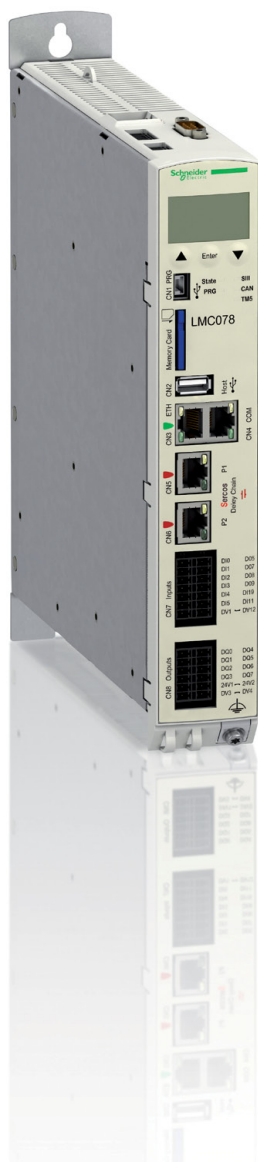


Modicon LMC078 motion controller

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2014

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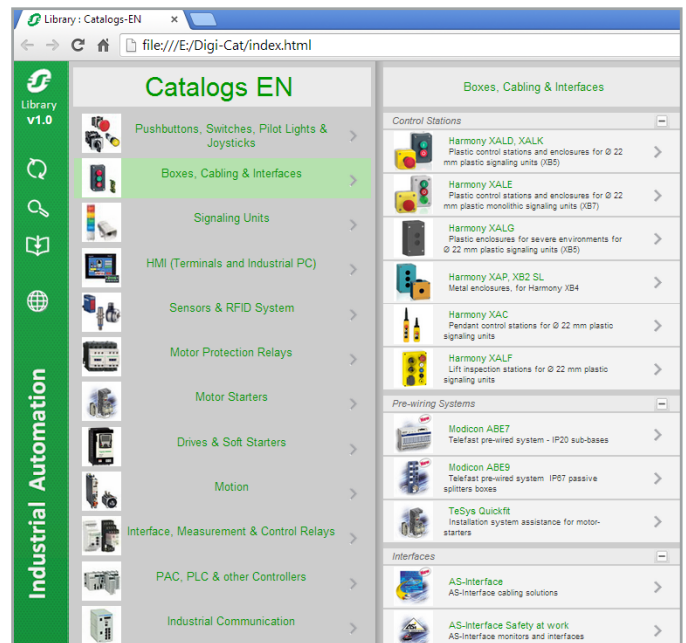
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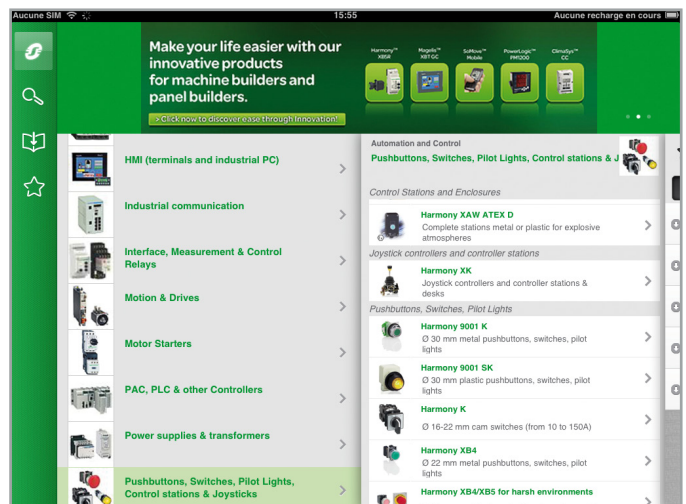
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Presentation

Modicon LMC078 motion controllers are designed for compact machines that require a high level of performance in motion control applications as well as control system and machine communication function management.

