EMX3 Advanced Soft Starters

Unprecedented motor control, protection and monitoring capabilities
for demanding applications

MOTOR CONTROL AND DRIVES

AuCom

NHP Electrical Engineering Products Pty Ltd

Sales 1300 NHP NHP nhp.com.au

AS ADVANCED SOFT STARTERS BECOME INCREASINGLY SOPHISTICATED, THE EMX3 REVERSES THE TREND, BRINGING A NEW ERA OF ADVANCED SIMPLICITY AND USE TO THE AUSTRALIAN ELECTRICAL INDUSTRY.

AVAILABLE FOR INDUSTRIAL MOTOR CONTROL APPLICATIONS TO 1500 kW AT 400 & 690 V AC, THE EMX3 IS A SMART, DEPENDABLE AND EASY TO USE PRODUCT, OFFERING THE MOST ADVANCED MOTOR CONTROL AND PROTECTION STRATEGIES.

MORE CONTROL

Whilst the EMX3 provides the very best technologies for minimising motor start-up currents, it also introduces XLR-8 Adaptive Acceleration Control. Using XLR-8, the EMX3 is able to learn the characteristics of the motor and load and use that to provide an unprecedented level of control over the motor's acceleration and deceleration performance.

More control means smarter starts and smoother stops that reduce downtime and increase productivity.

EASY TO USE

You'll find the EMX3 extremely easy to use during installation, commissioning, operation and even trouble-shooting.

Quick setup menus assist you to configure the starter for common applications greatly reducing commissioning time. Informative screens advise your operator on the performance of your system and real language trip messages pinpoint exactly where any issues lie.

Options for control wiring from the top, bottom or left side provide greater flexibility, plus unique wiring looms and cable retainers make for a faster, tidier install. Larger models also offer flexibility through allowing the installer to configure power connections (top, bottom or mixed) to suit the installation.

FEATURE SET

The EMX3 is a smart, dependable and easy to use soft starter. New design features make the EMX3 the perfect solution for quick setup or more customised control, including:

- Optimum motor control using XLR-8
- Extensive motor and system protection functionality
- Large multi-line display with plain English feedback
- Quick setup menu for common applications
- Intuitive programming
- Graphical display of motor starting, running and stopping currents
- Fault history and event log
- Braking algorithm for high inertia loads
- Preset slow speed, forward and reverse

XLR-8: Adaptive acceleration control

XLR-8: ADAPTIVE ACCELERATION CONTROL

AuCom's new EMX3 soft starter introduces a new generation in soft start technology: XLR-8 Adaptive Acceleration Control. XLR-8 gives you an unprecedented level of control over your motor's acceleration and deceleration profiles.

Using XLR-8, the EMX3 learns your motor's characteristics during start and stop, then adjusts its control to optimise performance. A variety of acceleration and deceleration profiles are available to ensure the best possible performance is achieved in any application.

ADAPTIVE ACCELERATION PROFILE OPTIONS

Adaptive acceleration control offers three start and stop profiles according to your needs.

THE EMX3 SIMPLIFIES THE INSTALLATION AND OPERATION OF MOTOR STARTING SYSTEMS TO REDUCE INSTALLATION COST AND TIME.

Easy to understand display

REAL LANGUAGE IN REAL TIME

The EMX3 makes your job easy, through providing real-language feedback messages, so you don't have to refer to manuals to know what's happening. With real-time metering displays and a 99-place event log recording time/date stamped details of operation and performance, it has never been easier to track how your system is behaving.

GRAPHICAL DISPLAY

In many cases the EMX3 does away with language altogether, using real-time graphs of motor operating performance and current to quickly and clearly illustrate exactly how your motor is performing.

REMOTE DISPLAY MOUNTING

The keypad is removable and easily mounted on the exterior of your enclosure. This allows centralised control from a single location, with all the relevant information. Mount a number of displays next to each other for quick diagnosis of problems (IP 65 when mounted).

METERING AND MONITORING

The EMX3 delivers an extensive range of information to replace an additional powermeter (Amps, kW, kVA, pf).

PROGRAM MULTIPLE UNITS

The removable keypad provides an upload/download facility to make programming of several EMX3 starters quick and easy. 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

Easy to install, easy to operate

SMARTER STARTING

The EMX3 puts you truly in control of motor starting. Depending on your application requirements you can select between the two best soft start control methods.

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

SMOOTHER STOPPING

XLR-8 also provides precise control over soft stopping and is ideal for applications requiring a smoother soft stop. XLR-8 is ideal for low inertia loads such as pumps and conveyors, and can substantially reduce or eliminate the effects of water hammer.

BRAKING

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

ADVANCED OPERATION

To meet the unique requirements of your application, the EMX3 offers a range of advanced features. The EMX3 meets the needs of specific applications including:

- Pumping (e.g. high head applications)
- Compressors (optimising load control)
- Bandsaws (easy blade alignment)
- Irrigators (built-in timer)

EASIER INSTALLATION

If space is at a premium in your motor control centre, the EMX3's compact size will save you space and trouble. Internal bypass contactors, built-in monitoring and indicators, and extensive on-board input and output functionality reduce the need for space and cost of external equipment, as well as simplifying installation.

Note: Internal bypass contactors fitted to EMX3 models up to 1000 A (nominal).

FASTER COMMISSIONING

The EMX3 has been designed for ease of use, and the user-friendly menu is no exception. A quick setup guide helps you configure the starter for common applications by suggesting a typical setting, which you can then fine tune to suit your needs.

SIMULATIONS

Need to test the installation before connecting a motor? The EMX3 simulation functions let you test the soft starter's operation, external control circuits and associated equipment without connecting the soft starter to line voltage or a motor. The EMX3 has three simulation modes:

- **Run simulation:** simulates a motor starting, running and stopping to ensure correct installation.
- **Protection simulation:** simulates activation of each protection mechanism to confirm correct protection response.
- **Signalling simulation:** simulates output signalling.

REMOVABLE CONNECTORS

Installation is easy with plug-in control terminal blocks. Simply unplug each block, complete the wiring and re-insert the block.

UNIQUE WIRING LOOM

Using the EMX3's unique and flexible cable ways, cables can be efficiently organised for wiring from either the top, left or from below. Maintenance is even easier with removable connectors.

Standard starting modes

XLR-8 ADAPTIVE ACCELERATION CONTROL

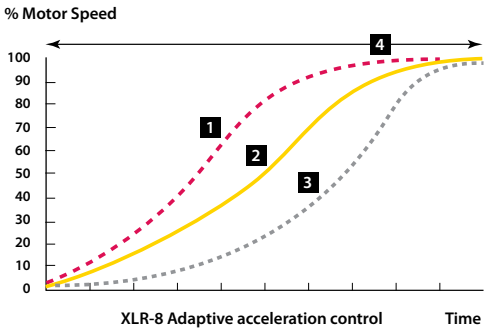
XLR-8 Adaptive Acceleration Control is a new intelligent motor control technique developed by AuCom. In an XLR-8 soft start, the EMX3 adjusts the current in order to start the motor within a specified time and using a selected acceleration profile.

