Commander SE

Simple and Easy

Overview

Control Techniques' newest microdrive is an AC open loop vector powerhouse, combining unmatched flexibility with a small footprint. Best of all, the Commander SE is simple to use and easy to install.

The Commander SE's first 10 parameters meet the needs of 80% of drive applications, making setup fast and effortless. Installation requires only a standard screwdriver, while the removable control terminal strip makes changeover quick and error free.

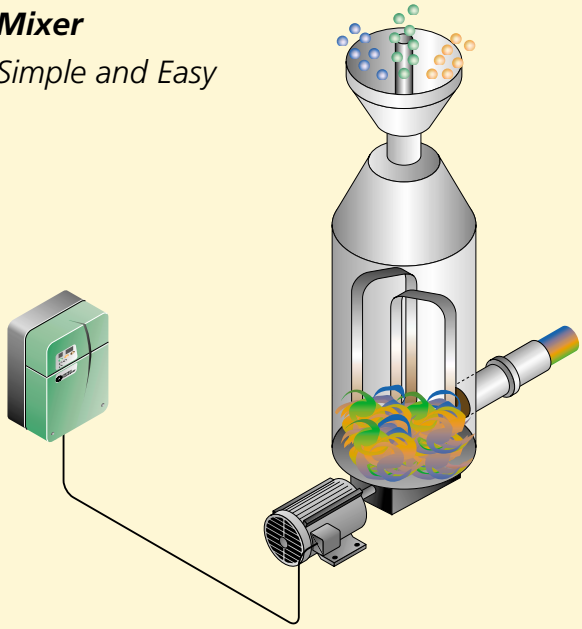
The rugged and robust design has been field tested in harsh environments and proven itself a dependable drive for a wide range of applications. The Commander SE, with its Intelligent Thermal Management (ITM) technology, was designed with reliability in mind. Rated at 50°C ambient temperature, the Commander SE withstands the most severe operating conditions.

- **Digital AC Drive**
- **1/3 to 3 HP, 1 phase, 230 VAC**
- **1 to 10 HP, 3 phase, 230 VAC**
- **1 to 20 HP, 3 phase, 460 VAC**
- **NEMA 1 (IP21) enclosure**
- **RS485 serial communications with Modbus RTU protocol**
- **Plug-in communications via Profibus-DP, DeviceNet, and Interbus-S**
- **SESoft Windows based configuration tool** FREE Software
- **QuicKey cloning module**
- **Ideal for pumps, conveyors, mixers, fans, ovens and more**
- **Advanced menus for ultimate control and flexibility**
- **Complete Motor Solutions** CMS

ISO 9002 APPROVAL · CE · N1652 · c UL us LISTED · 2 YEAR Digital Drive Warranty

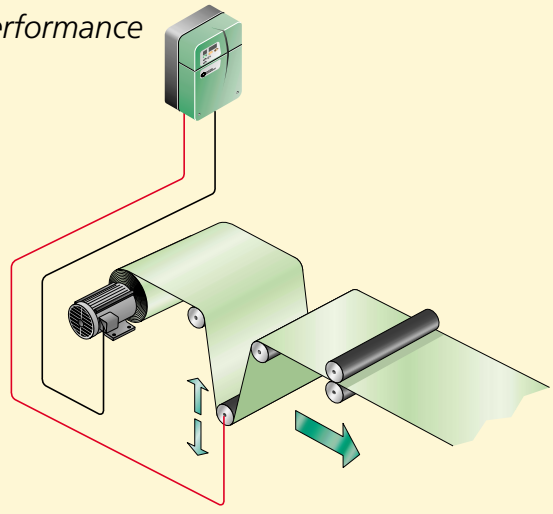
—Mixer

—Simple and Easy



—Material Payoff

—Performance



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)

QuicKey cloning module
Provides fast and cost-effective drive-to-drive parameter transfer and storage with no PC required

Terminal connection drawings and Level 1 parameters (10) listed on the drive's front cover
On-the-spot easy reference for drive set-up and maintenance