Their high processing power enables:

- Control of 8 synchronized axes in 1 ms/16 synchronized axes in 2 ms
- Execution of a Boolean instruction in 2 ns
- A minimum cycle time of 250 μs

Control functions

Modicon LMC078 motion controllers integrate the following standard motion control functions:

- > Velocity control and torque control
- > Relative or absolute positioning
- > Cam profiles for slave axes and programmable cam switch control
- > Virtual axes
- > Electronic gearing function for position control
- > Linear and circular interpolations via the G-code function
- > Master and virtual axes via external encoder

Applications

Modicon LMC078 motion controllers, combined with a dedicated Lexium 32S offer, provide a simple yet powerful solution for the following applications:

- > Machines performing operations “on the fly”: marking, adhesion, shearing, etc.
- > Packing machines (vertical and horizontal bagging): forming, filling, and sealing, etc.
- > Handling machines: packaging, sorting, palletizing, etc.

Hardware characteristics

- Modicon LMC078 motion controllers are in “book” format; dimensions (DxWxH) 220 x 45 x 230 mm (8.66 x 1.77 x 9.06 in.).
- Modicon LMC078 motion controllers have:
 - 12 inputs, 8 outputs (the I/O embedded in the controller are connected via removable spring terminals (1))
 - an encoder input configurable as an incremental or a Sin/Cos absolute encoder
- The 24 V $\overline{\text{DC}}$ controller power is supplied by an external source connected via removable spring terminals (1).
- The controller has a slot for an SD (Secure Digital) card (supplied with the controller).
- The Modicon LMC078 controller has a QR code for direct access to technical documentation relating to the controller and its associated servo drive.

Embedded communication

Modicon LMC078 motion controllers integrate the following embedded communication features as standard:

- sercos III communication bus
 - real-time communication bus (100 Mbps) for position control and remote I/O management
 - RJ 45 connectors
 - topology types: Master/Slave, linear or ring (for enhanced availability)
- CANopen bus
 - for controlling slave devices (63 slaves)
 - 9-way SUB-D connector
- Ethernet
 - communication network with supervisory tools
 - RJ 45 connector
 - Ethernet TCP/IP, FTP, and Ethernet Modbus TCP protocols
- Serial link
 - RS232 or RS485 configurable
 - RJ 45 connector
 - Modbus ASCII/RTU Master/Slave, ASCII (character string) protocols

(1) Connection terminals supplied with the controller





SoMachine software platform

Software configuration

Using SoMachine V4.1 software to configure and program Modicon LMC078 motion controllers and associated devices designed in line with Schneider Electric's Flexible Machine Control concept helps to reduce costs and optimize machine performance.

SoMachine V4.1 integrates tested, validated, documented architectures (TVDA), templates and dedicated motion control libraries.

The "Motion Library" contains a selection of function blocks designed to help reduce device configuration times.

This PLCopen-compliant library consists of administrative function blocks (read/write parameters, states, etc.) and single-axis and multi-axis function blocks.

The main functions are as follows:

- Power on, stop, reset
- Relative, absolute, or additional positioning
- Continuous positioning (reaching a position at a predefined speed)
- Velocity control
- Velocity profile
- Position profile
- Cam profile
- Electronic gearing
- Phasing
- Programmable cam switch
- Linear or circular interpolation

