# SM Option Modules

## Click-in Automation, Communication, Feedback and I/O Solutions

For use with Mentor MP, Quantum MP,
Unidrive SP and Digitax ST Motor Drives

**CONTROL TECHNIQUES**™

**Nidec**

~All for dreams

# Drive and Motion Control Option Modules

## Add Only the Functionality You Need

With Control Techniques' click-in SM option modules, adding control functionality, communications flexibility and I/O is quick and easy. Rather than add or change out another drive to meet changing application requirements, option modules allow the user to re-purpose in-place drives with click-in ease, thus eliminating the need to buy another drive while reducing installation and commissioning times.

Now line changes can often be achieved in a matter of minutes rather than hours. In addition, SM option modules can be configured quickly and easily using complimentary software from Control Techniques. Commonality of modules and software across control platforms helps ensure smooth integration with Nidec's Control Techniques brand AC, DC and servo drive systems. Best of all, you add only the functionality you need, when you need it — a cost-effective solution to keeping your drive and motion control investment under control. No other drive manufacturer delivers this level of flexibility at such an affordable price.

Common "click-in" design allows modules to be used with all Control Techniques brand products built with "Solution Module" architecture

# Option Modules for Every Application Need

## Scalable, Flexible and Cost-Effective Solutions

SM option modules enhance the functionality and connectivity of Nidec drives, providing the ultimate flexibility in customizing drive features to meet specific application requirements. Designed for seamless integration with additional Nidec, Control Techniques brand drives or other vendor-supplied equipment, a wide selection of modules is available for enhanced communications, I/O, feedback devices, safety features and onboard PLCs.

### Compatibility Matrix

| | Order Code | Color | MP | USP | DST |
|---|---|---|:---:|:---:|:---:|
| **Automation** | SM-APPS-LITE-V2 | White | ✓ | ✓ | ✓ |
| | SM-APPS-PLUS | Moss Green | ✓ | ✓ | ✓ |
| | SM-REGISTER | Golden Brown | ✓ | ✓ | ✓ |
| | SM-EZMOTION | Dark Blue | | ✓ | ✓ |
| **Communications** | SM-CAN | Pink | | ✓ | ✓ |
| | SM-CANOPEN | Light Grey | ✓ | ✓ | ✓ |
| | SM-DEVICENET | Medium Grey | ✓ | ✓ | ✓ |
| | SM-ETHERCAT | Brown Red | ✓ | ✓ | ✓ |
| | SM-ETHERNET | Beige | ✓ | ✓ | ✓ |
| | SM-INTERBUS | Dark Grey | ✓ | ✓ | ✓ |
| | SM-PROFIBUS-DP | Purple | ✓ | ✓ | ✓ |
| | SM-PROFINET-RT | Green | ✓ | ✓ | ✓ |
| | SM-SERCOS | Red | | ✓ | ✓ |
| **Feedback** | SM-ENCODER- OUT | Dark Brown | ✓ | ✓ | ✓ |
| | SM-ENCODER-PLUS | Brown | ✓ | ✓ | ✓ |
| | SM-RESOLVER | Light Blue | | ✓ | ✓ |
| | SM-UNI-ENCODER | Light Green | ✓ | ✓ | ✓ |
| **Inputs & Outputs** | SM-I/O-32 | Yellow | ✓ | ✓ | ✓ |
| | SM-I/O-120 V | Olive | ✓ | ✓ | ✓ |
| | SM-I/O-24 V | Cobalt Blue | ✓ | ✓ | ✓ |
| | SM-I/O-LITE | Dark Yellow | ✓ | ✓ | ✓ |
| | SM-I/O-PELV | Turquoise | ✓ | ✓ | ✓ |
| | SM-I/O-PLUS | Yellow | ✓ | ✓ | ✓ |
| | SM-I/O-TIMER | Dark Red | ✓ | ✓ | ✓ |
| | SM-BIPOLAR | Golden Yellow | | | |

USP = Unidrive SP; DST = Digitax ST; MP = Mentor MP and Quantum MP DC drives

## Performance Advantage

### Scalability: Modular Design Allows System Expansion

Four categories of SM option modules are available to enhance motion control as your application needs grow and change:

- Programmable - Automation and motion control
- Communications - EtherNet/IP and other industrial fieldbus communications
- Feedback - Encoder and resolver functions
- Inputs and Outputs - Additional analog and digital I/O

### Flexibility: Over 25 SM option modules Available

With the ability to click-in different option modules, drives can be enhanced with digital motion networks, communication networks, I/O expansion or feedback options to provide the ultimate in system flexibility.

### Cost Effective: Select only the Options You Need

To help optimize your control system investment, SM option modules can be used in an open slot on any Control Techniques AC, DC or servo drive.

### Connectivity: Best-in-Class Networking Solutions

Connectivity options are of key importance when working with any control system. SM option modules deliver simultaneous multiple fieldbus support in EtherNet/IP, PROFINET RT, DeviceNet, PROFIBUS DP, SERCOS, EtherCAT, CANopen and many other network systems.

### Performance:

Programmable SM option modules contain a high-performance microprocessor to free the drive's built-in processor to deliver superior motor performance when compared to centralized PLC drive systems. And because option modules communicate with each other, using multiple programmable modules can boost system performance by segregating portions of a program.

