with Unidrive SP

Savings

- Equipment and machinery manufacturers as well as end-users can achieve lower total component costs using the 'no-extra-cost onboard' motion functions of the Unidrive SP.
- In more complex applications the modular hardware approach allows scaling of processing power so that it more precisely matches the demands of the application.
- Space Saving – the PLC/Motion and integration options for the Unidrive SP save space as they are all fitted internally.
- Reduce commissioning time – Unidrive SP and SM-Applications options can be programmed together, using intuitive PLC programming language to IEC61131-3.
- No additional Power Supply Unit (PSU) needed.
- Direct access to speed set point – no additional analogue connections.

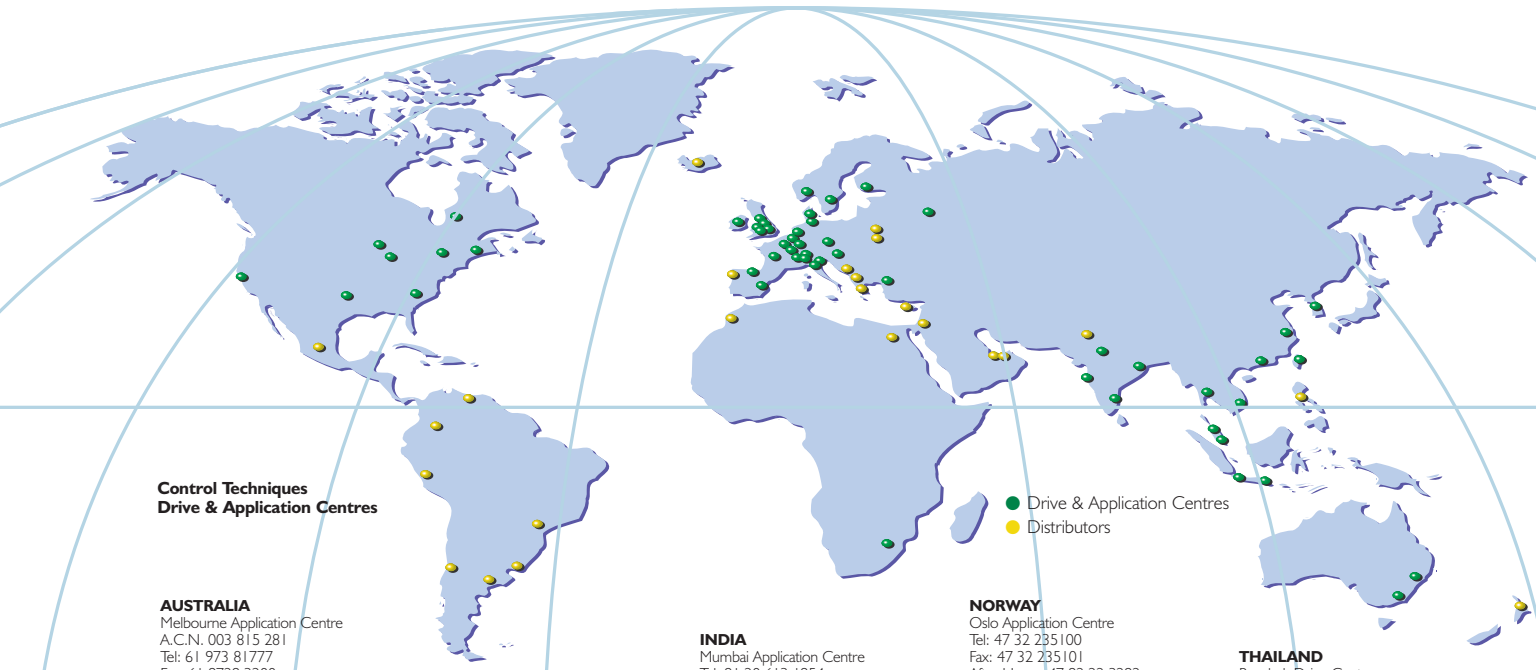
Performance

- **Servo Motion Loop Update Times** – Runs synchronous with the drive speed loop, 250µs, 500µs, 1ms, 2ms, 4ms & 8ms.
- **High Speed Input for Registration** – 24Vdc and 5Vdc differential with SM-Universal Encoder Plus
- **Virtual Master** CTSYNC – Simple RS485 protocol. Synchronises all the connected axes servo loops with the master. The slaves acquire the master notion reference data synchronously ±2µs jitter.
- **Analogue Input** – High precision (16 bit plus sign) differential and general purpose with update times of 250µs or 4ms
- The scalablility of the SM-Applications range allows users to substitute the Unidrive SP for motion controllers.
- Multiple SM-Applications modules and drives can be networked together as part of a decentralised automation system to communicate and share information using the standard on-board CTNET protocol.
- The synchronised real time interface between the Unidrive SP host and the SM-Applications Lite and SM-Applications modules are achieved via the internal ultra-fast quad-port RAM. For example, the SM-Applications module can retrieve parameter information (such as changes in drive load) from the Unidrive SP in 10µs (turn around time of a classic PLC to drive is approx 2ms).
- SyPT's multitasking architecture allows easy implementation and segmentation of "real time" process control algorithms and fixed-base calculations. To optimize process utilisation, you select the jobs that require the highest to lowest attention. For example, the high-priority speed loop task contains motion control instructions that supercede PLC control.

Experience

- Control Techniques has years of successful experience in developing, manufacturing and supplying drives with PLC/Motion functionality. The Unidrive SP takes this strategy even further by its unique modular approach. Our comprehensive libraries of IEC61131-3 software function blocks (PLC, motion and communication) allows users to take advantage of our extensive experience.
