

Commander SX

NEMA 4X Dependability

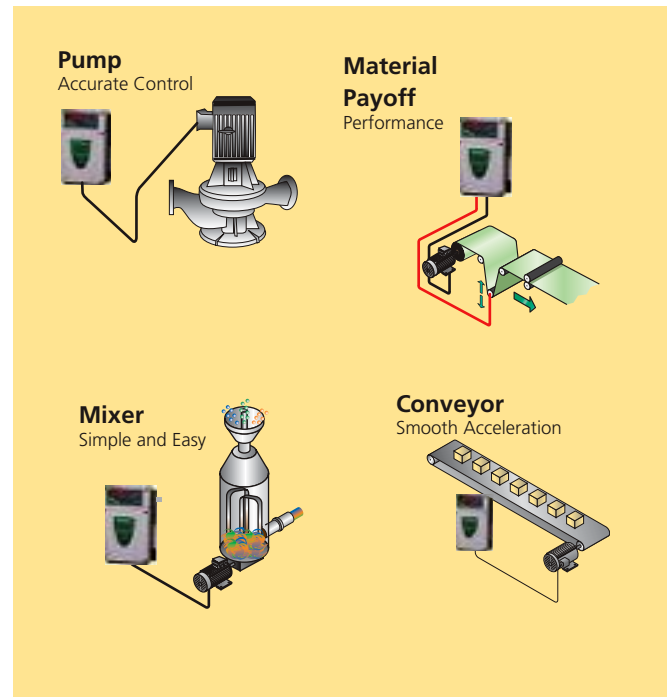
Dirt, dust, water, pollution. All environments that can mean additional cost whenever a variable speed drive is needed. From wash-down food and drink applications to dust and other airborne particles found in a textile plant, Control Techniques has designed the perfect match for such rugged applications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

The Commander SX from 0.5 hp to 10 hp (.37 to 7.5 kW) is a NEMA 4X (IP66) protected drive that enables users to mount the drive at 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 (.37 to 3.7kW), 3Ø 230VAC
- 0.1 to 10 hp (.25 to 7.5kW), 3Ø 460VAC
- 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 units up to 5 hp, with external IP66 filters above 5 hp
- 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

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 accel/decel profiling

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 accel/decel 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.

Order String

SX	1	3	4	0	0	0	7	5	PB
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↑ Frame size ↑ Voltage code ↑ 3-phase power supply ↑ Rating ↑ Display Version

Commander SX: IP66/NEMA 4X flux vector variable speed drive for induction motors



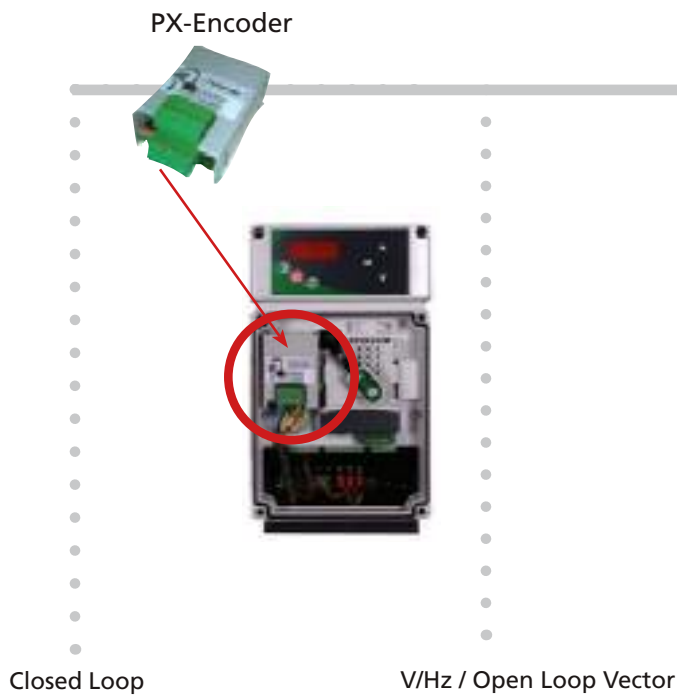
Commander SX Overview

Wash down drive...

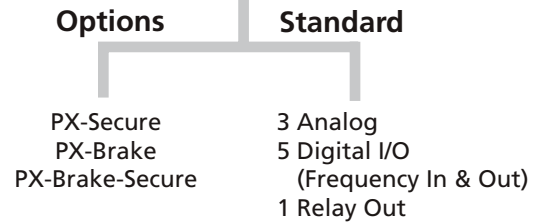
OPERATOR INTERFACE



CONTROL MODE



INPUT/OUTPUT



FILTERS



DYNAMIC BRAKING



PX Brake Resistor

COMMUNICATIONS

Standard

Options



Modbus RTU



DeviceNet



Modbus TCP/IP



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 3mA 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, 0-20mA, 4-20mA.

