

Commander SX

NEMA 4X Washdown Duty Drive

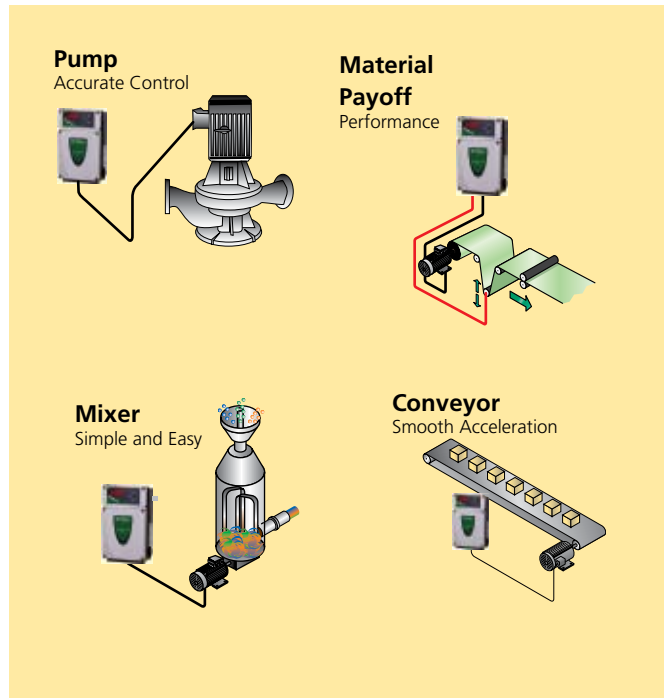
Dirt, dust, water, pollution – all environments that can mean additional cost whenever a variable speed drive is needed. From washdown food and drink applications to dust and other airborne particles found in a textile plant, Control Techniques has designed the perfect AC drive for such rugged applications – Commander SX.

The Commander SX from 0.5 hp to 10 hp (0.37 to 7.5 kW) is a NEMA 4X (IP66) protected drive that enables users to mount the drive close to the motor providing significant cabling, enclosure and installation savings. The practicality of mounting the drive near the motor, while being protected from the harsh environment, brings users the additional benefit over integrated motors/drives by separating the two technologies in the event of maintenance and breakdown.



- 0.5 to 5.0 hp (0.37 to 3.7 kW), 3Ø 230 VAC
- 0.1 to 10 hp (0.25 to 7.5 kW), 3Ø 460 VAC
- Nema 4X/IP66 enclosed drive – no need for separate enclosure
- Designed for direct to wall or next to motor mounting – reducing cabling, enclosure, and installation costs
- Easy set up and commissioning – the first ten parameters cover 80% of applications
- More than 8 preset drive configurations
- Surface textured and rounded corners designed to maximize washdown effectiveness
- Internally fitted EMC filter (to generic and drive standards) for sizes 1 & 2
- External IP66 filter option for size 3
- Robust industrial housing with simple speed control interface

TYPICAL APPLICATIONS



FEATURE

Performance Advantage

Open Loop Vector Control with True Space Vector Modulation

Precise control algorithm provides full torque down to 1 Hz for exceptional performance

Closed Loop Vector Control

With optional PX-Encoder module

Access to Multiple Parameter Levels

Customizes the drive to meet each user's needs: simple (level 1), flexible (level 2) and advanced (level 3)

XpressKey Cloning Module

Provides fast and cost-effective drive-to-drive parameter transfer and storage without a PC

Static Auto-Tune

Allows fast motor/drive optimization without motor shaft rotation

Configurable Analog and Digital I/O

Customizes drive to the specific application

S-ramp Acceleration & Deceleration

Provides smooth speed transitions, minimizing machine "jerk"

Built-in Independent PID Control

Eliminates the need for an external PID controller while providing "outer loop" control of a process variable not necessarily related to the motor

Built-in Motorized Potentiometer

Emulates the functionality of the traditional motorized potentiometer with increase/decrease pushbuttons.

