81	36	CF	CF
CFMVRMX18-6000-6900**	6900	6000	504†	92	81	36	CF	CF

- CFMVRMX series starters are complete combination E2 controllers. They include a load break/fault make disconnect switch, R rated current limiting motor fuses, vacuum inline isolation contactor, SCR power stacks and microprocessor controls, CPT, and vacuum bypass contactor.
- MVRMX non-combination starters are available. Please contact the factory for pricing and application assistance.
- CPT IS 700VA standard.

\*\* Insert appropriate option code as shown below:

NEMA 1 = 1  
 NEMA 12 = 12  
 NEMA 3R = 3R

† 350% for 30 sec. rated

# Smart Full Voltage Across the Line Starters

## CFMVRMXATL SERIES

The “Smart” Medium Voltage “ATL” package includes the addition of the RediStart MX<sup>3</sup> control package for additional branch circuit monitoring motor protection, metering, diagnostics and communication. Refer to MVRMX RediStart MX<sup>3</sup> specification for complete details. A sampling of the enhanced features includes:

### Protection (ANSI standard numbers given)

- ◆ 51 - Electronic motor overload, class 1 to 40
- ◆ 86 - Overload lockout
- ◆ 48 - Adjustable up-to-speed timer (off; 0 to 300 seconds)
- ◆ 59/27 - Adjustable over/under voltage protection
- ◆ 46 - Adjustable line to average current imbalance
- ◆ 81 - Adjustable high and low frequency protection
- ◆ Single phase protection
- ◆ 66 - Adjustable starts per hour (off or 1 to 20 starts)
- ◆ Adjustable time between starts (off or 1 to 600 minutes)
- ◆ Backspin timer (off or 1 to 200 minutes)
- ◆ 51 - Overcurrent detection (off or 50 to 800%) and time (0.1 to 90.0 sec. in 0.1 sec. intervals)
- ◆ 37 - Undercurrent detection (off or 10 to 100% and time (0.1 to 90.0 sec. in 0.1 sec. intervals)
- ◆ 51G - Ground fault detection (off or 1 to 100 amps) and time (0.1 to 90.0 sec. in 0.1 sec. intervals)
- ◆ Overcurrent, undercurrent, and ground fault can each be set to trip or activate a relay
- ◆ 50 - Instantaneous electronic overcurrent trip
- ◆ 47 - Phase rotation selectable ABC, CBA, or Ins (insensitive)
- ◆ 38/49 - Remote mountable RTD protection package, 8 or 16 RTD inputs (optional)



**5 KV Class  
Smart ATL**

### Control

- ◆ Local start/stop controls
- ◆ Emergency reset capability

### Input/Output and Display

- ◆ Plain English operation via back lit LCD display interface
- ◆ LCD and LED status and diagnostics (full fault annunciation)
- ◆ Programmable metering (amps, volts, frequency, overload, power factor, elapsed time, watts, VARs, watt hours, VA, current imbalance, ground fault current, RTD temperatures with optional RTD module)
- ◆ Programmable relay outputs
- ◆ Latched fault relay output
- ◆ Real time clock
- ◆ Time stamped event recorder
- ◆ Password protection
- ◆ Battery backed-up starter parameters and lockout times

# MX<sup>3</sup> Control Features (Smart Across the Line)

## Motor Protection:

- ◆ Motor thermal overload
- ◆ Independent starting and running OL's
- ◆ Up to speed timer exceeded
- ◆ Low line voltage
- ◆ Low line frequency
- ◆ High line frequency
- ◆ Phase reversal
- ◆ Phase loss
- ◆ Instantaneous overcurrent
- ◆ Overcurrent
- ◆ Undercurrent
- ◆ Current imbalance
- ◆ Ground fault (residual or zero sequence)
- ◆ Disconnect fault
- ◆ Inline contactor fault
- ◆ Control power low
- ◆ Motor PTC input
- ◆ RTD modules

## Metering:

- ◆ Accuracy:
  - 3% out-of-box
  - 2% factory calibrated
- ◆ Average current
- ◆ L1 current
- ◆ L2 current
- ◆ L3 current
- ◆ Current imbalance %
- ◆ Ground fault current
- ◆ Average volts
- ◆ L1 - L2 voltage
- ◆ L2 - L3 voltage
- ◆ L3 - L1 voltage
- ◆ Overload %
- ◆ Power factor
- ◆ Watts
- ◆ VA
- ◆ VARS
- ◆ KW hours
- ◆ MW hours
- ◆ Phase order
- ◆ Line frequency
- ◆ Analog input
- ◆ Analog output
- ◆ Run time - days

## Metering, continued:

- ◆ Run time - hours
- ◆ # of starts
- ◆ Tru Torque %
- ◆ Power %
- ◆ Peak starting current
- ◆ Last starting duration
- ◆ RTD temperatures
- ◆ Real-time clock

## 8 Digital Inputs Configurable to:

- ◆ Stop
- ◆ Fault
- ◆ Fault reset
- ◆ Bypass / inline confirm
- ◆ OL reset
- ◆ Local/remote selection
- ◆ 1 dedicated start input
- ◆ Disconnect

## 6 Relay Outputs Configurable to:

- ◆ Faulted
- ◆ Running
- ◆ Up to speed
- ◆ Alarm condition
- ◆ Ready condition
- ◆ Locked out
- ◆ Over current
- ◆ Under current
- ◆ OL alarm
- ◆ Shunt trip
- ◆ Ground fault
- ◆ Cooling fan

## 1 Analog 4-20mA / 0-10Vdc Input Configurable to:

- ◆ Trip high level
- ◆ Trip low level

## 1 Analog 4-20mA / 0-10Vdc Output Configurable to:

- ◆ Current (0-200%/0-800%)
- ◆ Voltage (0-150%)
- ◆ OL (0-150%)
- ◆ KW (0-10 Kw/0-100 Kw)
- ◆ MW (0-1 Mw)
- ◆ Analog input (0-100%)
- ◆ Firing (0-100%)
- ◆ Calibration

## User Interface:

- ◆ Event log (99 events)
- ◆ Door mounted LCD display
  - Set/examine operating parameters
  - View status information, line current, voltage and frequency
  - Start and stop the starter

## 1 Communication Port:

- ◆ ModBus / RS485

# Smart Full Voltage Across the Line Starters 2300V / 3300V

## CFMVRMXATL SERIES

### 2300V SMART CFMVRMXATL WITH REDISTART MX<sup>3</sup> PACKAGE

MODEL NUMBER	VOLT	HP	FLA	DIMENSIONS (IN)			LIST PRICE NEMA 1/12	LIST PRICE NEMA 3R
				H	W	D		
CFMVRMXATL-500-2300-**	2300	500	120	92	24	32	CF	CF
CFMVRMXATL-1000-2300-**	2300	1000	240	92	24	32	CF	CF
CFMVRMXATL-1500-2300-**	2300	1500	360	92	24	32	CF	CF

### 3300V SMART CFMVRMXATL WITH REDISTART MX<sup>3</sup> PACKAGE

MODEL NUMBER	VOLT	HP	FLA	DIMENSIONS (IN)			LIST PRICE NEMA 1/12	LIST PRICE NEMA 3R
				H	W	D		
CFMVRMXATL-1000-3300-**	3300	1000	169	92	24	32	CF	CF
CFMVRMXATL-1250-3300-**	3300	1250	211	92	24	32	CF	CF
CFMVRMXATL-1500-3300-**	3300	1500	254	92	24	32	CF	CF
CFMVRMXATL-2000-3300-**	3300	2000	338	92	24	32	CF	CF
CFMVRMXATL-2250-3300-**	3300	2250	380	92	60	36	CF	CF
CFMVRMXATL-2500-3300-**	3300	2500	423	92	60	36	CF	CF

\*\* Insert appropriate option code as shown below:

NEMA 1 = 1  
 NEMA 12 = 12  
 NEMA 3R = 3R

# Smart Full Voltage Across the Line Starters 4160V / 6900V

## CFMVRMXATL SERIES

### 4160V SMART CFMVRMXATL WITH REDISTART MX<sup>3</sup> PACKAGE

MODEL NUMBER	VOLT	HP	FLA	DIMENSIONS (IN)			LIST PRICE NEMA 1/12	LIST PRICE NEMA 3R
				H	W	D		
CFMVRMXATL-1000-4160-**	4160	1000	133	92	24	32	CF	CF
CFMVRMXATL-2000-4160-**	4160	2000	266	92	24	32	CF	CF
CFMVRMXATL-2500-4160-**	4160	2500	333	92	24	32	CF	CF
CFMVRMXATL-3000-4160-**	4160	3000	399	92	60	36	CF	CF

### 6900V SMART CFMVRMXATL WITH REDISTART MX<sup>3</sup> PACKAGE

MODEL NUMBER	VOLT	HP	FLA	DIMENSIONS (IN)			LIST PRICE NEMA 1/12	LIST PRICE NEMA 3R
				H	W	D		
CFMVRMXATL-1500-6600-**	6600	1500	125	92	24	32	CF	CF
CFMVRMXATL-2250-6600-**	6600	2250	187	92	24	32	CF	CF
CFMVRMXATL-4000-6600-**	6600	4000	332	92	24	32	CF	CF

\*\* Insert appropriate option code as shown below:

NEMA 1 = 1  
 NEMA 12 = 12  
 NEMA 3R = 3R

# Full Voltage Across the Line Starters

## CFMVATL SERIES

### CFMVATL Series Product Highlights

CFMVATL medium voltage across-the-line starters are full voltage controllers for three phase induction motors. The RediStart MX<sup>3</sup> control package can be added as an option to provide a "Smart" CFMVRMXATL package.

