



EMERSON
Industrial Automation



Unidrive SP

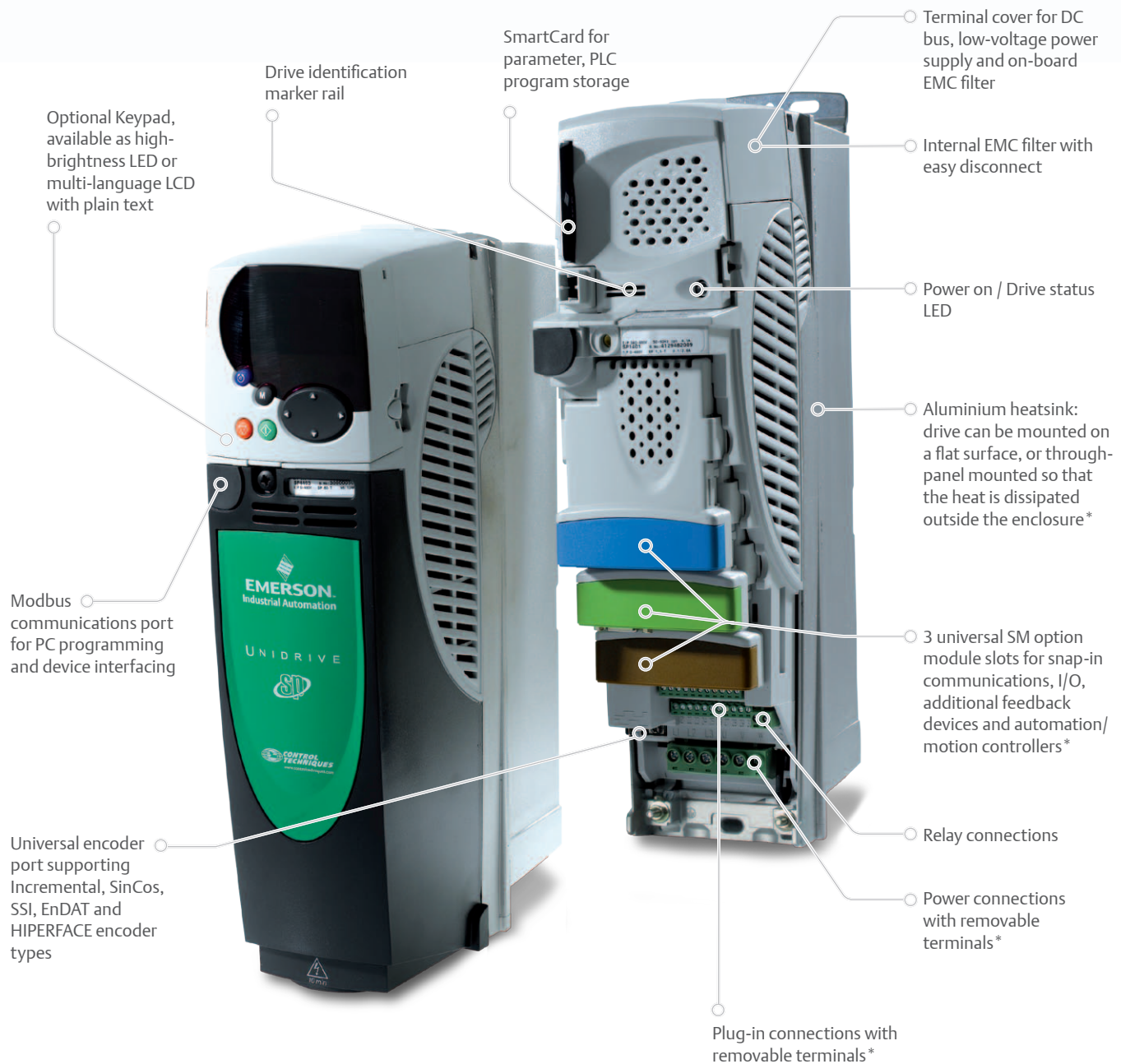
Panel Mount
Universal AC and Servo Drive

0.5 - 200hp (0.37 - 132kW)
208 - 240V / 380 - 480V / 575V / 690V



Unidrive SP, the Ultimate High Performance AC Drive

Performance and flexibility allow you to do something new — create opportunities to innovate, find better ways to control your application, increase speeds, improve processes and reduce the footprint of your system. Unidrive SP, Control Techniques' high-performance drive family, allows you to achieve this. Unidrive SP is the ultimate universal AC drive.



* Features and their locations vary on some drive sizes



One Drive, Any Power, Any Motor

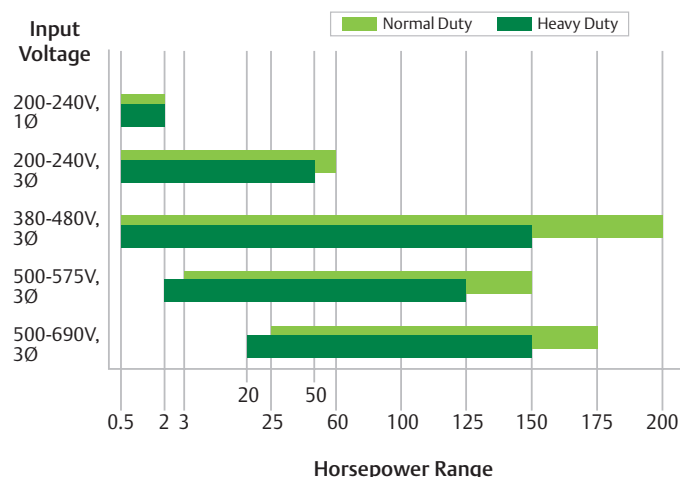
The Unidrive SP is a universal AC and Servo drive with ratings from 0.5 to 2,900hp. This versatile drive can be used to control virtually any motor with any type of feedback device and with any control scheme. These drives are packaged in three form factors: Panel Mount, Free Standing and Solution Platform Modular (SPM).

Panel Mount – Standard Drives

0.5 - 200hp (0.37kW - 132kW)

Unidrive SP Panel Mount drives are standard AC input, AC output sizes for installation within a control panel. Optional conduit boxes are available for wall mounting.

Ratings



Performance Advantage

Dual Duty Ratings — Normal and Heavy

One drive provides cost-effective sizing choices for all applications.

