Modicon™ LMC078 Motion Controller

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Schneider Electric™

Contents

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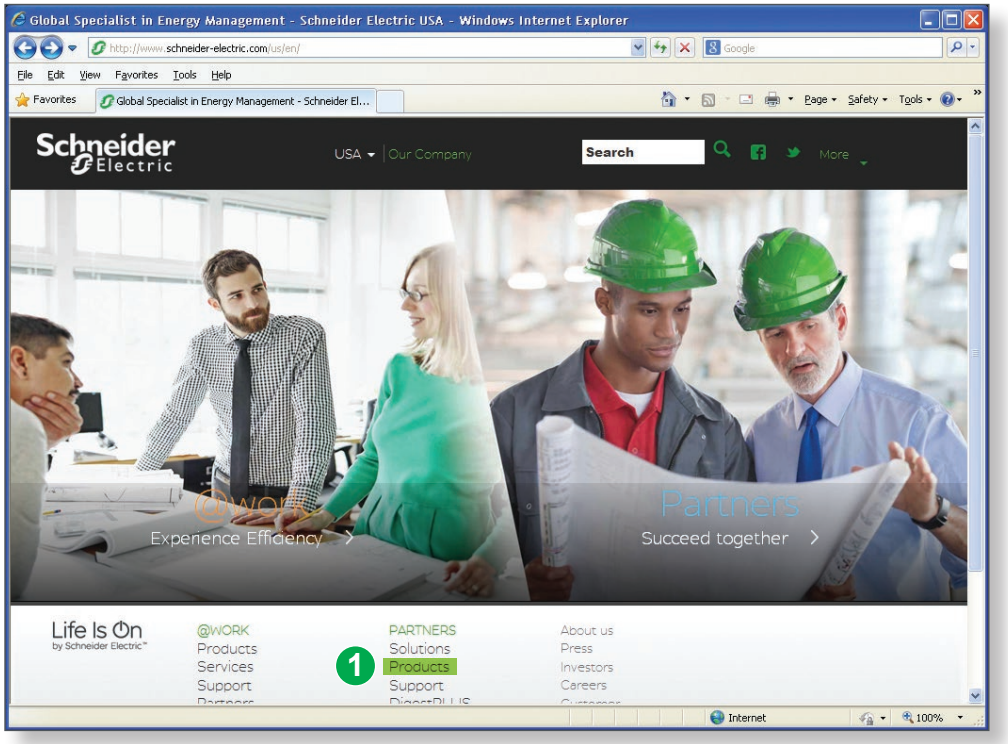
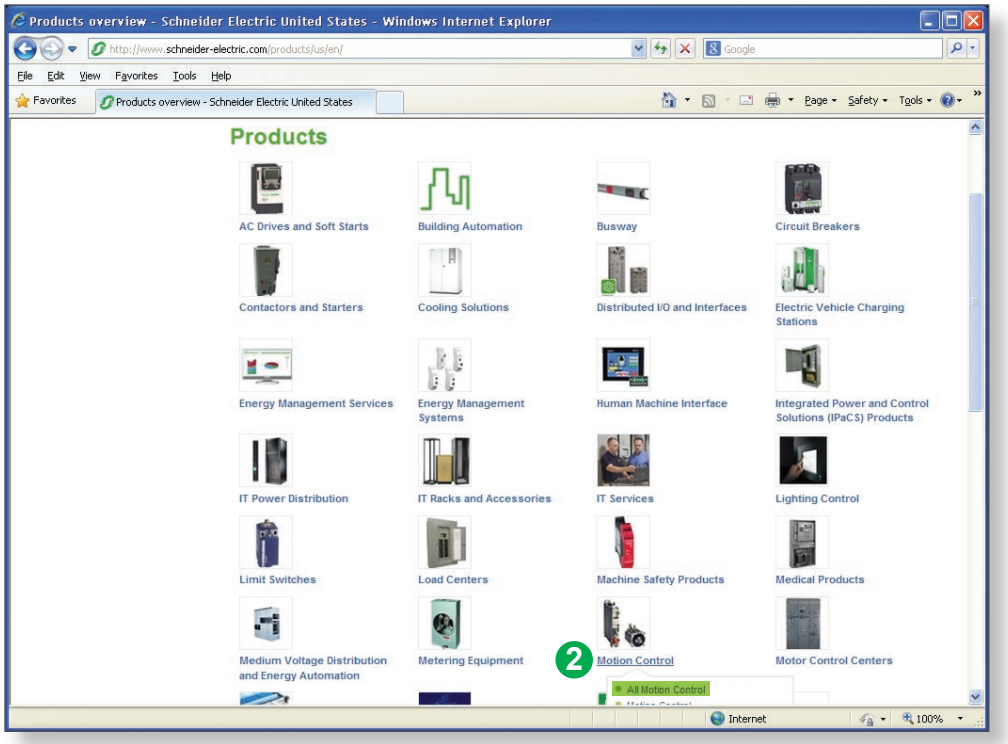
Go to www.schneider-electric.com for information about Motion Control products listed in this catalog, including:

