

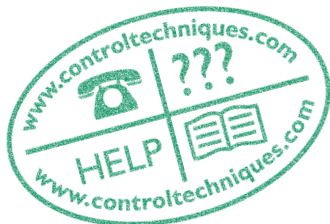


**CONTROL
TECHNIQUES**

www.controltechniques.com

Unidrive

Universal AC Drive
Solutions Platform



EMERSON[™]
Industrial Automation

Overview of the Solutions Platform

AC DRIVE 0.75kW TO 1.5MW 200V, 400V, 575V AND 690V

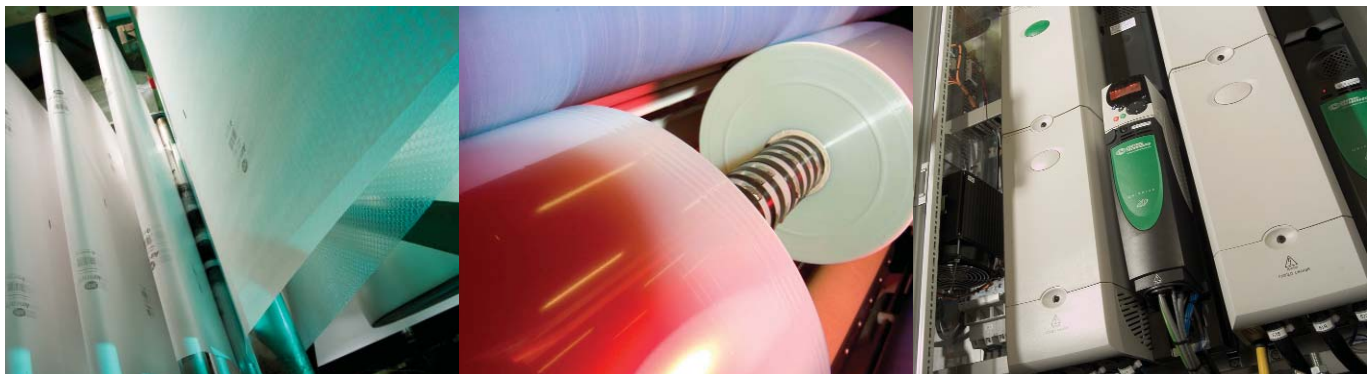
Drive application areas are very diverse in terms of control and power requirements. The Unidrive **SD** meets this challenge with its ever increasing family of products.

Already established as the Benchmark in terms of applications flexibility, the Unidrive **SD** now adds power flexibility to become the Benchmark in large drives.

Common features of all Unidrive **SD** drives include:

- Fully universal motor control - induction, servo and synchronous
 - Motor control modes:
 - New Rotor Flux Control (RFC) - open loop high performance control mode
 - Closed Loop Vector - precision control of induction motors
 - Servo - wide range of rotary and linear servo motors
 - Open Loop Vector
 - V/f control with motor slip and voltage compensation - parallel motors
- World class reliability assured by design
 - Special attention is given to thermal stability and mechanical robustness. Components selected for long life
- Active front end control mode for harmonic elimination and regeneration

- PLC elimination with scalable programmability onboard Unidrive **SD** and through option modules
- World standard field bus connectivity options
- Global power supplies
 - 200-240, 380-480, 500-575 and 500-690 V
- Choice of optional simple LED keypad or multi-lingual plain text keypad with help function
- IP54 adaptation features in all drive modules for external Heat Sink Cooling
- Onboard dynamic braking control as standard
- Onboard optional dynamic braking resistors
 - Sizes 1 and 2
- Onboard EMC filter to Drive Standard EN61800-3 (1st environment)
 - Simple to remove for applications sensitive to earth leakage currents
- Full range of External EMC filters to meet all requirements
- Secure Disable feature to meet:
 - Machinery Standard EN954-1 cat 3
 - Elevator Standard EN81-1
 - Contactor elimination to reduce cost
- Onboard software selectable flexible encoder feedback interface
 - 14 feedback standards included
- Low Voltage DC operation
 - Elevator rescue
 - Emergency machine operation
- Comprehensive range of digital and analogue I/O interfaces
- Worldwide certification including CE and UL



Integration Flexibility	Performance, Configuration and Set up	System Design	PLC Functionality	Integration Options	Motion Functionality	Specifications and Order Codes
pages 1 – 3	pages 4 – 5	pages 6 – 7	pages 8 – 9	pages 10 – 11	pages 12 – 13	pages 14 – 19

Comprehensive integrat

Control Mode

Open loop motor



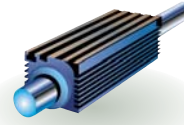
Closed loop motor



Servo motor



Linear motor

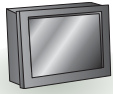


Regenerative Active Front End



Drive Programming and Operator Interface

Operator Interface



FREE Software

CTSoft
CTScope

LCD Keypad



LED Keypad



SMARTCARD



Options

Standard

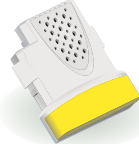
Input/Output

Standard

Options



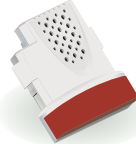
5 Analogue I/O
7 Digital I/O
I Secure Disable



SM-I/O Plus



SM-I/O Lite



SM-I/O Timer



SM-I/O I20V



SM-PELV



Remote I/O

Centralised PLC/Motion Control



Motion
Controller

PLC



PC



Filters

Standard

Options



Footprint EMC filter



N1652



Certification No. EMS 64448



003



Certification No. 12 12116



003



LISTED 8D14

tion flexibility with Unidrive -

STANDARD POWER APPLICATIONS

AC in / AC out single drive configuration

Unidrive  Panel Mounted – 0.75kW to 132kW

- Industry leading compact IP20 drive module
- Each model consist of rectifier; DC link and an inverter as a single unit

Unidrive  Free Standing – 90kW to 675kW

- Complete Free Standing drive system can be ordered with simple order codes
- IP21 standard cubicle design
- High power density
- Ready to install
- Supplied with or without fuses
- **Optional additional cubicles:**
 - Incomer Shell
 - Basic installation features for integration of switch fuse, MCCB and EMC filter
 - System Shell
 - Empty for your application specific control equipment
- Baying kits are available to allow integration with industry standard cubicles
- Each 400mm section shipped separately for ease of transport and installation
- The cubicle is designed for compactness, the need for maintenance access and ease of cabling



CUSTOM POWER APPLICATIONS

Modular Input and Output power units, optimised for system integrators and OEMs to build into their own cubicles using a range of integration accessories with full documentation.


Unidrive  Modular – 90kW to 1.5MW

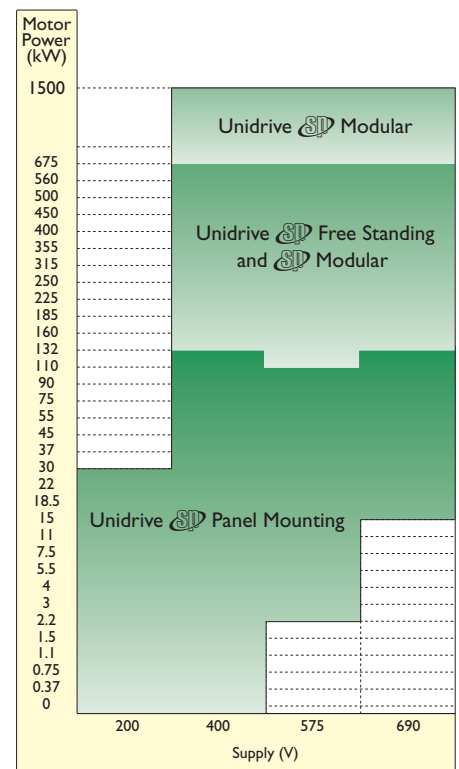
A range of very compact and innovative IP20 input and output power modules enable the creation of a comprehensive range of power systems.