### Conformance: Meets or Exceeds Standards

Communications interfaces are certified for conformance with relevant standards to ensure performance and interoperability.
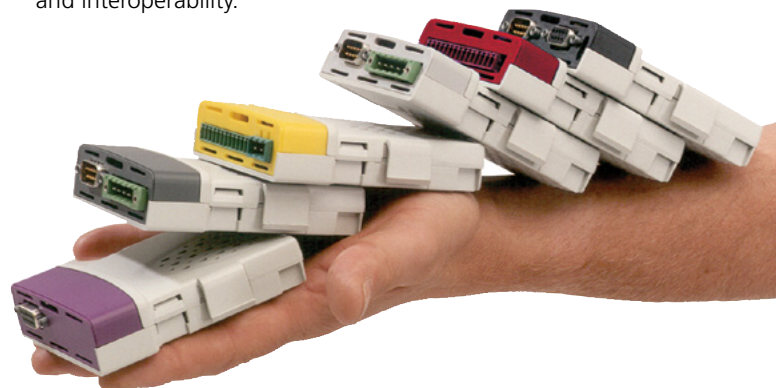
# Automation SM Option Modules

## SM-APPS-PLUS

The SM-APPS-PLUS option module meets many demanding automation and high-speed motion application needs. The module transforms Unidrive SP AC/Servo drives and Mentor MP series DC drives into powerful automation controllers that add PLC functionality and can connect to devices via CTNet, our drive-to-drive network. This provides all the benefits of a fully distributed control system including enhanced performance, reduced cost and smaller electrical panel sizes.

- **Performance** - This SM option module contains its own high-performance microprocessor freeing the drive's processor to deliver the best possible motor performance. The module also contains 384 K of user program memory, enough for virtually all drive applications.

- **High-speed serial port** - An RS485 serial communications port supports standard protocols such as Modbus for connection to external devices such as operator interface panels. The port can be configured either as a Modbus "Master" or "Follower." In Master mode, the drive can control other automation devices. This port also supports CTSync drive-to-drive synchronization.

- **Drive-to-drive communications** - Each SM-APPS-PLUS module includes CTNet, our high-speed drive-to-drive network optimized for intelligent drive systems offering flexible peer-to-peer communications. The bus has the capability to connect to remote I/O, operator panels, PLCs and other Nidec AC, DC and servo motor drives.

*SyPTPro*

- **Easy, powerful configuration** - PLC functionality is programmed using SyPTPro (System Programming Tool) allowing the user to tackle automation problems from simple start-and-stop sequencing to more complex machine and motion control applications. The device is programmed within an IEC61131-3 environment with a choice of 3 languages: Ladder Logic, Function Blocks and text-based programming. SyPTPro provides a suite of diagnostic and debugging features to help shorten installation time and simplify maintenance.

- **Real-time control** - The SM-APPS-PLUS option module provides real-time access to all drive parameters as well as access to data from I/O or other drives. The module uses a high-speed multi-tasking operating system with task update times as low as 250 µs. Tasks are fully synchronized to the drive's control loop to deliver the best possible performance for drive control and motion.

- **Inputs/Outputs** – This SM option module has two digital inputs and two digital outputs for high-speed I/O operations such as position capture and actuator firing.

| SM-APPS-PLUS | | |
|---|---|---|
| **Mentor MP Quantum MP** | **Unidrive SP** | **Digitax ST** |
| ✓ | ✓ | ✓ |

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

| 6 | 7 | 8 |
|---|---|---|

| 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|

| EIA-485 | Function |
|---|---|
| 1 | Isolated. OV |
| 2 | EIA-485/Rx- |
| 3 | EIA-485/Rx+ |
| 4 | EIA-485/Tx- |
| 5 | EIA-485/Tx+ |

| CTNet | Function |
|---|---|
| 6 | CTNet- |
| 7 | CTNet shield |
| 8 | CTNet+ |

| Digital I/O | Function |
|---|---|
| 9 | Digital OV |
| 10 | Digital input 0 |
| 11 | Digital input 1 |
| 12 | Digital output 0 |
| 13 | Digital output 1 |

### Networks
- Modbus RTU master or follower  *CTNET*

- 2-Wire

- 4-Wire

- *CTSYNC*

## SM-APPS-LITE-V2

This option module is designed to provide programmable control for standalone drive applications or applications in which the drive is connected to a centralized controller via I/O or fieldbus. The module provides many of the same functions of the SM-APPS-PLUS module but may be programmed using Ladder Logic with either SyPTLite or the full automation and motion capabilities contained within SyPTPro. Programming with SyPTLite provides an intermediate-level automation solution that is suitable for a wide variety of applications. Programming the module with SyPTPro allows the user to exploit the full power and performance of the module in standalone applications.

| SM-APPS-LITE-V2 | | |
|---|---|---|
| Mentor MP Quantum MP | Unidrive SP | Digitax ST |
| ✓ | ✓ | ✓ |

## SM-REGISTER

Designed for use with the SM-APPS-PLUS option module, the SM-REGISTER module provides additional capability for position capture and registration making it an ideal solution for critical high-speed motion applications.

- 2 independent capture channels

- Edge filtering

- Automated pattern recognition

- Pulse capture

- Registration windowing

- Positive and negative edge capture

| SM-REGISTER | | |
|---|---|---|
| Mentor MP Quantum MP | Unidrive SP | Digitax ST |
| ✓ | ✓ | ✓ |

See SM-APPS-PLUS for terminal descriptions and networks.

## SM-EZMOTION

The SM-EZMOTION option module and PowerTools Pro software provide a user-friendly environment for motion programming. The EZMotion approach is ideal for applications that are low in volume and low in engineering time. Features include:

- Simple drag-and-drop programming allows the user to create programs "out of the box" without having to write any code

- 5-step programming with the software guiding the user through drive configuration, I/O configurations and programming steps

- Familiar Windows®-based environment with simple data entry
  — "Fill-in-the-blank" values
  — "Point-and-click" radio buttons
  — Scrolling menu selections
  — "Drag-and-drop" parameters

- Four digital inputs and two digital outputs for high-speed I/O operations

| SM-EZMOTION | | |
|---|---|---|
| Mentor MP Quantum MP | Unidrive SP | Digitax ST |
| | ✓ | ✓ |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|

| PL1 | Function |
|---|---|
| 1 | OV common |
| 2 | Digital input 1 |
| 3 | Digital input 2 |
| 4 | Digital input 3 |
| 5 | Digital input 4 |
| 6 | Digital output 1 |
| 7 | Digital output 2 |

