

EMX3



The Ultimate Soft Starter

The EMX3 utilizes the latest technology in soft starters, including new adaptive acceleration technology for the ultimate in control. The EMX3 is a complete motor starting and management system with an extensive range of features in a single user friendly package. Never before has motor control been so simple for jobs of all sizes and needs, such as pumps, band saws, conveyors and more.

THE EMX3 MEANS MORE CONTROL

The EMX3 soft starter features Constant Current and Current Ramp, and our adaptive acceleration technology, XLR-8, which makes the EMX3 the world's first soft starter to control acceleration.

Depending on application requirements, the user can select between early, constant or late acceleration/ deceleration. This level of control means smarter starts and smoother stops, which reduces downtime and eliminates issues such as water hammer.

EASY TO INSTALL, COMMISSION AND OPERATE

Options for control wiring from the top, bottom or left side provide greater access, plus unique wiring looms and cable retainers make for a faster, cleaner installation.

Quick setup gets machinery running quickly using menu screens that allow users to select from common applications and then fine tune suggested settings to specific needs. Also, informative screens advise operators on motor performance and real language trip messages to pinpoint exactly where any issues may be.

The EMX3 can simulate functions, which enables testing of the soft starter's operation, external control circuits and associated equipment without connecting to line

- 23 Models from 23A to 1600A
- 200-525VAC and 380-690VAC
- In-line Motor Connections
- Control Voltage 110V-460V
- Adaptive Acceleration Control
- Easy to install
- User friendly controls
- Complete feature set
- Ultimate motor protection
- "Power Through" emergency operation



voltage or a motor. Simulation modes include: Run, Protection, and Signalling simulations.

SMARTER STARTING

The EMX3 puts you in control of motor starting. Depending on your application requirements you can select the best soft start control method—voltage ramp, current ramp, acceleration ramp.

For applications requiring precise control of motor start current, the EMX3 offers a choice of Constant Current or Current Ramp start modes. For superior control over acceleration or deceleration choose XLR-8 Adaptive Acceleration Control.

SMOOTHER STOPPING

EMX3 also provides precise control over soft stopping and is ideal for applications requiring a smoother soft stop. EMX3 is ideal for low inertia loads such as pumps in pumping applications and conveyors, and can substantially reduce or eliminate the effects of water hammer.

BRAKING

For high inertia loads, the EMX3 incorporates the latest braking algorithm, letting you take precise control over the motor's stopping time. Shorter stopping times improve your production efficiency by reducing downtime between operating cycles.

EMX3 OPTIONS

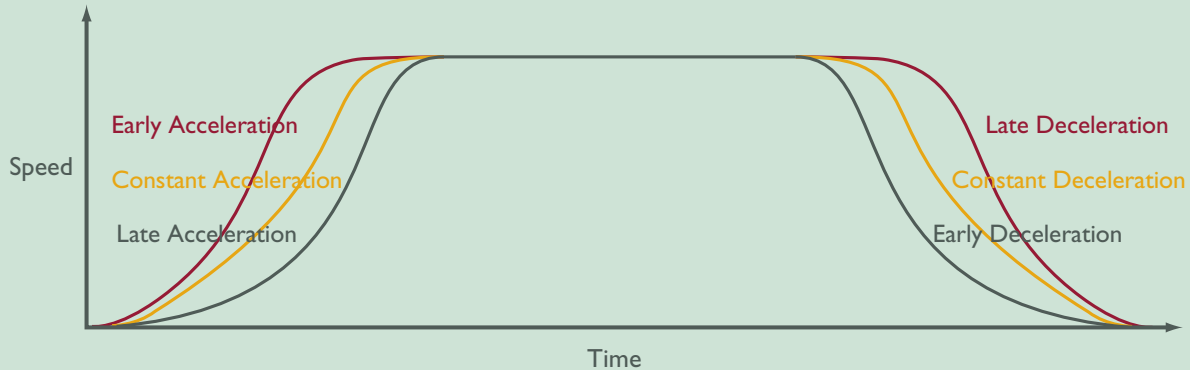
Description	Model Number	Order Code
Remote Keypad Kit (remote operator & Serial Interface Module)	PIM-RO-01	870-1346
Modbus Interface Module	PIM-MB-01	870-1340
Profibus Interface Module	PIM-PB-01	870-1341
DeviceNet Interface Module	PIM-DN-01	870-1342

Note: Series Communications Modules to be ordered as a separate line item and shipped loose (not installed).