Combination CFMVATL starters are supplied in a free standing enclosure. Enclosures are available in NEMA 1, NEMA 12, and NEMA 3R configurations. Enclosure consists of two distinct compartments. The medium voltage section is located in the main body of the enclosure, and the low voltage section containing the control logic is located behind the door in an isolated compartment.

Standard combination CFMVATL starters are supplied with a load break / fault make disconnect isolation switch, Class "R" motor current limiting fuses, vacuum motor starting contactor, and the "SPE" SureProtex electronic overload protection. Refer to the CFMVRMXATL series for the RediStart MX<sup>3</sup> control package for additional branch circuit monitoring, motor protection, metering, diagnostics and communication.



### Standard Features:

The standard medium voltage combination "ATL" package includes:

- ◆ NEMA 1,12, 3R enclosure
- ◆ Disconnect switch
  - Load break / fault make
  - Grounding bar
  - Viewing window
- ◆ Motor fusing
  - Class "R"
  - Current limiting
- ◆ Vacuum motor starting contactor
- ◆ Start / stop push-buttons
- ◆ "SPE" overload protection
  - Class 10-30 adjustable
  - 1 N/O, 1 N/C trip contact
  - "Trip free" design
  - Phase imbalance protection
  - Phase reversal protection
  - Phase loss protection
  - Test function / trip indication
  - Fault indication

# Full Voltage Across the Line Starters 2300V / 3300V

## CFMVATL SERIES

### 2300V CFMVATL WITH STANDARD PACKAGE

MODEL NUMBER	VOLT	HP	FLA	DIMENSIONS (IN)			LIST PRICE NEMA 1/12	LIST PRICE NEMA 3R
				H	W	D		
CFMVATL-500-2300-**	2300	500	120	92	24	32	CF	CF
CFMVATL-1000-2300-**	2300	1000	240	92	24	32	CF	CF
CFMVATL-1500-2300-**	2300	1500	360	92	24	32	CF	CF

### 3300V CFMVATL WITH STANDARD PACKAGE

MODEL NUMBER	VOLT	HP	FLA	DIMENSIONS (IN)			LIST PRICE NEMA 1/12	LIST PRICE NEMA 3R
				H	W	D		
CFMVATL-1000-3300-**	3300	1000	169	92	24	32	CF	CF
CFMVATL-1250-3300-**	3300	1250	211	92	24	32	CF	CF
CFMVATL-1500-3300-**	3300	1500	254	92	24	32	CF	CF
CFMVATL-2000-3300-**	3300	2000	338	92	24	32	CF	CF
CFMVATL-2250-3300-**	3300	2250	380	92	60	36	CF	CF
CFMVATL-2500-3300-**	3300	2500	423	92	60	36	CF	CF

\*\* Insert appropriate option code as shown below:

NEMA 1 = 1  
 NEMA 12 = 12  
 NEMA 3R = 3R

# Full Voltage Across the Line Starters 4160V / 6900V

## CFMVATL SERIES

### 4160V CFMVATL WITH STANDARD PACKAGE

MODEL NUMBER	VOLT	HP	FLA	DIMENSIONS (IN)			LIST PRICE NEMA 1/12	LIST PRICE NEMA 3R
				H	W	D		
CFMVATL-1000-4160-**	4160	1000	133	92	24	32	CF	CF
CFMVATL-2000-4160-**	4160	2000	266	92	24	32	CF	CF
CFMVATL-2500-4160-**	4160	2500	333	92	24	32	CF	CF
CFMVATL-3000-4160-**	4160	3000	399	92	60	36	CF	CF

### 6900V CFMVATL WITH STANDARD PACKAGE

MODEL NUMBER	VOLT	HP	FLA	DIMENSIONS (IN)			LIST PRICE NEMA 1/12	LIST PRICE NEMA 3R
				H	W	D		
CFMVATL-1500-6600-**	6600	1500	125	92	24	32	CF	CF
CFMVATL-2250-6600-**	6600	2250	187	92	24	32	CF	CF
CFMVATL-4000-6600-**	6600	4000	332	92	24	32	CF	CF

\*\* Insert appropriate option code as shown below:

NEMA 1 = 1  
 NEMA 12 = 12  
 NEMA 3R = 3R



# Main Lug Only (MLO)

## MLO SERIES

### MLO Series Product Highlights

Benshaw's Main Lug Only (MLO) section provides a full height and depth NEMA rated enclosure for use as a convenient area to land the line or load cable connections while providing a transition area for a disconnect switch, starter, or an MCC.

The MLO can be configured for top or bottom cable access (specify when ordering). Customized MLO sections are available—just contact Benshaw's factory with your requirements.

#### Key Advantages:

- ◆ Landing pad for input cable
- ◆ Optional feed through bus to Benshaw line up
- ◆ Top or bottom cable entry
- ◆ NEMA 1, 12 or 3R enclosure configurations
- ◆ Transition from other manufacturers' line up
- ◆ Configure to match up to existing bus network (optional)
- ◆ Optional control transformers and metering can be added

See page 6-38 for available enclosure options:

- Upsizing 24W to 36W
- Upsizing 30D to 36D
- Door interlock switch



#### Standard Features:

The MLO Series includes:

- ◆ Landing pad for cabling
- ◆ NEMA 1/12 construction
- ◆ ANSI 61 grey
- ◆ 11 gauge steel construction
- ◆ Super durable polyurethane TGIC powder paint
- ◆ Tin plated copper bus
- ◆ Paint finish meets ASTM A252-9 or A525-83
- ◆ UL listed 5KV Class

#### Options:

- ◆ Lockable front panel
- ◆ Bus entry, left or right

# Main Lug Only 2300V

## MLO SERIES - NEMA 1 / 12

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>2300V NEMA 1 - 18" WIDE</b>		
MV-MLO-18-800-2300-1	800 AMP PULL SECTION 18" WIDE NEMA 1 ENCLOSURE	CF
MV-MLO-18-1200-2300-1	1200 AMP PULL SECTION 18" WIDE NEMA 1 ENCLOSURE	CF
MV-MLO-18-2000-2300-1	2000 AMP PULL SECTION 18" WIDE NEMA 1 ENCLOSURE	CF

<b>2300V NEMA 1 - 24" WIDE</b>		
MV-MLO-24-800-2300-1	800 AMP PULL SECTION 24" WIDE NEMA 1 ENCLOSURE	CF
MV-MLO-24-1200-2300-1	1200 AMP PULL SECTION 24" WIDE NEMA 1 ENCLOSURE	CF
MV-MLO-24-2000-2300-1	2000 AMP PULL SECTION 24" WIDE NEMA 1 ENCLOSURE	CF

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>2300V NEMA 12 - 18" WIDE</b>		
MV-MLO-18-800-2300-12	800 AMP PULL SECTION 18" WIDE NEMA 12 ENCLOSURE	CF
MV-MLO-18-1200-2300-12	1200 AMP PULL SECTION 18" WIDE NEMA 12 ENCLOSURE	CF
MV-MLO-18-2000-2300-12	2000 AMP PULL SECTION 18" WIDE NEMA 12 ENCLOSURE	CF

<b>2300V NEMA 12 - 24" WIDE</b>		
MV-MLO-24-800-2300-12	800 AMP PULL SECTION 24" WIDE NEMA 12 ENCLOSURE	CF
MV-MLO-24-1200-2300-12	1200 AMP PULL SECTION 24" WIDE NEMA 12 ENCLOSURE	CF
MV-MLO-24-2000-2300-12	2000 AMP PULL SECTION 24" WIDE NEMA 12 ENCLOSURE	CF

- For NEMA 3R, add 5% to NEMA 1 price then change the last digit in the part number from 1 to 3R.

# Main Lug Only 3300V

## MLO SERIES - NEMA 1 / 12

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>3300V NEMA 1 - 18" WIDE</b>		
MV-MLO-18-800-3300-1	800 AMP PULL SECTION 18" WIDE NEMA 1 ENCLOSURE	CF
MV-MLO-18-1200-3300-1	1200 AMP PULL SECTION 18" WIDE NEMA 1 ENCLOSURE	CF
MV-MLO-18-2000-3300-1	2000 AMP PULL SECTION 18" WIDE NEMA 1 ENCLOSURE	CF

<b>3300V NEMA 1 - 24" WIDE</b>		
MV-MLO-24-800-3300-1	800 AMP PULL SECTION 24" WIDE NEMA 1 ENCLOSURE	CF
MV-MLO-24-1200-3300-1	1200 AMP PULL SECTION 24" WIDE NEMA 1 ENCLOSURE	CF
MV-MLO-24-2000-3300-1	2000 AMP PULL SECTION 24" WIDE NEMA 1 ENCLOSURE	CF

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>3300V NEMA 12 - 18" WIDE</b>		
MV-MLO-18-800-3300-12	800 AMP PULL SECTION 18" WIDE NEMA 12 ENCLOSURE	CF
MV-MLO-18-1200-3300-12	1200 AMP PULL SECTION 18" WIDE NEMA 12 ENCLOSURE	CF
MV-MLO-18-2000-3300-12	2000 AMP PULL SECTION 18" WIDE NEMA 12 ENCLOSURE	CF

<b>3300V NEMA 12 - 24" WIDE</b>		
MV-MLO-24-800-3300-12	800 AMP PULL SECTION 24" WIDE NEMA 12 ENCLOSURE	CF
MV-MLO-24-1200-3300-12	1200 AMP PULL SECTION 24" WIDE NEMA 12 ENCLOSURE	CF
MV-MLO-24-2000-3300-12	2000 AMP PULL SECTION 24" WIDE NEMA 12 ENCLOSURE	CF

- For NEMA 3R, add 5% to NEMA 1 price then change the last digit in the part number from 1 to 3R.