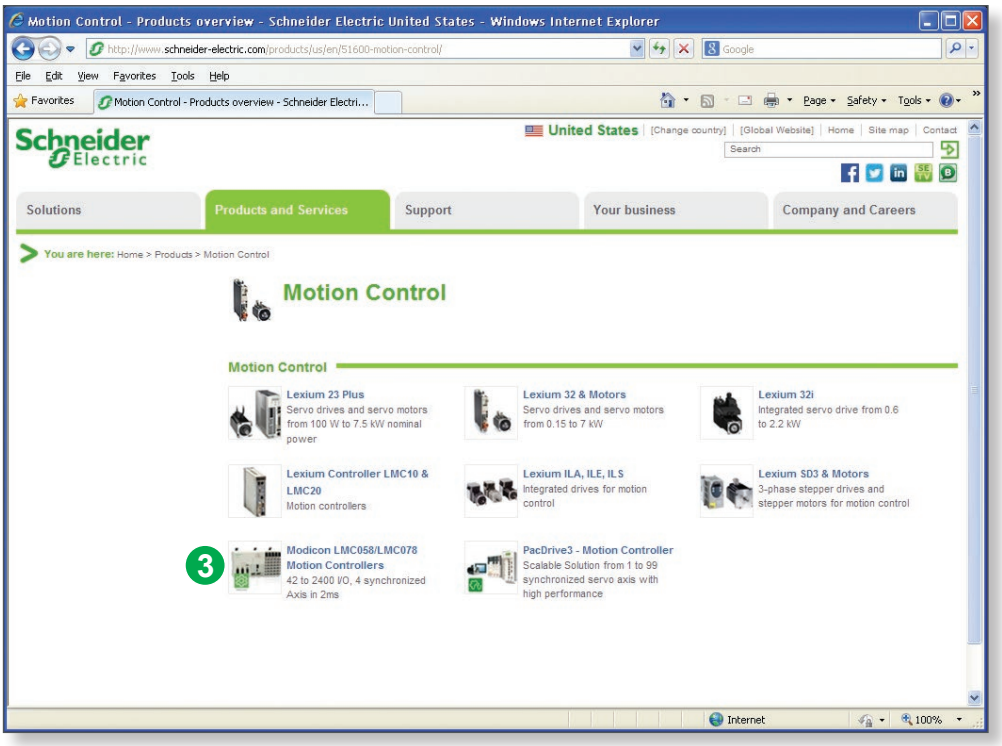
1 Go to: www.schneider-electric.com and select "Products" underneath the "PARTNERS" heading at the bottom of the page.



