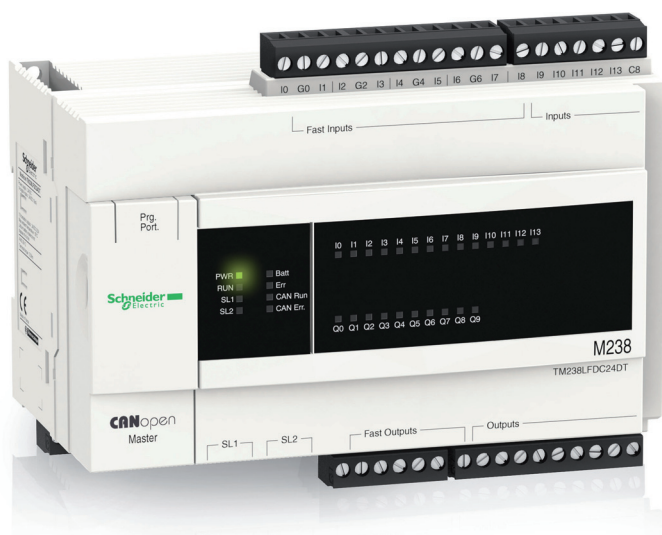


Logic controller Modicon M238

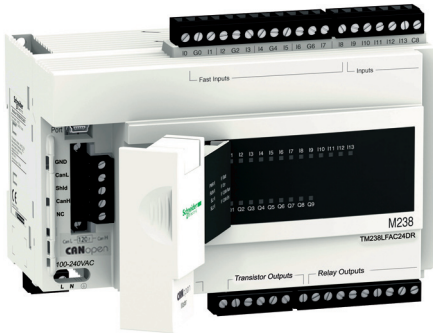
Catalogue
January 2010



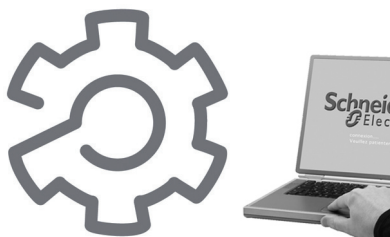
| | |
|---|----|
| M238 Compact bases | |
| ■ Presentation..... | 2 |
| ■ Description..... | 3 |
| ■ Characteristics..... | 5 |
| ■ References..... | 10 |
| ■ Dimensions, mounting..... | 10 |
| ■ Connections example: with Modbus products / on CANopen bus..... | 12 |
| ■ Connections..... | 14 |
| ■ Electromagnetic compatibility..... | 17 |
| Discrete I/O extension modules | |
| ■ Selection guide..... | 18 |
| ■ Presentation, description..... | 22 |
| ■ Characteristics..... | 23 |
| ■ References..... | 26 |
| Analog I/O extension modules | |
| ■ Selection guide..... | 32 |
| ■ Presentation, description..... | 34 |
| ■ Characteristics..... | 35 |
| ■ References..... | 38 |
| ■ Electromagnetic compatibility..... | 40 |
| ■ Connections..... | 41 |
| TM200 HSC 206D counter modules | |
| ■ Presentation..... | 44 |
| ■ Description..... | 45 |
| ■ Functions..... | 46 |
| ■ Characteristics..... | 47 |
| ■ References, dimensions..... | 48 |
| ■ Connections..... | 49 |
| AS-Interface actuator/sensor bus: AS-Interface master module | |
| ■ Presentation, description..... | 50 |
| ■ Characteristics, references, dimensions..... | 51 |
| Modicon OTB distributed I/O, Optimum IP 20 I/O system | |
| ■ Presentation..... | 52 |
| ■ Description..... | 53 |
| ■ Characteristics..... | 54 |
| ■ References..... | 57 |
| ■ Dimensions, mounting..... | 58 |
| ■ Connections..... | 59 |
| Ethernet Modbus/TCP network: TwidoPort interface module | |
| ■ Presentation, description..... | 60 |
| ■ Characteristics, references..... | 61 |
| ■ Connections, references..... | 62 |
| CANopen: Integrated port CANopen bus | |
| ■ Presentation..... | 64 |
| ■ Characteristics..... | 65 |
| ■ Architecture, references..... | 66 |
| ■ References..... | 67 |
| SoMachine: Simplify machine programming and commissioning | |
| ■ Presentation..... | 70 |
| ■ Characteristics..... | 72 |
| ■ References..... | 73 |
| Connection interfaces: Modicon Telefast ABE 7 pre-wired system | |
| ■ Selection guide..... | 74 |
| ■ Presentation, compatibility..... | 75 |
| ■ Characteristics..... | 76 |
| ■ Curves..... | 77 |
| ■ References..... | 78 |
| ■ Schemes..... | 80 |
| Compatibility: Discrete inputs modules | |
| ■ and OsiSense® XS inductive proximity sensors..... | 82 |
| ■ and OsiSense® XU photo-electric sensors..... | 84 |
| ■ and OsiSense® XG rotary encoders..... | 86 |
| Operator dialogue terminals | |
| ■ Selection guide: Magelis Small Panels..... | 88 |
| ■ Selection guide: Magelis XBT GT/GK/GTW Advanced Panels..... | 90 |
| Power supplies and transformers | |
| ■ Selection guide: Power supplies for DC control circuits..... | 94 |



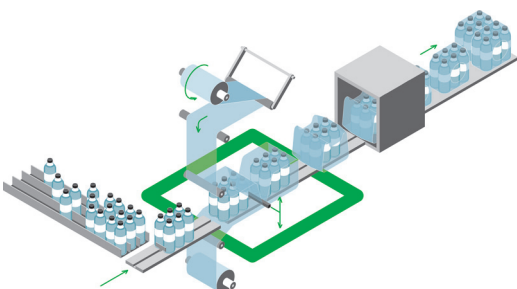
TM238 LFDC24DT



TM238 LFAC24DR



SoMachine software platform



Presentation

Modicon M238 compact logic controllers offer an “all-in-one” solution in a compact unit (157 x 118 x 86 mm excluding extension modules). Four models are available, with different embedded communications and supply voltages.

Models TM238 LDD24DT and TM238 LFDC24DT, powered with 24 V \pm offer:

- 14 x 24 V \pm inputs, including 8 fast inputs, dedicated to special functions such as high-speed counting (HSC)
 - 10 x 24 V \pm solid state outputs, including 4 fast outputs, dedicated to special functions such as PWM and PTO.
 - An RS 232/RS 485 serial link (SoMachine-Network, Modbus, ASCII protocols)
- Model **TM238 LFDC24DT** also has:
- A CANopen bus master link
 - A second RS 485 serial link (SoMachine-Network, Modbus, ASCII protocols)

Models **TM238 LDA24DR** and **TM238 LFAC24DR**, powered with 100-240 V \sim offer:

- 14 x 24 V \pm inputs, including 8 fast inputs, dedicated to special functions such as high-speed counting (HSC)
 - 4 x 24 V \pm solid state outputs, dedicated to HSC reflex functions, and 6 relay outputs
 - An RS 232/RS 485 serial link (SoMachine-Network, Modbus, ASCII protocols)
- Model **TM238 LFAC24DR** also has:
- A CANopen bus master link
 - A second RS 485 serial link (SoMachine-Network, Modbus, ASCII protocols).

■ The number of I/O can be expanded on all four models by adding up to 7 extension modules (1) of the following type on the right-hand side of the base unit:

- Discrete **TM2 DDI/DDO/DMM/DRA**
- Analog **TM2 AMI/ALM/ARI/AMO/AVO/AMM**
- up to 3 High-speed counter **TM200 HSC206DT/DF**
- up to 2 AS-Interface master module **TWD NOI 10M3**.

Modems or communication gateways can be connected to the serial links in order to expand the connectivity capability to include Ethernet Modbus/TCP, Profibus DP, DeviceNet, etc..

Note: A serial link on each controller delivers a 5 V \pm voltage dedicated primarily to powering a Magelis display unit or Small panel terminal XBT N●00/R400/RT500 or the Ethernet gateway 499 TWD 01100.

The compact controller solution also has great flexibility in terms of wiring. With discrete I/O extension modules, several connection options are available, including removable screw terminals, spring terminals and HE 10 connectors, providing simple, quick, safe wiring. The Advantys Telefast ABE 7 prewiring system can be used for easy connection of extension modules with HE 10 connectors.

(1) The addition of 7 extension modules allows a maximum number per configuration of 136/192/248 I/O (depending on whether extension modules with screw terminals, spring terminals or HE 10 connectors are being used).

Design and installation of Modicon M238 applications

Schneider Electric's **SoMachine** software platform can be used to program Modicon M238 controllers using:

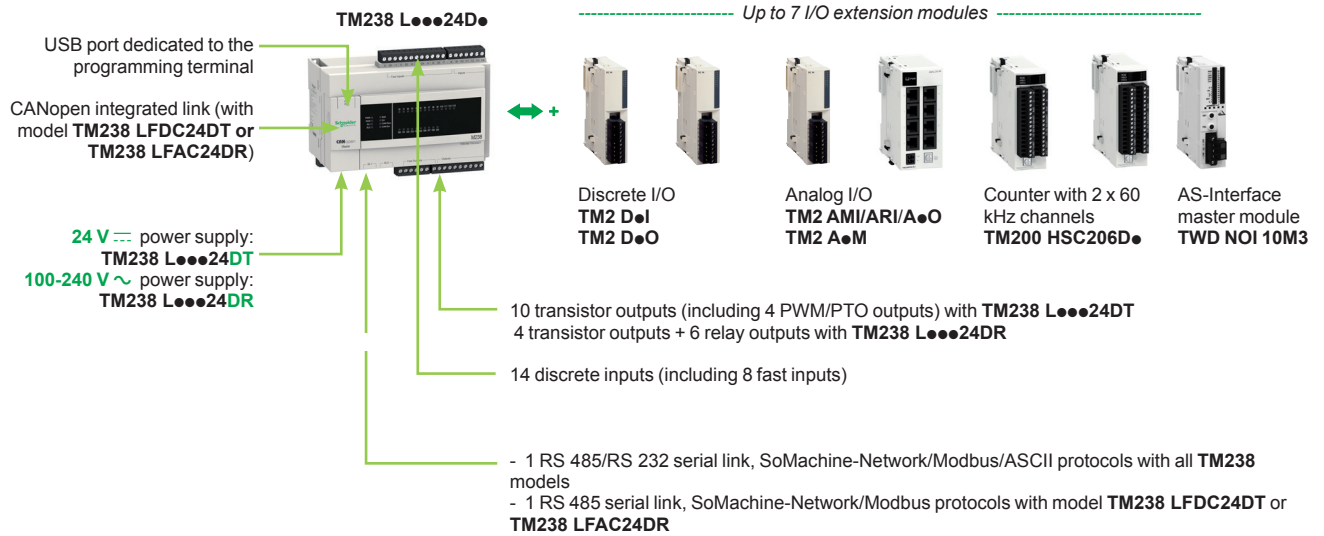
- IEC 61131-3 programming languages: Instruction List (IL), Ladder Diagram (LD), Function Block Diagram (FBD), Sequential Function Chart/Grafset (SFC) and Structured Text (ST)
- CFC (Continuous Function Chart) language.

Modicon M238, the solution for packaging and conveying machines

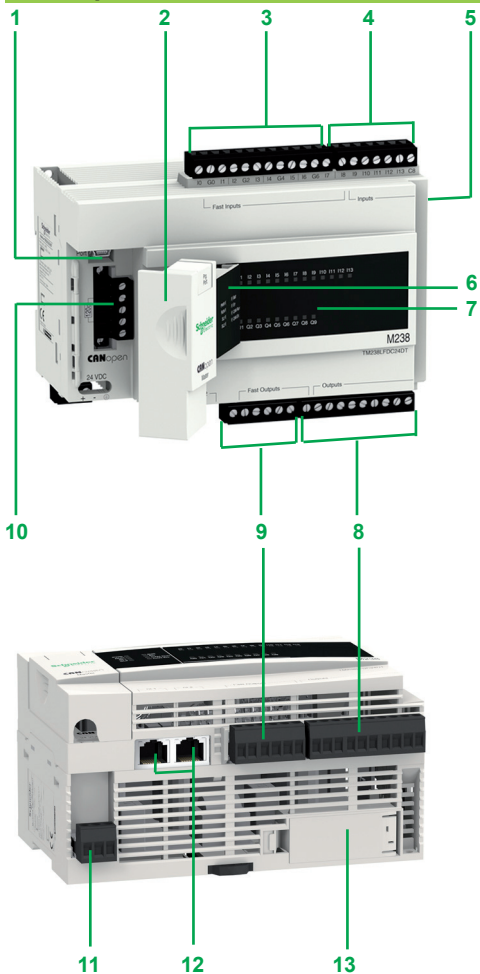
The Modicon M238 controller's languages, dedicated function blocks and integrated functions (HSC (high-speed counting), PTO (Pulse Train Outputs) and PWM (Pulse Width Modulation) mean that Modicon M238 controllers are ideal for use with Altivar variable speed drives, Lexium servo drives and Magelis HMI terminals in packaging machine applications:

- Vertical bagging machines
- Vertical packaging machines
- Rotary or linear labelling machines
- Conveyors
- Etc.

Compact base configuration



Description



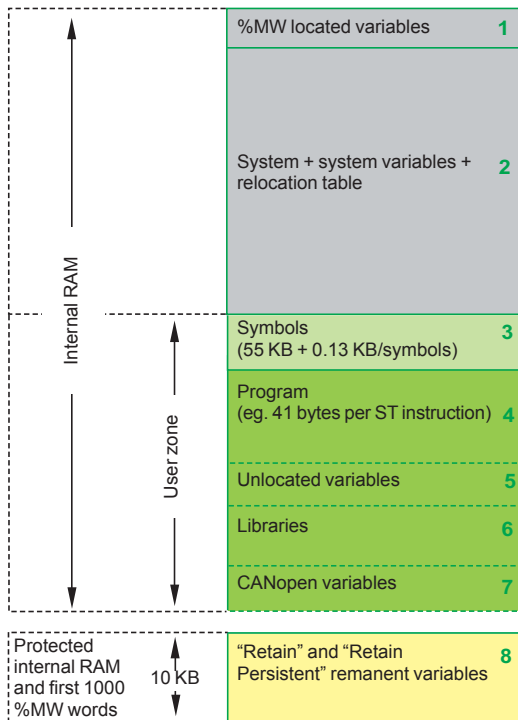
The Modicon M238 logic controller bases **TM238 LDD24DT/LFDC24DT** and **TM238 LDA24DR/LFAC24DR** comprise:

- 1 A mini B USB connector, marked Prg. Port, for connecting a programming terminal
- 2 A hinged access cover with 2 cable glands (1 removable for the terminal cordset and 1 for the CANopen cable)
- 3 A removable screw terminal block (12 terminals) for connecting the sensors (24 V --- fast inputs)
- 4 A removable screw terminal block (7 terminals) for connecting the sensors (24 V --- inputs)
- 5 A connector for up to 7 discrete **TM2 D●●**, analog **TM2 A●●**, counter **TM200 HSC206D●**, and up to 2 AS-Interface master module **TWD NOI10M3** I/O extension modules
- 6 A display unit showing:
 - The controller status by means of 4 LEDs (PWR, RUN, Batt and Err)
 - The integrated communication port status by means of 4 LEDs (SL1, SL2, CAN Run and CAN Err)
- 7 A display unit showing the I/O states (I0...I13 and Q0...Q9)
- 8 A removable screw terminal block (10 terminals) for connecting 6 preactuators
- 9 A removable screw terminal block (6 terminals) for connecting 4 preactuators
- 10 A removable screw terminal block (5 terminals marked CANopen) for connection to the CANopen bus, with model **TM238 LFDC24DT** or **TM238 LFAC24DR**

Accessible from the underside of the controller:

- 11 A removable screw terminal block (3 terminals):
 - +, -, --- marked 24 VDC for connecting the 24 V --- power supply
 - L, N, --- marked 100-240 VAC for connecting the 100-240 V \sim power supply
- 12 One RJ45 connector marked SL1 (with model **TM238 LDD24DT** or **TM238 LDA24DR**) or 2 RJ45 connectors marked SL1 and SL2 (with model **TM238 LFDC24DT** or **TM238 LFAC24DR**) for connecting the serial links
- 13 A hinged cover for accessing the RAM backup battery (optional) and the internal real-time clock

The compact bases are mounted as standard on a symmetrical --- rail or on a metal plate (two --- holes).



Memory structure

Modicon M238 controllers offer great flexibility in memory management. Depending on the model used, they have a user memory zone of:

- 500 KB with **TM238 LDD24DT** or **TM238 LDA24DR** base
- 1024 KB with **TM238 LFDC24DT** or **TM238 LFAC24DR** base.

This user memory zone is divided according to the application program requirements and the volume needed by the symbols, unlocated variables and libraries required by the application.

The memory structure of Modicon M238 controllers is shown opposite.

The table below lists the maximum memory capacities depending on the model (1).

| | | TM238 LDD24DT, TM238 LDA24DR | TM238 LFDC24DT, TM238 LFAC24DR |
|--|--------------|--|-----------------------------------|
| Internal RAM | KB | 1024 | 2048 |
| 1 Located variables | KB | 120 (60,000 %MW) | 120 (60,000 %MW) |
| 2 System + system variables + relocation table | KB | 400 | 900 |
| User zone | KB | 500 | 1000 |
| 3 Symbols | KB | 100 (max. 400 symbols) | 200 (max. 1000 symbols) |
| 4 Program (including online program modification) | | As required by the application, within the limits of the size of the user zone | |
| 5 Unlocated variables | | | |
| 6 Libraries | | | |
| 7 CANopen variables | KB | – | 115 + 10 per slave |
| Protected internal RAM | KB | 10 | 10 |
| 8 "Retain" variables | Bytes | 8168 | 8168 |
| 8 "Retain Persistent" variables | Bytes | 400 | 400 |
| 8 First 1000 %MW words | Bytes | 2000 | 2000 |

(1) Values given for information only.

Storing variables

Remanent variables can be one of two types depending on their declaration in the application:

- "Retain" variables, 8168 bytes maximum
- "Retain Persistent" variables, 400 bytes maximum.

The first 1000 located variables **1** (first 1000 %MW words) and all the unlocated variables **5** configured as "Retain" and "Retain Persistent" type are backed up by the internal battery or by the optional external battery. They are maintained when the power returns if the startup context allows this (see "Restart context" below). In addition, "Retain Persistent" type variables are maintained on a change of application if the startup context allows this (see "Restart context" below).

Restart context

The state of the remanent memory before disconnection is restored on the next power-up when the internal battery and/or the optional external battery is/are capable of protecting the internal RAM (no memory checksum error). If the internal battery or optional external battery does not have enough charge to back up the internal RAM, the values of the "Retain" and "Retain Persistent" remanent variables are reset to 0.

The external battery can be monitored by the *GetBatteryLevel* software function, and its charging status is visible from the status of the Batt LED on the front of the controller.

Storing the program

Regardless of the context and status of the internal battery and/or optional external battery, the program is backed up in the Flash EEPROM during the "boot application" creation procedure (SoMachine software procedure).

| Environment | | | |
|-------------------------------|----------------------|--|-------------|
| Type of base | | TM238 LDD24DT, TM238 LDA24DR, TM238 LFDC24DT, TM238 LFAC24DR | |
| Certifications | | <ul style="list-style-type: none"> ■ For all bases: CE, UL, CSA, ACA (C-Tick), GOST (pending) ■ For TM238 LDA24DR and TM238 LFAC24DR bases: CSA (Class 1, Division 2, Groups A, B, C, D) | |
| Temperature | Operation | °C | - 10...+ 55 |
| | Storage | °C | - 40...+ 70 |
| Relative humidity | | 95% max. without condensation | |
| Degree of | Protection | IP 20 | |
| | Pollution | ≤ 2 | |
| Altitude | Operation | m | 0...2000 |
| | Storage | m | 0...3000 |
| Immunity to mechanical stress | Sinusoidal vibration | 5...150 Hz with 3.5 mm amplitude at 1 g Endurance: 10 cycles of 1 octave/min per axis | |
| | Shock | 15 g/11 ms; 3 shocks/direction/axis | |

| Characteristics of the compact bases | | | | | | |
|--|--|---|--|------------------------|--|------------------------|
| Type of base | | TM238 LDD24DT | TM238 LDA24DR | TM238 LFDC24DT | TM238 LFAC24DR | |
| Backup components | Protected internal RAM | | "Retain" and "Retain Persistent" type variables (types declared at the time of configuration) | | | |
| | Type of component | Internal battery | Type VL1220, 7mAh non-replaceable | | | |
| | | Optional battery | Lithium thionyl chloride TSX PLP 01 | | | |
| | Backup autonomy | Internal battery | 3 days | | | |
| | | Optional battery | 1 year | | | |
| | Charging time | Internal battery | hrs | 22 for a full charge | | |
| Service life | Internal battery | 10 years max. (derating depending on the operating temperature) | | | | |
| Discrete I/O | No. of 24 V $\overline{\text{V}}$ inputs | | 14, 8 of which can be configured as fast inputs | | | |
| | No. of outputs | | 10 transistor, 4 of which can be configured as fast outputs | 4 transistor + 6 relay | 10 transistor, 4 of which can be configured as fast outputs | 4 transistor + 6 relay |
| | Connection via | | 4 removable screw terminal blocks (supplied as standard) 4 removable spring terminal blocks with optional unit TM238 RSSPT (to be ordered separately) | | | |
| I/O extension | Max. number of modules | | 7: discrete, analog, high-speed counter, AS-Interface master (3 high-speed counter TM200HSC060●●, 2 TWDNOI10M3 AS-Interface master) | | | |
| | Max. number of discrete I/O | | 136/192/248 (1) | | | |
| Embedded communication | Serial link | | 1 RS 232/RS 485 channel (SL1) delivering a 5 V $\overline{\text{V}}$ voltage | | 1 RS 232/RS 485 channel (SL1) 1 RS 485 channel (SL2) delivering a 5 V $\overline{\text{V}}$ voltage | |
| | CANopen | | – 1 master for 16 slaves max. | | | |
| Real-time clock | | Integrated. Drift: 10 s a month at 25°C | | | | |
| User zone in internal RAM (see page 4) | Capacity | | KB | 500 | 1000 | |
| | No. of instructions | | 10 Kinstructions depending on the language and type of instruction used | | 25 Kinstructions depending on the language and type of instruction used | |
| Application structure | Master task | | 1 task configurable as "Freewheeling" or "Cyclic" 1 "Freewheeling" task max. among different choices | | | |
| | Auxiliary tasks | | 2 tasks configurable as "Freewheeling", "Cyclic", or "Event", tripped on the rising and/or falling edge of a Boolean variable | | | |
| | Interrupt tasks | | 4 "External" tasks tripped by the fast inputs or by the integrated counter channels | | | |
| | Priority between tasks | | 32 levels of priority of execution can be assigned to each of the 7 tasks | | | |
| I/O assignment | I/O on base | | Read/write by the task which uses the I/O integrated in the base | | | |
| | I/O on extension modules | | Read/write by the master task regardless of which task is using the extension module I/O | | | |
| | I/O on CANopen bus | | – | | Read/write by the master task regardless of which task is using the I/O on the CANopen bus | |

(1) The 1st value corresponds to the maximum number of I/O (base and extensions) with extension modules with screw terminals, the 2nd to extension modules with spring terminals and the 3rd to extension modules with HE 10 connectors.

| Characteristics of the compact bases | | | | | | |
|--|--|----------|---|----------------|-------------------------------------|----------------|
| Type of base | | | TM238 LDD24DT, TM238 LDA24DR, TM238 LFDC24DT, TM238 LFAC24DR | | | |
| Typical no. of Kinstructions executed per ms | 70% Boolean + 30% fixed arithmetic | Kinst/ms | 3 | | | |
| Execution time for one instruction | Boolean | µs | 0.971 | | | |
| | Arithmetic +, -, x operations | µs | INT word | 0.439 | | |
| | | | DINT double word | 0.506 | | |
| | / operation | µs | – | – | 7.25 | |
| LD and ST | µs | 0.42 | 0.459 | 0.648 | | |
| Event task execution time (1) | | ms | 0.75 min | 0.95 typical | 1.75 max. | |
| Master task system overhead | I/O and system | ms | 0.9 | | | |
| | Counting | ms | 0.15 (simple counting), 0.35 (advanced counting) | | | |
| | Motion | ms | 0.15 (PWM, frequency meter), 0.20 (PTO) (2) | | | |
| Power supply | | | | | | |
| Type of compact base | | | TM238 LDD24DT | TM238 LFDC24DT | TM238 LDA24DR | TM238 LFAC24DR |
| Voltage | Nominal | V | 24 --- (- 15% / + 20 %) | | 100-240 V ~ (+ 10% / - 15 %) | |
| | Limit (including ripple) | V | 19.2...28.8 --- | | 85...264 V ~ (Frequency 47...63 Hz) | |
| Sensor power supply | | | Use an external 24 V --- Phaseo power supply from the Optimum range | | | |
| Max. inrush current (Un) | | A | 35 | | | |
| Immunity to micro-cuts (class PS-2) | | ms | 10 | | | |
| Max. consumption | | W | 17.2 | | 25 at 100 V ~, 42 at 264 V ~ | |
| Dielectric strength | Between power supply terminals and earth terminals | V rms | 500 --- for 1 min | | 1500 --- for 1 min | |
| | Between I/O terminals and earth terminals | V rms | 500 --- for 1 min | | 1500 --- for 1 min | |
| Isolation resistance | Between power supply terminals and earth terminals | MΩ | > 10 (500 V ---) | | > 10 (500 V ---) | |
| | Between I/O terminals and earth terminals | MΩ | > 10 (500 V ---) | | > 10 (500 V ---) | |

(1) Time including acquisition of the event, processing of 100 IL instructions and activation of an output.

(2) Only with **TM238 LDD24DT** and **TM238 LFDC24DT**.

| Communication | | | | | |
|---------------------------------------|------------------------|-----------------------|---|--|--|
| Type of compact base | | | TM238 LDD24DT, TM238 LDA24DR | TM238 LFDC24DT, TM238 LFAC24DR | |
| Terminal port "Prg. Port" | Type | | 1 USB 2.0 | | |
| | Connection | | Mini B USB connector | | |
| RS 485/ RS 232 serial port | Marking on front panel | | SL1 | SL1 (1) | |
| | Type | | Master/slave type isolated serial link | | |
| | Physical interface | | RS 485/RS 232 | | |
| | Data rate | Kbps | 1.2...115.2 (115.2 by default) | 1.2...38.4 (19.2 by default) | |
| | Protocol | Default | SoMachine-Network (programming/ debugging) | Modbus slave | |
| | | | Modbus master/slave RTU/ASCII, ASCII, SoMachine-Network | | |
| | Peripheral | | Delivers a 5 V \pm /200 mA power supply (2) | – | |
| Connection | | RJ45 female connector | | | |
| RS 485 serial port | Marking on front panel | | – | SL2 (1) | |
| | Type | | – | Master/slave type isolated serial link | |
| | Physical interface | | – | RS 485 | |
| | Data rate | Kbps | – | 1.2...115.2 (115.2 by default) | |
| | Protocol | Default | – | SoMachine-Network (programming/ debugging) | |
| | | | – | Modbus master/slave RTU/ASCII, ASCII, SoMachine-Network | |
| | Peripheral | | – | Delivers a 5 V \pm /200 mA power supply (2) | |
| Connection | | – | RJ45 female connector | | |
| CANopen port | Standards | | – | DS 301 V4.02, DR 303-1 | |
| | Class | | – | Conformity class M20, limited to 16 slaves | |
| | Data rate | Max. length | m | – | 20 50 100 125 250 500 1000 |
| | | Data rate | Kbps | – | 1000 800 500 425 250 125 50 |
| | No. of slaves | | – | – | 16 max. with max. limit of: 64 TPDOs and 64 RPDOs (3) |
| | Line matching | | – | – | Line termination resistor supplied with the screw terminal block, to be mounted when necessary |
| | Connection | | – | – | Removable screw terminal block supplied with the base |
| Integrated functions | | | | | |
| Type of compact base | | | TM238 LDD24DT, TM238 LFDC24DT | TM238 LDA24DR, TM238 LFAC24DR | |
| HSC | No. of channels | | 8 x 100 kHz simple channels, 4 x 100 kHz simple channels and 1 x 100 kHz advanced channel (4) or 2 x 100 kHz advanced channels (4) | | |
| | Capacity | | 32 bits | | |
| Motion or Reflex functions | No. of channels | | 2 advanced channels | 4 | |
| | Frequency | | PMW: 20 kHz PTO: 100 kHz | 100 Hz | |
| | Functions | | PWM (Pulse Width Modulation) output PTO (Pulse Train Output) | HSC reflex | |
| PID regulation | | | Yes | | |
| Event processing | | | Yes, up to 4 event tasks that can be activated by the base's fast inputs or by the integrated counter channels (threshold attained) | | |


(1) Serial link "SL1" and serial link "SL2" are not isolated from one another.


(2) 5 V \pm /200 mA power supply for self-powering of a Magelis XBT N/R HMI terminal or the Ethernet gateway 499 TWD 01100.


(3) TPDOs: transmitted process data objects (PDOs). RPDOs: received process data objects (PDOs).