Universal Motor Control

Open- and closed-loop induction motor control, closed-loop servo motor control and power regeneration control in one drive.

24Vdc Auxiliary Power Supply Input

Maintains control, network communications and position loop on input AC power loss, minimizing system recovery time.

Comprehensive Auto-tune

Inertia monitoring and static auto-tune reduce startup time.

Universal Feedback Interface

Interface supports 14 different types of feedback devices, including several absolute encoders. Multiple encoders can be connected to a single drive with SM option modules.

High-resolution Analog Input

Input has 16-bit, 250 µsec interface for high-performance applications. Two additional 10-bit analog inputs for lower level controls.

Extensive Fieldbus Connectivity

ModbusRTU (Standard), Profibus-DP (V1), Ethernet, DeviceNet, CAN, CANOpen, EtherCAT, SERCOS, Interbus-S and CTNet/CTSync are optional via zero-space SM option modules. Up to four fieldbus devices can connect to a single drive, eliminating the need for expensive gateways.

Universal Option Slots

Unidrive SP size 0 has two slots. Unidrive SP sizes 1 and up have 3 snap-in option module slots. Fieldbus, I/O and Application modules fit in any of the open SM option modular slots.

Safe Torque Off Function

Function conforms to IEC61800-5-2, SIL 3 and EN81-1 for machine safety with system cost reduction.

SmartCard for Simple Setup and Cloning

Easy-to-use card stores drive configuration for simple startup and parameter cloning. Supplied FREE with every Unidrive SP.

Keypad Options

Choose no keypad, LED keypad or LCD keypad based on the system design and operating environment.

Drive-mounted Brake Resistors

Unidrive SP sizes 0, 1 and 2 feature a drive-mounted brake resistor option to reduce panel space requirements.

Any Motor, Any Encoder

Unidrive SP provides high-performance motor control for induction motors, asynchronous servo and synchronous servo motors. The control mode is simply selected using the drive keypad.

- **Servo** — Precision, dynamic control supporting a wide range of rotary and linear motors
- **Closed-loop vector** — Ultimate precision control of induction motors offering full motor torque at zero speed
- **Rotor Flux Control (RFC) mode** — Superior dynamic performance and stability without a feedback device
- **Open-loop vector** — Good open-loop motor performance with minimum configuration
- **Open-loop V/Hz control** — A simple control algorithm that is ideal for parallel motors
- **Regenerative** — Active Front End control mode for harmonic reduction and regeneration

Unidrive SP includes the hardware required to connect to virtually any feedback encoder type, allowing the designer to select the most appropriate technology for the application:

- **Incremental** — Offers a good balance of cost and performance
- **SinCos** — Provides increased position resolution for precision and low-speed applications
- **SSI** — Provides absolute position feedback
- **EnDat and HIPERFACE** — These encoders transfer position data using a high-speed communications network, often combined with SinCos technology

Add the Extra Features You Need

Snap-in SM option modules allow you to customize the drive to suit your needs. Over 25 different options are available including Fieldbus, Ethernet, I/O, extra feedback devices and automation controllers.

Intelligently Driven

Unidrive SP allows the drive system designer to embed automation and motion control within the drive. This eliminates communication delays that reduce performance while CTNet, a high-performance drive-to-drive network, links the different parts of the system.

Reliability and Innovation

Unidrive SP is designed using a proven development process that prioritizes innovation and reliability. This process has resulted in Control Techniques having a market leading reputation for both product performance and quality.

Global Support

Control Techniques' global network of over 50 Drive Centers located in more than 30 countries, backed by over 30 carefully selected and fully trained international distributors, ensure that service, support and expertise are just around the corner, all around the world. Our engineers are passionate about drives and are able to offer the level of service that you need, from advice on an application problem to providing a complete drive solution design.

Free Standing — Ready-to-Run Large Drives 125 - 2,450hp (90kW - 1.6MW)

Unidrive SP Free Standing drives are supplied in standard NEMA1 enclosures for floor mounting. The Free Standing can be ordered with input power options to facilitate immediate connection to the power supply and motor.

For more information please refer to the Unidrive SP Free Standing brochure.

(BRO-USPFS-1107)



SP Modular — Power Rectifier and Inverter Modules 60 - 2,900hp (45kW - 1.9MW)

Unidrive SP Modular offers maximum power system design flexibility. Drive modules can be connected together in a variety of ways to create common DC bus systems, active input systems for returning excess energy to the power supply and paralleling of drives for high power motors. All drive modules are compact high power density products for easy installation with minimal space requirements.

For more information please refer to the Unidrive SPM brochure.

(BRO-USPSPM-1107)



Unidrive SP Electrical and Mechanical Integration

Unidrive SP enables system designers to reduce costs. Standard features such as integrated EMC filters, through panel mounting and back-up power supply inputs reduce enclosure size and eliminate external components.

Safety as Standard

Unidrive SP's Safe Torque Off (STO) is a functional safety feature which complies with EN/IEC 61800-5-2 SIL 3 and is built into the drive as standard. When the Safe Torque Off function is active, the drive output is disabled with a high degree of integrity.

- Certified by BGIA and TUV
- Allows the drive to become part of the machine safety system
- Reduces user cost in machine safety controller designs that must comply with EN/IEC 62061 up to SIL 3, EN ISO 13849-1 up to PL e, EN 954-1 category 3 and EN 81-1 for elevators
- Eliminates one or more power contactors
- Eliminates need for additional feedback monitoring
- Drive can be powered continuously
- Safe Torque Off can form part of an EN 954-1 Category 4 system by adding control circuitry.

Back-up Power Supply Inputs for Continuous Operation

24Vdc Input - Control

24Vdc supply allows the Unidrive SP control circuits to remain active when the main power supply is removed. This enables the control portion of the drive (including fieldbus communications, SM option modules and encoders) to remain active and continue to operate.

48-96Vdc Input - Power

Allows the drive power output to control the motor. This feature is often used for emergency back-up situations such as moving elevators to an exit during a power supply failure.



See the Options & Accessories brochure for more detailed information.
(BRO-OPTIONS-1107)



See the SM Option Modules brochure for more detailed information.
(BRO-SMOP-1107)



Automation Solutions

Programmable drives offer more compact, higher-performance and lower-cost solutions in machinery automation applications. Over the past 20 years, Control Techniques has pioneered the embedding of programmable automation, motion control and communications features within its Unidrive SP drives.