- solutions software is available for quick and reliable implementation of Winders, Flying Shears and Duty Assist (pump staging) applications, etc. and consists of pre-configured function blocks.
- Control Techniques Drive Centre engineering staff can offer programming and on-site commissioning help with system implementation as well as after sales support agreements.
- SyPT based programming is the ideal environment for solving motion control applications that require one or more of the following features:
  - *Camming with multiple interpolation types*
  - *Electronic Gearbox*
  - *Indexing*
  - *Resolver Feedback*
  - *Absolute Feedback reference and simulated outputs*
  - *SinCos Hiperface or Endat formats*
  - *Serial Synchronous Interface (SSI)*
  - *Virtual Master*
  - *Synchronised Motion*
  - *Expandable I/O*
  - *Multi Programmable Limit Switch (PLS)*
  - *Multiple Fieldbus Interfacing*
  - *PLC Control*
  - *Closed Loop Motor Control*

Driving the world...



Control Techniques
Drive & Application Centres

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

Sydney Drive Centre
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Tel: 61 2 9838 7222
Fax: 61 2 9838 7764
After Hours: 61 2 9963 5271

AUSTRIA
Linz Drive Centre
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Fax: 43 7229 789481 0
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Fax: 66 2591 4559
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A/Hours Service: 66 1443 4098

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Fax: 90 216 4182423
After Hours: 90 216 418 2420

UNITED KINGDOM
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Fax: 44 1952 213701
After Hours: 44 1952 213700

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Charlotte Application Centre
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After Hours: 1 800 893 2321

Chicago Application Centre
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Fax: 1 630 752 4156
After Hours: 1 800 893 2321

Cleveland Drive Centre
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Fax: 1 440 717 0133
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Minneapolis US Headquarters
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After Hours: 1 800 893 2321

Providence Drive Centre
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Fax: 1 401 333 6330
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/84 8 849 1980
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replace with latest addresses

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CONTROL TECHNIQUES

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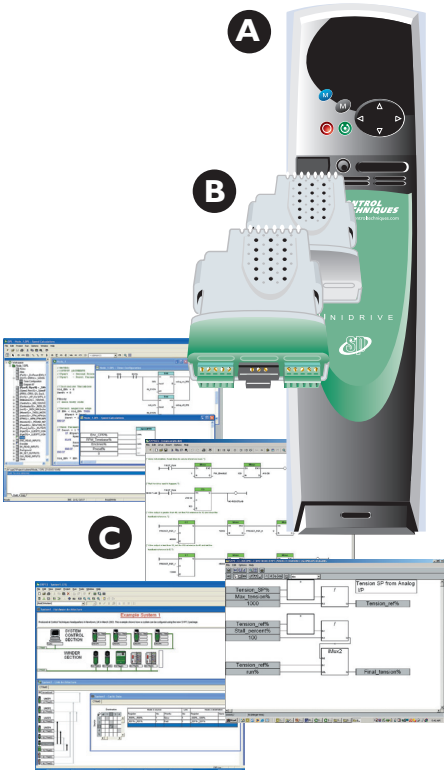
Motion Functionality with Unidrive SP