(4) Advanced channel with two-phase signal inputs for encoder, threshold detection function and reflex function.

| --- input characteristics | | | | |
|--|-------------------------------------|---------|--|--|
| Type of compact base | | | TM238 LDD24DT, TM238 LFDC24DT, TM238 LDA24DR, TM238 LFAC24DR | |
| Type of input | | | Physical inputs I8 to I13 | Physical inputs I0 to I7 |
| Number of input channels | | | 6 | 8, 100 kHz max. |
| Nominal input values | Voltage | V | 24 --- | |
| | Current | mA | 10.4 | 8 |
| Input logic | | | Sink/source (positive/negative) | Sink (positive) |
| Commons | | | 1 | 4 |
| Sensor power supply (including ripple) | | | V | 19.2...30 --- |
| Input limit values | At state 1 | Voltage | V | ≥ 15 |
| | | Current | mA | ≥ 2 |
| | At state 0 | Voltage | V | ≤ 5 |
| | | Current | mA | ≤ 1.5 |
| Input impedance | | | kΩ | 2.3 |
| Response time | | | | 3 ms |
| Digital filtering (configurable) | | | ms | – |
| Anti-bounce filtering (configurable) | | | ms | 0 - 1.5 - 4 or 12 |
| IEC/EN 61131-2 conformity | | | Type 1 | |
| Max. input frequency | | | 100 Hz | Counter mode 100 kHz Normal mode 100 Hz |
| Length of sensor connection cables | | | m | 30 max. |
| Isolation | Between channels | V | None | 500 --- between groups of 2 channels |
| | Between channels and internal logic | V | 500 --- | |

| Output characteristics | | | | |
|-----------------------------------|-------------------------------------|-----|--|--------------------------------|
| Type of compact base --- | | | TM238 LDD24DT, TM238 LFDC24DT | |
| Type of output | | | Fast solid state outputs (Q0 to Q3) | Solid state outputs (Q4 to Q9) |
| Number of output channels | | | 4 | 6 |
| Output power supply | Nominal value | V | 24 --- | |
| | Limit values | V | 19.2...30 --- (including ripple) | |
| Output current | Minimum | mA | PWM mode | PTO mode |
| | Maximum | mA | Normal mode | |
| Max. frequency | | | 20 kHz | 100 kHz |
| Accuracy | Cyclic ratio 20...80% | %FS | 1 | – |
| | Accuracy | | – | 1% |
| Output logic | | | Source (positive)/Sink (negative) | Source (positive) |
| Commons | | | 1 | 2 |
| Response time | | | ms | – |
| Leakage current | | | mA | < 2 |
| Voltage drop | | | V | < 2 |
| Tungsten filament lamp max. power | | | W | < 3 |
| Protection | Against short-circuits | | Yes, against short-circuits at the 0 V  | Yes |
| | Against overloads | | Yes | |
| | Against overvoltages | | Yes | |
| Length of connection cables | | | m | 10 max. with shielded cable |
| Isolation | Between channels | V | 500 --- | 30 max. |
| | Between channels and internal logic | V | 500 --- | 30 max. |

 Never connect a positive polarity to fast outputs (see page 15).

| Output characteristics (continued) | | | |
|------------------------------------|--|--------------------------------|--|
| Type of compact base ~ | | TM238 LDA24DR, TM238 LFAC24DR | |
| Type of output | | Solid state outputs (Q0 to Q3) | Relay outputs (Q4 to Q9) |
| Number of output channels | | 4 | 6 |
| Output power supply | Nominal value | V | 24 ~ |
| | Limit values | V | 19.2...30 ~ (including ripple) |
| Output current | Nominal | A | 0.5 |
| | Minimum | mA | 20 |
| | Maximum | mA | 500 |
| Commons | Common 4 (C4) | – | 2 "N/O" contacts (2 A per channel and 4 A per common) |
| | Common 6 (C6) | – | 2 "N/O" contacts (2 A per channel and 4 A per common) |
| | Common 8 (C8) | – | 1 "N/O" contact (2 A) |
| | Common 9 (C9) | – | 1 "N/O" contact (5 A) |
| Min. switchable load | | mA | – |
| Switch resistance | When new | mΩ | – |
| Load on relay outputs Q4 to Q8 | Resistive | A | – |
| | Min. electrical service life | | – |
| | Minimum mechanical service life | | – |
| | Inductive without protection device (1)/capacitive | | – |
| Load on output Q9 | Resistive | A | – |
| | Min. electrical service life | | – |
| | Minimum mechanical service life | | – |
| | Inductive without protection device (1) /c apacitive | | – |
| Max. frequency | | 100 Hz | – |
| Output logic | | Source (positive) | – |
| Commons | | 1 | – |
| Response time | | ms | 0.25 |
| Leakage current | | mA | < 2 |
| Voltage drop | | V | < 2 |
| Tungsten filament lamp max. power | | W | < 3 |
| Protection | Against short-circuits | | Yes, against short-circuits at the 0 V  |
| | Against overloads | | Yes |
| | Against overvoltages | | Yes |
| Length of connection cables | | m | 30 max. |
| Insulation voltage | Between channels and internal logic | V rms | 500 ~ |

 Never connect a positive polarity to fast outputs (see page 15).

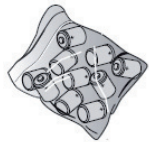
(1) Each inductive load must be equipped with a protection device such as a peak limiter, RC circuit or freewheel diode.



TM238 LFDC24DT



TM238 LFAC24DR



TSX PLP 101



TCS XCN AMUM3P



TM200 RSRCEMC



499 TWD 01100 LUF P●



SR2 MOD03



HMI ZSUSBB

References

| Number of I/O | Inputs | Outputs | No. of I/O extension modules | Integrated serial port | Integrated master CANopen port | Reference | Weight kg |
|--|---|---|------------------------------|---------------------------------|--------------------------------|----------------|-----------|
| Compact bases, 24 V $\overline{\text{---}}$ power supply | | | | | | | |
| 24 I/O (removable battery to be ordered separately) | 6 x 24 V $\overline{\text{---}}$ inputs (sink/source) 8 x 24 V $\overline{\text{---}}$ fast inputs (sink) | 10 transistor outputs (source) including 4 fast | 7 modules max. | 1 RS 232/485 (1) – (marked SL1) | – | TM238 LDD24DT | 0.560 |
| | | | | 1 RS 232/485 (marked SL1) | 1 | TM238 LFDC24DT | 0.595 |
| | | | | 1 RS 485 (1) (marked SL2) | | | |

| Compact bases, 100-240 V \sim power supply | | | | | | | |
|--|---|---|----------------|---------------------------------|---|----------------|-------|
| 24 I/O (removable battery to be ordered separately) | 6 x 24 V $\overline{\text{---}}$ inputs (sink/source) 8 x 24 V $\overline{\text{---}}$ fast inputs (sink) | 4 transistor outputs (source) and 6 relay outputs | 7 modules max. | 1 RS 232/485 (1) – (marked SL1) | – | TM238 LDA24DR | 0.560 |
| | | | | 1 RS 232/485 (marked SL1) | 1 | TM238 LFAC24DR | 0.595 |
| | | | | 1 RS 485 (1) (marked SL2) | | | |

| Separate parts | | | | | |
|---|---|---------------------|-----------------|---------------|-------|
| Designation | Use | Length Sold | Reference | Weight kg | |
| Removable backup batteries | Lithium thionyl chloride type for Modicon M238 compact bases TM238 L●●●●● | Individual | TSX PLP 01 | 0.012 | |
| | | Pack of 10 | TSX PLP 101 | 0.189 | |
| Terminal port/USB port cordset | From the mini B USB port on the Modicon M238 base to the type A USB port on the PC terminal for programming and updating firmware | 3 m | TCS XCN AMUM3P | 0.065 | |
| RS 232 serial link cordsets for DTE/DCE terminal device | 1 RJ45 connector For DTE terminal (printer) and one 9-way SUB-D connector For DCE terminal (modem, converter) | 3 m | TCS MCN 3M4F3C2 | 0.150 | |
| | | 3 m | TCS MCN 3M4M3S2 | 0.150 | |
| Removable spring connectors for discrete I/O | Set of 5 removable spring connectors. Replaces the 5 screw connectors supplied with Modicon M238 compact bases | – | TM238 RSSPT | 0.048 | |
| Shielding connection clamps | Attachment and earthing of the cable shielding Pack of 25 clamps including 20 clamps for \varnothing 4.8 mm cable and 5 for \varnothing 7.9 mm cable | Pack of 25 | TM200 RSRCEMC | – | |
| | | | | | |
| Modbus communication gateways | Connection of Modicon M238 base to network/bus | Ethernet Modbus/TCP | (2) | 499 TWD 01100 | 0.200 |
| | | Profibus DP | (3) | LUF P7 | 0.245 |
| | | DeviceNet | (3) | LUF P9 | 0.245 |
| GSM/GPRS modem (DCE terminal) | 4-band 900/1800 MHz (Europe) and 850/1900 MHz (United States) IP 31 casing supplied with: - 1.5 m power cable - SMA-M magnetic GSM 4-band aerial with 2.5 m cable - Fixed on panel or \perp 5.5...24 V $\overline{\text{---}}$ supply voltage | – | SR2 MOD03 | 0.335 | |

| Designation | Use From | To | Length | Reference | Weight kg |
|---|----------------------------|---------------------------------|--------|----------------|-----------|
| Modbus cables equipped with 2 RJ45 connectors | Serial port marked SL1/SL2 | Ethernet gateway 499 TWD 01100 | 2.5 m | XBT Z9980 | – |
| | | Profibus DP LUF P7 or DeviceNet | 1 m | VW3 A8 306 R10 | 0.050 |
| | | LUF P9, TSX CUSB 485 | 3 m | VW3 A8 306 R30 | 0.150 |
| | | converter | 0.3 m | VW3 A8 306 R03 | 0.030 |

| Accessories | | | | | |
|---|--|--------|------------|-----------|--|
| Designation | Description | Length | Reference | Weight kg | |
| Remote location of the USB port for M238 controllers and XBT GT2●●0...GT7340, GT1●●5, GK●●●, GTW●●● terminals | Used to locate the USB port of M238 controllers (front) and XBTG terminals (rear) remotely on panel or enclosure door (\varnothing 21 mm fixing device) | 1 m | HMI ZSUSBB | 0.100 | |

(1) RS 485 link delivering a 5 V $\overline{\text{---}}$ /200 mA power supply.
 (2) Connection to serial port SL1 on controllers TM238 LDD24DT and TM238 LDA24DR or to serial port SL2 on controllers TM238 LFDC24DT and TM238 LFAC24DR via Modbus cable XBT Z9980 (to be ordered separately).
 (3) Connection to serial port SL1 on controller controllers TM238 LDD24DT and TM238 LDA24DR, to serial port SL1 or SL2 on controllers TM238 LFDC24DT and TM238 LFAC24DR via Modbus cable VW3 A8 306 R●● (to be ordered separately). Requires a 24 V $\overline{\text{---}}$ external power supply.
 Gateway configurable via the ABC Config Tool software, downloadable from our website www.schneider-electric.com



TSX CUSB 485

References

Connection elements for RS 485 OS download port for M238 version V1.0 (1)

| Designation | Use | Length | Reference | Weight kg |
|----------------------|--|-----------------------------|--------------|-----------|
| USB/RS 485 converter | Used to connect the RS 485 port (SL1) to the USB port on the PC to update the controller operating system. Requires Modbus cable VW3 A8 306 R●● for the PC end connection at the controller end | 0.4 m (integrated cable at) | TSX CUSB 485 | 0.144 |

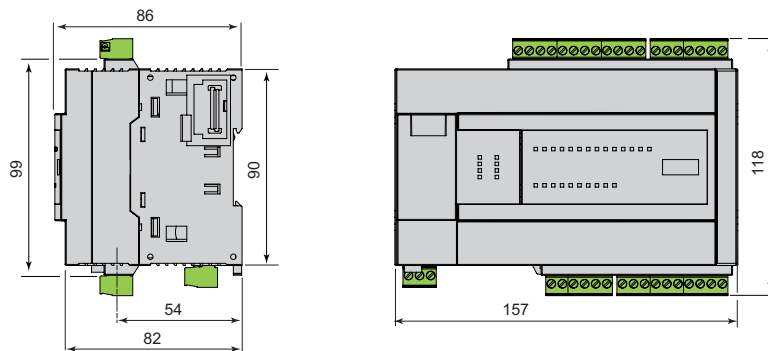
Replacement parts

| Designation | Use | Reference | Weight kg |
|--|---|------------------------------|----------------|
| Removable screw connectors, supplied with Modicon M238 compact bases | Set of 5 removable screw connectors for discrete I/O One 5-way connector with line terminator for CANopen link | TM238 RSSCT TM238 CNTLSCT | 0.055 0.010 |

(1) For later versions, use the USB port and cable.

Dimensions, mounting

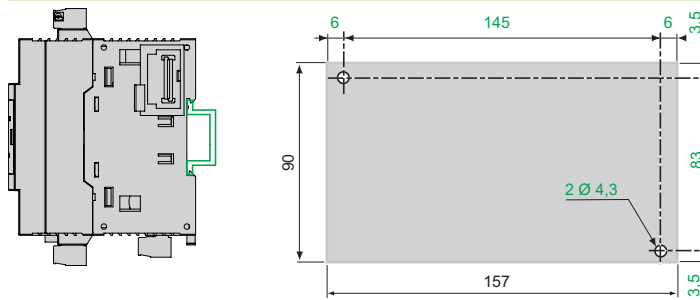
TM238 LDD24DT, TM238 LFDC24DT, TM238 LDA24DR and TM238 LFAC24DR



Mounting

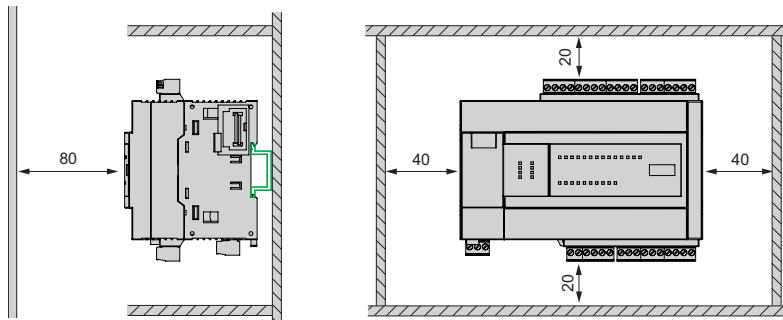
On \perp rail (1)

On panel, attached with two M4 screws x 6/8 mm



(1) Use of 35 x 15 mm \perp rail recommended to ensure vibration resistance (see page 5).

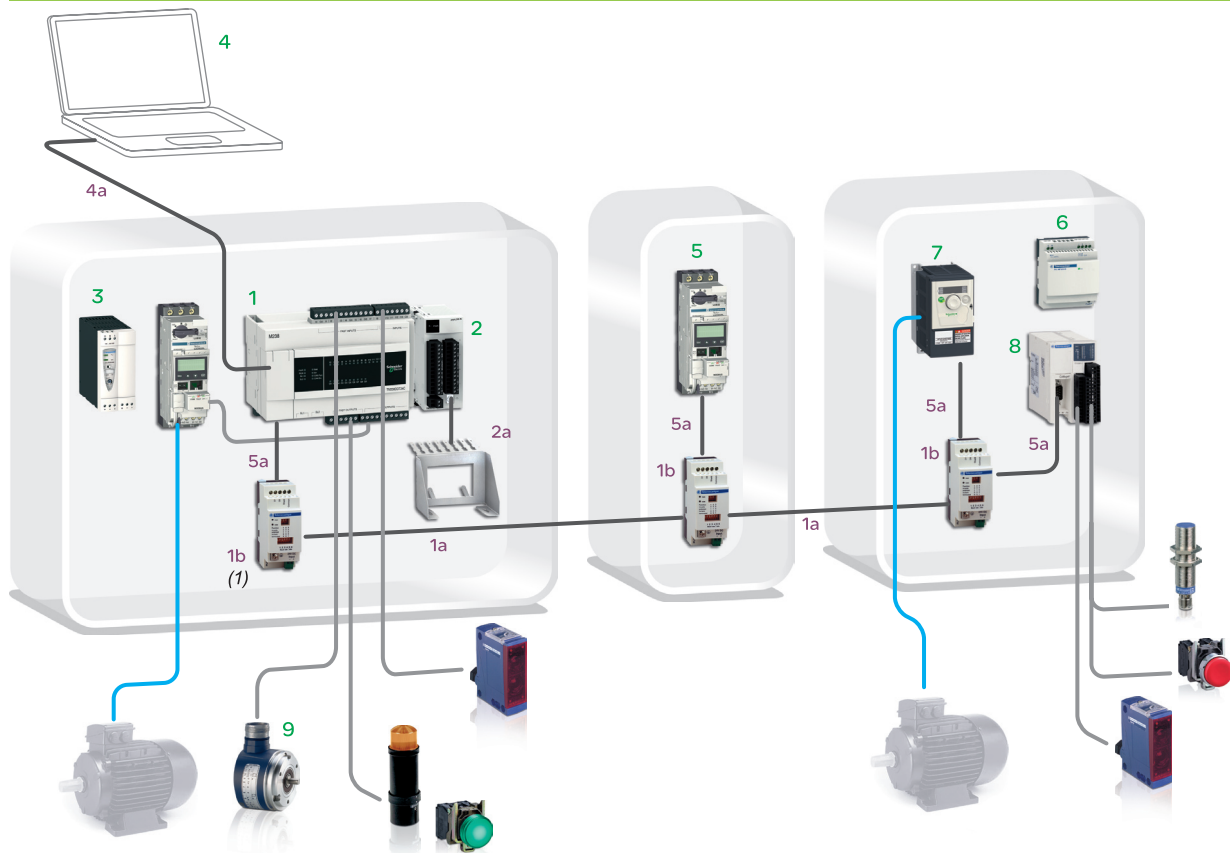
Installation rules



⚠ Important:

- Vertical mounting: Possible with extension modules facing up.
- Flat mounting: Not possible.
- Avoid placing heat-generating equipment (transformers, power supplies, power contactor, etc.) below the controller.

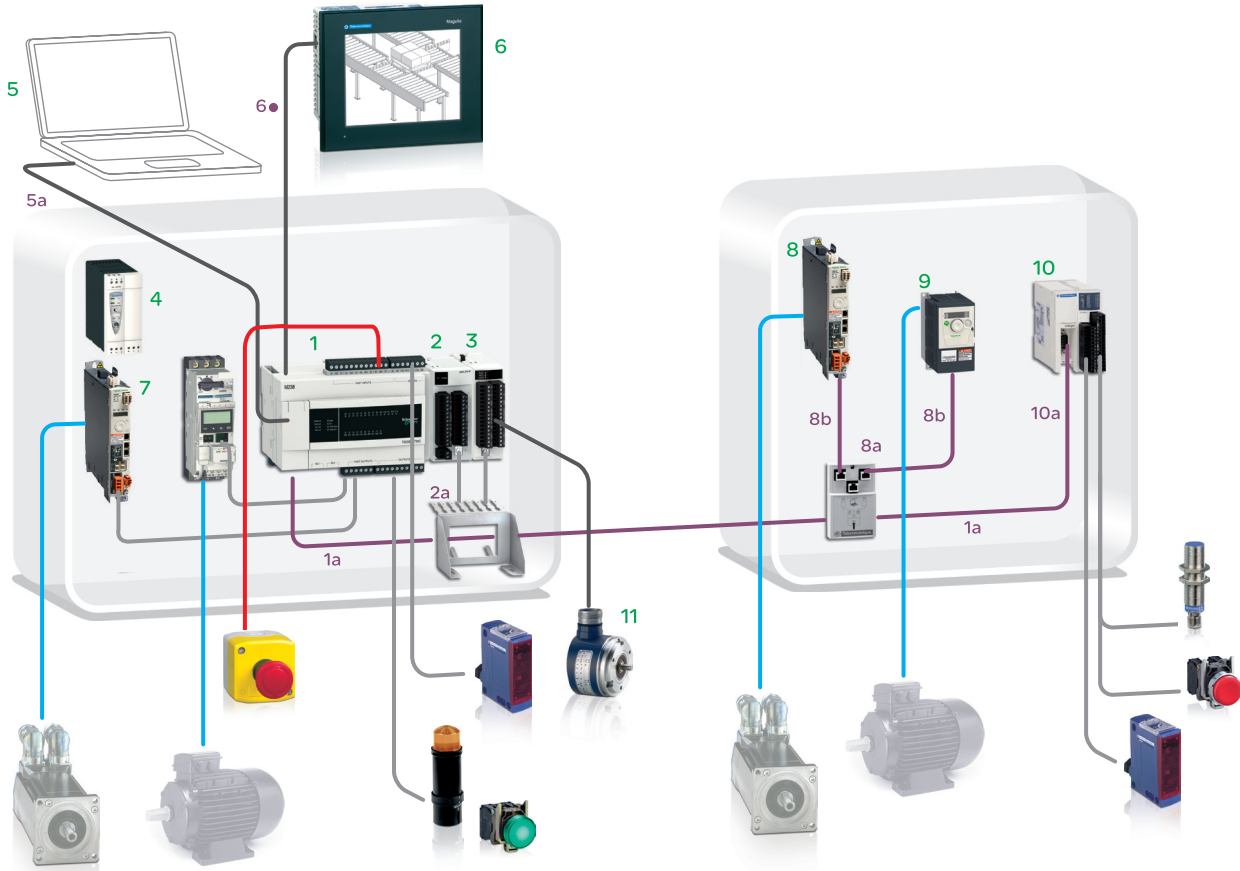
Modicon M238 logic controller-based solutions, using the Modbus RS 485 port



| No. | Device | Reference | Description | Voir page |
|-----|-----------------------------------|---------------------------------|--|-----------|
| 1 | Logic controller | TM238 LDD24DT, TM238 LDA24DR | Controller with 24 I/O (including 2 inputs used as fast inputs) and SL1 port (Modbus protocol) | 10 |
| 2 | Module with 8 analog inputs | TM2 ARI 8LT | Module with eight 2 or 3-wire temperature probe inputs, connected on 2 screw terminal blocks | 10 |
| 3 | Phaseo 24 V ~ power supply | ABL 8REM24●●● | Optimum power supply, ●●●: 030 for I = 3 A, 050 for I = 5 A | 94 |
| 4 | Programming PC | MSD CHNSFUV20 | SoMachine software, 1-station license | 73 |
| 5 | TeSysU starter-controller | LUB 320 | 32 A power base with multifunction control unit LUCM 32BL and Modbus communication module LUL C032 | - |
| 6 | Phaseo 24 V ~ power supply | ABL 7RM24025●●●● | Modular power supply 2.5 A | - |
| 7 | Altivar 312 variable speed drive | ATV 312●●●●●● | Drive for asynchronous motor (integrated Modbus and CANopen) | - |
| 8 | Advantys OTB distributed I/O | OTB 1S0 DM9LP | Modbus bus interface module, 12 x 24 V ~ inputs, 2 x 24 V ~ outputs and 6 relay outputs | 57 |
| 9 | Osicoder incremental encoder | XCC 14●K/15●Y/19●KN | Rotary Ø 40/58/90 mm with Push-pull outputs with extension XCC PM23121L● | - |
| 1a | Modbus trunk cable | TSX SCA 100/200/500 | RS 485 double shielded twisted pair cables (100/200/500 m) | - |
| 1b | Modbus junction box | TWD XCA ISO | Screw terminal block for trunk cable, 2 RJ45 connectors for tap junction, line isolation and line termination. 24 V ~ power supply | - |
| 2a | Earthing plate | TM2 XMTGB | Connection of cable shielding and functional earth (FE) on module 2 | 38 |
| 4a | Terminal port/PC USB port cordset | TCS XCN AMUM3P | Cordset from USB port on Modicon M238 base to PC terminal USB port (3 m) | 10 |
| 5a | Modbus drop cables | VW3 A8 306 R03/10/30 | Cable with 2 RJ45 connectors (0.3/1/3 m) | 10 |

(1) Recommended wiring diagram for connecting the Modbus trunk cable on screw terminal block and for distances ≥ 30 m.

Modicon M238 logic controller-based solutions, using the CANOpen integrated port



| No. | Device | Reference | Description | Voir page |
|-----|---|---|---|-------------|
| 1 | Logic controller | TM238 LFDC24DT TM238 LFAC24DR | Controller with 24 I/O (including 2 outputs as PTO signals) and integrated CANOpen port Controller with 24 I/O (without PTO and PWM functionality) | 10 10 |
| 2 | Module with 8 analog inputs | TM2 ARI 8LT | Module with eight 2 or 3-wire temperature probe inputs, connected on 2 screw terminal blocks | 38 |
| 3 | High-speed counter module | TM200 HSC 206DF | Module with two 60 kHz high-speed counting channels, connected on 2 spring terminal blocks | 48 |
| 4 | Phaseo 24 V ~ power supply | ABL 8REM24●●● ABL 8RPS24●●● | Optimum power supply, ●●●: 030 for I = 3 A, 050 for I = 5 A Universal power supply, ●●●: 050 for I = 5 A, 100 for I = 10 A | 94 - |
| 5 | Programming PC | MSD CHNSFUV20 | SoMachine software, 1-station license | 73 |
| 6 | Magelis HMI terminal (Modbus protocol) | XBT N200/R400 + 6a XBT RT500/RT511 + 6a | Small Panel with keypad for displaying text messages of 2...10 lines. Connection to controller serial port SL2, 5 V ~ power supply via controller (1) | 88 |
| | | XBT N401/N410 + 6b XBT R410/R411 + 6b | Small Panel with keypad for displaying text messages and control/configuration of data, 5.7" screen, external 24 V ~ power supply. Connection to controller port SL1 or SL2 | 88 |
| | | XBT GT11●●/ GT1335 + 6a | Advanced Touch Panel with graphic display, 3.8" screen, external 24 V ~ power supply. Connection on COM1 port to controller port SL1 or SL2 | 90 |
| | Magelis HMI terminal (SoMachine-Network protocol) | XBT GT2●●0...7340 + 6c XBT GK●●●0 + 6c | Advanced Touch Panel with graphic display, 5.7"...15" screen, external 24 V ~ power supply. Connection on COM1 port to controller port SL1 or SL2 | - |
| 7 | Lexium 32 servo drive | LXM 32●●●● | Servo drive on CANOpen bus, to be used with BRH/BSH motor | - |
| 8 | Lexium 32 servo drive | LXM 32●●●● | Servo drive on CANOpen bus, to be used with BRH/BSH motor | - |
| 9 | Altivar 312 variable speed drive | ATV 312●●●●●● | Drive for asynchronous motor (integrated Modbus and CANopen) | - |
| 10 | Advantys OTB distributed I/O | OTB 1C0 DM9LP | CANOpen bus interface module, 12 x 24 V ~ inputs, 2 x 24 V ~ outputs and 6 relay outputs | 57 |
| 11 | Osicoder incremental encoder | XCC 14●K/15●Y/19●KN | Rotary Ø 40/58/90 mm with Push-pull outputs with extension XCC PM23121L● | - |
| 1a | CANOpen cable | TSX CAN CA 50/100/300 | Cables for standard environments (50/100/300 m) | 66 |
| 2a | Earthing plate | TM2 XMTGB | Connection of cable shielding and functional earth (FE) on modules 2 and 3 | 38 |
| 5a | Terminal port/PC USB port cordset | TCS XCN AMUM3P | Cordset from USB port on Modicon M238 base to PC terminal USB port (3 m) | 10 |
| 6● | Magelis HMI cordsets | 6a XBT Z9980 6b XBT Z938 6c XBT Z9008 | 2 RJ45, RS 485 Modbus connectors (2.5 m) 1 SUB-D25 and 1 RJ45, RS 485 Modbus (2.5 m) 1 SUB-D9 and 1 RJ45, RS 485 Modbus (2.5 m) | - - - |
| 8a | IP 20 junction box | VW3 CAN TAP2 | IP20 junction box with 2 CANopen RJ45 connectors and 1 diagnostic terminal RJ45 connector | 66 |
| 8b | CANOpen preassembled cordset | VW3 CAN CARR03/1 | Cordset with 1 RJ45 connector at each end (0.3/1 m) | 67 |
| 10a | IP20 9-way SUB-D connector | TSX CAN KCDF 90T/180T | Connector with line terminator, straight/right-angled | 66 |

(1) Except for XBT RT511, connection to controller serial port SL1 or SL2, external 24 V ~ power supply.

Modicon M238 logic controller

Compact bases

Power supply and inputs

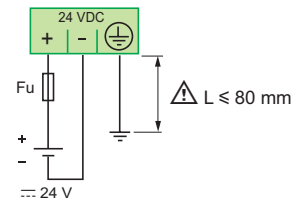
Connections

Conductor cross-section and tightening torque on removable screw terminals (power supply and I/O)

| | | | | | | |
|----------------------------------|-----------|------------|---------|--------------|----------|-----------|
| 6 mm | | | | | | |
| Cross-section (mm ²) | 0.2...1.5 | 0.25...1.5 | 0.2...1 | 0.2...1.5 | 0.25...1 | 0.5...1.5 |
| AWG gauge | 24...14 | 24...14 | 26...16 | 24...14 | 24...16 | 20...14 |
| Screwdriver | | | | Ø 3.5 mm | | |
| Tightening torque | | | | 0.6 Nm, max. | | |

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

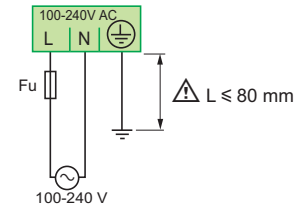
TM238 LDD24DT/LFDC24DT



Fu: 2 A fast-blow fuse ABE 7FU200

100-240 V \sim power supply

TM238 LDA24DR/LFAC24DR

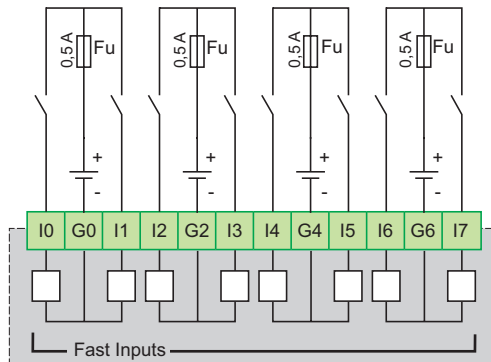


2A Type T fuse

TM238 LDD24DT/LFDC24DT, TM238 LDA24DR/LFAC24DR bases

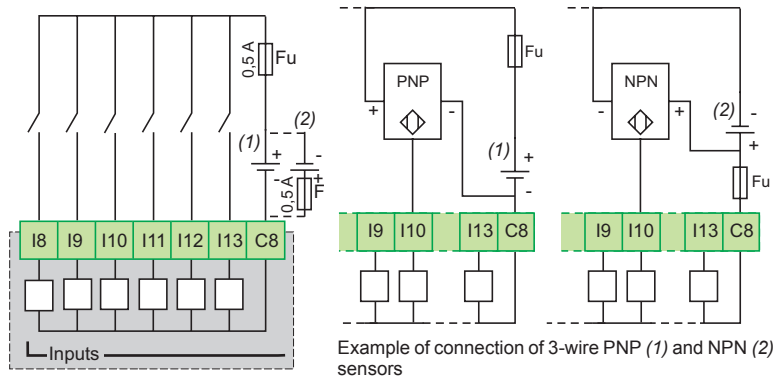
24 V $\bar{\sim}$ inputs

Fast sink inputs (positive logic)



Fu: 0.5 A fast-blow fuse

Sink/source inputs (positive/negative logic)



Example of connection of 3-wire PNP (1) and NPN (2) sensors

Fu: 0.5 A fast-blow fuse

(1) Sink inputs (positive logic)

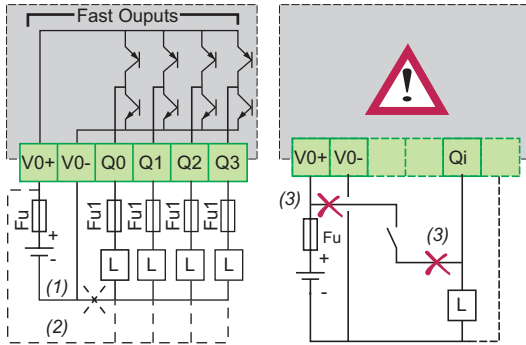
(2) Source inputs (negative logic)

Connections (continued)

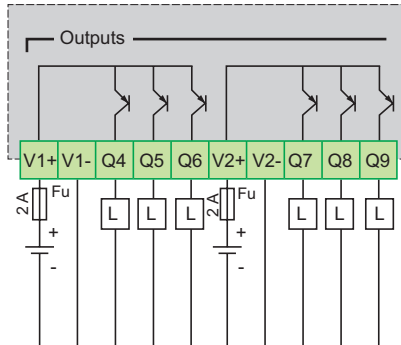
TM238 LDD24DT/LFDC24DT bases

24 V \square solid state outputs

Fast outputs (positive logic/negative logic)



Source outputs (positive logic)



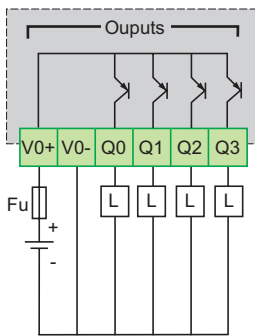
Note: The power supply for the outputs $\frac{+}{-}$ must be placed:
 - Close to the Modicon M238 base with a connection < 3 m
 - Or close to the preactuators for connections with the base Modicon M238 > 10 m. The cables for connection to the preactuators and the power supply must be within a single strand or be routed in the same cable duct.

- Fu: 2 A fast-blow fuse.
- Fu1: fast-blow fuse: 0, 1A for PTO use, 0,5A for standard use.
- (1) ——— Outputs positive logic cabling.
- (2) - - - - Outputs negative logic cabling.
- (3) Never connect a positive polarity to fast outputs Q0, Q1, Q2 and Q3.