# Communications SM Option Modules

## Standards Compliance

Nidec drives support almost any industrial Ethernet, fieldbus or real-time servo network. Where possible, we obtain independent certification for compliance with the relevant protocol standards to guarantee operation with other vendors' equipment. Nidec is a member of PROFIBUS International, ODVA, CiA (CAN in Automation) and EtherCAT Technology Group (ETG).
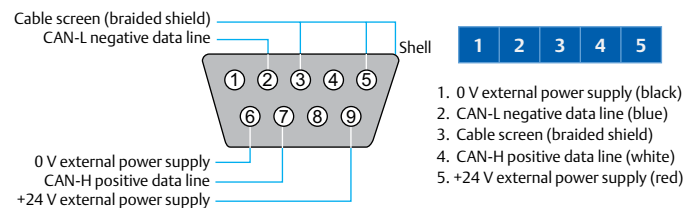
## SM-CAN

The user-programmable SM-CAN option module allows the user to develop custom CAN protocols.

The SM-CAN module requires a second processor such as SM-APPS-PLUS module to be installed in the drive.

| SM-CAN | | |
|---|---|---|
| Mentor MP Quantum MP | Unidrive SP | Digitax ST |
|  | ✓ | ✓ |

Cable screen (braided shield)
CAN-L negative data line
Shell

① ② ③ ④ ⑤
⑥ ⑦ ⑧ ⑨

0 V external power supply
CAN-H positive data line
+24 V external power supply

| 1 | 2 | 3 | 4 | 5 |

1. 0 V external power supply (black)
2. CAN-L negative data line (blue)
3. Cable screen (braided shield)
4. CAN-H positive data line (white)
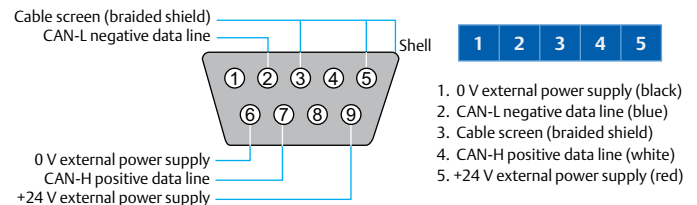5. +24 V external power supply (red)

## SM-CANOPEN

Supports various profiles including several drive profiles.

- Up to 127 nodes on a network
- Data rates up to 1 Mbps (detected automatically)
- Up to 4 cyclic data channels, each with up to 4 words I/O
- Non-cyclic data available: Service Data Object non-cyclic protocol or mapping non-cyclic channel into the cyclic data
- Vendor-independent profile supported: DS-402 profile supported (drives and motion control)
- A Control Techniques-specific drive synchronization mechanism is implemented for synchronization of position loops between drives on CANopen networks
- Object dictionary extendible with SM-APPS-LITE-V2 and SM-APPS-PLUS option modules

| SM-CANOPEN | | |
|---|---|---|
| Mentor MP Quantum MP | Unidrive SP | Digitax ST |
| ✓ | ✓ | ✓ |

Cable screen (braided shield)
CAN-L negative data line
Shell

① ② ③ ④ ⑤
⑥ ⑦ ⑧ ⑨

0 V external power supply
CAN-H positive data line
+24 V external power supply

| 1 | 2 | 3 | 4 | 5 |

1. 0 V external power supply (black)
2. CAN-L negative data line (blue)
3. Cable screen (braided shield)
4. CAN-H positive data line (white)
5. +24 V external power supply (red)

CANopen

## SM-DEVICENET

- Up to 62 nodes on a network
- Data rates up to 500 kbps (detected automatically)
- Cyclic data sizes of up to 28 words in/out
- Non-cyclic access supported using explicit data channel
- Vendor independent assembly objects for basic, extended speed and torque control

DeviceNet

| SM-DEVICENET | | |
|---|---|---|
| Mentor MP Quantum MP | Unidrive SP | Digitax ST |
| ✓ | ✓ | ✓ |

Cable screen (braided shield)
CAN-L negative data line
Shell

① ② ③ ④ ⑤
⑥ ⑦ ⑧ ⑨

0 V external power supply
CAN-H positive data line
+24 V external power supply

| 1 | 2 | 3 | 4 | 5 |

1. 0 V external power supply (black)
2. CAN-L negative data line (blue)
3. Cable screen (braided shield)
4. CAN-H positive data line (white)
5. +24 V external power supply (red)
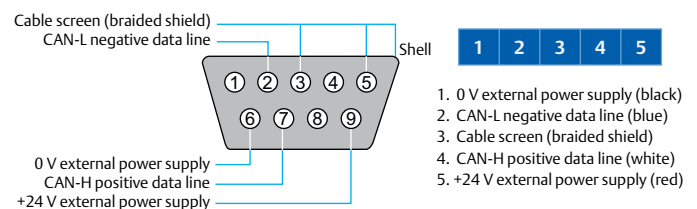
## SM-ETHERCAT

- "Follower" option module for high-performance servo applications
- Up to 64535 nodes on a segment
- Data rate of 100 Mbps (100BASE-TX)
- Non-cyclic data using the CoE (CANopen over Ethernet) mailbox
- CANopen DS-402 profile supported (drives and motion control)
- EOE (EtherNet/IP over EtherCAT)

**EtherCAT®**

| SM-ETHERCAT | | |
|---|---|---|
| **Mentor MP Quantum MP** | **Unidrive SP** | **Digitax ST** |
| ✓ | ✓ | ✓ |

Spade connector

Channel A — Link / activity indicator 🟢
Channel B — Link / activity indicator 🟢

Channel A          Channel B

87654321          87654321

Digital Inputs

| 1 | 2 | 3 |
|---|---|---|

| Input | Function |
|---|---|
| 1 | 0 V common |
| 2 | Digital input 1 |
| 3 | Digital input 2 |

| Pin | Channel A & B | Pin | Channel A & B |
|---|---|---|---|
| 1 | Transmit + | 5 | Not used |
| 2 | Transmit - | 6 | Receive - |
| 3 | Receive + | 7 | Not used |
| 4 | Not used | 8 | Not used |

## SM-ETHERNET

This option module can generate emails and be used to provide high-speed drive access, global connectivity and integration with IT network technologies such as wireless networking.

