CONTROL TECHNIQUES

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Unidrive SP

THE BENCHMARK

Universal AC Drive
Solutions Platform

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Unidrive SP is the Solutions Platform

AC DRIVE 0.75kW TO 132kW

What makes Unidrive SP the benchmark in AC drives?

From the simplest to the most complex AC drive application, Unidrive SP is a truly scalable Solutions Platform.

Unidrive SP is so flexible it can be personalised to your requirements, to lower total costs whilst improving your productivity – Unidrive SP rewrites the standard for all drive users. As a Solutions Platform with ultimate flexibility, it is the point from which all drive users should measure themselves – it is THE BENCHMARK

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Unique integration

Power Range at a Glance

	SIZE 1		SIZE 2		SIZE 3		SIZE 4		SIZE 5		SIZE 6		SIZE 7	
VOLTS	kW	hp	kW	hp	kW	hp	kW	hp	kW	hp	kW	hp	kW	hp
200 – 240	3	3	7.5	10	15	20	30	40	–	–	–	–	–	–
380 – 480	5.5	7.5	15	20	30	40	55	75	90	125	132	200	200	300
500 – 575	–	–	–	–	18.5	25	45	60	75	100	110	150	150	200
500 – 690	–	–	–	–	–	–	55	75	90	125	132	150	185	250

Highest rating in each size is shown, full table inside back page.

Available soon.

flexibility with Unidrive SP - the

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

SM-I/O Plus | SM-I/O Lite | SM-I/O Timer | SM-I/O 120V | SM-PELV | Remote I/O

Standard | Options

Input/Output

Unidrive SP - The Solutions Platform AC drive that delivers more performance and maximum productivity to users through its unique approach to your application.

From stand alone to complex multidrive applications, configure the Unidrive SP to the level of integration to match your application.

Unidrive SP - The Solutions Platform AC drive that matches your application perfectly.

Communications

Standard | Options

Modbus RTU | PROFIBUS | INTERBUS | CAN Interface | DeviceNet | ***Ethernet TCP/IP*** | CANopen | CTNET | SERCOS interface | SLM technology

For further information, documentation and local support go to **www.controltechniques.com**

Solutions Platform

Applications with PLC or Motion functionality

SM-Applications Lite OR SM-Applications

SM-EZMotion

On board functionality

Programming Platform
SyPTLite OR SyPTPro (IEC61131-3)

Programming Platform
Power ToolsPro
Motion Made Easy
Indexing
Gearing
Profiles

PLC Functionality
Function Block Programming
Ladder Logic Sequencing

AND

Motion Functionality
Advanced Position Controller
Function Block Programming
Ladder Logic Sequencing

CSYNC

Automation Hierarchy

Centralised Control

De-centralised Control

Hybrid Control

Feedback

Standard

SinCos
Quadrature
Frequency/Direction
Clockwise/
Counter clockwise

EnDat

HIPERFACE®

ssi

Options

SM-Universal Encoder Plus

Accepts or replicates all standard feedback types

SM-Encoder Plus

Quadrature

SM-Resolver

N1652

LISTED 8D14

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Unidrive SP

OVERVIEW OF THE SOLUTIONS PLATFORM

- **Universal Digital AC Drive**
- **0.75 to 30kW, 3 phase, 200-240 VAC**
- **0.75 to 132kW, 3 phase, 380-480 VAC**
- **1.5 to 110kW, 3 phase, 575 VAC**
- **18.5 to 132kW, 3 phase, 690 VAC**
- **Five operating modes with energy-saving Power Factor Control in Regen Mode***
- **Secure Disable for contactor elimination to EN954-1 cat 3**
- **SMARTCARD – Parameter cloning and back up card**
- **Universal feedback interface with 12 selectable modes**
- **High resolution analog input (16 bit plus sign)**
- **RS485 Interface for PC connection**
- **Dual duty ratings: Normal and Heavy**
- **Three zero-space universal option slots**

Multiple Fieldbus Capability

The Unidrive SP provides unrivaled fieldbus flexibility. In addition to the standard Modbus RTU port, up to three fieldbus option modules can be installed in the Unidrive SP's option slots.