Configure a multiple drive system with an interconnected DC bus to:

- Utilize an existing DC supply
- Reduce running costs:
 - Regenerating braking energy to the AC Mains Supply
 - Circulate energy between drives and provide motor to motor braking
- Enable a single AC power entry, simplifying installation and minimising cabling

Additional features made possible by Unidrive  Modular are:

- Power supply harmonic reduction:
 - Minimise harmonics with 12, 18 and 24 pulse input rectifier configurations
 - Eliminate harmonics with an active front end
- Control high current motors by paralleling output inverter modules
- Unidrive  Panel mount drives can be used in support of custom power applications through connection to the DC Bus



your Solutions Platform

Standard

Options

Applications with PLC or Motion functionality

On Board PLC



Easy to use onboard ladder logic PLC at zero cost, ideal for simple applications requiring extra drive functionality

Configured using Lite software

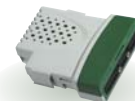
SM-Applications Lite



Powerful automation controller using a dedicated microprocessor giving full drive parameter access

Configured using Lite or SyTI Pro software

SM-Applications



Powerful automation controller with drive to drive networking and full motion capability

Configured using SyTI Pro software

SM-EZMotion



Motion made easy with intuitive step-by-step configuration

Configured using Powertools Pro software

Communications

Standard

Options



Modbus RTU



CAN Interface



DeviceNet



Ethernet TCP/IP



Feedback

Standard

Options

SinCos
Quadrature
Frequency/Direction
Clockwise/
Counter clockwise

New EnDat V2.2

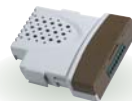


SM-Universal Encoder Plus



Accepts or replicates all standard feedback types

SM-Encoder Plus



Quadrature

SM-Resolver




DC Back up Power Supply



24V Control



48 - 96V Power

Unidrive  has a common control interface for the entire range.

- Comprehensive autotune features
 - quick and predictable commissioning
- Synchronised control loops for deterministic control
 - ideal for motion applications
- Stepless gain change
 - for online tuning

Control	
Switching Frequency	3, 4, 6, 8, 12, 16 kHz
Output Frequency	0 to 3000 Hz (open loop)
Output Speed	0 to 40,000 rpm (closed loop)
Frequency Accuracy	±0.01% of full scale
Frequency Resolution	0.001 Hz
3 Analogue Inputs	1 x 16 Bit + sign 2 x 10 Bit + sign
Serial Communications	2 or 4-wire RS232/RS485. Protocol is Modbus RTU or ANSI x 3.28-2.5 -A4 Baud rate 300 to 115,200
Braking	DC injection braking (stopping and holding). Dynamic braking transistor as standard
Supply Dip Ride Through	Dependant upon inertia and deceleration time

Optimise motor performance

Stationary autotune

- Measures stator resistance and voltage offset for dynamic vector control (for open and closed loop)
 - Ideal for tuning loaded motors (eg elevators).


Rotating autotune

- Incorporates stationary autotune and then measures power factor
- Low speed autotune to set phase angle and current loop
- High speed rotating autotune sets up inertia measurement and speed loop
 - Easy to obtain maximum shaft performance

Servo autotune with minimal movement (5° electrical)

- Primarily for linear motors, but also useful for rotary motors
 - Ideal where excessive shaft movement during autotune is unacceptable eg machine tools
 - Ideal for applications with non-absolute position feedback

Synchronised control loops

All drive (and option module) control loops are synchronised and can synchronise with an external source. This enables precise multi-axis motion co-ordination with Unidrive .

Position loop

- Update time of 250µs

Speed loop

- Update time of 250µs
- Gains in real SI units
- Increased precision in positioning systems and high performance section control
- Selectable gain sets for speed profiling and multi-motor operation
- Step-less gain change for on-line tuning
- Fully selectable feedback source for flexibility

Torque loop

- Update time of 83µs
- Torque feed forward for minimal speed error during acceleration
- Set point to two decimal places for precision torque applications, such as dynamometer test rigs

Motor control

- Open loop, closed loop, servo
 - Second motor map for rapid change between motors
 - Support for embedded motor map in encoders with serial communications

New Rotor Flux Control (RFC)

Open loop high performance control mode for induction motors

- Flux oriented control without a position feedback sensor
 - Robust motor model - insensitive to motor parameter variations
 - In contrast with other contemporary control methods
 - User selectable switching frequency for applications demanding quiet motor operation (e.g. lifts or air conditioning) - not possible with other contemporary control methods
 - Automatic capture of motor parameters
 - Characterised by:
 - Accurate speed holding at very low speeds – 175% torque or more at speeds as low as 30rpm
 - Exceptional transient performance
 - Torque step response between 0.5 and 1.2ms – depending on switching frequency
 - Speed recovery in 100ms or less, after load change of 100%
 - Fast acceleration without position feedback
 - Stable operation with any load
 - Torque control with sufficient accuracy for majority of applications
 - Reliable supply interruption ride through operation
 - Able to switch between RFC motor model and flux orientation position feedback modes due to much commonality of implementation
- The machine tool spindle example illustrates the benefit of this:
- Full torque capability with high resolution position feedback and accurate positioning at standstill for tool changing
 - Very high speed operation, outside the specification of the feedback device for cutting
 - The drive can switch “on the fly” between the two

Protection systems

- Independent thermal protection for options, control, power stage, brake resistor and motor
- On drive thermal model dynamically controls switching frequency and drives cooling fan speed to ride through thermal overloads to minimise motor noise
- Recovery from supply disturbances such as phase loss, imbalance, brown out, notching are all managed within the drive
- The drive protects itself from wiring errors such as output short, output earth fault, I/O overload, encoder wire break and short circuit
- The polarised control connectors cannot be exchanged accidentally

CONFIGURATION & SET UP

SMARTCARD

- Easy parameter & program loading
- Simplified maintenance and set up
- Machine upgrades can be shipped on a SMARTCARD and easily installed
- Control parameter access without impairing maintainability
- Save up to 128 complete sets of parameters
- Save and restore onboard SyPTLite application programs
- SELV comms port – single point access for all drive configuration and programming tools

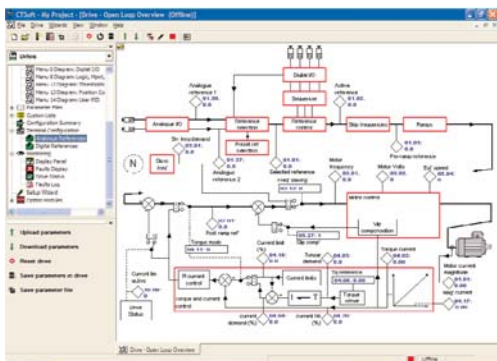


CTSoft AND CTScope

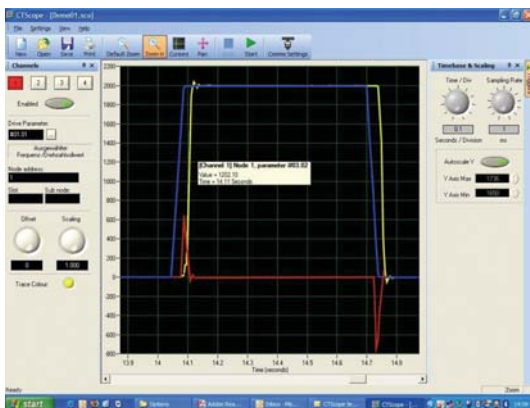
PC configuration tools for Control Techniques product. The software tools will help you:

- Commission your drive
- Optimise and monitor your motor and drives performance
- Save, upload and download drive configuration settings
- CTSoft uses on-line animated logic diagrams to easily visualise your drives configuration
- The software tools may be used remotely or wirelessly using Ethernet and internet technologies

CTSoft



CTScope



SELECT KEYPAD

No Keypad	Standard format. Ideal for high volume applications where the drive can share keypad for set up. Excellent security feature
SM-Keypad	Low cost, hot pluggable, 7 segment LED display
SM-Keypad Plus	Multi-lingual, hot pluggable, backlit LCD display, with customisable database for application specific text and a help function
HMI	A range of touch screen HMI's (Human Machine Interface) are available from local Drive Centres/Distributors

SM-Keypad Plus



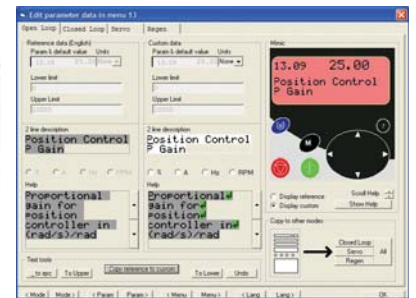
SM-Keypad



HMI Range



Customisation tool for SM-Keypad Plus



INTERNAL BRAKE RESISTORS

The Unidrive SD 1 and 2 have an optional space-saving heatsink mounted self-fusing resistor. The drive provides overload protection.



BUILT-IN EMC COMPATIBILITY

Built-in filter allows drive to comply with EN 61800-3 (standard for Power Drive Systems). Can be easily removed where sensitive earth leakage protection is installed.