XLR-8 Adaptive Control

Using XLR-8 Adaptive Acceleration Control, the EMX3 learns your motor's performance during start and stop, then adjusts control to optimize performance. Simply select the profile that best matches your load type and the soft starter automatically ensures the smoothest possible acceleration for your load.



EMX3 offers a complete feature set for the ultimate in protection and functionality

Protection Features

- Fully customizable protection
- Motor thermal model
- Motor thermistor input
- Phase sequence
- Undercurrent
- Instantaneous overcurrent
- Auxiliary trip input
- Heatsink overtemperature
- Excess start time
- Supply frequency
- Shorted SCR
- Power circuit
- Motor connection
- RS485 failure
- Motor overload
- Current imbalance
- Ground fault (optional)

Keypad Features

- Remote mounting option
- Status LEDs
- Easy to read screen
- Real language feedback
- Multi-language options
- Shortcut buttons
- Parameter copy other starters

Starting Functions

- XLR-8 adaptive acceleration
- Constant current start mode
- Current ramp start mode
- Kickstart

Stopping Functions

- XLR-8 adaptive deceleration
- TVR soft stop
- Brake mode
- Coast to stop

Additional Features

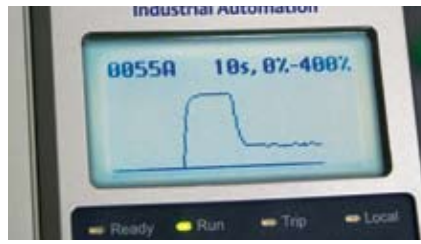
- Starter communication time out
- Network communication trip
- Auto detection of in line power connection
- Programmable auto start/stop
- 24 VDC auxiliary power supply
- PT100 (RTD) input
- Real time clock with battery backup
- Power through - enables the choice of continuous operation despite a power assembly failure. This allows production to continue while long-term remedial action can be taken.
- Forward and reverse jog function
- I/O expansion card (optional)

Ergonomic and Intelligent Keypad Control



REAL LANGUAGE IN REAL TIME

The EMX3 makes the operator's job easy, providing real-language feedback messages, so they don't have to look up codes to know what's happening. With real-time metering displays and a 99-place event log recording time-stamped details of operation and performance, it has never been easier to monitor a motor.



GRAPHICAL DISPLAY

The graphic display provides real-time performance data, including graphs, to keep operators informed of motor temperature, current, motor power, last start information, date and time, SCR conduction, and trip messages. The display also serves as a programming screen, and the keypad itself can be used to copy parameters to other starters.



REMOTE DISPLAY MOUNTING

The keypad is easily mounted on the exterior of enclosures, using an optional keypad mounting kit. Mounting multiple soft starters in a single enclosure allows centralized control from a single location, with all the relevant information. Mount a number of displays next to each other for quick diagnosis of problems. (IP65 when mounted).

Soft Starters

METERING AND MONITORING

As shown below, the EMX3 delivers an extensive range of information to replace an additional power meter (Amps, kW, kVA, pf).

PROGRAM MULTIPLE UNITS

When programming multiple units, simply plug the keypad into different starters for immediate download of your data. No fuss, no trouble – a smoother start in every sense.



MOTOR TEMPERATURE



CURRENT



MOTOR POWER



LAST START INFORMATION



DATE AND TIME



PERFORMANCE GRAPH



SCR CONDUCTION



USER-PROGRAMMABLE SCREEN



TRIP MESSAGES



EMX3 Options

COMMUNICATION MODULES



The EMX3 supports network communication using Profibus-DP, DeviceNet and Modbus RTU protocols, via an easy-to-install communication interface.

INPUT/OUTPUT CARD

These hardware expansion cards suit users who require additional inputs and outputs or advanced functions. Each EMX3 can support one expansion card.