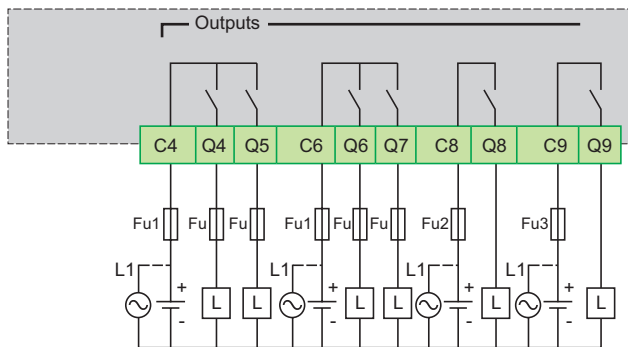
TM238 LDA24DR/LFAC24DR bases

24 V \square solid state outputs and relay outputs

Solid state outputs



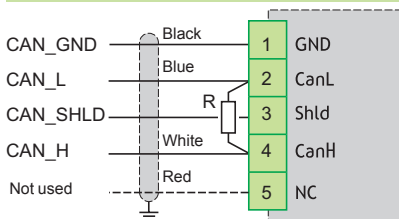
Relay outputs



Fu: 2 A fast-blow fuse

Fu: 2A fast-blow fuse
 Fu1: 4 A delayed fuse
 Fu2: 2 A delayed fuse
 Fu3: 5 A delayed fuse

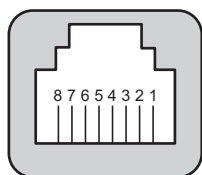
Terminal cabling for Bus CANopen (with models TM238 LFDC24DT and TM238 LFAC24DR)



- Connection with CANopen 4-wire cable TSX CAN CA/CB/CD ●00 (50, 100 or 300 m).
- Colour of conductors: black, blue, white and red
- R: 120 Ω line termination resistor (supplied with the CANopen screw terminal block)
- Terminal 3 (Shld): for connecting the CANopen cable shielding
- Terminal 5 (NC): not used

Serial links SL1 and SL2

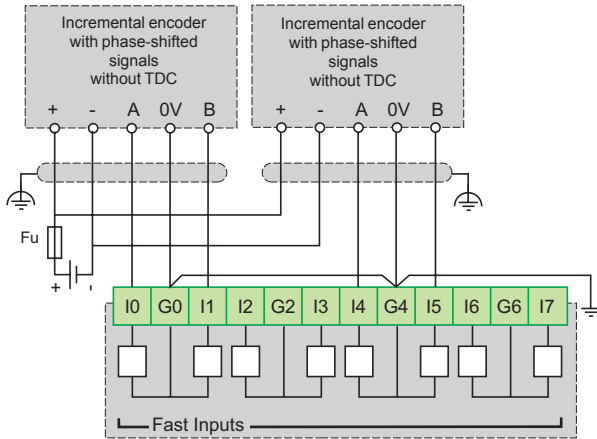
| Compact base | TM238 LDD24DT/LDA24DR | | TM238 LFDC24DT/LFAC24DR | | |
|--------------------|-----------------------------|-----------------------------|-------------------------|------------|-----------------------------|
| Link number | SL1 | | SL1 | SL2 | |
| Physical interface | RS 232 | RS 485 | RS 232 | RS 485 | RS 485 |
| 1 | RXD | - | RXD | - | - |
| 2 | TDX | - | TDX | - | - |
| 3 | RTS | - | RTS | - | - |
| 4 | - | D1 (A+) | - | D1 (A+) | D1 (A+) |
| 5 | - | D0 (B-) | - | D0 (B-) | D0 (B-) |
| 6 | CTS | - | CTS | - | - |
| 7 | + 5 V, for HMI power supply | + 5 V, for HMI power supply | - | - | + 5 V, for HMI power supply |
| 8 | 0 V common | 0 V common | 0 V common | 0 V common | 0 V common |



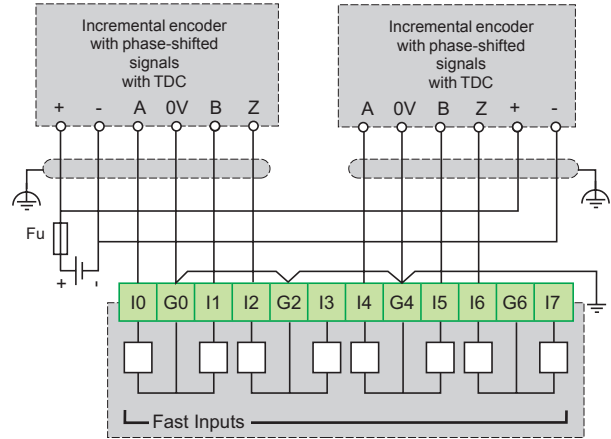
Connections (continued)

Connection of 24 V $\bar{\square}$ fast inputs

Using 2 incremental encoders with phase-shifted signals without TDC

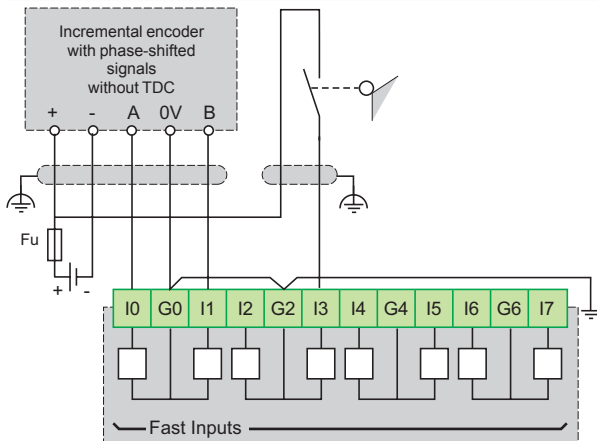


Using 2 incremental encoders with phase-shifted signals with TDC

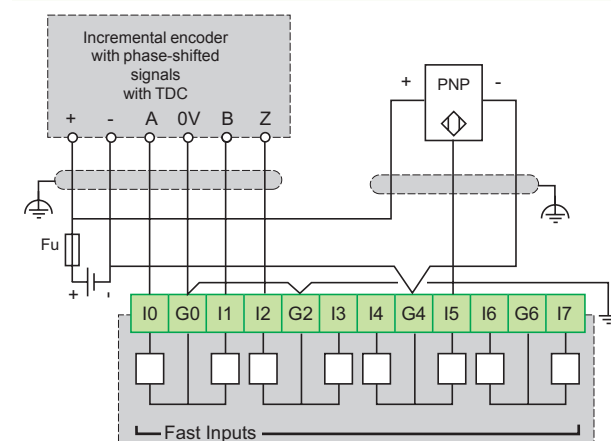


Note: It is possible to use the available fast inputs I2, I3, I6, and I7 as "normal mode" inputs: 30 m unshielded cables max. and separate 24 V $\bar{\square}$ power supply from the specific auxiliary power supply for the fast inputs.

Using 1 incremental encoder with phase-shifted signals without TDC and 1 electromechanical sensor



Using 1 incremental encoder with phase-shifted signals with TDC and one 3-wire PNP sensor



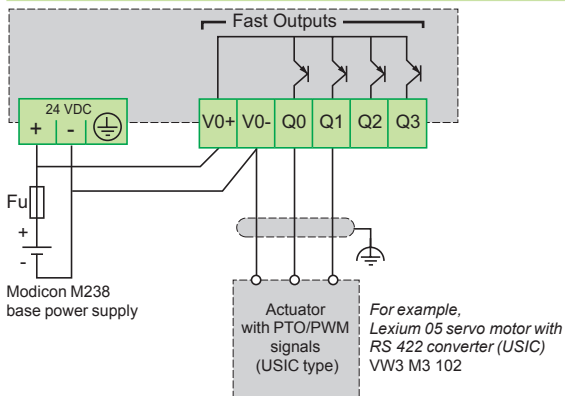
Cordsets with mandatory shielding: 10 m max. and shielding to be connected to the metal support for mounting the Modicon M238 controller.

Specific auxiliary power supply for the encoders and sensors connected to the fast inputs and used in "fast counter" mode.

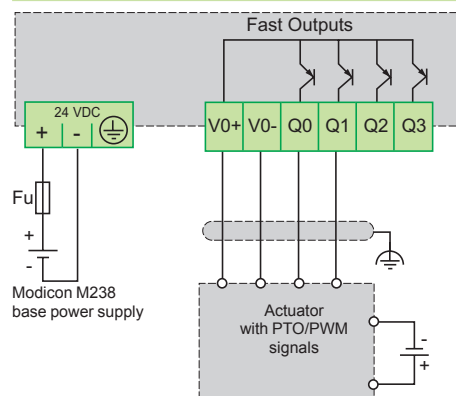
0.5 A fast-blow fuse.

Connection of 24 V $\bar{\square}$ fast outputs (TM238 LDD24DT, TM238 LFCD24DT)

Using actuators with USIC type PTO/PWM signals



Using actuators with PTO/PWM signals delivering a 24 V $\bar{\square}$ power supply



Cordsets with mandatory shielding: 10 m max. and shielding to be connected to the metal support for mounting the Modicon M238 controller.

Principle

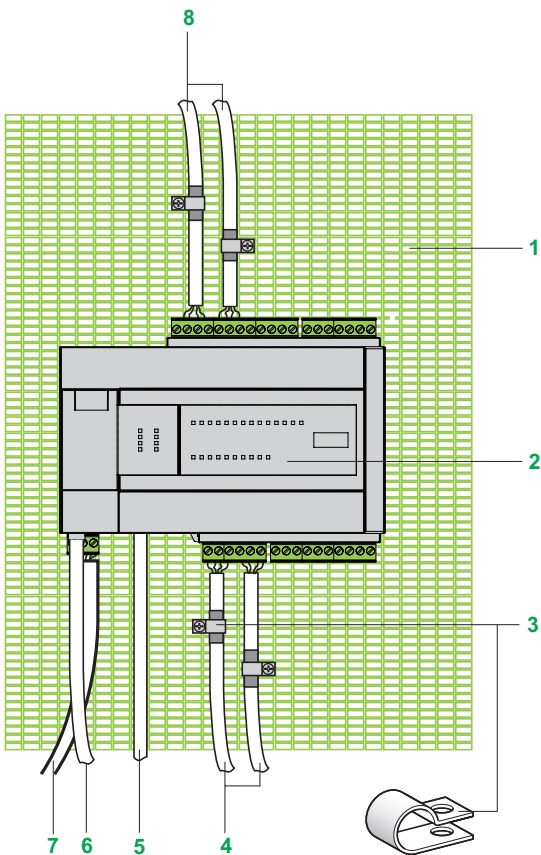
In order to protect against external interference, cables and cordsets carrying the signals below must be shielded:

- Incremental encoders and sensors connected to the fast inputs and used in counter mode (> 100 Hz)
- Actuators with PTO/PWM signals connected to the fast outputs for **TM238 LDD24DT** and **TM238 LFCD24DT**
- Sensors and actuators connected to the extension modules' analog I/O
- Serial links and CANopen buses

The use of shielded cables requires compliance with the following wiring rules:

- Shielding 360° connected to earth at both ends of the cables. Metal conduit or ducting can be used for part of the shielding length provided that there is no break in the continuity of the earth connections.
- Keep cables carrying signals of different categories as far apart as possible.

Installation diagram for Modicon M238 controller



- 1 Metal plate or metal panel (earthed casing) connected to the device's protective earth (PE)
- 2 Modicon M238 logic controller
- 3 **Shielding connection clamp TM200 RSRCEMC**: Attach and earth the shielding of cables 4 and 8 as close as possible to the controller base:
 - Strip the shielding (on the clamp)
 - Attach the cable to the metal support 1 by attaching the clamp to the stripped part of the shielding.
- 4 The shielding must be clamped tightly enough to the metal support to ensure good contact.
- 4 Shielded cables for connecting the fast outputs to the actuators with PTO/PWM signals
- 5 Shielded cordset for connecting serial links SL1 and SL2 (**TCS MCN 3M4●●●2** cordsets include the earthing lug).
Use "**TM200 RSRCEMC** shielding connection clamp" in the serial lines cable 5
- 6 Shielded cable for connecting the CANopen bus. The shielding is connected to terminal 3 on the connection terminal block (see page 11).
Use "**TM200 RSRCEMC** shielding connection clamp" in the CANopen cable 6
- 7 Unshielded power supply wires or cable (2 conductors + Earth)
- 8 Shielded cable for connecting the encoder and sensor signals used on the fast inputs in counter mode

Note: The shielding of the shielded cables used for connecting the sensors/actuators to the analog I/O extension modules should be attached and earthed via earthing plate **TM2 XMTGB** (see page 40).

Note: These shielding connections do not remove the need to connect the PE protective conductors (green-yellow) to the appropriate terminals on each unit or product.

| | | |
|---------------------|---------------------------|--|
| Applications | Type of extension modules | Discrete inputs with removable screw terminal block |
| | Compatibility | |



| | | | |
|------------------------|---------------------------------------|-----------------------|--|
| Number and type | 8 $\overline{\text{---}}$ 24 V inputs | 8 \sim 120 V inputs | 16 $\overline{\text{---}}$ 24 V inputs |
|------------------------|---------------------------------------|-----------------------|--|

| | | | |
|-------------------|-----------------------------------|--|--|
| Connection | By removable screw terminal block | | |
|-------------------|-----------------------------------|--|--|

| | | | | | |
|---------------|---------------|---------------------------------------|--------------------|---------------------------------------|------|
| Inputs | Voltage range | $\overline{\text{---}}$ 20.4...28.8 V | \sim 85...132 V | $\overline{\text{---}}$ 20.4...28.8 V | |
| | Input current | 7 mA per channel | 7.5 mA per channel | 7 mA per channel | |
| | Input logic | Sink/source (1) | - | Sink/source (1) | |
| | Commons | 1 x 8 channels | 1 x 8 channels | 1 x 16 channels | |
| | Response time | <input type="checkbox"/> Off-on | 4 ms | 25 ms | 4 ms |
| | | <input type="checkbox"/> On-off | 4 ms | 30 ms | 4 ms |

| | | | | | |
|----------------|----------------|--|--|--|--|
| Outputs | Output types | | | | |
| | Voltage range | | | | |
| | Commons | | | | |
| | Output current | <input type="checkbox"/> Per output | | | |
| | | <input type="checkbox"/> Per group of channels | | | |

| | | | | |
|------------------|-------------------------------------|----------------------------|-----------------------------|----------------------------|
| Isolation | Between channels | None | | |
| | Between channels and internal logic | 500 V rms \sim for 1 min | 1500 V rms \sim for 1 min | 500 V rms \sim for 1 min |

| | | | |
|------------------------|--------------------|--------------------|---------------------|
| I/O module type | TM2 DDI 8DT | TM2 DAI 8DT | TM2 DDI 16DT |
|------------------------|--------------------|--------------------|---------------------|

| | |
|--------------|----|
| Pages | 26 |
|--------------|----|

(1) Sink input: positive logic, source input: negative logic.

Discrete inputs with HE10 connector

- Modicon M238 logic base controllers
- Twido compact and modular controllers
- Magelis HMI Controller
- Modicon OTB I/O distributed Interfaces

Discrete I/O with removable screw terminal block

Discrete I/O with non-removable spring terminal block



16 \leftrightarrow 24 V inputs

32 \leftrightarrow 24 V inputs

4 \leftrightarrow 24 V inputs/4 relay outputs

16 \leftrightarrow 24 V inputs/8 relay outputs

By HE10 connector
Allows use of the Modicon Telefast ABE 7 pre-wired system

By removable screw terminal block

By non-removable spring terminal block

\leftrightarrow 20.4...28.8 V

\leftrightarrow 20.4...28.8 V

5 mA per channel

7 mA per channel

Sink/source (1)

Sink/source (1)

1 x 16 channels

2 x 16 channels

1 x 4 channels

1 x 16 channels

4 ms

4 ms

4 ms

4 ms

1 N/O contact

\sim 240 V, \leftrightarrow 30V

1 x 4 channels

2 x 4 channels

2 A (lth)

7 A (lth)

None

None between input channels, none between output channels

Between input group and output groups: 1500 V rms \sim for 1 min

Between output groups: 1500 V rms \sim for 1 min

Between input channels and internal logic: 500 V rms \sim for 1 min

Between output channels and internal logic: 2300 V rms \sim for 1 min

500 V rms \sim for 1 min

TM2 DDI 16DK

TM2 DDI 32DK

TM2 DMM 8DRT

TM2 DMM 24DRF

| | | |
|---------------------|---------------------------|---|
| Applications | Type of extension modules | 8/16 outputs with removable screw terminal block |
| | Compatibility | |



| | | | |
|-------------|-----------------------------|-----------------|------------------|
| Type | 8 ∩ 24 V transistor outputs | 8 relay outputs | 16 relay outputs |
|-------------|-----------------------------|-----------------|------------------|

| | | | |
|-------------------|-----------------------------------|--|--|
| Connection | By removable screw terminal block | | |
|-------------------|-----------------------------------|--|--|

| | | | | | | |
|---|----------------|--|---------------|--------------------------|----------------|--|
| Outputs | Output types | Transistor | | Relay with 1 N/O contact | | |
| | Voltage range | ∩ 20.4..28.8 V | | ~ 240 V, ∩ 30 V | | |
| | Logic (1) | Sink | Source | - | | |
| | Commons | 1 x 8 channels | | 2 x 4 channels | 2 x 8 channels | |
| | Output current | 0.3 A max. | 0.5 A max. | 2 A max. | | |
| | □ Per output | 3 A at 28.8 V | 4 A at 28.8 V | 7 A max. | 8 A max. | |
| □ Per group of channels | - | Yes, with automatic reactivation on elimination of the fault | | - | | |
| Protection against overload and short-circuit | - | | - | | | |

| | | | |
|------------------|-------------------------------------|-----------------------|------------------------|
| Isolation | Between channels | None | None |
| | Between group of channels | - | 1500 V rms for 1 min |
| | Between channels and internal logic | 500 V rms ~ for 1 min | 2300 V rms ~ for 1 min |

| | | | | |
|---------------------------|--------------------|--------------------|--------------------|---------------------|
| Output module type | TM2 DDO 8UT | TM2 DDO 8TT | TM2 DRA 8RT | TM2 DRA 16RT |
|---------------------------|--------------------|--------------------|--------------------|---------------------|

| | |
|--------------|---|
| Pages | 26 (1) Source output: positive logic, sink output: negative logic. |
|--------------|---|

16/32 outputs with HE 10 connectors

- Modicon M238 logic base controllers
- Twido compact and modular controllers
- Magelis HMI Controller
- Modicon OTB I/O distributed Interfaces



16 --- 24 V transistor outputs

16 --- 24 V transistor outputs

32 --- 24 V transistor outputs

32 --- 24 V transistor outputs

By HE10 connector

By HE10 connector
Allows use of the Modicon
Telefast ABE 7 pre-wired system

By HE10 connector

By HE10 connector
Allows use of the Modicon
Telefast ABE 7 pre-wired system

Transistors

--- 20.4...28.8 V

Sink

Source

Sink

Source

1 x 16 channels

2 x 16 channels

0.1 A max.

0.4 A max.

0.1 A max.

0.4 A max.

1 A at 28.8 V

2 A at 28.8 V

1 A at 28.8 V

2 A at 28.8 V

–

Yes, with automatic reactivation on
elimination of the fault

–

Yes, with automatic reactivation on
elimination of the fault

None

–

500 V rms ~ for 1 min

TM2 DDO 16UK

TM2 DDO 16TK

TM2 DDO 32UK

TM2 DDO 32TK

26

Presentation

The offer discrete I/O extension modules includes input modules, output modules and mixed input/output modules. With the 15 I/O modules offered, in addition to the I/O integrated in 24 I/O compact base controllers and modular base controllers, configurations can be adapted to best suit application requirements, so optimising costs.

The following discrete I/O modules are available:

- Four 24 V discrete input modules comprising an 8, 16 and a 32-channel module, equipped with either removable screw terminal blocks or HE 10 connector, depending on the model. These modules can be either “sink or source” .
- One ~ 120 V discrete input module, 8 channels, equipped with a removable screw terminal block.
- Eight discrete output modules comprising two output modules with 8 and 16 relay outputs, output modules with 8, 16 or 32-channel “sink” or “source” transistor outputs, equipped with either removable screw terminal blocks or HE 10 connector, depending on the model.
- Two mixed discrete input and output modules, comprising one 4-channel input/4-channel relay output module with removable screw terminal block and one 16-channel input/8-channel relay output module with non-removable spring terminal block.

The narrow width of these I/O modules (17.5 mm, 23.5 mm, 29.7 mm or 39.1 mm) makes it possible to build Modicon M238, Twido or Modicon OTB configurations of up to 248 I/O with a minimal overall size of L 364.9 mm x H 90 mm x D 81.3 mm.

Discrete I/O extension modules and the analogue I/O modules are connected to the different base controller according to the following rules:

- Modicon M238 24 I/O compact base controllers, **TM238 L●●●●●●** : 7 modules max.
- Twido 24 E/S compact base controllers, **TWD LC●A 24DRF**: 4 modules max.
- Twido 40 E/S compact base controllers, **TWD LC●● 40DRF**: 7 modules max.
- Twido 20 E/S modular base controllers, **TWD LMDA 20D●K**: 4 modules max.
- Twido 20 E/S and 40 E/S modular base controllers, **TWD LMDA 20DRT/40D●K**: 7 modules max.
- Magelis HMI Controller, **XBT GC1100●**: 2 modules max.
- Magelis HMI Controller, **XBT GC2●●0●**: 3 modules max
- Modicon OTB Interface 20 E/S, **OTB 1●0 DM9LP**: 7 modules max.

All the discrete I/O modules are electrically isolated with the use of a photocoupler between the internal electronic circuit and the input/output channels.

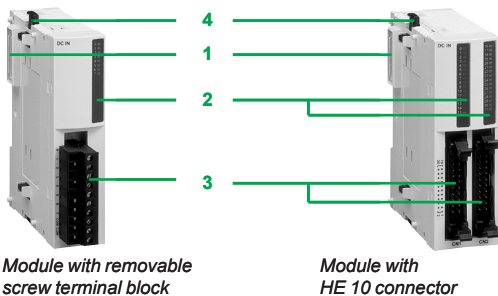
Description

Discrete I/O extension modules comprise:

- 1 An extension connector for electrical connection to the previous module (1).
- 2 One or two blocks for displaying the channels and module diagnostics.
- 3 One or two connection components of varying type, depending on the model:
 - removable screw terminal block (1 or 2) for modules whose reference ends in **T**,
 - HE 10 connector (1 or 2) for modules whose reference ends in **K**,
 - non-removable spring terminal block for module **TM2 DMM 24DRF**.
- 4 Latching mechanism for attachment to the previous module.

These modules are mounted on a symmetrical rail. Fixing kit **TWD XMT 5** (supplied in lots of 5) allows plate or panel mounting. For modules with removable screw terminal block, the terminal blocks are supplied with the module.

The **OTB 9ZZ 61JP** supply common distribution module (2 isolated groups of 10 terminals) simplifies the wiring of supply commons of sensors or actuators via 2 removable screw terminal blocks.



(1) A connector on the right-hand side ensures continuity of the electrical link with the next I/O module.

| Characteristics of $\bar{0}$ input channels | | | | | | | | | | |
|--|--|--------------------------------|--------------------------|---------------------------|-----------------|-----------------|--------------------------------|---------------------------|--------|--------|
| Type of modules | TM2 | DAI 8DT | DDI 8DT | DDI 16DT | DDI 16DK | DDI 32DK | DMM 8DRT | DMM 24DRF | | |
| Number of input channels | | 8 | | 16 | | 32 | 4 | 16 | | |
| Nominal input voltage | V | \sim 120 V | $\bar{0}$ 24 sink/source | | | | | | | |
| Connection | | Removable screw terminal block | | | HE 10 connector | | Removable screw terminal block | Spring terminal block | | |
| Commons | | 1 x 8 channels | | 1 x 16 channels | | 2 x 16 channels | 1 x 4 channels | 1 x 16 channels | | |
| Input limit values (at states 0 and 1 guaranteed) | V | \sim 85...132 V | $\bar{0}$ 20.4...28.8 | $\bar{0}$ 20.4...28.8 (1) | | | $\bar{0}$ 20.4...28.8 | $\bar{0}$ 20.4...28.8 (1) | | |
| Nominal input current | mA | 7.5 | 7 | 5 | | 7 | | | | |
| Input impedance | k Ω | 11 | 3,4 | 4,4 | | 3,4 | | | | |
| Response time | At state 1 | ms | 25 | 4 | 4 | | 4 | | | |
| | At state 0 | ms | 30 | 4 | 4 | | 4 | | | |
| Isolation | Between channels | | None | | | | | | | |
| | Between input groups and output groups | V rms | – | – | – | | | 1500 for 1 min | | |
| | Between channels & internal logic | V rms | 1500 for 1 min | 500 for 1 min | – | | | 500 for 1 min | | |
| Max. consumption on internal extension bus | All inputs at state 1 | $\bar{0}$ 5 V | mA | 55 | 25 | 40 | 35 | 65 | 25 (2) | 65 (2) |
| | | $\bar{0}$ 24 V | mA | 0 | – | | | | 20 (2) | 45 (2) |

(1) Derating temperature curves depends on nominal input voltage, see page 29.

(2) Consumption values are indicated for all mixte inputs/output modules at state 1.

| Characteristics of transistor output modules | | | | | | | | |
|---|-------------------------------|--------|--------------------------------|---------|-----------------|----------|-----------------|----------|
| Type of modules | TM2 | | DDO 8UT | DDO 8TT | DDO 16UK | DDO 16TK | DDO 32UK | DDO 32TK |
| Number of output channels | | | 8 | | 16 | | 32 | |
| Output logic (1) | | | Sink | Source | Sink | Source | Sink | Source |
| Connection | | | Removable screw terminal block | | HE 10 connector | | | |
| Commons | | | 1 x 8 channels | | 1 x 16 channels | | 2 x 16 channels | |
| Nominal output values | Voltage | V | 24 | | | | | |
| | Current | A | 0,3 | 0,5 | 0,1 | 0,4 | 0,1 | 0,4 |
| Output limit values | Voltage | V | 20.4...28.8 | | | | | |
| | Current per channel | A | 0.36 | 0.6 | 0.12 | 0.48 | 0.12 | 0.48 |
| | Current per common | A | 3 | 4 | 1 | 2 | 1 | 2 |
| Response time | State 0 to state 1 | µs | 300 | 450 | 300 | 450 | 300 | 450 |
| | State 1 to state 0 | µs | 300 | 450 | 300 | 450 | 300 | 450 |
| Leakage current | | mA | – | 0,1 | – | 0,1 | – | 0,1 |
| Residual voltage | At state 1 | V | ≤ 1 | ≤ 0.4 | ≤ 1 | ≤ 0.4 | ≤ 1 | ≤ 0.4 |
| Inductive load | L/R | ms | – | ≤ 10 | – | ≤ 10 | – | ≤ 10 |
| Internal protection of the outputs against overload and short-circuit | with automatic reactivation | | No | Yes | No | Yes | No | Yes |
| Maximum power of filament lamp | | W | 8 | 12 | 8 | 9,6 | 8 | 9,6 |
| Isolation | Between channels | | None | | | | | |
| | Between channels & int. logic | V rms | 500 for 1 min | | | | | |
| Max. consumption on internal extension bus | All outputs | ⎓ 5 V | 10 | | 10 | 15 | 20 | 25 |
| | at state 1 | ⎓ 24 V | 20 | | 40 | 20 | 70 | 40 |

(1) Source output: positive logic, sink output: negative logic.

| Characteristics of relay output channels | | | | | | | |
|--|--|---|---|----------------|----------------|-------------------------------------|--------|
| Type of modules | TM2 | | DRA 8RT | DRA 16RT | DMM 8DRT | DMM 24DRF | |
| Number of output channels | | | 8 NO contacts | 16 NO contacts | 4 NO contacts | 8 NO contacts | |
| Connection | | | Removable screw terminal block | | | Non removable spring terminal block | |
| Output currents | Current per channel | A | 2 (5 max. surge current) | | | | |
| | Max. Current per common | A | 7 | 8 | 7 | | |
| Commons | | | 2 x 4 channels | 2 x 8 channels | 1 x 4 channels | 2 x 4 channels | |
| Minimum switching load | | mA | 0,1 under \sim 0,1 V | | | | |
| Contact resistance | When new | m Ω | 45 max. | | | | |
| Mechanical life time | Unload | | 20 x 10 ⁶ operations | | | | |
| Loads on relay outputs | Resistive | e.g.: heating element | Electric life time : 1 x 10 ⁵ operations min.: - 2 A at \sim 240 V - 2 A at \sim 30 V with 600 operations max./hour | | | | |
| | Inductive with protection (1) | e.g.: relay, solenoid valve | Electric life time : 1 x 10 ⁵ operations min.: - régime inductif AC-15 : \sim 240 V 1 A, cos φ = 0,7 - régime inductif AC-15 : \sim 240 V 0,5 A, cos φ = 0,35 - régime inductif DC-13 : \sim 24 V 1 A, L/R = 7 ms | | | | |
| | Capacitive | e.g.: TeSys U starters, Festo solenoid valves | Use of relay outputs not guaranteed (reduction of life). For this type of application, it is advisable to use the transistor outputs of extension modules TM2 DDO ●●●● | | | | |
| Response time | State 0 to state 1 | ms | \leq 10 | | | | |
| | State 1 to state 0 | ms | \leq 5 | | | | |
| Isolation voltage | Between channels | V rms | 1500 for 1 min | | None | | |
| | Between output groups | V rms | 1500 for 1 min | | | | |
| | Between input groups and output groups | V rms | - | | 1500 for 1 min | | |
| | Between channels & internal logic | V rms | 2300 for 1 min | | | | |
| Max. consumption on internal extension bus | All outputs at state 1 | \sim 5 V | mA | 30 | 45 | 25 (2) | 65 (2) |
| | | \sim 24 V | mA | 40 | 75 | 20 (2) | 45 (2) |

(1) Inductive load fitted with a protection device such as an RC peak limiter or flywheel diode.

(2) Consumption values are indicated for all inputs/outputs at state 1.