User library

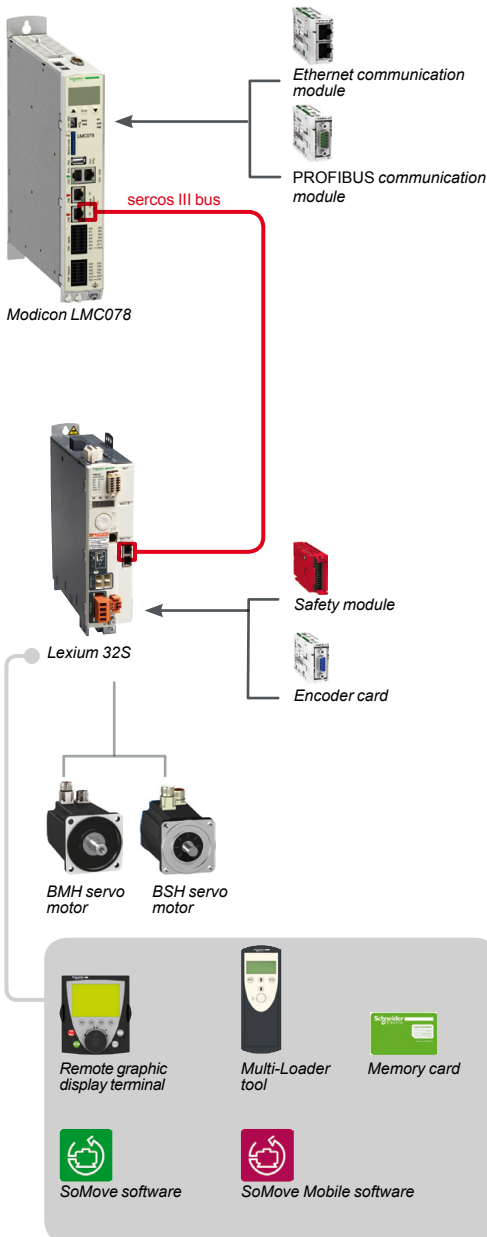
With SoMachine software, it is easy to create your own function blocks (user library) to reduce programming times. Creating a user library simplifies the standardization and reuse of programs and also allows you to help protect proprietary information.

Note: Applications created with a Modicon LMC058 controller (as well as applications created with earlier versions of SoMachine) can be reused on the LMC078 motion controller.

Embedded functions on the Modicon LMC078 motion controller

- > PID control, with SoMachine library
- > SoftMotion libraries integrating coordinated motion functions, and synchronized axis management through gearing, camming, and path follower functions (G-code). An integrated path editor provides simplified access to G-code programming.
- > Diagnostics tools:
 - with message log, error message, and time-stamping
 - integrated diagnostics on controller display
 - integrated oscilloscope function in SoMachine software
- > I/O expansion with Modicon TM5 and TM7 ranges of expansion modules:
 - Modicon TM5 (IP 20) for expansion of digital, analog, and expert (counter module) I/O (1)
 - Modicon TM7 (IP 67) for expansion of digital and analog I/O (1)

(1) Please refer to our website www.schneider-electric.com.



Options and software for LXM32S servo drives

Options for Modicon LMC078 motion controller

Communication modules

LMC078 motion controller has a slot for an additional communication module.

Two types of communication module are available:

- VW3E704100000 EtherNet/IP slave interface
- VW3E704000000 PROFIBUS DP slave interface

Expansion memory

LMC078 motion controller memory can be expanded using a USB flash drive: stored files can be read/written via function blocks managed by the application.

Offer associated with the Modicon LMC078 motion controller

Lexium 32S servo drives are used with Modicon LMC078 motion controllers to facilitate configuration and startup.

Performance is enhanced through optimized motor control achieved through reduced vibration with automatic parameter calculation, a speed observer, and an additional band-stop filter. This optimization helps to increase machine productivity.

Modicon LMC078 motion controllers are programmed using SoMachine software; the servo drive is set up using SoMove software.

The compact size of Lexium 32S servo drives and the associated BSH and BMH servo motors offers optimum performance in a small area, thus helping to reduce the overall size and cost of equipment.

Lexium 32S servo drives offer the following options:

- Memory card (SIM type) for saving the servo drive parameters (**recommended to help ensure a quick resumption of operation after a drive is replaced**)
- Enhanced safety module for integrated safety functions in a control system
- A module for handling a second encoder input

I/O expansion

Modicon LMC078 motion controllers can expand the I/O configuration over the sercos III and/or the CANopen bus.

