Product data sheet

Specifications

logic controller, Modicon M221, 16 IO, 8 DI, 8 DO, transistor, PNP, Ethernet

TM221ME16T

Main

Range of product	Modicon M221
Product or component type	Logic controller
[Us] rated supply voltage	24 V DC
Discrete input number	8, discrete input 4 fast input conforming to IEC 61131-2 Type 1
Analogue input number	2 at 0...10 V
Discrete output type	Transistor
Discrete output number	8 transistor 2 fast output
Discrete output voltage	24 V DC
Discrete output current	0.5 A

Complementary

Discrete I/O number	16
Maximum number of I/O expansion module	7 (local I/O-Architecture) 14 (remote I/O-Architecture)
Supply voltage limits	20.4…28.8 V
Inrush current	35 A
Maximum power consumption in W	22.9 W at 24 V (with max number of I/O expansion module) 4 W at 24 V (without I/O expansion module)
Power supply output current	0.52 A 5 V for expansion bus 0.49 A 24 V for expansion bus
Discrete input logic	Sink or source (positive/negative)
Discrete input voltage	24 V
Discrete input voltage type	DC
Analogue input resolution	10 bits
LSB value	10 mV
Conversion time	1 ms per channel + 1 controller cycle time for analogue input analog input
Permitted overload on inputs	+/- 30 V DC for 5 min (maximum) for analog input +/- 13 V DC (permanent) for analog input
Voltage state 1 guaranteed	>= 15 V for input
Voltage state 0 guaranteed	<= 5 V for input
Discrete input current	7 mA for discrete input 5 mA for fast input
Input impedance	100 kOhm for analog input 3.4 kOhm for input 4.9 kOhm for fast input

Response time	35 μs turn-off, I2...I5 terminal(s) for input
	5 μs turn-on, I0, I1, I6, I7 terminal(s) for fast input
	35 μs turn-on, other terminals terminal(s) for input
	5 μs turn-off, I0, I1, I6, I7 terminal(s) for fast input
	100 μs turn-off, other terminals terminal(s) for input
	5 μs turn-on, turn-off, Q0...Q1 terminal(s) for output
	50 μs turn-on, turn-off, Q2...Q3 terminal(s) for output
	300 μs turn-on, turn-off, other terminals terminal(s) for output
Configurable filtering time	0 ms for input
	3 ms for input
	12 ms for input
Discrete output logic	Positive logic (source)
Maximum current per output common	4 A
Output frequency	100 kHz for fast output (PWM/PLS mode) at Q0...Q1
	5 kHz for output at Q2...Q3
	0.1 kHz for output at Q4...Q6
Absolute accuracy error	+/- 1 % of full scale for analog input
Maximum leakage current	0.1 mA for transistor output
Maximum voltage drop	<1 V
Mechanical durability	20000000 cycles for transistor output
Maximum tungsten load	<12 W for output and fast output
Protection type	Short-circuit and overload protection with automatic reset
	Short-circuit protection on output
	Overload and short-circuit protection at 1 A
Reset time	1 s automatic reset
Memory capacity	256 kB for user application and data RAM with 10000 instructions
	256 kB for internal variables RAM
Data backed up	256 kB built-in flash memory for backup of application and data
Data storage equipment	2 GB SD card (optional)
Battery type	BR2032 or CR2032X lithium non-rechargeable
Backup time	1 year at 25 °C (by interruption of power supply)
Execution time for 1 KInstruction	0.3 ms for event and periodic task
	0.7 ms for other instruction
Execution time per instruction	0.2 μs Boolean
Exct time for event task	60 μs response time
Application structure	1 cyclic auxiliary task
	1 configurable freewheeling/cyclic master task
	8 interrupt tasks
Maximum size of object areas	512 %M memory bits
	512 %KW constant words
	8000 %MW memory words
	255 %TM timers
	255 %C counters
Realtime clock	With
Clock drift	<= 30 s/month at 25 °C
Regulation loop	Adjustable PID regulator up to 14 simultaneous loops
Positioning functions	Position PTO 2 axe(s)pulse/direction mode (100 kHz)
	Position PTO 1 axe(s)CW/CCW mode (100 kHz)
Function available	PLS
	Frequency generator
	PWM
Counting input number	4 fast input (HSC mode) at 100 kHz 32 bits