8 Preset Speeds with Independent Acceleration & Deceleration Ramps

Allows predetermined speed sequencing via logic inputs

Selectable Stopping Modes including Ramp, Coast, DC Injection, and Dynamic Braking

Added flexibility meets many application requirements

Full EMC Compliance with Optional Filter

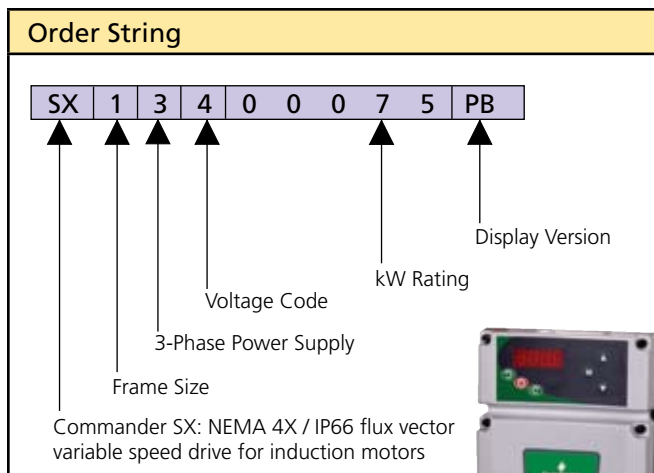
Meets global standards for worldwide use

COMMANDER SX RATINGS

200 to 240 VAC 3 phase ± 10%					
HP / kW	Input Phase	100% Output Current (A)	150% Overload Current for 60s	Size	Order Code
0.5 / 0.37	3	2.5	3.8	1	SX13200037
0.75 / 0.55	3	3.2	4.8	1	SX13200055
1.0 / 0.75	3	4.5	6.8	1	SX13200075
1.5 / 1.1	3	6	9	2	SX23200110
2.0 / 1.5	3	8	12	2	SX23200150
3.0 / 2.2	3	10	15	2	SX23200220
3.0 / 3.0	3	13.5	20	3	SX33200300
5.0 / 4.0	3	16.5	25	3	SX33200400

380 to 480 VAC 3 phase ± 10%					
HP / kW	Input Phase	100% Output Current (A)	150% Overload Current for 60s	Size	Order Code
1.0 / .75	3	2.5	3.8	1	SX13400075
1.5 / 1.1	3	3.2	4.8	1	SX13400110
2.0 / 1.5	3	4.5	6.8	1	SX13400150
3.0 / 2.2	3	6	9	2	SX23400220
3.0 / 3.0	3	8	12	2	SX23400300
5.0 / 4.0	3	10	15	2	SX23400400
7.5 / 5.5	3	13.5	20	3	SX33400550
10 / 7.5	3	16.5	25	3	SX33400750

Motor horsepower based on typical 230 / 460 VAC four-pole motor ratings. Select model based on actual motor current rating.



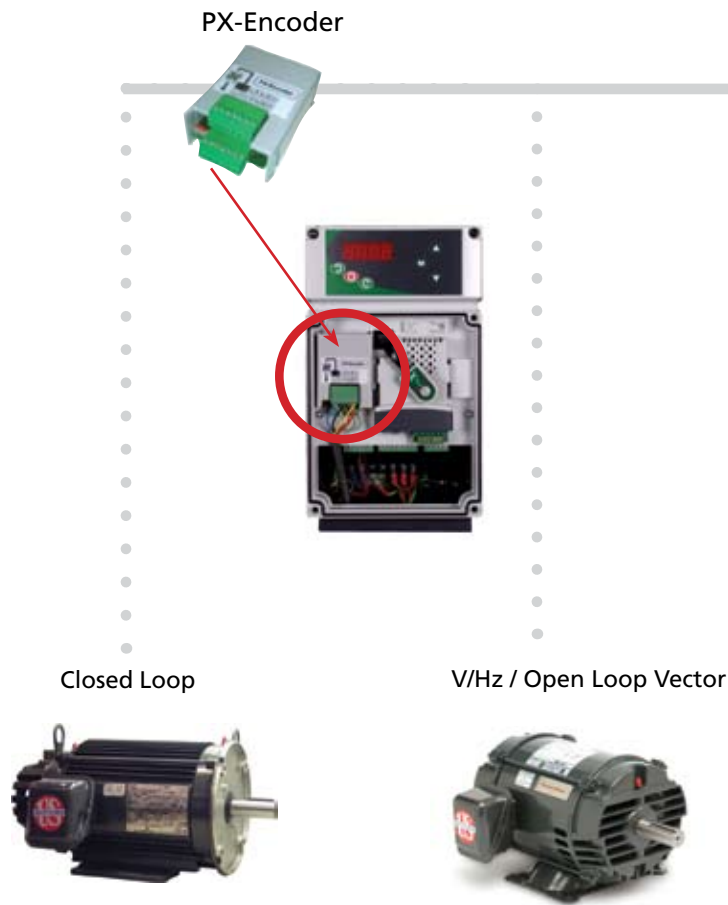
Commander SX Overview

Washdown drive...