# Main Lug Only 4160V

## MLO SERIES - NEMA 1 / 12

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>4160V NEMA 1 - 18" WIDE</b>		
MV-MLO-18-800-4160-1	800 AMP PULL SECTION 18" WIDE NEMA 1 ENCLOSURE	CF
MV-MLO-18-1200-4160-1	1200 AMP PULL SECTION 18" WIDE NEMA 1 ENCLOSURE	CF
MV-MLO-18-2000-4160-1	2000 AMP PULL SECTION 18" WIDE NEMA 1 ENCLOSURE	CF

<b>4160V NEMA 1 - 24" WIDE</b>		
MV-MLO-24-800-4160-1	800 AMP PULL SECTION 24" WIDE NEMA 1 ENCLOSURE	CF
MV-MLO-24-1200-4160-1	1200 AMP PULL SECTION 24" WIDE NEMA 1 ENCLOSURE	CF
MV-MLO-24-2000-4160-1	2000 AMP PULL SECTION 24" WIDE NEMA 1 ENCLOSURE	CF

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>4160V NEMA 12 - 18" WIDE</b>		
MV-MLO-18-800-4160-12	800 AMP PULL SECTION 18" WIDE NEMA 12 ENCLOSURE	CF
MV-MLO-18-1200-4160-12	1200 AMP PULL SECTION 18" WIDE NEMA 12 ENCLOSURE	CF
MV-MLO-18-2000-4160-12	2000 AMP PULL SECTION 18" WIDE NEMA 12 ENCLOSURE	CF

<b>4160V NEMA 12 - 24" WIDE</b>		
MV-MLO-24-800-4160-12	800 AMP PULL SECTION 24" WIDE NEMA 12 ENCLOSURE	CF
MV-MLO-24-1200-4160-12	1200 AMP PULL SECTION 24" WIDE NEMA 12 ENCLOSURE	CF
MV-MLO-24-2000-4160-12	2000 AMP PULL SECTION 24" WIDE NEMA 12 ENCLOSURE	CF

- For NEMA 3R, add 5% to NEMA 1 price then change the last digit in the part number from 1 to 3R.

# Main Lug Only 6900V

## MLO SERIES - NEMA 1 / 12

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>6900V NEMA 1 - 18" WIDE</b>		
MV-MLO-18-800-6900-1	800 AMP PULL SECTION 18" WIDE NEMA 1 ENCLOSURE	CF
MV-MLO-18-1200-6900-1	1200 AMP PULL SECTION 18" WIDE NEMA 1 ENCLOSURE	CF
MV-MLO-18-2000-6900-1	2000 AMP PULL SECTION 18" WIDE NEMA 1 ENCLOSURE	CF

<b>6900V NEMA 1 - 24" WIDE</b>		
MV-MLO-24-800-6900-1	800 AMP PULL SECTION 24" WIDE NEMA 1 ENCLOSURE	CF
MV-MLO-24-1200-6900-1	1200 AMP PULL SECTION 24" WIDE NEMA 1 ENCLOSURE	CF
MV-MLO-24-2000-6900-1	2000 AMP PULL SECTION 24" WIDE NEMA 1 ENCLOSURE	CF

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>6900V NEMA 12 - 18" WIDE</b>		
MV-MLO-18-800-6900-12	800 AMP PULL SECTION 18" WIDE NEMA 12 ENCLOSURE	CF
MV-MLO-18-1200-6900-12	1200 AMP PULL SECTION 18" WIDE NEMA 12 ENCLOSURE	CF
MV-MLO-18-2000-6900-12	2000 AMP PULL SECTION 18" WIDE NEMA 12 ENCLOSURE	CF

<b>6900V NEMA 12 - 24" WIDE</b>		
MV-MLO-24-800-6900-12	800 AMP PULL SECTION 24" WIDE NEMA 12 ENCLOSURE	CF
MV-MLO-24-1200-6900-12	1200 AMP PULL SECTION 24" WIDE NEMA 12 ENCLOSURE	CF
MV-MLO-24-2000-6900-12	2000 AMP PULL SECTION 24" WIDE NEMA 12 ENCLOSURE	CF

- For NEMA 3R, add 5% to NEMA 1 price then change the last digit in the part number from 1 to 3R.

# Load Break Interrupter Switch

## CFMVDISC SERIES

### MVDISC Series Product Highlights

Benshaw's free standing medium voltage load break interrupter switch is the latest design in medium voltage high current switching equipment for a wide range of applications. The fused interrupter switch provides an economical means of disconnect and short circuit protection of medium voltage loads such as transformers, single circuit or multi-circuit systems.

The switch is provided in a NEMA rated enclosure configured for use as a standalone unit, in an equipment line-up or MCC.

#### Key Advantages:

- ◆ Bolts directly to Benshaw MCC line-up or starter
- ◆ UL labeled up to 4800 volts
- ◆ Available in 400, 600 and 1200 amp ratings
- ◆ Available up to 6600 volts
- ◆ Class E fusing included\*
- ◆ Configurable with added options
- ◆ Load break rated



#### Standard Features:

- ◆ Load break fault make
- ◆ 60 KV BIL up to 7.2 KV
- ◆ Symmetric fault ratings of 50 KA for 5KV - 7.2 KV  
45 KA for 2.4 KV
- ◆ NEMA 12 enclosure
- ◆ Viewing window to verify switch position
- ◆ Enclosure MV door interlocked with switch mechanism to prevent access while switch is on
- ◆ Operating mechanism lockable in the off position
- ◆ Load side grounding in off position
- ◆ Blown fuse indication
- ◆ Welded 11 guage steel construction
- ◆ Enclosure finish meets ASTM A252-9 or A525-83, G-90 designation
- ◆ Line and load landing pads with NEMA bolt pattern

#### Options:

- ◆ Lockable front panel
- ◆ Bus entry, left or right

- See page 6-32 for available options.

\* For use on motor loads Class R fuse will be provided and must be specified by customer

# Load Break Interrupter Switch

## CFMVDISC SERIES

CATALOG NUMBER	DESCRIPTION	DIMENSION (IN)			LIST PRICE
		H	W	D	
<b>2300V</b>					
CFMV-DISC-24-400-2300-12*	MV DISC SWITCH 400A 2300V TOP ENTRY/BOTTOM EXIT	92	24	30	CF
CFMV-DISC-36-600-2300-12*	MV DISC SWITCH 600A 2300V BOTTOM ENTRY/TOP EXIT	92	36	36	CF
CFMV-DISC-36-1200-2300-12*	MV DISC SWITCH 1200A 2300V BOTTOM ENTRY/TOP EXIT	92	36	36	CF

CATALOG NUMBER	DESCRIPTION	DIMENSION (IN)			LIST PRICE
		H	W	D	
<b>3300V</b>					
CFMV-DISC-24-400-3300-12*	MV DISC SWITCH 400A 3300V TOP ENTRY/BOTTOM EXIT	92	24	30	CF
CFMV-DISC-36-600-3300-12*	MV DISC SWITCH 600A 3300V BOTTOM ENTRY/TOP EXIT	92	36	36	CF
CFMV-DISC-36-1200-3300-12*	MV DISC SWITCH 1200A 3300V BOTTOM ENTRY/TOP EXIT	92	36	36	CF

CATALOG NUMBER	DESCRIPTION	DIMENSION (IN)			LIST PRICE
		H	W	D	
<b>4160V</b>					
CFMV-DISC-24-400-4160-12*	MV DISC SWITCH 400A 4160V TOP ENTRY/BOTTOM EXIT	92	24	30	CF
CFMV-DISC-36-600-4160-12*	MV DISC SWITCH 600A 4160V BOTTOM ENTRY/TOP EXIT	92	36	36	CF
CFMV-DISC-36-1200-4160-12*	MV DISC SWITCH 1200A 4160V BOTTOM ENTRY/TOP EXIT	92	36	36	CF

CATALOG NUMBER	DESCRIPTION	DIMENSION (IN)			LIST PRICE
		H	W	D	
<b>6600V</b>					
CFMV-DISC-24-400-6600-12**	MV DISC SWITCH 400A 6600V TOP ENTRY/BOTTOM EXIT	92	24	30	CF
CFMV-DISC-36-600-6600-12**	MV DISC SWITCH 600A 6600V BOTTOM ENTRY/TOP EXIT	92	36	36	CF
CFMV-DISC-36-1200-6600-12**	MV DISC SWITCH 1200A 6600V BOTTOM ENTRY/TOP EXIT	92	36	36	CF