Every application has a particular starting profile, based on characteristics of the load and motor. XLR-8 offers three different starting profiles, to suit the requirements of different applications.

Selecting an XLR-8 profile that matches the inherent profile of the application can help smooth out acceleration across the full start time. Selecting a dramatically different XLR-8 profile can somewhat neutralise the inherent profile. For example, using a late cubic profile to start an early cubic application will result in a more linear behaviour.

XLR-8 start profile:

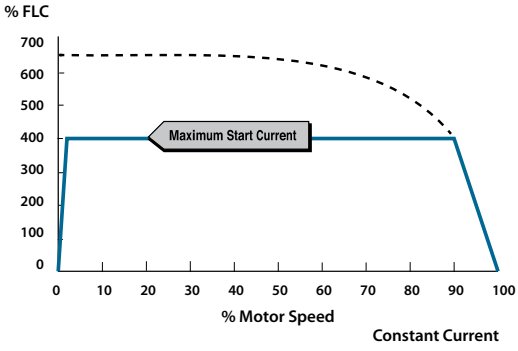
1. Early acceleration
2. Constant acceleration
3. Late acceleration
4. Start ramp time



CONSTANT CURRENT

Constant current is the traditional form of soft starting, which raises the current from zero to a specified level and keeps the current stable at that level until the motor has accelerated.

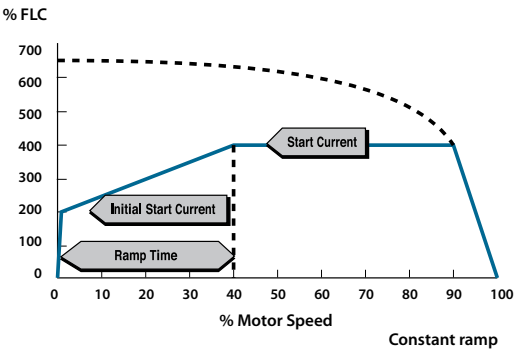
Constant current starting is ideal for applications where the start current must be kept below a particular level.



CURRENT RAMP

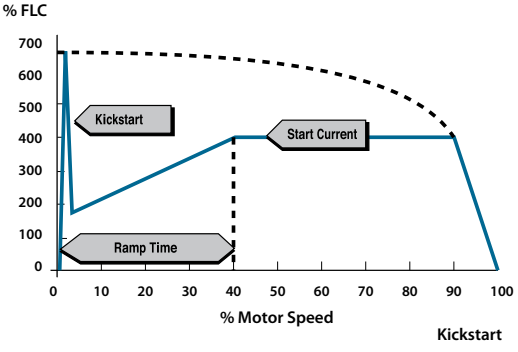
Current ramp soft starting raises the current from a specified starting level to a maximum limit, over an extended period of time. Current ramp starting can be useful for applications where:

- The load can vary between starts (for example a conveyor which may start loaded or unloaded). Set the initial current to a level that will start the motor with a light load, and the current limit at a level that will start the motor with a heavy load.
- The load breaks away easily, but starting time needs to be extended (for example a centrifugal pump where pipeline pressure needs to build up slowly).
- The electricity supply is limited (for example a generator set), and a slower application of load will allow greater time for the supply to respond.



KICKSTART

Kickstart provides a short boost of extra torque at the beginning of a start, and can be used in conjunction with current ramp or constant current starting. Kickstart can be useful to help start loads that require high breakaway torque but then accelerate easily (for example flywheel loads such as presses).



Standard stopping modes

XLR-8 ADAPTIVE DECELERATION CONTROL

In an XLR-8 soft stop, the EMX3 controls the current in order to stop the motor within a specified time and using a selected deceleration profile. XLR-8 can be useful in extending the stopping time of low inertia loads. Every application has a particular stopping profile, based on characteristics of the load and the motor. XLR-8 offers three different stopping profiles.

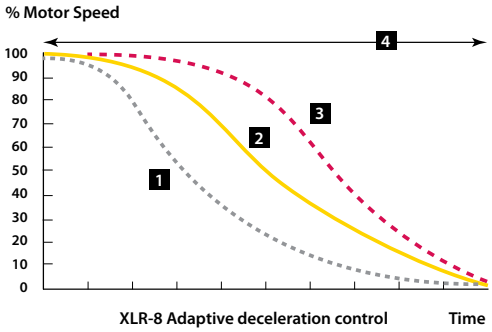
Choose the XLR-8 profile that best matches your application requirements.

XLR-8 stop profile:

1. Early deceleration
2. Constant deceleration
3. Late deceleration
4. Stop time

COAST TO STOP

Coast to stop lets the motor slow at its natural rate, with no control from the soft starter. The time required to stop will depend on the type of load.



TVR SOFT STOP

Timed voltage ramp reduces the voltage to the motor gradually over a defined time. The load may continue to run after the stop ramp is complete. Timed voltage ramp stopping can be useful for applications where the stop time needs to be extended, or to avoid transients on generator set supplies.

BRAKE

When brake is selected, the EMX3 uses DC injection to slow the motor.

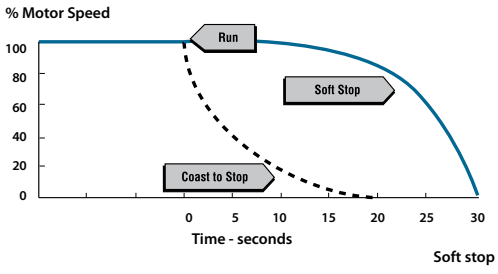
The EMX3 braking:

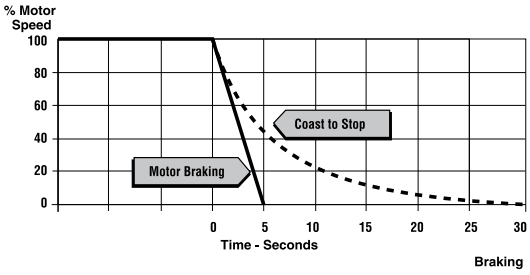
- Does not require the use of a DC brake contactor
- Controls all three phases so that the braking currents and associated heating is evenly distributed through the motor.

Braking has two stages:

1. Pre-brake: provides an intermediate level of braking to slow motor speed to a point where full brake can be operated successfully (approximately 70% speed).

2. Full brake: brake provides maximum braking torque but is ineffective at speeds greater than approximately 70%.





Standard protection

MOTOR THERMAL MODEL

The EMX3 will verify whether the motor has sufficient thermal capacity for a successful start. The soft starter compares the motor's temperature rise from the last motor start and only operates if the motor is cool enough to start successfully.

EXCESS START TIME

Excess start time is the maximum time the EMX3 will attempt to start the motor. If the motor does not reach full speed within the programmed limit, the starter will trip indicating a stalled condition.

ELECTRONIC SHEARPIN PROTECTION

With electronic shearpin or instantaneous overcurrent protection the EMX3 can be configured to trip if the average current of all three phases exceeds a specified level while the motor is running. This would usually occur in a 'stall' or 'locked rotor' condition.

UNDERCURRENT

The soft starter can be configured to trip if the average current of all three phases drops below a specified level while the motor is running. This undercurrent or under-load is usually indicative of a broken coupling between the motor and driven machine, a broken conveyer belt, loss of product or a dry pump.