Static auto-tune
Allows fast motor / drive optimization without motor shaft rotation

Two sets of motor map parameters saved in the drive's memory
Allows sequenced switching between two motors with different operating characteristics

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

Built-in MOP (motorized potentiometer)
Emulates the functionality of the traditional MOP 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 (except size 1)
Added flexibility meets many application requirements

Full EMC compliance with optional filter
Meets global standards for worldwide use

Ratings: Commander SE

SINGLE OR THREE PHASE INPUT
.33 to 10 HP (208 / 230 VAC)
1 to 20 HP (380 / 480 VAC)

208 / 230 VAC

Motor HP①	Input Phase	Contin. Output Current (A)	Overload Current② (A)	Size	Catalog Number
0.33	1	1.5	2.25	1	SE11200025
0.50	1	2.3	3.45	1	SE11200037
0.75	1	3.1	4.65	1	SE11200055
1	1	4.3	6.45	1	SE11200075
1	1 or 3	4.3	6.45	2	SE2D200075
2	1 or 3	7.5	11.3	2	SE2D200150
3	1 or 3	10.6	15.9	2	SE2D200220
5	3	17	25.6	2	SE23200400
7.5	3	25	37.5	3	SE33200550
10	3	28.5	42.8	3	SE33200750

380 / 480 VAC

Motor HP①	Input Phase	Contin. Output Current (A)	Overload Current② (A)	Size	Catalog Number
1	3	2.1	3.15	2	SE23400075
2	3	4.2	6.3	2	SE23400150
3	3	5.8	8.7	2	SE23400220
5	3	9.5	14.3	2	SE23400400
7.5	3	13	19.5	3	SE33400550
10	3	16.5	24.8	3	SE33400750
15	3	24.5	36.8	4	SE43401100
20	3	30.5	45.8	4	SE43401500

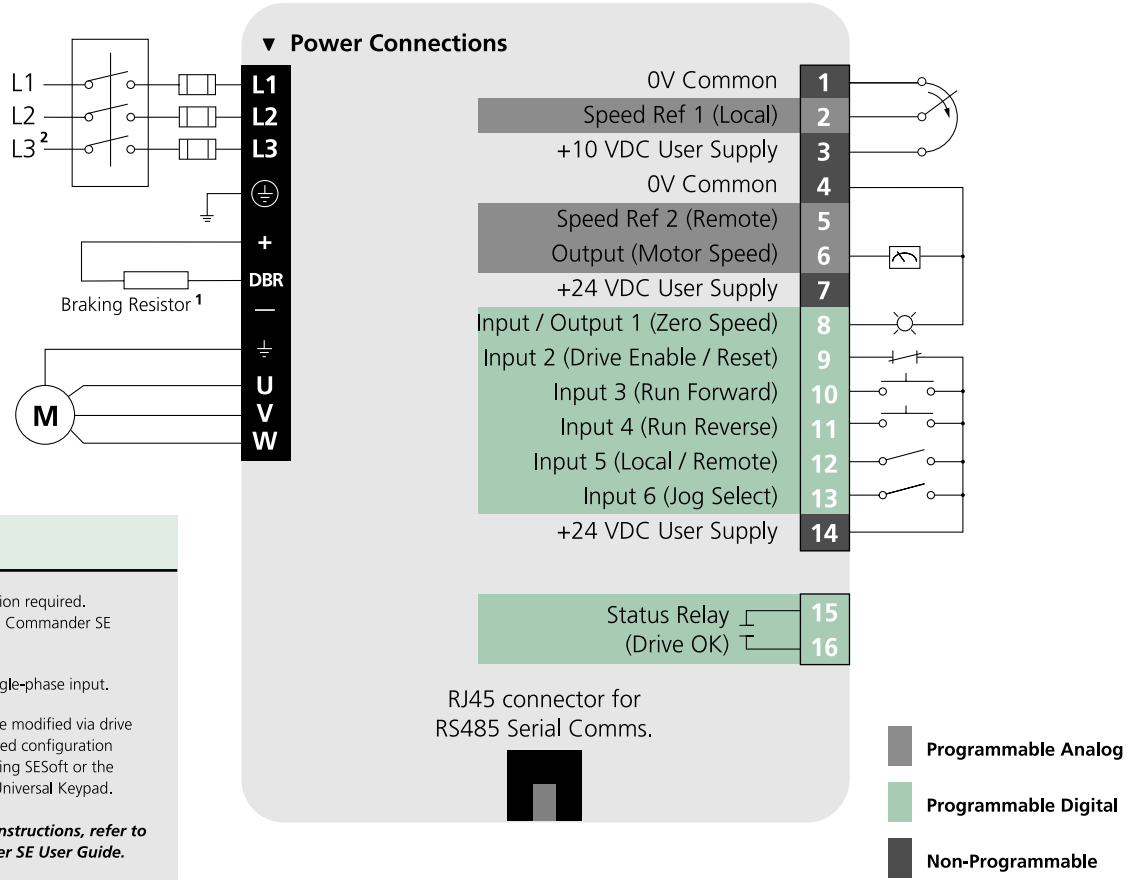
① Motor HP is based on four pole, 230 / 460 VAC NEMA ratings.
② Overload: 150% for one minute.