- See page 6-32 for available options. Options include horizontal bus, kirk key interlock and Main Lug Only (MLO) sections.
- \* For use on motor load Class R fuse will be provided and must be specified by customer.
- \*\* Non UL listed disconnect switch

# Medium Voltage Starters

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# Medium Voltage Starter Options

## PILOT DEVICES

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>PUSH-BUTTONS</b>		
A001	RAISED STOP PUSH-BUTTON - RED	CF
A002	FLUSH START PUSH-BUTTON - GREEN	CF
A003	JOG PUSH-BUTTON - YELLOW	CF
A004	OL RESET PUSH-BUTTON - (FOR EXTERNAL OL RELAY) - BLACK	CF
A005	RESET PUSH-BUTTON - BLACK	CF
A006	RAISED PUSH-BUTTON - SPECIFY COLOR AND FUNCTION	CF
A007	FLUSH PUSH-BUTTON - SPECIFY COLOR AND FUNCTION	CF
A008	MUSHROOM HEAD STOP PUSH-BUTTON - RED	CF
A009	ILLUMINATED PUSH-BUTTON - SPECIFY COLOR AND FUNCTION	CF
<b>PILOT LIGHTS</b>		
A021	RED RUN LIGHT	CF
A022	GREEN STOP LIGHT	CF
A023	AMBER FAULT LIGHT	CF
A024	GREEN READY LIGHT	CF
A025	AMBER BYPASS LIGHT	CF
A026	RED LIGHT - SPECIFY FUNCTION	CF
A027	GREEN LIGHT - SPECIFY FUNCTION	CF
A028	AMBER LIGHT - SPECIFY FUNCTION	CF
A029	WHITE LIGHT - SPECIFY FUNCTION	CF
A030	BLUE LIGHT - SPECIFY FUNCTION	CF
A031	PUSH TO TEST CONTACT ASSEMBLY (ADDITION TO ABOVE)	CF
<b>SELECTOR SWITCHES</b>		
A041	HAND - OFF - AUTO SELECTOR SWITCH	CF
A042	LOCAL - OFF - REMOTE SELECTOR SWITCH	CF
A043	KEY OPERATED HAND - OFF - AUTO SELECTOR SWITCH	CF
A044	DUAL RAMPS SELECTOR SWITCH	CF
A045	TWO POSITION SELECTOR SWITCH - SPECIFY FUNCTION	CF
A046	THREE POSITION SELECTOR SWITCH - SPECIFY FUNCTION	CF
A047	OTHER SLECTOR SWITCH - SPECIFY FUNCTION AND TYPE	CF


 Consult factory

# Medium Voltage Starter Options

## PILOT DEVICES

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>METERS</b>		
A061	SINGLE PHASE ANALOG AMMETER - INCLUDES CT'S*	CF
A062	ANALOG AMMETER WITH THREE PHASE SELECTOR SWITCH - INCLUDES CT's*	CF
A065	ELAPSED TIME METER	CF
A066	OPERATIONS COUNTER	CF
A069	OTHER POWER METERING - SPECIFY FUNCTION	CF
A075	ANALOG VOLTMETER, SINGLE PHASE*	CF
A076	ANALOG VOLTMETER WITH THREE PHASE SELECTOR SWITCH*	CF
A077	AC WATTMETER	CF
A078	AC WATT HOUR METER	CF

\* Switchboard type

 Consult factory


# Medium Voltage Starter Options

## CONTROL OPTIONS

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>MX<sup>3</sup> OPTIONS</b>		
A401	DOOR MOUNTED COMMUNICATIONS PACKAGE - INCLUDES DOOR MOUNTED CONNECTOR AND RS232/485 CARD	CF
MXCOMP	PROFIBUS COMMUNICATIONS BRIDGE	CF
MXCOME	ETHERNET COMMUNICATIONS BRIDGE	CF
MXCOMD	DEVICENET COMMUNICATIONS BRIDGE	CF
MXCOML	LON WORKS COMMUNICATIONS BRIDGE	CF
A405	POWER OUTAGE RIDE THRU - THIS OPTION ALLOWS THE STARTER TO AUTOMATICALLY RESTART AFTER A POWER LOSS OF UP TO 30 SECS. CUSTOMER MUST SUPPLY SEPARATE SOURCE OF UNINTERRUPTED 120V TO THE STARTER.	CF
A406	RTD MODULE - UNIT WILL ACCEPT 8 INPUT RTD'S. RTD'S MUST BE 100 OHM PLATINUM. (AVAILABLE FOR REMOTE MOUNTING. CONSULT FACTORY FOR DETAILS)	CF
A407	RTD MODULE - UNIT WILL ACCEPT 16 INPUT RTD'S. RTD'S MUST BE 100 OHM PLATINUM. (AVAILABLE FOR REMOTE MOUNTING. CONSULT FACTORY FOR DETAILS)	CF
A411	1000 VA UPS / 700 W FOR 120V SUPPLY INSTEAD OF CUSTOMER SUPPLIED FOR OPTION A405 POWER OUTAGE RIDE THRU	CF

### EMERGENCY START OPTIONS


A410	EMERGENCY / ACROSS THE LINE BYPASS OPTION, INCLUDES START / STOP PUSH-BUTTONS, OVERLOAD RELAY AND CURRENT TRANSFORMERS AND SELECTOR SWITCH	CF
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 Consult factory

# Medium Voltage Starter Options

## CONTROL OPTIONS

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>CONTROL POWER TRANSFORMERS</b>		
A105	500 VA ADDITIONAL CONTROL POWER	CF
A106	1000 VA ADDITIONAL CONTROL POWER	CF
A107	SPECIFY CONTROL POWER AMOUNT	CF
A110	1500 VA ADDITIONAL CONTROL POWER	CF
A111	2500 VA ADDITIONAL CONTROL POWER	CF
<b>GENERAL PURPOSE CONTROL RELAYS</b>		
A121	THREE POLE RELAY - SPECIFY FUNCTION	CF
A122	FOUR POLE RELAY - SPECIFY FUNCTION	CF
A123	OTHER RELAYS - SPECIFY FUNCTION AND TYPE	CF
A124	ON DELAY TIMER - SPECIFY FUNCTION AND TIME	CF
A125	OFF DELAY TIMER - SPECIFY FUNCTION AND TIME	CF
A126	OTHER TIMERS - SPECIFY FUNCTION AND TIME	CF
A127	GROUND FAULT RELAY - FOR EQUIPMENT PROTECTION ONLY	CF
<b>TRANSDUCERS</b>		
A141	TRANSDUCER OUTPUT 0-5VDC BASED ON MOTOR FLA	CF
A142	TRANSDUCER OUTPUT 4 - 20ma BASED ON MOTOR FLA	CF
A145	TRANSDUCER OUTPUT 4 - 20ma BASED ON MOTOR VOLTAGE	CF

 Consult factory


# Medium Voltage Starter Options

## MOTOR PROTECTIVE RELAYS

The following protective relays include the necessary current and potential transformers included in the price. For optional zero sequence ground fault sensing, the appropriate current transformer should be added.

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>PROTECTIVE RELAYS</b>		
A826	MULTILIN 369 W / RTD, METERING AND COMMUNICATIONS OPTIONS	CF
A827	MULTILIN 469	CF
A828	MULTILIN MPM (REQUIRES 369/469)	CF
A829	MULTILIN PQM W / ANALOG OUTPUT OPTIONS	CF
A830	CUTLER HAMMER MP4000	CF
A831	SCHWEITZER SEL 710	CF
A832	SCHWEITZER SEL 749M	CF
A838	OTHER	CF
<b>PROTECTIVE RELAY OPTIONS</b>		
A875	GROUND FAULT CT, 2000:1, 4.0:DIA. (FOR MX3 USE)	CF
A876	GROUND FAULT CT, 2000:1, 8.13:DIA. (FOR MX3 USE)	CF

- Other manufacturers motor protective relays available on request.

 Consult factory

# Medium Voltage Starter Options

## ENCLOSURE OPTIONS

CATALOG NUMBER	DESCRIPTION				LIST PRICE
	208V	240V	480V	575V	
<b>AUXILLIARY MOTOR STARTERS</b>					
A151	2 HP	2 HP	5 HP	7.5 HP	CF
A152	3 HP	3 HP	7.5 HP	10 HP	CF
A153	7.5 HP	7.5 HP	10 HP	15 HP	CF
A154	7.5 HP	10 HP	20 HP	20 HP	CF

- This option will add a three phase electromechanical contactor and motor OL relay along with fuses. Customer must provide two wire start command for starting and stopping the starter unless otherwise specified.
- Please note that the three phase power for the above starters is provided by the customer.