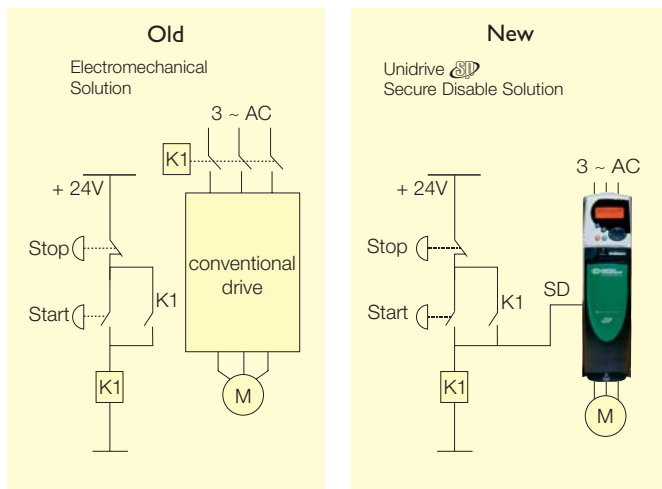
System designers look to maximise the features of the drive itself, in combination with the integration options to minimise cost whilst maximising performance. Features such as secure disable and back up power supply inputs help to realise system cost reductions.

SECURE DISABLE

Secure Disable is inherently failsafe without the need for feedback contacts, unlike safety relays. When the input is disconnected the drive will not operate the motor, even with a combination of internal drive faults. Secure Disable is implemented in hardware, totally independent of drive software, and has been certified by BIA and TÜV.

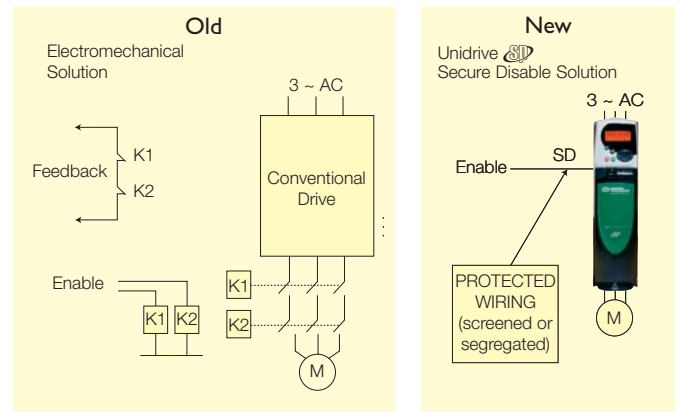
- Reduces user cost in machine safety designs that must comply with EN954-I category 3 and EN81-I for elevators
- Allows the drive to become part of the machine safety system
- Prevents the drive from turning the motor, with a very high degree of confidence

Simple stop/start control to EN954-I category I



- **Component cost and space saving in system design**
 - Eliminate one or more power contactors
 - Eliminate feedback checking arrangement
 - Drive can be powered continuously, maintaining auxiliary functions
 - A continuous 24V supply can be taken from the drive for auxiliary control purposes

Fail safe interlock to EN954-I category 3




- Secure Disable can form part of a EN954-I Cat 4 system by adding control circuitry. Consult your local Drive Centre or Distributor

Detailed drawings and implementation help can be found in: "A Guide to the Unidrive  Secure Disable Function".

BACK UP POWER SUPPLY INPUTS

● 24Vdc input – control

Allows the control circuits of Unidrive  to remain active with AC supply removed. This enables fieldbus modules, application modules and encoders to continue to operate

● 48-96Vdc input – power

Allows for motor operation in an emergency back-up situation following loss of AC supply (in elevators)

THROUGH-PANEL MOUNTING

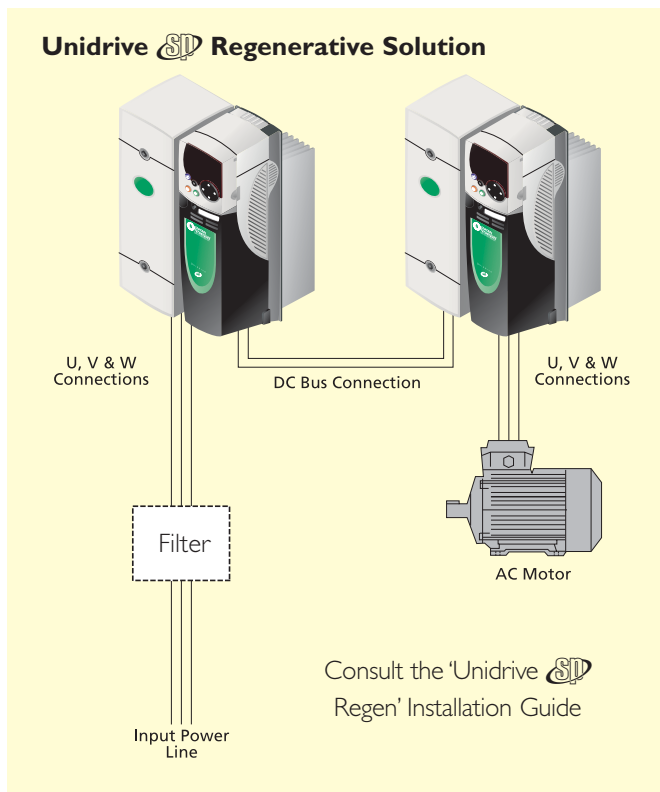


For convenient heat dissipation and cubicle size reduction all Unidrive  frame sizes can be through-panel-mounted. An IP54 mounting kit is included as standard and IP54 fans are available as an option. This mounting method reduces temperature rise in the control panel.

UNIDRIVE ^{SD} REGENERATIVE MODE

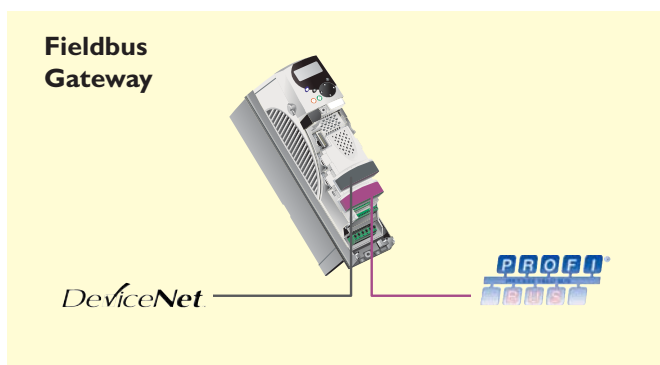
Unidrive ^{SD} can be configured to provide full four-quadrant control of the power within the drive system. In regenerative mode, the Unidrive is capable of either supplying power to the DC bus of the Unidrive controlling the motor or removing power from the DC bus of the Unidrive controlling the motor and returning it back to the supply.

- Energy saving:
 - Unity or controllable Input Power Factor
 - Sinusoidal Input Current (Low Harmonic Content)



FIELDBUS GATEWAY

Within the drive itself and with no external components, gateways can be configured between any supported networks, saving users that need to bridge between two networks considerable costs, thus allowing OEMs to standardise on one network at the machine with a gateway to any plant network.



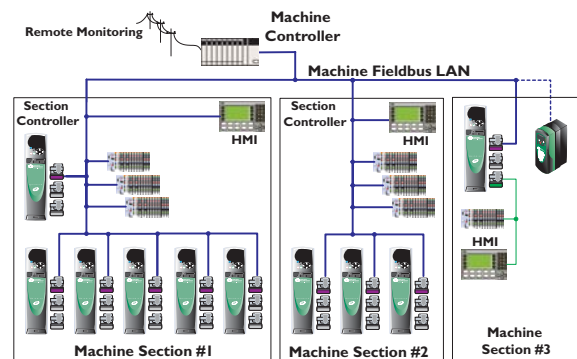
UNIDRIVE ^{SD} INTEGRATION WITH NETWORK CONTROL STRATEGIES

In modern facilities the ability to integrate machine level solutions into factory automation is crucial. The Unidrive ^{SD} makes this simple.

Where there is a choice of network control strategy to be made, Unidrive ^{SD} is equally well suited to centralised, de-centralised or a combination of the two – hybrid.

Centralised control networks

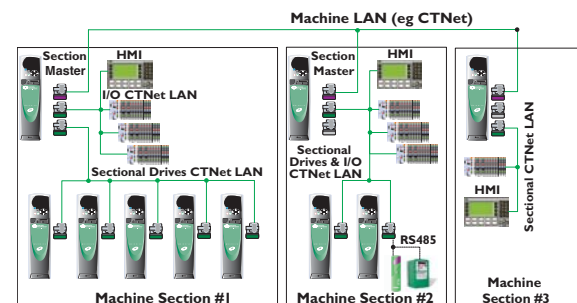
Field bus connectivity enables integration into centralised control systems.



The flexible architecture and 3 universal option slots offer unique opportunities for system configuration, and resource management.