Over sercos III bus

- The **TM5NS31** interface module for sercos III bus allows connection of distributed I/O islands (sensors and actuators) that are distributed over machines via the sercos III bus.

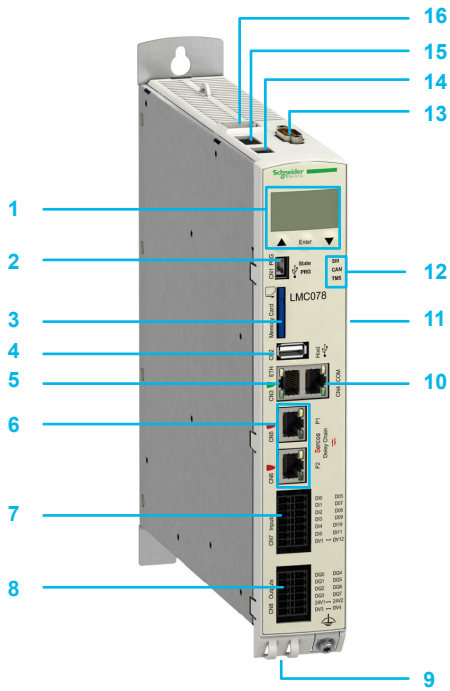
Modicon TM5NS31 interface for sercos III bus (1)

Over CANopen bus

- The **TM5NCO1** CANopen interface module allows the connection of distributed I/O islands (sensors and actuators) that are distributed over machines via the CANopen fieldbus.

Modicon TM5NCO1 interface for CANopen bus (1)

(1) Please refer to our website www.schneider-electric.com.



Description

Modicon LMC078 motion controller

- 1 LCD display and control keys
- 2 Mini USB programming connector
- 3 SD card slot (for firmware and project data)
- 4 USB-A connector for memory expansion
- 5 RJ 45 connector for Ethernet network, with status LED
- 6 Two RJ 45 connectors for sercos III network
- 7 Removable spring terminals (1) for connecting 12 digital inputs (8 standard inputs + 4 Registration inputs)
- 8 Removable spring terminals (1) for connecting 8 digital outputs
- 9 Slot for 1 communication module (EtherNet/IP or Profibus DP bus)
- 10 RJ 45 connector for serial link, with status LED
- 11 (On the side panel) QR code for identifying LMC078 and LXM32S technical documentation
- 12 Controller status LED display block
- 13 9-way SUB-D connector for CANopen bus connection
- 14 Removable spring terminals (1): 3 terminals: +, -, \perp marked 24 VDC for connecting the 24 V $\overline{\text{DC}}$ power supply
- 15 Not used
- 16 RJ 45 connector for Master encoder (incremental or absolute encoder)

(1) Removable spring terminals supplied with the controller

Modicon LMC078 motion controller characteristics	
Conformity	
Certification	CE, UL, CSA 508
Standards	IEC61131-2
Operating characteristics	
Class 3 K3 conforming to IEC/EN 60721-3-3	
Degree of protection	IP 20
Pollution degree	2 (conforming to IEC-61131-2, UL508)
Ambient temperature	+5 ... + 55 °C (41...131 °F)
Condensation or refrigeration	Not tolerated
Relative humidity	5...95%
Operating altitude	0...2,000 m (0... 6561.68 ft) without derating 2,000...3,000 m (6561.68...9842.52 ft): ambient temperature 40 °C/104 °F
Class 3M4	
Shock resistance	100 m/s ²
Vibration resistance	10 m/s ²
Transportation characteristics	
Class 2K3 conforming to IEC/EN 60721-3-2	
Ambient temperature	-25... +70 °C (-13...+158 °F)
Condensation or refrigeration	Not tolerated
Relative humidity	5...95%
Maximum operating altitude	10,000 m (32,808 ft)
Class 2M2	
Shock resistance	300 m/s ²
Vibration resistance	15 m/s ²
Characteristics of long-term storage in original packaging	
Class 1K4 conforming to IEC/EN 60721-3-1	
Ambient temperature	-25... + 55 °C (-13...+131 °F)
Condensation or refrigeration	Not tolerated
Relative humidity	5... 95%
Power supply characteristics	
Power supply	24 V $\overline{\text{---}}$ (20.4 to 30 V $\overline{\text{---}}$), 30 W max.



