

# PLC functionality with Unidrive

AC and Servo drive

The Solutions Platform

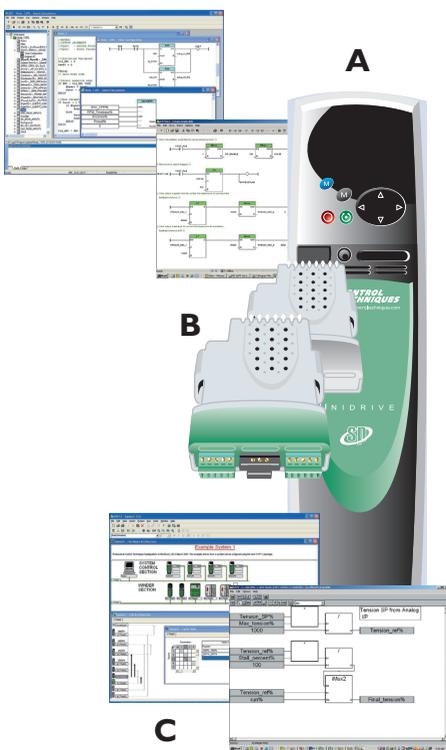


# Scalable PLC functionality

Unidrive **SD**, the AC and Servo drive is the true Solutions Platform, offering a wide range of PLC (Programmable Logic Controller) solutions giving users unparalleled flexibility in configuring PLC logic and implementing applications. Real cost and space savings are quickly achievable with the flexible modular Unidrive **SD** approach in selecting hardware and IEC61131-3 software.

## Why Unidrive **SD** and 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 application, and hardware. The true scalability of Unidrive **SD**, its SM-Applications and SyPT allows users to match exactly the tools required to achieve PLC logic and advanced machine control to their application – and cost effectively.



### A) Unidrive **SD** - the drive hardware Solutions Platform

- Global voltage availability, 200-575 V, with full range of industrial output ratings – see main product brochure
- 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:
  - CNet protocol for decentralised automation
  - 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
  - 48V dc operation for low speed set-up/operation or mains supply back-up
  - 24V dc back up to maintain power for control, fieldbus and encoder for commissioning and monitoring with mains disconnected
- Two further option slots for extra I/O and a range of fieldbus options allow for “one click” upgrades
  - Profibus DP, Interbus, CAN, CANopen, DeviceNet

### 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 controller.
- Programmable via CNet or the Unidrive **SD** RJ45 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.

### C) Systems Programming Tool (SyPT) and SyPTLite

- SyPT and SyPTLite software are intuitive PC/Laptop tools 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 **SD** 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 Application modules, I/O modules as well as fieldbus options.
- Multiple fieldbus options can be configured to reduce bus traffic via the use of multiple LANS or to allow dynamic bridging from one network to another (e.g. PROFIBUS → DeviceNet).

# with Unidrive

## Savings

- Equipment and machinery manufacturers as well as end-users can achieve lower total component costs using the no-extra-cost onboard PLC functions of the Unidrive .
- In more complex applications the modular hardware approach allows scaling of PLC processing power so that it more precisely matches the demands of the application.
- Space Saving – the PLC options for the Unidrive  save space since they are all contained within the drive.
- Reduce commissioning time – Unidrive  and its PLC options can be programmed together, using intuitive PLC programming language to IEC61131-3.