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counter function	Pulse/direction A/B Single phase
Integrated connection type	USB port with mini B USB 2.0 connector Non isolated serial link serial 1 with RJ45 connector and RS232/RS485 interface Ethernet with RJ45 connector
Supply	(serial 1)serial link supply: 5 V, <200 mA
Transmission rate	1.2...115.2 kbit/s (115.2 kbit/s by default) for bus length of 15 m for RS485 1.2...115.2 kbit/s (115.2 kbit/s by default) for bus length of 3 m for RS232 480 Mbit/s for USB
Communication port protocol	USB port: USB - SoMachine-Network Non isolated serial link: Modbus master/slave - RTU/ASCII or SoMachine-Network Ethernet
Port Ethernet	10BASE-T/100BASE-TX 1 port with 100 m copper cable
Communication service	DHCP client Ethernet/IP adapter Modbus TCP server Modbus TCP slave device Modbus TCP client
Local signalling	1 LED (green) for PWR 1 LED (green) for RUN 1 LED (red) for module error (ERR) 1 LED (green) for SD card access (SD) 1 LED (red) for BAT 1 LED per channel (green) for I/O state 1 LED (green) for SL Ethernet network activity (green) for ACT Ethernet network link (yellow) for Link (Link Status)
Electrical connection	terminal block, 3 terminal(s) for connecting the 24 V DC power supply connector, 4 terminal(s) for analogue inputs Mini B USB 2.0 connector for a programming terminal removable screw terminal block, 10 terminal(s) for inputs removable screw terminal block, 11 terminal(s) for outputs
Maximum cable distance between devices	Shielded cable: <10 m for fast input Unshielded cable: <30 m for output Unshielded cable: <30 m for digital input Unshielded cable: <1 m for analog input Shielded cable: <3 m for fast output
Insulation	Between input and internal logic at 500 V AC Between fast input and internal logic at 500 V AC Non-insulated between inputs Between output and internal logic at 500 V AC Non-insulated between analogue input and internal logic Non-insulated between analogue inputs
Marking	CE
Mounting support	Top hat type TH35-15 rail conforming to IEC 60715 Top hat type TH35-7.5 rail conforming to IEC 60715 plate or panel with fixing kit
Height	90 mm
Depth	70 mm
Width	70 mm
Product weight	0.264 kg

Environment

Standards	IEC 61131-2 UL 508 CAN/CSA C22.2 No. 213 IACS E10 ANSI/ISA 12-12-01

Product certifications	RCM ABS cULus DNV-GL EAC LR CE UKCA cULus HazLoc
Environmental characteristic	Ordinary and hazardous location
Resistance to electrostatic discharge	8 kV in air conforming to IEC 61000-4-2 4 kV on contact conforming to IEC 61000-4-2
Resistance to electromagnetic fields	10 V/m 80 MHz...1 GHz conforming to IEC 61000-4-3 3 V/m 1.4 GHz...2 GHz conforming to IEC 61000-4-3 1 V/m 2...2.7 GHz conforming to IEC 61000-4-3
Resistance to magnetic fields	30 A/m 50/60 Hz conforming to IEC 61000-4-8
Resistance to fast transients	2 kV (power lines) conforming to IEC 61000-4-4 2 kV (relay output) conforming to IEC 61000-4-4 1 kV (I/O) conforming to IEC 61000-4-4 1 kV (Ethernet line) conforming to IEC 61000-4-4 1 kV (serial link) conforming to IEC 61000-4-4
Surge withstand	2 kV power lines (AC) common mode conforming to IEC 61000-4-5 2 kV relay output common mode conforming to IEC 61000-4-5 1 kV I/O common mode conforming to IEC 61000-4-5 1 kV shielded cable common mode conforming to IEC 61000-4-5 0.5 kV power lines (DC) differential mode conforming to IEC 61000-4-5 1 kV power lines (AC) differential mode conforming to IEC 61000-4-5 1 kV relay output differential mode conforming to IEC 61000-4-5 0.5 kV power lines (DC) common mode conforming to IEC 61000-4-5
Resistance to conducted disturbances	10 V 0.15...80 MHz conforming to IEC 61000-4-6 3 V 0.1...80 MHz conforming to Marine specification (LR, ABS, DNV, GL) 10 V spot frequency (2, 3, 4, 6.2, 8.2, 12.6, 16.5, 18.8, 22, 25 MHz) conforming to Marine specification (LR, ABS, DNV, GL)
Electromagnetic emission	Conducted emissions - test level: 79 dBµV/m QP/66 dBµV/m AV (power lines (AC)) at 0.15…0.5 MHz conforming to IEC 55011 Conducted emissions - test level: 73 dBµV/m QP/60 dBµV/m AV (power lines (AC)) at 0.5…300 MHz conforming to IEC 55011 Conducted emissions - test level: 120...69 dBµV/m QP (power lines) at 10…150 kHz conforming to IEC 55011 Conducted emissions - test level: 63 dBµV/m QP (power lines) at 1.5…30 MHz conforming to IEC 55011 Radiated emissions - test level: 40 dBµV/m QP class A (10 m) at 30…230 MHz conforming to IEC 55011 Conducted emissions - test level: 79...63 dBµV/m QP (power lines) at 150…1500 kHz conforming to IEC 55011 Radiated emissions - test level: 47 dBµV/m QP class A (10 m) at 200…1000 MHz conforming to IEC 55011
Immunity to microbreaks	10 ms
Ambient air temperature for operation	-10…55 °C (horizontal installation) -10…35 °C (vertical installation)
Ambient air temperature for storage	-25…70 °C
Relative humidity	10…95 %, without condensation (in operation) 10…95 %, without condensation (in storage)
IP degree of protection	IP20 with protective cover in place
Pollution degree	<= 2
Operating altitude	0...2000 m
Storage altitude	0…3000 m
Vibration resistance	3.5 mm at 5…8.4 Hz on symmetrical rail 3.5 mm at 5…8.4 Hz on panel mounting 1 gn at 8.4…150 Hz on symmetrical rail 1 gn at 8.4…150 Hz on panel mounting