References

These discrete I/O modules are mounted as standard on symmetrical \perp rails to the right of the Twido base controller. The maximum number of discrete and/or analogue I/O modules which may be mounted depends on the type of base controller:

| Base controller type | Twido compact TWD | | | | Twido modular TWD | | | Modicon M238 | Magelis HMI Controller | | Modicon OTB Interface |
|----------------------|-------------------|------------|------------|------------|-------------------|------------|------------|--------------|------------------------|--------------|-----------------------|
| | LC●A 10DRF | LC●A 16DRF | LC●A 24DRF | LC●● 40DRF | LMDA 20D●K | LMDA 20DRT | LMDA 40D●K | TM238 L●●●●● | XBT GC 1100● | XBT GC 2●●0● | OTB 1●0 DM9LP |
| Number of modules | 0 | 0 | 4 | 7 | 4 | 7 | 7 | 7 | 2 | 3 | 7 |



TM2 DDI 8DT



TM2 DDI 32DK



TM2 DDO 8●T/DRA 8RT



TM2 DDO 16●K



TM2 DDO 32●K



TM2 DRA 16RT



TM2 DDM 8DRT



TM2 DDM 24DRF

Discrete input modules

| Input voltage | Nb of channels | Nb of common points | Connection | Reference | Weight kg |
|--------------------|----------------|---------------------|---|--------------------------------------|----------------|
| ≡ 24 V sink/source | 8 | 1 | Removable screw terminal block (supplied) | TM2 DDI 8DT | 0.085 |
| | 16 | 1 | Removable screw terminal block (supplied) | TM2 DDI 16DT | 0.100 |
| | 32 | 2 | HE 10 connector | TM2 DDI 16DK (1) TM2 DDI 32DK (1) | 0.065 0.100 |
| ~ 120 V | 8 | 1 | Removable screw terminal block (supplied) | TM2 DAI 8DT | 0.081 |

Discrete output modules

| Type de sortie | Nb of channels | Nb of common points | Connection | Reference | Weight kg |
|--------------------------------|------------------|---------------------|---|------------------|-----------|
| Transistors ≡ 24 V | 8, sink 0.3 A | 1 | Removable screw terminal block (supplied) | TM2 DDO 8UT | 0.085 |
| | 8, source 0.5 A | 1 | Removable screw terminal block (supplied) | TM2 DDO 8TT | 0.085 |
| Transistors ≡ 24 V | 16, sink 0.1 A | 1 | HE 10 connector | TM2 DDO 16UK | 0.070 |
| | 16, source 0.4 A | 1 | HE 10 connector | TM2 DDO 16TK (1) | 0.070 |
| | 32, sink 0.1 A | 2 | HE 10 connector | TM2 DDO 32UK | 0.105 |
| | 32, source 0.4 A | 2 | HE 10 connector | TM2 DDO 32TK (1) | 0.105 |
| Relay 2 A (lth) ~ 230 V/≡ 30 V | 8 (N/O contact) | 2 | Removable screw terminal block (supplied) | TM2 DRA 8RT | 0.110 |
| | 16 (N/O contact) | 2 | Removable screw terminal block (supplied) | TM2 DRA 16RT | 0.145 |

Discrete mixed input/output modules

| Nb of I/O | Nb, type of input | Nb, type of output | Nb of common points | Connection | Reference | Weight kg |
|-----------|--------------------------|------------------------------------|--|---|---------------|-----------|
| 8 | 4 I, ≡ 24 V sink/source | 4 O, relay (N/O contact) 2 A (lth) | Inputs: 1 common Outputs: 1 common | Removable screw terminal block (supplied) | TM2 DMM 8DRT | 0.095 |
| 24 | 16 I, ≡ 24 V sink/source | 8 O, relay (N/O contact) 2 A (lth) | Inputs: 1 common Outputs: 2 commons | Non-removable spring terminal block | TM2 DMM 24DRF | 0.140 |

(1) Module that allows use of the Modicon Telefast ABE 7 pre-wired system.



OTB 9ZZ 61JP

References

Separate components

| Description | Application | Reference | Weight kg |
|--|---|---------------------|-----------|
| Fixing kit Sold in lots of 5 | For plate or panel mounting of the discrete modules. | TWD XMT 5 | 0.065 |
| Commun distribution module | For distribution of supply commons. 8 A max. Connection on 2 removable screw terminal blocks | OTB 9ZZ 61JP | 0.100 |
| Modicon Telefast ABE 7 pre-wired system | Connection sub-bases I/O connection sub-bases Pre-wired solutions Cables and accessories | See page 78 | – |

| Description | Number of ways | Reference | Weight kg |
|---|----------------|---------------------|-----------|
| HE 10 female connectors Sold in lots of 5 | 20 | TWD FCN 2K20 | – |
| | 26 | TWD FCN 2K26 | – |

Pre-formed cables for discrete I/O modules with HE 10 connectors

| Description | For use with Twido | Gauge C.s.a. | Cable length | Reference | Weight kg |
|---|--|---------------------------------|--------------|--------------------|-----------|
| Pre-formed cables 1 pre-formed cable: one end fitted with HE 10 connector, one end with free wires | I/O extensions TM2 DDI 16DK/32DK | AWG 22 0.035 mm ² | 3 m | TWD FCW 30K | 0.405 |
| | TM2 DDO 16●K/32●K | AWG 22 0.035 mm ² | 5 m | TWD FCW 50K | 0.670 |

Pre-formed connecting cables (1)

| Description | Association | Gauge Section | Longueur cordon | Reference | Weight kg |
|---|---------------------------------|---------------------------------|-----------------|----------------------|-----------|
| Discrete input pre-formed cables, 1 pre-formed cable: one end with 20-way HE 10 connector on TM2 side, one end with 20-way HE 10 connector on sensor side | Inputs TM2 DDI 16DK/32DK | AWG 28 0.080 mm ² | 1 m | ABF TE20EP100 | 0,080 |
| | | AWG 28 0.080 mm ² | 2 m | ABF TE20EP200 | 0.140 |
| | | AWG 28 0.080 mm ² | 3 m | ABF TE20EP300 | 0.210 |
| Discrete output pre-formed cables 1 pre-formed cable: one end with 20-way HE 10 connector on TM2 side, one end with 20-way HE 10 connector on preactuator side | Outputs TM2 DDO 16TK/32TK | AWG 28 0.080 mm ² | 1 m | ABF TE20SP100 | 0,080 |
| | | AWG 28 0.080 mm ² | 2 m | ABF TE20SP200 | 0.140 |
| | | AWG 28 0.080 mm ² | 3 m | ABF TE20SP300 | 0.210 |

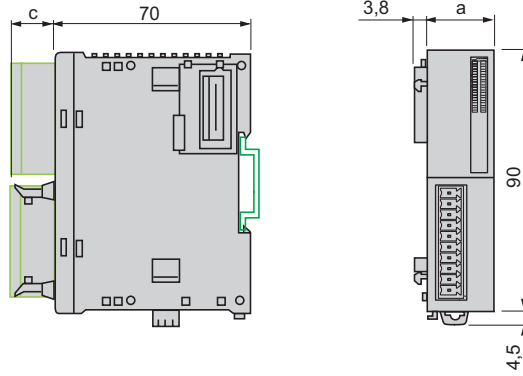
(1) Cables strictly for applications other than use of Modicon Telefast ABE 7 sub-bases with Twido controllers. For use of Modicon Telefast ABE 7 sub-bases with Twido controllers, see page 75.

Dimensions

Discrete I/O modules

| TM2 | a | c |
|-----------------|------|------|
| DDI 8DT/DAI 8DT | 23,5 | 14,6 |
| DDI 16DT | 23,5 | 14,6 |
| DDI 16DK | 17,6 | 11,3 |
| DDI 32DK | 29,7 | 11,3 |
| DDO 8UT/8TT | 23,5 | 16,6 |
| DDO 16UK/16TK | 17,6 | 11,3 |
| DDO 32UK/32TK | 29,7 | 11,3 |
| DRA 8RT/16RT | 23,5 | 14,6 |
| DMM 8DRT | 23,5 | 14,6 |
| DMM 24DRF | 39,1 | 1,0 |

| OTB | a | c |
|----------|------|------|
| 9ZZ 61JP | 23,5 | 14,6 |



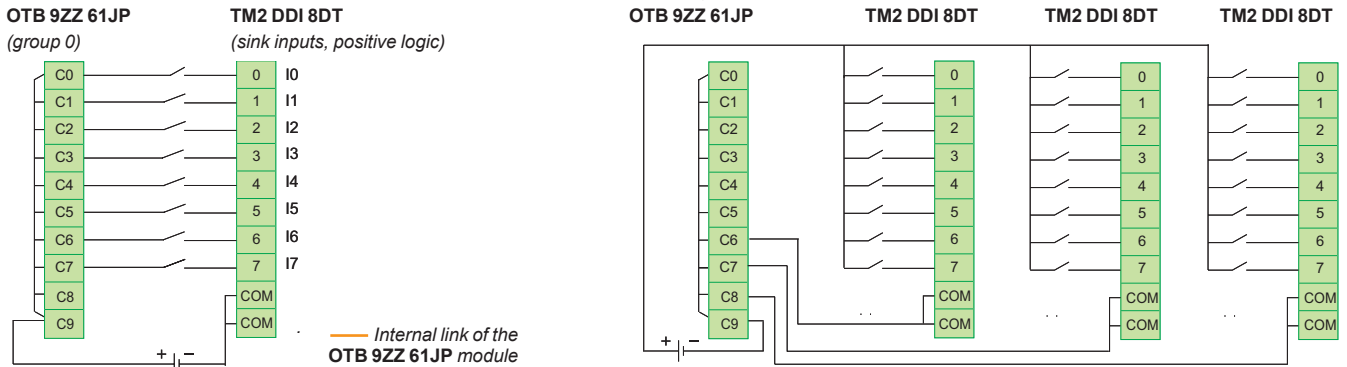
Connections

| ABF TP26MP●00 (1) | | | ABF TE20EP●00 (1) | | ABF TE20SP●00 (1) | |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| HE 10 26-way A | HE 10 20-way B | HE 10 20-way C | HE 10 20-way A | HE 10 20-way B | HE 10 20-way A | HE 10 20-way B |
| Twido side | Sensor side | Preactuator side | TM2 side | Sensor side | TM2 side | Preactuator side |
| 1 | – | 18 | 1 | – | 1 | 18 |
| 2 | 20 | – | 2 | – | 2 | 20 |
| 3 | – | 20 | 3 | 18 | 3 | 19 |
| 4 | 12 | – | 4 | 20 | 4 | 17 |
| 5 | – | 17 | 5 | 16 | 5 | 16 |
| 6 | 11 | – | 6 | 8 | 6 | 8 |
| 7 | – | 19 | 7 | 15 | 7 | 15 |
| 8 | 10 | – | 8 | 7 | 8 | 7 |
| 9 | – | – | 9 | 14 | 9 | 14 |
| 10 | 9 | – | 10 | 6 | 10 | 6 |
| 11 | – | 8 | 11 | 13 | 11 | 13 |
| 12 | 8 | – | 12 | 5 | 12 | 5 |
| 13 | – | 7 | 13 | 12 | 13 | 12 |
| 14 | 7 | – | 14 | 4 | 14 | 4 |
| 15 | – | 6 | 15 | 11 | 15 | 11 |
| 16 | 6 | – | 16 | 3 | 16 | 3 |
| 17 | – | 5 | 17 | 10 | 17 | 10 |
| 18 | 5 | – | 18 | 2 | 18 | 2 |
| 19 | – | 4 | 19 | 9 | 19 | 9 |
| 20 | 4 | – | 20 | 1 | 20 | 1 |
| 21 | – | 3 | | | | |
| 22 | 3 | – | | | | |
| 23 | – | 2 | | | | |
| 24 | 2 | – | | | | |
| 25 | – | 1 | | | | |
| 26 | 1 | – | | | | |

(1) Cordsets do not be associated with a Modicon Telefast ABE 7 bases.
For Modicon Telefast ABE 7 bases association, see page 75.

OTB 9ZZ 61JP

Examples of connection: input module **TM2 DDI 8DT** with distribution module of supply commons **OTB 9ZZ 61JP**



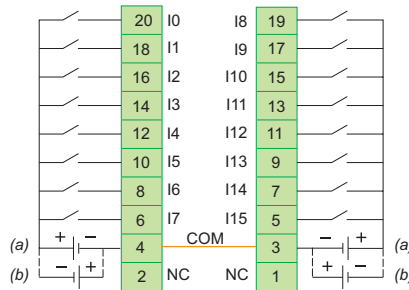
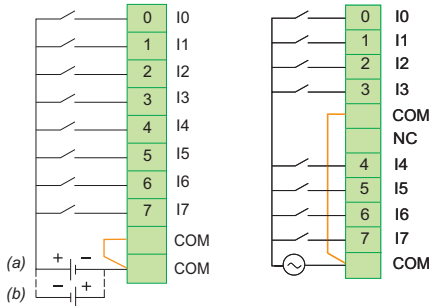
Connections

Input modules

TM2 DDI 8DT (--- 24 V)

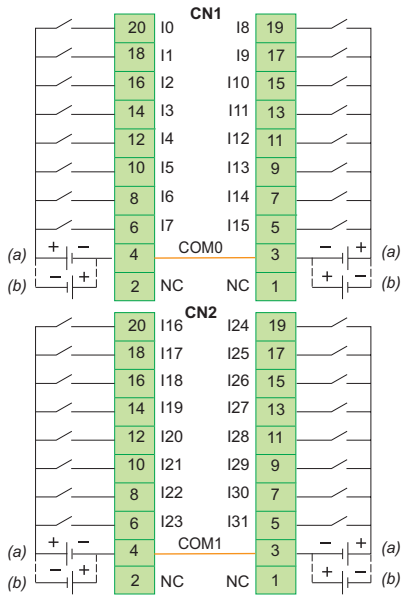
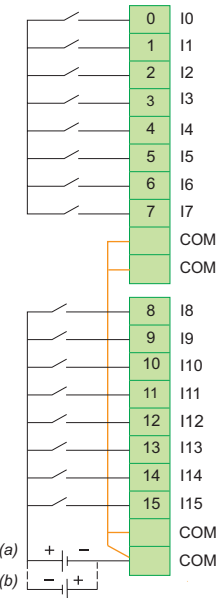
TM2 DAI 8DT (~ 120 V)

TM2 DDI 16DK (--- 24 V)



TM2 DDI 16DT (--- 24 V)

TM2 DDI 32DK (--- 24 V)

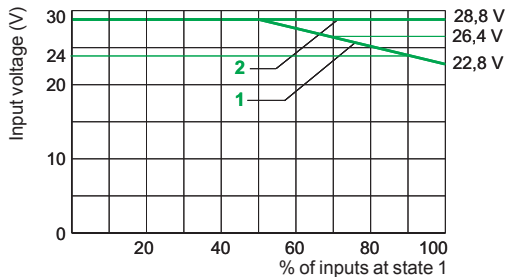
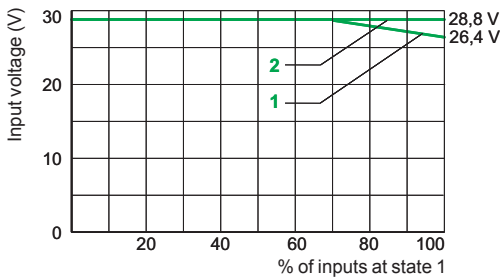


(a) Sink input (positive logic).
(b) Source input (negative logic).
— COM or COM● internal links.

Temperature derating curves of input modules

TM2 DDI 16DT

TM2 DDI 16DK/32DK



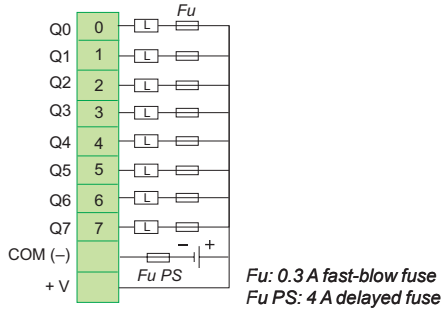
1 Input voltage at 45 °C
2 Input voltage at 55 °C

1 Input voltage at 30 °C
2 Input voltage at 55 °C

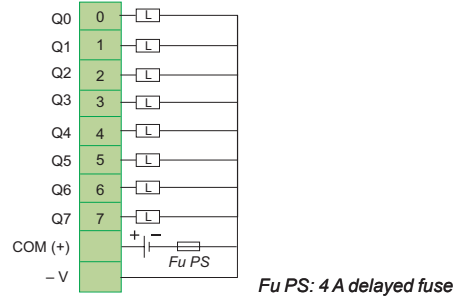
Connections (continued)

Transistor output modules

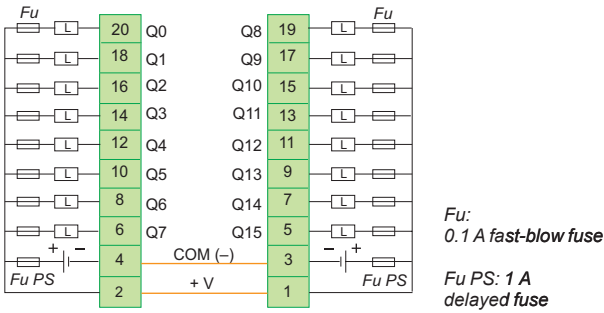
TM2 DDO 8UT



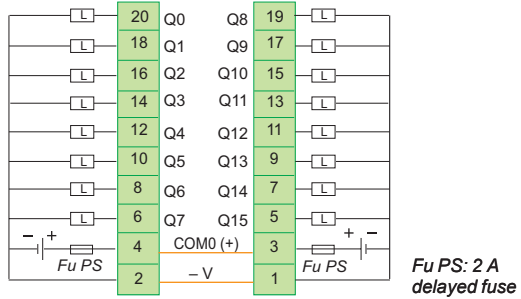
TM2 DDO 8TT



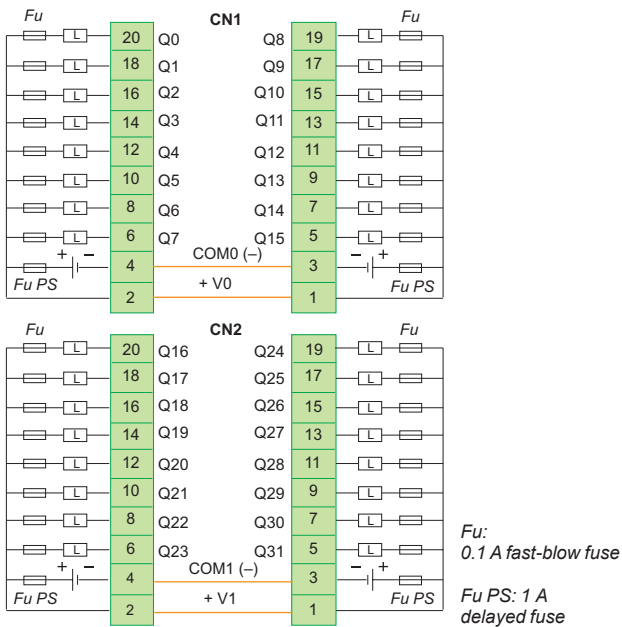
TM2 DDO 16UK



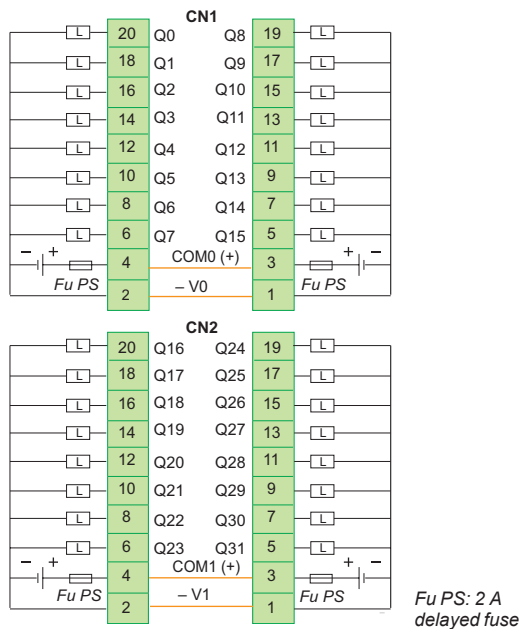
TM2 DDO 16TK



TM2 DDO 32UK



TM2 DDO 32TK

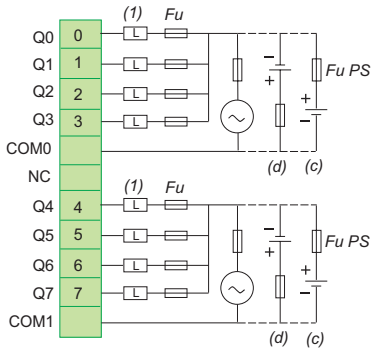


COM● (-), COM● (+), +V● or -V● internal links.

Connections (continued)

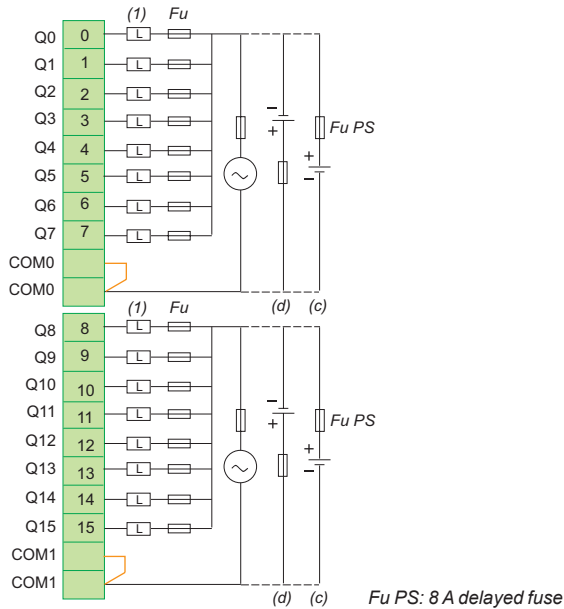
Relay output modules

TM2 DRA 8RT



Fu PS: 8 A delayed fuse

TM2 DRA 16RT



Fu PS: 8 A delayed fuse

(1) L inductive load: must be equipped with a protection device such as an RC peak limiter or flywheel diode.

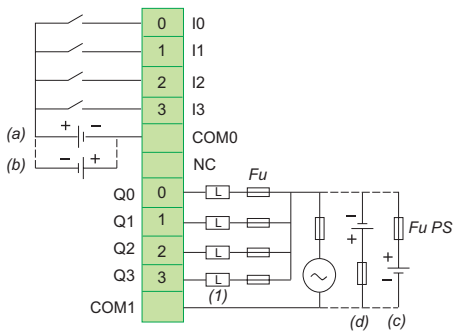
(c) Sink output (negative logic).

(d) Source output (positive logic).

COM● internal links.

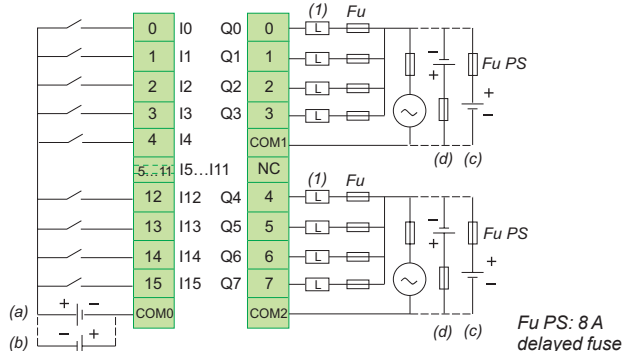
Input/output mixed modules

TM2 DMM 8DRT



Fu PS: 8 A delayed fuse

TM2 DMM 24DRF



Fu PS: 8 A delayed fuse

(1) L inductive load: must be equipped with a protection device such as an RC peak limiter or flywheel diode.

(a) Sink input (positive logic).

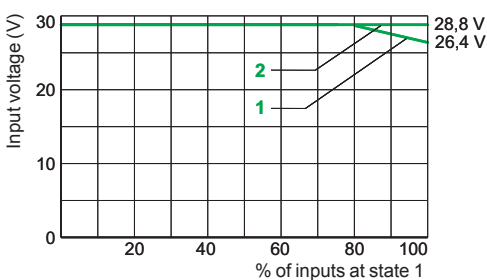
(b) Source input (negative logic).

(c) Sink output (negative logic).

(d) Source output (positive logic).

Temperature derating curves of mixed input/output modules (continued)

TM2 DMM 24DRF



1 Input voltage at 45 °C

2 Input voltage at 55 °C

| | | | | | | | |
|---------------------------------|--|--|--|--|--|---|--|
| Applications | | Type of extension modules | | Analogue inputs | | | |
| | | Compatibility | | <ul style="list-style-type: none"> - Modicon M238 logic base controllers - Twido compact and modular controllers - Magelis HMI controller - Modicon OTB I/O distributed Interfaces | | | |
| | |  | | | | | |
| Type | | 2 inputs | | 4 inputs | | 8 inputs | |
| Nature | | Voltage/current | | Thermocouple inputs | | Voltage/current Temperature probe | |
| Connection | | Removable screw terminal block | | | | | |
| Inputs | | Range | | 0...10 V 4...20 mA (non differential) | | Thermocouple type J, K and T (differential) | |
| | | Resolution | | 12 bits (4096 points) | | 12 bits (4096 points) | |
| | | Acquisition period | | 10 ms per channel + 1 controller cycle time | | 200 ms per channel + 1 controller cycle time | |
| | | | | 0...10 V ● 0...20 mA ● Temperature probe 2, 3 or 4-wire Pt100/1000 ■ : - 200...600 °C Ni 100/1000 ■ : - 50...150 °C (non differential) | | 0...10 V 0...20 mA (non differential) | |
| | | | | 12 bits (4096 points) | | 12 bits (4096 points) | |
| | | | | 10 ms per channel + 1 controller cycle time | | 160 ms per channel ● 320 ms per channel ■ + 1 controller cycle time | |
| | | | | 160 ms per channel + 1 controller cycle time | | 160 ms per channel + 1 controller cycle time | |
| Outputs | | Range | | | | | |
| | | Resolution | | | | | |
| | | Transfer time | | | | | |
| External supply | | Nominal voltage | | ☰ 24 V | | | |
| | | Limit values | | ☰ 20.4...28.8 V | | | |
| Isolation | | Between channels | | Non isolated | | | |
| | | Between channels and sensor supply | | ~ 500 V rms | | Non isolated | |
| | | Between channels and internal logic | | ~ 500 V rms | | ~ 2500 V rms | |
| | | | | ~ 2500 V rms | | ~ 2500 V rms | |
| Analogue I/O module type | | TM2 AMI 2HT | | TM2 AMI 2LT | | TM2 AMI 4LT | |
| | | | | | | TM2 AMI 8HT | |
| Pages | | 38 | | | | | |

| Analogue inputs (continued) | Analogue outputs | Analogue I/O |
|-----------------------------|------------------|--------------|
|-----------------------------|------------------|--------------|

- Modicon M238 logic base controllers
- Twido compact and modular controllers
- Magelis HMI controller
- Modicon OTB I/O distributed Interfaces



| | | | | |
|----------|----------|-----------|-------------------|--------------------|
| 8 inputs | 1 output | 2 outputs | 2 inputs/1 output | 4 inputs/2 outputs |
|----------|----------|-----------|-------------------|--------------------|

| | | | | | |
|--------------------------|-----------------|---------|-----------------|--|-----------------|
| Temperature probe inputs | Voltage/current | Voltage | Voltage/current | Thermocouple/ temperature probe inputs Voltage/current output | Voltage/current |
|--------------------------|-----------------|---------|-----------------|--|-----------------|

| | | | | | |
|--------------------------------|--|--------------------------------|--|--|--|
| Removable screw terminal block | Removable screw terminal block and RJ11 connectors | Removable screw terminal block | | | |
|--------------------------------|--|--------------------------------|--|--|--|

| | | | | | |
|--|--|--|---|--|---|
| NTC probe (non differential) | PTC probe Threshold detection (high and low) (non dif.) | Temperature probe 2 or 3-wire Pt100: - 200...600 °C Pt1000 :- 50...200 °C (non differential) | 0...10 V 4...20 mA (non differential) | Thermocouple type J, K and T Temperature probe 2 or 3-wire Pt100: - 100...500 °C (non differential) | 0...10 V 4...20 mA (non differential) |
| 10 bits (1024 pts) | 1 < range 2 = range 4 > range | 12 bits (4096 points) | 12 bits or 11 bits + sign (4096 points) | | 12 bits (4096 points) |
| 160 ms per channel + 1 controller cycle time | 320 ms per channel (1280 ms maxi.) + 1 controller cycle time | | 10 ms per channel + 1 controller cycle time | 50 ms per channel + 1 controller cycle time | 64 ms per channel + 1 controller cycle time |

| | | |
|---------------------------------|--------------------------------|---------------------------------|
| 0...10 V 4...20 mA | ± 10 V | 0...10 V 4...20 mA |
| 12 bits (4096 points) | 11 bits (2048 points) + sign | 12 bits (4096 points) |
| 10 ms + 1 controller cycle time | 2 ms + 1 controller cycle time | 20 ms + 1 controller cycle time |

| | |
|-----------------|---------------|
| ~ 24 V | ~ 24 V |
| ~ 20.4...28.8 V | ~ 19.2...30 V |

| | | | | | |
|--------------|-------------|-------------|--------------|-------------|--------------|
| Non isolated | | | | | |
| Non isolated | ~ 500 V rms | ~ 500 V rms | Non isolated | ~ 500 V rms | ~ 800 V rms |
| ~ 2500 V rms | ~ 500 V rms | ~ 500 V rms | ~ 2500 V rms | ~ 500 V rms | ~ 1500 V rms |

| | | | | | | |
|-------------|-------------------------------------|-------------|-------------|-------------|-------------|-------------|
| TM2 ARI 8HT | TM2 ARI 8LT (1) TM2 ARI 8LRJ (2) | TM2 AMO 1HT | TM2 AVO 2HT | TM2 AMM 3HT | TM2 ALM 3LT | TM2 AMM 6HT |
|-------------|-------------------------------------|-------------|-------------|-------------|-------------|-------------|

38
 (1) Connection by a removable screw terminal block.
 (2) Connection by a RJ11 connector.

Presentation

Analog I/O extension modules enable the acquisition of various analog values encountered in industrial applications.

Analog output modules are used to control the preactuators in devices such as variable speed drives, valves and applications that require process control. The output current or voltage is proportional to the numerical value defined by the user program. When the controller stops, the outputs can be configured with fallback (reset to the lowest scale value or hold the last value received). This function, when set to 'hold', is useful when debugging the application or when a fault occurs, to ensure that the process being controlled is not disturbed.

The following 10 analog I/O modules are available:

- One module with 2 inputs: 0...10 V, 4...20 mA
- One module with 2 inputs for type J, K and T thermocouples
- One module with 4 inputs: 0...10 V, 0...20 mA, Pt 100/1000 range - 200...600°C, Ni100/1000 range - 50...150°C
- Two modules with 8 temperature probe inputs: Pt100 range - 200...600°C and Pt1000 range - 50...200°C (with RJ11 connectors or removable screw terminal block)
- One module with 8 inputs: 0...10 V, 0...20 mA
- One module with 8 inputs: PTC/NTC (1)
- One module with 1 output: 0...10 V, 4...20 mA
- One module with 2 outputs: ± 10 V
- One mixed module with 2 inputs (0...10 V, 4...20 mA) and 1 output (0...10 V, 4...20 mA)
- One mixed module with 2 thermocouple (type J, K and T) or temperature probe inputs and 1 output 0...10 V, 4...20 mA
- One mixed module with 4 inputs (0...10 V, 4...20 mA) and 2 outputs (0...10 V, 4...20 mA)

Analog extension modules offer a resolution of 10 bits, 11 bits + sign and 12 bits, with connection by removable screw terminal block. An external 24 V $\bar{\text{---}}$ power supply is required for each analog module.

Discrete I/O extension modules and analog I/O modules are connected to the different base controllers according to the following rules:

- Modicon M238 24 I/O compact base controllers, **TM238 L●●●●●●**: 7 modules max.
- Twido 24 I/O compact base controllers, **TWD LC●A 24DRF**: 4 modules max.
- Twido 40 I/O compact base controllers, **TWD LC●● 40DRF**: 7 modules max.
- Twido 20 I/O modular base controllers, **TWD LMDA 20D●K**: 4 modules max.
- Twido 20 I/O and 40 I/O modular base controllers, **TWD LMDA 20DRT/40D●K**: 7 modules max.
- Magelis HMI Controller, **XBT GC1100●**: 2 modules max.
- Magelis HMI Controller, **XBT GC2●●0●**: 3 modules max.
- Modicon OTB Interface 20 I/O, **OTB 1●0 DM9LP**: 7 modules max.

All analog I/O modules are electrically isolated with the use of a photocoupler between the internal electronic circuit and the input/output channels.