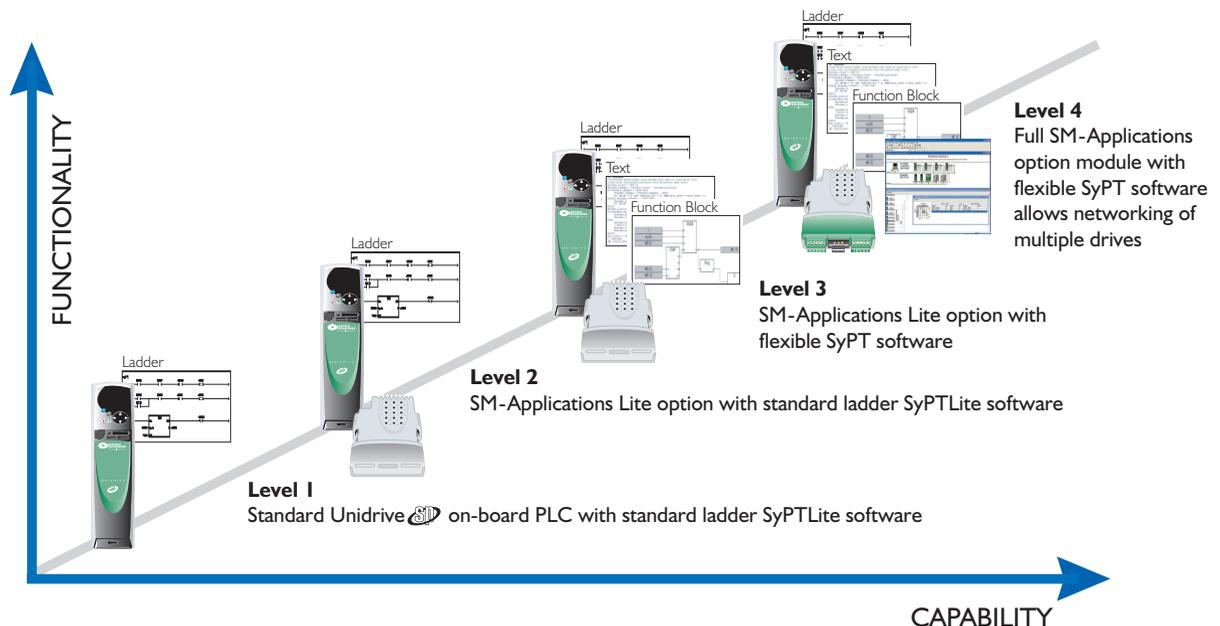
## Performance

- The scalability of the PLC option module range allows users to substitute the Unidrive  for the smallest Nano-PLCs up to large or advanced PLCs.
- Multiple SM-Application option modules and drives can be networked together as part of a decentralised automation system in order to communicate and share information using the standard on-board **CANET** protocol.
- The synchronised real time interface between the Unidrive  host and the SM-Applications Lite and SM-Applications option 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  in 10µs (turn around time of a classic PLC to drive is approx 2ms).



## Experience

- Control Techniques has years of successful experience in developing, manufacturing and supplying drives with PLC functionality. The Unidrive  takes this strategy even further by its unique modular PLC 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), etc. and consists of pre-configured function blocks.
- Control Techniques Drive Centres engineering staff can offer programming and on-site commissioning help with System implementation as well as after sales support agreements.



# Unidrive Solutions Platform

## PLC Level 1

### Hardware

- Unidrive  – standard with on-board PLC – (no further options required)
- PC /laptop-to-drive connection cable.

### Software

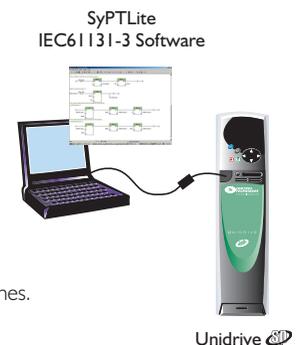
- SyPTLite ladder logic software to IEC61131-3, free-of-charge with registration to the on-line SyPTLite Users' Club.

### Functionality

- Create your own PLC ladder logic programs on the standard Unidrive . (Zero extra cost).
- Functions include all standard PLC logic functions, timers, counters... and many more.
- Replaces relay logic components as well as nano-PLCs and saves space.
- The PLC's program is executed as a background task by the control processor on the Unidrive .
- 4 k bytes executable program capacity (including source code) – up to 50 ladder logic rungs maximum (7 function blocks and 10 contacts per rung) – depending on function blocks used. (more than 150 instructions)

### Applications

- Replaces relay logic components, thresholds logic, comparators of analogue values.
- Typical applications include: Ancillary pumps, fans and control valves, interlocking logic, sequencing routines.



## PLC Level 2

### Hardware

- Unidrive 
- SM-Applications Lite option module
- PC / Laptop-to-drive connection cable.