- Modbus TCP/IP, EtherNet/IP, e-mail, web pages, SMTP
- IP-based addressing
- Data rates –10 Mbps/100 Mbps
- Cyclic data sizes of up to 80 words in/out
- Explicit messaging supported
- Non-vendor-specific AC drive profile supported

**EtherNet/IP™**

| SM-ETHERNET | | |
|---|---|---|
| **Mentor MP Quantum MP** | **Unidrive SP** | **Digitax ST** |
| ✓ | ✓ | ✓ |

Spade connector

87654321

Link / Activity 🟢  🟢 Module status
Speed (On = 100 Mbs) 🟢  🟢 Flash access

Not used
Not used
Receive -
Not used

Transmit +
Transmit -
Receive -
Not used

## SM-INTERBUS

- Up to 63 nodes on a network
- Fixed data rate of 500 kbps
- Cyclic data sizes of up to 10 words in/out
- Non-cyclic access supported using standard PCP protocol

**INTERBUS Certified! No. 197**

| SM-INTERBUS | | |
|---|---|---|
| **Mentor MP Quantum MP** | **Unidrive SP** | **Digitax ST** |
| ✓ | ✓ | ✓ |

Cable shield
0 V ISO IN
DI1
D01

Cable screen (braided shield)
DO2
DI2
0 V ISO OUT
+5 V ISO OUT
Shell

Spade connector
Shell

① ② ③ ④ ⑤
⑥ ⑦ ⑧ ⑨

⑤ ④ ③ ② ①
⑨ ⑧ ⑦ ⑥

/DO1
/DI1

RBST
/DI2
/D02

# Communications SM Option Modules

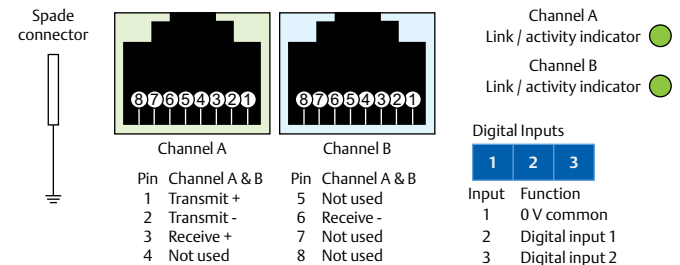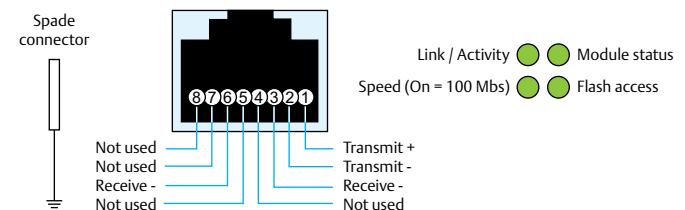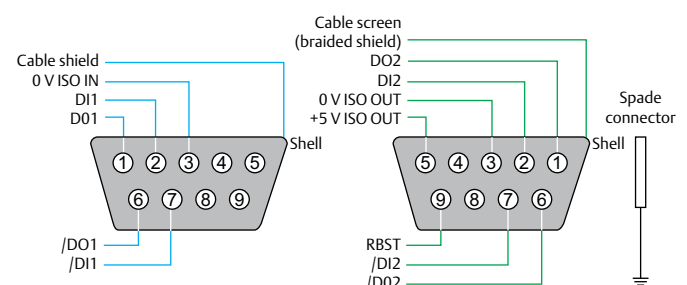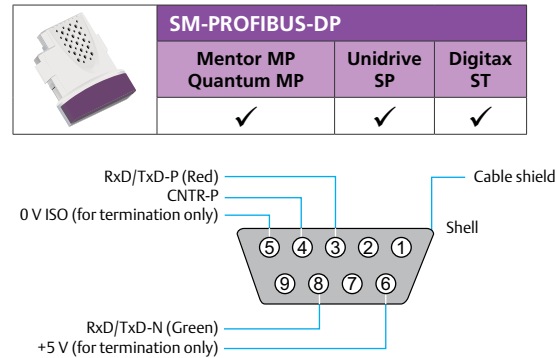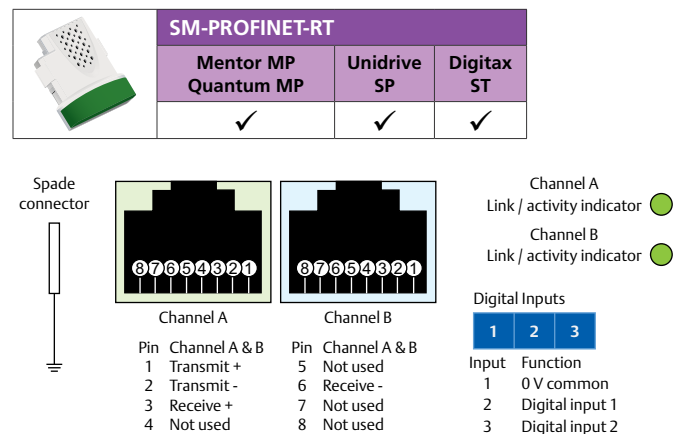## SM-PROFIBUS-DP

- PROFIBUS DP protocol up to specification DP-V0 and DP-V1

- Up to 125 nodes on a network

- Data rates up to 12 Mbps (automatically detected)