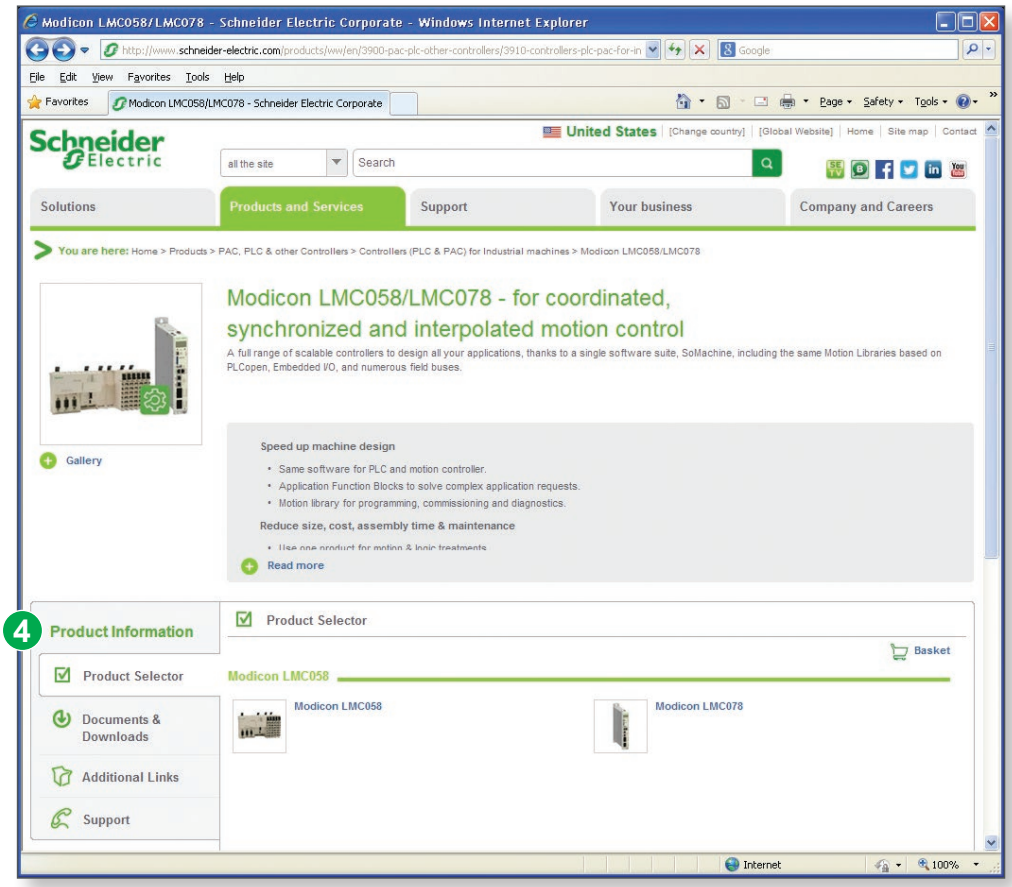
2 On the "Products" page, find the "Motion Control" icon and select "All Motion Control".



3 On the “Motion Control” page, select **“Modicon LMC058/LMC078 Motion Controllers”**.



4 Explore the Modicon LMC058/LMC078 product page, including the “Product Information” tabs: **“Product Selector”** and **“Documents & Downloads”**.



Modicon™ LMC078 Motion Controller

Introduction

The Modicon LMC078 Motion Controller is 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.
The high processing power of the LMC078 enables:
- Control of 8 synchronized axes in 1 ms/16 synchronized axes in 2 ms
- Execution of a Boolean instruction in 2 ns
- Minimum cycle time of 250 µs

Control functions

This LMC078 Motion Controller integrates 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

Combined with a dedicated Lexium™ 32S Servo Drive, the Modicon LMC078 Motion Controller provides a simple yet powerful solution for the following applications:
> Machines performing operations “on the fly”: marking, adhesion, and shearing.
> Packing machines (vertical and horizontal bagging): forming, filling, and sealing.
> Handling machines: packaging, sorting, and palletizing.