<b>ENCLOSURE OPTIONS</b>		
A171	SPACE HEATER WITH THERMOSTAT	CF
A251	DOOR INTERLOCK SWITCH	CF
A252	SINGLE KEY KIRK KEY INTERLOCK	CF
A255	MULTIPLE ENCLOSURE MECHANICAL DOOR INTERLOCK	CF
A256	ENCLOSURE UPSIZING - 24" W TO 36" W	CF
A257	ENCLOSURE UPSIZING - 36" W TO 45" W	CF
A258	ENCLOSURE UPSIZING - 32" D TO 36" D	CF

<b>BUS OPTIONS</b>		
A259A	HORIZONTAL BUS - TIN PLATED COPPER; NON-INSULATED, 800 AMP	CF
A259B	HORIZONTAL BUS - TIN PLATED COPPER; NON-INSULATED, 1200 AMP	CF
A259C	HORIZONTAL BUS - TIN PLATED COPPER; NON-INSULATED, 2000 AMP	CF
A259D	HORIZONTAL BUS - TIN PLATED COPPER; INSULATED, 800 AMP	CF
A259E	HORIZONTAL BUS - TIN PLATED COPPER; INSULATED, 1200 AMP	CF
A259F	HORIZONTAL BUS - TIN PLATED COPPER; INSULATED, 2000 AMP	CF
A260A	BUS SPLICE KIT - TIN PLATED COPPER, NON-INSULATED, 800 AMP	CF
A260B	BUS SPLICE KIT - TIN PLATED COPPER, NON-INSULATED, 1200 AMP	CF
A260C	BUS SPLICE KIT - TIN PLATED COPPER, NON-INSULATED, 2000 AMP	CF
A260D	BUS SPLICE KIT - TIN PLATED COPPER, INSULATED, 800 AMP	CF
A260E	BUS SPLICE KIT - TIN PLATED COPPER, INSULATED, 1200 AMP	CF
A260F	BUS SPLICE KIT - TIN PLATED COPPER, INSULATED, 2000 AMP	CF

- Replace V with the system voltage and ENC with enclosure rating in part number.
- Main lug only sections are recommended for bottom entry configurations.

# Medium Voltage Starter Options

## 2300V POWER FACTOR CORRECTION CAPACITORS

Power factor correction capacitors are available in two options. If the starter requires a UL label, the power factor capacitors are installed on the top of the unit as standard (capacitors are shipped loose and must be installed by customer). This will add twenty-eight inches to the enclosure height. For remote mount, contact factory. For units not requiring UL approval, capacitors may be installed inside the enclosure. Both options require enclosure width to increase to the next standard size to accommodate the added contactor. Capacitors are three phase, supplied with three fuses, rated for 60Hz operation. Price includes hardware needed to top mount and wire capacitors.

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>NON-UL LABELED 2300V INSIDE MOUNT</b>		
A701	PFCC, MV 25KVAR	CF
A702	PFCC, MV 50KVAR	CF
A703	PFCC, MV 75KVAR	CF
A704	PFCC, MV 100KVAR	CF
A705	PFCC, MV 125KVAR	CF
A706	PFCC, MV 150KVAR	CF
A707	PFCC, MV 175KVAR	CF
A708	PFCC, MV 200KVAR	CF
A709	PFCC, MV 225KVAR	CF
A710	PFCC, MV 250KVAR	CF
A711	PFCC, MV 275KVAR	CF
<b>UL LABELED 2300V TOP MOUNT - 28" HEIGHT ADDER (CAPACITOR AND MOUNTING COMPONENTS SHIPPED LOOSE)</b>		
A725	PFCC, MV 25KVAR	CF
A726	PFCC, MV 50KVAR	CF
A727	PFCC, MV 75KVAR	CF
A728	PFCC, MV 100KVAR	CF
A729	PFCC, MV 125KVAR	CF
A730	PFCC, MV 150KVAR	CF
A731	PFCC, MV 175KVAR	CF
A732	PFCC, MV 200KVAR	CF
A733	PFCC, MV 225KVAR	CF
A734	PFCC, MV 250KVAR	CF
A735	PFCC, MV 275KVAR	CF
<b>POWER FACTOR CAPACITOR OPTIONS</b>		
A750	ILLUMINATED BLOWN FUSE INDICATOR - TOP MOUNTED CAPACITORS	CF
A751	ILLUMINATED BLOWN FUSE INDICATOR - INSIDE MOUNTED CAPACITORS	CF

- Please consult factory for capacitor requirements above 275KVAR or above 4160 volts.
- De-tuning reactors see page 6-43

# Medium Voltage Starter Options

## 4160V POWER FACTOR CORRECTION CAPACITORS

Power factor correction capacitors are available in two options. If the starter requires a UL label, the power factor capacitors are installed on the top of the unit as standard (capacitors are shipped loose and must be installed by customer). This will add twenty-eight inches to the enclosure height. For remote mount, contact factory. For units not requiring UL approval, capacitors may be installed inside the enclosure. Both options require enclosure width to increase to the next standard size to accommodate the added contactor. Capacitors are three phase, supplied with three fuses, rated for 60Hz operation. Price includes hardware needed to top mount and wire capacitors.

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>NON-UL LABELED 4160V INSIDE MOUNT</b>		
A775	PFCC, MV 25KVAR	CF
A776	PFCC, MV 50KVAR	CF
A777	PFCC, MV 75KVAR	CF
A778	PFCC, MV 100KVAR	CF
A779	PFCC, MV 125KVAR	CF
A780	PFCC, MV 150KVAR	CF
A781	PFCC, MV 175KVAR	CF
A782	PFCC, MV 200KVAR	CF
A783	PFCC, MV 225KVAR	CF
A784	PFCC, MV 250KVAR	CF
A785	PFCC, MV 275KVAR	CF
<b>UL LABELED 4160V TOP MOUNT - 28" HEIGHT ADDER (CAPACITOR AND MOUNTING COMPONENTS SHIPPED LOOSE)</b>		
A801	PFCC, MV 25KVAR	CF
A802	PFCC, MV 50KVAR	CF
A803	PFCC, MV 75KVAR	CF
A804	PFCC, MV 100KVAR	CF
A805	PFCC, MV 125KVAR	CF
A806	PFCC, MV 150KVAR	CF
A807	PFCC, MV 175KVAR	CF
A808	PFCC, MV 200KVAR	CF
A809	PFCC, MV 225KVAR	CF
A810	PFCC, MV 250KVAR	CF
A811	PFCC, MV 275KVAR	CF
<b>POWER FACTOR CAPACITOR OPTIONS</b>		
A750	ILLUMINATED BLOWN FUSE INDICATOR - TOP MOUNTED CAPACITORS	CF
A751	ILLUMINATED BLOWN FUSE INDICATOR - INSIDE MOUNTED CAPACITORS	CF

- Please consult factory for capacitor requirements above 275KVAR or above 4160 volts.
- De-tuning reactors see page 6-43



# Medium Voltage Starter Options

## SURGE / LIGHTNING ARRESTORS

The surge or lightning arrestors are available in two options. If the unit is required to be UL approved the surge arrestors must be installed on the top of the unit (components are shipped loose and must be installed by customer). This will add eighteen inches to the height of the enclosure. For units not requiring UL approval the arrestors may be installed inside the enclosure. This requires the enclosure width to increase to the next standard size. The price includes the hardware necessary to mount and wire the arrestors and the increased size of the enclosure where required.

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>NON-UL LABELED INSIDE MOUNT</b>		
A901	SURGE ARRESTOR, 2300VAC	CF
A902	SURGE ARRESTOR, 3300VAC	CF
A903	SURGE ARRESTOR, 4160VAC	CF
A904	SURGE ARRESTOR, 4800VAC	CF
A905	SURGE ARRESTOR, 6900VAC	CF
A906	SURGE ARRESTOR, 9000VAC	CF
A907	SURGE ARRESTOR, 12000VAC	CF
<b>UL LABELED TOP MOUNT - 18" HEIGHT ADDER (18H X 30W X 24D TOP HAT SHIPPED LOOSE)</b>		
A925	SURGE ARRESTOR, 2300VAC	CF
A926	SURGE ARRESTOR, 3300VAC	CF
A927	SURGE ARRESTOR, 4160VAC	CF
A928	SURGE ARRESTOR, 4800VAC	CF
A929	SURGE ARRESTOR, 6900VAC	CF
A930	SURGE ARRESTOR, 9000VAC	CF
A931	SURGE ARRESTOR, 12000VAC	CF

# Medium Voltage Starter Options

## SURGE CAPACITORS

Surge capacitors will be supplied in a top hat package for starters that must maintain the UL label. This will add eighteen inches to the height of the enclosure (components are shipped loose and must be installed by customer). For non-UL units the capacitors are packaged into the unit, this increases the width of the enclosure up to the next standard size.

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>NON-UL LABELED INSIDE MOUNT</b>		
A950	SURGE CAPACITOR, 2300VAC	CF
A951	SURGE CAPACITOR, 3300VAC	CF
A952	SURGE CAPACITOR, 4160VAC	CF
A953	SURGE CAPACITOR, 4800VAC	CF
A954	SURGE CAPACITOR, 6900VAC	CF
A955	SURGE CAPACITOR, 9000VAC	CF
A956	SURGE CAPACITOR, 15KV	CF
<b>UL LABELED TOP MOUNT - 18" HEIGHT ADDER (18H X 30W X 24D TOP HAT SHIPPED LOOSE)</b>		
A975	SURGE CAPACITOR, 2300VAC	CF
A976	SURGE CAPACITOR, 3300VAC	CF
A977	SURGE CAPACITOR, 4160VAC	CF
A978	SURGE CAPACITOR, 4800VAC	CF
A979	SURGE CAPACITOR, 6900VAC	CF
A980	SURGE CAPACITOR, 9000VAC	CF
A981	SURGE CAPACITOR, 15KV	CF

# Medium Voltage Starter Options

## LINE REACTORS

For **2.4 KV** solid state starters, line reactors are not required.