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Shock resistance	147 m/s² for 11 ms

Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Height	10.8 cm
Package 1 Width	10.0 cm
Package 1 Length	12.6 cm
Package 1 Weight	430.0 g
Unit Type of Package 2	S04
Number of Units in Package 2	24
Package 2 Height	30 cm
Package 2 Width	40 cm
Package 2 Length	60 cm
Package 2 Weight	10.966 kg
Unit Type of Package 3	P12
Number of Units in Package 3	288
Package 3 Height	105.0 cm
Package 3 Width	120.0 cm
Package 3 Length	80.0 cm
Package 3 Weight	142 kg

Environmental Data

Schneider Electric aims to achieve Net Zero status by 2050 through supply chain partnerships, lower impact materials, and circularity via our ongoing "Use Better, Use Longer, Use Again" campaign to extend product lifetimes and recyclability.

Environmental Data explained ›

How we assess product sustainability ›

Environmental footprint

Total lifecycle Carbon footprint	**98**
Environmental Disclosure	**Product Environmental Profile**

Use Better

Materials and Substances

Packaging made with recycled cardboard	**Yes**
Packaging without single use plastic	**Yes**
EU RoHS Directive	**Pro-active compliance (Product out of EU RoHS legal scope)**
REACh Regulation	**REACh Declaration**
California proposition 65	**WARNING: This product can expose you to chemicals including: Lead and lead compounds, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov**
PVC free	**Yes**

Use Again

Repack and remanufacture

End of life manual availability	**End of Life Information**
Take-back	**No**
WEEE Label	**The product must be disposed on European Union markets following specific waste collection and never end up in rubbish bins**

Dimensions Drawings

Dimensions

mm
in.

85
3.35

70
2.76

102
4.02
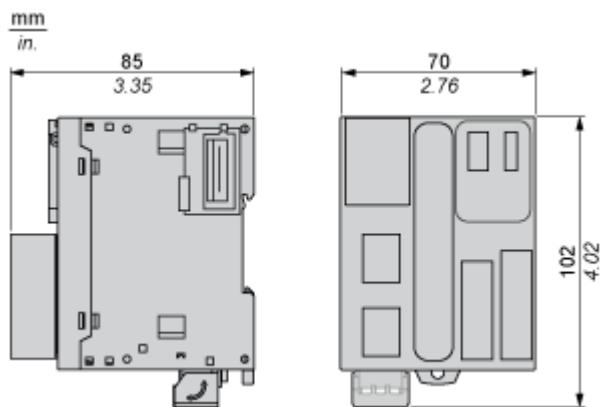
Mounting and Clearance

Mounting on a Rail
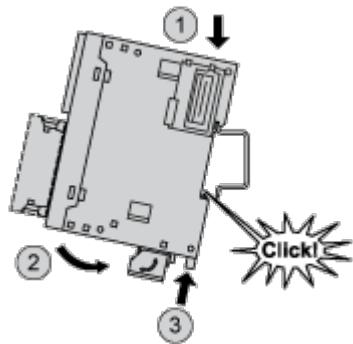
Direct Mounting on a Panel Surface

mm / in.