Description

Analog I/O modules comprise:

- 1 An extension connector for electrical connection to the adjacent module (2)
- 2 A PWR display block
- 3 One (or two, depending on model) removable screw terminal block(s) for connecting the 24 V $\bar{\text{---}}$ external power supply, the sensors and the preactuators
- 4 A latching mechanism for attachment to the adjacent module

For modules with 8 temperature probe inputs:

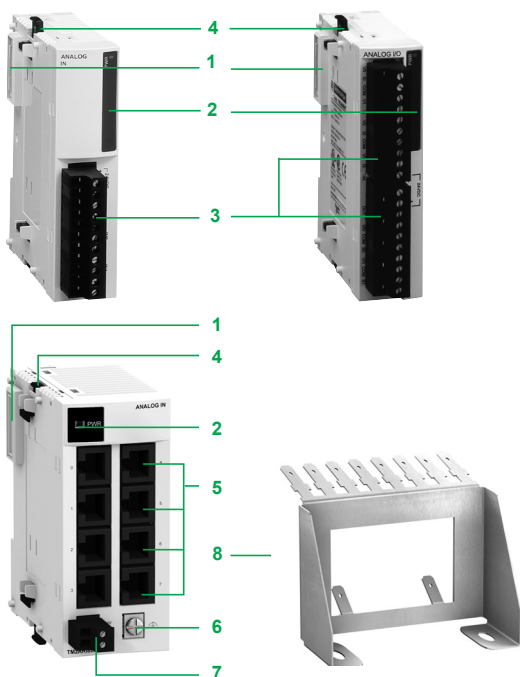
- 5 8 RJ11 connectors. A version of this module is available with 2 removable screw terminal blocks (2 x 13 terminals)
- 6 A screw terminal for connecting the functional ground (FG)
- 7 A removable screw terminal block for connecting the 24 V $\bar{\text{---}}$ power supply

The **TM2 XMTGB** ground connection plate 8 simplifies connection of the analog sensor and actuator cable shielding. This shielding must be connected to the device's functional ground (FG).

These modules are mounted on a symmetrical \perp rail. Mounting kit **TWD XMT 5** (supplied in lots of 5) can be used for plate or panel mounting.

(1) With PTC probe, threshold detection inputs (high and low).

(2) A connector on the right-hand side panel ensures continuity of the electrical link with the adjacent I/O module.



Characteristics of 2 and 4-channel analog input modules

| Module type | | TM2 AMI 2HT | | TM2 AMI 2LT | | TM2 AMI 4LT | |
|--|--|--|-------------|--|--|---|---|
| Number of channels | | 2 high-level inputs | | 2 low-level inputs | | 4 inputs | |
| Range | | Voltage | Current | Thermocouple | | Voltage | Current Temperature probe |
| | | 0...10 V | 4...20 mA | Type J: - 200...760° Type K: - 270...1370°C Type T: - 270...400°C No isolation between the input channels | | 0...10 V | 0...20 mA Pt100/1000: - 200... 600°C Ni100/1000: - 50...150°C |
| Type | | Non-differential | | Differential | | Non-differential | |
| Resolution | | 12 bits | | 12 bits | | 12 bits | |
| LSB value | | 2.5 mV | 4.8 µA | Type J: 0.3°C Type K: 0.325°C Type T: 0.1°C | | 2.5 mV | 4.8 µA 0.15 ° K |
| Connection | | Removable screw terminal block | | | | | |
| Sensor cabling | | Shielded cable (shielding to be connected to the TM2 XMTGB ground connection plate) | | | | | |
| Permissible continuous overload | | 13 V $\overline{\text{---}}$ | 40 mA | ± 7.5 V $\overline{\text{---}}$ | | 40 mA | 13 V $\overline{\text{---}}$ |
| Input impedance | | 1 M Ω min. | 10 Ω | 1 M Ω min. | | 10 K Ω | 470 Ω > 10 k Ω |
| Maximum sampling duration | | ms | | 10 | | 200 | |
| Acquisition period | | ms | | 10 per channel + 1 controller cycle time | | 200 per channel + 1 controller cycle time | |
| Measuring precision | | Max. error at 25°C | | % FS | | ± 0.2 | |
| | | Temperature coefficient | | % FS/°C | | ± 0.006 | |
| | | Repeat accuracy after stabilization time | | % FS | | ± 0.5 | |
| | | Nonlinearity | | % FS | | ± 0.2 | |
| | | Total error | | % FS | | ± 1 | |
| Crosstalk | | 2 low significance bits max. | | 1 low significance bit max. | | | |
| Dielectric strength | | Between channels | | Non-isolated | | Non-isolated | |
| | | Between channels and external supply | | V rms | | 500 \sim | |
| | | Between channels and internal logic | | V rms | | 500 \sim 2500 \sim | |
| Isolation | | Photocoupler between the input and the internal circuit | | | | | |
| External supply | | Nominal voltage 24 $\overline{\text{---}}$; Limit values: 20.4...28.8 $\overline{\text{---}}$ (ripple included) | | | | | |
| Consumption | | Internal 5 V $\overline{\text{---}}$ supply | | mA | | 50 | |
| | | External 24 V $\overline{\text{---}}$ supply | | mA | | 40 30 60 | |

Characteristics of 8-channel analog input modules

| Module type | | TM2 ARI 8HT | | TM2 AMI 8HT | | TM2 ARI 8LRJ/8LT | |
|--|--|---|--|---|-----------------|--|--|
| Number of channels | | 8 inputs | | 8 inputs | | 8 inputs (2 groups of 4 inputs) | |
| Range | | Temperature NTC probe, PTC probe, 100 Ω < R < 10 k Ω | | Current | Voltage | Temperature probe | |
| | | | | 0...20 mA | 0...10 V | Pt100: - 200...600°C Pt1000: - 50...200°C | |
| Type | | Non-differential | | | | | |
| Resolution | | 10 bits with NTC (2) | | 10 bits | | 12 bits | |
| LSB value | | - | | 19.5 µA | 9.7 mV | 0.2°C (Pt 100), 0.06°C (Pt 1000) | |
| Connection | | Sensors | | Removable screw terminal block | | | |
| | | External supply | | Removable screw terminal block | | | |
| Sensor cabling | | Shielded cable (shielding to be connected to the TM2 XMTGB ground connection plate) | | | | | |
| Permissible continuous overload | | - | | 40 mA | 13 V | - | |
| Input impedance | | >1 M Ω | | 470 Ω | > 10 k Ω | > 10 k Ω | |
| Maximum sampling duration | | ms | | 160 | | | |
| Acquisition period | | ms | | 160 per channel + 1 controller cycle time | | | |
| Measuring precision | | Max. error at 25°C | | % FS | | ± 0.2 | |
| | | Temperature coefficient | | % FS | | ± 0.01 | |
| | | Repeat accuracy after stabilization time | | % FS | | ± 0.4 FS | |
| | | Nonlinearity | | % FS | | ± 0.002 | |
| | | Total error | | % FS | | ± 1 FS | |
| Crosstalk | | 1 low significance bit max. | | - | | | |
| Dielectric strength | | Between channels | | Non-isolated | | | |
| | | Between channels and external supply | | V rms | | | |
| | | Between channels and internal logic | | 2500 \sim 2500 \sim | | | |
| Isolation | | Photocoupler between the input and the internal circuit | | | | | |
| External supply | | Nominal voltage | | V | | 24 $\overline{\text{---}}$ | |
| | | Limit values | | V | | 20.4...28.8 $\overline{\text{---}}$ (ripple included) 19.2...30 $\overline{\text{---}}$ (ripple included) | |
| Consumption | | Internal 5 V $\overline{\text{---}}$ supply | | mA | | 60 | |
| | | External 24 V $\overline{\text{---}}$ supply | | mA | | 45 90 140 max. | |

(1) $\pm 5^\circ\text{C}$: Precision of cold junction compensation

(2) With PTC probe, 2 threshold detection (1: value \leq low threshold, 2: value included between low and high threshold, 4: value \geq high threshold)


Characteristics of 3 and 6-channel analog input/output modules

| Analog inputs | | TM2 AMM 3HT | | TM2 AMM 6HT | | TM2 ALM 3LT | | |
|---------------------------------|--|---|-----------|---|------------|---|--------------------------------------|----------|
| Module type | | 2 high-level inputs | | 4 high-level inputs | | 2 low-level inputs | | |
| Number of channels | | Voltage | Current | Voltage | Current | Thermocouple | Temperature probe | |
| Range | | 0...10 V | 4...20 mA | 0...10 V | 4...20 mA | Type: - J: 0...1200°C - K: 0...1300°C - T: 0...400°C | 3-wire Pt probe: - 100...500°C | |
| Type | | Non-differential | | Non-differential | | Non-differential | | |
| Resolution | | 12 bits | | | | | | |
| LSB value | | 2.5 mV | 4.8 µA | 2.5 mV | 4 µA | 0.1°C | 0.15°C | |
| Permissible continuous overload | | 13 V --- | 40 mA | 13 V --- | 40 mA | - | | |
| Input impedance | | 1 MΩ min. | 10 Ω min. | 1 MΩ min. | 250 Ω max. | 1 MΩ min. | | |
| Maximum sampling duration | | ms 10 | | 16 | | 60 | | |
| Acquisition period | | ms 60 + 1 controller cycle time | | 16 per channel, configurable software + 1 controller cycle time | | 60 + 1 controller cycle time | | |
| Measuring precision | Max. error at 25°C | % FS ± 0.2 | | ± 0.5 | | 0.2 ± 4°C max. (1) ± 0.2 | | |
| | Temperature coefficient | % FS/°C ± 0.006 | | ± 0.015 | | ± 0.006 | | |
| | Repeat accuracy after stabilization time | % FS ± 0.5 | | ± 0.5 | | ± 0.5 | | |
| | Nonlinearity | % FS ± 0.2 | | ± 0.4 | | ± 0.2 | | |
| | Total error | % FS ± 1 | | ± 1 | | ± 1 | | |
| Crosstalk | | 2 low significance bits max. | | | | | | |
| Isolation | | Photocoupler between the inputs and the internal circuit | | | | | | |
| Analog outputs | | TM2 AMM 3HT | | TM2 AMM 6HT | | TM2 ALM 3LT | | |
| Module type | | 1 output | | 2 outputs | | 1 output | | |
| Number of channels | | Voltage | Current | Voltage | Current | Voltage | Current | |
| Range | | 0...10 V | 4...20 mA | 0...10 V | 4...20 mA | 0...10 V | 4...20 mA | |
| Resolution | | 12 bits | | | | | | |
| LSB value | | 2.5 mV | 4.8 µA | 2.5 mV | 4 µA | 2.5 mV | 4.8 µA | |
| Load | | Resistive | | | | | | |
| Type | | Impedance | | | | | | |
| Impedance | | Ω | 2000 min. | 300 max. | 2000 min. | 300 max. | 2000 min. | 300 max. |
| Stabilization time | | ms 20 | | | | | | |
| Recovery time | | ms 20 + 1 controller cycle time | | | | | | |
| External supply | | V Nominal voltage: 24 ---; Limit values: 20.4...28.8 --- (ripple included) | | | | | | |
| Measuring precision | Max. error at 25°C | % FS ± 0.2 | | ± 0.9 | | ± 0.2 | | |
| | Temperature coefficient | % FS/°C ± 0.015 | | ± 0.02 | | ± 0.015 | | |
| | Repeat accuracy after stabilization time | % FS ± 0.5 | | ± 1 | | ± 0.5 | | |
| | Output error | % FS ± 1 | | | | | | |
| | Nonlinearity | % FS ± 0.2 | | ± 0.5 | | ± 0.2 | | |
| | Output ripple | 1 low significance bit max. | | | | | | |
| | Total error | % FS ± 1 | | ± 1.5 | | ± 1 | | |
| Isolation | | Photocoupler between the inputs and the internal circuit | | | | | | |
| Analog I/O common | | TM2 AMM 3HT | | TM2 AMM 6HT | | TM2 ALM 3LT | | |
| Module type | | TM2 AMM 3HT | | TM2 AMM 6HT | | TM2 ALM 3LT | | |
| Connection | | Removable screw terminal block | | | | | | |
| Sensor and preactuator cabling | | Shielded cable (shielding to be connected to the TM2 XMTGB ground connection plate) | | | | | | |
| Dielectric strength | Between input channels | Non-isolated | | | | | | |
| | Between input and output channels | V rms | 500 ~ | 800 ~ | 500 ~ | | | |
| | Between channels and external supply | V rms | 500 ~ | 800 ~ | 500 ~ | | | |
| | Between channels and internal logic | V rms | 500 ~ | 1500 ~ | 500 ~ | | | |
| External supply | Nominal voltage | V 24 --- | | | | | | |
| | Limit values | 19.2...30 --- (ripple included) | | | | | | |
| Module consumption | Internal 5 V --- supply | mA 50 | | 60 | | 50 | | |
| | External 24 V --- supply | mA 50 | | 80 | | 50 | | |

(1) ± 4°C: Precision of cold junction compensation

| Characteristics of 1 and 2-channel analog output modules | | | | | |
|--|--|--|---|-------------------------------|-----------------|
| Module type | | | TM2 AMO 1HT | | TM2 AVO 2HT |
| Number of channels | | | 1 output | | 2 outputs |
| Range | | | Voltage | Current | Voltage |
| Resolution | | | 0...10 V | | ±10 V |
| LSB value | | | 4...20 mA | | ±11 bits + sign |
| Connection | | | 12 bits | | ±9.8 mV |
| Cabling | | | Removable screw terminal block | | |
| Load | | Type | Resistive | | |
| Stabilization time | | Impedance | Ω | 2000 min. | 300 max. |
| Recovery time | | | ms | 10 | 2 |
| Measuring precision | | Max. error at 25°C | % FS | ±0.2 | |
| | | Temperature coefficient | % FS/°C | ±0.015 | |
| | | Repeat accuracy after stabilization time | % FS | ±0.5 | |
| | | Nonlinearity | % FS | ±0.2 | |
| | | Output ripple | | 1 low significance bit max. | |
| | | Total error | % FS | ±1 | |
| Dielectric strength | | Between channels | | – | |
| | | Between channel(s) and external supply | V rms | 500 ~ | |
| | | Between channel(s) and internal logic | V rms | 500 ~ | |
| Isolation | | | Photocoupler between the outputs and the internal circuit | | |
| External supply | | Nominal voltage | V | 24 ~ | |
| | | Limit values | V | 19.2...30 ~ (ripple included) | |
| Module consumption | | Internal 5 V ~ supply | mA | 50 | |
| | | External 24 V ~ supply | mA | 40 | |
| | | | | 60 | |

References

These analog I/O extension modules are mounted on symmetrical  rails to the right of base controller below. The maximum number of I/O and/or analog modules which may be mounted depends on the type of base controller:

| Base controller type | Twido compact TWD | | | | Twido modular TWD | | | Modicon M238 | Magelis HMI Controller | | Modicon OTB Interface |
|----------------------|-------------------|------------|------------|------------|-------------------|------------|------------|--------------|------------------------|--------------|-----------------------|
| | LC●A 10DRF | LC●A 16DRF | LC●A 24DRF | LC●● 40DRF | LMDA 20D●K | LMDA 20DRT | LMDA 40D●K | TM238 L●●●●● | XBT GC 1100● | XBT GC 2●●0● | OTB 1●0 DM9LP |
| Number of modules | 0 | 0 | 4 | 7 | 4 | 7 | 7 | 7 | 2 | 3 | 7 |



TM2 AMI 2HT



TM2 AMI 2LT



TM2 ARI 8LRJ



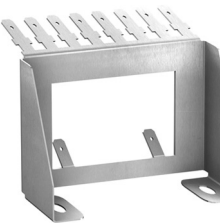
TM2 ARI 8LT



TM2 ALM LT



TM2 AMM 6HT



TM2 XMTGB



TM200 RSRCEMC

Analog input modules

| Channel type | Input range | Output range | Resolution | Connection by Reference | | Weight kg |
|-------------------|--------------------------------------|-----------------------|---|---|---|-------------|
| 2 inputs | 0...10 V 4...20 mA | – | 12 bits | Removable screw terminal block (supplied) | TM2 AMI 2HT | 0.085 |
| | Thermocouple K, J, T | – | 12 bits | Removable screw terminal block (supplied) | TM2 AMI 2LT | 0.085 |
| 4 inputs | 0...10 V 0...20 mA Temperature | – | 12 bits | Removable screw terminal block (supplied) | TM2 AMI 4LT | 0.085 |
| | 8 inputs | 0...10 V 0...20 mA | – | 10 bits | Removable screw terminal block (supplied) | TM2 AMI 8HT |
| Pt 100 Pt 1000 | | – | 12 bits | RJ11 connector | TM2 ARI 8LRJ | 0.190 |
| PTC/NTC | | – | 10 bits for NTC 2-threshold detection with PTC | Removable screw terminal block (supplied) | TM2 ARI 8HT | 0.085 |

Analog output modules

| | | | | | | |
|-----------|---|-----------------------|----------------|---|-------------|-------|
| 1 output | – | 0...10 V 4...20 mA | 12 bits | Removable screw terminal block (supplied) | TM2 AMO 1HT | 0.085 |
| 2 outputs | – | ± 10 V | 11 bits + sign | Removable screw terminal block (supplied) | TM2 AVO 2HT | 0.085 |

Analog I/O modules

| | | | | | | |
|------------------------|---|-----------------------|---------|---|-------------|-------|
| 2 inputs and 1 output | 0...10 V 4...20 mA | 0...10 V 4...20 mA | 12 bits | Removable screw terminal block (supplied) | TM2 AMM 3HT | 0.085 |
| | J, K, T thermocouple 3-wire Pt 100 temperature probe | 0...10 V 4...20 mA | 12 bits | Removable screw terminal block (supplied) | TM2 ALM 3LT | 0.085 |
| 4 inputs and 2 outputs | 0...10 V 4...20 mA | 0...10 V 4...20 mA | 12 bits | Removable screw terminal block (supplied) | TM2 AMM 6HT | 0.085 |

Separate components

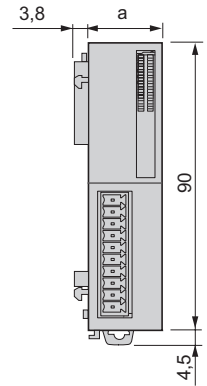
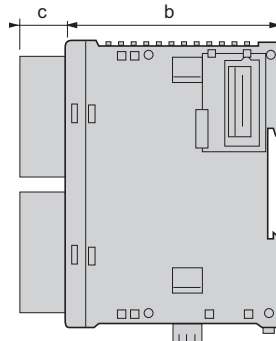
| Description | Description | Reference | Weight kg |
|-----------------------------|---|---------------|-----------|
| Ground connection plate | Plate equipped with male Faston connector for connecting cable shielding (via Faston clamp 6.35 mm, not supplied) and functional grounds (FG) | TM2 XMTGB | 0.045 |
| Shielding connection clamps | Attach and ground the shielding of the cables Sold in lots of 25 (20 for cable Ø 4.8 mm and 5 for cable Ø 7.9 mm) | TM200 RSRCEMC | – |
| Mounting kit | For plate or panel mounting of the analog modules. Sold in lots of 5 | TWD XMT 5 | 0.065 |

Dimensions

Analog I/O modules

| TM2 | a | b | c |
|----------|------|----|----------|
| AMI ●●T | 23.5 | 70 | 14.6 |
| ARI 8HT | 23.5 | 70 | 14.6 |
| ARI 8LT | 39.1 | 70 | 14.6 |
| ARI 8LRJ | 39.1 | 70 | 14.6 (1) |
| AMO ●HT | 23.5 | 70 | 14.6 |
| A●M ●●T | 23.5 | 70 | 14.6 |

(1) Included removable screw terminal block for connecting 24 V $\overline{\text{---}}$ power supply



Connections for ensuring conformity to EMC standards

Principle

In order to protect against external interference, cables and cordsets carrying the signals below must be shielded:

- Extension modules:
 - Sensors and actuators connected to **TM2 AMI/ARI** and **TM2 A●O/A●M** analog I/O
 - Sensors connected to **TM200 HSC206D●** high-speed counter inputs
- Modicon M238 controller base:
 - Incremental encoders and sensors connected to the high-speed inputs and used in counter mode (> 100 Hz)
 - Actuators with PTO/PWM signals connected to the high-speed outputs
 - Serial links and CANopen buses

The use of shielded cables requires compliance with the following wiring rules:

- Shielding earthed at both ends of the cables. Metal conduit or ducting can be used for part of the shielding length, provided there is no break in the continuity of the ground connections.
- Wherever possible, keep cables carrying signals of different categories separate.

Installation diagram for Modicon M238 controller

- 1 Metal plate connected to the device's protective earth (PE)
- 2 Modicon M238 logic controller
- 3 Analog or high-speed counter extension modules
- 4 Shielded cables for connecting the high-speed inputs **4a** and high-speed outputs **4b** to the actuators with PTO/PWM signals
- 5 Shielded cordset for connecting serial links SL1 and SL2. **TCS MCN 3M4●●●2** cordsets include the earthing lug.
- 6 Shielded cable for connecting the CANopen bus. The shielding is connected to terminal 3 on the terminal block (see page 10).
- 7 Unshielded power supply wires or cable; see connection of the \oplus terminal on page 40.
- 8 Shielded cable for connecting the extension module sensors/actuators (analog or high-speed counter)
- 9 Earth connection plate **TM2 XMTGB** for attaching and earthing the shielding of the cables numbered **8** in the diagram (see detail **A**)

Connecting the shielding of cables 4a and 4b

Shielding of cables **4a** and **4b** (connection of sensors/actuators to the base) via shielding connection clamp **15** (1):

- Attach and ground the shielding of the cables **4** as close as possible to the controller base.
- Strip the shielding (at the clamp **15**).
- Attach the cable to the metal support **1** by tightening the clamp onto the stripped part of the shielding.

The shielding must be clamped tightly enough to the metal support to ensure good contact.

Connecting the shielding of cables 8

The shielding for cables **8** (connection of the extension modules' sensors/actuators) must be attached to the ground connection plate **TM2 XMTGB** (see detail **A** opposite)

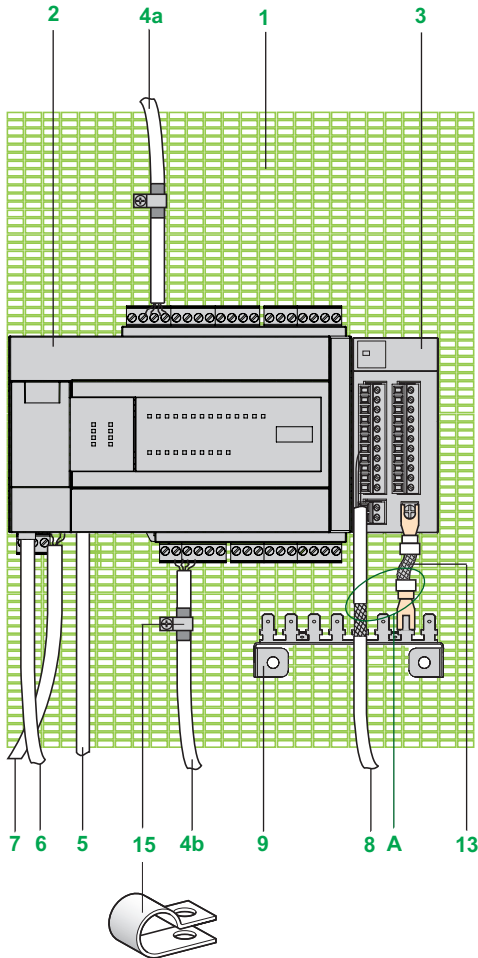
Connecting the functional ground terminals

The functional ground terminals (FG) of the:

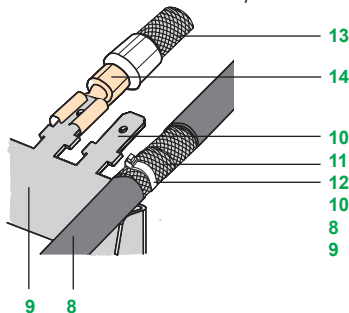
- 24 V $\overline{\text{---}}$ power supply of the Modicon M238 controller base
- Analog I/O or high-speed counter extension modules (see detail **A**)

Installing the ground connection plate TM2 XMTGB

- **8, 9, 10, 11** and **12**: The shielding on cable **8** is stripped at the male Faston connector **10** for a length of 15 mm **11**, then tightly clamped on it using the Rilsan clamp **12** (width 2.5...3 mm).
- **13** and **14**: Functional ground terminal (FG). Each earth terminal on the extension modules (analog and counter) must be connected to the **TM2 XMTGB** plate **9** via an earth braid **13** (2) (width **W** 2...5 mm, thickness **W/5**) and using a 6.35 mm Faston connector **14**.



Detail A: Ground connection plate TM2 XMTGB



Note: These shielding connections do not remove the need to connect the PE protective conductors (green-yellow) to the appropriate terminals on each unit or product.

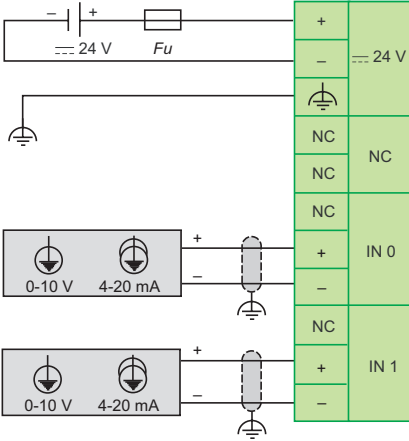
(1) The shielding of cables **4a** and **4b** can be attached to plate **TM2 XMTGB**, in the same way as cable **8**.

(2) Earth braid supplied with **TM2 ARI 8LT/LRJ** analog modules and **TM200 HSC206D●** counter module.

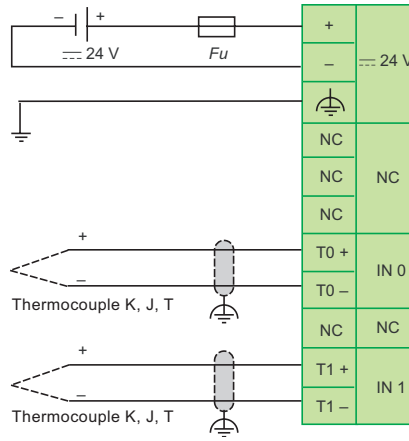
Connections

Analog input modules

TM2 AMI 2HT



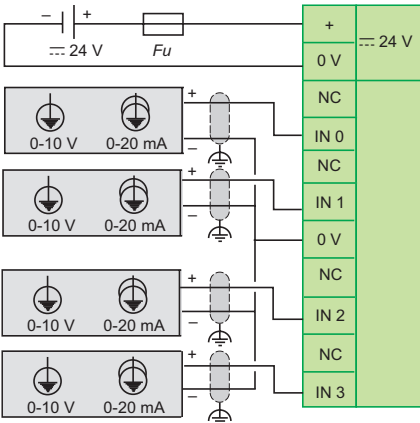
TM2 AMI 2LT



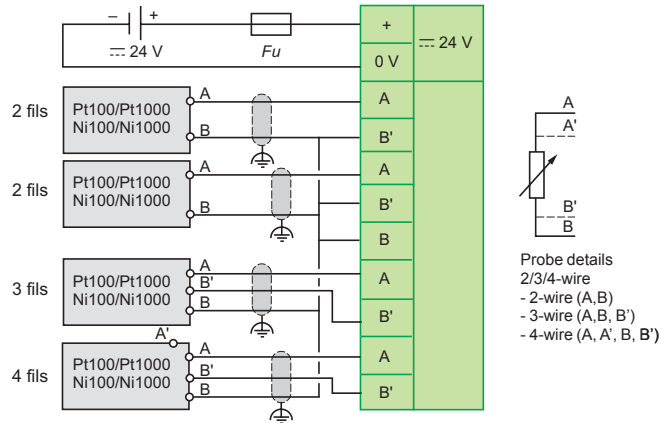
⚠ Do not connect any wires to an unused channel.

TM2 AMI 4LT

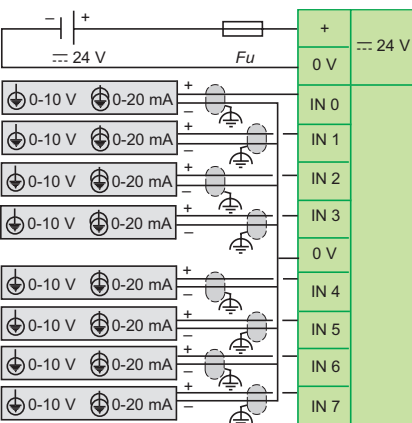
Voltage/current configuration



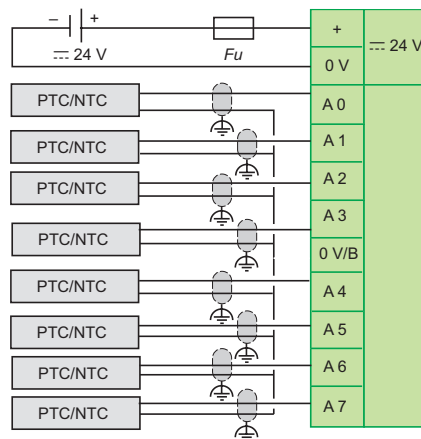
PT100/PT1000 temperature probe, Ni100/Ni1000 configuration



TM2 AMI 8HT



TM2 ARI 8HT



⚠ With PTC probe, threshold detection input (high and low)

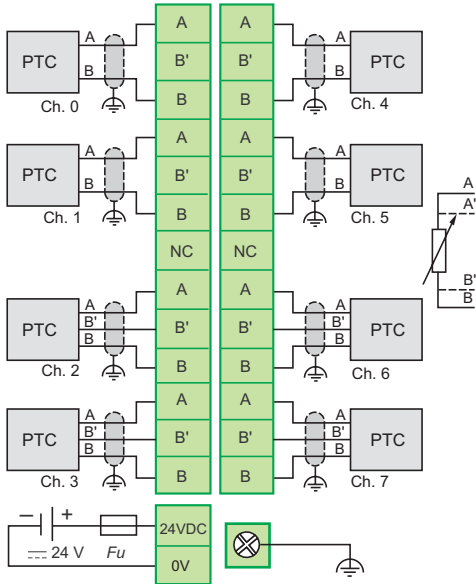
⚠ Do not connect any wires to an unused channel.

Fu: 2 A delayed fuse

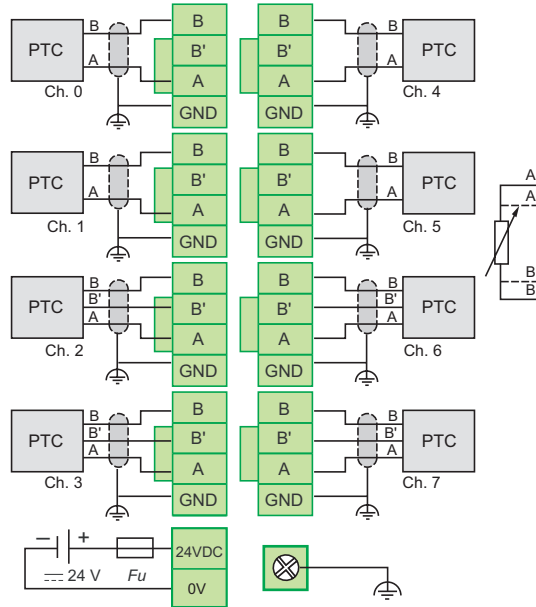
Connections (continued)

Analog input modules (continued)

TM2 ARI 8LT



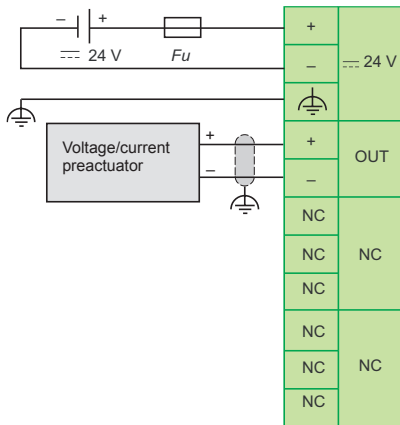
TM2 ARI 8LRJ



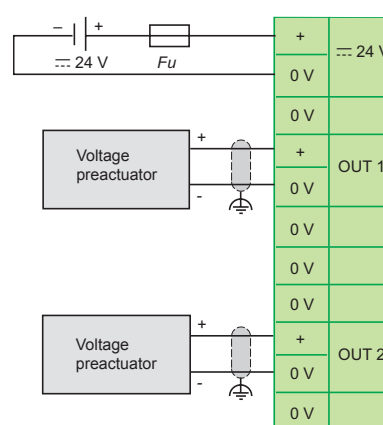
Each channel of the TM2 ARI 8LT/8LRJ module can be used as either 2-wire or 3-wire.