SM Option Modules

To provide the best possible dynamic motor performance, the following Control Techniques SM option modules contain a high-performance microprocessor that allows the base drive processor to be dedicated to shaft control.

SM-EZMotion

The SM-EZMotion option module and PowerTools Pro software provide a user-friendly environment for motion programming. The EZMotion approach is ideal for rapid development of motion application solutions.



This option module has four digital inputs and two digital outputs for high-speed I/O operations.

SM-Applications Plus

The SM-Applications Plus option module offers all of the features of the SM-Applications Lite V2 option module plus CTNet communications, RS485 serial port and high speed I/O. SM-Applications Plus is programmed using the SyPTPro system.



- **Drive-to-drive communications:** SM-Applications Plus includes a high-speed drive-to-drive network called CTNet. This network is optimized for intelligent drive systems offering flexible peer-to-peer communications. CTNet has the capability to connect to remote I/O, operator panels, Mentor MP DC drives and PCs.
- **High-speed serial port:** This option module supports standard protocols such as Modbus (master and follower modes) for connection to external devices such as operator interface panels plus CTSync. CTSync is also standard on SM-Applications Plus and provides the drive clock synchronization with <4µs jitter.
- **Inputs/Outputs:** SM-Applications Plus has two digital inputs and two digital outputs for high-speed I/O operations such as position capture and actuator firing.

SM-Applications Lite V2

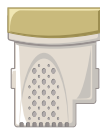
The SM-Applications Lite V2 option module provides programmable control for standalone drive applications or when the drive is connected to a centralized controller via I/O or Fieldbus. SM-Applications Lite V2 may be programmed using Ladder Logic with SyPTLite or can make use of the full automation and motion control capabilities contained within SyPTPro, IEC 61131 software.



- **Real-time Control:** SM Applications Lite V2 provides real-time access to all of the drives' parameters plus access to data from I/O and other drives. The option module uses a high-speed multi-tasking operating system with task update times as low as 250µs. Tasks are synchronized to the drive's own control loops to give you the best possible performance for drive control and motion.

SM-Register

The SM-Register option module is designed to provide a flexible, high-performance solution for programmable motion requiring high-speed registration features. It is ideal for applications such as printing, packaging and cutting machinery.



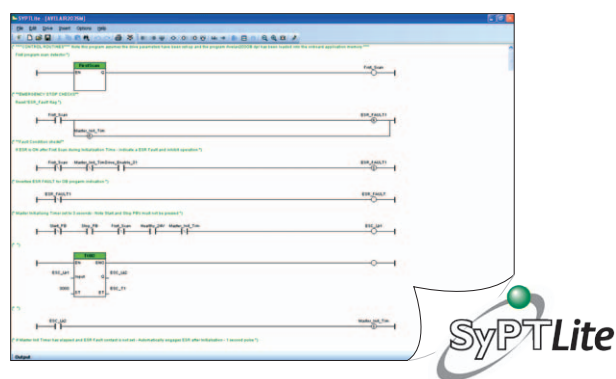
Features include:

- Motion programming using PLCopen or Control Techniques' Advanced Position Controller (APC)
- Two fully independent registration capture channels
- Storage for 256 events per channel, microseconds apart
- Pattern recognition
- Speeds in excess of 3000ft/min can be handled
- Ability to filter unwanted marks (i.e. splashes, dirt, text, etc)
 - Minimum and/or maximum pulse width
 - Distance from previous edge
- Compensation for registration sensor throughput delay

Automation Software

SyPTLite Onboard Automation Programming

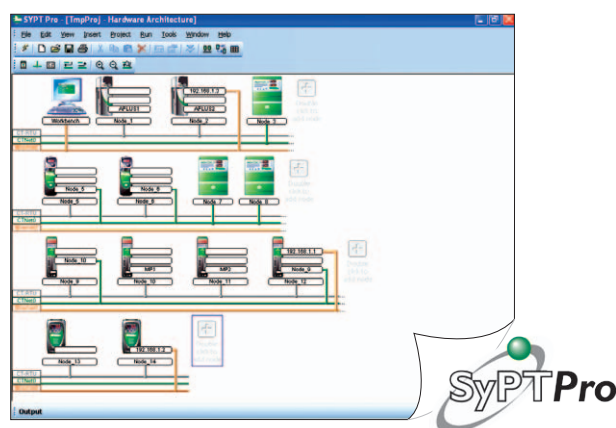
Unidrive SP has a built-in controller programmed using SyPTLite, an easy-to-use Ladder Logic program editor, suitable for replacing relay logic or a micro PLC for simple drive control applications.



SyPTPro Automation Development Environment

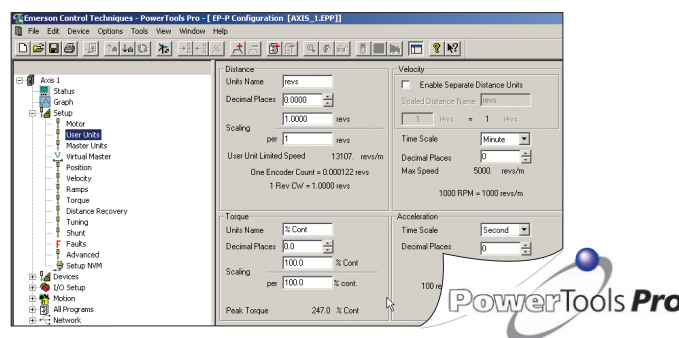
SyPTPro is a full-featured automation development environment that can be used for developing tailored solutions for single or multiple drive applications. The programming environment fully supports three IEC 61131 languages: Function Block, Ladder Logic and Structured Text. Motion control is configured using PLCopen motion language, supporting multiple axes.

CTNet, a high-speed, deterministic drive-to-drive network links the drives, SCADA and I/O together to form networked system, with SyPTPro managing both the application programs and network communications.



PowerTools Pro — Motion Made Easy™

PowerTools Pro is a software program used to develop “Motion Made Easy™” motion control applications and is used when an SM-EZMotion option module is used with the Unidrive SP. PowerTools Pro is used to develop sophisticated motion programs in minutes instead of hours and is ideal for solving a full range of axis and axis-and-a-half servo applications.