De-centralised control networks

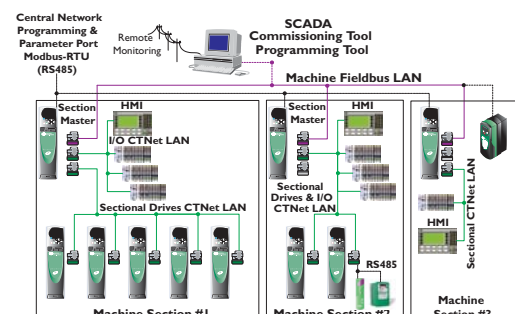
The application processor enables the customer to embed his application program inside the drive for distributed control.



Hybrid (Network segregation)


Networks can be optimised by segregating data by function.

For example, low speed high volume supervisory data on one and high speed low volume machine control on another.



Unidrive PLC Functionality

Today's machine designers and users aim to find the most cost effective method of achieving advanced machine control through the optimum deployment of processing resource, software, and hardware.

The scalability of Unidrive , with its choice of programmable options and tools, enables users to implement the correct level of PLC logic and machine control for their applications.

To optimise the design strategy, there are dual customisation methods with associated options and tools. Select the method that suits your application:

Either SyPT IEC61131-3 based approach...


- Perfect match for machines and applications that are: High volume / high performance
- Different levels of scalable customisation
 - On-board (no options)
 - SM-Applications Lite
 - SM-Applications


...Or convenient Motion Made Easy approach

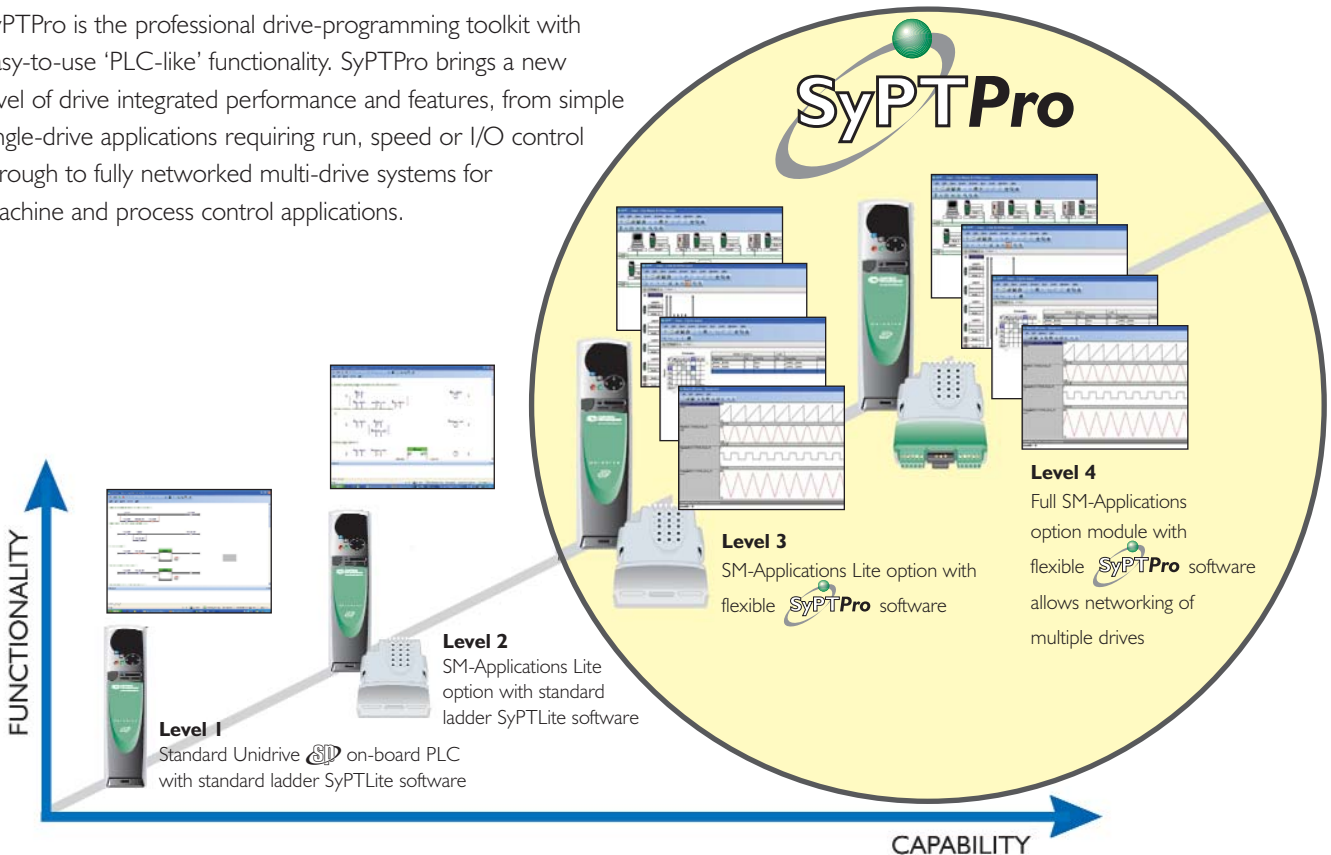
- Perfect match for machines and applications that are: Low volume / low engineering time / high performance
- SM-EZMotion option module
- Simple 5-step process

The drive automation tool to make your machine or factory more productive

SyPTPro is the professional drive-programming toolkit with easy-to-use 'PLC-like' functionality. SyPTPro brings a new level of drive integrated performance and features, from simple single-drive applications requiring run, speed or I/O control through to fully networked multi-drive systems for machine and process control applications.

Unidrive  together with SM-Application or SM-EZ Motion options forms a fully digital high performance motion control system:

- 250µs position control loop update
- To maximise performance the position control loop is synchronised accurately to drive speed and current loops
- To implement real time control, each option is synchronised with the drives internal control loops with $\pm 0.6\mu\text{s}$ jitter
- Unidrive  may be connected to most encoder feedback devices including high-resolution SinCos encoders. Encoder resolution improves the positioning accuracy and performance of the system
- Additional feedback option modules allow master/slave configurations such as electronic gearbox, flying shear or rotary knife



Level 1 SyPTLite – IEC61131-3 Software



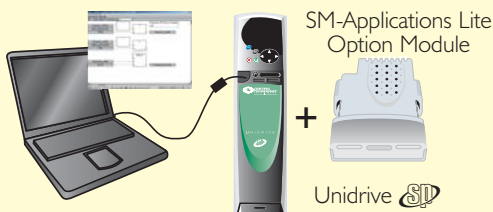
User benefits

- All standard PLC logic functions, timers, counters, analogue comparators... and many more
- Replaces relay logic components as well as nano-PLCs and saves space
- Up to 50 ladder logic rungs
- 7 function blocks and 10 contacts per rung
- More than 150 instructions

Typical applications

- Ancillary pumps, fans and control valves, interlocking logic, sequencing routines

Level 2 SyPTLite – IEC61131-3 Software



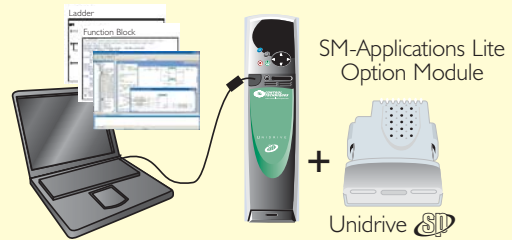
Extra user benefits above level 1

- Replace micro-PLCs
- Real time PLC to drive communication via internal dual-port RAM
- Real time clock task synchronised to drive control loops
- Up to 150 ladder logic rungs
- Almost unlimited function blocks and contacts per rung
- More than 500 instructions

Typical applications

- Time critical sequencing, cam switches, hoist and crane control, conveyor positioning

Level 3 SyPTPro – IEC61131-3 Software



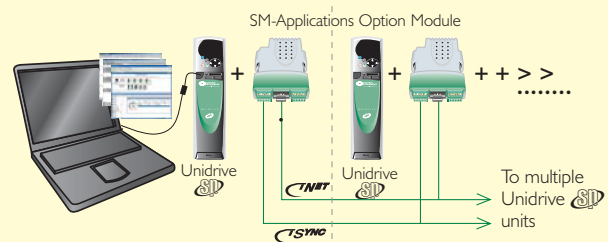
User benefits above level 2

- Replaces micro and small PLCs
- Comprehensive library of PLC function blocks
- Interrupt and position loop tasks
- Create variables – 32 bit integer, single and double precision floating point
- More than 5,000 instructions
- Preconfigured software available, as function blocks, for winders, flying shears and fan & pump duty assist applications

Typical applications

- Centre winder, cam, gearing / digital lock using the SM-Encoder Plus (2nd encoder input) option, speed functionality