- Cyclic data sizes of up to 32 words in/out

- Non-cyclic access available by mapping a non-cyclic channel into the cyclic data

- DP-V1 adds a non-cyclic channel

- Vendor-independent profile for variable speed drive, PROFIdrive

| SM-PROFIBUS-DP | | |
|---|---|---|
| Mentor MP Quantum MP | Unidrive SP | Digitax ST |
| ✓ | ✓ | ✓ |

RxD/TxD-P (Red)
CNTR-P
0 V ISO (for termination only)
Cable shield
Shell
⑤ ④ ③ ② ①
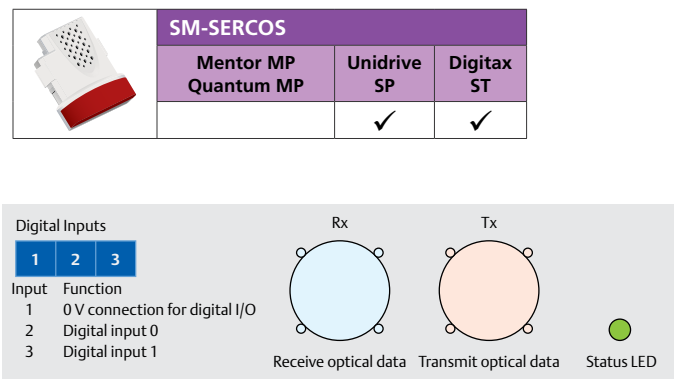⑨ ⑧ ⑦ ⑥
RxD/TxD-N (Green)
+5 V (for termination only)

## SM-PROFINET-RT

- Dual 100 BASE-TX RJ45 connectors with support for shielded twisted pair, full-duplex 10/100 Mbps connectivity

- Both RJ45 ports act as a network switch in full duplex mode

- Auto-negotiation

- Auto-crossover detection

- LED indication of network port activity

- PROFINET RT (real-time) protocol

| SM-PROFINET-RT | | |
|---|---|---|
| Mentor MP Quantum MP | Unidrive SP | Digitax ST |
| ✓ | ✓ | ✓ |

Spade connector

⑧⑦⑥⑤④③②①  Channel A
⑧⑦⑥⑤④③②①  Channel B

Channel A Link / activity indicator 🟢
Channel B Link / activity indicator 🟢

Digital Inputs

| 1 | 2 | 3 |
|---|---|---|

| Input | Function |
|---|---|
| 1 | 0 V common |
| 2 | Digital input 1 |
| 3 | Digital input 2 |

| Pin | Channel A & B | Pin | Channel A & B |
|---|---|---|---|
| 1 | Transmit + | 5 | Not used |
| 2 | Transmit - | 6 | Receive - |
| 3 | Receive + | 7 | Not used |
| 4 | Not used | 8 | Not used |

## SM-SERCOS

- Up to 254 nodes on a network

- Data rates up to 16 Mbps

- Cyclic data sizes of up to five words in and out

- Non-cyclic data available: SERCOS service channel

- Vendor independent profile supported: torque, velocity and position

| SM-SERCOS | | |
|---|---|---|
| Mentor MP Quantum MP | Unidrive SP | Digitax ST |
| | ✓ | ✓ |

Digital Inputs

| 1 | 2 | 3 |
|---|---|---|

| Input | Function |
|---|---|
| 1 | 0 V connection for digital I/O |
| 2 | Digital input 0 |
| 3 | Digital input 1 |

Rx — Receive optical data
Tx — Transmit optical data
Status LED 🟢

# Feedback SM Option Modules

## SM-UNI-ENCODER

Nidec's additional combined encoder input and output interface supporting incremental, sincos, HIPERFACE, EnDAT and SSI encoders.

- Provides the drive with an additional feedback port with the same functionality as the base drive, supporting:
  - SinCos with commutation, quadrature incremental, pulse and direction and SSI
- Simulated encoder output that can be programmed to operate in the following modes:
  - Quadrature incremental, pulse and direction and SSI
- Incorporates high-speed inputs for position capture
- Includes encoder power supply selectable to 5, 8 or 15 V
- Recommended for digital lock (gearing) applications

| SM-UNI-ENCODER | | |
|---|---|---|
| Mentor MP Quantum MP | Unidrive SP | Digitax ST |
| ✓ | ✓ | ✓ |

SK1

PL2
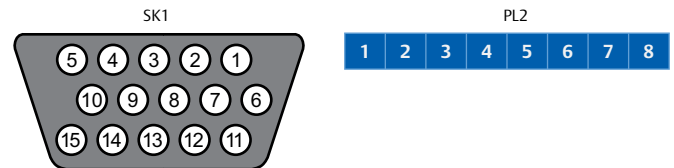
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

| SK1 Pin | Encoder | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Ab** | **Fb** | **Fr** | **Ab,SErVO** | **Fd,SErVO** | **Fr.SEvVO** | **SC** | **SC.HiPEr** | **EndAt** | **SC.EndAt** | **SSI** | **SC.SSI** | **SC.UVW** |
| 1 | A | F | F | A | F | F | | Cos | | Cos | | Cos | |
| 2 | A\ | F\ | F\ | A\ | F\ | F\ | | Cosref | | Cosref | | Cosref | |
| 3 | B | D | R | B | D | R | | Sin | | Sin | | Sin | |
| 4 | B\ | D\ | R\ | B\ | D\ | R\ | | Sinref | | Sinref | | Sinref | |
| 5 | Z | | | | | | | Encoder Input – Data (input/output) | | | | | Z |
| 6 | Z\ | | | | | | | Encoder Input – Data (input/output) | | | | | Z\ |
| 7 | Sim. Enc, Aut, Fout, Data SSI (Output) | | | U | | | Simulated Encoder - Aout, Fout, Data SSI (output) | | | | | | U |
| 8 | Sim. enc, Aout, Fout, Data SSI (output) | | | U\ | | | Simulated Encoder - Aout, Fout, Data SSI (output) | | | | | | U\ |
| 9 | Sim. enc, Bout, Dout, Clock\ SSI (input) | | | V | | | Simulated Encoder - Bout, Dout, Clock\ SSI (input) | | | | | | V |
| 10 | Sim. enc, Bout, Dout, Clock\ SSI (input) | | | V\ | | | Simulated Encoder - Bout, Dout, Clock\ SSI (input) | | | | | | V\ |
| 11 | | | | W | | | | | | Enc. Input - Clock (output) | | | W |
| 12 | | | | W\ | | | | | | Enc. Input - Clock\ (output) | | | W\ |
| 13 | +V | | | | | | | | | | | | |
| 14 | 0 V common | | | | | | | | | | | | |
| 15 | th | | | | | | | | | | | | |