SP Control Platform — Stand-alone Unidrive SP Control Module

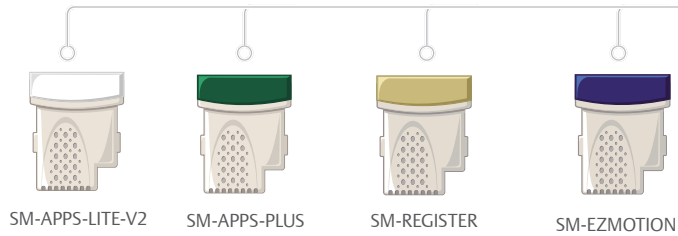
The SP Control Platform provides all the same functions as a Unidrive SP thus expanding the control flexibility without the ability to run a motor, eliminating redundant power electronics. Applications include:



- Use as a protocol converter between a supervisory control system using one protocol and a drive system using another.
- Adding an extra Unidrive SP to a system to accommodate additional option modules. Additional position feedback devices can also be added to a system in this way.

Unidrive SP, Fast and Easy Integration Flexibility

Applications with PLC or Motion Functionality



TNET **TSYNC**

SyPT Lite

SyPT Pro

PowerTools Pro

See page 6 for software relevance to each module
and page 12 for order codes

FREE
Software

External Control



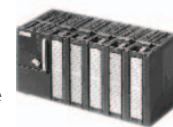
Windows 98,
NT 4.0, 2000,
XP, Vista 32 or
7-Compatible PC

PLC

Multi-Axis Controller



USB Port-to-Drive Serial Interface Cable
CT-USB-CABLE



MC464

Operator Interface Options

SmartCard



Memory device to
store and copy drive
parameters
SMARTCARD

Software

CTSoft
CTScope
CTOPCserver
OPC
FOUNDATION
MEMBER

HMI Operator Interface



See the Options & Accessories
brochure for order codes

LCD Keypad



Remote panel or drive-
mount LCD multilingual
text keypad display to IP54
(NEMA 12)

SM-KEYPAD-PLUS



Interconnect Cable
See page 12 for order codes

LED Keypad



Drive mount LED
display to IP54
(NEMA 12)
Size 1 and up.

SM-KEYPAD

LED Keypad



Drive mount LED
display to IP54
(NEMA 12)
Size Zero.

KEYPAD-SP0

Communications

Standard

Options

Modbus RTU



SM-CAN
SM-CANOPEN
SM-DEVICENET
SM-ETHERCAT

SM Option Modules

SM-ETHERNET:
EtherNet/IP, Modbus TCP/IP,
email, web server, simple
network time Protocol

SM-INTERBUS
SM-PROFIBUS-DP
SM-PROFINET
SM-SERCOS

DeviceNet

PROFI
BUS

EtherCAT

EtherNet/IP

Input / Output

Standard

Options



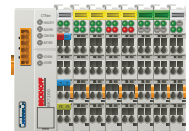
5 Analog input/outputs
7 Digital input/outputs
1 Safe Torque Off



SM Option Modules

SM-I/O-32 (32 digital I/O)
SM-I/O-24V (Protected)
SM-I/O-LITE
SM-I/O PLUS
SM-I/O-TIMER (Real-Time Clock)
SM-I/O-120V (120V AC I/O)
SM-PELV

Remote I/O



See the Options & Accessories
brochure for order codes

Dynamic Braking Options

Filters

Standard

Options

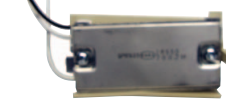
Internal EMC Filter

External EMC Filter



See the Options & Accessories brochure for order codes

Internal Zero-Space Braking Resistor, E-Stop Duty



Frame sizes 0 to 2
See page 13 for order codes

Dynamic Brake Resistors E-Stop or Cyclic Duty



See the Options & Accessories brochure for order codes

Feedback

Standard

Options

Sin/Cos
Quadrature
Frequency/Direction
Clockwise/Counter Clockwise



SM Option Modules



SM-UNI-ENCODER*
SM-ENCODER-OUT**
SM-ENCODER-PLUS**
SM-RESOLVER

* Accepts and replicates incremental and absolute feedback types. Recommended for Servo and positioning applications

** For use with Induction motors and incremental feedback devices.

Installation Accessories

DC Back-up Power Supply

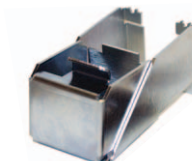
24Vdc Control



48-96Vdc Power



Conduit Boxes

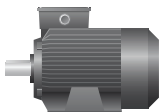


Available on sizes 1 to 6 for wall-mount applications

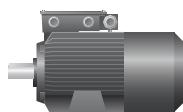
See page 13 for order codes

Motor Control Modes

Open-loop Vector Control



Closed-loop Motor



Servo Motor



Linear Motor



Regenerative Active Front End



Terminal Diagram

RS485

Pin #	Function
1	120Ω Termination resistor
2	RX TX
3	Isolated 0V
4	+24V (100mA)
5	Isolated 0V
6	TX enable
7	RX\ TX\
8	RX\ TX\ (if termination resistors are required, link to pin1)
Shell	Isolated 0V

Control Terminals - Bottom Row

Pin #	Function	Description
21	0V Common	Common for external digital inputs
22	+24Vdc Output	200mA max user supply
23	0V Common	Common for external digital inputs
24	Digital I/O 1	0 to 24Vdc input, or 1 to 24Vdc, 100mA max output digital I/O
25	Digital I/O 2	0 to 24Vdc input, or 1 to 24Vdc, 100mA max output digital I/O
26	Digital I/O 3	0 to 24Vdc input, or 1 to 24Vdc, 100mA max output digital I/O
27	Digital Input 4	0 to 24Vdc, 6kΩ digital input
28	Digital Input 5	0 to 24Vdc, 6kΩ digital input
29	Digital Input 6	0 to 24Vdc, 6kΩ digital input
30	0V Common	Common for external digital inputs
31	Safe Torque Off	0 to 24Vdc, 8μsec typical/20μsec max sample digital input
41	Status Relay	240Vac, 2A resistive normally open
42	Status Relay	240Vac, 2A resistive normally open

Power - Line/Motor

Pin #	Function
PE	Ground Connection
L1	Line In
L2	Line In
L3	Line In
U	Motor Connection
V	Motor Connection
W	Motor Connection
GND	Motor Ground