MAINS FREQUENCY

The EMX3 monitors mains frequency throughout operation, and can be configured to trip if the frequency varies beyond a specified tolerance.

PHASE SEQUENCE

This feature selects which phase sequences the soft starter will allow at a start. During its pre-start checks, the starter examines the sequence of the phases at its input terminals and trips if the actual sequence does not match the selected option.

CURRENT IMBALANCE

The EMX3 can be configured to trip if the currents on the three phases vary from each other by more than a specified amount.

The imbalance is calculated as the difference between the highest and lowest currents on all three phases, as a percentage of the highest current.

AUXILIARY INPUT TRIP

Auxiliary input trip allows the connection of external fault detection devices, such as low pressure or no flow detectors, vibration sensors, etc.

MOTOR THERMISTOR INPUT

The EMX3 has provisions for motor thermistor input and is able to detect excessive temperature in the motor windings generally caused by a stall or from inadequate ventilation.

RS 485 FAILURE

The EMX3's serial link is provided with a user adjustable time-out function which will trip if the maximum allowable period of RS 485 serial inactivity has been exceeded.

Optional protection functions

GROUND FAULT

The optional Ground fault/RTD card allows the user to configure the soft starter to trip if ground fault exceeds a specified level while the motor is running. Ground fault is a dynamic trip based on phase current measurements every half-cycle.

RTD INPUTS

The optional Ground fault/RTD card allows the user to connect up to six PT100 RTD's directly to the EMX3. This feature enables the EMX3 to measure the temperature of the RTD's and trip if overheating is detected. Trip levels are user programmed.

Features

Mounting holes for easy mounting and removal

Top and bottom cable retainers for tidier wiring

Small footprint and depth saves space

Large viewable screen with real language text, no more trip codes

Status LEDs for immediate feedback

Start, Stop, Reset, Local/ Remote pushbuttons

Shortcut buttons for quick access to common tasks

IP 65 Removable keypad for mounting on cabinet exterior

Easy access door hides cables from operator, but allows easy access for installers

Unique wiring loom separates wires for easy install, greater access allows access from top, left or bottom for more flexibility

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

KEYPAD

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

PROTECTION

- Fully customisable protection
- Motor overload with programmable 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
- RS 485 failure
- Mains frequency
- Input trip
- Current imbalance
- Ground fault (optional)

ADDITIONAL FEATURES

- Starter communication timeout
- Network communication trip
- Auto detection of line or inside delta power connection
- Programmable auto start/stop
- 24 V DC auxiliary power supply
- PT100 RTD input
- Real time clock with battery backup
- Powerthrough - 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
- Emergency Run mode
- I/O expansion card (optional)
- RTD/Ground fault card (optional)
- Ethernet IP™, Modbus® RTU, Modbus® TCP, DeviceNet™, Profibus®, Profinet® communications (optional)
- USB interface (optional)
- PC software (optional / free)

EMX3 product range

The EMX3 comes in a range of sizes to suit the demands of your application. See rating and sizes for details.

Product identification

EMX3 - 0255 B - V4 - C1 - H

Keypad
H = keypad fitted

Control Voltage
C1 = 110 - 210 V AC & 220 - 440 V AC
C2 = 24 V AC/DC

Three Phase Supply Voltage
V4 = 200 V AC - 440 V AC
V7 = 380 V AC - 690 V AC

Bypass
B = internal bypassed
C = non-bypassed (continuous connection)

Nominal Current Rating

Product Series Designation

Application and duty cycle categories

Soft starters are influenced by several factors but none more so than the starting time and starting current characteristics of the driven machine. The following table, when used in conjunction with the ratings matrices provided on the following pages, ensures accurate soft starter selection.

APPLICATION	DUTY
Agitator	Heavy
Atomiser	Heavy
Bottle washer	Light
Centrifuge	Severe
Chipper	Severe
Compressor - Recip (Loaded)	Severe
Compressor - Recip (Unloaded)	Heavy
Compressor - Screw (Loaded)	Severe
Compressor - Screw (Unloaded)	Heavy
Conveyor - Belt	Severe
Conveyor - Roller	Medium
Conveyor - Screw	Heavy
Crusher - Cone	Medium
Crusher - Jaw	Severe
Crusher - Rotary	Medium
Crusher - Vertical impact	Medium
Debarker	Medium
Dryer	Severe
Dust collector	Medium
Edger	Medium
Fan - Axial (Damped)	Medium
Fan - Axial (Un-damped)	Severe
Fan - Centrifugal (Damped)	Medium
Fan - Centrifugal (Un-damped)	Severe

APPLICATION	DUTY
Fan - High pressure	Severe
Grinder	Medium
Hydraulic power pack	Medium
Mill	Severe
Mill - Ball	Severe
Mill - Hammer	Severe
Mill - Roller	Severe
Mixer	Severe
Palletiser	Severe
Planer	Medium
Press	Medium
Pump - Bore	Light
Pump - Centrifugal	Medium
Pump - Positive displacement	Heavy
Pump - Slurry	Severe
Re-pulper	Severe
Rotary table	Heavy
Sander	Heavy
Saw - Bandsaw	Severe
Saw - Circular	Medium
Separator	Severe
Shredder	Severe
Slicer	Light
Tumbler	Heavy

Note: The above table is intended as a guide only. Individual machine and motor characteristics will determine the actual start current and start time requirements.

DUTY CATEGORY DEFINITION - EXAMPLE

Category	Continuous operation	Bypassed operation
Light duty	AC 53a: 3-10: 50-10	AC 53b: 3-10: 350
Medium duty	AC 53a: 3.5-15: 50-10	AC 53b: 3.5-15: 345
Heavy duty	AC 53a: 4-20: 50-10	AC 53b: 4-20: 340
Severe duty	AC 53a: 4.5-30: 50-10	AC 53b: 4.5-30: 330

Example 1: Continuous operation

AC 53a: 3-10: 50-10

Start condition
3 = 3 x FLC
10 = 10 seconds

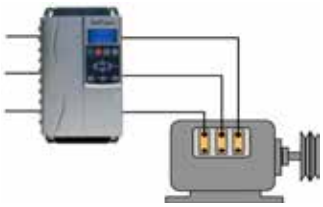
Duty cycle
50 = Ratio of ON/OFF time 50 %
10 = Operating cycles per hour

Example 2: Bypassed operation

AC 53b: 3-10: 350

Start condition
3 = 3 x FLC
10 = 10 seconds

Time between ramps
350 = 350 seconds



3 wire - 400 / 415 V AC applications [1])

EMX3 maximum motor FLC ratings [2])