AC and Servo drive

The Solutions Platform

Scalable Applications & Motion functionality

Unidrive SP, the AC variable speed drive is the true Solutions Platform, offering a wide range of motion control solutions giving users unparalleled performance and flexibility. Real cost and space savings are quickly achievable with the flexible modular Unidrive SP approach in selecting hardware and **IEC61131-3** software.



Why Unidrive SP and 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 application, and hardware. The true scalability of Unidrive SP, SM-Applications and SyPT allows users to match exactly the hardware required to achieve PLC logic and advanced motion control to their application – and cost effectively.

A Unidrive SP - the drive hardware Solutions Platform

- Global voltage availability, 200-575 V, with full range of industrial output ratings – see main product brochure
- Universal motor control platform - induction, servo, linear
- Universal feedback with 14 selectable encoder types including:
  - *Quadrature, SSI, SinCos, Endat, Hiperface – Integration with your motor feedback virtually guaranteed*
- Cost and space saving design features including:
  - *RS485 Port, Modbus RTU*
  - *Secure Disable input as standard to meet EN954-1 cat. 3 – a must for modern machine builders*
  - *Integral EMC filter as standard meets EN61800-3 for global machine conformity*
  - *Optional zero-space dynamic braking resistors*
  - *48 V dc operation for low speed set-up/operation or mains supply back-up*
  - *24 V dc back up to maintain power for control, fieldbus and encoder for commissioning and monitoring with mains disconnected*
- Three option slots supporting a wide range of Solutions Modules for maximum system flexibility.

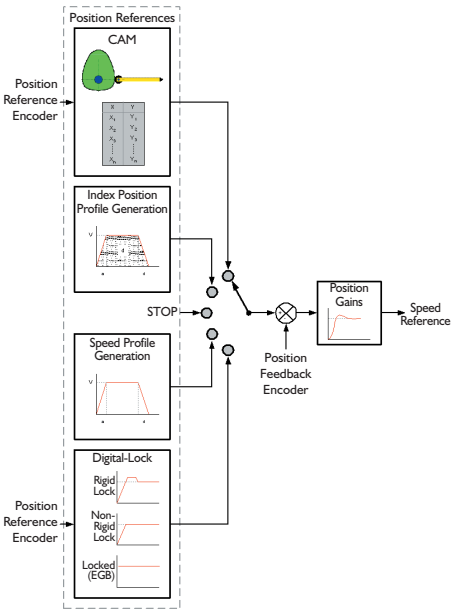
B SM-Applications and SM-Applications Lite

- High speed microprocessor that gives a low cost facility for system designers to write application specific programs without the need for an expensive PLC or other stand alone motion controller.
- Programmable via CTNet or the Unidrive SP RS485 port using SyPT which complies with IEC61131-3.
- The 32 bit RISC processor and 385 K of user program flash memory allow over 5000 lines of ladder logic or basic instruction code. A powerful base for a designer to accomplish complex algorithms for demanding time critical process control.
- CTNet, user configurable RS485 port and high speed I/O on SM-Applications module .