Analog output modules

TM2 AMO 1HT



TM2 AVO 2HT



⚠ Do not connect any wires to an unused channel.

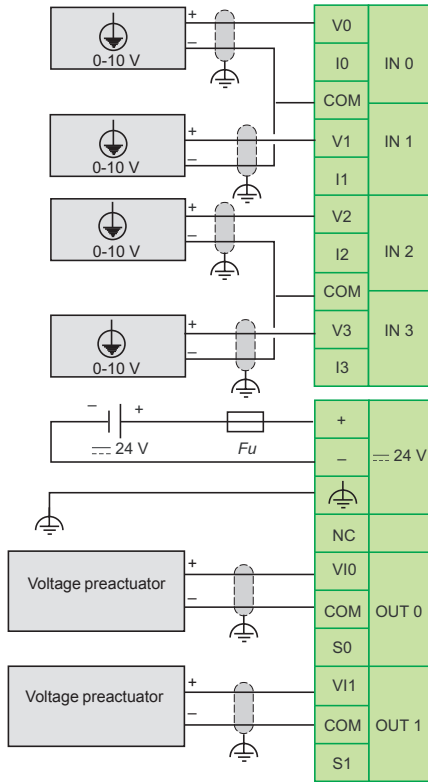
Fu: 2 A delayed fuse

Connections (continued)

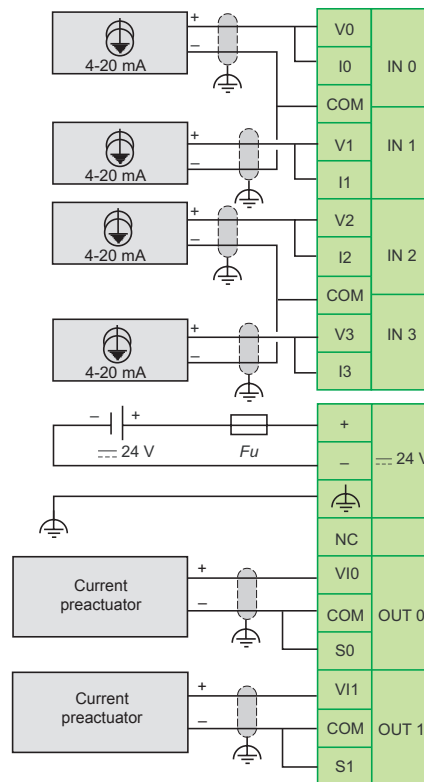
Mixed input/output modules

TM2 AMM 6HT

Voltage configuration

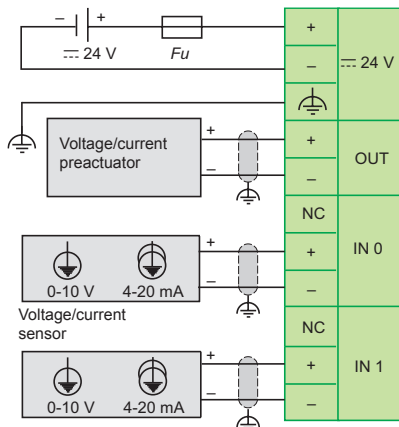


Current configuration

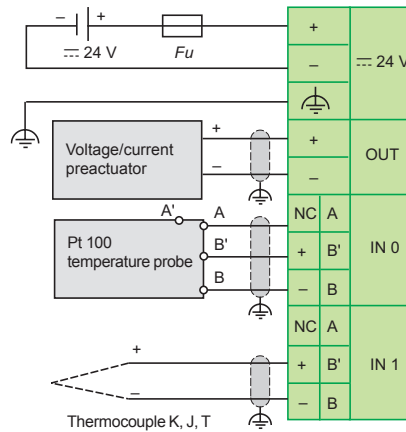


⚠ Do not connect any wires to an unused channel.

TM2 AMM 3HT



TM2 ALM 3LT



- For a Pt 100 3-wire temperature probe (RTD), connect the three wires to terminals A, B' and B (channels IN0 and IN1).
- For a Pt 100 2-wire temperature probe (RTD), connect the two wires to terminals A and B' and make a bridge between B' and B (channels IN0 and IN1).
- For a thermocouple, connect the two wires to terminals B' and B (channels IN0 and/or IN1).

⚠ Do not connect any wires to an unused channel.

Fu: 2 A delayed fuse

Presentation

TM200 HSC 206DT/DF counter modules for the Modicon M238 logic controller are used to count the pulses generated by a sensor or to process the signals from an incremental encoder.

The two modules, both with two 60 KHz counter channels, differ in the way they are connected:

- Removable screw terminal block (2 x 16 contacts): **TM200 HSC 206DT**
- Removable spring terminals **TM200 HSC 206DF**


| Counter modules | No. of channels | Maximum frequency | Integrated functions | Physical I/O per channel | |
|---|-----------------|-------------------|---|--------------------------|---------|
| | | | | Inputs | Outputs |
| TM200 HSC 206DT TM200 HSC 206DF (3 modules max. per TM238 base) | 2 | 60 KHz | Upcounting Downcounting Period meter Frequency meter Frequency generator Axis following with encoder | 6 | 2 |

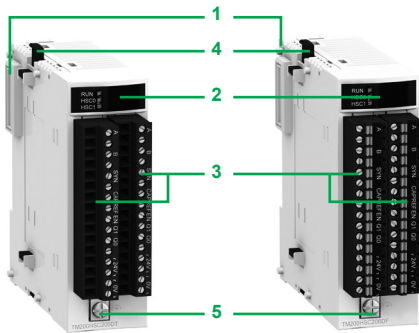
The sensors used on each channel can be:

- 2-wire 24 V proximity sensors,
- 3-wire PNP 24 V proximity sensors,
- Limit switches (N/O or N/C contact),
- 15/30 V output signal incremental encoders and source outputs (positive logic).

TM200 HSC 206D● counter modules meet the requirements of such applications as:

- Alarm generation on empty unwinder status using the ratio,
- Sorting small parts using the period meter,
- Single electronic cam using the dynamic setting thresholds,
- Speed control using the period meter,
- Grouping/ungrouping for packaging machines,
- Event counting,
- Flow or speed measurement.

TM200 HSC 206D● counter modules are considered to be extension modules and as such are connected to the Modicon 238 base by stacking them on a  rail starting at the right-hand side panel of the base (7 extension modules are permitted in total, a maximum of 3 of which can be **TM200 HSC 206D●** counter modules). The function parameters are set by configuration using SoMachine software.



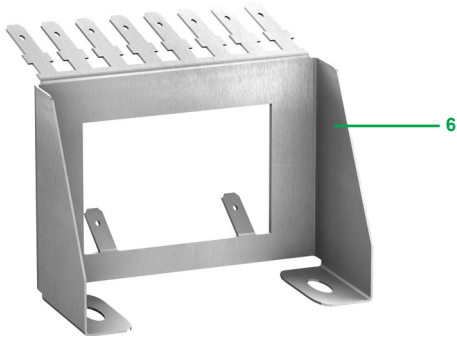
Description

TM200 HSC 206D● 60 KHz counter modules comprise:

- 1 An extension connector for linking with the adjacent module (1).
- 2 A channel and module diagnostics display block.
- 3 2 removable screw or spring terminal blocks marked TB0 and TB1 for connecting the sensors and preactuators.
- 4 A mechanical device for locking to the adjacent module.
- 5 A screw terminal for the functional ground (FG) connection.

The **TM2 XMTGB** ground connection plate **6** simplifies connection of the sensor and encoder cable shielding. This shielding must be connected to the device's functional ground.

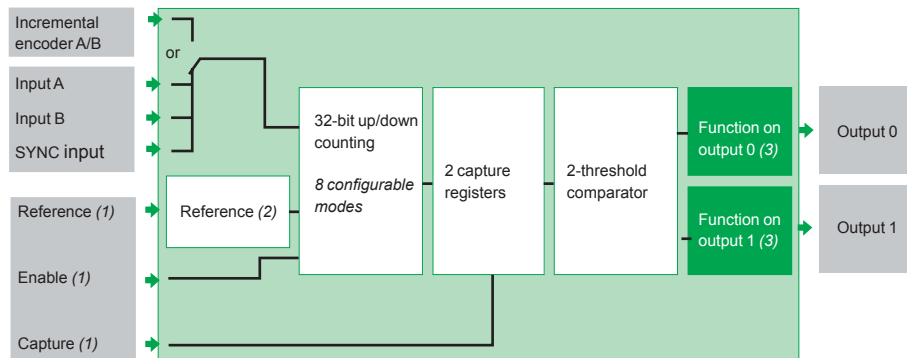
These modules are mounted as standard on a symmetrical \perp rail. The **TWD XMT 5** mounting kit (supplied in lots of 5) can be used for plate or panel mounting.



(1) A connector on the right-hand side panel ensures continuity of the link with the adjacent I/O module.

Operation

Block diagram of a TM200 HSC 206DT/DF module counter channel



(1) Optional inputs.

(2) Reference: 4 operating modes for "IN_SYNC" SYNC and "IN_REF" Reference inputs.

(3) Function on outputs: 11 possible types of behaviour.

Functional characteristics of TM200 HSC 206DT/DF modules

| | | |
|-----------------------------|-------------------------|--|
| 8 configurable modes | Frequency meter | <p>This mode measures a frequency, speed, data rate or an event stream. As standard, this mode measures the frequency received on the IN_A input. This frequency is always expressed in Hz (number of pulses/second), with a precision of 1 Hz.</p> <p>The maximum frequency on the IN_A input is 60 kHz. The maximum cyclic ratio at 60 kHz is 60%.</p> |
| | Event counting | <p>This mode is used to determine the number of events received. In this mode, the counter calculates the number of pulses applied to the IN_A input at time intervals defined by the user.</p> <p>The module counts the pulses applied to the IN_A input each time the pulse for this input lasts longer than 5 μs (without anti-bounce filter).</p> |
| | Period measurement | <p>This mode is used to:</p> <ul style="list-style-type: none"> ■ Determine the duration of an event ■ Determine the time between 2 events ■ Time and measure the execution time of a process <p>It measures the time elapsed during an event or between 2 events (IN_A input) according to a selectable time base of 1 μs, 100 μs or 1 ms. The IN_SYNC input can be used to enable or stop a measurement. The module can carry out a maximum of 1 measurement every 5 ms. The shortest measurable pulse is 100 μs, even if the unit defined by the user is 1 μs. The maximum measurable duration is 4,294,967,295 units (unit to be defined).</p> |
| | Ratio counting | <p>Ratio counting mode only uses the IN_A and IN_B inputs. There are 2 possible modes:</p> <ul style="list-style-type: none"> ■ Ratio 1: Used to divide 2 frequencies. This is intended for applications such as flowmeters, mixers, etc. ■ Ratio 2: Used to subtract 2 frequencies. This is intended for the same applications, but for those requiring more precise regulation (more similar frequencies). <p>Ratio 1 mode gives the results in thousandths for better accuracy (a display of 2000 corresponds to a value of 2) and ratio 2 mode gives the results in Hz.</p> <p>The maximum frequency that the module can measure on the IN_A and IN_B inputs is 60 kHz.</p> |
| | Downcounting | <p>This mode is used to list a group of operations. In this mode, activating the synchronization function starts the counter which, starting from a user-defined preset value, decreases with each pulse applied to the IN_A input, until it reaches 0. This downcounting is made possible when the enable function has been activated. The counting register is thus updated at 1 ms intervals.</p> <p>One basic use of this mode is to signal, using an output, the end of a group of operations (when the counter reaches 0).</p> <p>The shortest pulse applied to the IN_SYNC input is 100 μs. The maximum frequency applied to the IN_SYNC input is 1 pulse every 5 ms. The maximum user-defined preset value is 4,294,967,295. The maximum count value is 4,294,967,295 units.</p> |
| | Loop (modulo) counting | <p>This mode is used in packaging and labelling applications where actions are repeated on sets of moving objects.</p> <ul style="list-style-type: none"> ■ In upcounting, the counter increases until it reaches the user-defined “modulo - 1” value. On the next pulse, the counter is reset to 0 and counting restarts. ■ In downcounting, the counter decreases until it reaches 0. On the next pulse, the counter is reset to the user-defined “modulo - 1” value. Downcounting can then restart. <p>The maximum frequency applied to the IN_A and IN_B inputs is 60 kHz. The maximum frequency of the modulo event is 1 event every 5 ms. The maximum modulo value is 4,294,967,296 (possible by declaring 0 in the modulo setting value).</p> |
| | 32-bit counter counting | <p>This mode is mainly used in axis following.</p> <p>The maximum frequency applied simultaneously to the IN_A and IN_B inputs is 60 kHz. The maximum frequency of the referencing event is 1 event every 5 ms. The counter value is between - 2,147,483,648 and + 2,147,483,647.</p> |

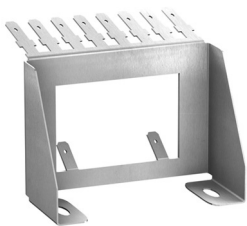
| Environnement | | | | | |
|---|-------------------------------------|--------------------------|--|---|--|
| Module | | | TM200 HSC 206DT | TM200 HSC 206DF | |
| Certifications | | | CE, UL, CSA, ACA (C-Tick), GOST (pending) | | |
| Temperature | Operation | °C | - 10...+ 55 | | |
| | Storage | °C | - 40...+ 70 | | |
| Relative humidity | | | 95% max, without condensation | | |
| Degree of | Protection | | IP 20 | | |
| | Pollution | | ≤ 2 | | |
| Altitude | Operation | m | 0...2000 | | |
| | Storage | m | 0...3000 | | |
| Immunity to mechanical constraints | Sinusoidal vibrations | | 5...150 Hz with 3,5 mm amplitude under 1 g Endurance : 10 cycles of 1 octave/min | | |
| | Shocks | | 15 g / 11 ms; 3 shocks/direction/axis | | |
| General characteristics | | | | | |
| Module | | | TM200 HSC 206DT | TM200 HSC 206DF | |
| Modularity | | | 2 channels | | |
| No. of counter modules per TM238 base | | | 3 | | |
| No. of sensor inputs | | | 6 per channel | | |
| No. of actuator outputs | | | 2 per channel | | |
| Applications | | | Upcounting, downcounting, period measurement, frequency meter, frequency generator, axis following | | |
| Configurable modes | | | 8 modes | | |
| Counter capacity | | | 31 bits + sign | | |
| Frequency on counter inputs | | kHz | 60 (cyclic ratio 60/40) | | |
| Module cycle time | | ms | 1 | | |
| Encoder | | | 15...30 V incremental encoder and source outputs (positive logic) | | |
| Connection | | | 1 screw terminal block (16 terminals) per channel | 1 spring terminal block (16 contacts) per channel | |
| Wiring | | | Shielded cable for the signals carrying the counter information > 1 kHz | | |
| Insulation voltage | Between channels and internal logic | V rms | 1500 for 1 min | | |
| Maximum consumption | 5 V ∴ internal power supply | mA | 100 | | |
| | 24 V ∴ internal power supply | mA | 100 | | |
| | 24 V ∴ external power supply | A | 2 | | |
| Input characteristics | | | | | |
| Input type | High-speed inputs per channel | | IN_A, IN_B and IN_SYNC | | |
| | Auxiliary inputs | | IN_EN, IN_REF and IN_CAP | | |
| Inputs | No. per channel | V | 6 | | |
| | Voltage | V | 24 ∴ | | |
| | IEC/EN 61131-2 conformity | | Type 1 | | |
| | Input logic | | Positive (sink) | | |
| | At state 1 | Voltage | V | 15...30 ∴ | |
| | | Current | mA | 5 up to 30 V ∴ | |
| | At state 0 | Voltage | V | < 5 ∴ | |
| | | Current | mA | < 0.5 | |
| Current | At 11 V ∴ | mA | > 2 | | |
| Output characteristics | | | | | |
| Outputs | No. per channel | | 2, 24 V ∴, 0.5 A | | |
| Voltages | Nominal | V | 24 ∴ | | |
| | Limits | V | 19.2...30 ∴ | | |
| Maximum load current | Per output | A | 0.5 | | |
| | Per module | A | 2 | | |
| Response time | On energization/de-energization | µs | < 200 | | |
| Leakage current | At state 0 | mA | ≤ 0.1 | | |
| Voltage drop | At state 1 | V | ≤ 3 | | |
| current short-circuit | Per channel | A | < 1.5 | | |
| Internal protection against overloads and short-circuits | | | Protection per output: 0.5 A...1.5 A max. trip current with automatic reset after disappearance of fault | | |
| Output logic | | | Positive (source) | | |
| Fallback state on fault | Default | | Faulty channel set to 0 | | |
| | By user configuration | | Each channel individually held at its last value or set to the predefined value (0 or 1) | | |
| Maximum load | Capacitance | µF | 50 | | |
| | Inductance | H | L = 0.5/I ² × F where: | | |
| | | H | - L: load inductance | | |
| | | A | - I: load current | | |
| | Hz | - F: switching frequency | | | |



TM2 00HSC 206DT



TM2 00HSC 206DF



TM2 XMTGB

References

Counter modules (3 modules max. per TM238 base)

| Description | No. of channels | Characteristics | Connection | Reference | Weight kg |
|--|-----------------|-----------------|------------------|------------------------|-----------|
| Counter modules for: - 24 V $\overline{\text{DC}}$ 2 and 3-wire sensors - 15/30 V $\overline{\text{DC}}$ incremental encoders with source outputs (positive logic) | 2 | 60 kHz counting | Screw terminals | TM200 HSC 206DT | 0,150 |
| | | | Spring terminals | TM200 HSC 206DF | 0,150 |

Separate parts

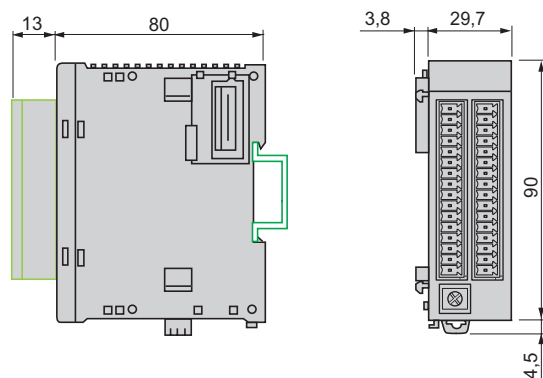
| Designation | Description | Reference | Weight kg |
|--|---|------------------|-----------|
| Ground connection plate | Support equipped with 10 male Faston connectors for connecting the cable shielding (via 6.35 mm connectors, not supplied) and the functional grounds (FG) | TM2 XMTGB | 0.045 |
| Mounting kit Sold in lots of 5 | For plate or panel mounting of the analog | TWD XMT 5 | 0.065 |

Note: The shielding of the cordsets carrying the counter signals must be connected to the metal plate or panel (earthed casing) which is connected to the device's protective ground (PE). See 13 and detail A on page 40.

⚠ Connecting the shielding does not remove the need to connect the functional ground screw terminal FG (item 5 on page 45) on the module to ground via the TM2 XMTGB ground connection plate.

Dimensions

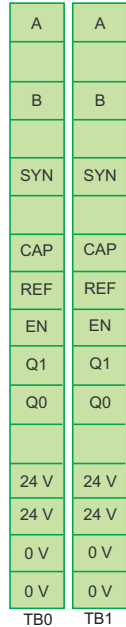
TM200 HSC206D● counter modules



Connections

Pinout of the screw or spring terminals on the TM200 HSC 206D● module

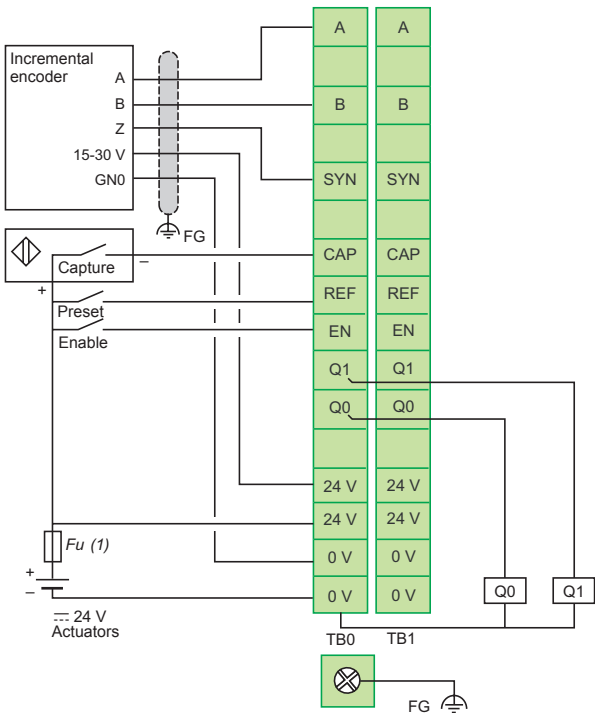
Channel 0 Channel 1



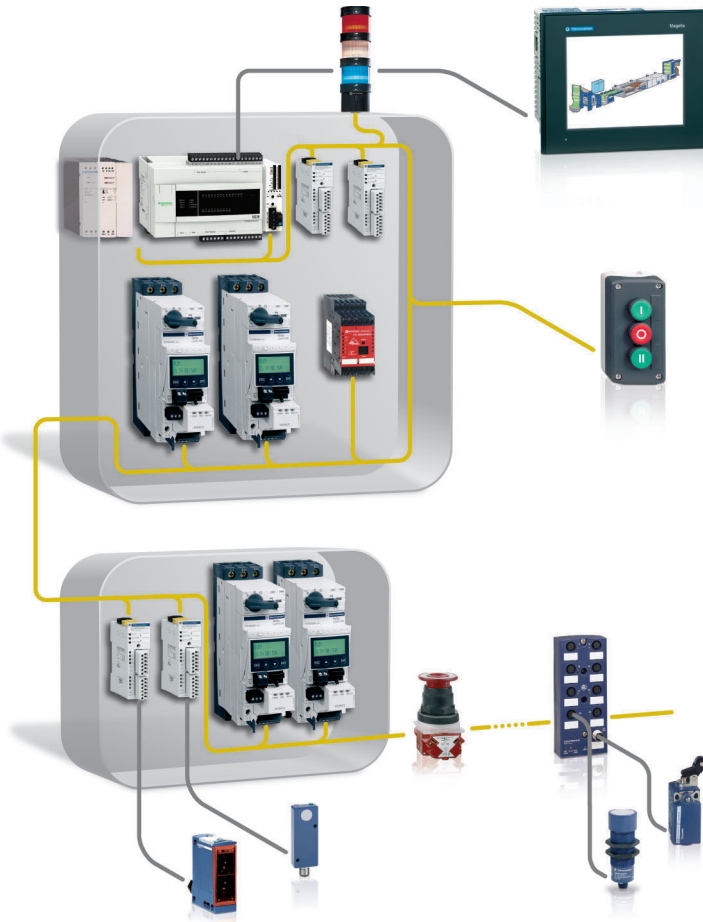
| Marking terminal | Symbol | Description/channel |
|------------------|---------|----------------------------------|
| A | IN_A | Sensor input A |
| B | IN_B | Sensor input B |
| SYN | IN_SYNC | Synchronization input |
| CAP | IN_CAP | Capture input |
| REF | IN_REF | Referencing input |
| EN | IN_EN | Enable input |
| Q1 | Q1 | Counter channel Q1 output |
| Q0 | Q0 | Counter channel Q0 output |
| 24 V | 24V | + 24 V --- external power supply |
| 0 V | 0V | 0 V --- external power supply |



Example of connecting incremental encoder, 2-wire sensors and actuators on channel 0 (TB0)



(1) Fu: 3.15 A fast-blow fuse to protect the module electronics in the event of reversed polarity of the output power supplies. For connection of the functional ground (FG), see page 40, detail A.



Presentation

AS-Interface master module **TWD NOI 10M3** allows the M238 compact logic controller (version ≥ 2.0) to perform the function of AS-Interface master.

The AS-Interface consists of a master station (M238 compact logic controller) and slave stations. The master, which supports the AS-Interface profile, polls each of the devices connected to the AS-Interface, in turn, and stores information gathered (sensor/actuator status, operating status of the devices) in the controller memory. Communication on the AS-Interface is managed in a way that is totally transparent to the M238 logic controller application program.

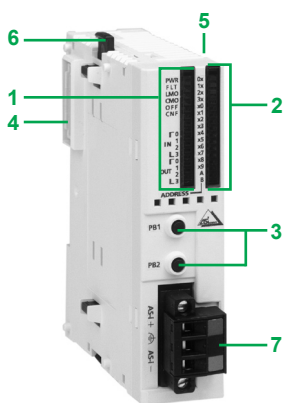
The **TWD NOI 10M3** master module manages the following with the AS-Interface M3 profile:

- discrete slave modules (maximum of 62 slaves arranged in 2 banks, A and B, of 31 addresses each),
- analogue slaves (maximum of 7 slaves in bank A).

The AS-Interface M3 profile supports analogue profile 7.3 (7 slaves), but does not support analogue profile S-7.4.

The maximum number of **TWD NOI 10M3** modules per M238 compact logic controller is 2.

An AS-Interface power supply is essential to supply the various modules on AS-Interface. It should preferably be located close to the stations with high power consumption.



Description

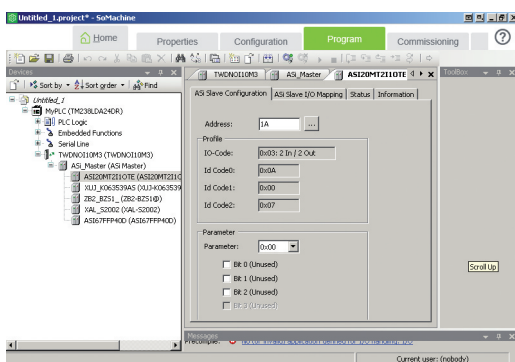
Module **TWD NOI 10M3** takes the form of a standard-size module. It is connected to an M238 compact logic controller in the same way as any I/O module.

It has the following on the front panel:

- 1 A display block comprising:
 - 6 pilot lights indicating the module operating modes:
 - green PWR pilot light: module powered up,
 - red FLT pilot light: error in the configuration loaded,
 - green LMO pilot light: module in local mode,
 - green CMO pilot light: module in connected mode,
 - red CNF pilot light: not used,
 - red OFF pilot light: module in protected, unconnected mode.
 - 6 green pilot lights, 3 for inputs, 3 for outputs.
- 2 A block for displaying the status of the addresses.
- 3 Two pushbuttons PB1 and PB2 for controlling the status of the slaves by selecting their address and changing the mode.
- 4 An extension connector for electrical connection to the previous module.
- 5 A connector (on the RH side) for I/O extension modules **TM2 D●I** ou **TM2 D●O**.
- 6 A latching mechanism for attachment to the previous module.
- 7 An AS-Interface yellow cable removable screw terminal block.

Extension module **TWD NOI 10M3** can be mounted as standard on symmetrical rail. Fixing kit **TWD XMT5** (sold in lots of 5) allows plate or panel mounting.

Diagnostics



The 30 pilot lights on the front panel of the module are used in conjunction with the two pushbuttons for diagnostics by the Twido controller. The display block on the front panel of master module **TWD NOI 10M3** allows simplified local diagnostics to be performed by displaying the slaves present on the AS-Interface.

Software set-up

AS-Interface is configured using SoMachine (1) software.

The services offered are based on the principle of simplicity:

- Management of profile tables, parameters and data by the master, in a way that is transparent to the user.
 - Topological addressing of I/O: each AS-Interface slave defined has a topological address assigned to it, in a way that is transparent to the user.
- Each AS-Interface sensor/actuator is seen by the M238 compact logic controller in the same way as any "In-rack" I/O.

Characteristics

| Module type | | TWD NOI 10M3 | |
|--------------------------------------|--|---|---|
| AS-Interface profile | | AS-Interface M3, V 2.11 (profile S-7.4 not supported) | |
| Type of addressing | | Standard and extended | |
| Product certifications | | AS-Interface n° 47801 | |
| Degree of protection | | IP 20 | |
| Temperature | Operation | °C | 0...+ 55 |
| | Storage | °C | - 25...+ 70 |
| As-Interface external power supply | | V | 29.5...31.6 |
| Internal current | At --- 5 V | mA | 80 |
| | At --- 24 V | mA | 0 |
| AS-Interface consumption at --- 24 V | | mW | 540 |
| Data exchange characteristics | | | |
| AS-Interface cycle time | With 1 to 19 slaves | ms | 3 |
| | With 20 to 62 slaves | ms | 0.156 x (1 + N) where N = number of active slaves |
| | With 31 standard slaves or slaves in banks A and B | ms | 5 |
| | With 62 slaves in banks A and B | ms | 10 |
| Max. number of modules | Analogue modules (1) | | 7 |
| | Discrete modules (1) | | 62 |
| Max. number of I/O | Standard slaves | | 248 = 124 inputs + 124 outputs |
| | Slaves in banks A and B | | 434 = 248 inputs + 186 outputs |
| Max. length of AS-Interface cable | Without repeater or line extension | m | 100 |
| | With line extension TCS ARR01M | m | 200 (Consult our catalogue "Machines & installations with industrial communications") |
| | With 2 repeaters ASI RPT01 | m | 300 (Consult our catalogue "Machines & installations with industrial communications") |

References



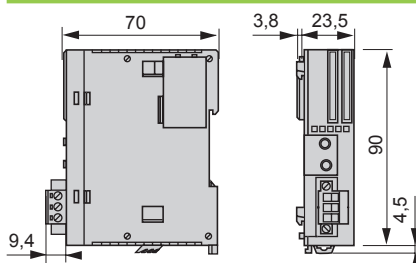
TWD NOI 10M3

| Description | No. modules per base controller | AS-Interface profile | Number of I/O (1) | Reference | Weight kg |
|---|---------------------------------|----------------------|---|---------------------|-----------|
| AS-Interface master module for Modicon M238 compact logic controllers: - TM238 LDD24DT - TM238 LFDC24DT - TM238 LDA24DR - TM238 LFAC24DR | 2 | M3, V 2.11 | 62 discrete modules max. 7 analogue modules max. | TWD NOI 10M3 | 0.085 |

| Description | Application | Reference | Weight kg |
|--|---|-----------------|-----------|
| Fixing kit Sold in lots of 5 | For plate or panel mounting of the module | TWD XMT5 | — |

(1) When analogue and discrete modules are connected simultaneously to a system, the analogue modules use addresses 1 to 31 in bank A. When an analogue module uses a certain address, the module addresses having the same number in bank B cannot be occupied by slaves in banks A/B.

