



## SM Option Modules

**Click-in Automation, Communication, Feedback and I/O Solutions**  
For Use With Commander SK, Mentor MP, Quantum MP,  
Unidrive SP and Digitax ST Motor Drives

**Control Techniques™**

  
**EMERSON™**  
Industrial Automation

# Drive and Motion Control Option Modules

## Add Only the Functionality You Need

With Emerson Industrial Automation's Control Techniques brand 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 FREE software from Control Techniques. Commonality of modules and software across control platforms helps ensure smooth integration with Emerson'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.



# Option Modules for Every Application Need

## Scalable, Flexible and Cost-Effective Solutions

SM option modules enhance the functionality and connectivity of Emerson drives, providing the ultimate flexibility in customizing drive features to meet specific application requirements. Designed for seamless integration with additional Emerson, 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	CSK	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	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-120V	Olive	✓	✓	✓	✓
	SM-I/O-24V	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; CSK = Commander SK; MP = Mentor 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 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

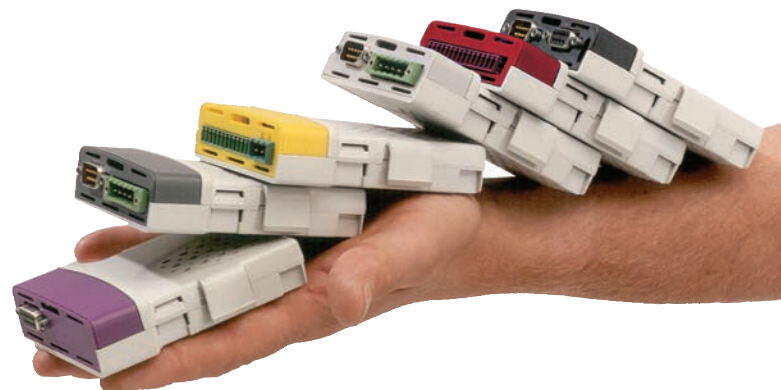
Connectivity options are of key importance when working with any control system. SM option modules deliver simultaneous multiple fieldbus support in EtherNet I/P, ProfiNet, DeviceNet, Profibus, Sercos, EtherCAT, CANopen and many other network systems.

### 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

AUTOMATION

## SM-Applications Plus

The SM-Applications 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 384K 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-Applications 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 Emerson AC, DC and servo motor drives.

- **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-Applications 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 250µs. 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			
Commander SK	Mentor MP Quantum MP	Unidrive SP	Digitax ST
	✓	✓	✓

1 2 3 4 5		6 7 8		9 10 11 12 13	
EIA-485	Function	CTNet	Function	Digital I/O	Function
1	Isolated OV	6	CTNet-	9	Digital OV
2	EIA-485/Rx-	7	CTNet shield	10	Digital input 0
3	EIA-485/Rx+	8	CTNet+	11	Digital input 1
4	EIA-485/Tx-			12	Digital output 0
5	EIA-485/Tx+			13	Digital output 1

### Networks




- Modbus RTU master or follower
- 2-Wire
- 4-Wire
- CTSync



## SM-Applications 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-Applications 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			
	Commander SK	Mentor MP Quantum MP	Unidrive SP	Digitax ST
		✓	✓	✓



## SM-Register

Designed for use with the SM-Applications 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			
	Commander SK	Mentor MP Quantum MP	Unidrive SP	Digitax ST
		✓	✓	✓

See SM-Applications 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			
	Commander SK	Mentor MP Quantum MP	Unidrive SP	Digitax ST
			✓	✓

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

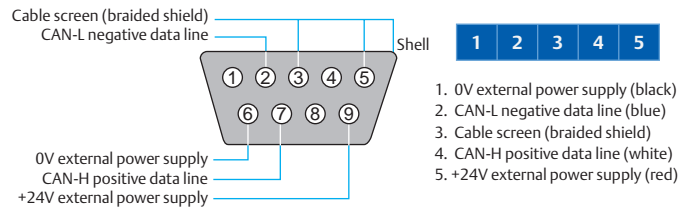
Emerson drives support almost any industrial EtherNet, fieldbus or real-time servo network. Where possible, we obtain independent certification for compliance with the relevant protocol standards to guarantee operation with other vendors' equipment. Emerson is a member of PROFIBUS International, ODVA, 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-Applications Plus module to be installed in the drive.