### Software

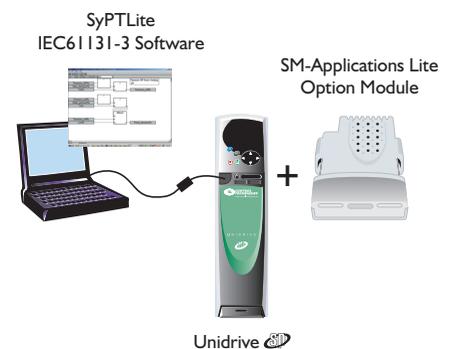
- SyPTLite ladder logic software to IEC61131-3. Free-of-charge with registration to the on-line SyPTLite Users' Club.

### Functionality

- Create your own PLC ladder logic programs on the SM-Applications Lite option module.
- Functions include standard PLC logic functions, timers, counters... and many more.
- Replaces micro-PLCs and saves space.
- Real time PLC to drive communication via internal dual-port RAM.
- Tasks – Initial, Real time clock and Background.
- 10 k bytes executable program capacity – up to 150 ladder logic rungs maximum (almost unlimited function blocks and contacts per rung). (more than 500 instructions)

### Applications

- Replaces relay logic components, PID modules, thresholds logic, comparators of analogue values.
- Typical applications include: Time critical sequencing, Cam switches, Hoist and crane control, Conveyor positioning.



# PLC Functionality with Unidrive

## PLC Level 3

### Hardware

- Unidrive 
- SM-Applications Lite option module
- PC / Laptop-to-drive connection cable.

### Software

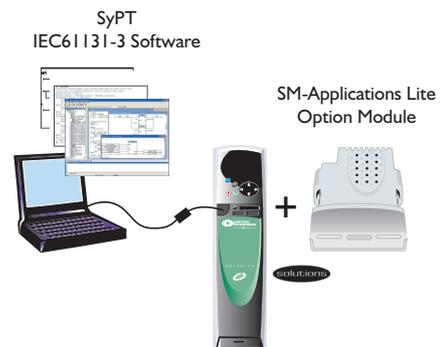
- SyPT programming software to IEC61131-3 with user license.

### Functionality

- Create your own PLC Ladder logic, Function block or DPL (Drive Programming Logic) programs on the SM-Applications Lite option module.
- Comprehensive library of PLC function blocks.
- Tasks – Initial, Real time clock, Background and Interrupt – Real time tasks synchronised to Drive control loops.
- Create variables – 32 bit integer, single and double precision floating point. PLC program manipulates drive parameters and PLC variables
- Real time PLC to drive communication via internal dual-port RAM.
- 100 k bytes executable program capacity, 20 k bytes RAM (more than 5,000 instructions)
-  software available (preconfigured function blocks) for easier set up of Winders, Flying Shears and Fan & Pump Duty Assist applications.