Connection shown for Size 1 unit

Bottom view

Power - DC Connections

Pin #	Function
48V	48Vdc
-DC	- DC Bus
+DC	+ DC Bus
BR	Brake Resistor
GND	Ground

Connection shown for size 1 unit
Terminal locations may vary based on unit size

Control Terminals - Top Row

Pin #	Function	Description
1	0V Common	Common for backup power supply
2	+24Vdc External Input	60W, 24Vdc - Backup power supply for control
3	0V Common	Common for external analog signals
4	10Vdc source	10mA max reference supply
5	Analog Input 1+	±10Vdc 100kΩ - differential analog input, non-inverting input, 16 bit
6	Analog Input 1-	±10Vdc 100kΩ - differential analog input, inverting input, 16 bit
7	Analog Input 2	±10Vdc, 100kΩ or 0-20/4-20mA, 200Ω single-ended analog input 10 bit
8	Analog Input 3	±10Vdc, 100kΩ or 0-20/4-20mA, 200Ω single-ended analog input 10 bit, motor thermistor input
9	Analog Output 1	±10Vdc or 0-20 / 4-20mA single-ended analog output, bi-polar, 10 bit
10	Analog Output 2	±10Vdc or 0-20 / 4-20mA single-ended analog output, bi-polar, 10 bit
11	0V Common	Common for external analog signals

Encoder

Pin #	Signal Quadrature	ABS	Pulse
1	A	Cos	F
2	A/	Cosref	F/
3	B	Sin	D, R
4	B/	Sinref	D/, R/
5	Z	Data	Z
6	Z/	Data/	Z/
7	U	n/c	U
8	U/	n/c	U/
9	V	n/c	V
10	V/	n/c	V/
11	W	Clock	W
12	W/	Clock/	W/
13	+V	+V	+V
14	0V Common	0V Common	0V Common
15	Thermistor	Thermistor	Thermistor

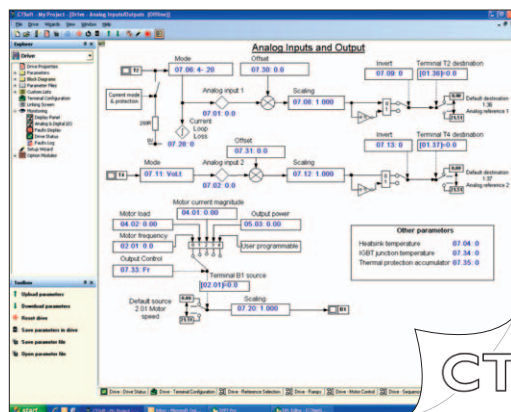
Software and SmartCard Tools for Rapid Project Implementation

Control Techniques FREE software suite makes it easier to access the drive's full feature set. It allows you to optimize the drive tuning, back-up the configuration and set-up communications networks. The software tools can connect using Ethernet, serial ports, USB or CTNet, Control Techniques' drive-to-drive network.

CTSoft Drive Configuration

CTSoft is a drive configuration tool for commissioning, optimizing and monitoring Control Techniques drives. It allows you to:

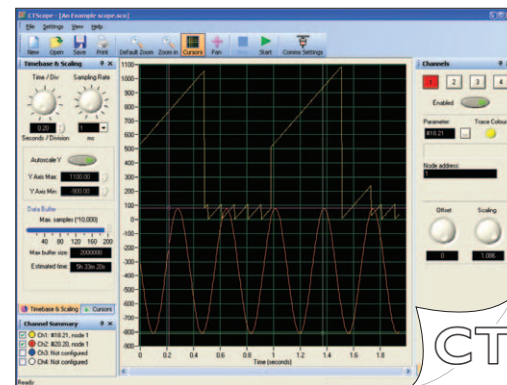
- Use the configuration wizards to commission your drive
- Read, save and load drive configuration settings
- Manage the drive's SmartCard data
- Visualize and modify the configuration with live animated diagrams



CTSoft

CTScope Digital Oscilloscope

CTScope is a full featured 4-channel software oscilloscope for viewing and analyzing changing values within the drive. The time base can be set to give high-speed capture for tuning or for longer term trends. The user interface is based on a traditional oscilloscope, making it familiar and friendly to all engineers worldwide.



CTScope

Try it! Download CTSoft and
CTScope software from
www.controltechniques.com



FREE SmartCard Memory Device

The SmartCard is supplied with every Unidrive SP. It can be used to back-up parameter sets and PLC program and copy them from one drive to another.

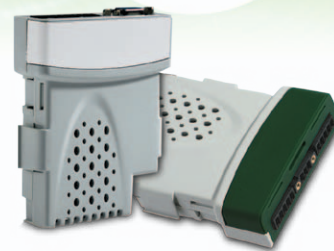
- Parameter and program storage
- Simplify drive maintenance and commissioning
- Quick set-up for sequential build of machines
- Machine upgrades can be stored on a SmartCard and sent to the customer for installation

SMARTCARD



Options

The Unidrive SP provides application and system designers with an incredibly flexible drive platform which is easily modified by an extensive range of sophisticated snap-in SM option modules for economical, space saving solutions. SM option modules install easily into any of the three option slots on the Unidrive SP with no tools required. The I/O, feedback, motion control, communication and application modules enable the Unidrive SP to provide an optimized solution to meet your specific application requirements.



Option	Description	Order Code
Base Drive Configuration and Programming	Cloning and parameter storage card	SMARTCARD ¹
	Configuration software	CTSOFT
	USB 485 communications cable	CT-USB-CABLE
	Keypad to drive cable, 5ft	SP-LCD-485-005
	Keypad to drive cable, 10ft	SP-LCD-485-010
	Keypad to drive cable, 15ft	SP-LCD-485-015
	Keypad to drive cable, 25ft	SP-LCD-485-025
	Keypad to drive cable, 50ft	SP-LCD-485-050
	Keypad to drive cable, xxx is cable length in 5ft increments (max length 100ft)	SP-LCD-485-xxx
Operator Interface	No keypad option	Standard
	LED keypad (SP size 1-6)	SM-KEYPAD ²
	LED keypad (SP size 0 only)	KEYPAD-SP0 ²
	LCD keypad	SM-KEYPAD-PLUS ²
	Programmable HMI panels	See the Options & Accessories brochure
Power Accessories	Zero-space brake resistor	Based on Drive
	E-Stop duty braking resistor	See page 13
	Cyclic-duty braking resistor	See the Options & Accessories brochure
	Zero-space EMC filter	Standard
	External EMC filters	See the Options & Accessories brochure
Applications Programming Software	Ladder Logic and Function Blocks	SYPT-LITE
	IEC 61131-3 (Ladder Logic, Function Block, and text-based)	SYPTPRO
	Motion Made Easy™ programming	POWERTOOLSPRO
Programmable SM Option Modules	Systems programming (distributed control) SM-Applications Plus	SM-APPS-PLUS
	Systems programming (centralized control) SM-Applications Lite V2	SM-APPS-LITE-V2
	System programming and registration	SM-REGISTER
	Dedicated motion control	SM-EZMOTION ⁴