SM-CAN	Commander SK	Mentor MP Quantum MP	Unidrive SP	Digitax ST
				✓



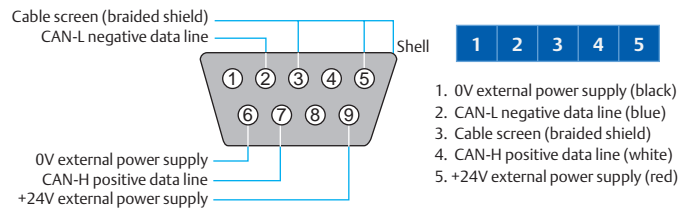
COMMUNICATIONS

## SM-CANopen

Supports various profiles including several drive profiles.

- Up to 127 nodes on a network
- Data rates up to 1Mbps (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-Applications Lite V2 and SM-Applications Plus option modules

SM-CANOPEN	Commander SK	Mentor MP Quantum MP	Unidrive SP	Digitax ST
	✓	✓	✓	✓

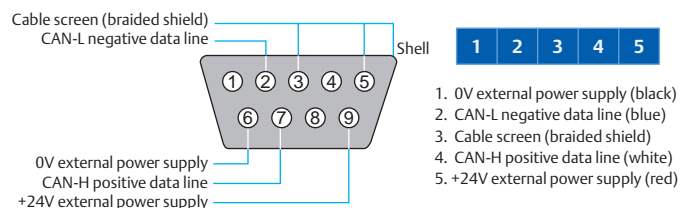


## SM-DeviceNet

- Up to 62 nodes on a network
- Data rates up to 500kbps (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



SM-DEVICENET	Commander SK	Mentor MP Quantum MP	Unidrive SP	Digitax ST
	✓	✓	✓	✓

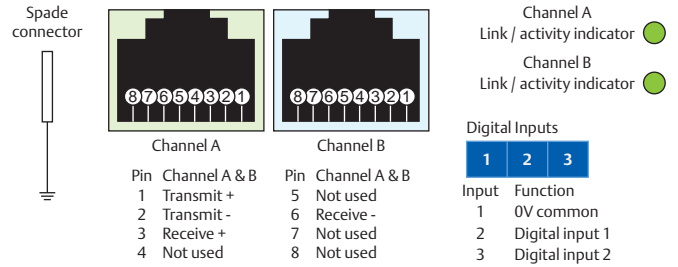


## SM-EtherCAT

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



SM-ETHERCAT				
Commander SK	Mentor MP Quantum MP	Unidrive SP	Digitax ST	
✓	✓	✓	✓	



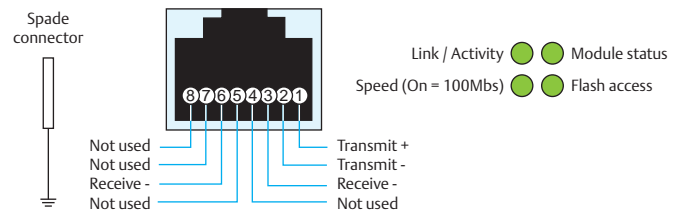
## SM-EtherNet

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 – 10Mbps/100Mbps
- Cyclic data sizes of up to 80 words in/out
- Explicit messaging supported
- Non-vendor-specific AC drive profile supported



SM-ETHERNET				
Commander SK	Mentor MP Quantum MP	Unidrive SP	Digitax ST	
✓	✓	✓	✓	