Dimensions



Modicon M238 logic controller

Modicon OTB distributed I/O

Optimum IP 20 I/O system

Interface modules

Presentation



Example of Modicon OTB islands on CANopen bus

There is an increasing tendency for machine manufacturers to design their automation systems using modular architectures. The use of distributed inputs/outputs (I/Os) is becoming more and more common. The Modicon OTB offer is an ideal solution for “optimised” type distributed input/output requirements. This offer, complementing the Modicon interface family, has been designed to provide the right technical-economical balance: it meets the needs of machine manufacturers and users seeking the best compromise between size, ease of cabling, setting-up and costs. Open and modular, the Modicon OTB solution enables the creation of industrial I/O islands managed by a master controller (PLC, PC or variable speed drive) via a fieldbus or communication network.

With its expandable block type architecture, the Modicon OTB solution adapts to all configurations of automation system islands. The Modicon OTB offer is particularly economical for small and medium size islands. In addition, the optimised sizes of this offer are ideally suited to the size of enclosures for distributed I/Os, that are located as near to the machine as possible. This solution reduces cabling time and costs and at the same time takes into account the modular architecture of the machine.

Furthermore, the Modicon OTB offer proposes fewer references relating to spare parts and accessories that are required for creating an island.

The Modicon OTB offer has also been designed to be as simple as possible. This offer includes 2 communication bases (interface modules) for the various types of fieldbus:

- CANopen bus,
- Modbus RS 485 Serial Line.

Inputs and outputs are directly integrated in the interface modules. Each base incorporates 20 I/O:

- 12 \pm 24 V inputs,
- 6 relay outputs,
- 2 \pm 24 V solid-state outputs.

All the bases use a \pm 24 V supply. Of monobloc design, each Modicon OTB interface module can be fitted with extension modules of Modicon M238 logic controller.

With its range of I/O extensions, the Modicon OTB offer provides a modularity that allows all requirements to be met, commencing with a base that can be fitted with up to 7 discrete I/O modules **TM2 D●●** or analogue I/O modules **TM2 A●●**. The extension modules, like the interface modules, simply clip-on to 35 mm symmetrical rail and enable configurations of up to 244 discrete I/O and up to 42 analogue I/O channels, or a mixture of both types (within the limit of 7 extension modules), to be obtained.

Sensors and actuators are connected to the interface modules and I/O extension modules using removable screw terminal blocks. All Modicon OTB modules provide an IP 20 degree of protection.

To simplify sensor and actuator connections, as well as linking commons, the Modicon OTB offer also includes a commoning module **OTB 9ZZ 61JP**. This module, as with all the other modules of the Modicon OTB range, allows the through connection of the internal bus or network (passively in this case) and enables connection of the commons in two isolated groups for each commoning module



OTB 1C0 DM9LP
Interface module for CANopen bus

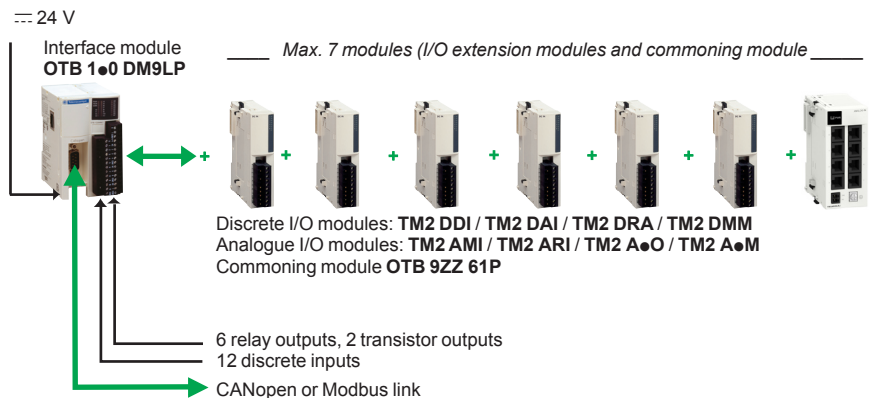


TM2 D●●/TM2 A●●
Discrete and analogue I/O extension modules



OTB 9ZZ 61JP
Commoning module

Configuration of interface modules



Description

The Modicon **OTB 100 DM9LP** (1) interface modules comprise:

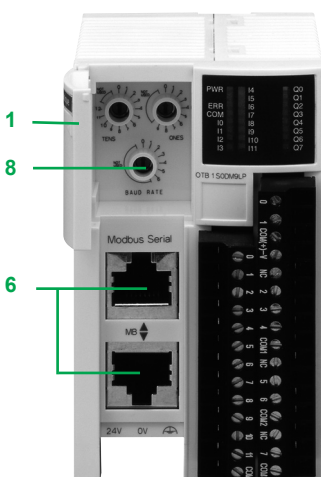
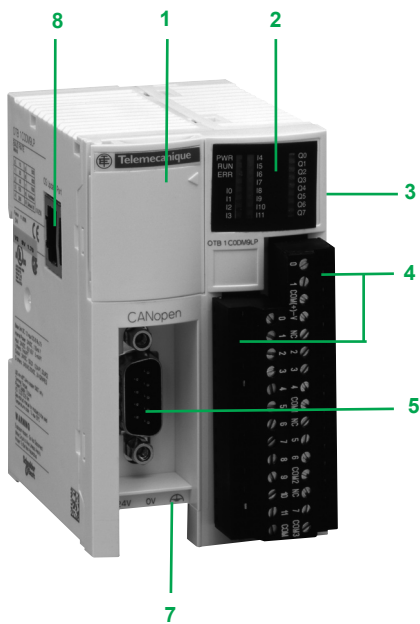
- 1 An access door.
- 2 Indicator lights:
 - module and communication status (PWR, RUN, ERR, COM, STAT)
 - I/O states (IN● and OUT●)
- 3 A connector for expansion modules (right-hand side).
- 4 Two removable screw terminal connectors for connection of inputs/outputs.
- 5 or 6 Depends on model:
 - 5 A SUB-D 15-way connector for connection CANopen bus with **OTB 100 DM9LP** model.
 - 6 Two RJ45 connectors for connection Modbus serial link with **OTB 150 DM9LP** model.
- 7 Terminal for connection of \approx 24 V supply.
- 8 One RJ45 connector for operating system update of interface.

Via access door 1

- 9 Two or three coding wheels (depending on model) for OTB island address and communication data rate adjustment.

Mounting: the interface modules is mounted on 35 mm symmetrical \perp rail. Fixing kit **TWD XMT5** (supplied in lots of 5) allows plate or panel mounting.

(1) Only the communication part 5, 6 and 9 is dedicated to each model and can differ, the general description remains the same.



| Environmental characteristics | | | | |
|---|---|---------------------------|--|--------------------|
| Interface module type | | | OTB 1C0 DM9LP | OTB 1S0 DM9LP |
| Products certifications | | | UL, CSA, CE | |
| Temperature | Operation | °C | 0...+ 55 | |
| | Storage | °C | - 25...+ 70 | |
| Relative humidity | | | 30...95%, without condensation | |
| Degree of protection | | | IP 20 | |
| Degree of pollution | | According to IEC/EN 60664 | Type 2 | |
| Altitude | Operation | m | 0...2000 | |
| | Storage | m | 0...3000 | |
| Vibration resistance | Mounted on 15 mm \perp rail | Hz | 10...57, amplitude 0,075 mm, acceleration 57...150 z | |
| | | m/s ² | 9.8 (1 gn) | |
| | Plate or panel mounted (using TWD XMT5 fixing kit) | Hz | 2...25, amplitude 1,6 mm, accélération 25...100 Hz | |
| | | m/s ² | 39.2 (4 gn) | |
| Shock resistance | According to IEC/EN 61131 | m/s ² | 147 (15 gn) | |
| Immunity According to IEC/EN 61000-6-2 | Electrostatic discharge | | CEI/EN 61000-4-2 (4 kV en contact, 8 kV dans l'air) | |
| | Radiated electromagnetic fields | | According to IEC/EN 61000-4-3 (10V/m : 80 MHz...2 GHz) | |
| | Rapid transients | | According to IEC 61000-4-4 (1 kV for \pm 24 V discrete I/O and communication, 2 kV for \pm 24 V supply) | |
| Mounting | | | On \perp 35 mm symmetrical rail | |
| Interface modules characteristics (except communication, see page 55) | | | | |
| Interface module type | | | OTB 1C0 DM9LP | OTB 1S0 DM9LP |
| Type of bus | | | CANopen | Modbus serial link |
| Power supply | Nominal voltage | \pm V | 24, non isolated | |
| | Limits values | \pm V | 20.4...26.2 including ripple | |
| | Max. input current | mA | 700 at 26,2 V | |
| | Immunity to micro-cuts | ms | Max.10 | |
| | Max inrush current at \pm 24 V | A | 50 | |
| | Consumption | W | 19 (interface module with 7 I/O extension modules) | |
| Number of \pm 24 V inputs | | | 12 | |
| Number and type of outputs | | | 6 relay and 2solid-state | |
| I/O connections | | | Removable screw terminal block | |
| I/O extensions | Max. number of modules | | 7 | |
| | Max. number of I/O (including 20 I/O of interface module) | | - 132 with screw terminal discrete I/O extensions - 188 with spring terminal discrete I/O extensions - 244 with HE10 connector discrete I/O extensions - Screw terminal analogue I/O: up to 7 x 8 In, or 7 x 2 Out, or 7 x (4 In/2 Out) | |
| Dielectric strength | Between power supply terminals and earth terminals | V eff | 500 for 1 min | |
| | Between I/O terminals and earth terminals | V eff | 500 for 1 min | |
| Insulation resistance | Between power supply terminals and earth terminals | M Ω | > 10 (\pm 500 V) | |
| | Between I/O terminals and earth terminals | M Ω | > 10 (\pm 500 V) | |
| Integrated functions | | | | |
| Counting | Number of channels | | 2 | |
| | Frequency | | 5 kHz x 2 channels or 20 kHz x 2 channels (depending on configuration) | |
| | Capacity | | 32 bits | |
| Movement | Number of channels | | 2 | |
| | Frequency | kHz | 7 | |
| | Functions | | PWM (output with pulse width modulation) PLS (pulse generator output) | |

| Communication | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------|-------------------------|--|------------------------------------|----------------|-------------|------------|------------|-----------|-----------|------------|------|------|-------|-------|-------|--------|--------|--------|-------|-----|------|------|------|-------|-------|-------|-------------|--|--|----------------|--|--|--|--|--|--|--|----|--|--|----|--|--|--|--|------------|--|--|------------|--|--|--|--|--|--|--|----|--|--|--|--|--|--|--|------------|--|--|--|--|------------------------------------|--|--|--|--|------|
| CANopen bus | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Type of interface module | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OTB 1C0 DM9LP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CANopen services | Conformity class | S20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Standard | DS 301 V4.02, DR 303-2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Profile | DS 401 V2.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Specials | – | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Structure | Physical interface | 9-way male SUB-D | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Topology | Link by daisy-chaining | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Access method | CSMA-MA, multimaster with priority information | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Transmission | Data rate | 10, 20, 50, 125, 250, 500, 800 and 1000 Kbit/s. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Médium | Double shielded twisted pairs | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Physical configuration | Number of devices | Max. 63 per segment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Data rate | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 12.5%;">1 Mbit/s</th> <th style="width: 12.5%;">800 Kbit/s</th> <th style="width: 12.5%;">500 Kbit/s</th> <th style="width: 12.5%;">250 Kbit/s</th> <th style="width: 12.5%;">125 Kbit/s</th> <th style="width: 12.5%;">50 Kbit/s</th> <th style="width: 12.5%;">20 Kbit/s</th> <th style="width: 12.5%;">10 Kbit/s</th> </tr> </thead> <tbody> <tr> <td>20 m</td> <td>40 m</td> <td>100 m</td> <td>250 m</td> <td>500 m</td> <td>1000 m</td> <td>2500 m</td> <td>5000 m</td> </tr> <tr> <td>0,6 m</td> <td>6 m</td> <td>10 m</td> <td>10 m</td> <td>10 m</td> <td>120 m</td> <td>300 m</td> <td>600 m</td> </tr> <tr> <td colspan="3">Per segment</td> <td colspan="3">No. of devices</td> <td colspan="2"></td> </tr> <tr> <td colspan="3"></td> <td colspan="3">64</td> <td colspan="2">32</td> </tr> <tr> <td colspan="3"></td> <td colspan="3">Max. 160 m</td> <td colspan="2">Max. 185 m</td> </tr> <tr> <td colspan="3"></td> <td colspan="3"></td> <td colspan="2">16</td> </tr> <tr> <td colspan="3"></td> <td colspan="3"></td> <td colspan="2">Max. 205 m</td> </tr> <tr> <td colspan="3"></td> <td colspan="5">Equivalent length of each repeater</td> <td>15 m</td> </tr> </tbody> </table> | 1 Mbit/s | 800 Kbit/s | 500 Kbit/s | 250 Kbit/s | 125 Kbit/s | 50 Kbit/s | 20 Kbit/s | 10 Kbit/s | 20 m | 40 m | 100 m | 250 m | 500 m | 1000 m | 2500 m | 5000 m | 0,6 m | 6 m | 10 m | 10 m | 10 m | 120 m | 300 m | 600 m | Per segment | | | No. of devices | | | | | | | | 64 | | | 32 | | | | | Max. 160 m | | | Max. 185 m | | | | | | | | 16 | | | | | | | | Max. 205 m | | | | | Equivalent length of each repeater | | | | | 15 m |
| | 1 Mbit/s | 800 Kbit/s | 500 Kbit/s | 250 Kbit/s | 125 Kbit/s | 50 Kbit/s | 20 Kbit/s | 10 Kbit/s | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 20 m | 40 m | 100 m | 250 m | 500 m | 1000 m | 2500 m | 5000 m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0,6 m | 6 m | 10 m | 10 m | 10 m | 120 m | 300 m | 600 m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Per segment | | | No. of devices | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 64 | | | 32 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Max. 160 m | | | Max. 185 m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | Max. 205 m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Equivalent length of each repeater | | | | | 15 m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CANopen interface module | LED indicators | Controller status (PWR, RUN et ERR), I/O (I●/Q●) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Products certification | cULus, CE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Conformity to standards | IEC/EN 61131-2, UL 508, CSA 22.2 No. 213 (Class 1, Division 2, Groups A, B, C, D), CE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Modbus serial link | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Type of interface module | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| OTB 1S0 DM9LP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Structure | Type | Non-isolated serial link (4), RS 485, 3-wire | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Access method | Master/slave | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Topology | Tap link connection | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Physical interface | 2 x RJ45 connectors (en parallèle) permettant la topologie chaînage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Transmission | Mode | Asynchronous in baseband | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Frame | RTU/ASCII, Half duplex | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Data rate | 1.2...38.4 Kbit/s (19.2 Kbit/s by default) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Format | 7 or 8 data bits, 1 or 2 stop bit(s) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Parity | Even, odd or none | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Medium | Double shielded twisted pair | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Physical configuration | Number of devices | Max. 32 maxi per segment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Type of link | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Non-isolated</th> <th style="width: 50%;">Isolated (3)</th> </tr> </thead> <tbody> <tr> <td>Max. length</td> <td>Bus</td> <td>10 m</td> <td>1000 m</td> </tr> <tr> <td></td> <td>Derivation</td> <td>15 m</td> <td>40 m</td> </tr> </tbody> </table> | Non-isolated | Isolated (3) | Max. length | Bus | 10 m | 1000 m | | Derivation | 15 m | 40 m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Non-isolated | Isolated (3) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Max. length | Bus | 10 m | 1000 m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Derivation | 15 m | 40 m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Max. length | Bus | 10 m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Derivation | 15 m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Modbus interface module | LED indicators | Controller status (PWR, COM et ERR), I/O (I●/Q●) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Products certification | cULus, CE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Conformity to standards | CEI/EN 61131-2, UL 508, CSA 22.2 No. 213 (Class 1, Division 2, Groups A, B, C, D), CE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

(1) For other limitations, consult our catalogue "Machines & installations with industrial communications".

(2) With using the **TSX CAN C●50/100/300** CANopen cables and the **TSX CAN C●DD03/1/3/5** preformed cordsets.

(3) For isolated link, tap isolation **TWD XCA ISO** must be used.

Inputs/outputs characteristics

24 V $\overline{\text{---}}$ inputs

| | | | |
|-----------------------------|-------------------------------------|---------------------------|---|
| Number of input channels | | | 12, type 1 (according IEC/EN 61131) |
| Nominal input voltage | | $\overline{\text{---}}$ V | 24 sink/source (positive or negative logic, PNP or NPN) |
| Common | | | 1 |
| Input voltage limits | | $\overline{\text{---}}$ V | 20.4...26.4 |
| Nominal input current | | mA | 4.5 for I0, I1, I6 and I7; 7 for I2...I5 and I8...I11 |
| Input impedance | | k Ω | 5.3 for I0, I1, I6 and I7; 3,4 for I2...I5 and I8...I11 |
| Electronic filtering time | At state 1 | μ s | 35 for I0, I1, I6 and I7; 40 for I2...I5 and I8...I11 |
| | At state 0 | μ s | 45 for I0, I1, I6 and I7; 150 for I2...I5 and I8...I11s |
| Configurable filtering time | | ms | - Electronic filtering time - 3 ms ou 12 ms depending on configuration |
| Isolation | Between channels | | None |
| | Between channels and internal logic | V eff | \sim 500 for 1 min |

Transistor output

| | | | |
|-------------------------------|-------------------------------------|---------------------------|--|
| Number of output channels | | | 2 (Q0 and Q1) |
| Output logic | | | Source (positive logic, PNP) |
| Common | | | 1 |
| Nominal output values | Voltage | $\overline{\text{---}}$ V | 24 |
| | Current | A | 0,3 |
| Output value limits | Voltage | $\overline{\text{---}}$ V | 20.4...28,8 |
| | Current per channel | A | 0.36 |
| | Current per common | A | 0.72 |
| Response time | At state 1 | μ s | 5 |
| | At state 0 | μ s | 5 |
| Voltage drop | At state 1 | $\overline{\text{---}}$ V | Max.1 |
| Maximum inrush current | | A | 1 |
| Leakage current | | mA | 0.1 |
| Induction L/R | | ms | 10 (28.8 V $\overline{\text{---}}$, 1 Hz) |
| Overvoltage protection | | $\overline{\text{---}}$ V | 39 \pm 1 |
| Maximum power (filament lamp) | | W | 8 |
| Isolation | Between channels | | Aucun |
| | Between channels and internal logic | \sim V | \sim 500 for 1 min |

Relay outputs

| | | | |
|--|---------------------|------------------------------|---|
| Number of output channels | | | 6 (Q2...Q7) |
| Commons | Common 1 | | 3 contacts (relay) NO (Q2, Q3 and Q4) |
| | Common 2 | | 2 contacts (relay) NO (Q5 and Q6) |
| | Common 3 | | 1 contact (relay) NO (Q7) |
| Nominal output values (1) (resistive or inductive load) | Voltage | $\overline{\text{---}}$ V | 30 |
| | | \sim V | 240 |
| | Current per channel | A | 2 |
| | Current per common | A | 8 |
| Response time | At state 1 | ms | 5 |
| | At state 0 | ms | 2 |
| Bounce time | | ms | \leq 1 |
| Min. switchable load | | mA | 0.1 / $\overline{\text{---}}$ 0,1 V (reference value) |
| Contact resistance (unused condition) | | m Ω | Max. 30 |
| Isolation voltage | | V rms | \sim 500 for 1 min |
| Consumptions for all the outputs | At state 1 | $\overline{\text{---}}$ 5 V | mA 30 |
| | | $\overline{\text{---}}$ 24 V | mA 40 |
| | At state 0 | $\overline{\text{---}}$ 5 V | mA 5 |
| Electrical durability | In AC-1 | | 5 x 10 ⁵ operating cycles with 500 VA load |
| | In AC-14 | | 5 x 10 ⁵ operating cycles with 250 VA load |
| | In AC-15 | | 5 x 10 ⁵ operating cycles with 200 VA load |
| | In DC-1 | | 5 x 10 ⁵ operating cycles with 60 W load |
| | In DC-13 | | 5 x 10 ⁵ operating cycles with 30 W load |

Commoning block characteristics

| | | | |
|-----------------------|----------|----------------------|--|
| Type de module | | | OTB 9ZZ 61JP |
| Application | | | Passive, inter-module |
| Commons | | | 2 groups of 10 removable terminals |
| Nominal output values | Voltage | V | $\overline{\text{---}}$ 19...30 / \sim 215...240 |
| | Currents | Per channels | A 2 |
| | | Per group of commons | A 8 |

(1) With 1800 operations max./hour;
 electric life: min. 100 000 operations, mechanical life: min. 20 x 10⁶ operations.

Modicon M238 logic controller

Modicon OTB distributed I/O

Optimum IP 20 I/O system

Interface modules



OTB 1C0 DM9LP



OTB 1S0 DM9LP



OTB 9ZZ 61JP

Interface modules with integrated discrete I/O

| Supply voltage | Number and type of integrated I/O | | | Connection by Link | Reference | Weight kg | |
|----------------|-----------------------------------|---------------------------|------------------------------------|--------------------------------|---------------------------|---------------|-------|
| | Inputs | Solid-state outputs | Relay outputs | | | | |
| 24 V | 12 I 24 V IEC type 1 (1 common) | 2 O 24 V 0.3 A (1 common) | 6 O 30 V / ~ 240 V 2 A (3 commons) | Removable screw terminal block | CANopen bus | OTB 1C0 DM9LP | 0.195 |
| | | | | | Modbus RS 485 serial link | OTB 1S0 DM9LP | 0.190 |

Separate parts

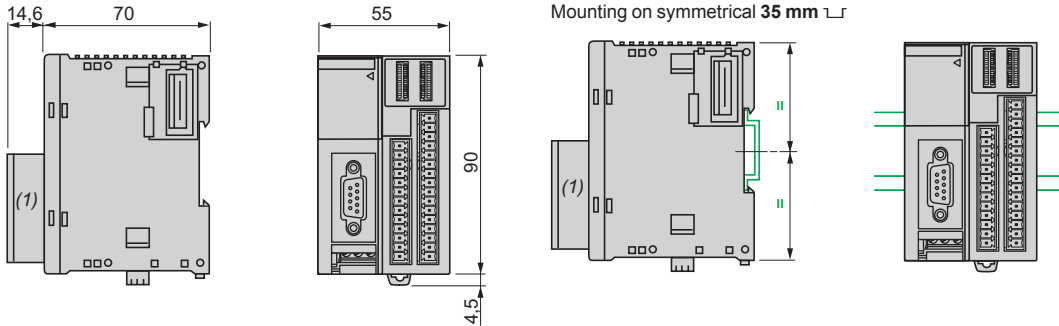
| Description | Application | Number of commons | Connection by | Number of wires | Reference | Weight kg |
|---------------------------------------|--|-------------------|--------------------------------|-----------------|--------------|-----------|
| Commoning modules | For grouping input or output commons, 8 A maximum; inter-module | 2 isolated groups | Removable screw terminal block | 2 x 10 | OTB 9ZZ 61JP | 0.100 |
| Fixing kit Sold in lot of 5 | Plate or panel mounting of modules | – | – | – | TWD XMT5 | – |
| Software and documentation | Configuration software "Modicon Configuration Tool-Lite" and hardware user guide | – | – | – | FTX ES01 | 0.050 |

Connection accessories

| Description | Application | Reference | Weight kg |
|---------------------------|---|---------------------|-----------|
| CANopen bus | Cabling system: junction boxes, cables, cordsets, IP 20 and IP 67 accessories | See pages 66 and 53 | |
| Modbus serial link | Cabling system: ta-off, hub, cables, cordsets, line end adapter | See pages 68 and 69 | |

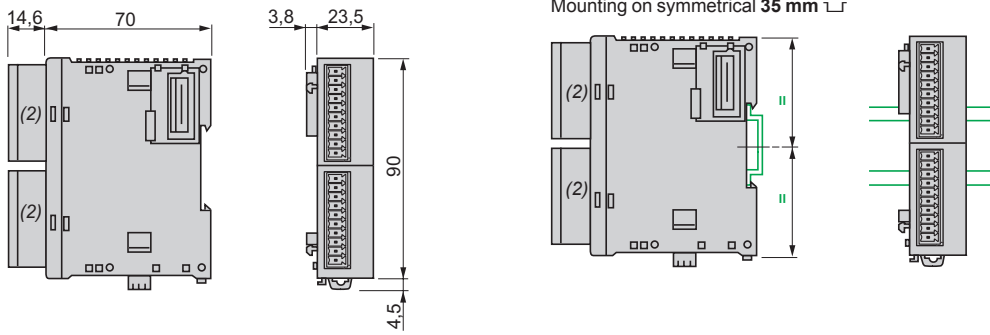
Dimensions

OTB 100 DM9LP



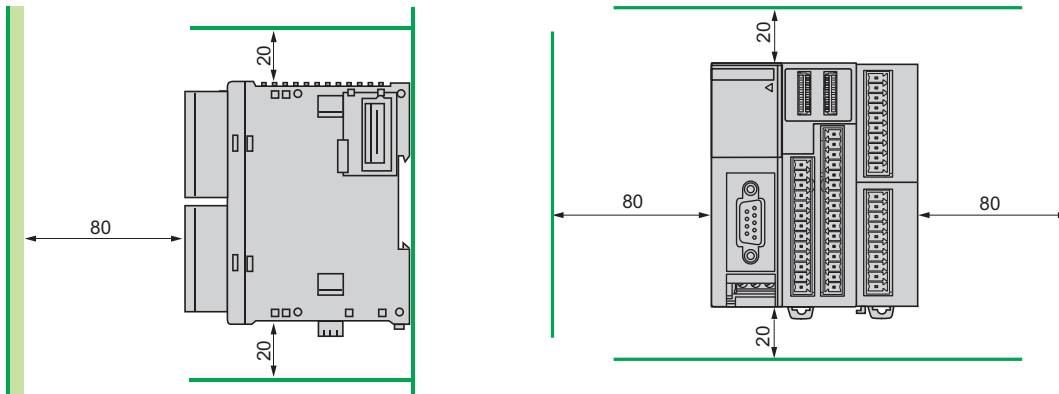
(1) With removable screw terminal block type connector.

OTB 9ZZ 61JP



(2) With removable screw terminal block type connector.

Installation rules

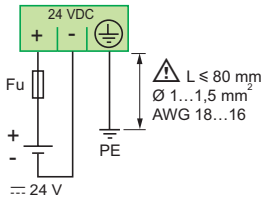


- Must not be horizontally or flat mounted
- Avoid placing the module over a source of heat (transformer, power supply, power contactor, etc.)

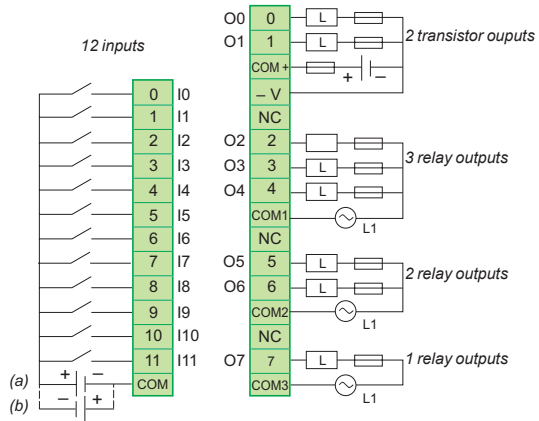
Connections

OTB 1●0 DM9LP

24 V $\overline{\text{---}}$ power supply

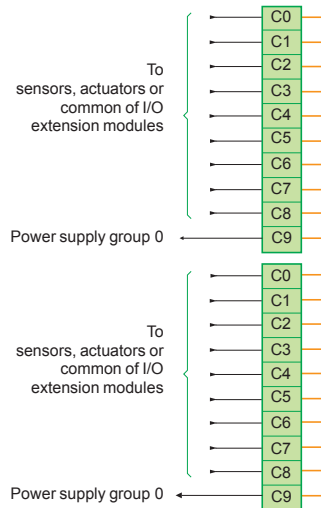


$\overline{\text{---}}$ 24 V inputs, 24 V $\overline{\text{---}}$ transistor outputs and relay outputs

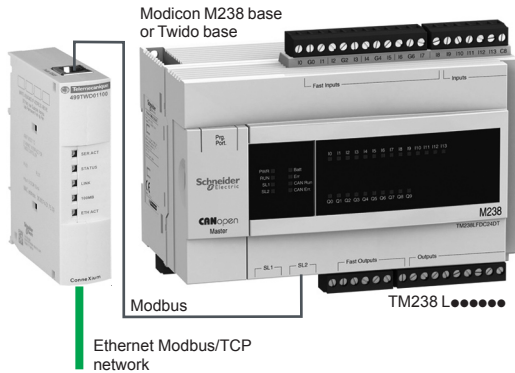


Fu : 2A fast-blow fuse **ABE 7FU200**

OTB 9ZZ 61JP



Internal links



Presentation

TwidoPort module **499 TWD 01100** is an Ethernet interface that is easy to use and dedicated to Modicon M238 logic controllers and Twido compact or modular programmable controllers. It allows incorporation of this controllers into an Ethernet network as a passive device (slave). The TwidoPort module is ready for use. When connected to the integrated RS 485 serial port acts as a gateway between the Ethernet network and the controller's Modbus serial link port.

The main characteristics of the TwidoPort module are as follows:

- Connects to the RS 485 of the Modicon M238 controller (marked SL1 or SL2 depending on model) or the RS 485 port of the Twido controller; no external auxiliary supply is necessary.
- Ethernet configuration:
 - takes the Ethernet configuration from the Twido application configuration (normal mode),
 - supports manual configuration using Telnet.
- Provides Ethernet statistics via a Telnet session.

Description

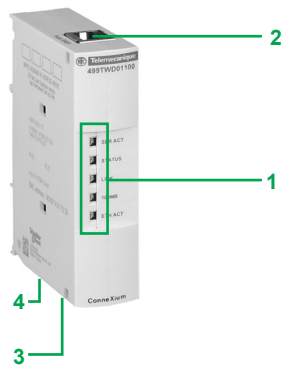
The TwidoPort **499 TWD 01100** interface module comprises:

- 1 Five pilot lights indicating the status of the interface and of the TwidoPort module links.
- 2 An RJ45 type connector for connection of the power supply and of the link to the controller's integrated RS 485 port. This connection is made using connection cable **TWD XCA RJP03P** supplied with the TwidoPort interface module in case of the Twido controller.
- 3 An RJ45 connector (accessed through the bottom of the module) for connection to the Ethernet TCP/IP network.
- 4 An earthing screw (accessed through the bottom of the module).

The TwidoPort interface module can be mounted as standard on a symmetrical \sqcup rail. Fixing kit **TWD XMT5** (sold in lots of 5) allows plate or panel mounting (2 x \varnothing 4.3 holes).