| PL2 Terminal | Input / Encoder Outputs | | | | | |
|---|---|---|---|---|---|---|
| | **Freeze RS485 Input** | **Freeze +24 Input** | **Ab Output** | **Fd Output** | **SSI Output** | **Marker Output** |
| 1 | | Freeze | | | | |
| 2 | 0 V common | | | | | |
| 3 | | | A | F | Data | |
| 4 | | | A\ | F\ | Data\ | |
| 5 | | | B | D | Clock | |
| 6 | | | B\ | D\ | Clock\ | |
| 7 | 0 V common | | | | | |
| 8 | Freeze | | | | | Z |
| 9 | Freeze\ | | | | | Z\ |

# Feedback SM Option Modules

## SM-ENCODER-OUT

This incremental encoder input and simulated output* option module enables connection to external motion controllers. The module includes an encoder power supply selectable to 5, 8 or 15 V and supports incremental encoder inputs for closed-loop vector drive control. Use SM-UNI-ENCODER module for servo motor feedback.

| SM-ENCODER-OUT | | |
|---|---|---|
| **Mentor MP Quantum MP** | **Unidrive SP** | **Digitax ST** |
| ✓ | ✓ | ✓* |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

| PL1 (Input) | | | |
|---|---|---|---|
| Terminal | Ab | Fd | Fr |
| 1 | A | F | F |
| 2 | A\ | F\ | F\ |
| 3 | B | D | R |
| 4 | B\ | D\ | R\ |
| 5 | Z | | |
| 6 | Z\ | | |
| 7 | 0 V | | |
| 8 | +V | | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

| PL2 (Output) | | | | |
|---|---|---|---|---|
| Terminal | Ab | Fd | Fr | Ab.L | Rd.L |
| 1 | 0 V | 0 V | | | |
| 2 | | | | | |
| 3 | A | F | F | A | F |
| 4 | A\ | F\ | F\ | A\ | F\ |
| 5 | B | D | R | B | D |
| 6 | B\ | D\ | R\ | B\ | D\ |
| 7 | Z | | | | |
| 8 | Z\ | | | | |

*Applies to all Digitax servo drives except Digitax ST-Z.

## SM-ENCODER-PLUS

Incremental encoder input option module features the same input functionality as the SM-ENCODER-OUT option module. (Note: Only encoders with lines-per-revolution to the power of 2 can be used with the SM-ENCODER-PLUS option module (e.g. 256, 512, 1024, etc.)

| SM-ENCODER-PLUS | | |
|---|---|---|
| **Mentor MP Quantum MP** | **Unidrive SP** | **Digitax ST** |
| ✓ | ✓ | ✓* |

*Applies to all Digitax servo drives except Digitax ST-Z.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

| PL1 (Input) | | | |
|---|---|---|---|
| Terminal | Ab | Fd | Fr |
| 1 | A | F | F |
| 2 | A\ | F\ | F\ |
| 3 | B | D | R |
| 4 | B\ | D\ | R\ |
| 5 | Z | | |
| 6 | Z\ | | |
| 7 | 0 V | | |
| 8 | External power supply coupling | | |

## SM-RESOLVER

Designed for robust feedback in demanding environments, this SM option module enables the drive to measure the speed and position of motors and machines fitted with resolvers. Due to their ruggedness, resolvers are often used in hot, demanding environments. The module also offers a simulated incremental encoder output.

Input Impedance:  >85 Ω @ 6 kHz
Turns Ratio:    3:1 or 2:1 (input : output)
Number of Poles:  2, 4, 6 or 8

SM-RESOLVER Excitation Output:
Output Waveform:
    6 kHz rms sine wave (turns ratio = 3:1) OR
    6 kHz rms sine wave (turns ratio = 2:1)

SM-RESOLVER Inputs:
    Input voltage    2 V rms

| SM-RESOLVER | | |
|---|---|---|
| **Mentor MP Quantum MP** | **Unidrive SP** | **Digitax ST** |
| | ✓ | ✓ |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |

| Terminal | Simulated encoder output connections |
|---|---|
| 1 | A |
| 2 | A\ |
| 3 | 0 V common |
| 4 | B |
| 5 | B\ |
| 6 | 0 V common |
| 7 | Z |
| 8 | Z\ |

| Terminal | Resolver connections |
|---|---|
| 9 | SIN LOW |
| 10 | SIN HIGH |
| 11 | COS LOW |
| 12 | COS HIGH |
| 13 | REF HIGH (excitation) |
| 14 | REF LOW (excitation) |
| 15 | 0 V |
| 16 | 0 V common |
| 17 | 0 V |

FEEDBACK

# I/O SM Option Modules

## SM-I/O-32

This option module adds 32 digital high-speed, bidirectional I/O points to the drive. Each group of four outputs can supply a total of 16 mA, so each output is able to supply at least 4 mA. A digital output can supply up to a maximum of 16 mA as long as the total output current for the group does not exceed 16 mA (for example, one digital I/O set as an output and the other three digital I/O in the group set to inputs).