Level 4 SyPTPro IEC61131-3 Software










User benefits above level 3

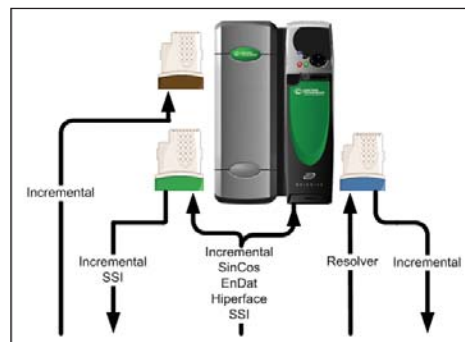
- Replaces small, medium and large PLCs with single or multiple SM-Applications option modules
- Create PLC Ladder logic, Function block or DPL (Drive Programming Logic) programs on the SM-Applications option module
- Extensive PLC functions library
- More than 20,000 instructions
- Range of extended I/O gives almost limitless additional I/O via CTNet on the SM-Applications option module
- Multiple SM-Applications option modules can be linked together to achieve decentralised automation architecture and can be synchronised using the standard on-board and bus connections
- CTSync: a high performance communication link that enables multi-axis control with < 4µsec jitter


Typical applications


- Paper machines, rolling mills, gearing, digital lock
- Distributing data such as speed or torque references for web control applications (e.g. tension control, cascade control etc) on a multi drive network

Integration Options	Order Code	Description
Operator Interfaces 	SM-Keypad	Two row 7 segment LED displays. Easy to see at distance and in poor lighting conditions. The upper display shows the drive status / current menu and parameter number. The lower display - parameter value or the specific trip.
	SM-Keypad Plus	Multi-lingual backlit LCD display with three lines of text. Line 1 shows drive status / current menu and parameter value or the specific trip. Lines 2 and 3 show the parameter name or the help text. There are five languages as standard: French, Italian, German, Spanish and English plus a custom database for application specific text.
	CTSoft and CTScope	Software tools for configuring, mentoring and diagnostics with all Control Techniques AC drives. CTSoft and CTScope are designed for performance for your application. CTSoft also allows you to backup your configuration to re-use with other drives.
	HMI	Our HMI partners are Horner and ESA. For more information please contact your local Drive Centre or distributor.
Programmable Control 	SM-Applications	Powerful applications module for implementing fully customised PLC and Motion solutions, or executing pre-programmed motion sequences. Replaces micro and small PLCs
	SM-Applications Lite	As SM-Applications but with 100kbytes of user flash memory and no CTNet interface, I/O, RS485 interface
	 SyPT Lite	IEC61131-3 ladder logic software providing all standard PLC logic functions, timers, counters, analogue comparators and many more. Replaces relay logic components as well as nano-PLCs and saves space. Free-of-charge with SM-Applications
	 SyPT Pro	SyPTPro is a professional drive system programming environment that maximises the control and performance of the drive. It offers a range of features such as drive network configuration and PLC open motion for high performance positioning
	SM-EZMotion	A cost effective motion controller providing a simple, fast and effective motion solution. Precise, reliable motion control using its own internal processor. Six high-speed, digital I/O points (4 input & 2 output) are standard on the Unidrive  . One-and-a-half axis motion synchronised to a reference encoder (with optional encoder)
PowerTools Pro	Windows-based programming software that provides an unparalleled set-up and commissioning environment for all skill levels – professional motion control engineer, infrequent user, or someone new to servo systems. For use with SM-EZmotion	
Connectivity 	SM-PROFIBUS-DP	Supported data rates (bit/s): 12M, 6.0M, 3.0M, 1.5M, 500k, 187.5k, 93.75k, 45.45k, 19.2k, 9.6k. Configuration: 1 or 4 words 5 Predefined Parameter Process Objects (PPOs) fully supported Control Techniques Single Word mode
	SM-DeviceNet	Up to 500kbits/s data transmission rate; 8 Predefined Objects, Configurable Polled data words; up to 28 in/out supported
	SM-CANopen	Supported data rates (bit/s): 1.0M, 800K, 500K, 250K, 125K, 100K, 50K, 20K, 10K 4 transmit and 4 receive Process Data Objects (PDOs) supported All synchronous and asynchronous PDO communication modes supported Total of 32 bytes (16 words) in each direction using PDOs Direct mapping of PDO data to and from SM-Applications parameters Service Data Object (SDO) provides access to all Unidrive  and SM-Applications parameters Heartbeat protocol supported to guard against loss of communications; Emergency object supported
	SM-Ethernet	10 base-T / 100 base-T; Supports web pages, SMTP mail and multiple protocols; DHCP IP addressing; Standalone operation
	SM-CAN	Customise your CAN protocol with this interface and SM-Applications; CAN 2.0 Part B passive (11-bit identifier) supported 14 transmit/receive CAN slots plus 1 receive only CAN slot Supported data rates: 1M, 800K, 500K, 250K, 125K, 100K, 50K, 20K, 10K; Auto-detection of network data rates
	SM-INTERBUS	1 to 10 input/output cyclic data words (16-bit) supported PCP V2.0, Control Techniques Single Word or PPO 4 Word mode non-cyclic data channel (optional)
	SM-SLM	Provides Unidrive  with SLM functionality to compliment the M'Ax and MultiAx servo product range Encoderless
	CTNet	CTNet is an industrial network designed to be deterministic, robust and tolerant to noise and interference. A maximum of 20 drives can be connected to a CTNet and have a total cable length of up to 100 metres, multiple segments may be connected together to manage and extend systems to be managed and extended. A CTNet port is standard with SM-Applications
	SM-SERCOS	Class B compliant. Torque velocity and position control modes supported with data rates (bit/sec): 2MB, 4MB, 8MB, 16MB Minimum 250µs network cycle time. Two digital high speed probe inputs (1µs) for position capture
	Additional Feedback 	SM-Universal Encoder Plus
SM-Encoder Plus		Additional feedback interface for incremental encoders without commutation signals. No simulated encoder output
SM-Resolver		Feedback interface for resolvers, with a simulated quadrature encoder outputs
I5-way D-type converter		Provides screw terminal interface for encoder wiring and spade terminal for shield
Extra I/O 	SM-I/O Plus	Increases the I/O capability by adding the following to the existing I/O in the drive: Digital inputs x 3, Analog inputs x 3, relay x 2, Analog inputs (voltage) x 2
	SM-I/O Lite	Additional I/O (1 x AI (± 10V bi-polar or 4-20mA), 1 x AO (0-10V or 4-20 mA), 3 x DI and 1 x Relay)
	SM-I/O Timer	As per SM-I/O Lite but with the addition of a Real Time Clock for scheduling drive running
	SM-PELV	Isolated I/O to NAMUR NE37 specifications for chemical industry applications
	SM-I/O 120V	Additional I/O conforming to IEC61131-2 120VAC. 6 inputs and 2 non-protected relay outputs rated for 120VAC
External EMC filters	See Filter Order Codes	To comply with the generic emission standards, a full range of external EMC filters has been designed, specific to the drive footprint (underneath the drive) or bookend (at the side of the drive). For SP4 to SPMD the filters are block mounted
Braking Resistors	1220-2756-01	SP1 heatsink mounted braking resistor. IP54 75Ω at 25°C. Peak power for 1ms is 8kW. Average power for 10ms is 1.6kW.
	1220-2758-01	SP2 heatsink mounted braking resistor. IP54 37.5Ω at 25°C. Peak power for 1ms is 16kW. Average power for 10ms is 3.2kW.

shows trip type	
meter number plus e text databases	
CTScope allow you to configure and optimise your drive to give you maximum drives and ensure security of production.	
istributor	
-engineered solutions. with CTNet interface, I/O, RS485 interface and CTSync.	
or CTSync	
comparators...	
h on-line registration @ SyPTLite.com	
ce of your drive and machine. The software is easy to use and incorporates a wide g. The software is a premium product that requires registration @ SyPTPro.com	
2 output), adding to h encoder module)	
nt equally suitable Free-of-charge, download from ControlTechniques.com.	
able cyclic data words, up to 32 in and 32 out supported; ord or PPO 4 Word mode non-cyclic data channel (optional)	
	
	
ard RJ45 connection	Ethernet TCP/IP
ifiers only)	CAN Interface
a rate	
oder only and Host modes are supported	
A single segment of a CTNet network may connect to gether using CTNet Hubs, allowing large or small drive	
B, 8MB and 16MB.	
output available	
output (voltage) x 1,	
20VAC operation.	
ically for Unidrive  . Up to SP3 these have a choice of two mounting planes style and mount inline with the supply input terminals or elsewhere	
60s is 50W	
for 60s is 100W	




Unidrive  gives users the freedom to select and/or 'gateway' feedback signals



Unidrive  allows different motion solutions to be achieved with maximum performance and at the best value. There are two motion concepts that are widely used in industry:

- Stand-alone dedicated motion controllers including PLC and PC based systems
- Integrated motion controls that fit within the drives own footprint

Unidrive  excels with either concept.