The input/output expansion card adds:

- 2 x inputs
- 1 x analog input
- 3 x relay outputs
- 1 x analog output

VOLTAGE MEASUREMENT CARD



The voltage measurement card allows real-time monitoring of mains voltage, eliminating the need for external devices. The voltage measurement card enhances undervoltage and overvoltage protection.

RTD AND GROUND FAULT



The RTD and ground fault protection card provides the following additional inputs:

- 6 x PT100 RTD inputs
- 1 x ground fault input

To use ground fault protection at 1000:1 a 5 VA current transformer is also required.

FINGER GUARDS



This option ensures personnel safety by preventing accidental contact with live terminals. The finger guard kit fits the EMX3-0145B to EMX3-0220B and provides IP20 protection when used with 22 mm plus size cables.

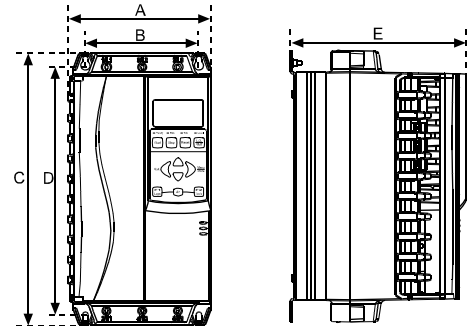
ADJUSTABLE BUS BAR CONFIGURATION



The bus bars on models EMX3-0360C ~ EMX3-1600C can be adjusted for top or bottom input and output as required. This flexibility allows you optimization of your switchboard layout.

DIMENSIONS AND WEIGHTS

Model	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	Weight lbs. (kg)				
EMX3-0023B	6.16 (156.4)	4.88 (124.0)	11.60 (294.6)	10.94 (278.0)	7.57 (192.2)	7.05 (3.2)				
EMX3-0043B										
EMX3-0050B										
EMX3-0053B										
EMX3-0076B					8.77 (222.7)	7.22 (3.5)				
EMX3-0097B					11.10 (282)	9.84 (250)	17.24 (438)	14.96 (380)	9.84 (250)	35.27 (16)
EMX3-0100B										
EMX3-0105B										
EMX3-0145B										
EMX3-0170B					15.35 (390)	12.60 (320)	16.42 (417)	15.75 (400)	11.06 (281)	55.12 (25)
EMX3-0200B										
EMX3-0220B										
EMX3-0255C										
EMX3-0360C	16.93 (430)	12.60 (320)	21.46 (545)	20.55 (522)						
EMX3-0380C										
EMX3-0430C										
EMX3-0620C										
EMX3-0930C										
EMX3-1200C	22.60 (574)	19.69 (500)	29.53 (750)	28.62 (727)	14.21 (361)	299.83 (136)				
EMX3-1410C										
EMX3-1600C										



COMPACT DESIGN

The design of the EMX3 allows for multiple units to be mounted side by side, or in a bank of starters due to the flexibility in cabling options. Internally bypassed starters further reduce the overall size of your soft starter.

For EMX3-0145B ~ EMX3-1600C, dimensions A & C are the unit footprint. Bus bars are not included as this dimension will vary with bus bar configuration.

Soft Starters

SPECIFICATIONS

General

Current Range 23 A ~ 1600 A (nominal)
 Motor connection In-line
 Bypass Integrated internal or external

Supply

Mains Voltage (L1, L2, L3)
 EMX3-xxxx-V4 200 VAC ~ 440 VAC (± 10%)
 EMX3-xxxx-V7 380 VAC ~ 690 VAC (± 10%) (in-line conn.)
 EMX3-xxxx-V7 380 VAC ~ 600 VAC (± 10%)
 Control Voltage (A1, A2, A3) 110 ~ 220 VAC (+ 10% / -15%)
 or 230 ~ 440 VAC (+ 10% / -15%)
 Mains Frequency 45 Hz to 66 Hz

Inputs

Inputs Active 24 VDC, 8 mA approx.
 Start (C23, C24) Normally open
 Stop (C31, C32) Normally closed
 Reset (C41, C42) Normally open or closed
 Programmable Inputs
 Input A (C53, C54) Normally open or closed
 Input B (C63, C64) Normally open or closed
 Motor Thermistor (B4, B5)
 PT100 RTD (B6, B7, B8)