PLC/Motion Functionality with Unidrive SP

In addition to the extensive drive configuration capabilities of the Unidrive SP, scalable programming is available to solve virtually any application requirements.

48-96V DC Main Power Supply Input

Ideally suited for elevator rescue and machine tool set up.

Comprehensive Autotune

Inertia measurement and static autotune reduce startup time.

Keypad Options

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

Drive Mounted Brake Resistor

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

*Note: Additional components are necessary to produce a regen drive package.

Typical Applications

Extruder

Elevator Control

Conveyor

Wire Drawing

Pump

Bridle Control

Unidrive SP

SOLUTIONS PLATFORM HIGHLIGHTS

Unidrive SP 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
- Smooth changes between speed and torque control
  – 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
Analog Input Resolution	16 Bit + sign (qty 1),10 Bit + sign (qty 2)
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) standard. Dynamic braking transistor standard
Supply Dip Ride Through	Up to 1 second depending on inertia and decel time

Unidrive SP's speed loop step response
Switching Frequency = 12kHz
Damping Factor = 1.0
Bandwidth as shown

Autotune

- Stationary autotune
  - Measures stator resistance and voltage offset for dynamic vector control (for open and closed loop)
  - Ideal for tuning loaded motors (eg elevators). Power factor must be entered manually from nameplate
- 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
- Inertia measurement
- Servo autotune with minimal movement (5º electrical)
  - Primarily for linear motors, but also useful for rotary motors 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 together and can synchronise with an external source. This enables precise multi-axis motion co-ordination with Unidrive SP.

Position loop

- Update time of 250µs; bandwidth 8Hz

Speed loop

- Update time of 250µs; bandwidth 150Hz
- 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; typical bandwidth 830Hz
- 'In-motion' transfer between open and closed loop control
  – for high speed machine tool spindles
- 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

- Open loop, closed loop, servo, linear
- 40,000rpm maximum shaft speed
- Output frequency to 3kHz open loop and 1.2kHz closed loop
- Up to 16kHz switching frequency for near silent operation
- Second motor map for rapid change between motors
- Support for embedded motor map in encoders with serial communications

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
- Supply disturbances: Phase loss, imbalance, brown out, notching, over voltage
- Wiring errors: Output short, output earth fault, I/O overload, encoder wire break and short circuit
- Polarised control connectors – cannot be mixed up

Unidrive SP Configuration & Set Up

SMARTCARD

- Easy parameter & program loading
- Simplified maintenance and set up
- Machine upgrades can be shipped on a SMARTCARD and easily installed
- Low cost archiving saving of parameter set up
- 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

A PC configuration tool for all Control Techniques products to download/upload parameter sets to drives. It stores multi-drive parameter set-ups as projects and can browse all CTNet networks connected to the option slots of the drive.

- All functions are accessed from a tree view and include all Unidrive SP options
- CTSoft handles multiple options on one drive, including 3 off SM-Applications or multiple field buses. Parameter files can be imported/exported to other applications
- Customisable set up wizard to tailor the drive to an application or industry, with familiar units or terminology
- On-line monitoring of drive parameters including drive logic diagrams

SELECT KEYPAD

No Keypad	Standard format. Ideal for high volume applications where 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 SP 1 and 2 have an optional space-saving heatsink mounted self-fusing resistor – no external overload needed.

BUILT-IN EMC COMPATIBILITY

Built-in filter allows drive to comply with EN 61800-3 (standard for Power Drive Systems) with 4m motor cable, and it continues to work and reduce emissions up to 100m.