OPERATOR INTERFACE



CONTROL MODE



INPUT/OUTPUT

Options	Standard
PX-Secure PX-Brake PX-Brake-Secure	3 Analog 5 Digital I/O (Frequency In & Out) 1 Relay Out

DYNAMIC BRAKING



PX Brake Resistor

COMMUNICATIONS

Standard



Modbus RTU

FILTERS

Standard



Embedded (sizes 1 & 2)

Options



RFI Filter

COMMANDER SX SPECIFICATIONS

Environment

IP66 NEMA 4X rating for mounting in close proximity to the motor and application.

Ambient temperature 40°C (104°F) without derating. Up to 50°C operation with a maximum derating of only one motor size.

Removable gland plate for easy termination and removal of control and motor cables.

Complies with EN954-1 Cat 3 with PX-Secure option. EMC cable gland option for shielded cable management.

Electromagnetic Immunity complies with EN61800-3 (Drive standard) and EN61000-6-2 (generic standard).

Electromagnetic Emissions Complies with EN61000-6-3 and EN61000-6-4 (Generic standard) with integral EMC filter. and with EN61800-3 (Drive standard - 1st and 2nd environment) with integral EMC filter.

Earth leakage current less than 3 mA with integral EMC filter in circuit.

European Hygienic Engineering and Design Group EHEDG and FDA hygienic recommendations have been adopted for the food industry:

- No paint.
- Anodized aluminium heat sink.
- Polycarbonate covers.
- All slopes > 3 degrees incline.
- Roughness < 0.8 microns.
- No zones where liquids can accumulate.

AC Supply Requirements

Voltage	208-240V ±10%, 380-480V ±10%
Phase	3
Imbalance	3%
Frequency	50 or 60 Hz ±2%

Control

Open loop vector control.

V/Hz control.

Closed loop vector with PX-Encoder option.

Speed reference input 0-10V, 0-20 mA, 4-20 mA.

Digital inputs: Enable, Run forward, Run reverse, Jog, local/remote select.

Switching frequency 3 kHz to 11 kHz with 4.5 kHz as default.

Acceleration and Deceleration ramps (linear and S-type).

Serial communication as standard

Modbus RTU RS485 via RJ45 connector.

DC injection braking as standard.

Integral dynamic braking transistor and resistor. PID Controller.

Protection

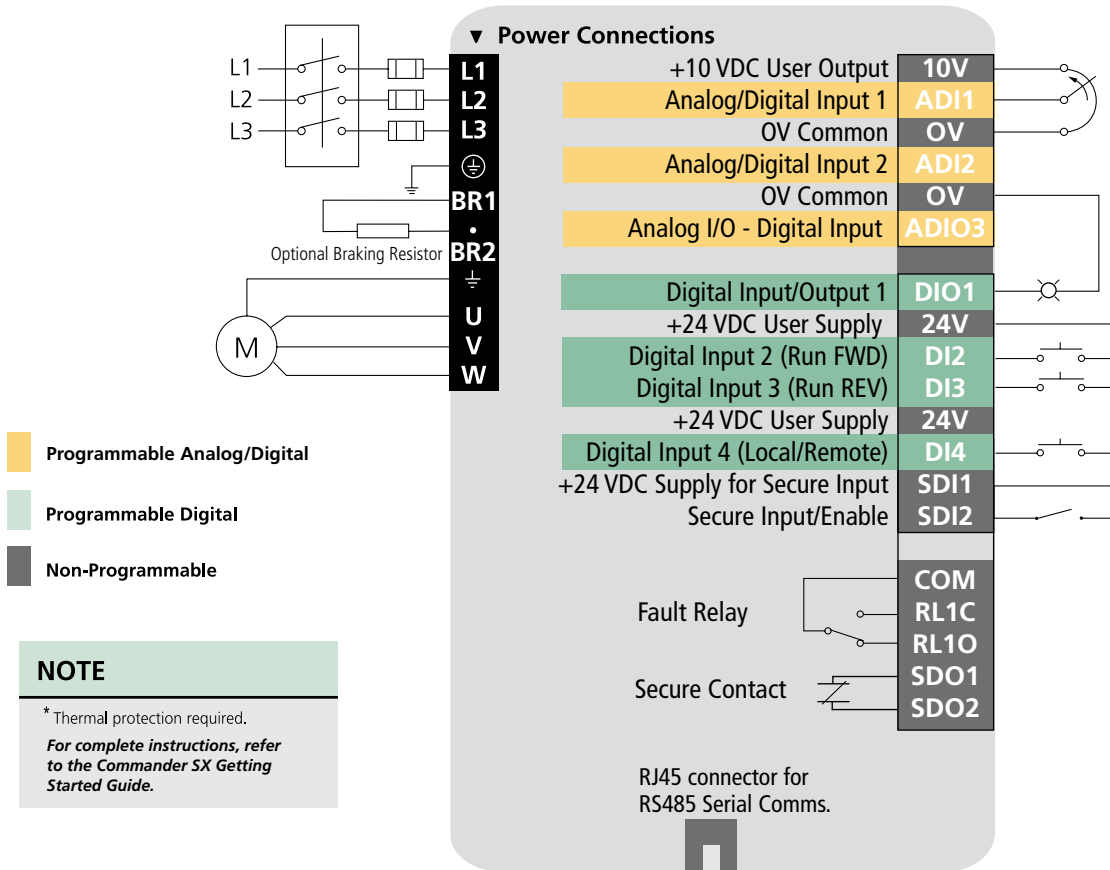
Undervoltage, Supply and DC Link overvoltage, Phase loss, Drive overload, Instantaneous overcurrent, Over temp, Short circuit, Ground fault, Motor thermal, Watchdog.