- 32 digital inputs/outputs

- Includes breakout board and cable

- Access to all I/O requires the use of SyPTLite or SyPTPro programming

The module has eight groups of four I/Os rated at 24 Vdc. There are two update methods to access I/Os:

### Fast Update Method:

- Allows access to all 32 I/Os

- Requires SyPTLite or SyPTPro for programming

- 500µs update

### Standard Update Method:

- Access only DIO1 to DIO8

  — DIO1 to DIO4 are I/Os
  — DIO5 to DIO8 are I/Ps

- Accessible with CTSoft

- 4 ms update

| | SM-I/O-32 | | |
|---|---|---|---|
| | Mentor MP Quantum MP | Unidrive SP | Digitax ST |
| | ✓ | ✓ | ✓ |

19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 22 21
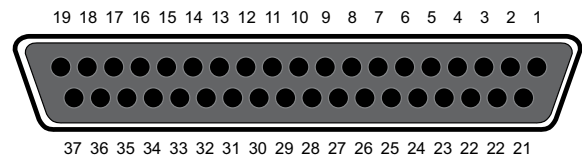
| PL3 Terminal | Function |
|---|---|
| 1 to 32 | Digital input/output 1 to 32 (DI01 to 32) |
| 33 | +24 V output |
| 34 to 37 | 0 V |

## SM-I/O-PLUS

This option module provides expanded digital and analog I/O.

- 2 analog inputs (10-bit plus sign,±10 V)

- 1 analog output (10-bit plus sign,±10 V)

- 3 digital input/outputs

- 3 digital inputs

- 2 relays (2 A @ 240 Vac, 4 A @ 30 Vdc resistive)

| | SM-I/O-PLUS | | |
|---|---|---|---|
| | Mentor MP Quantum MP | Unidrive SP | Digitax ST |
| | ✓ | ✓ | ✓ |

1 2 3 4 5 6 7 8 9 10 11 12   21 22 23

| PL1 Terminal | Function | PL1 Terminal | Function | PL2 Terminal | Function |
|---|---|---|---|---|---|
| 1 | 0 V common | 7 | Digital input 5 | 21 | Relay 1 |
| 2 | Digital input/output 1 | 8 | Digital input 6 | 22 | Relay common |
| 3 | Digital input/output 2 | 9 | Analog input 4 | 23 | Relay 2 |
| 4 | Digital input/output 3 | 10 | Analog input 5 | | |
| 5 | 0 V common | 11 | 0 V common | | |
| 6 | Digital input 4 | 12 | Analog output 3 | | |

I/O

# I/O SM Option Modules

## SM-I/O-LITE

This option module provides expanded digital and analog I/O plus encoder reference.

- 1 analog input (±10 V, 0-20, 20-0, 4-20, 20-4 mA)
- 1 analog output (0-10 V, 4-20, 20-4, 0-20, 20-0 mA)
- 3 digital inputs
- 1 relay (2 A @ 240 Vac, 4 A @ 30 Vdc)
- Quadrature encoder reference input

| SM-I/O-LITE | | |
|---|---|---|
| **Mentor MP Quantum MP** | **Unidrive SP** | **Digitax ST** |
| ✓ | ✓ | ✓ |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 21 | 22 | 23 |

| PL1 Terminal | Function | PL1 Terminal | Function | PL2 Terminal | Function |
|---|---|---|---|---|---|
| 1 | 0 V common | 7* | Digital input 3 Encoder B | 21 | Relay Contact 1 |
| 2 | Analog input | 8 | Encoder B\ | 22 | Not Connected |
| 3 | Analog output | 9 | Encoder A | 23 | Relay Contact 2 |
| 4 | +24 V | 10 | Encoder A\ | | |
| 5 | Digital input 1 | 11 | 0 V | | |
| 6 | Digital input 2 | 12 | Encoder +5 V | | |

*When terminal 7 is used as an encoder input, then digital input 3 is not available.

## SM-I/O-TIMER

This option module has the same I/O specifications as the SM-I/O-LITE above, but with an additional Real-Time Clock and Calendar for scheduling drive events.

- Access to year, month, day, hour, minute, second and day light savings mode control.

| SM-I/O-TIMER | | |
|---|---|---|
| **Mentor MP Quantum MP** | **Unidrive SP** | **Digitax ST** |
| ✓ | ✓ | ✓ |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 21 | 22 | 23 |

| PL1 Terminal | Function | PL1 Terminal | Function | PL2 Terminal | Function |
|---|---|---|---|---|---|
| 1 | 0 V common | 7* | Digital input 3\ Encoder B | 21 | Relay Contact 1 |
| 2 | Analog input | 8 | Encoder B\ | 22 | Not connected |
| 3 | Analog output | 9 | Encoder A | 23 | Relay Contact 2 |
| 4 | +24 V | 10 | Encoder A\ | | |
| 5 | Digital input 1 | 11 | 0 V | | |
| 6 | Digital input 2 | 12 | Encoder +5 V | | |

*When terminal 7 is used as an encoder input, then digital input 3 is not available.

## SM-I/O-120V

Provides digital I/O rated for 120 or 240 Vac. These I/O conform to IEC 61131-2 120 Vac standard.

- 6 digital inputs (@ 120 Vac) or
- 3 digital inputs (@ 240 Vac)
- 2 relays (2 A @ 120 or 240 Vac, 4 A @ 30 Vdc)

| SM-I/O-120V | | |
|---|---|---|
| **Mentor MP Quantum MP** | **Unidrive SP** | **Digitax ST** |
| ✓ | ✓ | ✓ |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

| PL1 Terminal | Function | PL1 Terminal | Function |
|---|---|---|---|
| 1 | Digital input 1 | 7 | Digital input 5 |
| 2 | Digital input 2 | 8 | Digital input 6 |
| 3 | Neutral - digital inputs 1 & 2 | 9 | Neutral - digital inputs 5 & 6 |
| 4 | Digital input 3 | 10 | Relay 1 |
| 5 | Digital input 4 | 11 | 0 V common |
| 6 | Neutral for digital inputs 3 & 4 | 12 | Relay 2 |

I/O

## SM-I/O-PELV

This option module provides PELV (Protective Extra Low Voltage) double-insulated digital and analog I/O to meet IEC 61131-2, Clause 3.3.1 Type as well as NAMUR NE37 specifications for chemical industry applications.