M4 x 6/8
0.24/0.31

35
1.38

2xØ4.3
2xØ0.17

100
3.94

(1)
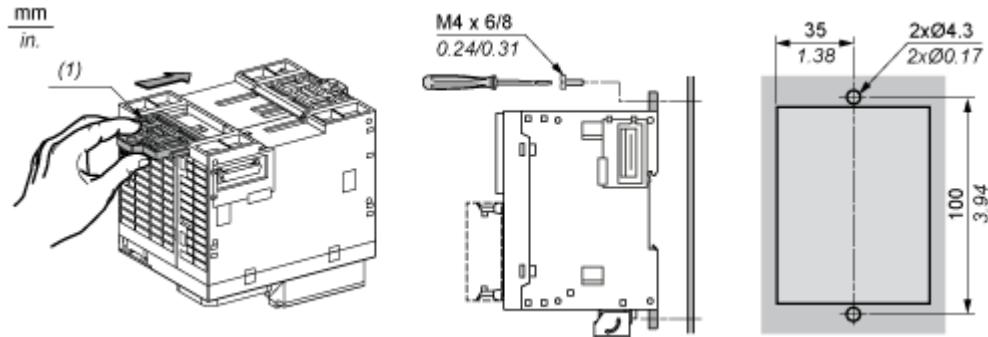
(1)   Install a mounting strip

Mounting

Correct Mounting Position
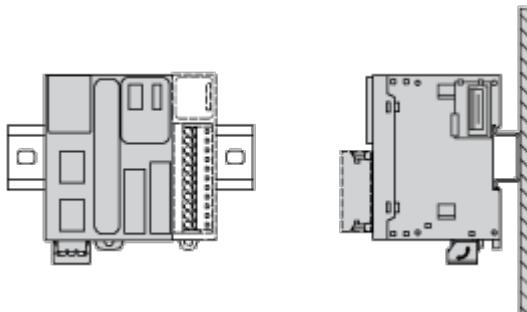
Acceptable Mounting Position
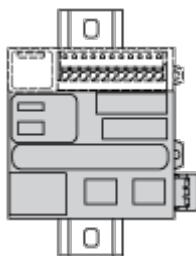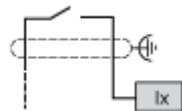
Incorrect Mounting Position
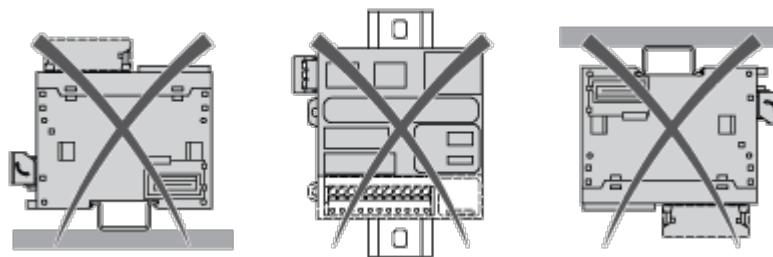
Clearance
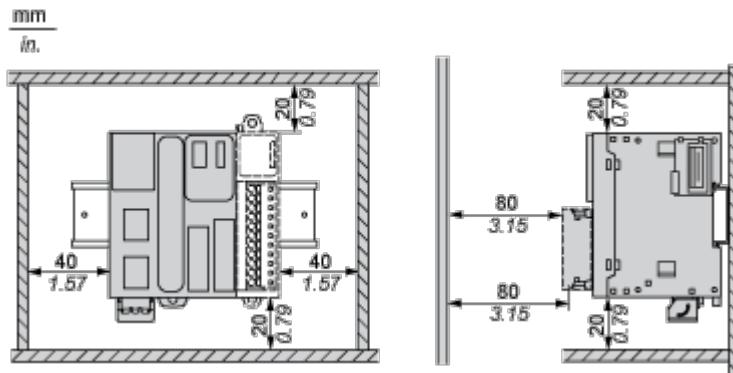
Connections and Schema