For **5 KV/7.2 KV** solid state starters, line reactors are required when the supply source transformer is greater than 20 MVA (5% Impedence) or the motor lead wiring length is 1,000 feet or greater. For systems with custom motor control lineups and power factor correction capacitors, consult the factory.

For **13.8 KV** starters, consult factory for the requirement of line reactors.

The line reactors are available in two options. If the unit is required to be UL approved the reactors must be installed on the top of the unit (reactors are shipped loose and must be installed by customer). This will add up to twenty-four inches to the height of the enclosure. For units not requiring UL approval the reactors may be installed inside the enclosure. The inside mounting requires the enclosure width to increase to the next standard size to accommodate the added reactor. The price includes the hardware necessary to mount and wire the reactors and the increased size of the enclosure where required.

A de-tuning reactor may be required to protect the power system from the adverse interaction of capacitors and non-linear loads. To ensure the power factor correction device is properly applied consult a qualified engineer or provide your single line electrical diagrams to Benschaw for evaluation.

LINE REACTOR - 4160 VOLT NON UL LABELED INSIDE MOUNT		
CATALOG NUMBER	DESCRIPTION	LIST PRICE
A985	750 HORSEPOWER	CF
A986	1500 HORSEPOWER	CF
A987	3000 HORSEPOWER	CF
A988	>3000 HORSEPOWER	CF

LINE REACTOR - 4160 VOLT UL LABELED TOP MOUNT							
CATALOG NUMBER	HP	APPROXIMATE DIMENSIONS (IN)			PRICE NEMA 1	PRICE NEMA 12	PRICE NEMA 3R
		H	W	D			
A991	750	22	22	24	CF	CF	CF
A992	1500	23	24	24	CF	CF	CF
A993	3000	23	24	24	CF	CF	CF
A994	>3000	-	-	-	CF	CF	CF


- Consult factory on other voltage ratings in the 5 and 7.2KV class.

 Consult factory

# Medium Voltage Starter Options

## DOCUMENTATION

CATALOG NUMBER	DESCRIPTION	LIST PRICE
<b>APPROVAL DOCUMENTATION</b>		
26A1	APPROVAL DRAWINGS - 2 SETS ANSI B SIZE - STANDARD CATALOG STARTER	CF
26A6	SUBMITTAL PACKAGE / APPROVAL DRAWINGS PER 26A1 PLUS MAJOR COMP. CUTSHEETS	CF
26A12	COMPACT DISC DRAWING FILE - AUTOCAD DRAWINGS - ACAD 14	CF
26A13	E-MAIL DRAWINGS IN AUTOCAD FORMAT - ACAD 14	CF
26A14*	SPECIAL PROJECT DRAWINGS	CF
<b>†O&amp;M MANUALS</b>		
25A1	O&M MANUALS	CF
<b>WITNESS TEST</b>		
27A1**	WITNESS TEST	CF

 Consult factory

- \* Special project drawings requirements are evaluated on a case by case basis. The detailed requirements must be provided in project specifications.
- Witness testing includes a testing plan and procedure that must be reviewed and approved in advance by the customer. Benshaw has the utmost regard for the safety of its employees and its customers, so we believe it is prudent to restrict direct customer access to the equipment when main power is applied.
- † The distribution date of documentation is established after receipt of complete technical and commercial requirements along with the purchase order. When final approval drawings are returned and accepted by Benshaw, manufacturing resources are allocated, material procurement is initiated, and the ship date is scheduled. Documentation is sent by standard service to the address provided.

# Medium Voltage Application Specific Products

## PRODUCT OVERVIEW

Benshaw is the trusted expert for any AC motor application. Benshaw provides a full line of application solutions for motors ranging from 2.3 through 15KV Class up to 22,000 HP. Application specific motor starters include Reversing, DC Injection Braking, Wound Rotor, Two Speed/P.A.M., Synchronous, Multiple Motor, Capacitor Start/Switching Controls, Mine Duty Skid Mounted and more.

### **15KV Class Solid State Starters**

- ◆ 10,000, 11,000, 13,800 volt nominal operating voltages
- ◆ Up to 60,000HP
- ◆ Combination or non-combination configurations
- ◆ Stand alone or motor control center lineups
- ◆ Custom enclosures and transition sections

### **Synchronous Motor Solid State Starters**

- ◆ Soft start stator control
- ◆ Synchronous speed monitoring package
- ◆ Solid state DC field excitor
- ◆ Applications include chillers, compressors, pumps, ball mills, chippers...

### **Synchronous Motor DC Positioning Controls**

- ◆ Integrated synchronous motor starter
- ◆ Solid State Positioning Control
- ◆ Applications include cement plant ball mills, rubber mills...

### **Two Speed/P.A.M. Motor Starters**

- ◆ Solid state starter
- ◆ Vacuum contactors for speed changing
- ◆ Applications include power generation plant I.D. fans, F.D. fans, Banbury mixers...

### **Reversing Motor Starters**

- ◆ Solid state starter
- ◆ Vacuum contactors for motor reversing
- ◆ Applications include aggregate crushers, shredders, rubber mills, coal mills...

### **Wound Rotor Motor Starters**

- ◆ Solid state starter
- ◆ Rotor resistors, shorting contactors, and interface
- ◆ Applications in aggregate, steel, mining, paper, power generation industries...

### **Capacitive Start/Switching Controls**

- ◆ Solid state starter
- ◆ Capacitor banks, switching contactors, power monitoring devices
- ◆ Excessive voltage drop improvement, plant bus support, remote utility grid access...

### **Multiple Motor Starting**

- ◆ Solid state starter
- ◆ Individual motor protection
- ◆ Applications include aggregate and coal conveyors, crushers, grinders, shredders...

# For Any Industry

2300V TO 13,800V



**LOW PROFILE SKID MOUNT  
MINING PACKAGES**



**CUSTOM ENCLOSURES  
W/ TRANSITIONS**



**15 KV CLASS NON-COMBINATION  
AND COMBINATION SOLID STATE  
STARTERS**

# Intelligent MV Motor Control Centers / Lineups

## *Incoming Section(s)*

- ◆ Main breakers or disconnects
- ◆ Main-Tie-Main (MTM) arrangements
- ◆ Main lug only sections
- ◆ 400, 600 or 1200 amp load break fault make disconnects
- ◆ Surge protection devices
- ◆ Metering and communications

## *Custom Configured Multiple Unit Motor Control Center (MCC) Lineups*

- ◆ Transition sections to third party equipment
- ◆ 800 / 1200 / 2000 / 3000 amp horizontal bus
- ◆ Reduced voltage / full voltage / feeder controls
- ◆ Back to back construction

## *Intelligent MCC Integration*

- ◆ Easy MCC networking
- ◆ MTM, disconnects, feeders; SSRV, ATL, PAM, 2 speed starters
- ◆ Diagnostics and communications
- ◆ Intelligent SSRVS power poles