C Systems Programming Tool (SyPT) and SyPTLite

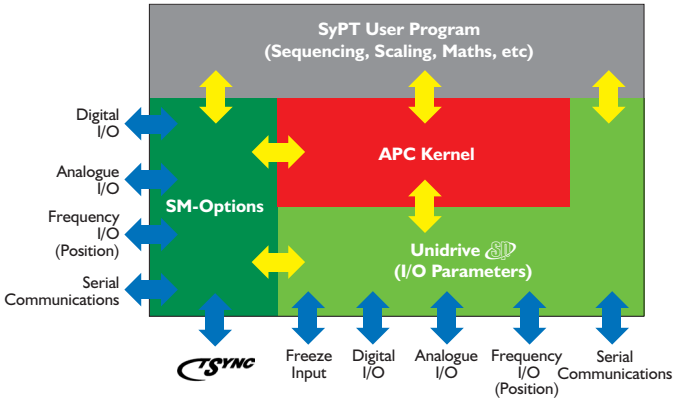
- SyPT software is an intuitive PC/Laptop package for PLC programmers used to working with standard IEC61131-3 programming tools.
- SyPTLite is the entrance level programming tool which is delivered free of charge with the Unidrive SP and can be used straight out of the box for programming in quick ladder logic.
- SyPT is fully flexible programming tool which is supplied with a users licence for programming in Ladder logic, Function blocks, DPL (Drive Programming Language) script.
- SyPT gives the user visibility of the entire system which may include multiple SM-Applications modules, I/O modules as well as fieldbus options.
- Extensive applications based function block library.

SM-Applications, SyPT and Advanced Position Controller (APC)



An Advanced Position Controller with multiple functionality is built into the operating system of the SM-Applications module. The main features of the position controller are:

- Position control using linear ramps for the velocity profile
- Speed control using linear or S-ramps for the velocity profile
- Rigid or non-rigid digital lock with slave ratio
- Incremental cam table providing automatic control of slave position, relative to master position
- Reference and Feedback position sources are fully selectable from any drive or option interface
- Smooth switching between each reference

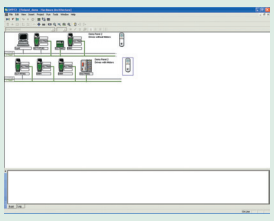


The Advance Position Controller is a software kernel at the heart of the SM-Applications module. The SyPT software package is used to interface the kernel to any of the Unidrive SP parameters and feedback devices allowing control in Open Loop, Closed Loop and Servo modes. Using an industry standard ladder and function block programming environment motion programs can be precisely tailored to applications with ease.

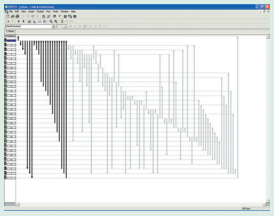
SyPT Programming Package

Drive Network/ System Configuration

Hardware

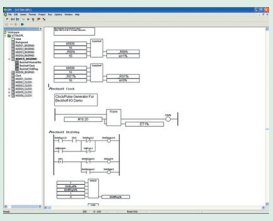


Network Data

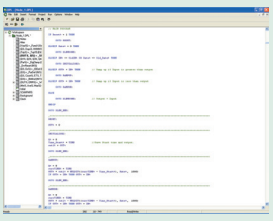


Programming

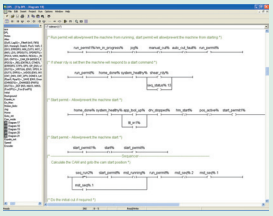
Function Block Editor



DPL Textual Editor

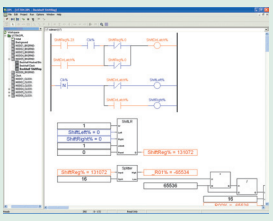


Quick Ladder Editor

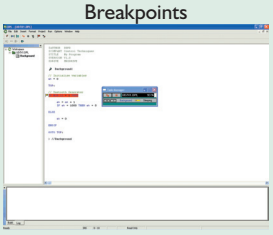


Monitoring & Debugging

On-Line Monitoring



Single Stepping & Breakpoints

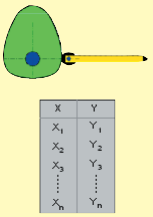


Motion Functionality with Unidrive SP

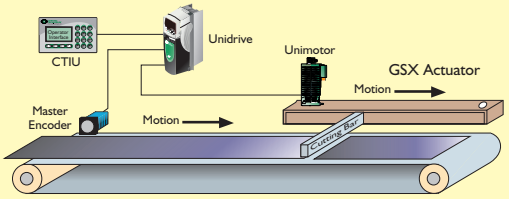
CAM – Application: Any synchronous motion applications, flying shear, rotary knife,etc

- Multiple interpolations between each co-ordinate of the master and 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