Approvals & Listings

UL, cUL	UL File Listed 8D14
IEC	Meets IEC Vibration, Mechanical Shock and Electromagnetic Immunity Standards
CE	Low Voltage Directive
UL	UL type 1 with kit
ISO 9001:2000	Certified Manufacturing Facility
ISO 14001	Certified Manufacturing Facility



COMMANDER SX TERMINAL DIAGRAM



TERMINAL DESCRIPTION

Pin#	Function ①	Type/Description	Notes
10V	Reference Supply	+10 VDC	20 mA max
ADI1	Local Speed reference 0-10V	Analog Input 1 or Digital Input	0 to +10 VDC or 4-20 mA (Analog In) 0 to +24 VDC (Digital In)
OV	Common for external analog signals	OV Common	
ADI2	Remote Speed reference 4-20 mA	Analog Input 2 or Digital Input	0 to +10 VDC or 4-20 mA (Analog In) 0 to +24 VDC (Digital In)
OV	Common for external analog signals	OV Common	
ADIO3	Speed Output 0-10V	Analog Input 3 or Analog Output or Digital Input	0 to +10 VDC or 4-20 mA (Analog In or Out) 0 to +24 VDC (Digital In)
DIO1	Zero speed output	Digital Input/Output 1	0 to +24 VDC
+24V	User supply	+24 VDC output	100 mA maximum load (total of all 24 VDC outputs)
DI2	Run forward	Digital Input 2	0 to +24 VDC
DI3	Run reverse	Digital Input 3	0 to +24 VDC
+24V	User supply	+24 VDC output	100 mA maximum load (total of all 24 VDC outputs)
DI4	Local/Remote select	Digital Input 4	0 to +24 VDC
SDI1		+24 VDC Secure input supply	
SDI2		Secure input/enable	
COM	Fault relay	Relay common	250 VAC, 2A inductive load
RL1C		Closed contact	
RL1O		Open contact	
SDO1	Secure contact open when disabled	Secure contact	250 VAC, 1A inductive load
SDO2			