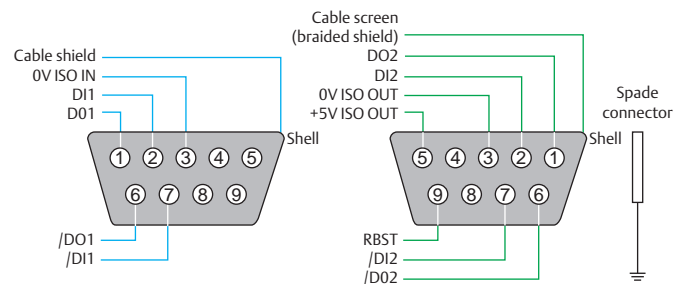


## SM-Interbus

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



SM-INTERBUS				
Commander SK	Mentor MP Quantum MP	Unidrive SP	Digitax ST	
✓	✓	✓	✓	



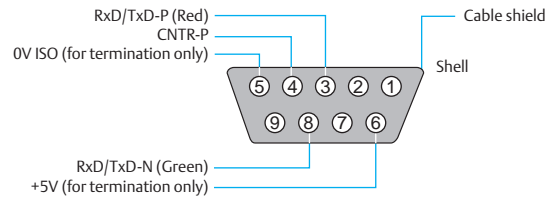
# Communications SM Option Modules

## SM-Profibus DP

- Profibus protocol up to specification DP-V0 and DP-V1
- Up to 125 nodes on a network
- Data rates up to 12Mbps (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	Commander SK	Mentor MP Quantum MP	Unidrive SP	Digitax ST
	✓	✓	✓	✓



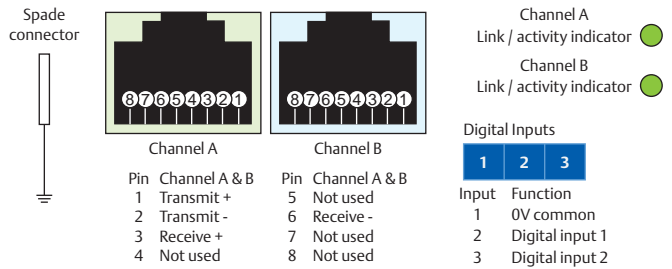
COMMUNICATIONS

## SM-Profinet

- Dual 100 BASE-TX RJ45 connectors with support for shielded twisted pair, full-duplex 10/100Mbps 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	Commander SK	Mentor MP Quantum MP	Unidrive SP	Digitax ST
	✓	✓	✓	✓

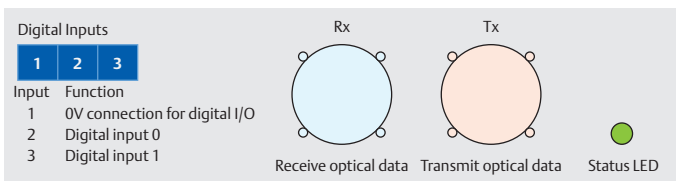


## SM-Sercos

- Up to 254 nodes on a network
- Data rates up to 16Mbps
- 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	Commander SK	Mentor MP Quantum MP	Unidrive SP	Digitax ST
				✓





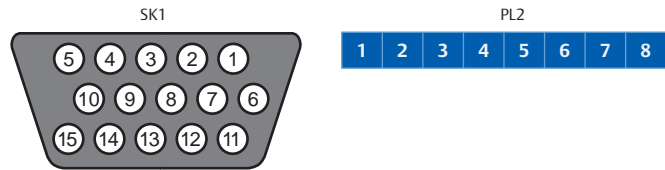
# Feedback SM Option Modules

## SM-Universal Encoder Plus

Emerson'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 15V
- Recommended for digital lock (gearing) applications

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



SK1 Pin	Encoder												
	Ab	Fb	Fr	Ab,SErVO	Fd,SErVO	Fr,SErVO	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	0V 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	0V common					
3			A	F	Data	
4			A\	F\	Data\	
5			B	D	Clock	
6			B\	D\	Clock\	
7	0V common					
8	Freeze					Z
9	Freeze\					Z\

FEEDBACK

# Feedback SM Option Modules

## SM-Encoder Output Plus

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 15V and supports incremental encoder inputs for closed-loop vector drive control. Use SM-Universal Encoder Plus module for servo motor feedback.