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

Switching frequency 3kHz to 11kHz with 4.5kHz 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

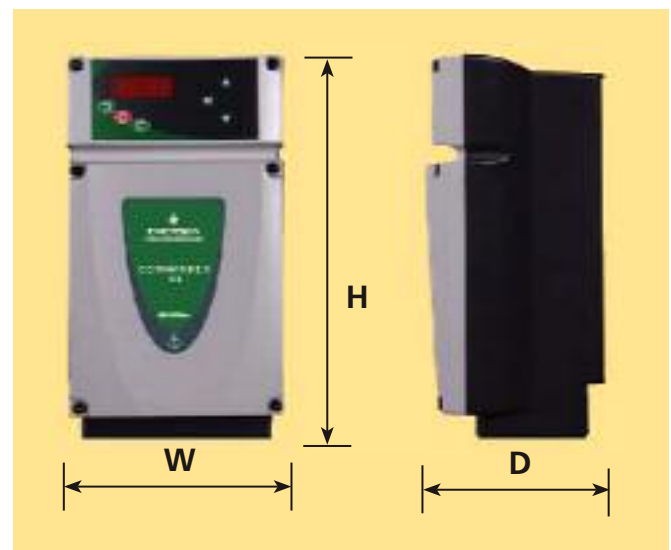
UL, cUL	UL File Listed 8D14
IEC	Meets IEC Vibration, Mechanical Shock and Electromagnetic Immunity Standards
CE	Low Voltage Directive
UL	UL type 1 with kit
ISO 9001:2000	Certified Manufacturing Facility
ISO 14001	Certified Manufacturing Facility



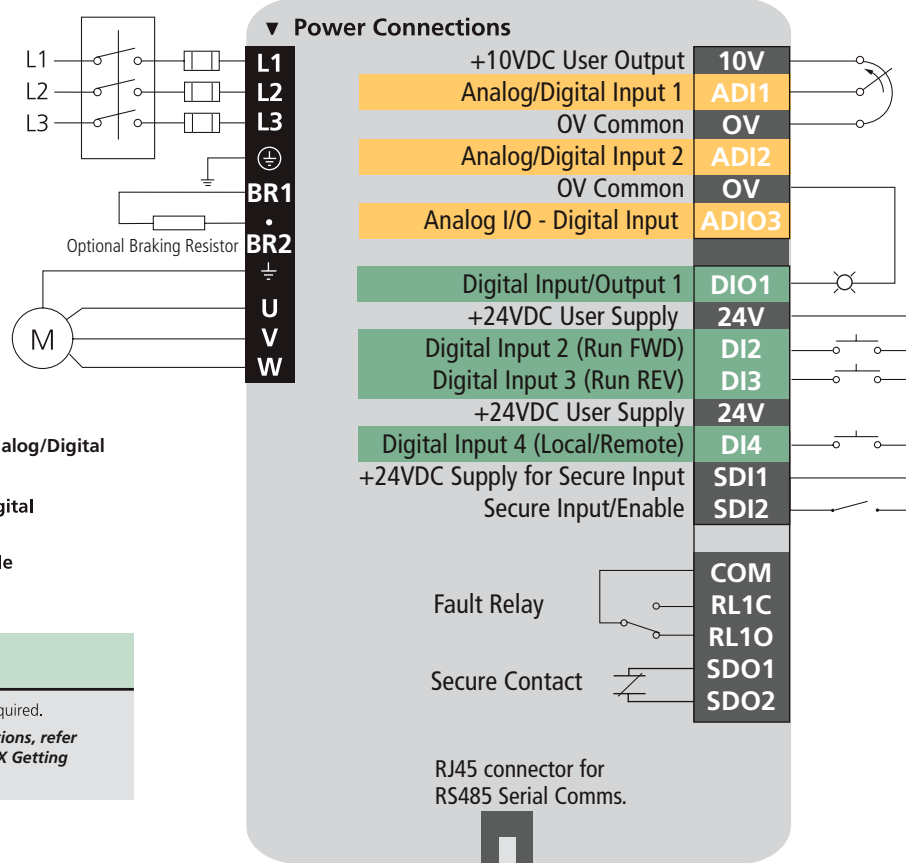


COMMANDER SX DIMENSIONS

Frame Size	H in (mm)	W in (mm)	D in (mm)
1	12.99 (330)	(7.08) (180)	7.44 (189)
2	12.99 (330)	(7.08) (180)	8.78 (223)
3	12.99 (330)	11.06 (281)	9.17 (233)



COMMANDER SX TERMINAL DIAGRAM



NOTE

* Thermal protection required.
 For complete instructions, refer to the Commander SX Getting Started Guide.