Order String

SE X X X X X X X X

- SE: Commander SE Product Family
- X: Size: 1, 2, 3, 4
- X: Input Phase: 1 = 1, D = 1 & 3, 3 = 3
- X: Drive Voltage Rating: 2 = 208 / 230 VAC, 4 = 380 / 480 VAC
- X: Place Holder (0)
- X X X X: Drive Kilowatt Rating

Terminal Diagram: Commander SE



NOTE

1 Thermal protection required. Not available on Commander SE Size 1.

2 Not used for single-phase input.

3 Some I/O may be modified via drive Keypad. Enhanced configuration may be done using SESoft or the optional CTKP Universal Keypad.

For complete instructions, refer to the Commander SE User Guide.

Terminal Description

Pin#	Function ①	Type/Description	Notes
1	0V Common	Common for External Analog Signals	
2	Analog Input 1 (Local Frequency / Speed Reference), 10 bit	Single-ended Analog Input	0 to +10 VDC, 100k Ohms, Sample Time 6ms
3	+10 VDC User Supply	Reference Supply	5 mA max Short Circuit Protected
4	0V Common	Common for External Digital Signals	
5	Analog Input 2 (Remote Frequency / Speed Reference), 10 bit	Single-ended Analog Input	4-20 mA② input, 200 Ohms, Sample Time 6ms
6	Analog Output 1 (Frequency / Speed), 10 bit	Single-ended Analog Output, Unipolar	0 to +10 VDC @ 5 mA max Update Time 22ms
7	+24 VDC User Supply	User Supply	100 mA max Short Circuit Protected
8	Digital I/O 1 (Zero Speed Output)	Digital Input / Output	0 to 24 VDC, 7.5k Ohms input or 0 to 24 VDC, 50 mA max output Update Time 1.5ms
9	Digital Input (Enable)	Digital Input	0 to 24 VDC, 7.5k Ohms Update Time 1.5ms
10	Digital Input (Run Forward)	Digital Input	0 to 24 VDC, 7.5k Ohms Update Time 1.5ms
11	Digital Input (Run Reverse)	Digital Input	0 to 24 VDC, 7.5k Ohms Update Time 1.5ms
12	Digital Input (Local/Remote Select)	Digital Input	0 to 24 VDC, 7.5k Ohms Update Time 1.5ms
13	Digital Input (Jog Select)	Digital Input	0 to 24 VDC, 7.5k Ohms Update Time 1.5ms
14	+24 VDC User Supply	User Supply	100 mA max Short Circuit Protected
15	Status Relay (Drive Healthy)	Normally Open	240 VAC, 6A resistive
16	Status Relay (Drive Healthy)	Normally Open	240 VAC, 6A resistive

Programmable Analog Programmable Digital All Analog I/O is scaleable

① Values in parenthesis designate default functions.
② 0-20, 20-0, and 20-4 mA are also available. See Commander SE Manual.