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

1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
PL1 (Input)								PL2 (Output)							
Terminal	Ab	Fd	Fr					Terminal	Ab	Fd	Fr	Ab.L	Rd.L		
1	A	F	F					1	0V	0V					
2	A\	F\	F\					2							
3	B	D	R					3	A	F	F	A	F		
4	B\	D\	R\					4	A\	F\	F\	A\	F\		
5		Z						5	B	D	R	B	D		
6		Z\						6	B\	D\	R\	B\	D\		
7		0V						7			Z				
8		+V						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			
	Commander SK	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		0V					
8	External power supply coupling						

\*Applies to all Digitax Servo drives except Digitax ST-Z.

FEEDBACK

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

SM-Resolver Excitation Output:

Output Waveform:

6kHz rms sine wave (turns ratio = 3:1) OR  
6kHz rms sine wave (turns ratio = 2:1)

SM-Resolver Inputs:

Input voltage 2V rms

	SM-RESOLVER			
	Commander SK	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							Terminal	Resolver connections								
1	A							9	SIN LOW								
2	A\							10	SIN HIGH								
3	0V common							11	COS LOW								
4	B							12	COS HIGH								
5	B\							13	REF HIGH (excitation)								
6	0V common							14	REF LOW (excitation)								
7	Z							15	0V								
8	Z\							16	0V common								
								17	0V								

# 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 16mA, so each output is able to supply at least 4mA. A digital output can supply up to a maximum of 16mA as long as the total output current for the group does not exceed 16mA (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 24Vdc. There are two update methods to access I/Os:

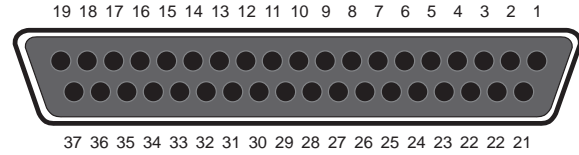
### Fast Update Method:

- Allows access to all 32 I/Os
- Requires SyPTLite or SyPTPro for programming
- 500µs update (30ms for Commander SK)

### Standard Update Method:

- Access only DIO1 to DIO8
  - DIO1 to DIO4 are I/Os
  - DIO5 to DIO8 are I/Ps
- Accessible with CTSoft
- 4ms update (750ms for Commander SK)

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




PL3 Terminal	Function
1 to 32	Digital input/output 1 to 32 (DIO1 to 32)
33	+24V output
34 to 37	0V

## SM-I/O Plus

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

- 2 analog inputs (10-bit plus sign, ±10V)
- 1 analog output (10-bit plus sign, ±10V)
- 3 digital input/outputs
- 3 digital inputs
- 2 relays (2A @ 240Vac, 4A @ 30Vdc resistive)

	SM-I/O-PLUS			
	Commander SK	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	0V 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	0V common						11	0V common								
6	Digital input 4						12	Analog output 3								




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

	SM-I/O-LITE			
	Commander SK	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	0V 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	+24V	10	Encoder A\											
5	Digital input 1	11	0V											
6	Digital input 2	12	Encoder +5V											

*\*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			
	Commander SK	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	0V 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	+24V	10	Encoder A\											
5	Digital input 1	11	0V											
6	Digital input 2	12	Encoder +5V											

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

I/O

## SM-I/O 120V

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

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

	SM-I/O-120V			
	Commander SK	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	0V common											
6	Neutral for digital inputs 3 & 4	12	Relay 2											

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

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

	SM-I/O-PELV			
	Commander SK	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	0V common	10	Analog output 1
2	+24V input	11	0V common
3	Digital I/O 1	12	Analog output 2
4	Digital I/O 2	13	0V 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		


### Notes

- Digital input – 4 available only with Commander SK
- Freeze input not available with Commander SK

## SM-I/O 24V Protected

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

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

	SM-I/O-24V			
	Commander SK	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	0V common	10	Analog output 1
2	0V common	11	0V common
3	Digital I/O 1	12	Analog output 2
4	Digital I/O 2	13	0V 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		

### Notes

- Digital I/O – 4 available only with Commander SK
- Relay 2 and Freeze input not available with Commander SK



# I/O Option Modules

## SM-Bipolar (Commander SK only)

The SM-Bipolar option module provides connectivity for bipolar  $\pm 10V$  frequency reference signal to a Commander SK to control motor speed in both directions. The module converts the bipolar voltage reference into a 0 to 10V unipolar signal along with “run forward” and “run reverse” commands that are connected to the Commander SK drive terminals. This module also has a built-in relay that can be used to convert the drive’s digital output into a relay output.