Option	Description	Order Code
Communications SM Option Modules	Modbus RTU follower	Standard
	Modbus RTU master	SM-APPS-PLUS ³
	Modbus RTU master	SM-REGISTER ³
	DeviceNet	SM-DEVICENET
	PROFIBUS DP	SM-PROFIBUS-DP
	PROFINET	SM-PROFINET
	Ethernet (Modbus TCP/IP, EtherNet IP)	SM-ETHERNET
	INTERBUS-S	SM-INTERBUS
	CANopen	SM-CANOPEN
	CAN Interface	SM-CAN ⁷
	Ethernet (EtherCAT)	SM-ETHERCAT
	SERCOS	SM-SERCOS
	CTNet, CTSync	SM-APPS-PLUS
	CTNet, CTSync	SM-REGISTER
Feedback SM Option Modules	Universal encoder feedback SM-Universal Encoder Plus	SM-UNI-ENCODER
	Incremental encoder input SM-Encoder Plus	SM-ENCODER-PLUS
	Incremental encoder input and output SM-Encoder Output Plus	SM-ENCODER-OUT
	Resolver feedback	SM-RESOLVER
	Screw terminal connector	SM-ETC
I/O SM Option Modules	Extended analog and digital I/O	SM-I/O-PLUS
	Extra analog and digital I/O	SM-I/O-LITE
	Extended I/O	SM-I/O-32
	Extra I/O with Real-Time Clock/Calendar	SM-I/O-TIMER
	120/240 Vac I/O	SM-I/O-120V
	Double insulated extended I/O	SM-I/O-PELV
	Remote network I/O	See the Options & Accessories brochure
Safety	+24 Vdc protected I/O	SM-I/O-24V
	Safe Torque Off (STO)	Standard
	High-speed IEC 61800-5-2 functions	SM-SAFETY ⁵
Miscellaneous	Conduit entry plates	See the Options & Accessories brochure
	IP54 or IP55 cooling fans	(Based on drive)

1 Can be ordered separately, but comes standard with Unidrive SP
2 Must be ordered separately
3 Provides an additional Modbus RTU port (in addition to one on drive)
4 Only one of these modules can be used in a Unidrive SP at a time
5 Available mid-2011
6 Where xxx is the length in feet in 5 foot increments up to 100ft
7 Requires an SM-Application module

Internal Dynamic Braking Resistors

During deceleration, the kinetic energy stored in the spinning mass of the motor/load combination is converted to electrical energy which recharges the drive's DC bus. Dynamic braking resistors provide a means of rapidly dissipating that energy so that the drive does not fault from the DC bus over voltage trip. The Ohmic value and power rating of the braking resistor is a function of the application drive type, size and duty cycle.

A zero-space braking resistor is available for heatsink mounting on Unidrive SP frame sizes 0 to 2. These resistors are designed for low-inertia loads commonly used in servo type applications. For higher-inertia loads, the heatsink-mounted resistor may not have enough braking capacity, and a larger external resistor may be required. No additional thermal protection device is required with these heatsink-mounted resistor packages.

Frame Size	DC Resistance	Power Rating	Order Code
0	70Ω	50W	SM-HEATSINK-DBR0
1	75Ω	50W	SM-HEATSINK-DBR1
2	37.5Ω	100W	SM-HEATSINK-DBR2

Drives larger than size 2 do not have this option.

IP54 and IP55 Fan Options

For applications using through-panel mounting, and located in demanding environments, the Unidrive SP can be fitted with optional fans providing either IP54 or IP55 ingress protection ratings. The chart below lists the available fan options.

Drive Frame Size	IP54 Fan Option Order Code	IP55 Fan Option Order Code
1	3024-00	3251-3824
2	3024-00	3251-3824
3	3251-4024-00	3251-1224
4	3251-7824-01	N/A
5	Standard	N/A
6	Standard	N/A

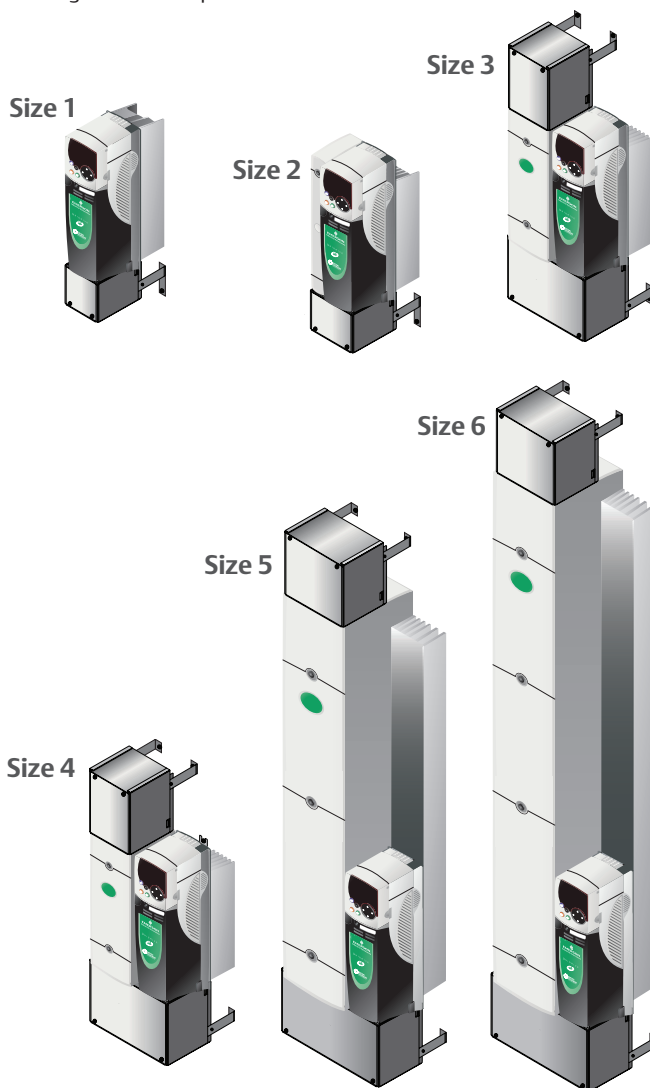
Drives fitted with fan options require field wiring.