Specifications: Commander SE

Environment

Ambient Operating Temperature	0 to 40°C (32 to 104°F) @ 6kHz switching 0 to 50°C (32 to 122°F) @ 3kHz switching
Cooling method	Convection and forced convection, model dependant
Humidity	95% maximum non-condensing at 40°C (104°F)
Storage Temperature	-40 to 60°C (-40 to 140°F)
Altitude	0 to 4000m (13,000 ft). Derate 1% per 100m (328 ft) between 1000m (3280 ft) and 4000m (13,000 ft).
Vibration	Tested in accordance with IEC 68-2-34 and IEC 68-2-36
Mechanical Shock	Tested in accordance with IEC 68-2-29
Enclosure	NEMA 1 (IP 21)
Electromagnetic Immunity	In compliance with EN61800-3 and EN50082-2
Electromagnetic Emissions	In compliance with EN61800-3 second environment, without RFI filter. EN50081-1*, EN500821-2 and EN50081-3 first environment with optional RFI filter. **Size 1 only.*

AC Supply Requirements

Voltage	200V model: 200 to 240 VAC ±10% 400V model: 380 to 480 VAC ±10%
Phase	1Ø and 3Ø
Maximum Supply Imbalance	2% negative phase sequence (3% voltage imbalance between phases)
Frequency	48 to 62 Hz
Input Displacement Power Factor	0.97

Control

Carrier Frequency	3, 6 (default), and 12 kHz
Output Frequency	Up to 1000 Hz
Frequency Accuracy	±0.01% of full scale
Frequency Resolution	0.1 Hz
Analog Input Resolution	10 Bit + sign (Qty 2)
Serial Communications	ANSI 2-wire EIA485 via RJ45 connector. Baud rate is 4800, 9600 or 19,200
Braking	DC injection braking standard. Dynamic braking transistor standard (not available on Size 1).