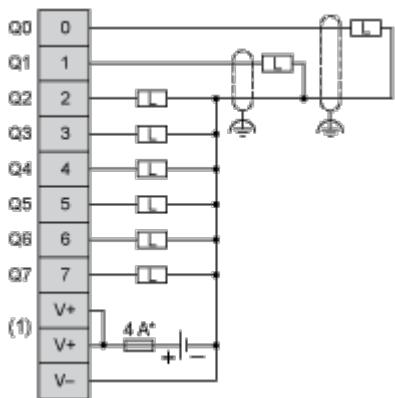### Digital Inputs
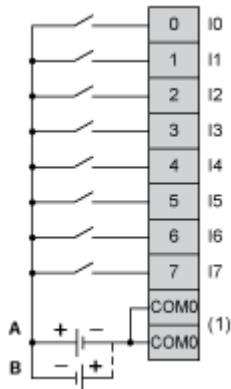
(1)   The COM0 terminals are connected internally.

A :   Sink wiring (positive logic).

B :   Source wiring (negative logic).

Ix   I0, I1, I6, I7

Digital Outputs

(*)   Type T fuse

(1)   The V+ terminals are connected internally.
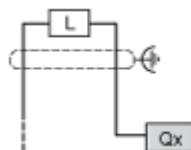
Qx   Q0, Q1

Analog Inputs
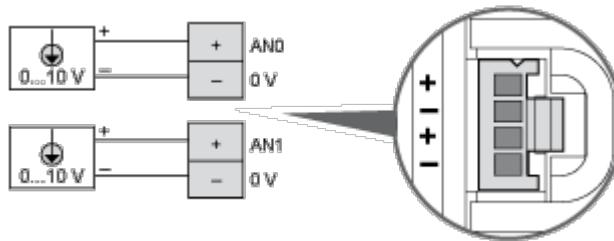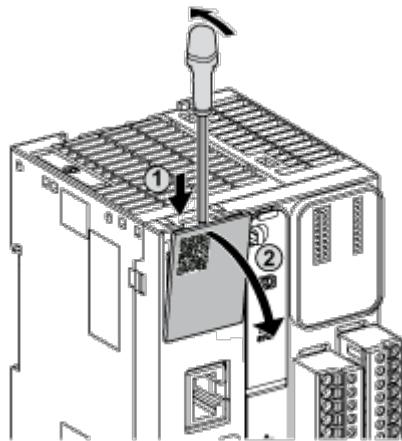
The (-) poles are connected internally.
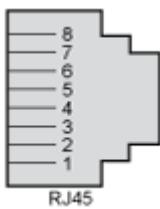
Pin	Wire Color
AN0 / AN1	Red
0 V	Black

Ethernet Connection

RJ45
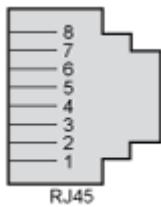
Pin N °	Signal
1	TD+
2	TD-
3	RD+
4	–
5	–
6	RD-
7	–
8	–
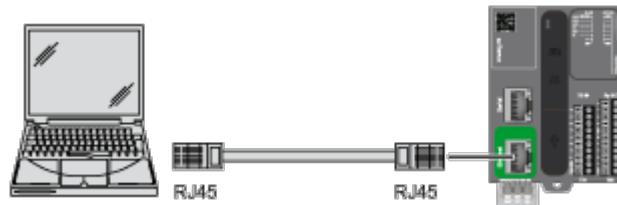
USB Mini-B Connection

SL1 Connection

RJ45
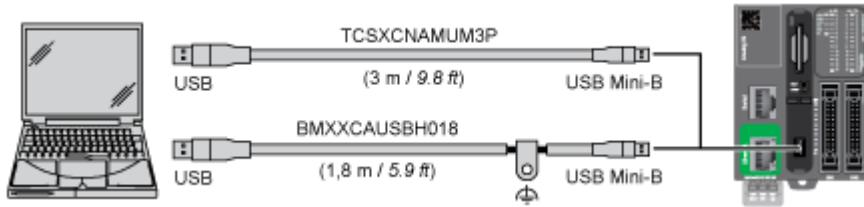
SL1

N °	RS 232	RS 485
1	RxD	N.C.
2	TxD	N.C.
3	RTS	N.C.
4	N.C.	D1
5	N.C.	D0
6	CTS	N.C.
7	N.C.*	5 Vdc
8	Common	Common

N.C.: not connected
* : 5 Vdc delivered by the controller. Do not connect.