Outputs

Relay outputs 10 A at 250 VAC resistive
 5 A at 250 VAC, AC15 pf 0.3
 Run Relay (23, 24) Normally Open
 Programmable Outputs
 Relay A (13, 14) Normally Open
 Relay B (31, 32, 34) Changeover
 Relay C (41, 42, 44) Changeover
 Analog Output (B10, B11) 0-20 mA or 4-20 mA
 24 VDC Output (P24, COM) 200 mA

Environmental Protection

EMX3-0023B ~ EMX3-0105B IP20 & NEMA1
 EMX3-0145B ~ EMX3-1600C IP00
 Operating temperature -10 °C ~ 60 °C
 Storage temperature -10 °C ~ 60 °C
 Humidity 5% to 95% Relative Humidity

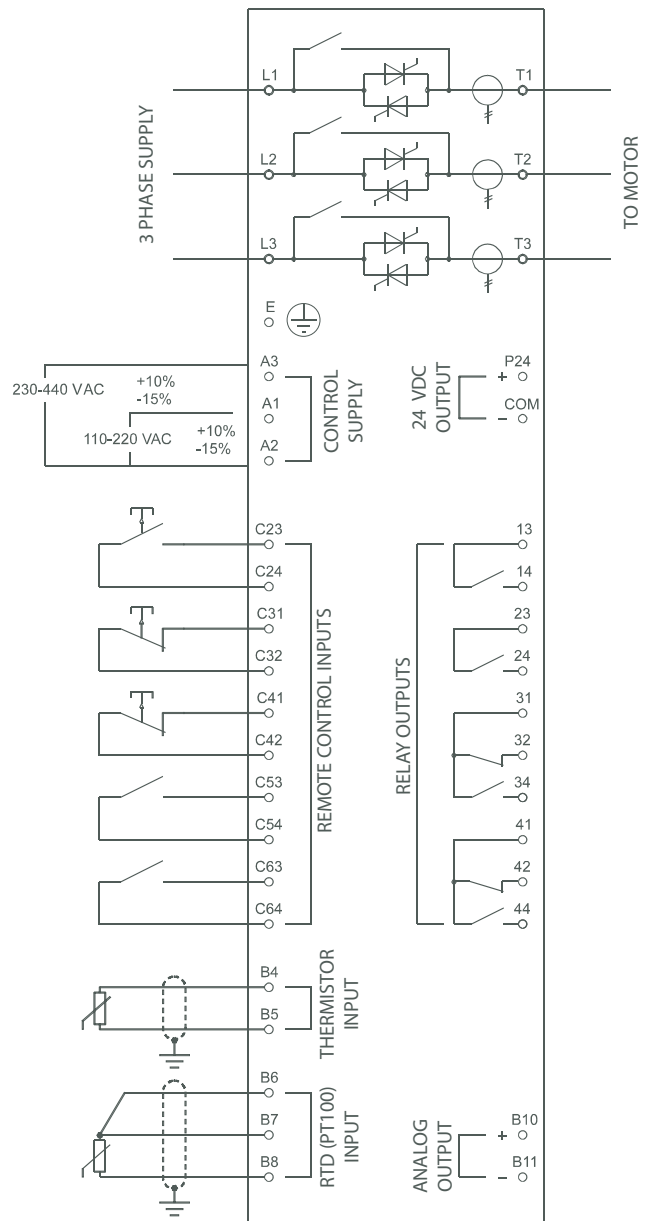
Heat Dissipation

During start 4.5 Watts per ampere
 During run
 EMX3-0023B ~ EMX3-0053B 39 Watts approx
 EMX3-0076B ~ EMX3-0105B 51 Watts approx
 EMX3-0145B ~ EMX3-0220B 120 Watts approx
 EMX3-0255C ~ EMX3-0930C 4.5 Watts per ampere approx
 EMX3-1200C ~ EMX3-1600C 4.5 Watts per ampere approx

Certification

UL/ C-UL UL 508, UL 347
 EMX3-0023B ~ EMX3-0105B Indoor, Enclosed. Type 1
 EMX3-0145B ~ EMX3-1600C Indoor, Open Type.
 CE IEC 60947-4-2
 ✓ IEC 60947-4-2
 CCC GB 14048-6
 RoHS Compliant with EU Directive 2002/95/EC
 Marine
 EMX3-0023B – EMX3-0220B only Lloyds Marine No 1 Specification

EMX3 WIRING DIAGRAM



The internal bypass feature is included only on units with the suffix 'B'.