Standalone Motion


Modern stand alone motion controllers use communication systems to link the controller with the drive. Unidrive  has the communications options and I/O capability to integrate closely with the control system using technologies such as SERCOS and CANopen, these networks are specifically designed to satisfy motion requirements by using high speed synchronised networks.

Traditional standalone motion systems used an analogue speed reference to control the drive with incremental encoder signals for position feedback. This control system is well catered for with Unidrive  through high resolution analogue inputs to maximise the performance and simulated incremental encoder outputs. With Unidrive  you can even convert from one encoder technology to another such as high resolution SinCos to Incremental encoder signals.

Integrated Motion


The trend for high productivity machinery is clearly towards motion control that is integrated within the drive platform; this has significant benefits for your application through:

- Reduced communication delays, increasing the response and so performance of the control system
- Precision synchronisation with the drives speed control loop and current loop, again maximising the performance
- Significant cost reduction through reduced hardware costs, smaller foot print and integral power supplies
- Potential for distributing the intelligence and adding system redundancy
- Flexibility to use a wide range of position feedback options supported by Unidrive  as standard, such as high resolution SinCos encoders

Unidrive  integrates motion control through click-in option modules that have their own high performance CPU; this approach does not impact on the drives main microprocessor and so does not compromise the drives ability to attain the maximum motor shaft performance and best motion control possible.

Two option modules families are available for high performance one-and-a-half axis motion control.

SM-EZ Motion

SM-EZ Motion is a premium high performance click in motion controller that is optimised for simplicity of configuration. This is achieved through a dedicated windows software environment called PowerTools Pro connecting to the drive through the main serial port on Unidrive .

PowerTools Pro will guide you step-by-step through the motion configuration for your application. The software tools are supplied with the option module or may be downloaded free of charge from www.controltechniques.com for evaluation.

Hardware and Software Requirements



	Software Environment		Added I/O and Networking			
	Power Tools Pro Support	SyPTPro Support with PLCopen Motion	CTNet Drive-to-Drive Communications	CTSync Drive-to-Drive Synchronisation	RS485 – Modbus RTU	Number of High Speed Digital I/O
SM-Applications		✓	✓	✓	✓	2IN/2OUT
SM-Applications Lite		✓				
SM-EZ Motion	✓					4IN/2OUT

SM-APPLICATIONS & SM-APPLICATIONS LITE

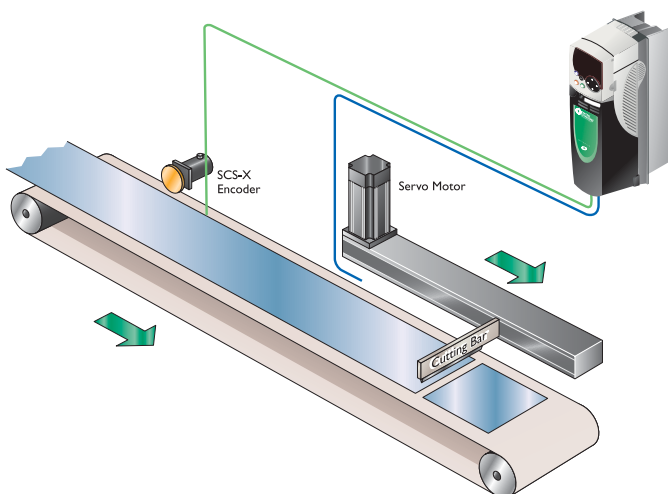
The SM-Applications family of option modules provide a high-performance, high-value canvas for you to create your automation system. The SyPTPro IEC 61131-3 software environment is used to configure the option modules and provide network configuration for drive-to-drive communications using CNet. SyPTPro software offers a high level motion development environment that makes projects quick, easy and enjoyable to achieve.

Motion Control is integrated within the option module using the now industry standard PLCopen motion control function blocks, meaning that the learning curve to success is short, and the possibilities endless.

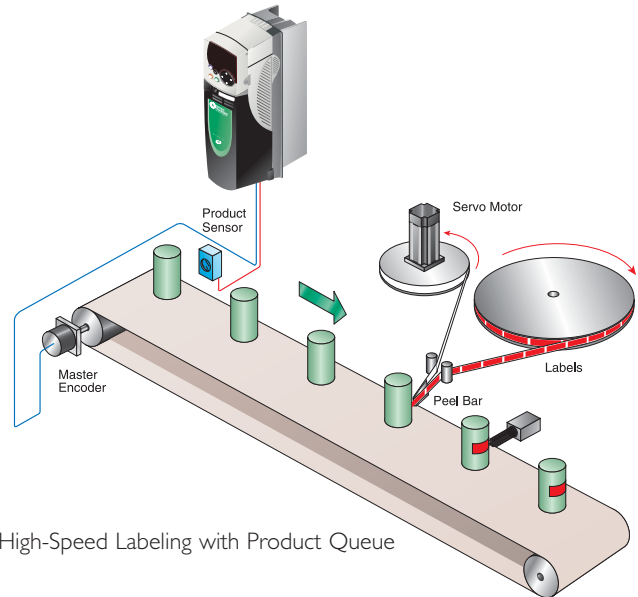
SM-Applications also includes as standard a high speed serial network that can be simply connected from drive-to-drive to send high speed data and synchronise the control loops across multiple option modules and drives in the system. This is achieved using a protocol called CTSync, maximising the performance of the system at zero additional cost. CTSync is frequently used for Virtual Master applications.

Typical Application for Unidrive  includes:

- Conveyor synchronisation
- Feed to sensor/torque
- Labelling and printing
- Point-to-point positioning
- Random in-feed control
- Rotary knife
- Traverse winding
- ...and many more
- Electronic gearing
- Flying cut off
- Multi-lane merge control
- Product spacing
- Registration control
- Thermoforming
- Web control



Flying Shear using Synchronised Indexing



High-Speed Labeling with Product Queue

SPECIFICATIONS

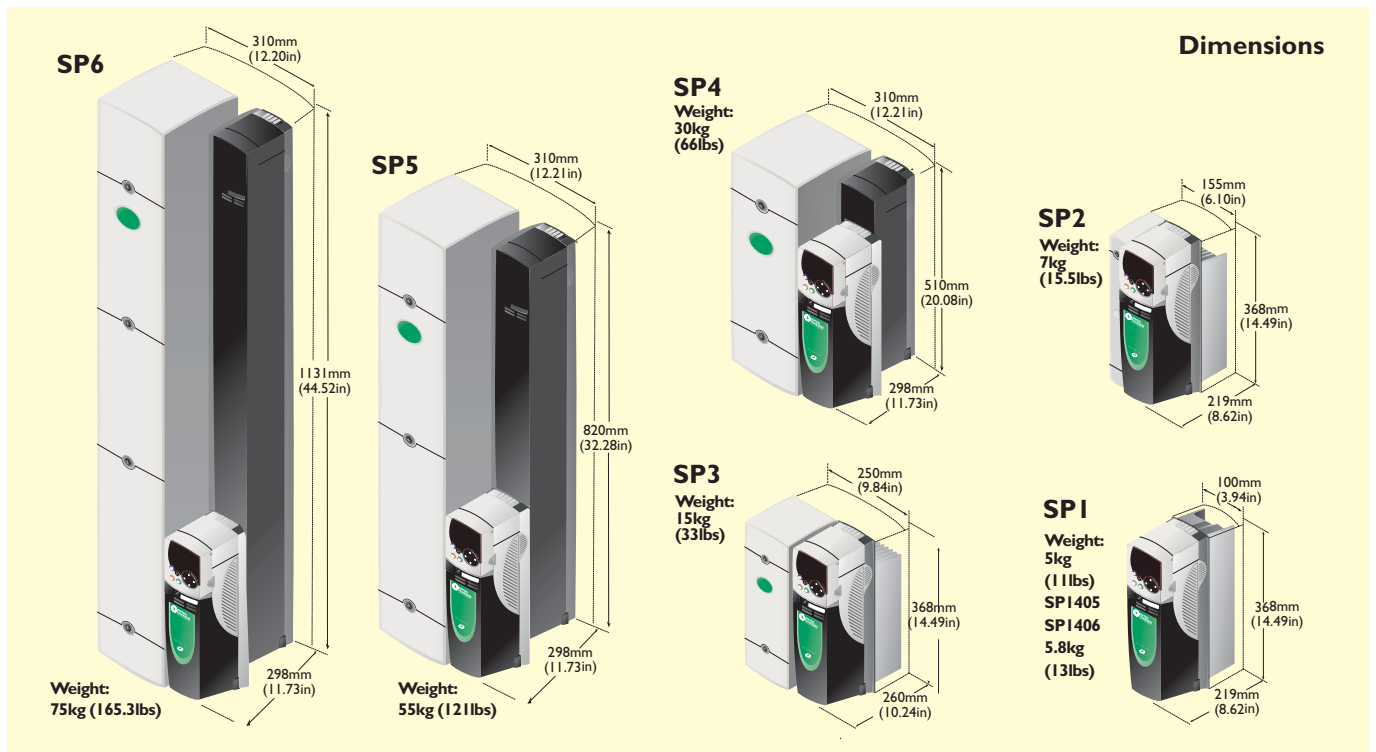
Environmental Safety and Electrical Conformance