ON BOARD DIGITAL INPUTS/OUTPUT

Analog inputs

1 High precision (16 bit plus sign) differential

2 General purpose (10 bit plus sign) with update times of 250µs or 4ms

Analog outputs

2 General purpose voltage or current (10 bit plus sign) with 4ms update time

Digital inputs

1 Secure Disable, 3 general purpose at 4ms update with the possibility of 2 having a 250µs update when configured as limit switch inputs

Selectable digital outputs/inputs

3 General purpose at 4ms update time. 1 relay output; normally open. 1 relay driver output.

ENCODER FEEDBACK

Compatibility virtually guaranteed with support for 12 different feedback device configurations as standard, including:

Quadrature (up to 400kHz), SinCos (single and multi-turn, Hiperface and Endat), SSI (plus grey code), Frequency and Direction, CW/CCW and Resolver.

Drive encoder connector
Female 15-way D-type

Additional universal feedback interfaces with identical specification may be fitted in the option slots, in the form of the SM-Universal Encoder Plus option, for synchronisation and positioning applications. This option also provides an encoder simulation output for all the configurations, other than SinCos.

Simulated Encoder or Motion Controller Gateway

The universal feedback interface enables an "encoder gateway" to be configured with the Unidrive SP.

Unidrive SP can be configured to input one type of reference encoder signal and at the same time output another providing a gateway to your motion controller. By virtue of the three universal option slots, the Unidrive SP could have a total of four configurable encoder inputs and three encoder outputs.

SM-APPLICATIONS

Powerful applications module for implementing fully customised PLC and motion solutions, or executing pre-engineered solutions, without the costs normally associated with buying and programming PLCs.

Features:

- Program in function block, ladder or Drive Programming Language with IEC61131-3 based programming tool
- 32 bit RISC processor
- Synchronisation with drive control loops
- 384kbytes of user flash memory, 80kbytes of user RAM, 400 x 32 bit non-volatile registers
- Speed reference and feedback resolution to 3 decimal places
- Torque reference and feedback resolution to 2 decimal places

Programmable User tasks:

- **Clock task:** Synchronised for precise real time control function with selectable update times between 4ms and 200ms
- **Position tasks:** 2 are available, synchronised with the drive position loop. One task executes immediately prior to the position loop and one immediately after. Update times selectable from 250µs to 8ms
  - **Drive to drive synchronisation:** may be implemented for multi-axis motion co-ordination, using the RS485 port configured for CTSync mode
- **Event task:** Triggered by timer I/O, software, CTSync or field bus cyclic data

SM-APPLICATIONS LITE

This module allows system designers to offer an intermediary level of Drive Programming Language, Ladder and Function Block programming as an alternative to the full SM-Applications in applications where CTNet, additional I/O, RS485 interface or CTSync are not required.

Unidrive SP System Design

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 fail-safe, 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.

- Reduces user cost in machine safety designs that must comply with EN954-1 category 3, EN81-1 lifts
- 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 EN954-1 category 1

- **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 EN954-1 category 3

- Secure Disable can form part of a EN954-1 Cat 4 system (or a need of EN81-1 for lift industry) 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 SP Secure Disable Function".

BACK UP POWER SUPPLY INPUTS

- **24Vdc input – control**

  Allows the control circuits of Unidrive SP 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) or to limit the speed of a motor during commissioning (eg robot cell)

THROUGH-HOLE MOUNTING

For convenient heat dissipation and cubicle size reduction all Unidrive SP frame sizes can be through-hole-mounted. An IP54 mounting kit is included as standard and IP54 fans are available as an option.

UNIDRIVE SP INTEGRATION WITH NETWORK CONTROL STRATEGIES

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

Where there is a choice of network control strategy to be made, Unidrive SP 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.

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 SP REGEN MODE

Unidrive SP can be configured to provide full four-quadrant control of the power or drive system. In regen 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.