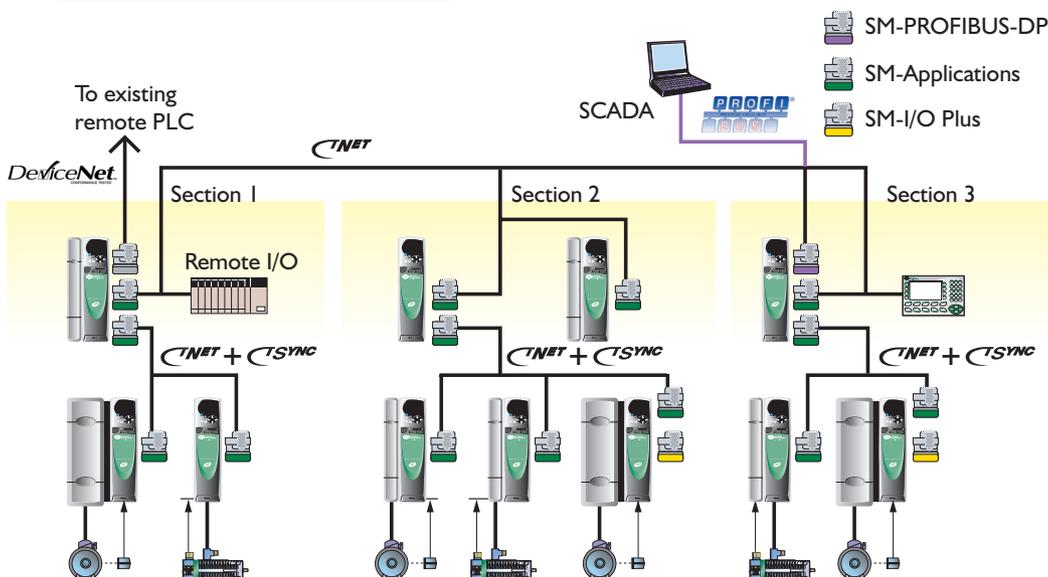
### Applications

- Replaces micro-PLCs and small PLCs and saves space.
- For example, applications include: Centre Winder, Cam (multiple interpolation), Gearing /digital lock using the SM-Encoder Plus (2nd encoder input) option, speed functionality.



## Ultimate flexibility

### Example of Distributed Control



**The flexibility of the Unidrive  together with the option module range makes the Unidrive  the perfect Solutions Platform for any automation system.**

The SM-Applications option modules can be used in almost unlimited combinations with fieldbus and I/O options in order to neatly dovetail into existing automation systems.

Alternatively, when starting out with a clean sheet of paper, the Unidrive  can achieve the necessary cost and space savings by allowing the Project Engineer to accurately match the PLC and I/O requirements.

# THE BENCHMARK in AC drives

## PLC Level 4

### Hardware

- Unidrive 
- SM-Applications option module with **TNET** communications, **TSYNC** synchronisation, high speed (<math><20\mu\text{s}</math>) I/O and RS485 port as standard. (RS485 industry standard protocols and user defined protocols).
- PC / Laptop-to-drive connection cable.

### Software

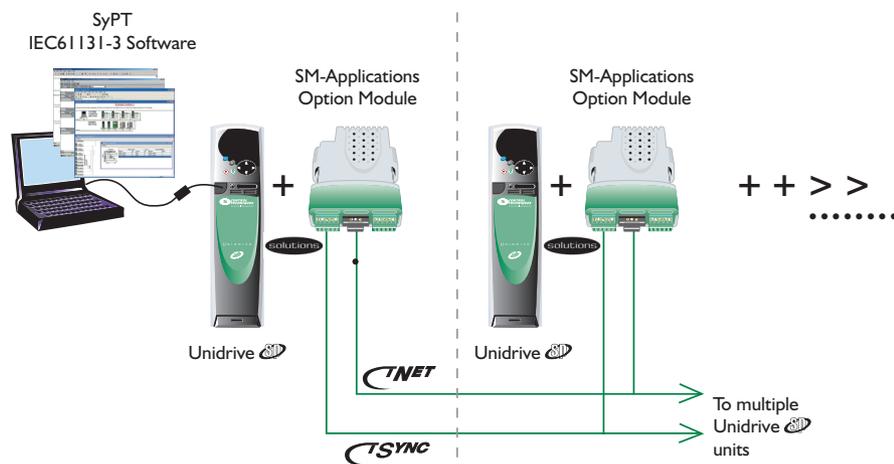
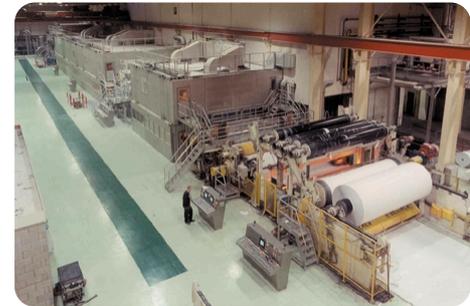
- SyPT PLC programming software to IEC61131-3 with user license.

### Functionality

- Create your own PLC Ladder logic, Function block or DPL (Drive Programming Logic) programs on the SM-Applications option module.
- Extensive PLC Functions library.
- Tasks - Initial, Real time clock, Background and Interrupt – Real time tasks synchronised to Drive control loops.
- Create variables – 32 bit integer, single and double precision floating point.
- Real time PLC to Drive communication via internal dual-port-RAM.
- 384 k bytes executable program capacity, 80 k bytes RAM (more than 20,000 instructions).
- **TNET** range of extended I/O gives almost limitless additional I/O via the **TNET** connection on the SM-Applications option module.
- **solutions** software available (preconfigured function blocks) for easier set up of Winders, Flying Shear and Fan & Pump Duty Assist applications.