MODULE

EMX3 (NORMAL DUTY RATINGS & ORDER GUIDE)

Normal Duty 300% HP			Module with internal bypass	
208V	230V	ND Amps	Model Number	Order Code
5	7.5	23	EMX30023B	870-1400
10	15	43	EMX30043B	870-1401
15	20	53	EMX30053B	870-1402
25	25	76	EMX30076B	870-1403
30	30	97	EMX30097B	870-1404
	40	105	EMX30105B	870-1405
60	60	170	EMX30170B	870-1406
75	75	220	EMX30220B	870-1407
Normal Duty 300% HP			Module without internal bypass	
208V	230V	ND Amps	Model Number	Order Code
	100	255	EMX30255C	870-1408
125	150	360	EMX30360C	870-1409
150		430	EMX30430C	870-1410
200	250	620	EMX30620C	870-1411
250	300	790	EMX30790C	870-1412
300	350	930	EMX30930C	870-1413
400	500	1200	EMX31200C	870-1414
500	600	1410	EMX31410C	870-1415
	700	1600	EMX31600C	870-1416

Normal Duty 300% HP			Module with internal bypass	
460V	575V	ND Amps	Model Number	Order Code
15	20	23	EMX30023B	870-1500
30	40	43	EMX30043B	870-1501
40	50	53	EMX30053B	870-1502
60	75	76	EMX30076B	870-1503
75	100	97	EMX30097B	870-1504
		105	EMX30105B	870-1505
125	150	170	EMX30170B	870-1506
150	200	220	EMX30220B	870-1507
Normal Duty 300% HP			Module without internal bypass	
460V	575-690V	ND Amps	Model Number	Order Code
200	250	255	EMX30255C	870-1508
300	350	360	EMX30360C	870-1509
350	450	430	EMX30430C	870-1510
500	600	620	EMX30620C	870-1511
600	800	790	EMX30790C	870-1512
700	900	930	EMX30930C	870-1513
1000	1200	1200	EMX31200C	870-1514
1100	1400	1410	EMX31410C	870-1515
1300	1600	1600	EMX31600C	870-1516

ND = Normal Duty (Fan/Pump Application) verify the motor amps. Then select the starter amps to be equal or greater than motor amps.
 EMX30023B to 53B = 300% starting current, with a maximum 10 second start time that requires 350 seconds between starts.
 EMX30076B to 220B has 590 seconds between starts.
 EMX30255C to 1600C, 300% starting current with a maximum 10 second start time that requires 360 seconds between starts.

EMX3 (HEAVY DUTY RATINGS & ORDER GUIDE)

Heavy Duty 450% HP			Module with internal bypass	
208V	230V	HD Amps	Model Number	Order Code
3	5	15	EMX30023B	870-1400
7.5	10	29	EMX30043B	870-1401
10		37	EMX30053B	870-1402
15	15	47	EMX30076B	870-1403
	20	58	EMX30097B	870-1404
25	25	78	EMX30105B	870-1405
30	30	97	EMX30170B	870-1406
50	50	148	EMX30220B	870-1407
Heavy Duty 450% HP			Module without internal bypass	
208V	230V	HD Amps	Model Number	Order Code
60	60	171	EMX30255C	870-1408
75	100	259	EMX30360C	870-1409
100		301	EMX30430C	870-1410
150	150	419	EMX30620C	870-1411
200	200	567	EMX30790C	870-1412
	250	644	EMX30930C	870-1413
350	400	983	EMX31200C	870-1414
		1023	EMX31410C	870-1415
400	500	1227	EMX31600C	870-1416