# Main - Tie - Main Arrangements

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## *Fixed Mount*

- ◆ Vacuum circuit breakers
- ◆ 46" deep

## *Fixed Mount*

- ◆ Fused disconnect switches
- ◆ 36" deep



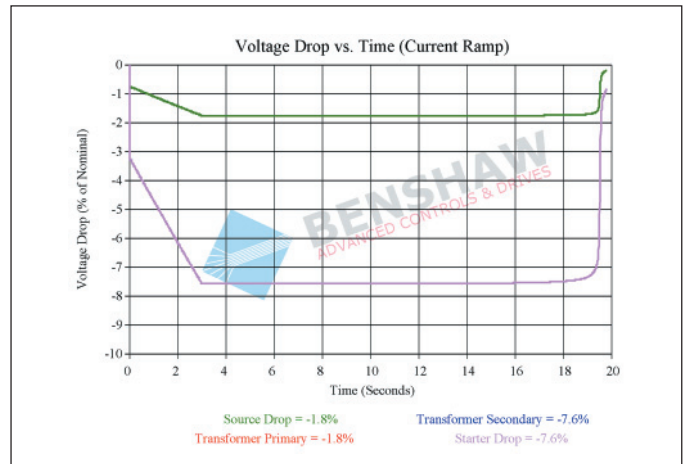
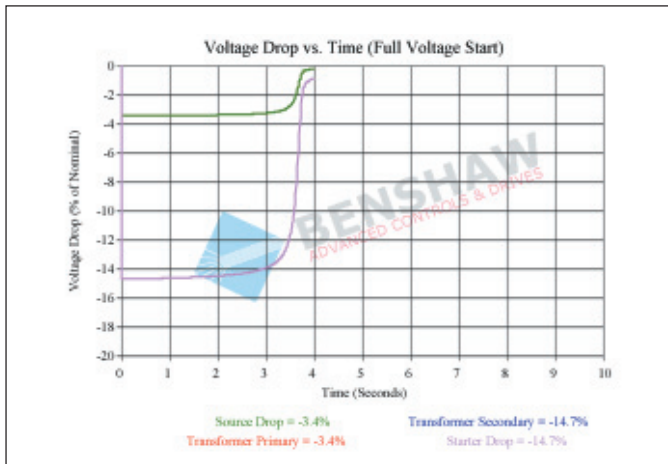
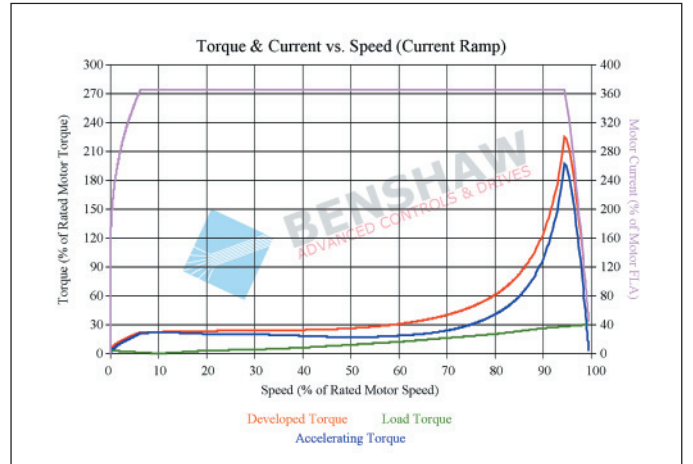
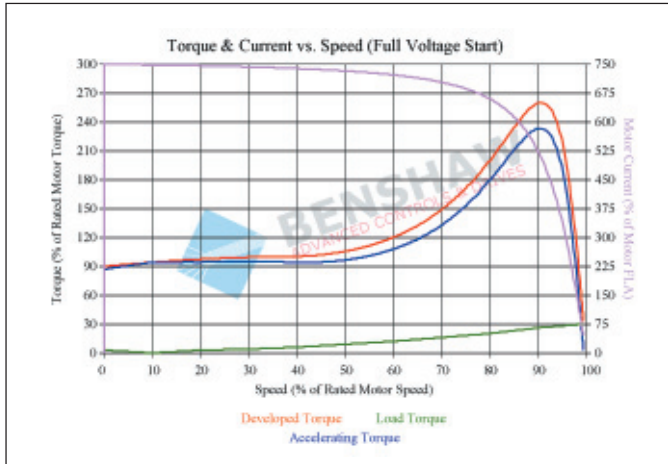
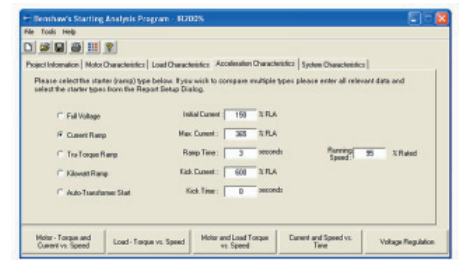
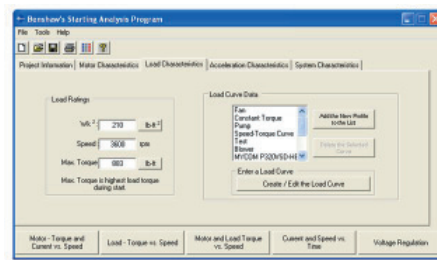
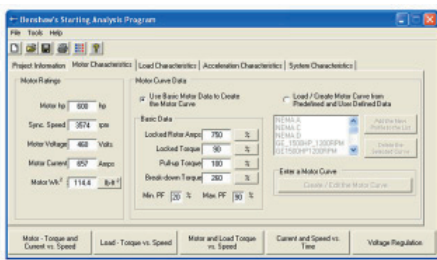
## *Draw Out*

- ◆ Vacuum circuit breakers
- ◆ 90" deep



# Medium Voltage Engineering Services

- ◆ Motor starting analysis
- ◆ System voltage drop analysis
- ◆ Capacitor switching packages
- ◆ Static VAR compensation systems



# Precision Engineered Systems

IN ADDITION TO CUSTOM ENGINEERING THE MOTOR CONTROL AND PROTECTION FEATURES OF INDIVIDUAL REDISTART MVRMX STARTERS, BENSRAW WILL DESIGN AND MANUFACTURE COMPLETE SYSTEMS TO YOUR SPECIFICATIONS:



- ◆ Local and remote communications
- ◆ All major PLC suppliers, as specified

### Coordinated lineups.

Benshaw will design, manufacture and test coordinated power distribution and motor control lineups based on your electrical system and motor control requirements, including:

- ◆ Fused main disconnects
- ◆ Main or tie breakers
- ◆ Distribution transformers
- ◆ Low voltage power distribution
- ◆ Low voltage motor control

**Integrated PLC controls.** Benshaw has extensive experience designing and integrating PLC hardware and software into individual RediStart MVRMX starters to provide system-level control functions, including:

- ◆ Machine control
- ◆ Process control
- ◆ Data collection and monitoring

**Packaged electrical and control systems.** In addition to providing coordinated lineups, Benshaw will design and manufacture completely packaged portable or stationary electrical systems for applications requiring self contained modules, including:

- ◆ 20- or 40-foot containers
- ◆ Self-contained air conditioning and lighting
- ◆ Low and medium voltage equipment
- ◆ Remote monitoring and control
- ◆ Personnel and support facilities



**Supervisory control and predictive maintenance systems.** In applications requiring the coordination and control of multiple RediStart MVRMX starters and third party equipment, Benshaw has the experience and technology to design and deliver integrated control systems:

- ◆ PC-based systems
- ◆ Local area networks
- ◆ Remote communications and control
- ◆ PLC design and programming
- ◆ Online and offline predictive maintenance



**Power system and motor starting studies.** Benshaw has developed comprehensive electrical system and motor starting analysis software and has state-of-the-art field testing equipment to perform complete studies, including:

- ◆ Motor/machine starting
- ◆ Voltage drop studies
- ◆ Short circuit studies
- ◆ Device coordination
- ◆ Harmonic analysis

# Terms and Conditions

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Benshaw is herein called 'Seller'. The person, firm or corporation to whom of which quotation is made is herein called 'Buyer'.

## AGREEMENT

These general conditions, together with any nonconflicting provisions in Benshaw's quotation, are intended by the parties as the final expression of their agreement and is the complete and exclusive statement of the conditions of that agreement. In the event the Customer's purchase order or any other form states terms additional to or different from those set forth in this document, this writing shall be deemed notification or objection to such additional or different terms. Accordingly, this Agreement is expressly conditioned on the Customer's acceptance of the conditions on the face and reverse side hereof. Acceptance of the conditions contained herein shall be considered to have occurred unless written notice of rejection is received by Benshaw within seven (7) calendar days of the date specified on this writing. In any event, if no date is specified, notice of rejection must be received prior to the performance by Benshaw of the services covered by this Agreement. This Agreement cannot be modified in any way except in writing signed by the parties nor shall this Agreement be waived, modified or altered by any subsequent course of conduct between the parties.

## PAYMENT

All bills rendered are payable in Pittsburgh, in cash or its equivalent. Terms of payment are net thirty (30) days from the date of shipment. Late payments will bear interest at the rate of 2% per month or the highest legal rate, whichever is less. Partial shipments will be invoiced as shipped.

## WARRANTIES AND REMEDIES

The sole and exclusive warranties given by Benshaw with respect to the goods

sold hereunder are that it has title to the goods free and clear from any lien or encumbrance and that the goods shall conform to the description and specification set forth herein. All other warranties, express or implied, by operation of law or otherwise, including without limitation the warranties of merchantability and fitness for a particular purpose are excluded and shall not apply to the goods sold pursuant to this agreement.

It is expressly understood that any technical advice furnished by Benshaw with respect to the use of its goods or services is given without charge, and Benshaw assumes no obligation or liability for the advice given or results obtained, all such advice being given and accepted at the customer's risk.

Should Benshaw breach either or both of the warranties given above, Customer's only remedy and Benshaw's only obligation shall be the replacement or repair of such nonconforming goods, FOB, Benshaw's plant or the refund of the price paid for such nonconforming goods at Benshaw's option, upon the return of such nonconforming goods to Benshaw. Benshaw shall not be liable for consequential, incidental or other damages whatsoever arising from its failure to supply goods conforming to the description and specification set forth herein.

## LIMITATION OF LIABILITY

The following limitations of Benshaw's liability are acknowledged by the Customer to be fair and reasonable and shall apply to any act or omission hereunder and to any breach of this Agreement of which these General Conditions form a part other than breach of warranty which is specifically covered in Paragraph 3 of these General Conditions: (a) Benshaw's total liability for any claim arising from this agreement shall be limited to the contract price; (b) In no event shall Benshaw be liable for special, indirect, consequential or

incidental damages whether arising under contract warranty, tort, negligence, strict liability or any other theory of liability. Such damages include but are not limited to loss of profits, loss of the use of the goods, damage to property and claims of third parties. Claims from any cause including but not limited to a claim for a remedy under the warranties contained in paragraph 3 hereof shall be deemed to be waived by Customer or the customer of the Customer in the case of resales, unless delivered in writing to Benshaw by Customer within one (1) year plus ten (10) days from the date of shipment ex-factory of the goods to the Customer. The parties expressly waive the Statue of Limitations and agree that any legal proceeding for any breach of this contract shall be waived unless filed within one (1) year within accrual of the cause of action therefore.