Conduit Boxes

Conduit boxes for Unidrive SP (sizes 1 to 6) panel-mount drives.

Frame Size	Order Code	Overall Dimensions	
		Height in (cm)	Width in (cm)
Size 1	C-BOX-S1	17.8 (45.2)	3.94 (10.0)
Size 2	C-BOX-S2	17.8 (45.2)	6.1 (15.5)
Size 3	C-BOX-S3B* C-BOX-S3T*	21.7 (55.1)	9.9 (25.1)
Size 4	C-BOX-S4	33 (83.9)	12.2 (31.0)
Size 5	C-BOX-S5	45.3 (115)	12.2 (31.0)
Size 6	C-BOX-S6	57.5 (146)	12.2 (31.0)

*C-BOX-S3T (top) is only necessary when a DC input power or dynamic braking resistor is required.



Specifications and Dimensions

Specifications

Environment

Ambient Operating Temperature	32 to 104 °F (0 to 40 °C)
Cooling method	32 to 122 °F (0 to 50 °C) with derating Forced convection
Humidity	95% maximum non-condensing at 104 °F (40 °C)
Storage Temperature	-40 to 122 °F (-40 to 50 °C)
Altitude	0 to 9,900ft (0 to 3000m). Derate 1% per 328ft (100m) between 3280ft (1000m) and 9,900ft (3000m)
Vibration	Tested in accordance with IEC 60068-2-6, 2-29, 2-64
Mechanical Shock	In accordance with IEC 60068-2-27
Enclosure	NEMA 1 (IP 20), NEMA 12 (IP 54) through-panel mounting
Electromagnetic Immunity	In compliance with EN 61800-3 and EN 61000-6-2, and complies with EN61800-3 2nd environment with built-in filter
Electromagnetic Emissions	In compliance with EN61000-6-3 and 6-4 EN61000-6-4 when the recommended RFI filter is used and EMC installation guidelines are followed

AC Supply Requirements

Voltage	200 to 240Vac ±10% 380 to 480Vac ±10% 500 to 575Vac ±10% 500 to 690Vac ±10%
Phase	3Ø (SP size Zero: 200 to 240V 1Ø or 3Ø)
Phase Imbalance	2% negative phase sequence (equivalent to 3% voltage imbalance between phases)
Frequency	48 to 65Hz
Input Power Factor	Displacement 0.97

Control

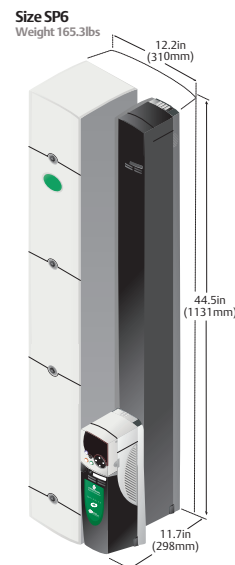
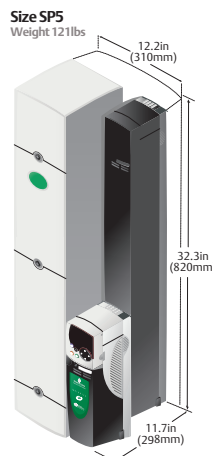
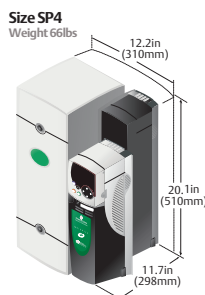
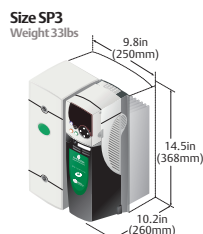
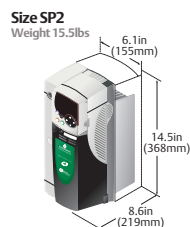
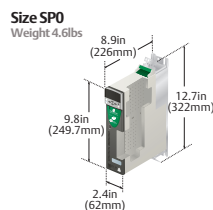
Carrier Frequency	3, 4, 6, 8, 12, 16kHz - Panel Mount drives 3, 4, 6kHz - Free Standing and SPM drives
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Output Frequency	0 to 3000Hz (Open-loop)
Output Speed	0 to 40,000rpm (Closed-loop)
Frequency Accuracy	±0.01% of full scale
Frequency Resolution	0.001Hz
Analog Input	10 bit + sign (Qty 2); 16 bit + sign (Qty 1) resolution
Serial Communications	2-wire RS485 4-wire RS232 or RS485 with SM-APPS module Protocol is ANSI x 3.28-2.5-A4, or Modbus RTU Baud rate 300 to 115,200
Braking	DC injection braking (stopping and holding) and dynamic braking transistor standard.
Control Power Ride Through	Up to 1 second depending on inertia and decel time

Protection

DC Bus Undervoltage Trip	175 / 330 / 435Vdc (approximately 124 / 233 / 307Vac line voltage)
DC Bus Overvoltage Trip	415 / 830 / 990Vdc (approximately 293 / 587 / 700Vac line voltage)
MOV Voltage Transient Protection	160 Joules, 1400Vdc clamping (Line to line and line to ground)
Drive Overload Trip	Current overload value is exceeded Programmable for Normal Duty or Heavy Duty, open-loop or closed-loop operation 225% of drive rated current
Instantaneous Overcurrent Trip	
Phase Loss Trip	DC bus ripple threshold exceeded
Overtemperature Trips	Drive heatsink, control board, and option module(s) monitoring
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