Heavy Duty 450% HP			Module with internal bypass	
460V	575V	HD Amps	Model Number	Order Code
10	10	15	EMX30023B	870-1500
20	25	29	EMX30043B	870-1501
30	30	37	EMX30053B	870-1502
	40	47	EMX30076B	870-1503
40	50	58	EMX30097B	870-1504
60	75	78	EMX30105B	870-1505
75	100	97	EMX30170B	870-1506
100	150	148	EMX30220B	870-1507
Heavy Duty 450% HP			Module without internal bypass	
460V	575V	HD Amps	Model Number	Order Code
125		171	EMX30255C	870-1508
200	250	259	EMX30360C	870-1509
250	300	301	EMX30430C	870-1510
350	450	419	EMX30620C	870-1511
450	500	567	EMX30790C	870-1512
500	600	644	EMX30930C	870-1513
700	1000	983	EMX31200C	870-1514
900	1100	1023	EMX31410C	870-1515
1000	1300	1227	EMX31600C	870-1516

HD = Heavy Duty (Conveyor Application) verify the motor amps. Then select the starter amps to be equal or greater than motor amps.
 EMX30023B to 53B = 450% starting current with a maximum 30 second start time that requires 330 seconds between starts.
 EMX30076B to 220B has 570 seconds between starts.
 EMX30255C to 1600C, 450% starting current with a maximum 30 second start time that requires 360 seconds between starts.

Soft Starters

DY5

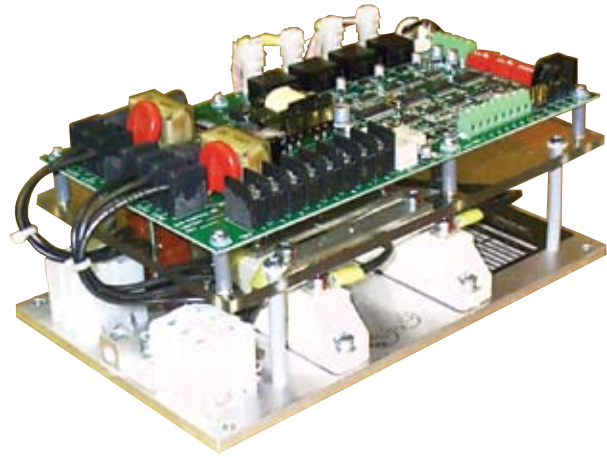
Electronic Motor Brake

The **DY5** unit is an electronic AC motor brake. Installation is simple and fast. Only four power wires are needed, plus five interconnecting leads to the existing starter. Use the DY5 to stop AC motors safely and quickly.

DY5 brakes can be applied to most full voltage electromechanical starters and solid state soft starts, and can be ordered as an installed option on a Safronics soft starter.

DY5 Digital Electronic Motor Brakes utilize a microprocessor and 4-SCR Full Wave Bridge to apply regulated DC current to the stator of an AC induction motor causing controlled braking. The DY5 employs zero speed sensing to automatically remove braking current as soon as the motor stops, thus minimizing motor heating and idle time before restarting. The DY5 is designed specifically for applications requiring smooth, rapid braking to reduce motor stopping time and help meet OSHA safety standards. Universal Input Voltage allows the DY5 to operate at line voltages from 200 to 600 VAC and line frequencies between 45 and 65 Hz. PC programmable for custom applications and braking curves.

NOTE: *Electronic indication should never be used as the only indication that it is safe to proceed. Zero speed should be mechanically or visually verified and the machine locked out before proceeding with any operation in which movement of the machine would pose a risk.*



- **Universal Input Voltage**
- **Zero Speed Detection**
- **SMD Technology**
- **Switch Mode Power Supply**
- **Closed loop current feedback**
- **Digital Timer**
- **Common Control Module**
- **SCR with 1600V PIV Rating**
- **MOV/RC Snubber protection**
- **Diagnostics LED's**
 - Control Power
 - Motor On
 - Brake On
 - Zero Speed Pulse
- **PC Programming Connection (Optional)**
- **Braking Current: 40-200% Brake Rating**
- **Backup Timer: 1-255 seconds via DIP switch**
- **Zero speed hold time: 0.5-7.5 seconds (delays release of brake after zero speed is sensed) via DIP switch**