## PRICES AND DELIVERY

Prices quoted herein are net F.O.B. shipping point, firm for thirty (30) days unless specified otherwise, and include standard domestic packaging. Shipping dates specified are only Benshaw's best estimate and are subject to the receipt of all necessary information from buyer, and final engineering and manufacturing information. All prices in catalogs are subject to change without notice. Prices are firm for orders meeting Benshaw's quoted shipping schedules. If shipments are held or postponed for any reason other than Benshaw's fault, and a price increase becomes effective during the period of such hold or postponement, the increase will apply to all shipments which are held or postponed thirty (30) days or more from the effective date of the increase.

## TAXES AND OTHER CHARGES

The Customer will pay, or reimburse Benshaw if it pays, any and all taxes or tariffs or any similar charges imposed upon the contract, the goods covered hereby, or the delivery or use thereof or upon any act or document of title or

# Terms and Conditions, *continued*

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instrument used in connection with the transaction and any and all taxes, tariffs or charges imposed upon or measured by sales contemplated or the purchase price payable under this Agreement.

## **FORCE MAJURE**

Benshaw shall not be liable for any delay in delivery, or failure to deliver, due to (1) fires, floods, strikes, or other labor disputes, accidents to machinery, acts of sabotage, riots, precedence or priorities granted at the request or for the benefit, directly or indirectly, of the federal or any state government or any subdivision or agency thereof, delays in transportation or lack of transportation facilities, restrictions imposed by federal, state or other governmental legislation or rules or regulations thereof; and (2) any other cause beyond Benshaw's control, including but not limited to delays in receipt of vendor materials or supplies. Buyer shall not cancel or have the right to cancel its purchase order because of delays or defaults in deliveries due to such causes.

If Benshaw in its sole discretion determines that the cost of manufacturing or acquiring the goods sold hereunder shall have increased as a result of governmental legislation or regulation to a point where Benshaw's performance hereunder would result in a loss to Benshaw on this sale as computed under Benshaw's normal accounting procedures then Benshaw may terminate this Agreement in whole or in part without liability for any delay in the delivery of, or failure to deliver, the goods sold hereunder.

## **TITLE AND RISK OF LOSS**

Title to the goods covered hereby shall vest in Customer, and risk of loss shall be assumed by Customer, upon delivery thereof to the carrier or to Customer FOB sellers shipping point.

## **\*WARRANTY & GUARANTEE**

Benshaw, the Seller, warrants to the Ultimate Purchaser (the Purchaser who buys for use, and not resale) that all products furnished and which are manufactured by Seller will conform to final specifications, drawings, samples and other written descriptions approved in writing by Seller, and will be free from defects in materials and workmanship. These warranties shall remain in effect for a period of twelve (12) months after shipment. Parts replaced or repaired in the warranty period shall carry the full warranty, the balance of the equipment will carry the unexpired portion of the original warranty. The liability of Seller hereunder is limited to replacing or repairing at Seller's factory or on the job site at Seller's option, any part or parts which have been returned to the Seller and which are defective or do not conform to such specifications, drawings or other written descriptions; provided that such part or parts are returned by the ultimate purchaser within ninety (90) days after such defect is discovered. The Seller shall have the sole right to determine if the parts are to be repaired at the job site or whether they are to be returned to the factory for repair or replacement. If Seller has determined warranty part or parts are to be repaired at the job site, a purchase order must be issued for traveling and living expenses. All items returned to Seller for repair or replacement must be accompanied by a Benshaw RMA number with all the necessary information required by Seller. Shipping charges for incoming part or parts to be repaired or replaced and replaced or repaired part or parts leaving the factory will be at the Buyer's expense. The above conditions must be met if warranty is to be valid. Seller will not be liable for any damage done by unauthorized repair work, unauthorized replacement parts, from any misapplication of the item, or for damage due to accident, abuse, or Act of God. In no event shall the Seller be liable for loss, damage, or expense directly or indirectly arising from the use of the

units, or from any other cause, except as expressly stated in this warranty. Seller makes no warranties, express or implied, including any warranty as to merchantability or fitness for a particular use. Seller is not liable for and Purchaser waives any right of action it has or may have against Seller for any consequential or special damages arising out of any breach of warranty, and for any damages Purchaser may claim for damage to any property or injury or death to any person arising out of its purchase or the use, operation or maintenance of the product. Seller will not be liable for any labor subcontracted or performed by Purchaser for preparation of warranted item for return to Seller's factory or for preparation work for field repair or replacement. Invoicing of Seller for labor either performed or subcontracted by Purchaser will not be considered as a liability by the Seller. This warranty shall be exclusive of any and all other warranties express or implied and may be modified only by a writing signed by an officer of the Seller. This warranty shall extend to the Ultimate Purchaser but to no one else. Accessories supplied by Seller, but manufactured by others, carry any warranty the manufacturers of such accessories have made to Seller and which can be passed on to Ultimate Purchaser.

## **RESALE OF GOODS SOLD HEREUNDER**

In the event of the resale of any goods sold hereunder, the reseller agrees to include the following language in a conspicuous place in the agreement covering such resale: "Warranties by manufacturers and resellers of goods sold hereunder are limited to such written warranties as may be applicable to the individual items sold hereunder, which warranties are limited to repair or replacement of the goods FOB manufacture's point of shipment or to the refund of the purchase price, at the manufacturer's option, within the time limit specified." Manufacturers and resellers make no warranties or



# Terms and Conditions, *continued*

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representations, express or implied, by operation of law or otherwise, as to the Merchantability or fitness for a particular purpose of the goods sold hereunder. Manufacturers and resellers shall not be liable for any defect in the goods sold hereunder and purchaser releases manufacturers and resellers from any and all liability for negligence in the manufacture, packaging, sale and/or any other activity engaged in by manufacturers and resellers with respect to the goods sold hereunder and from any and all liability imposed upon manufacturers or resellers of goods under section 402A of the restatement of torts, 2nd or under any similar legal theory purchaser acknowledges that it alone has determined that the goods purchased hereunder will suitably meet the requirements of their intended use.

## **CANCELLATION OR CHANGES**

Buyer shall have the right by written order to make changes in specifications or delivery schedules once agreed upon. If such changes cause an increase or decrease in the amount due under the purchase order or in the time required for its performance, an equitable adjustment of the price and/or time of performance shall be made. Cancellation charges may be assessed at seller's cost for all labor and materials plus a fair and reasonable profit. Cancellations for the convenience of the Federal Government may be effected and cancellation charges paid as required by applicable Federal statutes or regulations. If Buyer should be declared bankrupt or insolvent, or if a receiver should be appointed for all or a substantial portion of the assets of buyer by a court of competent jurisdiction, or if there should be filed in any such court and not dismissed within thirty days any application or petition for adjudication of such insolvency or bankruptcy, or for the appointment of such a receiver, or involving the resetting or extension, however termed, of the obligations of Buyer or if Buyer should make an assignment of all or a substantial portion of its property for the benefit of its creditors, then upon the happening of any of such events, the seller may cancel

any order placed by Buyer with Seller immediately by notice in writing sent to the buyer by registered mail at its last known business address, or by personal service upon such party. Goods in saleable condition and authorized by seller for return and restocking may incur a minimum restocking charge of fifteen (15) percent.

## **PATENT PROTECTION**

Seller agrees to hold Buyer and its customers harmless only against infringement of patents covering the material or part in the form sold by Seller, provided Buyer or its customer, as the case may be, promptly notifies Seller of any claim or litigation and tenders, to the extent of Buyer's ability to do so, the defense thereof to Seller. Buyer agrees to hold Seller harmless from any liability of Seller for infringement of patents by reason of manufacture according to Buyer's specific design or by reason of the incorporation of said part in a more comprehensive assembly than sold by Seller, provided Seller promptly notifies Buyer of any claim or litigation and tenders, to the extent of Seller's ability to do so, the defense thereof to Buyer and/or the Government where Government Contracts are involved. Seller grants no license, express or implied other than the right of Buyer to use the specific material or part in the form delivered by Seller.

## **INFRINGEMENT**

This agreement shall be governed by the laws of the Commonwealth of Pennsylvania.

## **SEVERABILITY**

The invalidity or unenforceability of any provision or term hereof shall not affect in any way the remainder of the provision or terms of this Agreement.

## **SURVIVAL OF TERMS**

All liabilities and obligations of the Customer to Benshaw, including those existing at the time of termination or expiration of the Agreement, shall remain

in effect until they are satisfied in full. They shall survive termination or expiration of any contractual arrangement between Benshaw and Customer.

## **WAIVER**

No waiver of any provision of these terms and conditions or any supplemental terms and conditions agreed to between Benshaw and Customer shall constitute any future waiver of such a provision or waiver of any future obligation of the customer.

## **ERRORS**

Stenographic or clerical errors for language contained here in are subject to correction without penalty to either party.

**\* WARRANTY VOID IF ORIGINAL INVOICE NOT PAID WITHIN NINETY (90) DAYS.**