Hardware specifications

- Modicon LMC078 Motion Controller has a “book” format; dimensions (D x W x H) 220 x 45 x 230 mm (*8.66 x 1.77 x 9.06 in.*).
- Modicon LMC078 Motion Controller features:
  - 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
- 24 V ⎓ controller power is supplied by an external source connected via removable spring terminals *(1)*.
- Controller has a slot for an SD (Secure Digital) card (supplied with the controller).
- Modicon LMC078 Motion Controller has a QR code for direct access to technical documentation relating to the controller and its associated servo drive.

Embedded communication

This versatile Motion Controller is integrated with 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 the Modicon LMC078 Motion Controller 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 (i.e., read/write parameters, states) 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's 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.

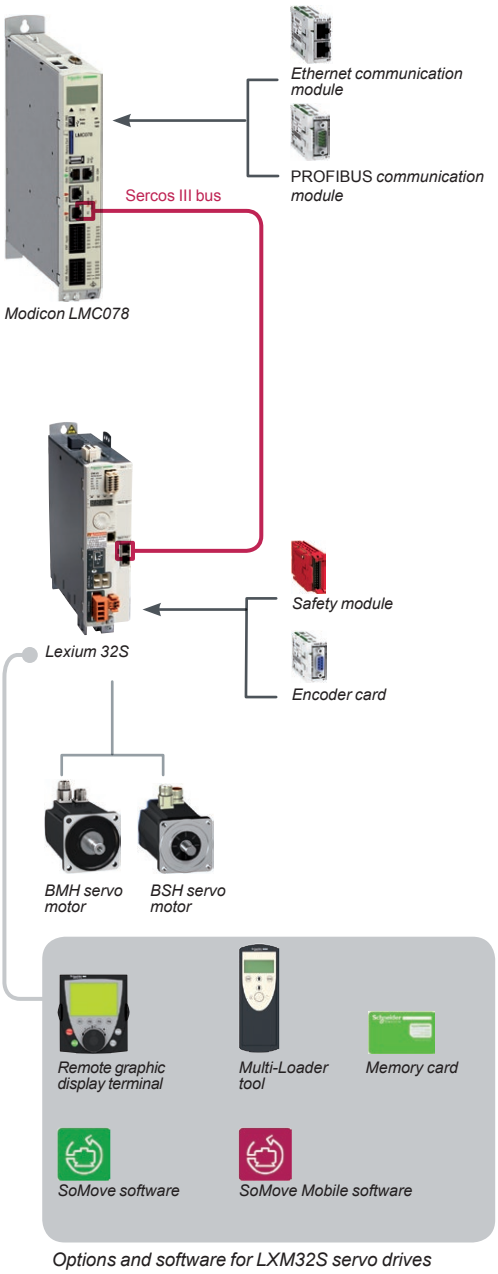
Note: *Applications created with a Modicon LMC058 Motion Controller (as well as applications created with earlier versions of SoMachine) can be reused on the LMC078 Motion Controller.*

Embedded functions on the 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 consult our website www.schneider-electric.com

Modicon™ LMC078 Motion Controller
Options, Combination Solution



Options and software for LXM32S servo drives

Options for the Modicon LMC078 Motion Controller

Communication modules

The LMC078 Motion Controller has a slot for an additional communication module. Two types of communication modules are available:
- VW3E704100000 EtherNet/IP slave interface
- VW3E704000000 PROFIBUS™ DP slave interface

Expansion memory

The 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.

Combination Solution: Modicon LMC078 Motion Controller and Lexium 32S Servo Drive

The Lexium 32S Servo Drive is used with the Modicon LMC078 Motion Controller to facilitate configuration and startup.
Performance is enhanced via optimized motor control, achieved through: reduced vibration with automatic parameter calculation, a speed observer, and an additional band-stop filter. These improvements help to increase machine productivity.

The Modicon LMC078 Motion Controller is programmed using SoMachine software; the servo drive is set up using SoMove software.
The compact size of the Lexium 32S Servo Drive – and the associated BSH and BMH servo motors – provides high performance in a small area, helping to reduce the overall size and cost of equipment.