SL1

RJ45　　　　RJ45

DCE (Modem...)
RJ45　　　　SUB D 9 pin

DTE
RJ45　　　　SUB D 9 pin
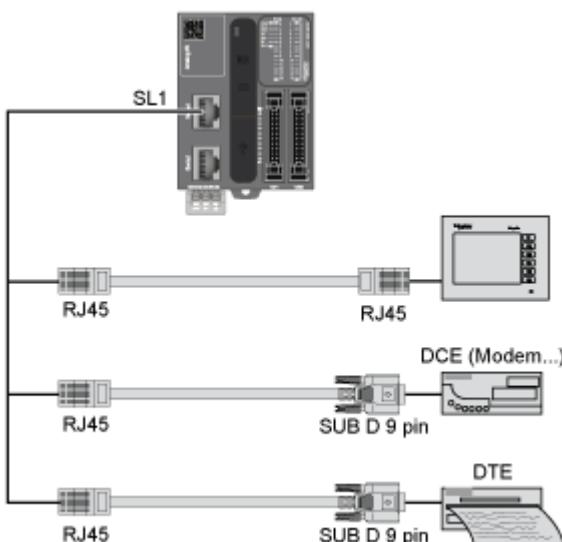
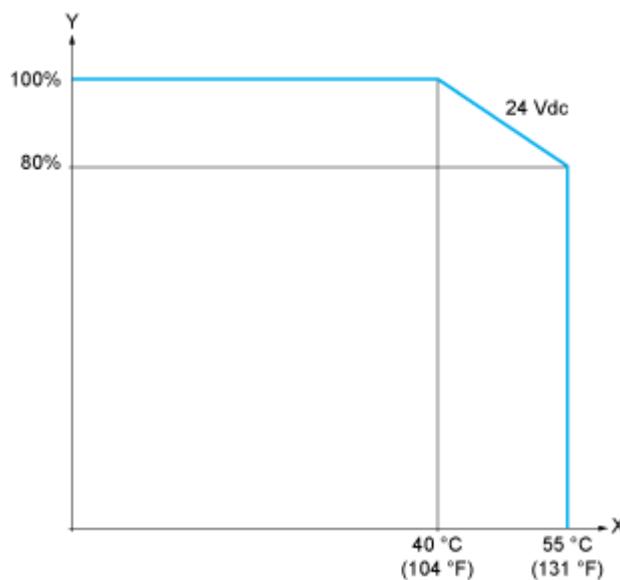Performance Curves

Derating Curves

Embedded Digital Inputs
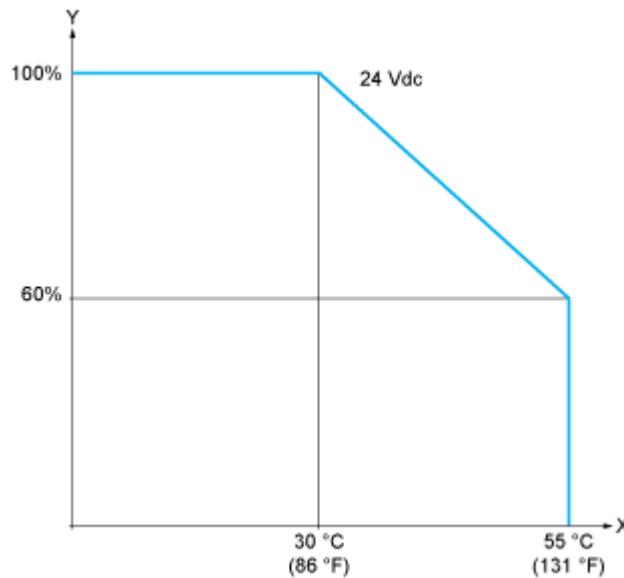
X :   Ambient temperature

Y :   Input simultaneous ON ratio

Embedded Digital Outputs

X :   Ambient temperature

Y :   Output simultaneous ON ratio