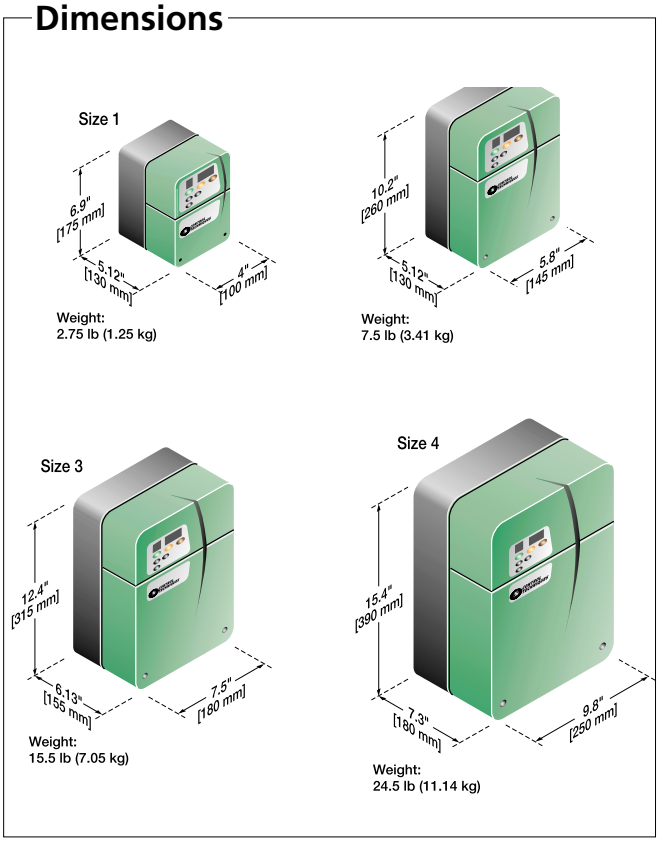
Protection

DC Bus Undervoltage Trip	200V model: 180 VDC (approximately 127 VAC line voltage) 400V model: 400 VDC (approximately 282 VAC line voltage)
DC Bus Overvoltage Trip	200V model: 420 VDC (approximately 299 VAC line voltage) 400V model: 830 VDC (approximately 587 VAC line voltage)
MOV Voltage Transient Protection	160 Joules, 1400 VDC clamping (Line to line and line to ground)
Drive Overload Trip	Current overload value is exceeded. Programmable to allow up to 150% of drive current for one minute.
Instantaneous Overcurrent Trip	215% of drive rated current
Phase Loss Trip	DC bus ripple threshold exceeded
Overtemperature Trip	Drive heatsink temperature exceeds 95°C (203°F)
Short Circuit Trip	Protects against output phase to phase fault
Ground Fault Trip	Protects against output phase to ground fault
Motor Thermal Trip	Electronically protects the motor from overheating due to loading conditions

Approvals & Listings

UL, cUL	UL File #E171230
IEC	Meets IEC Vibration, Mechanical Shock and Electromagnetic Immunity Standards
CE	Designed for marking
NEMA	NEMA 1 enclosure type
ISO 9002	Certified Manufacturing Facility

Dimensions



Commander SE

Options / Software / Accessories

Overview

This simple and easy drive also provides flexibility with easy to install options. Drive set-up is quick and convenient using our remote keypad or SESoft, our Windows based configuration tool. The SE QuicKey allows parameter cloning for fast parameter storage and transfer, making it easy to add or replace drives within your system. The Commander SE easily connects into your network with a wide range of fieldbus protocols and operator interface options.

At-A-Glance

Option	Description	Catalog Number
Input / Output	Bi-polar Analog Input Card	SE51
Memory	QuicKey Cloning Tool	SE55
Communication	RS485 / Modbus RTU Profibus-DP Interbus-S DeviceNet	Standard SE73 SE74 SE77DN
PC to Drive Accessories	Configuration Tool RS232/485 Cable Communications Kit	SESoft SE71 SEComKit SEComKit-Iso
Operator Interface	Remote Keypad CT Operator Interface	CTKP CTIU
Accessories	Cable Shield Clamps	SE11 to SE14
Extended Warranty	5-year Warranty	SE1WE to SE4WE

Commander SE

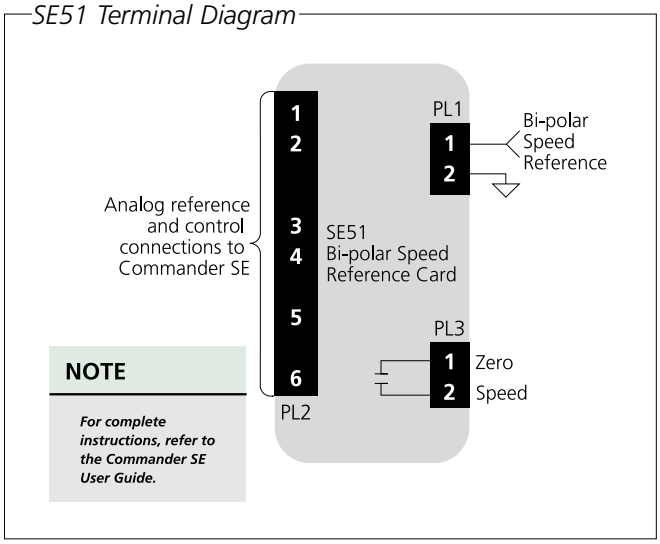
Input / Output Modules

Bi-polar Analog Input Card (SE51)

The bi-polar speed reference input card (SE51) allows the direction of a motor to be controlled via a speed potentiometer or external bi-polar speed reference rather than the forward/reverse terminal selector.