- 1 analog input (bipolar 0-10 V, 4-20, 0-20 or 20-0 mA)
- 2 analog outputs (4-20, 20-4, 0-20 or 20-0 mA)
- 1 digital input with freeze function (positive logic only)
- 4 digital input/outputs (positive logic only)
- 2 relays (1.5 A DC @ 60 V)

*Note: The SM-I/O-PELV module requires an external 24 Vdc power supply rated at 150 mA when all outputs are loaded.*

| SM-I/O-PELV | | |
|---|---|---|
| Mentor MP Quantum MP | Unidrive SP | Digitax ST |
| ✔ | ✔ | ✔ |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |

| PL1 Terminal | Function | PL1 Terminal | Function |
|---|---|---|---|
| 1 | 0 V common | 10 | Analog output 1 |
| 2 | +24 V input | 11 | 0 V common |
| 3 | Digital I/O 1 | 12 | Analog output 2 |
| 4 | Digital I/O 2 | 13 | 0 V common |
| 5 | Digital I/O 3 | 14 | Relay 1 contact 1 |
| 6 | Digital I/O 4 | 15 | Relay 1 contact 2 |
| 7 | Digital input 5/ freeze input | 16 | Relay 2 contact 1 |
| 8 | Analog input 1 non-inverting input | 17 | Relay 2 contact 2 |
| 9 | Analog input 1 inverting input | | |

## SM-I/O-24V

The SM-I/O-24V option module is designed for overvoltage protection and is able to withstand a +48 V input voltage being applied to the +24 V rated digital I/O terminals.

- 2 x analog current outputs (0-20, 20-0, 4-20,20-4 mA)
- 4 x digital input/outputs (positive logic only)
- 3 x digital inputs (positive logic only)
- 2 x relays (1.5A DC @ 60 V)

| SM-I/O-24V | | |
|---|---|---|
| Mentor MP Quantum MP | Unidrive SP | Digitax ST |
| ✔ | ✔ | ✔ |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |

| PL1 Terminal | Function | PL1 Terminal | Function |
|---|---|---|---|
| 1 | 0 V common | 10 | Analog output 1 |
| 2 | 0 V common | 11 | 0 V common |
| 3 | Digital I/O 1 | 12 | Analog output 2 |
| 4 | Digital I/O 2 | 13 | 0 V common |
| 5 | Digital I/O 3 | 14 | Relay 1 contact 1 |
| 6 | Digital I/O 4 | 15 | Relay 1 contact 2 |
| 7 | Digital input 5 | 16 | Relay 2 contact 1 |
| 8 | Digital input 6 | 17 | Relay 2 contact 2 |
| 9 | Digital input 7 | | |

I/O

## CTNet Network I/O

This high-quality I/O system is available for systems using our CTNet communications network. A CTNet port is standard on SM-APPS-PLUS and SM-REGISTER option modules. CTNet I/O systems include an I/O bus coupler and a large variety of snap-on terminal blocks allowing up to 256 digital inputs or outputs and up to 100 analog inputs and outputs per bus coupler. Up to 64 CTNet nodes can be attached to a CTNet network. I/O points can be easily read or written. Refer to our Options & Accessories brochure for details on the wide range of available CTNet I/O options.
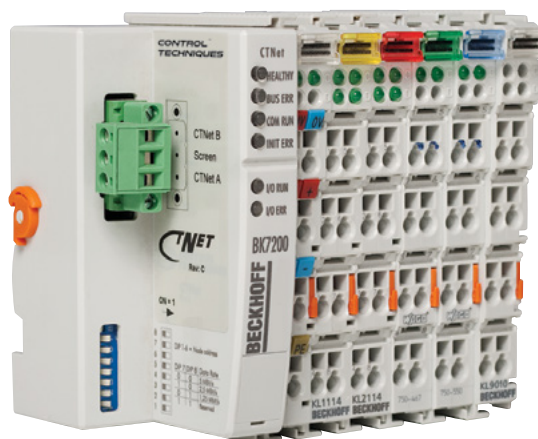
# Parameter Memory Storage Devices

## Mentor MP, Quantum MP, Unidrive SP and Digitax ST Devices

### Smartcard

Nidec's Smartcard is a memory device that ships with every Control Techniques' Unidrive SP, Mentor MP, Quantum MP and Digitax ST motor drive. The card enables simple configuration of parameters in a variety of ways. Primarily, the card is used to back up parameter sets and PLC programs from one drive and copy them to another effectively "cloning" the drive.

Features:

- Parameter and program storage

  — Save multiple complete sets of parameters
  — Set up an application as parameter differences from default
  — Automatically save all user parameter changes
     for maintenance purposes

- Simplifies drive maintenance and commissioning

- Machine upgrades can be stored on a Smartcard and sent to the customer for installation

  — Load complete motor map parameters
  — Read/write Smartcard information from within SM-APPS-PLUS
     and SM-APPS-LITE-V2 option modules.

- Quick set-up for sequential build of machines
  — "Clone" a complete set of parameters for serial production

- Smartcard is hot swappable – the drive only communicates with the Smartcard when commanded to read or write

- Available in two formats:
  — SMARTCARD (8 k memory)
  — SMARTCARD-64 (64 k memory)

| SMARTCARD | | |
|---|---|---|
| Mentor MP Quantum MP | Unidrive SP | Digitax ST |
| ✓ | ✓ | ✓ |

I/O

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