Light Duty 3 x FLC, 10 sec	Medium Duty 3.5 x FLC, 15 sec	Heavy Duty 4 x FLC, 20 sec	Severe Duty 4.5 x FLC, 30 sec	Frame size	110-440 V AC Control Standard Model [3])	24 V AC/DC Control Variant Model
AC 53b: INTERNAL BYPASS CONTACTOR						
23 A	20 A	17 A	15 A	G1B	**EMX3-0023B-V4-C1-H**	**EMX3-0023B-V4-C2-H**
43 A	37 A	31 A	26 A	G1B	**EMX3-0043B-V4-C1-H**	**EMX3-0043B-V4-C2-H**
50 A	44 A	37 A	30 A	G1B	**EMX3-0050B-V4-C1-H**	**EMX3-0050B-V4-C2-H**
53 A	53 A	46 A	37 A	G1B	**EMX3-0053B-V4-C1-H**	**EMX3-0053B-V4-C2-H**
76 A	64 A	55 A	47 A	G1B	**EMX3-0076B-V4-C1-H**	**EMX3-0076B-V4-C2-H**
97 A	82 A	69 A	58 A	G1B	**EMX3-0097B-V4-C1-H**	**EMX3-0097B-V4-C2-H**
100 A	88 A	74 A	61 A	G1B	**EMX3-0100B-V4-C1-H**	**EMX3-0100B-V4-C2-H**
105 A	105 A	95 A	78 A	G1B	**EMX3-0105B-V4-C1-H**	**EMX3-0105B-V4-C2-H**
145 A	123 A	106 A	90 A	G2B	**EMX3-0145B-V4-C1-H**	**EMX3-0145B-V4-C2-H**
170 A	145 A	121 A	97 A	G2B	**EMX3-0170B-V4-C1-H**	**EMX3-0170B-V4-C2-H**
200 A	189 A	160 A	134 A	G2B	**EMX3-0200B-V4-C1-H**	**EMX3-0200B-V4-C2-H**
220 A	210 A	178 A	148 A	G2B	**EMX3-0220B-V4-C1-H**	**EMX3-0220B-V4-C2-H**
255 A	23 A	201 A	176 A	G3B	**EMX3-0255B-V4-C1-H**	**EMX3-0255B-V4-C2-H**
350 A	306 A	266 A	230 A	G3B	**EMX3-0350B-V4-C1-H**	**EMX3-0350B-V4-C2-H**
425 A	371 A	321 A	276 A	G3B	**EMX3-0425B-V4-C1-H**	**EMX3-0425B-V4-C2-H**
500 A	445 A	383 A	326 A	G4B	**EMX3-0500B-V4-C1-H**	**EMX3-0500B-V4-C2-H**
580 A	492 A	425 A	364 A	G4B	**EMX3-0580B-V4-C1-H**	**EMX3-0580B-V4-C2-H**
700 A	592 A	512 A	438 A	G4B	**EMX3-0700B-V4-C1-H**	**EMX3-0700B-V4-C2-H**
820 A	705 A	606 A	516 A	G4B	**EMX3-0820B-V4-C1-H**	**EMX3-0820B-V4-C2-H**
920 A	804 A	684 A	571 A	G4B	**EMX3-0920B-V4-C1-H**	**EMX3-0920B-V4-C2-H**
1000 A	936 A	796 A	664 A	G4B	**EMX3-1000B-V4-C1-H**	**EMX3-1000B-V4-C2-H**
AC 53a: CONTINOUS OPERATION (NO INTERNAL BYPASS) [4])						
255 A	222 A	195 A	171 A	G3C	**EMX3-0255C-V4-C1-H**	**EMX3-0255C-V4-C2-H**
360 A	351 A	303 A	259 A	G4C	**EMX3-0360C-V4-C1-H**	**EMX3-0360C-V4-C2-H**
380 A	380 A	348 A	292 A	G4C	**EMX3-0380C-V4-C1-H**	**EMX3-0380C-V4-C2-H**
430 A	413 A	355 A	301 A	G4C	**EMX3-0430C-V4-C1-H**	**EMX3-0430C-V4-C2-H**
620 A	614 A	515 A	419 A	G4C	**EMX3-0620C-V4-C1-H**	**EMX3-0620C-V4-C2-H**
650 A	629 A	532 A	437 A	G4C	**EMX3-0650C-V4-C1-H**	**EMX3-0650C-V4-C2-H**
790 A	790 A	694 A	567 A	G4C	**EMX3-0790C-V4-C1-H**	**EMX3-0790C-V4-C2-H**
930 A	930 A	800 A	644 A	G4C	**EMX3-0930C-V4-C1-H**	**EMX3-0930C-V4-C2-H**
1200 A	1200 A	1135 A	983 A	G5C	**EMX3-1200C-V4-C1-H**	**EMX3-1200C-V4-C2-H**
1410 A	1355 A	1187 A	1023 A	G5C	**EMX3-1410C-V4-C1-H**	**EMX3-1410C-V4-C2-H**
1600 A	1600 A	1433 A	1227 A	G5C	**EMX3-1600C-V4-C1-H**	**EMX3-1600C-V4-C2-H**

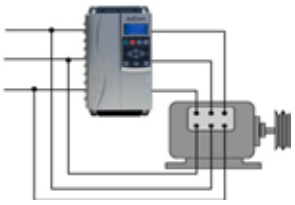
Notes: [1]) Representative image to aid soft starter product selection, does not constitute complete power circuit.

[2]) Ratings for models EMX3-0023B to EMX3-0053B are based on 10 starts per hour, equally spaced, 40 °C ambient. Ratings for models EMX3-0076B to EMX3-1000B and EMX3-0255C to EMX3-1600C are based on 6 starts per hour equally spaced, 40 °C ambient.

[3]) Standard models with internal bypass contactor (EMX3-xxxxB) are generally stocked.

[4]) Intended for use in well vented enclosures and / or with external bypass contactor. Particularly suited to applications with high overload trip class (>trip class 10) and those that may experience transient overload conditions as part of normal run time operation.

For application and duty category definitions refer to page 11. For 690 V AC applications refer to pages 14/15



6 wire - 400 / 415 V AC applications [1])

EMX3 maximum motor FLC ratings [2])