Dimensions



Ratings

Frame Size	200-240Vac +/- 10% 3Ø (kW@220V, hp@230V)	Normal Duty			Heavy Duty		
		Max Continuous Current (A)	Motor Power (hp)	Typical Output (kW)	Max Continuous Current (A)	Motor Power (hp)	Typical Output (kW)
	Order Code						
0	SP0201	2.2	0.5	0.37	2.2	0.5	0.37
	SP0202	3.1	0.75	0.55	3.1	0.75	0.55
	SP0203	4	1	0.75	4	1	0.75
	SP0204	5.7	1.5	1.1	5.7	1.5	1.1
	SP0205	7.5	2	1.5	7.5	2	1.5
1	SP1201	5.2	1.5	1.1	4.3	1	0.75
	SP1202	6.8	2	1.5	5.8	1.5	1.1
	SP1203	9.6	3	2.2	7.5	2	1.5
	SP1204	11	3	3	10.6	3	2.2
2	SP2201	15.5	5	4	12.6	3	3
	SP2202	22	7.5	5.5	17	5	4
	SP2203	28	10	7.5	25	7.5	5.5
3	SP3201	42	15	11	31	10	7.5
	SP3202	54	20	15	42	15	11
4	SP4201	68	25	18.5	56	20	15
	SP4202	80	30	22	68	25	18.5
5	SP4203	104	40	30	80	30	20
	SP5201	130	50	37	105	40	30
	SP5202	154	60	45	130	50	37

Frame Size	380-480Vac +/- 10% 3Ø (kW@400V, hp@460V)	Normal Duty			Heavy Duty		
		Max Continuous Current (A)	Motor Power (hp)	Typical Output (kW)	Max Continuous Current (A)	Motor Power (hp)	Typical Output (kW)
	Order Code						
0	SP0401	1.3	0.5	0.37	1.3	0.5	0.37
	SP0402	1.7	0.75	0.55	1.7	0.75	0.55
	SP0403	2.1	1	0.75	2.1	1	0.75
	SP0404	3	1.5	1.1	3	1.5	1.1
	SP0405	4.2	2	1.5	4.2	2	1.5
1	SP1401	2.8	1.5	1.1	2.1	1	0.75
	SP1402	3.8	2	1.5	3	1.5	1.1
	SP1403	5	3	2.2	4.2	2	1.5
	SP1404	6.9	5	3	5.8	3	2.2
	SP1405	8.8	5	4	7.6	5	3
	SP1406	11	7.5	5.5	9.5	5	4
2	SP2401	15.3	10	7.5	13	7.5	5.5
	SP2402	21	15	11	16.5	10	7.5
	SP2403	29	20	15	25	15	11
	SP2404	29	20	15	29	20	15
3	SP3401	35	25	18.5	32	25	15
	SP3402	43	30	22	40	30	18.5
	SP3403	56	40	30	46	30	22
4	SP4401	68	50	37	60	40	30
	SP4402	83	60	45	74	50	37
	SP4403	104	75	55	96	75	45
5	SP5401	138	100	75	124	100	55
	SP5402	168	125	90	156	125	75
6	SP6401	205	150	110	180	150	90
	SP6402	236	200	132	210	150	110

Frame Size	200-240Vac +/- 10% 1Ø (kW@220V, hp@230V)	Normal Duty			Heavy Duty		
		Max Continuous Current (A)	Motor Power (hp)	Typical Output (kW)	Max Continuous Current (A)	Motor Power (hp)	Typical Output (kW)
	Order Code						
0	SP0201	2.2	0.5	0.37	2.2	0.5	0.37
	SP0202	3.1	0.75	0.55	3.1	0.75	0.55
	SP0203	4	1	0.75	4	1	0.75
	SP0204	5.7	1.5	1.1	5.7	1.5	1.1
	SP0205	7.5	2	1.5	7.5	2	1.5

Frame Size	500-575Vac +/- 10% 3Ø (kW@575V, hp@575V)	Normal Duty			Heavy Duty		
		Max Continuous Current (A)	Motor Power (hp)	Typical Output (kW)	Max Continuous Current (A)	Motor Power (hp)	Typical Output (kW)
	Order Code						
3	SP3501	5.4	3	3	4.1	2	2.2
	SP3502	6.1	5	4	5.4	3	3
	SP3503	8.4	7.5	5.5	6.1	5	4
	SP3504	11	10	7.5	9.5	7.5	5.5
	SP3505	16	15	11	12	10	7.5
	SP3506	22	20	15	18	15	11
4	SP3507	27	25	18.5	22	20	15
	SP4603*	36	30	22	27	25	18.5
	SP4604*	43	40	30	36	30	22
	SP4605*	52	50	37	43	40	30
5	SP4606*	62	60	45	52	50	37
	SP5601*	84	75	55	63	60	45
	SP5602*	99	100	75	85	75	55
6	SP6601*	125	125	90	100	100	75
	SP6602	144	150	110	125	125	90

Frame Size	500-690Vac +/- 10% 3Ø (kW@690V, hp@690V)	Normal Duty			Heavy Duty		
		Max Continuous Current (A)	Motor Power (hp)	Typical Output (kW)	Max Continuous Current (A)	Motor Power (hp)	Typical Output (kW)
	Order Code						
4	SP4601	22	25	18.5	19	20	15
	SP4602	27	30	22	22	25	18.5
	SP4603	36	40	30	27	30	22
	SP4604	43	50	37	36	40	30
	SP4605	52	60	45	43	50	37
	SP4606	62	75	55	52	60	45
5	SP5601	84	100	75	63	75	55
	SP5602	99	125	90	85	100	75
6	SP6601	125	150	110	100	125	90
	SP6602	144	175	132	125	150	110

Notes: Select model on actual motor full load current. *The same model can be used on a 575V or a 690V supply, and has two different output ratings. For example: At Normal Duty, SP4603 is suitable for a 30hp output motor on a 575V supply and a 40hp output motor on a 690V supply. Can be used on IT supplies - all voltages, Grounded delta supplies - all voltages except 690V

Normal Duty	Heavy Duty
Suitable for most applications, current overload of 110% for 165 seconds is available. Where motor rated current is less than the drive rated continuous current, higher overloads are achieved.	Suitable for demanding applications, current overload of 175% for 40 seconds is available for frame size 0 - 5 in closed-loop, 150% for 60 seconds in open-loop, and size 0 single phase current overload is 150% for 60 seconds. For frame size 6 current overload of 150% for 60 seconds is available in closed-loop and 129% for 97 seconds in open-loop. Where the motor rated current is less than the drive rated continuous current higher overloads (200% or greater) are achieved.

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