APPLYING SECURE INPUT TO OBTAIN A SECURE STOP – PX-SECURE

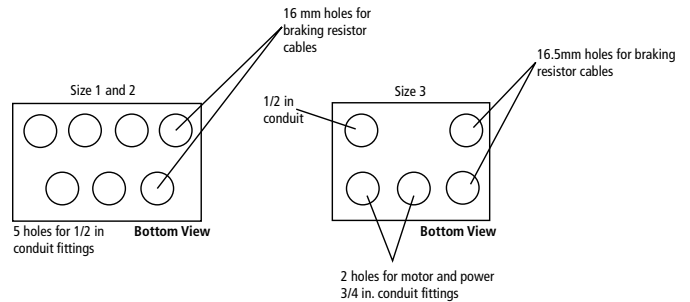
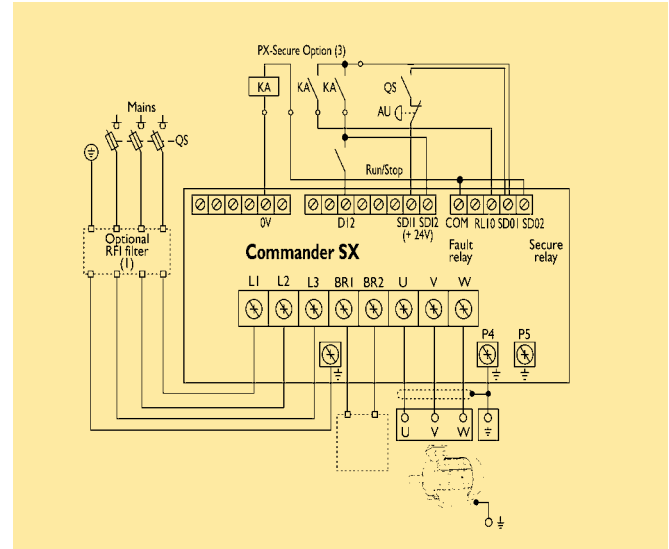
The Secure Input function provides a means of preventing the drive from generating torque in the motor, with a very high level of integrity. It is suitable for incorporation into a safety system for a machine. It is also suitable for use as a conventional drive enable input.

The Secure Input function is fail-safe, so when the input is disconnected the drive will not operate the motor under any circumstances. Secure Input is also independent of the drive firmware. This meets the requirements of EN954-1 category 3 for the prevention of operation of the motor when the PX-Secure option module is used.

Secure Input offers an extra level of safety in addition to electro-mechanical contactors.

CONNECTIONS IN ACCORDANCE WITH SAFETY STANDARD

EN954-1 - Category 2 or 3



XPRESSKEY

See the following page for more information about the XpressKey configuration option.

Slot for I/O Modules

See OPTIONS AT-A-GLANCE chart for more information.

PX-ENCODER

See the SK power accessories section on the following pages for more information.

Commander SX Options

OPTIONS AT-A-GLANCE

Option	Description	Order Code
Drive Configuration and Programming	LCD hand held programmer	PX-LCD
	Commissioning software	SXSOFT
	PC-to drive Comms cable	CT-COMMS-CABLE
	PC-to drive USB cable	CT-USB-CABLE
	Cloning & parameter copying	XPRESSKEY
Power Accessories	Brake resistor	Drive dependant
	EMC filter IP66	FS6376-17-07
	Cable Gland Kit	PX-CABLING-KIT
Input/ Output	Secure enable	PX-SECURE
	Brake Contactor*	PX-BRAKE
	Brake & Secure	PX-BRAKE-SECURE
Motor Feedback	Encoder feedback	PX-ENCODER
Communications	Modbus RTU	Standard
Braking	300 W size 1 and 2	PX-BRK-300-200
	600 W size 1 and 2	PX-BRK-600-200
	300 W size 3	PX-BRK-300-50
	600 W size 3	PX-BRK-600-50

*Note: This option is protected by a fuse marked "F1" on PCB.

XPRESSKEY

The XPressKey option is used to save a copy of all the Commander SX parameters so that they can be duplicated very simply into another drive. The XPressKey allows you to quickly and easily:

- Save parameters
- Clone parameters
- Transfer parameters



COMMUNICATION CABLE

Use our RS232 or USB to RS485 cable to connect a PC to the RJ45 serial port on the front of the drive. The same cable is used with other Control Techniques products that use a RS485 RJ45 connector such as the Unidrive SP and Commander SK.