Light Duty 3 x FLC, 10 sec	Medium Duty 3.5 x FLC, 15 sec	Heavy Duty 4 x FLC, 20 sec	Severe Duty 4.5 x FLC, 30 sec	Frame Size	110-440 V AC Control Standard Model [3])	24 V AC/DC Control Variant Model
AC 53b: INTERNAL BYPASS CONTACTOR						
34 A	30 A	26 A	22 A	G1B	**EMX3-0023B-V4-C1-H**	**EMX3-0023B-V4-C2-H**
64 A	59 A	51 A	44 A	G1B	**EMX3-0043B-V4-C1-H**	**EMX3-0043B-V4-C2-H**
75 A	66 A	55 A	45 A	G1B	**EMX3-0050B-V4-C1-H**	**EMX3-0050B-V4-C2-H**
79 A	79 A	69 A	55 A	G1B	**EMX3-0053B-V4-C1-H**	**EMX3-0053B-V4-C2-H**
114 A	96 A	83 A	70 A	G1B	**EMX3-0076B-V4-C1-H**	**EMX3-0076B-V4-C2-H**
145 A	123 A	104 A	87 A	G1B	**EMX3-0097B-V4-C1-H**	**EMX3-0097B-V4-C2-H**
150 A	132 A	112 A	82 A	G1B	**EMX3-0100B-V4-C1-H**	**EMX3-0100B-V4-C2-H**
157 A	157 A	143 A	117 A	G1B	**EMX3-0105B-V4-C1-H**	**EMX3-0105B-V4-C2-H**
217 A	184 A	159 A	136 A	G2B	**EMX3-0145B-V4-C1-H**	**EMX3-0145B-V4-C2-H**
255 A	217 A	181 A	146 A	G2B	**EMX3-0170B-V4-C1-H**	**EMX3-0170B-V4-C2-H**
300 A	283 A	241 A	200 A	G2B	**EMX3-0200B-V4-C1-H**	**EMX3-0200B-V4-C2-H**
330 A	315 A	268 A	223 A	G2B	**EMX3-0220B-V4-C1-H**	**EMX3-0220B-V4-C2-H**
382 A	346 A	302 A	264 A	G3B	**EMX3-0255B-V4-C1-H**	**EMX3-0255B-V4-C2-H**
525 A	459 A	399 A	345 A	G3B	**EMX3-0350B-V4-C1-H**	**EMX3-0350B-V4-C2-H**
638 A	557 A	482 A	414 A	G3B	**EMX3-0425B-V4-C1-H**	**EMX3-0425B-V4-C2-H**
750 A	668 A	575 A	490 A	G4B	**EMX3-0500B-V4-C1-H**	**EMX3-0500B-V4-C2-H**
870 A	738 A	637 A	546 A	G4B	**EMX3-0580B-V4-C1-H**	**EMX3-0580B-V4-C2-H**
1050 A	889 A	768 A	658 A	G4B	**EMX3-0700B-V4-C1-H**	**EMX3-0700B-V4-C2-H**
1230 A	1058 A	910 A	774 A	G4B	**EMX3-0820B-V4-C1-H**	**EMX3-0820B-V4-C2-H**
1380 A	1206 A	1026 A	857 A	G4B	**EMX3-0920B-V4-C1-H**	**EMX3-0920B-V4-C2-H**
1500 A	1404 A	1194 A	997 A	G4B	**EMX3-1000B-V4-C1-H**	**EMX3-1000B-V4-C2-H**
AC 53a: CONTINOUS OPERATION (NO INTERNAL BYPASS) [4])						
382 A	346 A	302 A	264 A	G3C	**EMX3-0255C-V4-C1-H**	**EMX3-0255C-V4-C2-H**
540 A	540 A	465 A	395 A	G4C	**EMX3-0360C-V4-C1-H**	**EMX3-0360C-V4-C2-H**
570 A	570 A	539 A	449 A	G4C	**EMX3-0380C-V4-C1-H**	**EMX3-0380C-V4-C2-H**
645 A	645 A	552 A	464 A	G4C	**EMX3-0430C-V4-C1-H**	**EMX3-0430C-V4-C2-H**
930 A	930 A	810 A	651 A	G4C	**EMX3-0620C-V4-C1-H**	**EMX3-0620C-V4-C2-H**
975 A	975 A	842 A	683 A	G4C	**EMX3-0650C-V4-C1-H**	**EMX3-0650C-V4-C2-H**
1185 A	1185 A	1071 A	868 A	G4C	**EMX3-0790C-V4-C1-H**	**EMX3-0790C-V4-C2-H**
1395 A	1395 A	1244 A	992 A	G4C	**EMX3-0930C-V4-C1-H**	**EMX3-0930C-V4-C2-H**
1800 A	1800 A	1800 A	1606 A	G5C	**EMX3-1200C-V4-C1-H**	**EMX3-1200C-V4-C2-H**
2115 A	2115 A	1979 A	1671 A	G5C	**EMX3-1410C-V4-C1-H**	**EMX3-1410C-V4-C2-H**
2400 A	2400 A	2400 A	2030 A	G5C	**EMX3-1600C-V4-C1-H**	**EMX3-1600C-V4-C2-H**

Notes: [1]) Representative image to aid soft starter product selection, does not constitute complete power circuit.

[2]) Ratings for models EMX3-0023B to EMX3-0053B are based on 10 starts per hour, equally spaced, 40 °C ambient. Ratings for models EMX3-0076B to EMX3-1000B and EMX3-0255C to EMX3-1600C are based on 6 starts per hour equally spaced, 40 °C ambient.

[3]) Standard models with internal bypass contactor (EMX3-xxxxB) are generally stocked.

[4]) Intended for use in well vented enclosures and / or with external bypass contactor. Particularly suited to applications with high overload trip class (>trip class 10) and those that may experience transient overload conditions as part of normal run time operation.

For application and duty category definitions refer to page 11. For 690 V AC applications refer to pages 14/15

3 wire - 690 V AC applications [1])

EMX3 maximum motor FLC ratings [2])

Light Duty 3 x FLC, 10 sec	Medium Duty 3.5 x FLC, 15 sec	Heavy Duty 4 x FLC, 20 sec	Severe Duty 4.5 x FLC, 30 sec	Frame Size	110-440 V AC Control Standard Model [3])	24 V AC/DC Control Model
AC 53b: INTERNAL BYPASS CONTACTOR						
23 A	20 A	17 A	15 A	G1B	**EMX3-0023B-V7-C1-H**	**EMX3-0023B-V7-C2-H**
43 A	37 A	31 A	26 A	G1B	**EMX3-0043B-V7-C1-H**	**EMX3-0043B-V7-C2-H**
50 A	44 A	37 A	30 A	G1B	**EMX3-0050B-V7-C1-H**	**EMX3-0050B-V7-C2-H**
53 A	53 A	46 A	37 A	G1B	**EMX3-0053B-V7-C1-H**	**EMX3-0053B-V7-C2-H**
76 A	64 A	55 A	47 A	G1B	**EMX3-0076B-V7-C1-H**	**EMX3-0076B-V7-C2-H**
97 A	82 A	69 A	58 A	G1B	**EMX3-0097B-V7-C1-H**	**EMX3-0097B-V7-C2-H**
100 A	88 A	74 A	61 A	G1B	**EMX3-0100B-V7-C1-H**	**EMX3-0100B-V7-C2-H**
105 A	105 A	95 A	78 A	G1B	**EMX3-0105B-V7-C1-H**	**EMX3-0105B-V7-C2-H**
145 A	123 A	106 A	90 A	G2B	**EMX3-0145B-V7-C1-H**	**EMX3-0145B-V7-C2-H**
170 A	145 A	121 A	97 A	G2B	**EMX3-0170B-V7-C1-H**	**EMX3-0170B-V7-C2-H**
200 A	189 A	160 A	134 A	G2B	**EMX3-0200B-V7-C1-H**	**EMX3-0200B-V7-C2-H**
220 A	210 A	178 A	148 A	G2B	**EMX3-0220B-V7-C1-H**	**EMX3-0220B-V7-C2-H**
255 A	231 A	201 A	176 A	G3B	**EMX3-0255B-V7-C1-H**	**EMX3-0255B-V7-C2-H**
350 A	306 A	266 A	230 A	G3B	**EMX3-0350B-V7-C1-H**	**EMX3-0350B-V7-C2-H**
425 A	371 A	321 A	276 A	G3B	**EMX3-0425B-V7-C1-H**	**EMX3-0425B-V7-C2-H**
500 A	445 A	383 A	326 A	G4B	**EMX3-0500B-V7-C1-H**	**EMX3-0500B-V7-C2-H**
580 A	492 A	425 A	364 A	G4B	**EMX3-0580B-V7-C1-H**	**EMX3-0580B-V7-C2-H**
700 A	592 A	512 A	438 A	G4B	**EMX3-0700B-V7-C1-H**	**EMX3-0700B-V7-C2-H**
820 A	705 A	606 A	516 A	G4B	**EMX3-0820B-V7-C1-H**	**EMX3-0820B-V7-C2-H**
920 A	804 A	684 A	571 A	G4B	**EMX3-0920B-V7-C1-H**	**EMX3-0920B-V7-C2-H**
1000 A	936 A	796 A	664 A	G4B	**EMX3-1000B-V7-C1-H**	**EMX3-1000B-V7-C2-H**
AC 53a: CONTINOUS OPERATION (NO INTERNAL BYPASS) [4])						
255 A	222 A	195 A	171 A	G3C	**EMX3-0255C-V7-C1-H**	**EMX3-0255C-V7-C2-H**
360 A	351 A	303 A	259 A	G4C	**EMX3-0360C-V7-C1-H**	**EMX3-0360C-V7-C2-H**
380 A	380 A	348 A	292 A	G4C	**EMX3-0380C-V7-C1-H**	**EMX3-0380C-V7-C2-H**
430 A	413 A	355 A	301 A	G4C	**EMX3-0430C-V7-C1-H**	**EMX3-0430C-V7-C2-H**
620 A	614 A	515 A	419 A	G4C	**EMX3-0620C-V7-C1-H**	**EMX3-0620C-V7-C2-H**
650 A	629 A	532 A	437 A	G4C	**EMX3-0650C-V7-C1-H**	**EMX3-0650C-V7-C2-H**
790 A	790 A	694 A	567 A	G4C	**EMX3-0790C-V7-C1-H**	**EMX3-0790C-V7-C2-H**
930 A	930 A	800 A	644 A	G4C	**EMX3-0930C-V7-C1-H**	**EMX3-0930C-V7-C2-H**
1200 A	1200 A	1135 A	983 A	G5C	**EMX3-1200C-V7-C1-H**	**EMX3-1200C-V7-C2-H**
1410 A	1355 A	1187 A	1023 A	G5C	**EMX3-1410C-V7-C1-H**	**EMX3-1410C-V7-C2-H**
1600 A	1600 A	1433 A	1227 A	G5C	**EMX3-1600C-V7-C1-H**	**EMX3-1600C-V7-C2-H**