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

Specification of integration options

Integration Tools	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 the drive status / current menu and parameter number. The lower display - parameter value or the specific
	SM-Keypad Plus	Multi-lingual backlit LCD display with three lines of text. Line 1 shows drive status / current menu and param parameter value or the specific trip. Lines 2 and 3 show the parameter name or the help text. There are fiv as standard: French, Italian, German, Spanish and English plus a custom database for application specific text
	CTSoft	A common windows tool for all Control Techniques products that enables the user to download and upload Multi-drive parameter setups can be stored as projects and all networks connected to the drive can be brow
	HMI	Our HMI partners are Horner and ESA. For more information please contact your local Drive Centre or dis
Programmable Motion	SM-Applications	Powerful applications module for implementing fully customised PLC and Motion solutions, or executing pre 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
	SyPTLite	IEC61131-3 ladder logic software providing all standard PLC logic functions, timers, counters, analogue com and many more. Replaces relay logic components as well as nano-PLCs and saves space. Free-of-charge wit
	SyPTPro	Professional drive-programming tool kit for OEM's and End Users. Replaces micro and small PLCs. Comprehensive library of PLC function blocks. Interrupt and Motion Tasks; Chargeable with on-line registrat
	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 & the six standard on the Unidrive SP. One-and-a-half axis motion synchronised to a reference encoder (with e
	PowerTools Pro	Windows-based programming software that provides an unparalleled set-up and commissioning environmen 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. Configura 1 or 4 words 5 Predefined Parameter Process Objects (PPOs) fully supported Control Techniques Single Wo
	SM-DeviceNet	Up to 500kbit/sec 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 SP 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; Stan
	SM-CAN	Customise your CAN protocol with this interface and SM-Applications; CAN 2.0 Part B passive (11-bit ident 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
	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 SP with SLM functionality to compliment the M'Ax and MultiAx servo product range Enco
	CTNet	CTNet is an industrial network designed to be deterministic, robust and tolerant to noise and interference. A up to 20 drives and have a total cable length of up to 100 metres, multiple segments may be connected tog 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, 4M Minimum 250 s network cycle time. Two digital high speed probe inputs (I m s) for position capture
Additional Feedback	SM-Universal Encoder Plus	Support for 14 different feedback device configurations as standard, plus a simulated encoder output
	SM-Encoder Plus	Additional feedback interface for incremental encoders without commutation signals. No simulated encoder
	SM-Resolver	Feedback interface for resolvers, with a simulated quadrature encoder outputs
	15-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 Digital I/O 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 IEC6 1131-2 120VAC. 6 inputs and 2 non-protected relay outputs rated for 12
External EMC filters	See Filter Order Codes	To comply with the generic emission standards, a full range of external EMC filters has been designed, specif footprint (underneath the drive) or bookend (at the side of the drive). For SP4 to SP7 the filters are block sty
Braking Resistors	1220-2756-01	SP1 heatsink mounted braking resistor. IP54 75Ω at 25ºC. Peak power for 1ms is 8kW. Average power for
	1220-2758-01	SP2 heatsink mounted braking resistor. IP54 37.5Ω at 25ºC. Peak power for 1ms is 16kW. Average power f

shows
trip type

neter number plus
e text databases

l parameter sets to all Control Techniques drives.
vsed. Also allows on-line monitoring

tributor

-engineered solutions. with CTNet interface, I/O, RS485 interface and CTSync.

or CTSync

parators…
h on-line registration @ SyPTPro.com

tion @ SyPTLite.com

2 output), adding to
encoder module)

t 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)

dard RJ45 connection — ***Ethernet TCP/IP***

ifiers only)

CAN Interface

rate

der 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 SP. Up to SP3 these have a choice of two mounting planes
yle and mount inline with the supply input terminals or elsewhere

60s is 50W

for 60s is 100W

Motion Made Easy for OEMs, integrators, machine builders and encoders

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

Example of Unidrive SP integrating distributed control

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

A wide range of additional I/O options to suit all applications

Unidrive SP PLC & Motion 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 SP, 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 SP 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 ±0.6µsec jitter
- Unidrive SP 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 free with registration via www.controltechniques.com or SyPTLite.com

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 free with registration via www.controltechniques.com or SyPTLite.com

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 with user licence via www.controltechniques.com or SyPTPro.com

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

Level 4 SyPTPro IEC61131-3 Software with user licence via www.controltechniques.com or SyPTPro.com

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

CTSYNC – CTSync is a high performance communication link that can improve your machine's performance and reduce the cost of your control system. CTSync is standard with SM-Applications. It provides synchronisation between drive control loops thus allowing the creation of a virtual master reference.