- IP20/Nema I rating, IP54 (NEMA 12) through panel mount
- Ambient temperature -15 to +40°C, 50°C with derating
- Humidity 95% maximum (non condensing) at 40°C
- Altitude: 0 to 3000m, derate 1% per 100m between 1000m and 3000m
- Vibration: Tested in accordance with IEC 60068-2-34
- Mechanical Shock Tested: In accordance with IEC 60068-2-27
- Storage temperature -40°C to 50°C
- Electromagnetic Immunity complies with EN 61800-3 and EN 61000-6-2
- Electromagnetic Emissions complies with EN 61800-3 (2nd environment)
- With on board EMC filter; complies with EN 61800-3 (2nd environment)
- EN 61000-6-3 and EN 61000-6-4 with optional footprint EMC filter
- IEC 61000-3-4 Supply conditions
- IEC 60146-1-1 Supply conditions
- IEC 61800-5-1 (Power Drive Systems)
- IEC 61131-2 I/O
- EN 60529 Ingress protection
- EN 50178 Electrical safety (future IEC 62103)
- Independently assessed by BIA (machine safety authority) to EN 954-1 cat 3 (secure disable)
- EN 81-1 assessed by TÜV
- EN 61000-6-2, EN 61000-6-4 EMC
- UL508C, UL840



PANEL MOUNTED DRIVES

- | | |
|--|---|
| ● Global Supply Voltages | ■ <i>One drive range for the world</i> |
| ● Wide power range | ■ <i>One drive for all your applications</i> |
| ● Regeneration with Power Factor Control | ■ <i>Common drive for power supply harmonics reduction</i> |
| ● Low voltage operation | ■ <i>Emergency battery operation for Elevator Rescue</i> |
| ● Built-in EMC filter | ■ <i>EN 61800-3 (revised) 2nd environment</i> |
| ● SMARTCARD as standard | ■ <i>Easy parameter and onboard SyPTLite program Saving & Reading</i> |
| ● Synchronised control loops | ■ <i>External source for deterministic control</i> |
| ● Comprehensive field bus connectivity | ■ <i>Compatible with all major communication standards</i> |
| ● Internal Brake Resistor in SPI and SP2 | ■ <i>Minimum space envelope</i> |



Unidrive Panel Mounted Order Codes

Note Select model on actual motor full load current

	Frame Size	Modules	Normal Duty			Heavy Duty			
			Max Cont Current (A)	Typical Motor Output Power (kW) (HP)		Max Cont Current (A)	Typical Motor Output Power (kW) (HP)		
200-240VAC (kW@220V) (HP@230V) +/-10%	1	SP1201	5.2	1.1	1.5	4.3	0.75	1	
		SP1202	6.8	1.5	2	5.8	1.1	1.5	
		SP1203	9.6	2.2	3	7.5	1.5	2	
		SP1204	11	3	3	10.6	2.2	3	
	2	SP2201	15.5	4	5	12.6	3	3	
		SP2202	22	5.5	7.5	17	4	5	
		SP2203	28	7.5	10	25	5.5	7.5	
	3	SP3201	42	11	15	31	7.5	10	
		SP3202	54	15	20	42	11	15	
	4	SP4201	68	18.5	25	56	15	20	
		SP4202	80	22	30	68	18.5	25	
		SP4203	104	30	40	80	22	30	
380-480VAC (kW@400V) (HP@460V) +/-10%	1	SP1401	2.8	1.1	1.5	2.1	0.75	1	
		SP1402	3.8	1.5	2	3	1.1	1.5	
		SP1403	5	2.2	3	4.2	1.5	3	
		SP1404	6.9	3	5	5.8	2.2	3	
		SP1405	8.8	4	5	7.6	3	5	
		SP1406	11	5.5	7.5	9.5	4	5	
	2	SP2401	15.3	7.5	10	13	5.5	10	
		SP2402	21	11	15	16.5	7.5	10	
		SP2403	29	15	20	25	11	20	
		SP2404	29	15	20	29	15	25	
		3	SP3401	35	18.5	25	32	15	25
			SP3402	43	22	30	40	18.5	30
	4	SP3403	56	30	40	46	22	40	
		SP4401	68	37	50	60	30	50	
		SP4402	83	45	60	74	37	60	
		SP4403	104	55	75	96	45	75	
		5	SP5401	138	75	100	124	55	100
			SP5402	168	90	125	156	75	125
	6	SP6401	202	110	150	180	90	150	
		SP6402	236	132	200	210	110	150	
	500 - 575VAC (kW@575V) (HP@575V) +/-10%	3	SP3501	5.4	3	3	4.1	2.2	2
			SP3502	6.1	4	5	5.4	3	3
			SP3503	8.4	5.5	7.5	6.1	4	5
			SP3504	11	7.5	10	9.5	5.5	7.5
SP3505			16	11	15	12	7.5	10	
SP3506			22	15	20	18	11	15	
4		SP3507	27	18.5	25	22	15	20	
		SP4603*	36	22	30	27	18.5	25	
		SP4604*	43	30	40	36	22	30	
		SP4605*	52	37	50	43	30	40	
		SP4606*	62	45	60	52	37	50	
		5	SP5601*	84	55	75	62	45	60
SP5602*			99	75	100	84	55	75	
6		SP6601*	125	90	125	100	75	100	
		SP6602*	144	110	150	125	90	125	
500 - 690VAC (kW@690V) (HP@690V) +/-10%		4	SP4601	22	18.5	25	19	15	20
			SP4602	27	22	30	22	18.5	25
			SP4603	36	30	40	27	22	30
	SP4604		43	37	50	36	30	40	
	SP4605		52	45	60	43	37	50	
	SP4606		62	55	75	52	45	60	
	5	SP5601	84	75	100	63	55	75	
		SP5602	99	90	125	85	75	100	
		SP6601	125	110	150	100	90	125	
	6	SP6602	144	132	150	125	110	150	

Notes: *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 22kW output motor on a 575V supply and a 30kW output motor on a 690V supply.
Can be used on: ● IT supplies - all voltages ● Grounded delta supplies - all voltages except 690V

Normal Duty (open loop)	Suitable for most applications, current overload is set at 110% for 60 seconds. Where motor rated current is less than the drive rated continuous current, higher overloads are achieved.
Heavy Duty (open loop vector, closed loop or servo)	Suitable for demanding applications, current overload is set at up to 175% for 40 seconds. Where motor rated current is less than the drive rated continuous current higher overloads (200% or greater) are achieved.