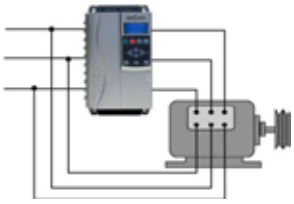
Notes: [1]) Representative image to aid soft starter product selection, does not constitute complete power circuit.

[2]) Ratings for models EMX3-0023B to EMX3-0053B are based on 10 starts per hour, equally spaced, 40 °C ambient. Ratings for models EMX3-0076B to EMX3-1000B and EMX3-0255C to EMX3-1600C are based on 6 starts per hour equally spaced, 40 °C ambient.

[3]) Standard models with internal bypass contactor (EMX3-xxxxB) are generally stocked.

[4]) Intended for use in well vented enclosures and / or with external bypass contactor. Particularly suited to applications with high overload trip class (>trip class 10) and those that may experience transient overload conditions as part of normal run time operation.

For application and duty category definitions refer to page 11. For 400 / 415 V AC applications refer to pages 12/13



6 wire - 690 V AC applications [1])

EMX3 maximum motor FLC ratings [2])

Light Duty 3 x FLC, 10 sec	Medium Duty 3.5 x FLC, 15 sec	Heavy Duty 4 x FLC, 20 sec	Severe Duty 4.5 x FLC, 30 sec	Frame Size	110-440 V AC Control-Standard Model [3])	24 V AC/DC Control Variant Model
AC 53b: INTERNAL BYPASS CONTACTOR						
34 A	30 A	26 A	22 A	G1B	**EMX3-0023B-V7-C1-H**	**EMX3-0023B-V7-C2-H**
64 A	59 A	51 A	44 A	G1B	**EMX3-0043B-V7 -C1-H**	**EMX3-0043B-V7-C2-H**
75 A	66 A	55 A	45 A	G1B	**EMX3-0050B-V7-C1-H**	**EMX3-0050B-V7-C2-H**
79 A	79 A	69 A	55 A	G1B	**EMX3-0053B-V7-C1-H**	**EMX3-0053B-V7-C2-H**
114 A	96 A	83 A	70 A	G1B	**EMX3-0076B-V7-C1-H**	**EMX3-0076B-V7-C2-H**
145 A	123 A	104 A	87 A	G1B	**EMX3-0097B-V7-C1-H**	**EMX3-0097B-V7-C2-H**
150 A	132 A	112 A	82 A	G1B	**EMX3-0100B-V7-C1-H**	**EMX3-0100B-V7-C2-H**
157 A	157 A	143 A	117 A	G1B	**EMX3-0105B-V7-C1-H**	**EMX3-0105B-V7-C2-H**
217 A	184 A	159 A	136 A	G2B	**EMX3-0145B-V7-C1-H**	**EMX3-0145B-V7-C2-H**
255 A	217 A	181 A	146 A	G2B	**EMX3-0170B-V7-C1-H**	**EMX3-0170B-V7-C2-H**
300 A	283 A	241 A	200 A	G2B	**EMX3-0200B-V7-C1-H**	**EMX3-0200B-V7-C2-H**
330 A	315 A	268 A	223 A	G2B	**EMX3-0220B-V7-C1-H**	**EMX3-0220B-V7-C2-H**
382 A	346 A	302 A	264 A	G3B	**EMX3-0255B-V7-C1-H**	**EMX3-0255B-V7-C2-H**
525 A	459 A	399 A	345 A	G3B	**EMX3-0350B-V7-C1-H**	**EMX3-0350B-V7-C2-H**
638 A	557 A	482 A	414 A	G3B	**EMX3-0425B-V7-C1-H**	**EMX3-0425B-V7-C2-H**
750 A	668 A	575 A	490 A	G4B	**EMX3-0500B-V7-C1-H**	**EMX3-0500B-V7-C2-H**
870 A	738 A	637 A	546 A	G4B	**EMX3-0580B-V7-C1-H**	**EMX3-0580B-V7-C2-H**
1050 A	889 A	768 A	658 A	G4B	**EMX3-0700B-V7-C1-H**	**EMX3-0700B-V7-C2-H**
1230 A	1058 A	910 A	774 A	G4B	**EMX3-0820B-V7-C1-H**	**EMX3-0820B-V7-C2-H**
1380 A	1206 A	1026 A	857 A	G4B	**EMX3-0920B-V7-C1-H**	**EMX3-0920B-V7-C2-H**
1500 A	1404 A	1194 A	997 A	G4B	**EMX3-1000B-V7-C1-H**	**EMX3-1000B-V7-C2-H**
AC 53a: CONTINOUS OPERATION (NO INTERNAL BYPASS) [4])						
382 A	346 A	302 A	264 A	G3C	**EMX3-0255C-V7-C1-H**	**EMX3-0255C-V7-C2-H**
540 A	540 A	465 A	395 A	G4C	**EMX3-0360C-V7-C1-H**	**EMX3-0360C-V7-C2-H**
570 A	570 A	539 A	449 A	G4C	**EMX3-0380C-V7-C1-H**	**EMX3-0380C-V7-C2-H**
645 A	645 A	552 A	464 A	G4C	**EMX3-0430C-V7-C1-H**	**EMX3-0430C-V7-C2-H**
930 A	930 A	810 A	651 A	G4C	**EMX3-0620C-V7-C1-H**	**EMX3-0620C-V7-C2-H**
975 A	975 A	842 A	683 A	G4C	**EMX3-0650C-V7-C1-H**	**EMX3-0650C-V7-C2-H**
1185 A	1185 A	1071 A	868 A	G4C	**EMX3-0790C-V7-C1-H**	**EMX3-0790C-V7-C2-H**
1395 A	1395 A	1244 A	992 A	G4C	**EMX3-0930C-V7-C1-H**	**EMX3-0930C-V7-C2-H**
1800 A	1800 A	1800 A	1606 A	G5C	**EMX3-1200C-V7-C1-H**	**EMX3-1200C-V7-C2-H**
2115 A	2115 A	1979 A	1671 A	G5C	**EMX3-1410C-V7-C1-H**	**EMX3-1410C-V7-C2-H**
2400 A	2400 A	2400 A	2030 A	G5C	**EMX3-1600C-V7-C1-H**	**EMX3-1600C-V7-C2-H**