### Applications

- Replaces small, medium and large PLCs with single or multiple SM-Applications option modules (adds no extra space). Multiple SM-Applications option modules can be linked together to achieve decentralised automation architecture and can be synchronised together using the standard on-board **TNET** and **TSYNC** bus connections.
- Applications include: Paper Machines, Rolling Mills, Gearing /digital lock using the **TSYNC** protocol.
- Distributing data such as speed or torque references for web control applications (e.g. tension control, cascade control etc) on a multi drive network is achieved using **TNET**.
- **TSYNC** also synchronises all the Unidrive  control and SM-Applications processor clocks within the automation system.

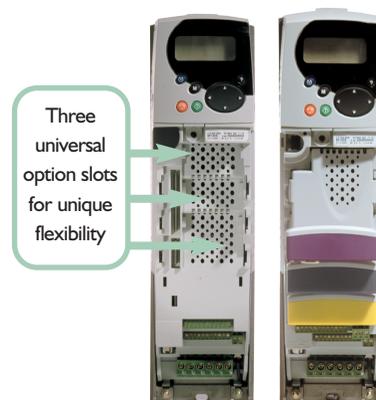


# Ordering

## PLC functionality

Level	Software (IEC 61131-3)	AC Drive**	Option Module	PC to Drive Cable
1	SyPT Lite	Unidrive	None required	CT Comms Cable
2	SyPT Lite	Unidrive	SM-Applications Lite	CT Comms Cable
3	SyPT	Unidrive	SM-Applications Lite	CT Comms Cable
4	SyPT	Unidrive	SM-Applications	CT Comms Cable

\*\* See Unidrive Brochure and Product Data booklet for further information, or go to [www.controltechniques.com](http://www.controltechniques.com)



## Unidrive Standard I/O

Unidrive standard onboard I/O: 3DI/DO, 3DI, 3AI (up to 16 bit + sign, 0-10 V or 4-20mA), 2 relay output, 2AO (up to 16 bit + sign, 0-10 V or 4-20mA)

## Fieldbus Option Modules

Option Order Code	Description
SM-PROFIBUS-DP	Profibus-DP V0 12M
SM-DeviceNet	DeviceNet
SM-INTERBUS	Interbus
SM-CANopen	CANopen
SM-CAN	Canbus

## Complementary Options

The Unidrive 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 product range into existing or new automation systems.

## 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, 1AO (0-10 V) - up to two I/O option modules may be inserted into the remaining available option slots within the Unidrive
CTNet I/O	Extra analogue and digital I/O interfaced with  for Level 4 applications

## Additional 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

## Solutions

Option Order Code	Description	Suitable for PLC Levels 3 and 4
Winder	software library is extensively field tested and comes complete with full documentation	
Flying Shear		
Duty Assist		

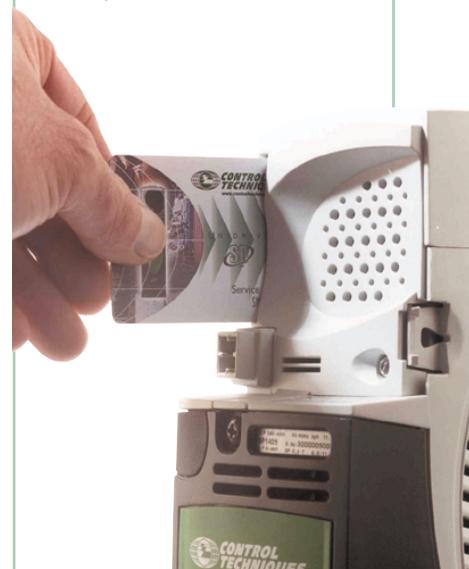
## Further Information

Item	Part Number
Motion Functionality with Unidrive	0175-0327
Motion Made Easy with Unidrive	0175-0326

## SMARTCARD

The SMARTCARD comes standard with each Unidrive

- Upload and save Unidrive parameter set up to the SMARTCARD – manually or automatically
- Upload and save PLC Level I programs stored within the Unidrive to the SMARTCARD – manually or automatically
- Copy parameter set ups and Level I PLC programs to the SMARTCARD for easy transfer to other Unidrive units.
- SMARTCARD read/write fully acceptable from all PLC levels.



# Driving the world...



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