The Lexium 32S Servo Drive offers 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
- Module for handling a second encoder input

I/O expansion

The Modicon LMC078 Motion Controller can expand the I/O configuration over the Sercos III and/or the CANopen bus.

- Over Sercos III bus
  - **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.

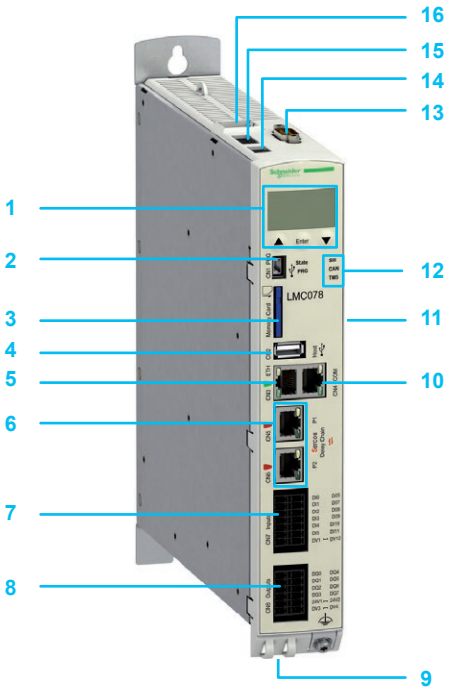
Modicon TM5NS31 interface for Sercos III bus *(1)*

- Over CANopen bus
  - **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 consult our website www.schneider-electric.com

Modicon™ LMC078 Motion Controller



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: +, -, ⏚ marked 24 VDC for connecting the 24 V ⎓ power supply
15 Not used
16 RJ 45 connector for Master encoder (incremental or absolute encoder)

(1) Removable spring terminals supplied with the controller

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Modicon LMC078 Motion Controller specifications

Conformity	
Certification	CE, UL, CSA 508
Standards	IEC61131-2
Operating specifications	
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 to + 55 °C *(41 to 131 °F)*
Condensation or refrigeration	Not tolerated
Relative humidity	5 to 95%
Operating altitude	0 to 2000 m *(0 to 6561.68 ft)* without derating 2000 to 3000 m *(6561.68 to 9842.52 ft)*: ambient temperature 40 °C *(104 °F)*
Class 3M4	
Shock resistance	100 m/s^2
Vibration resistance	10 m/s^2
Transportation specifications	
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 to 95%
Maximum operating altitude	10,000 m *(32,808 ft)*
Class 2M2	
Shock resistance	300 m/s^2
Vibration resistance	15 m/s^2
Specifications of long-term storage in original packaging	
Class 1K4 conforming to IEC/EN 60721-3-1	
Ambient temperature	-25 to + 55 °C *(-13 to +131 °F)*
Condensation or refrigeration	Not tolerated
Relative humidity	5 to 95%
Power supply specifications	
Power supply	24 V ⎓ (20.4 to 30 V ⎓), 30 W max.

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LMC078CECS20T

References

Modicon LMC078 Motion Controller *(1)*

24 V ⎓ 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 ⎓ 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: □ incremental encoder, output voltage 5 V ⎓ /200 mA □ absolute encoder (Sin Cos/Hiperface), output voltage 10 V ⎓ /200 mA Connection via RJ 45 connector							
SD card	Blank SD card						**TMASD2**	0.004/ *0.009*

Options for Modicon LMC078 Motion Controller

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**	–

VW3E704100000

VW3E704000000

Cordsets

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

Configuration software

Description	Use	See page
SoMachine V4.1 + 1 addon	For configuring Modicon **LMC078** Motion Controllers	Consult our website www.schneider-electric.com

Associated offers

Modicon TM5 digital/analog/expert I/O expansion modules	Consult 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) Modicon LMC078 Motion 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) Modicon LMC078 Motion Controllers have an embedded USB mini-B programming port.

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Product reference index

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