TERMINAL DESCRIPTION

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

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

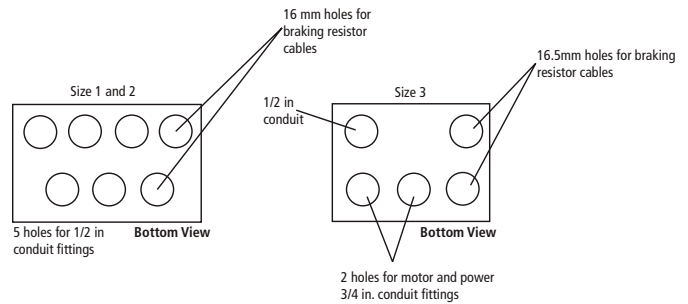
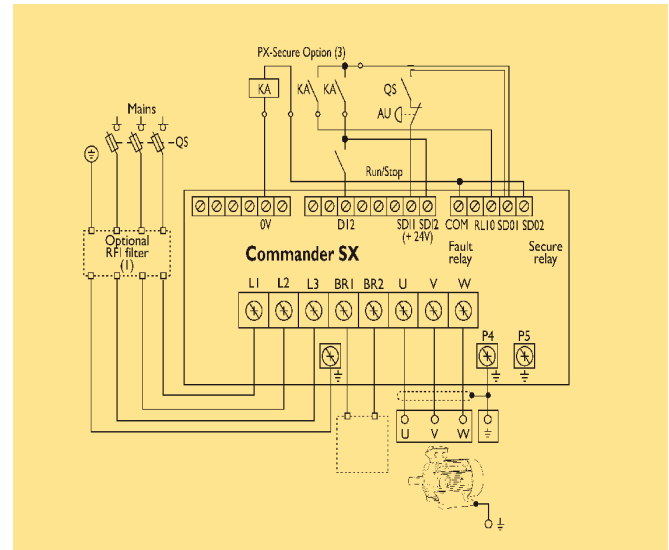
The Secure Input function provides a means for preventing the drive from generating torque in the motor, with a very high level of integrity. It is suitable for incorporation into a safety system for a machine. It is also suitable for use as a conventional drive enable input.

The Secure Input function is fail-safe, so when the input is disconnected the drive will not operate the motor, even if a combination of components within the drive has failed. Most component failures are revealed by the drive failing to operate. 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 can be used to eliminate the need for electro-mechanical contactors, including special safety contactors, which would otherwise be required for safety applications.

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.

SM-Devicenet

See communication section 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 and parameter copying	XPRESSKEY
Power Accessories	Brake resistor	Drive dependant
	EMC filter IP66	FS6376-16-07
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
	PROFIBUS-DP	SM-PROFIBUS-DP
	DeviceNet	SM-DeviceNet
	CANopen	SM-CANopen
	INTERBUS	SM-INTERBUS
	Ethernet	SM-Ethernet
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.

To Save parameters using the XPressKey:

- Connect the XPressKey to the Commander SX serial port
- With the drive disabled "Inh", set Pr 64 to "Prog"
- Confirm the transfer of parameters into XPressKey by pressing the drive "Stop" key

To set the drive parameters with the XPressKey:

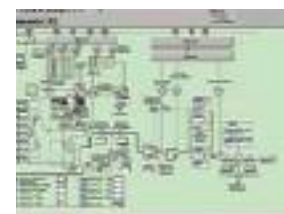
- Connect the XPressKey to the serial port
- With the drive disabled "Inh", press the "Key" button once
- Confirm the transfer of parameters into the drive by pressing the "Key" button a second time
- When the display reverts back to "Inh", the transfer is complete and the XPressKey can be disconnected and replaced in its storage slot

Drive Configuration & Programming

SX SOFT

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 off-line in the office or on-line 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
- Leroy-Somer motor database
- 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
- Supervision
- Diagnostics
- Representation of parameters in table or graph form



FREE Software SXSoft CAN DOWNLOAD FROM www.emersonct.com

COMMUNICATION CABLE

Using our special RS232 to RS485 converter you can connect a PC to the RJ45 serial port on the front of the drive. A special pre-made cable is available from Control Techniques for this purpose - the same cable is used with other Control Techniques products that use a RJ45 RS485 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

Operator Interface

LOCAL CONTROLS VIA PUSHBUTTON (PB)

Commander SX is supplied standard with a LED display comprising 4 x 7 segment digits to indicate drive status and operating data. Programming is done via intuitive operator panel with 3 control buttons and three parameter setting buttons. All parameters are in a simple menu structure and programming is done in a simple and easy way just like Commander SK.



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– 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 300mA at 5V or 200mA 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 FS 6376-16-07).

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

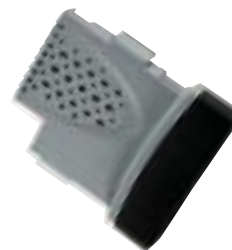
The optional PX-Brake solid-state contactor allows the direct control of an electro-mechanical brake from a single phase AC supply. This option is connected to a dedicated digital output, controlled from the brake command (parameter Pr36 to Pr43).

Communication Modules*

SM NETWORK COMMUNICATION MODULES



Modbus TCP/IP



* For more details and order codes see the AC Drive Options section at the end of the AC Drives section. For complete product descriptions please refer to the Options and Accessories section.