Traditional master / slave synchronisation

Disadvantages of traditional master/slave:

- High resolution SinCos encoders and SLM Encoders cannot be multi-dropped
- Difficult connections required for many encoder types, minimum of 6 wires
- Expensive encoder options required on every slave
- Drives software and control loops not synchronised between all drives preventing effective co-ordinated multi-axis position control
- Not always possible to connect a master encoder

Using a Virtual Master Reference:

Example: Motion control with 4 axis linear interpolation

Advantages of 'Virtual Master':

- Co-ordinated multi-axis control with < 4µsec jitter
- Solution for when a real encoder cannot be physically fitted to a machine
- Cleaner noise free signal for guaranteed performance
- Compensation with feed-forward
- Choice of encoder resolution

MOTION APPLICATIONS WITH SyPTPro, SM-APPLICATIONS AND UNIDRIVE SP

CAM – Applications: Any synchronous motion applications, flying shear, rotary knife,etc

- Multiple interpolations between each co-ordinate of the master & slave
  - Linear – Constant velocity
  - Square – Linear ramped velocity
  - Cosine – Sine ramped velocity
  - All the above can be from 0 velocity or an offset velocity
- Single shot or continuous cycling of the CAM modes
- Dynamic change of CAM segment, e.g. start and finish
- Master and Slave co-ordinates are entered as array elements, which can be dynamically changed on the fly or fixed in flash memory

CAM

Flying Shear - Intime

Position Profile Generator – Applications: indexing & point to point

- Linear ramps
- Acceleration, max speed and Jerk parameters can be dynamically changed on the fly

Index Position Profile Generation

Feeder Application

Extend – retract

Speed Profile Generator – Applications: jogging, homing

- Linear or 'S' ramps
- Acceleration, max speed and Jerk parameters can be dynamically changed on the fly

Speed Profile Generation

Bridle Control

Wire Drawing

Electronic Gear Box (Digital Lock) – Applications: Master follower applications, conveyors etc

- Wide range of Gear ratios, 32bit integer Numerator/Denominator
- Rigid Lock - ramp to ratio line speed and recover lost position during acceleration, then lock into line position
- Non-Rigid Lock - ramped to ratio line speed and lock into line position
- Lock, No ramps, lock into line position, like a true gearbox

Digital-Lock

Shaftless Offset Printing

Digital Lock
Electronic Lineshaft

'MOTION MADE EASY'

For most motion control applications, users are looking for fast set-up, short software learning curves and fill-in-the-dialogue-box, programming that achieves motion profiles quickly and reliably. The Unidrive SP 'Motion Made Easy' option has been designed specifically for those users.

Control Techniques' PowerTools Pro is a Windows™-based programming software that provides an unparalleled set-up and commissioning environment equally suitable for all skill levels – professional motion control engineer, infrequent user, or someone new to servo systems.

- "Plug and Play" implementation configures the Unidrive SP parameter settings, making hardware setup almost automatic
- Program the SM-EZMotion without removing the cover or powering down by using the Modbus RTU port on the front of the Unidrive SP
- Data entry simplified using WindowsTM-based interface
- Fill-in-the-Dialogue Box values
- Point-and-Click Radio Buttons
- Scrolling Menu Selections
- Drag-and-Drop parameters and I/O assignments
- The Hierarchy view provides instant access to all the tools in PowerTools Pro and is the key to "Motion Made Easy"
- PowerTools Pro software is free—go to www.controltechniques.com and download your copy now

SM-EZMotion option

The SM-EZMotion is a cost effective motion controller which clicks into a Unidrive SP option slot to give 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), in addition to the six standard on the Unidrive SP
- One-and-a-half axis motion synchronised to a reference encoder (with encoder module)