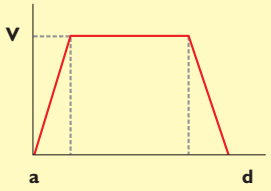
Flying Shear - Intime



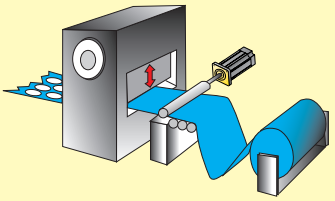
Position Profile Generator – Applications: indexing & point to point

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

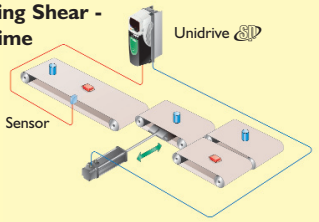
Index Position Profile Generation



Feeder Application



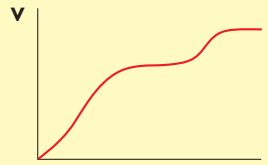
Flying Shear - Intime



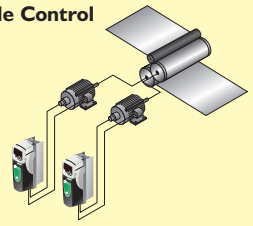
Speed Profile Generator – Applications: jogging, homing

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

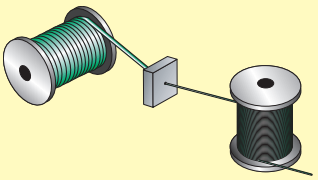
Speed Profile Generation



Bridle Control



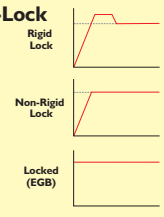
Wire Drawing



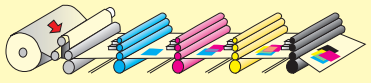
Electronic Gear Box (Digital Lock) – Applications: Master follower applications, conveyors etc

- 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

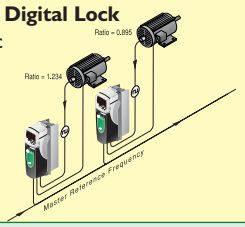
Digital-Lock



Shaftless Offset Printing



Unidrive Digital Lock
Electronic Lineshaft



SyPT- System Programming Toolkit

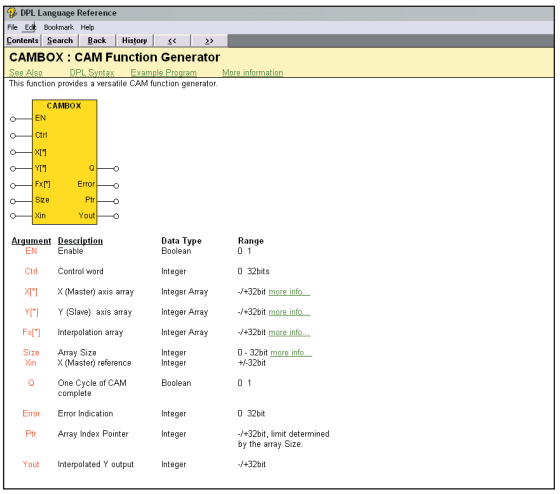
In addition to the extensive custom velocity and torque control capabilities of the Unidrive SP, SyPT provides a comprehensive library of motion function blocks ideally suited to sophisticated motion control applications when using the SM-Applications modules. SyPT motion applications are generally programmed using motion function blocks in an IEC61131-3 multi-tasking environment. Additional ladder and basic commands are typically used for I/O handling and other logic functions. The basic position loop runs in a high priority task to ensure the highest possible system bandwidth is achieved, while other functions, such as timers, run in lower priority tasks.

SyPT's multi-tasking architecture allows easy implementation and segmentation of 'real time' process control algorithms and fixed time-base calculations. To optimize process utilisation, select the jobs that require the highest to lowest attention, for example the high-priority speed loop task contains motion control instructions that take precedence over PLC tasks.

Program Editors

Motion programs can be created using any of the three programming editors, in any combination.