The +10V potentiometer reference can be supplied from the drive (term. #3) or from an external power supply. The –10V potentiometer reference must be supplied from an external supply. The SE51 also has a relay that is controlled by the digital output (default "zero speed") of the drive.

SE51 Terminal Diagram



SE51 Terminal Description

Signal Connector	Pin #	Function
PL1	1	Bi-polar Analog Input (±10 VDC, 22k Ohms)
	2	0V Common
PL2 (Interface connections to Commander SE)	1	0V Common
	2	0 to +10 VDC Analog Output
	3	+24 VDC Supply for option card
	4	Digital Input (+24 VDC) to control relay
	5	Run Forward Output (+24 VDC)*
	6	Run Reverse or Run Forward / Reverse Output (+24 VDC)*
PL3	1	Relay Contact Common (48 VAC / DC, 2A resistive)
	2	Relay Contact (Normally Open)

* Directional control of Commander SE

Memory

QuicKey / Cloning Module (SE55)

The QuicKey is a small, encapsulated memory module that stores the entire set of the drive's parameter values. It plugs onto the SE drive near the control terminals. The Commander SE may be programmed to download / upload a set of parameters to / from the QuicKey or to operate with or without the module installed. Once the information is stored in the QuicKey, it may be removed from the drive for future use such as cloning other drives or programming a replacement drive.

Communications

Communication Cards (SE73, SE74, SE77DN)

Each fieldbus interface for the Commander SE is a single option card that fits within the drive. Parameter data is transferred to and from the Commander SE using a 2-wire RS485 link into the RJ45 serial communications port on the drive.

Although power is taken from the Commander SE under normal operating conditions, an optional back-up power supply can also be connected to the interface card. This ensures that the interface is continually powered and able to communicate with the network during power outages and after the drive is powered down.

Communication Protocol*	Interface Card Catalog Number
RS485 / Modbus RTU	Standard
Profibus-DP	SE73
Interbus-S	SE74
DeviceNet	SE77DN

* Maximum communication rate through RJ45 port is 19.2 kbaud. Commander SE operates as slave node only.

Certified! No. 197

Commander SE

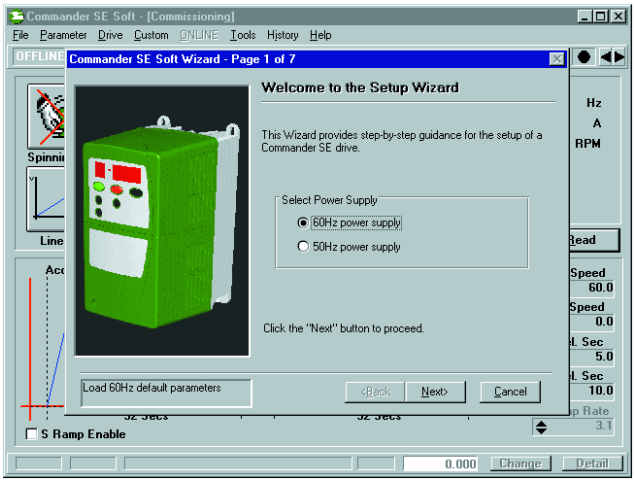
PC to Drive Accessories

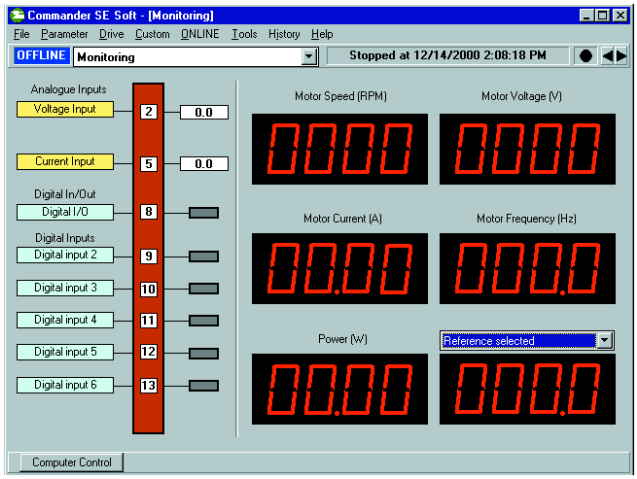
Drive Configuration Tool (SESoft)