LMC078CECS20T



VW3E704100000



VW3E704000000

References

Modicon LMC078 motion controller (1)

24 V $\bar{\bar{}}$ power supply

Number of logic I/O	Logic inputs	Logic outputs	Embedded communication ports (2)				Reference	Weight kg/ lb
			sercos III	CANopen master	Ethernet	Serial link		
20 I/O and 1 encoder input	12 x 24 V $\bar{\bar{}}$ sink inputs, including 4 registration inputs	8 source transistor outputs 0.5 A	2 x RJ 45	1 x 9-way SUB-D	1 x RJ 45	1 x RJ 45	LMC078CECS20T	2.200/ 4.850
1 configurable encoder input: <ul style="list-style-type: none"> <input type="checkbox"/> incremental encoder, output voltage 5 V $\bar{\bar{}}$ /200 mA <input type="checkbox"/> absolute encoder (Sin Cos/Hiperface), output voltage 10 V $\bar{\bar{}}$ /200 mA Connection via RJ 45 connector								
SD card	Blank SD card						TMASD2	0.004/ 0.009

Options

Designation	Description	Reference	Weight kg/ lb
Communication module	Ethernet/IP slave module equipped with 2 RJ 45 connectors with status LED	VW3E704100000	–
	PROFIBUS DP slave module equipped with a 9-way SUB-D connector	VW3E704000000	–

Cordsets

Designation	Description	Length m/ft	Reference	Weight kg/ lb
sercos III cordsets for redundant ring	Preassembled cordsets with an RJ 45 connector at each end	0.5/1.640	VW3E5001R005	–
		1/3.281	VW3E5001R010	–
		1.5/4.921	VW3E5001R015	–
		2/6.562	VW3E5001R020	–
		3/9.843	VW3E5001R030	–
		5/16.404	VW3E5001R050	–
		10/32.808	VW3E5001R100	–
		15/49.213	VW3E5001R150	–
		20/65.617	VW3E5001R200	–
		25/82.021	VW3E5001R250	–
		30/98.425	VW3E5001R300	–
40/131.234	VW3E5001R400	–		
50/164.042	VW3E5001R500	–		

Configuration software

Description	Use	See page
SoMachine V4.1 + 1 addon	For configuring Modicon LMC078 controllers	Please refer to our website www.schneider-electric.com

Associated offers

Modicon TM5 digital/analog/expert I/O expansion modules	Please refer to our website www.schneider-electric.com
Modicon TM7 digital/analog I/O expansion modules	
Modicon TM5 bus interface module for sercos III	
Modicon TM5 bus interface module for CANopen	
Modicon TM5 communication module for RS232 serial link	

(1) LMC078 controllers include:

- removable terminals (spring terminals) for connecting I/O
- removable spring terminals for connecting the power supply
- BR2032 button cell battery
- an SD card with the controller firmware.

(2) LMC078 controllers have an embedded USB mini-B programming port.

L
LMC078CECS20T 7

T
TMASD2 7

V
VW3E5001R005 7
VW3E5001R010 7
VW3E5001R015 7
VW3E5001R020 7
VW3E5001R030 7
VW3E5001R050 7
VW3E5001R100 7
VW3E5001R150 7
VW3E5001R200 7
VW3E5001R250 7
VW3E5001R300 7
VW3E5001R400 7
VW3E5001R500 7
VW3E704000000 7
VW3E704100000 7



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