Designed to get users up and running quickly with applications such as:

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

Flying Shear using Synchronised Indexing

High-Speed Labeling with Product Queue

Specifications

Dimensions

Environmental Safety and Electrical Conformance

- IP20/Nema 1 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 68-2-34
- Mechanical Shock: In accordance with IEC 68-2-27
- Storage temperature -40°C to 50°C
- Electromagnetic Immunity complies with EN61800-3 and EN50082-2
- Electromagnetic Emissions complies with EN61800-3 (second environment)
- With on board EMC filter. complies with EN61800-3 (first environment)
- EN50081-1 and EN50081-2 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 61800-5 Safety
- IEC 60364-4-41 Safety
- IEC 60950 Safety
- IEC 60664-1 Insulation
- IEC 60068-2 Physical environmental tests
- 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 50178
- EN 61000-6-2, EN 61000-6-4 EMC
- EN 954-1 Machine safety + EN 81-1 Elevators
- UL508C, UL873, UL840, UL94V1

Options Ordering

Description	Order Code
Cloning & Programme Storage	Smart Card***
Configuration Tool	CTSoft***
Communications Cable	CT Comms Cable
No Keypad	As standard
LED Keypad	SM-Keypad
Backlit LCD Keypad	SM-Keypad Plus
Operator Interfaces	Consult Drive Centre
Internal Fitting Brake Resistor	†
Internal Fitting EMC Filter	As standard
External Fitting EMC Filters	See table opposite
Universal Encoder Feedback	SM-Universal Encoder Plus
Second Encoder Feedback	SM-Encoder Plus
Resolver Input Feedback	SM-Resolver**
Encoder Screw Terminal Connector	15-way D-type Connector
Extended I/O	SM-I/O Plus
Extra I/O	SM-I/O Lite
Extra I/O with Real Time Clock	SM-I/O Timer
120V I/O	SM-I/O 120V
Isolated I/O	SM-PELV
Remote Network I/O	Beckhoff I/O
Modbus RTU (Standard)	SM-Applications*
PROFIBUS-DP	SM-PROFIBUS-DP
INTERBUS	SM-INTERBUS
DeviceNet	SM-DeviceNet
CTNet	SM-Applications
CANopen	SM-CANopen
CAN Interface	SM-CAN
SLM	SM-SLM
SERCOS	SM-SERCOS
Ethernet	SM-Ethernet
System Programming Co-processor	SM-Applications
System Programming Co-processor	SM-Applications Lite
Motion Made Easy Co-processor	SM-EZMotion**
SyPTLite Software Tool	Free with Unidrive SP
SyPTPro Software Tool	SyPTPro
PowerTools Pro Software Tool	Free at Control Techniques.com
Dual Mode Winder Software	SSP-4000-0010
Flying Shear Control Software	SSP-4000-0020
Fan and Pump Duty Assist Software	SSP-4000-0030

* Provides additional Modbus RTU port
** Only one of these modules per drive
*** Supplied as standard with Unidrive SP
† SP1: 1220-2756-01 SP2: 1220-2758-01

Ratings & Order Codes

CONTROL TECHNIQUES
www.controltechniques.com

Note Select model on actual motor full load current

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

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

www.controltechniques.com

Providing Solutions for Industries & Motion Applications

Control Techniques drives are found in nearly every industry where electric motors are used, providing outstanding reliability, performance, safety and economy. Engineers and machine builders specify Control Techniques drives because they are easily integrated and generate productivity and cost-savings often exceeding expectations.

Automotive

- Chassis Marriage Systems
- Wheel Alignment Systems
- Riveting
- Tyre Mounting
- Paint Shop HVAC
- Test Rigs
- Roll & Brake Test Machines
- Headlight Aiming
- Sub-Assembly Machines
- Laser Welding
- Wind Tunnels

Unidrive's integration flexibility is making it the "standard" drive in automobile plants around the world. The rolling test rig, shown, performs simulated road testing of front-wheel, rear-wheel and four-wheel drive vehicles, checking motor, brake, and gearbox performance, road-noise decibel levels, and the car's ABS and ACS systems.