SESoft is a complimentary Windows based drive configuration tool designed to enable the complete control and display of all parameters within a Commander SE. A set-up wizard guides the user in entering motor and application data. Motor data may be supplied from the motor nameplate, or the user may select a motor from the database supplied in the wizard. A monitoring screen displays real-time drive values such as current, voltage and DC bus level. SESoft communicates via the computer's serial port and the Commander SE's RJ45 port using the SE71 communication cable.

For more information, refer to the Accessories Section on page 134.

FREE Software





Communication Kits (SEComKit & SEComKit-Iso)

The communication kit contains both SESoft and an SE71 communication cable to enable a customer to communicate with the Commander SE via SESoft. The SEComKit-Iso also includes an optical isolator that provides additional protection for the user's PC.

SEComKit

SEComKit-Iso

Communication Cable (SE71)

The SE71 serial communications cable is a self-contained six-foot cable with an RS232 to 2-wire RS485 in-line converter. It enables SESoft to communicate via the computer's serial port to the 2-wire RS485 RJ45 port on the Commander SE. The serial port on the Commander SE is double insulated, but an optical isolator (RS232ISOLATOR) is recommended when using a personal computer.

Commander SE

Operator Interfaces

Remote Keypad (CTKP)

The CTKP Universal Keypad is an ideal maintenance tool for use with CT's digital drives (SE, GP, VTC, Unidrive, Mentor II, Quantum III) and option modules (UD7X, MD series). Five navigation keys and plain text parameter descriptions make the CTKP easy to use for viewing and modifying drive data. The keypad is designed for hand–held or panel mounting. The NEMA 4/12 rating, screw-down terminals and stress relief for cable connections assure a rugged and robust design.

A twelve-foot RS485 cable with an RJ45 connector on the Commander SE end and dressed wires on the CTKP end is available (order Catalog Number CTKP-SE-485-XXX). (XXX=ft.)

For more information, refer to the Accessories Section on page 151.

Operator Interface Unit (CTIU)

The CTIU operator interface units incorporate a back-lit LCD display and easy-to-use navigation keys. Using the "WYSIWIG" page editor, they can be programmed to display a variety of menus, submenus, alarms, fault conditions and other critical information. The CTIUs support a range of capabilities including multiple font sizes, real time trends and graphs, scheduling and background programs. They communicate via 2 or 4-wire RS485 and, to simplify installation, CTIUs are rated NEMA 4/12 and require no screw mounting holes.

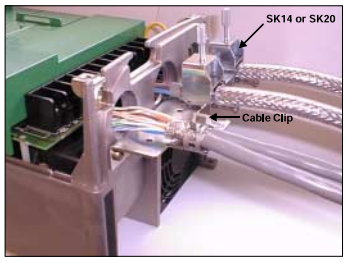
A twelve-foot RS485 cable with an RJ45 connector on the Commander SE end and dressed wires on the CTIU end is available (order Catalog Number CTIU-CTD-485-XXX). (XXX=ft.)

CTIU–50, CTIU–100, CTIU–110, CTIU-200

For more information, refer to the Accessories Section on pages 148-149.

Accessories

Cable Shield Clamps



The cable shield clamps are used with the Commander SE to stabilize wire / cable connections when mounting a drive inside an enclosure. The clamp attaches to the bottom of the Commander SE drive.

Clamp Catalog Number	Commander SE Size
SE11	1
SE12	2
SE13	3
SE14	4

Warranty

Extended Warranty

An industry-leading two-year warranty is standard for Commander SE drives. An extended warranty is available that increases the warranty period to five years.

Commander SE Size	Catalog Number
1	SE1WE
2	SE2WE
3	SE3WE
4	SE4WE