Notes: [1]) Representative image to aid soft starter product selection, does not constitute complete power circuit.

[2]) Ratings for models EMX3-0023B to EMX3-0053B are based on 10 starts per hour, equally spaced, 40 °C ambient. Ratings for models EMX3-0076B to EMX3-1000B and EMX3-0255C to EMX3-1600C are based on 6 starts per hour equally spaced, 40 °C ambient.

[3]) Standard models with internal bypass contactor (EMX3-xxxxB) are generally stocked.

[4]) Intended for use in well vented enclosures and / or with external bypass contactor. Particularly suited to applications with high overload trip class (>trip class 10) and those that may experience transient overload conditions as part of normal run time operation.

For application and duty category definitions refer to page 11. For 400 / 415 V AC applications refer to pages 12/13

Accessories / other features

EXPANSION INPUT/OUTPUT CARD

These hardware expansion cards provide for users who require additional inputs and outputs or advanced functions.

The input/output expansion card adds:

- 2 x digital inputs
- 3 x relay outputs
- 1 x analogue input
- 1 x analogue output

6 WAY RTD AND GROUND FAULT PROTECTION CARD

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 a 1000:1 5 VA current transformer is also required.

COMMUNICATION MODULES

The EMX3 supports network communication using either Ethernet IP™, Modbus® RTU, Modbus®TCP, DeviceNet™, Profibus®, Profinet® and USB, via easy-to-install communication interfaces.

REMOTE MOUNTING KIT

The keypad mounting kit allows remote mounting of the keypad up to 3 m away from the EMX3 soft starter.

The keypad is rated IP 65 when mounted correctly using the Remote Mounting Kit.

FINGER GUARDS

This option ensures personnel safety by preventing accidental contact with live terminals. The finger guards fit the EMX3-0145B to EMX3-0220B and provides IP 20 protection when used with 22 mm plus size cables.

ADJUSTABLE BUS BAR CONFIGURATION

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

Notes: Each EMX3 can support a maximum of one expansion card at a time.
Internally bypassed models EMX3-0255B to EMX3-1000B have input and output bus bars at both the top and bottom of the unit. These bus bars do not need to be adjusted.

Specifications

GENERAL

Current range ..... 23 A ~ 1600 A (nominal)
Motor connection ..... Line or inside delta
Bypass ..... Integrated internal (EMX3-xxxxB) or external (EMX3-xxxxC)

SUPPLY

Mains voltage (L1, L2, L3)
- EMX3-xxxx-V4 ..... 200 V AC ~ 440 V AC (± 10%)
- EMX3-xxxx-V7 ..... 380 V AC ~ 600 V AC (± 10%) (in-line or inside delta connection)
- EMX3-xxxx-V7 ..... 380 V AC ~ 690 V AC (± 10%) (earthed star supply system only)

Control voltage (A1, A2, A3)
- EMX3-xxxx-xx-C1 (A1, A2) ..... 110 ~ 210 V AC (+10% / -15%), 600 mA
- EMX3-xxxx-xx-C1 (A2, A3) ..... 220 ~ 440 V AC (+10% / -15%), 600 mA
- EMX3-xxxx-xx-C2 (A1, A3) ..... 24 V AC/VDC (± 20%), 100 VA

Mains frequency ..... 45 Hz to 66 Hz
Short circuit capability
Coordination with semiconductor fuses ..... Type 2
Coordination with HRC fuses ..... Type 1
- EMX3-0023B to EMX3-0220B ..... prospective current 65 kA
- EMX3-0255C to EMX3-0930C ..... prospective current 85 kA
- EMX3-0255B to EMX3-1000B ..... prospective current 85 kA
- EMX3-1200C to EMX3-1600C ..... prospective current 100 kA

INPUTS

Input rating ..... Active 24 V DC, 8 mA approx
Start (C23, C24) ..... Normally open
Stop (C31, C32) ..... Normally closed
Reset (C41, C42) ..... Normally closed
Programmable inputs
- Input A (C53, C54) ..... Normally open
- Input B (C63, C64) ..... Normally open

Motor thermistor (B4, B5) ..... Trip >3.6 kΩ, reset <1.6 kΩ
PT100 RTD (B6, B7, B8) ..... Accuracy 0 ~ 100 °C ± 0.5 °C, 100 °C ~ 150 °C ± 2°C, -20 ~ 0 °C ± 2°C

OUTPUTS

Relay outputs ..... 10A @ 250 V AC resistive, 5A @ 250 V AC 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

Analogue output (B10, B11) ..... 0-20 mA or 4-20 mA (selectable)
- Maximum load ..... 600 Ω (12 V DC @ 20 mA) (accuracy ± 5%)

24 V DC output (P24, COM) Maximum load ..... 200 mA (accuracy ± 10%)

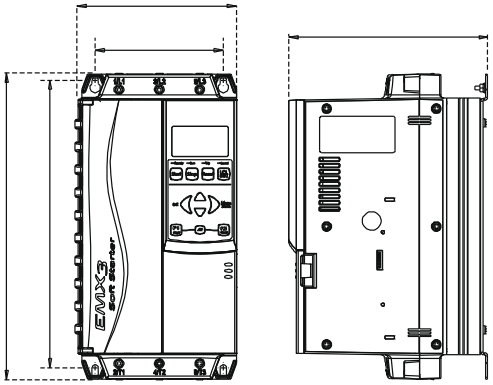
ENVIRONMENTAL

Protection
- EMX3-0023B ~ EMX3-0105B ..... IP 20
- EMX3-0145B ~ EMX3-1000B ..... IP 00
- EMX3-0255C ~ EMX3-1600C ..... IP 00