RATINGS, WEIGHTS & DIMENSIONS

Model	Maximum Horsepower by Voltage					Chassis			NEMA 12		
	208V	230V	460V	575V	Amps	Order Code	Dimensions H x W x D (inches)	Weight (lbs)	Order Code	Dimensions H x W x D (inches)	Weight (lbs)
DY5 - 15	3	5	10	15	15	3920-01	9.5 x 6.25 x 5.25	7	3920-02	16 x 14 x 10	32
DY5 - 40	10	15	30	40	40	3921-01			3921-02		
DY5 - 75	20	25	50	75	75	3922-01	10 x 7.5 x 6	8	3922-02	16 x 14 x 10	33
DY5 - 125	40	50	100	125	125	3923-01	13 x 7.5 x 7	17	3923-02	24 x 20 x 12	72
DY5 - 180	60	75	150	200	180	3924-01			3924-02		
DY5 - 480	150	200	400	500	480	3925-01	15.25 x 14 x 10	35	3925-02	30 x 24 x 16	115
DY5 - 720	250	300	600	700	720	3926-01	20 x 17 x 12.5	54	3926-02	36 x 30 x 16	175

SPECIFICATIONS:

Operating Conditions

Horsepower	3 thru 700 hp
Current range	15A-720A (nominal)
Line Voltage	3 hp, 200 – 600 VAC
Supply Frequency	45 to 65 Hz
Control Voltage	120 VAC 45 to 65 Hz, 20 VA
Enclosure	Chassis or NEMA12
Ambient Temperature	0 – 40°C (32°F - 104°F) (Operating)
Altitude	1000 m (3,300 ft)
Relative Humidity	5% to 95% Non-condensing

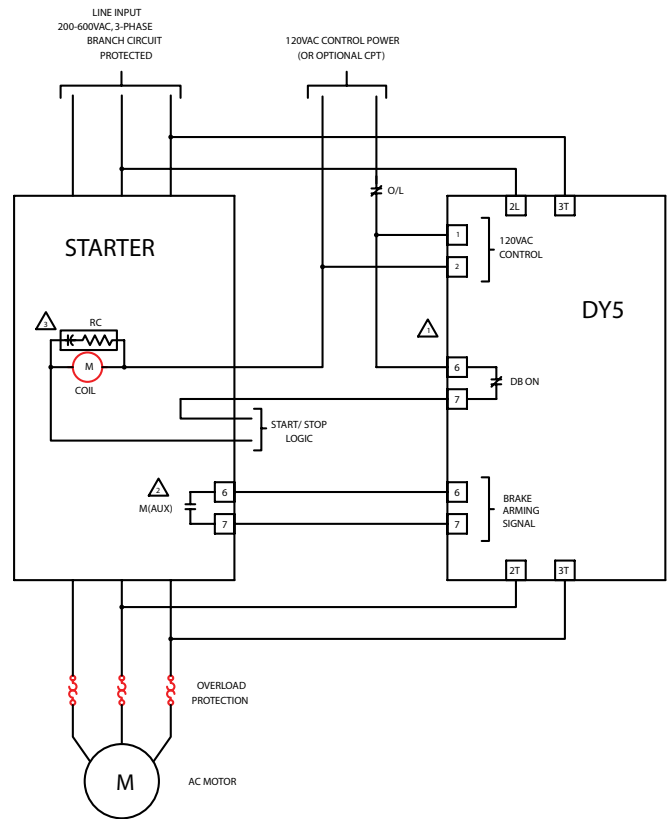
Standard Features

Control	Full Wave Controlled
Overload Capacity	200% for 60 seconds
Duty Cycle	One 30 second stop every 15 minutes at maximum current.
	Consult factory for suitability of other duty cycles.

Outputs

Relay Outputs	5A @ 250 VAC
Open Collector	24 VDC, 50 mA

DY5 WIRING DIAGRAMS:



- ⚠️ 1 Interlock to prevent motor starter closing when DY5 is operating.
- ⚠️ 2 Auxiliary interlock to indicate when motor starter is closed.
- ⚠️ 3 Motor starter coil must be suppressed.

Soft Starters