- Chroma coding indicates contact / colt / rung activity during run-time



DPL Textual Editor

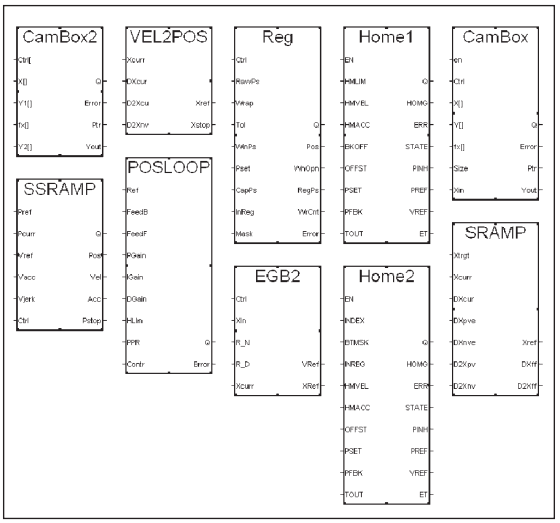
is the base operating language for the SyPT programming environment.

- Enhanced 'BASIC-like' language provides easy access to drive parameters
- Built-in real-time operating system for seamless execution
- Manipulates communication data

Quick Ladder Editor

used for logical decision making.

- >2000 rungs of executable ladder logic
- Rung annotation supported



Function Block Editor

performs maths or process signals.

- >140 mathematics, Boolean and communication function blocks
- User defined and created function blocks

In the following categories:

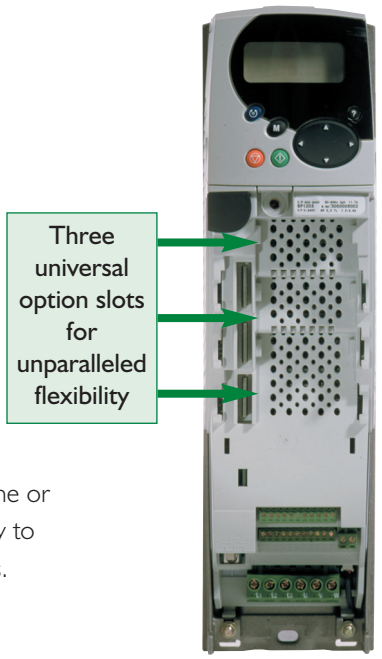
Pre-processor Directives, Program Flow, Mathematical, Real-time Data Functions, Bit Manipulation, Logical Functions, Parameter Access, Limiters, Timers & Counters, Latches, Ramps, Multiplexers & Demultiplexers, Encoders & Decoders, Communications, RAM Files, SmartCard, CT-Sync.

Ordering

Motion Functionality

Software (IEC61131-3)	AC Drive** Platform	PLC/Motion Options	PC to Drive Cable
SyPT	Unidrive SP	SM-Applications	CT Comms Cable
SyPTLite	Unidrive SP	SM-ApplicationsLite	CT Comms Cable

See Unidrive SP Brochure and Product Data booklet for further information, or go to **www.controltechniques.com



Complementary Options

The Unidrive SP has three universal option slots which can accommodate any one or more of the full range of fieldbus and I/O options. This allows unparalleled flexibility to integrate the Unidrive SP product range into existing or new automation systems.

Fieldbus Option Modules

Option Order Code	Description
SM-PROFIBUS-DP	Profibus-DP V1 12M6
SM-DeviceNet	DeviceNet
SM-INTERBUS	Interbus
SM-CANopen	CANOpen
SM-CAN	Canbus

I/O Option Modules

Option Order Code	Description
SM-I/O Plus	Additional I/O: 3DI/DO, 3DI, 2AI (0-10 V). 2 relay output, IAO (0-10 V) - up to two I/O option modules may be inserted into the remaining available option slots within the Unidrive SP
CTNet I/O	Extra analogue and digital I/O interfaced with CTNET (only on SM-Applications)

Feedback Option Modules

Option Order Code	Description
SM-Encoder Plus	Additional incremental encoder feedback
SM-Universal Encoder Plus	2nd universal encoder feedback with simulated universal encoder output
SM-Resolver	Resolver feedback

Further Information

Item	Part Number
PLC Functionality with Unidrive SP	0175-0328
Motion Made Easy with Unidrive SP	0175-0326

- The SMARTCARD comes standard with each Unidrive SP
- Upload and save Unidrive SP parameter set up to the SMARTCARD - manually or automatically
- SMARTCARD read/write fully acceptable