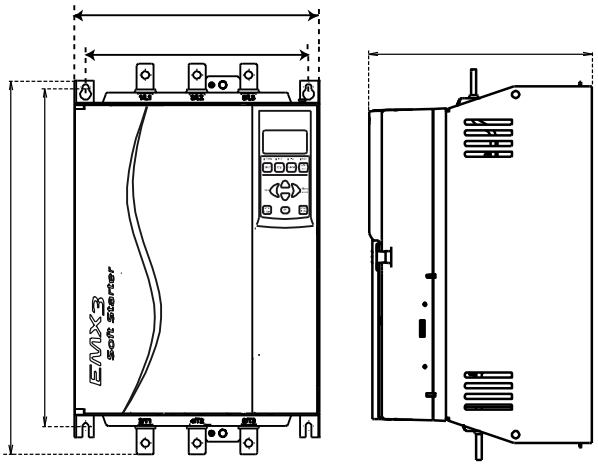
Keypad (when installed with remote mounting kit) ..... IP 65 & NEMA 12
Operating temperature ..... -10 °C to 60 °C, above 40 °C with derating
Storage temperature ..... - 25 °C to + 60 °C
Operating altitude ..... 0 - 1000 m, above 1000 m with derating
Humidity ..... 5% to 95% Relative Humidity

For complete specifications consult NHP

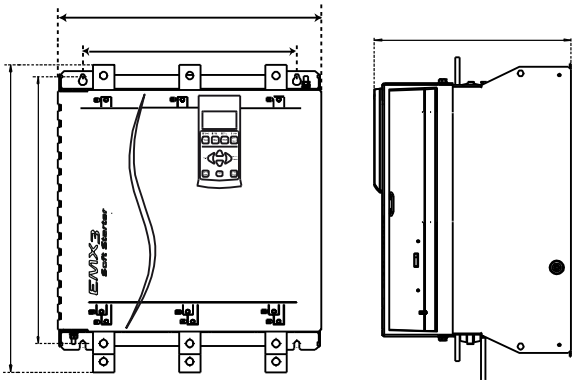
Dimensions and weights



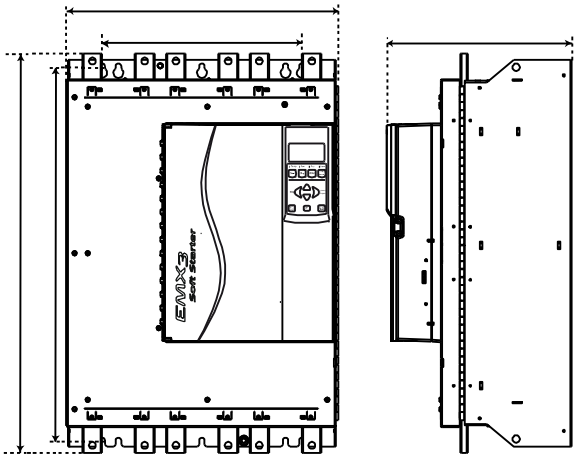
EMX3-0023B TO EMX3-0105B



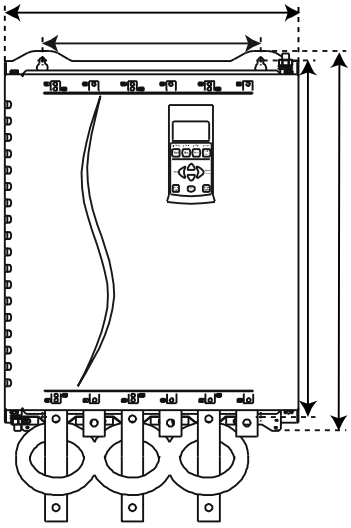
EMX3-0145B TO EMX3-0220B



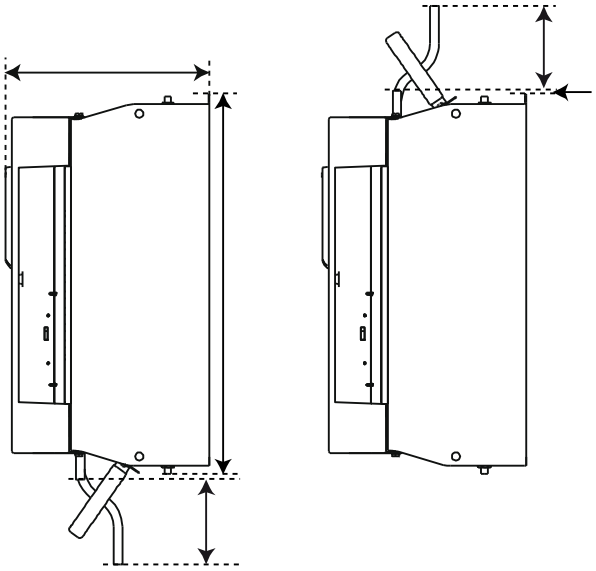
EMX3-0255B TO EMX3 - 0425B



EMX3-0500B TO EMX3-1000B



EMX3-0255C

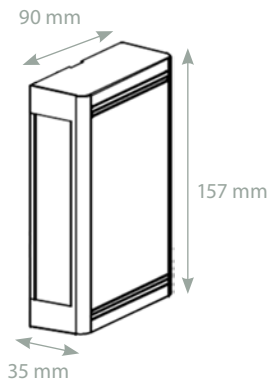


EMX3-0360C TO EMX3-1600C

Frame size	Model	A	B	C	D	E	F	G	H	Weight
		mm	mm	mm	mm	mm	mm	mm	mm	kg
G1B	EMX3-0023B	156	124	295	278	192	N/A	N/A	N/A	3.2
	EMX3-0043B									
	EMX3-0050B									
	EMX3-0053B									
	EMX3-0076B					223				3.5
	EMX3-0097B									4.8
	EMX3-0100B									
	EMX3-0105B									
G2B	EMX3-0145B	282	250	438	380	250	N/A	N/A	N/A	16
	EMX3-0170B									
	EMX3-0200B									
	EMX3-0220B									
G3B	EMX3-0255B	424	376	440	392	298	N/A	N/A	N/A	20
	EMX3-0350B									
	EMX3-0425B									30.2
G4B	EMX3-0500B	438	320	640	600	300	N/A	N/A	N/A	49.5
	EMX3-0580B									
	EMX3-0700B									60
	EMX3-0820B									
	EMX3-0920B									
	EMX3-1000B									
G3C	EMX3-0255C	390	320	417	400	284	N/A	N/A	N/A	25
G4C	EMX3-0360C	430	320	698	522	302	105	105	6	50.5
	EMX3-0380C									
	EMX3-0430C									
	EMX3-0620C									53.5
	EMX3-0650C									
	EMX3-0790C									
	EMX3-0930C									
G5C	EMX3-1200C	574	500	750	727	361	133	129	5	140
	EMX3-1410C									
	EMX3-1600C									

Note: Dimensions F, G and H are the additional space required for the output and input busbars, in addition to the overall chassis measurement (C).

Communication modules and USB interface



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