Optional External EMC Filters

Drive	Order Code
SP1201 to SP1202	4200-6118
SP1203 to SP1204	4200-6119
SP2201 to SP2203	4200-6210
SP3201 to SP3202	4200-6307
SP4201 to SP4203	4200-6406
SP1401 to SP1404	4200-6118
SP1405 to SP1406	4200-6119
SP2401 to SP2404	4200-6210

Drive	Order Code
SP3401 to SP3403	4200-6305
SP4401 to SP4403	4200-6406
SP5401 to SP5402	4200-6503
SP3501 to SP3507	4200-6309
SP4601 to SP4606	4200-6408
SP5601 to SP5602	4200-6504
SP6401 to SP6402	4200-6603
SP6601 to SP6602	4200-6604



FREE STANDING DRIVES

- | | |
|--|--|
| ● AC in / AC out single drive | ■ For standard applications |
| ● Pre-engineered solution | ■ Customer can focus on application |
| ● Factory produced | ■ Standard worldwide cubicle on short lead-time |
| ● High power density | ■ 355kW = 400mm wide & 675kW = 800mm wide |
| ● Each 400mm wide section shipped separately | ■ Easy to transport and install |
| ● Industry standard form factor | ■ Easy to integrate with existing cubicles |
| ● Ultra compact, low weight power modules | ■ Easy to maintain |
| ● Incomer Shell cubicle option | ■ To integrate customer supplied Switch Fuse, MCCB, EMC filter.
Top or Bottom Cable Entry |
| ● System Shell cubicle option | ■ Location for application specific control equipment |

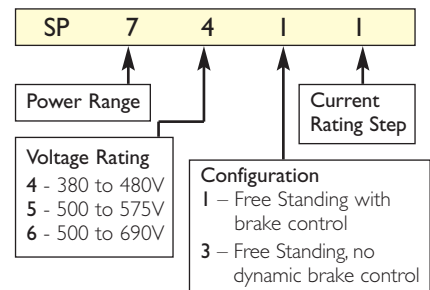
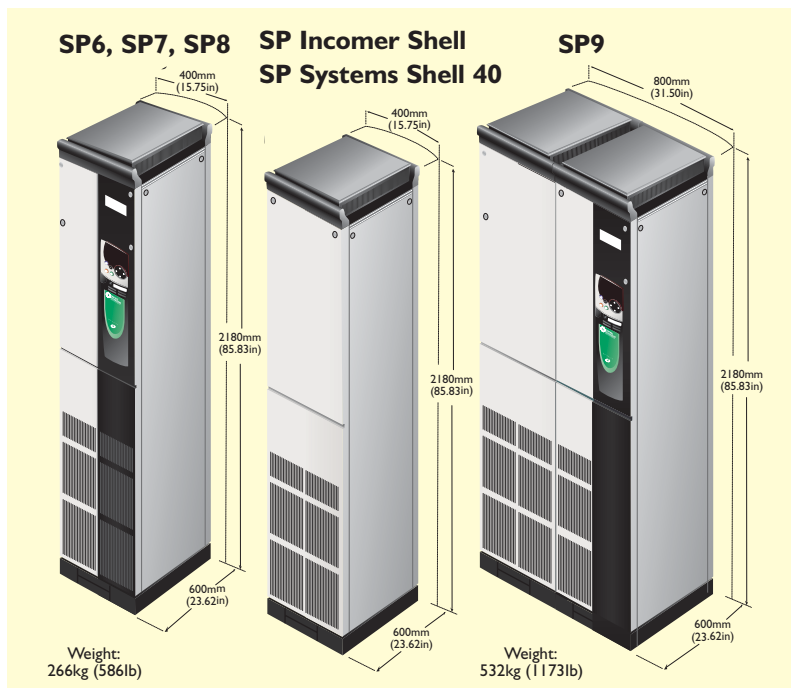




SP6 SP7 SP8 SP9

Note Select model on actual motor full load current

	Compact width (mm)	Order Code	Normal Duty			Heavy Duty		
			Max Continuous Current (A)	Typical Motor Output @ 400V (kW)	Typical Motor Output @ 460V (HP)	Max Continuous Current (A)	Typical Motor Output @ 400V (kW)	Typical Motor Output @ 460V (HP)
380-480VAC +/-10-%	400	SP6411	205	110	150	180	90	150
		SP6412	236	132	200	210	110	150
		SP7411	290	160	250	238	132	200
		SP7412	335	185	280	290	160	250
		SP8411	389	225	300	335	185	280
		SP8412	450	250	400	389	225	300
		SP8413	545	315	450	450	250	400
	800	SP8414	620	355	500	545	315	450
		SP9410	690	400	600	593	315	500
		SP9411	690	400	600	620	355	500
		SP9412	790	450	700	690	400	600
		SP9413	900	500	800	790	450	700
		SP9414	1010	560	900	900	500	800
		SP9415	1164	675	1000	1010	560	900



Order Code	Cubicle Width (mm)
SP Incomer Shell	400
SP Systems Shell 40	400

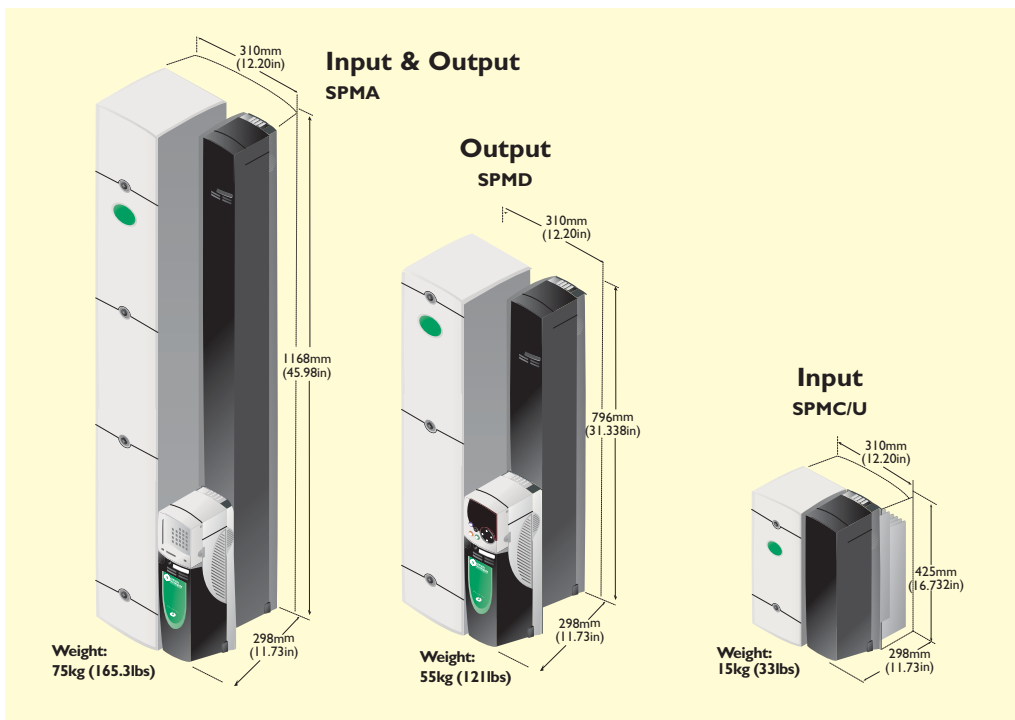
Normal Duty (open loop)	Suitable for most applications, current overload is set at 110% for 60 seconds. Where motor rated current is less than the drive rated continuous current, higher overloads are achieved.
Heavy Duty (open loop vector, closed loop vector or servo)	Suitable for demanding applications, current overload is set at up to 150% for 60 seconds. Where motor rated current is less than the drive rated continuous current, higher overloads (200% or greater) are achieved.



SPMA Master SPMA Slave SPMD Master SPMD Slave SPMC/U Rectifier

MODULAR DRIVES

- | | |
|--|--|
| ● Compact IP20 input and output power modules | ■ Create a comprehensive range of custom power systems |
| ● Utilize an existing DC supply | ■ Economic integration with existing plant |
| ● Return braking energy to AC supply with standard inverter modules | ■ Reduce running cost |
| ● Recycle energy between simultaneously motoring and regenerating drives | ■ Ideal for unwinding / winding processes |
| ● Enable a single AC power entry | ■ Simplify installation and minimise cabling |
| ● Minimise harmonics with 12, 18 and 24 pulse rectifier configurations | ■ Meet more demanding supply regulations |
| ● Eliminate harmonics with an active front end | ■ Comply with supply regulations |
| ● Control high current motors by paralleling output inverter modules | ■ Build customised high power drives with standard volume produced modules |



Drive & Application Centres

AUSTRALIA

Melbourne Application Centre
A.C.N. 003 815 281
Tel: 613 973 81777
Fax: 613 9729 3200
After Hours: 61 2 9963 5271

Sydney Drive Centre
A.C.N. 003 815 281
Tel: 61 2 9838 7222
Fax: 61 2 9838 7764
After Hours: 61 2 9963 5271

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Fax: 43 7229 7894810
After Hours: 43 7215 3502

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Fax: 1 905 201 4694
After Hours: 1 800 893 2321

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After Hours: 1 800 893 2321

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Fax: 1 403 255 4323

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Fax: 86 21 5426 0669

Beijing Application Centre
Tel: 86 10 856 31 122 ext 820
Fax: 86 10 856 35029

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Iftikhar Electrical Est.
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Email: ieeepower@batelco.com.bh

BRAZIL

ACIEL Comercio e Servicos LTDA
Tel: 55 11 5565 5798
Email: aciel@acielf.com.br

Positronic Sistemas Industriais Ltda.
Tel: 55 11 3832 2738
Email: info@positronic.com.br

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Tel: 359 32 968 007
Email: idt@idt.d

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Email: rrsaybe@mercadoindustrialinc.com

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Vicenza Drive Centre
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