	SM-BIPOLAR			
	Commander SK	Mentor MP Quantum MP	Unidrive SP	Digitax ST
	✓			

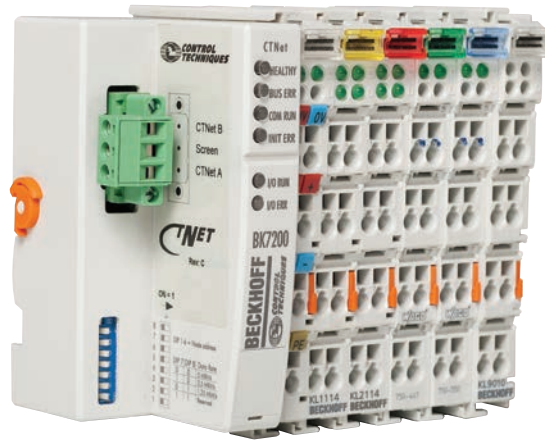
PL1						PL2		PL3		
1	2	3	4	5	6	7	8	21	22	23
PL1	Function					PL2	Function	PL3	Function	
1	0V					7	$\pm 10V$ bipolar input	21	Relay - common	
2	0 to +10V					8	0V	22	Not used	
3	+24V power supply							23	Relay - normally open	
4	Relay drive signal									
5	Run forward output									
6	Run reverse OR Forward/Reverse output									

**Notes:**

- \* SM-Bipolar option module can convert the drive’s digital output B3 into a relay output. Connect drive terminal B3 to module terminal 4. The relay normally open contact connections are module terminals 21 and 23.
- \*\* If Pr.11 = 2 or 3 or 4, no connection required at module terminal 5. For all other values connect module terminal 5 to Commander SK terminal B5.
- \*\*\* If Pr. 11 = 4, the SM-Bipolar module will not function. For all other values, connect module terminal 6 to terminal B6 in Commander SK.

## 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-Applications 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

## Commander SK Devices

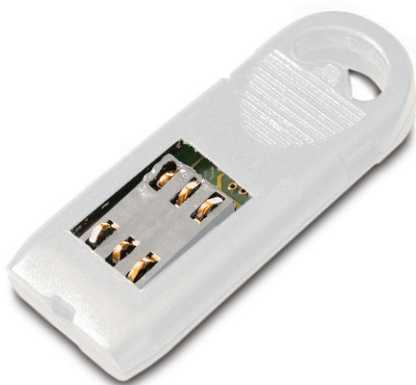
### SmartStick



The SmartStick memory device can be used to upload drive parameters for storage or for easy set-up of identical Commander SK drives. The SmartStick cloning module provides fast and cost-effective drive-to-drive parameter transfer and storage without a PC. A drive can be set to boot from the SmartStick on every power cycle.

## LogicStick PLC Functionality

Insert the LogicStick memory device into the front of the drive to provide the additional memory required to allow the Commander SK to execute a Ladder Logic PLC program. The PLC program is able to access the drive parameters, SM-I/O Timer option module with Real-Time Clock (RTC). The user can replace nano and micro PLCs using LogicStick and SyPTLite IEC61131-3 Ladder Logic and Function Block programming.



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


### SmartCard



Emerson's SmartCard is a memory device that ships with every Unidrive SP, Mentor MP, Quantum MP and Digitax ST Control Techniques' 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-Applications Plus and SM-Applications 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" – drive only communicates with the SmartCard when commanded to read or write
- Available in two formats:
  - SMARTCARD (8k memory)
  - SMARTCARD-64 (64k memory)

SMART CARD	SMART CARD			
	Commander SK	Mentor MP Quantum MP	Unidrive SP	Digitax ST
		✓	✓	✓



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