Packaging

- Form / Fill / Seal Machines
- Labelers
- Case Packers
- Carton and Case Erectors
- Baggers
- Bundlers
- Shrink Wrappers
- Smart Belts
- Indexing Tables

The Dual Mode Winder Solution is one of the pre-programmed, basic application solutions developed by Control Techniques for its AC, DC and Servo drives.

Plastics and Rubber

- Extruders
- Mixing
- Core Pulling
- Dual-Turret Winders
- Rotary Knife
- Feeders Heat Sealers/Perforators
- Compounding
- Pullers
- Slitters
- Re-spoolers
- Flying Shear

This oval-tube packaging printer has over 40 servomotors and several AC induction motors.

Cost savings were achieved using the Unidrive SP with an SM-Applications module together with several Commander SE drives to complete this one-of-a-kind machine.

Printing

- High-speed Labelers
- Flexographic Printing
- Electronic Line Shafting
- Infeed & Pay-off Machines
- Web Printing
- Sheet-fed Printing
- Bindery Machines
- Packaging and Palletising

Precision drive-to-drive synchronisation with CTSync on the Unidrive has revolutionised the printing industry with new, "jitter free" 8- and 10-colour flexographic presses. Retrofits with this gearless technology are giving older presses new life and greater flexibility.

Paper, Film and Foil

- Blown and Cast Film
- Laminating
- Vinyl
- Calendaring
- Slitting
- Winders
- Coating
- Metallising
- Embossing
- Drying
- Tubing

Rugged reliability, application flexibility, conformance to industry standards, and safety features have made our digital AC and DC drives the benchmark for drives in the metals industry.

Metals

- Annealing
- Tinning
- Pushers
- Tilt Vessels
- Casters
- Run-out Tables
- Skip Hoists
- Transfer Cars
- Galvanising
- Torch Machines
- Pilers
- Bar and Rod Mills
- Downcoilers
- Pinch Rolls
- Unit Rolls

The powerful and versatile Unidrive is the number one drive in both new installations and retrofits.

Materials Handling

- Augers
- Container Cranes
- Grab Buckets
- Palletising
- Smart belts
- Stacking
- Conveyors
- Gantry Systems
- Lift Systems
- Pick and Place
- Sorting

From anthracite to zinc, from deep in the mountain to on top, Control Techniques drives move industry's raw materials.

Mining

- Centrifuges
- Crushers / Hammer Mills
- Excavators
- Pumps
- Conveyors
- Grab Buckets
- Loaders

Other Industries and Applications Relying on Control Techniques Solutions Platform Drives include:

- Aerospace
- Automated Assembly
- Chemical
- Crane and Hoist
- Fiber and Textiles
- Glass
- Lumber and Timber
- Medical Devices
- Pharmaceutical
- Wire and Cable
- Asphalt and Cement
- Building Materials
- Converting
- Elevator *
- Food & Beverage
- HVAC-R
- Marine
- Oil and Gas
- Water & Waste Water

Need More?

Control Techniques maintains a wealth of information on industry applications on its web site:
www.controltechniques.com

Simply go to the Press page and you will find industry application stories, case studies by industry and product.

*Specific Elevator information and application set ups can be found on **LiftDrives.com**

Further Information - see www.controltechniques.com

Brochure	Part Number
Motion Functionality with Unidrive SP	0175-0327
Motion Made Easy with Unidrive SP	0175-0326
PLC Functionality with Unidrive SP	0175-0328
An Introduction to Unidrive SP	0175-0336
Mentor II Digital DC Drive	0175-0106
Commander SK	0175-0335

Driving the world...

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Fax: 43 7229 7894810
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Providence Drive Centre
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● Drive & Application Centres
● Distributors

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