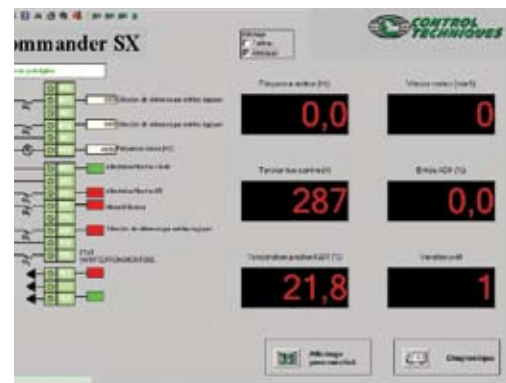
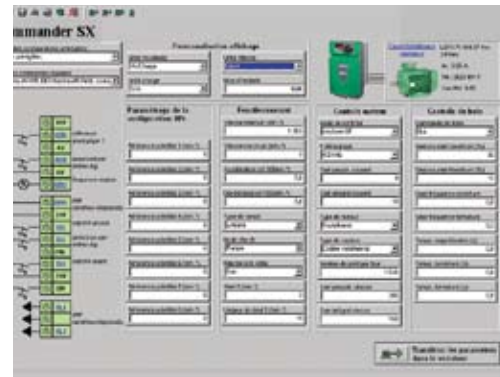
Description	Order Code
Communications Cable - RS232/485	CT-COMMS-CABLE
Communications Cable - USB	CT-USB-CABLE

Drive Configuration & Programming

SXSOFT

SXSoft software is a complimentary Windows-based drive configuration tool designed to enable complete control and display of all parameters within the Commander SX. Functions within SXSoft allow data to be uploaded, viewed and saved, or retrieved from disk, modified and printed. It can be used offline in the office or online in the factory. SXSoft communicates with the Commander SX via the computer's serial port to the drive's RS485 port using a communications cable (CT Comms Cable).

- Interactive parameter setting wizard
- File saving
- Online help
- Comparison of 2 files or one file with the factory setting
- Printing of a complete file or differences compared to the Factory setting
- Diagnostics
- Supervision
- Representation of parameters in table or graph form



SXSoft CAN DOWNLOAD FROM www.emersonct.com

Operator Interface

LOCAL CONTROLS VIA PUSHBUTTON (PB)

Commander SX is supplied standard with a LED display comprising of a 4 x 7 segment digits to indicate drive status and operating data. Programming is done via intuitive operator panel with control buttons. All parameters follow a simple menu structure and programming is done in a simple and easy way.



PX-LCD

This handheld NEMA 12 option makes it much easier to set the Commander SX parameters and access them. Its LCD display, consisting of one line of 12 characters and 2 lines of 16 characters, offers text which can be displayed in 5 languages (English, French, German, Italian and Spanish). The PX-LCD console has 4 main functions:

- A read mode for Commander SX supervision and diagnostics
- From the time it is plugged in, the PX-LCD display is in read mode. By pressing the keys, the user can scroll through all the parameters required for supervision and diagnostics, such as:
 - motor current
 - motor frequency
 - motor voltage
 - analog I/O levels
 - logic I/O states
 - logic function states
 - timer
- An interactive parameter-setting wizard which makes it very simple to configure the Commander SX. The parameters are set in successive steps. The parameters offered at each step by the PX-LCD handheld console depend on parameters set in the previous steps. The user will therefore only be offered those parameters required by the application
- Access to all the Commander SX advanced parameters in order to optimize settings or configure special applications. All the parameters, organized by menus, can be accessed via the PX-LCD console including last faults.



Motor Feedback

PX-ENCODER



The PX-Encoder module provides an encoder feedback option for closed loop vector control. The module supports differential quadrature type encoders with terminals for A,A\,B,B\ up to 140 kHz operation. The module also provides encoder power, up to 300 mA at 5V or 200 mA at 15V.

Power Accessories

EMC FILTER

Commander SX sizes 1 and 2 drives conform to the drive standard EN 61800-3 since they have an RFI filter integrated internally, as standard.



For conformity of size 3 Commander SX drives and in certain conditions for sizes 1 and 2, an external RFI filter must be added (part number FS6376-17-07).

The customer connects the filter to the main supply, without any special tools, using an IP 66 dust and damp proof insulation displacement connector. For Commander SX sizes 1 and 2, the filter should be mounted on the left as close as possible to the drive. For size 3, the filter should be mounted on the heatsink.

PX-BRAKE RESISTOR

The braking resistors are supplied on a metal plate ready to be fixed using 4 screws at the back of the drive. To ensure that the heat losses from the resistors are dissipated correctly, the drive must be fixed with spacers (supplied with the resistors).



PX-BRAKE

The optional PX-Brake solid-state contactor allows the direct control of an electro-mechanical brake from a single phase AC supply. This option is connected to a dedicated digital output, controlled by the brake command.