To order separately

For connecting to the Modicon M238 controller, the cordset for connection Modbus **XBT Z9980** (length 2.5 m).



| Characteristics | | |
|-----------------------------------|--|---|
| TwidoPort module | | 499 TWD 01100 |
| Services | Class | A10 |
| | Web services | No Web server |
| | Basic Ethernet Modbus/TCP communication services | Modbus messaging (read/write of data words) BOOTP function Auto MDI/MDX function (avoids the use of crossover cable) Supports manual configuration using Telnet. |
| Structure | Physical interface | 10BASE-T/100BASE-TX, standard RJ45 type connector |
| | Binary rate | 10/100 Mbit/s with automatic recognition |
| | Medium | Twisted pair |
| TwidoPort interface module | Operating temperature | 0...55 °C |
| | Relative humidity | 10...95 % (without condensation) |
| | Degree of protection | IP 20 |
| | Max. consumption at --- 5 V | 180 mA |
| | Supply | 5 ± 0.5 V provided by the Modicon M238 or Twido base controller |
| | Conforming to standards | UL 508, CSA 1010, FCC Class A, EN 61131-2, CE |
| | LED indicator | Activity on the Modbus serial link (SER ACT), controller status (STATUS), Ethernet link status (LINK), binary rate 100 Mbit/s (100 MB), Ethernet network activity (ETH ACT) |

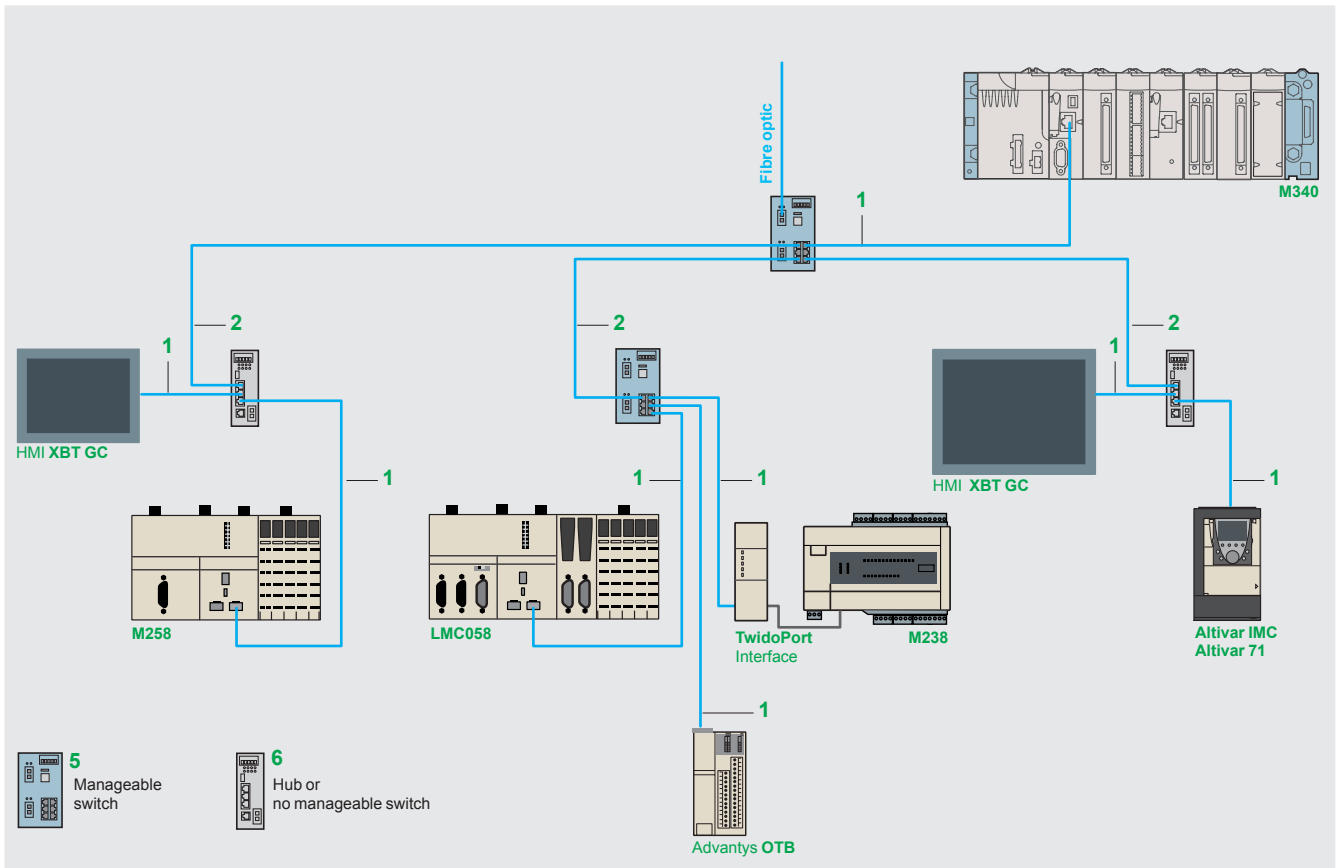
References



499 TWD 01100

| Description | Controller bases | Function | Reference | Weight kg |
|-----------------------------------|---|--|----------------------|-----------|
| TwidoPort interface module | Modicon M238 24I/O | 10/100 Mbit/s | 499 TWD 01100 | 0.200 |
| | Twido compact | Auto MDIX function | | |
| | 10/16/24/40 I/O | Connection cordset to Twido base controller TWD XCA RJP03P included (length 0.3 m) | | |
| Modbus RS 485 cordsets | Twido modular 20/40 I/O | | | |
| | Description | Use | Length | Reference |
| Modbus RS 485 cordsets | Connection to Modicon M238 Equiped with 2 RJ45 connectors | 2.5 m | XBT Z9980 | 0.100 |

Ethernet Modbus/TCP or Ethernet IP network architecture



References (1)

Shielded copper connection cables

ConneXium shielded copper connection cables are available in two versions to comply with the different standards and approvals in force:

■ **Shielded twisted pair copper cables to standard EIA/TIA 568**

These cables conform to:

- standard EIA/TIA 568, category CAT 5E,
- standard IEC 11801/EN 50173, class D.

Their flame resistance conforms to:

- NFC 32070# classification C2
- standards IEC 322/1,
- Low Smoke Zero Halogen (LSZH).

■ **Shielded twisted pair copper cables, UL and CSA 22.1 approved**

These cables conform to:

- standards UL and CSA 22.1.

Their flame resistance conforms to NFPA 70.

“Do It Yourself” cable and connectors

The ConneXium “Do It Yourself” range allows the user to make up Ethernet copper cables on site and to the required length. They are designed for cabling Ethernet 10/100 Mbit/s networks. The maximum length of cables made up in this way is 80 m. They can be assembled quickly using a knife and cutting pliers (no special tools are required).

| Description | Characteristics | Length | Reference | Weight kg |
|--|---|--------|----------------------|-----------|
| Ethernet copper cable 2 shielded twisted pairs 24 AWG | Conforming to the above-mentioned standards and approvals | 300 m | TCS ECN 300R2 | – |
| RJ 45 connector | Conforming to EIA/TIA-568-D | – | TCS EK3 MDS | – |
| M12 connector | Conforming to IEC 60176-2-101 | – | TCS EK1 MDRS | – |

(1) For other versions (fibre optic, switches, ...): please consult our “Machines and Installations with Industrial Communications” catalogue.



490 NT● 000 ●●



TCS ESU 043F1N0



TCS ESM 043F2C●0



499 NMS/NSS 251 02



TCS ESM 083F2C●0



TCS ESU 051 F0

References (continued)

Shielded twisted pair cables to standard EIA/TIA568

| Description | Pre-formed at both ends | Item | Length | Reference | Weight kg |
|------------------|---|------|--------|----------------|-----------|
| Straight cables | 2 x RJ45 connectors For connection to terminal equipment (DTE) | 1 | 2 m | 490 NTW 000 02 | — |
| | | | 5 m | 490 NTW 000 05 | — |
| | | | 12 m | 490 NTW 000 12 | — |
| | | | 40 m | 490 NTW 000 40 | — |
| | | | 80 m | 490 NTW 000 80 | — |
| Crossover cables | 2 x RJ45 connectors For connection between hubs, switches and transceivers | 2 | 5 m | 490 NTC 000 05 | — |
| | | | 15 m | 490 NTC 000 15 | — |
| | | | 40 m | 490 NTC 000 40 | — |
| | | | 80 m | 490 NTC 000 80 | — |

Shielded twisted pair cables, UL and CSA 22.1 approved

| Description | Pre-formed at both ends | Item | Length | Reference | Weight kg |
|------------------|---|------|--------|-----------------|-----------|
| Straight cables | 2 x RJ45 connectors For connection to terminal equipment (DTE) | 1 | 2 m | 490 NTW 000 02U | — |
| | | | 5 m | 490 NTW 000 05U | — |
| | | | 12 m | 490 NTW 000 12U | — |
| | | | 40 m | 490 NTW 000 40U | — |
| | | | 80 m | 490 NTW 000 80U | — |
| Crossover cables | 2 x RJ45 connectors For connection between hubs, switches and transceivers | 2 | 5 m | 490 NTC 000 05U | — |
| | | | 40 m | 490 NTC 000 40U | — |
| | | | 80 m | 490 NTC 000 80U | — |

Shielded twisted pair cable for IP 67 switch

| Description | Pre-formed at both ends | Item | Length | Reference | Weight kg |
|-----------------|--|------|--------|-------------------|-----------|
| Straight cables | 1 x IP 67 4-way M12 connector and 1 x RJ45 connector | 8 | 1 m | TCS ECL 1M3M 1S2 | — |
| | | | 3 m | TCS ECL 1M3M 3S2 | — |
| | | | 5 m | TCS ECL 1M3M 5S2 | — |
| | | | 10 m | TCS ECL 1M3M 10S2 | — |
| | | | 25 m | TCS ECL 1M3M 25S2 | — |
| | | | 40 m | TCS ECL 1M3M 40S2 | — |

ConneXium hub

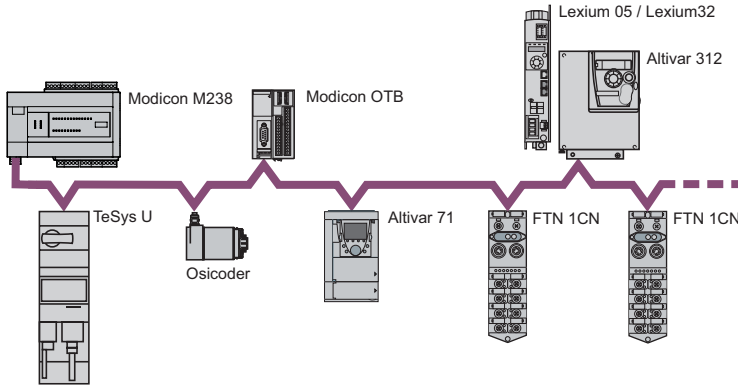
| Description | Number of ports | | Item | Reference | Weight kg |
|--|-----------------|-------------|------|----------------|-----------|
| | Copper cable | Fibre optic | | | |
| Twisted pair hub 10BASE-T copper ports, RJ45 shielded connectors | 4 | — | 6 | 499 NEH 104 10 | 0.530 |

ConneXium switches

| Description | Number of ports | | Item | Manag-eable | Reference | Weight kg |
|--|-----------------|----------------|------|-------------|-----------------|-----------|
| | Copper cable | Fibre optic | | | | |
| Optimised twisted pair switch | 3 | — | 6 | No | TCS ESU 033FN0 | 0.113 |
| 10BASE-T/100BASE-TX copper ports, RJ45 shielded connectors | 4 | 1 | 6 | No | TCS ESU 043FN0 | 0.120 |
| 100BASE-FX optic port, SC connectors | 5 | — | 6 | No | TCS ESU 053FN0 | 0.113 |
| Twisted pair switches | 8 | — | 6 | No | 499 NES 181 00 | 0.230 |
| 0BASE-T/100BASE-TX copper ports, RJ45 shielded connectors | 8 | — | 5 | Yes | TCS ESM083F23F0 | 0.410 |
| Twisted pair and fibre optic switches | 3 | 1, multimode | 5 | Yes | TCS ESM043F1CU0 | 0.400 |
| 10BASE-T/100BASE-TX copper ports, RJ45 shielded connectors. | 2 | 2, multimode | 5 | Yes | TCS ESM043F2CU0 | 0.400 |
| 100BASE-FX optic ports, SC connectors | 3 | 1, single-mode | 5 | Yes | TCS ESM043F1CS0 | 0.400 |
| | 2 | 2, single-mode | 5 | Yes | TCS ESM043F2CS0 | 0.400 |
| | 4 | 1, multimode | 6 | No | 499 NMS 251 01 | 0.330 |
| | 3 | 2, multimode | 6 | No | 499 NMS 251 02 | 0.335 |
| | 4 | 1, single-mode | 6 | No | 499 NSS 251 01 | 0.330 |
| | 3 | 2, single-mode | 6 | No | 499 NSS 251 02 | 0.335 |
| | 7 | 1, multimode | 5 | Yes | TCS ESM083F1CU0 | 0.410 |
| | 6 | 2, multimode | 5 | Yes | TCS ESM083F2CU0 | 0.410 |
| | 7 | 1, single-mode | 5 | Yes | TCS ESM083F1CS0 | 0.410 |
| | 6 | 2, single-mode | 5 | Yes | TCS ESM083F2CS0 | 0.410 |
| IP 67 twisted pair switch (1) 10BASE-T/100BASE-TX copper ports, shielded M12 connectors (type D) | 5 | — | — | No | TCS ESU 051 F0 | 0.210 |

(1) Require special cables with M12 connectors for their --- 24 V supply: XZC P1●64L●.

Presentation



Schneider Electric has selected CANOpen for its machines and installations because of its wealth of functions and its resulting benefits in the automation world. This decision was based on the general acceptance of CANOpen, and the fact that CANOpen products are increasingly used in control system architectures.

CANOpen is an open network supported by more than 400 companies worldwide, and promoted by CAN in Automation. CANOpen conforms to standards EN 50325-4 and ISO 15745-2.

Schneider Electric is heavily involved in working groups, which are important for machine and installation architectures, systems and products.

CANOpen brings transparency to Ethernet

The CANOpen bus is a multi-master bus ensuring reliable, deterministic access to real-time data in control system devices. The CSMA/CA protocol is based on broadcast exchanges, sent cyclically or on an event, to ensure optimum use of the passband. A message handling channel can also be used to define slave parameters.

The bus uses a double twisted pair on which, with the Modicon M238 logic controller, 16 slaves devices maximum are connected by daisy-chaining or by tap junctions. The variable data rate between 50 Kbit/s and 1 Mbit/s depends on the length of the bus (between 1,000 m and 20 m). Each end of the bus must be fitted with a line terminator.

The CANOpen bus is a set of profiles on CAN systems, possessing the following characteristics:

- Open bus system
- Data exchanges in real time without overloading the protocol
- Modular design allowing modification of size
- Interconnection and interchangeability of devices
- Standardized configuration of networks
- Access to all device parameters
- Synchronization and circulation of data from cyclic and/or event-controlled processes (short system response time)

The **TM238 LFDC24DT** and **TM238 LFAC24DR** compact bases integrated a CANOpen port (conformity M20 class) perform the role of master on the bus.

Connectable Schneider Electric devices

The following Schneider Electric devices can be connected to the CANOpen bus:

- Ø 58 mm Osicoder multi-turn absolute encoders **XCC 3510P/3515C S84CB**.
- TeSys U starter-controllers with **LUL C08** communication module.
- TeSys T motor management system with **LTM R●●C●●** controllers.
- Modicon OTB IP 20 Optimum distributed I/O with **OTB 1C0 DM9LP** interface module.
- Modicon FTB/FTM IP 67 I/O splitter boxes **FTB 1CN●●●●●** monobloc.
- Preventa configurable safety controllers **XPS MC16ZC/32ZC**.
- Altivar 312 variable speed drives for asynchronous motors (0.18...15 kW) **ATV 312H ●●●●●**.
- Altivar 61/71 variable speed drives for asynchronous motors (0.75...630 kW) **ATV 61H /71H ●●●●●**.
- Lexium 05/ Lexium 32 servo drives (0,15...7 kW) for BSH/BSM servo motors **LXM 05A●D●●●●/ LXM 32A●D●●●●**.
- Integrated training Lexium **ILA1B, ILE1B** and **ILS1B**.



TeSys U starter-controllers with communication module.



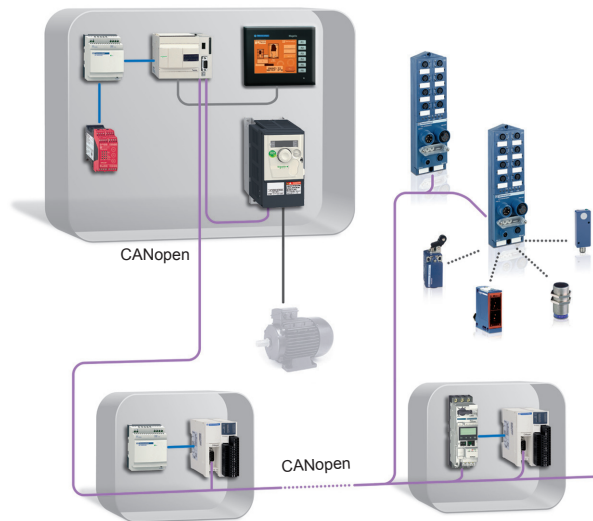
Modicon FTB



Altivar 312



Lexium ILA1B



Presentation

TM238 LFDC24DT and **TM238 LFAC24DR** logic controllers allow to act as CANopen master.
The bus consists of a master station, the Modicon M238 controller and slave stations. The master is in charge of configuration, exchanges and diagnostics on the slaves.

The CANopen bus is a communication type bus and allows management of various slaves such as:

- Discrete slaves,
- Analogue slaves,
- Variable speed controllers,
- Motor starters,
-

The Modicon M238 CANopen master controls up to 16 slaves, each with an input PDO (*Process Data Object*) and an output PDO.

If a slave has more than one PDO, the maximum number of slaves is reduced by an equivalent number.

CANopen conformity class

Schneider Electric has defined the conformity classes for CANopen master and slave devices. Conformity classes are used to identify the services and levels of service supported by each CANopen device or product. These services are described in section 4 of our "Machines & Installations with industrial communications" catalogue.

The table below shows product combination possibilities according to their conformity class.

| Conformity class | | Produit esclave | | |
|------------------|-----|-----------------|-----|-----|
| | | S10 | S20 | S30 |
| Master product | M10 | | | |
| | M20 | | | |
| | M30 | | | |

 Combination possible: Modicon M238 controller master M20 classe with slave device S10 and S20 classes

 Use restriction: Modicon M238 controller master M20 class with slave device S30 class limits the level of service to that of the lower conformity class, either S20.

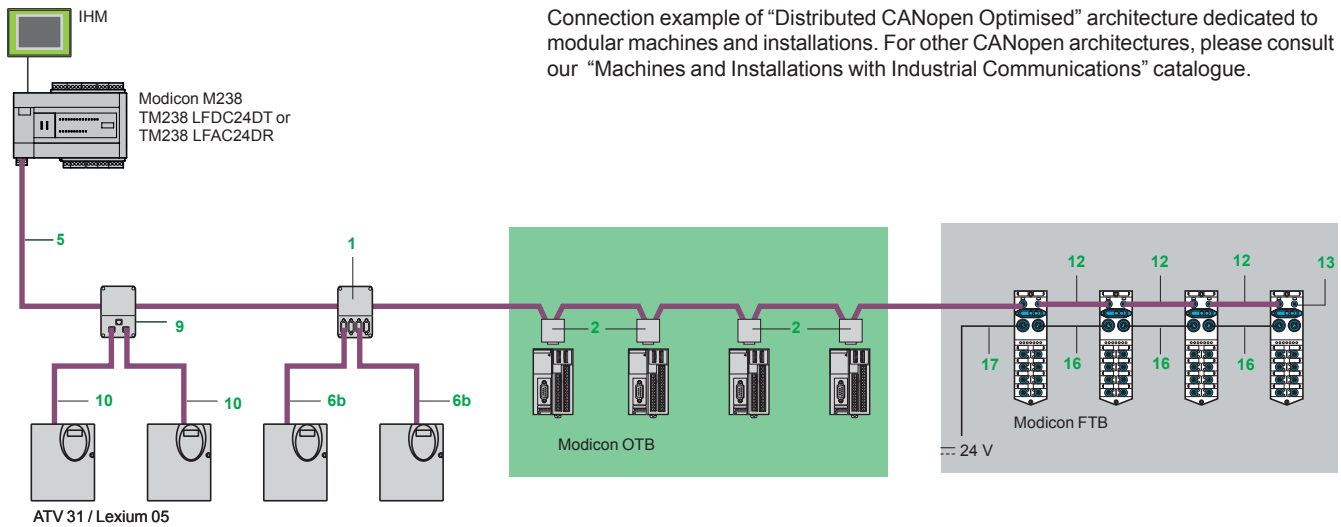
Characteristics

| Type of base | | TM238 LFDC24DT, TM238 LFAC24DR | | | | | | | | |
|---------------|-------------|--|--|-----|-----|-----|-----|-----|------|--|
| CANopen port | | Standards | DS 301 V4.02, DR 303-1 | | | | | | | |
| | | Class | Conformity class M20, limit of 16 slaves | | | | | | | |
| Data rate | Max. length | m | 20 | 50 | 100 | 125 | 250 | 500 | 1000 | |
| | Data rate | Kbit/s | 1000 | 800 | 500 | 425 | 250 | 125 | 50 | |
| No. of slaves | | 16 max, with max. limit of: 64 TDPOs and 64 RPDOs | | | | | | | | |
| Line matching | | Line termination resistor supplied with the screw terminal block, to be mounted when necessary | | | | | | | | |
| Connection | | Removable screw terminal block | | | | | | | | |

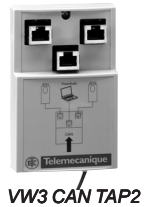
Reference

| | Number of I/O | Inputs | Outputs | No. of I/O extension modules | Integrated serial links | Reference | Weight kg |
|---|---------------|--|---|------------------------------|--------------------------|-----------------------|-----------|
| Compact bases, embedded CANopen port | | | | | | | |
| ■ 24 V $\overline{\text{---}}$ power supply | | | | | | | |
| TM238 LFDC24DT | 24 I/O | 6 x 24 V $\overline{\text{---}}$ (sink/source) 8 x 24 V $\overline{\text{---}}$ fast (sink) | 10 transistor (source) including 4 fast | 7 modules max. | 1 RS 232/485 1 RS 485 | TM238 LFDC24DT | 0.595 |
| ■ 100-240 V \sim power supply | | | | | | | |
| TM238 LFAC24DR | 24 I/O | 6 x 24 V $\overline{\text{---}}$ inputs (sink/source) 8 x 24 V $\overline{\text{---}}$ fast inputs (sink) | 4 transistor outputs (source) and 6 relay outputs | 7 modules max. | 1 RS 232/485 1 RS 485 | TM238 LFAC24DR | 0.595 |

CANopen architecture



References



| Standard junction boxes and connectors | | | | | | |
|---|---|------|----------------------------|---|----------------------------------|----|
| Description | Composition | Item | Length | Reference | Weight | kg |
| CANopen IP 20 tap junction box | 4 SUB-D ports. Screw terminal blocks for connection of main cables Line end adapter | 1 | – | TSX CAN TDM4 | 0.196 | |
| IP 20 connectors CANopen 9-way SUB-D female. Line end adapter switch | Elbowed (90°) | 2 | – | TSX CAN KCDF 90T | 0.046 | |
| | Straight (2) | – | – | TSX CAN KCDF 180T | 0.049 | |
| | Elbowed (90°) with 9-way SUB-D connector for connection to PC or diagnostic tool | – | – | TSX CAN KCDF 90TP | 0.051 | |
| M12 connectors IP 67 | Male | – | – | FTX CN 12M5 | 0.050 | |
| | Female | – | – | FTX CN 12F5 | 0.050 | |
| CANopen IP 20 tap junction box for Altivar and Lexium 05 | 2 x RJ45 ports | 9 | – | VW3 CAN TAP2 | – | |
| Standard IP 20 pre-formed cables | | | | | | |
| Description | Application | Item | Length | Unit reference | Weight | kg |
| CANopen cables (2 x AWG 22 2 x AWG 24) | For standard environments (3), CE marking: low fume emission. Halogen-free. Non flame propagating (IEC 60332-1) | 5 | 50 m 100 m 300 m | TSX CAN CA50 TSX CAN CA100 TSX CAN CA300 | 4.930 8.800 24.560 | |
| | For standard environments (3), UL certified, CE marking: non flame propagating (IEC 60332-2) | 5 | 50 m 100 m 300 m | TSX CAN CB50 TSX CAN CB100 TSX CAN CB300 | 3.580 7.840 21.870 | |
| | For standard environments (3) or mobile installation, CE marking: low fume emission. Halogen-free. Non flame propagating (IEC 60332-1). Oil resistant | 5 | 50 m 100 m 300 m | TSX CAN CD50 TSX CAN CD100 TSX CAN CD300 | 3.510 7.770 21.700 | |
| CANopen pre-formed cables 1 x 9-way SUB-D female connector at each end. | For standard environments (3), CE marking: low fume emission. Halogen-free. Non flame propagating (IEC 60332-1) | – | 0.3 m 1 m 3 m 5 m | TSX CAN CADD03 TSX CAN CADD1 TSX CAN CADD3 TSX CAN CADD5 | 0.091 0.143 0.295 0.440 | |
| | For standard environments (3), UL certified, CE marking: non flame propagating (IEC 60332-2) | – | 0.3 m 1 m 3 m 5 m | TSX CAN CBDD03 TSX CAN CBDD1 TSX CAN CBDD3 TSX CAN CBDD5 | 0.086 0.131 0.268 0.400 | |

(1) Connector VW3 CAN KCDF 180T may also be used for connection to a Controller Inside programmable card.

(2) Standard environment: without any particular environmental restrictions, operating temperature between + 5 °C and + 60 °C, and for fixed installation.

(3) Harsh environments: resistant to hydrocarbons, industrial oils, detergents, solder splashes, hygrometry up to 100%, saline environment, wide temperature variations, operating temperature between - 10 °C and + 70 °C, or mobile installation.

References (continued)

Standard IP 20 pre-formed cables (continued)

| Description | Composition | Item | Length | Unit reference | Weight kg |
|---------------------------|--|------|--------|------------------|-----------|
| CANopen pre-formed cables | Pre-formed cables with 1 x 9-way SUB-D female connector and 1 x RJ45 connector | 6b | 0.5 m | TCS CCN 4F3 M05T | – |
| | | | 1 m | TCS CCN 4F3 M1T | – |
| | | | | VW3 M38 05 R010 | – |
| | | | | (1) | – |
| | | | 3 m | TCS CCN 4F3 M3T | – |
| | Pre-formed cables with 2 x 9-way SUB-D connectors, 1 female and 1 male | – | 0.5 m | TLA CD CBA 005 | – |
| | | | 1.5 m | TLA CD CBA 015 | – |
| | | | 3 m | TLA CD CBA 030 | – |
| | | | 5 m | TLA CD CBA 050 | – |

Standard IP 67 pre-formed cables

| | | | | | |
|---------------------------|---|----|-------|-------------|-------|
| CANopen pre-formed cables | Pre-formed cables with 2 x 5-way, elbowed, M12 connectors, A coding (1 male connector and 1 female connector) | 12 | 0.3 m | FTX CN 3203 | 0.40 |
| | | | 0.6 m | FTX CN 3206 | 0.70 |
| | | | 1 m | FTX CN 3210 | 0.100 |
| | | | 2 m | FTX CN 3220 | 0.160 |
| | | | 3 m | FTX CN 3230 | 0.220 |
| | | | 5 m | FTX CN 3250 | 0.430 |

IP 20 connection accessories

| | | | | | |
|--|--|----|-------|-------------------|-------|
| CANopen connector for Altivar 71 (2) | 9-way SUB-D female. Line end adapter switch. 180° cable entry | – | – | VW3 CAN KCDF 180T | – |
| Adapter for Altivar 71 variable speed controller | CANopen SUB-D to RJ45 adapter | – | – | VW3 CAN A71 | – |
| Pre-formed CANopen cables | 1 RJ45 connector at each end. | 10 | 0.3 m | VW3 CAN CARR03 | – |
| | | | 1 m | VW3 CAN CARR1 | – |
| CANopen bus adapter for Lexium 17D | Hardware interface for link conforming to the CANopen standard + 1 connector for connection of PC terminal | – | – | AM0 2CA 001V000 | 0.110 |
| Y connector | CANopen/Modbus | – | – | TCS CTN011M11F | – |

IP 67 connection accessories for Advantys FTB/FTM monobloc and modular splitter boxes

| Description | Composition | Item | Length m | Reference | Weight kg |
|-------------------------------|--|-------|---|------------|-----------|
| IP 67 line terminator | Equipped with one M12 connector (for end of bus) | 13 | – | FTX CNTL12 | 0.010 |
| 24 V supply connection cables | Equipped with two 5-way, 7/8 type connectors | 16 | 0.6 | FTX DP2206 | 0.150 |
| | | | 1 | FTX DP2210 | 0.190 |
| | | | 2 | FTX DP2220 | 0.310 |
| | | | 5 | FTX DP2250 | 0.750 |
| | | | Equipped with one 5-way, 7/8 type connector at 1 end with free wires at the other end | 17 | 1.5 |
| 3 | FTX DP2130 | 0.430 | | | |
| 5 | FTX DP2150 | 0.700 | | | |
| T-connector for power supply | Equipped with two straight, 5-way, 7/8 type connectors | – | – | FTX CNCT1 | 0.100 |

(1) Cable equipped with line end adapter.

(2) For variable speed controllers ATV 71H●●●M3, ATV 71HD11M3X, HD15M3X, ATV 71H075N4... HD18N4, this connector can be replaced by connector TSX CAN KCDF 180T.

(3) Standard environment: without any particular environmental restrictions, operating temperature between + 5 °C and + 60 °C, and for fixed installation.



VW3 CAN A71



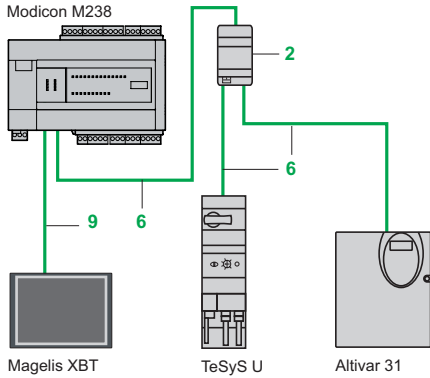
AM0 2CA 001V000



FTX DP21●●

Modbus cabling system

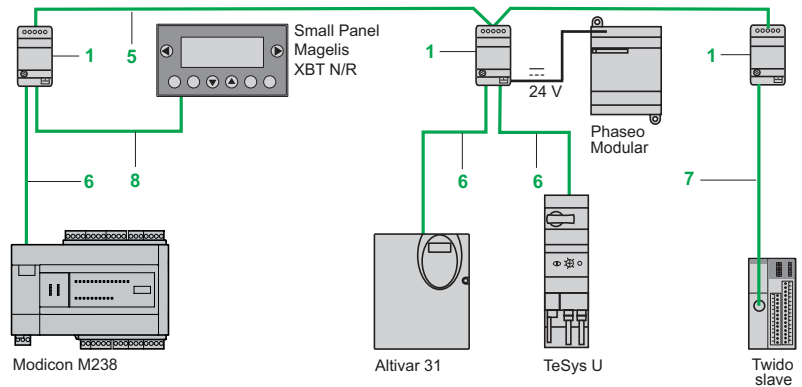
Non isolated link (Modicon M238 master)



Cable length between Modicon M238 and Altivar 31:
≤ 30 m max.

- ★ Line polarisation active
- Line end adapter

Isolated link (Modicon M238 master)



- Total length of cables between tap isolation boxes 1: ≤ 1000 m
- Length of tap link cables 6, 7 or 8: ≤ 10 m

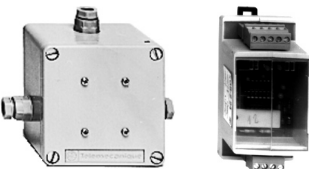
References



TWD XCA ISO TWD XCA T3RJ



LU9 GC3



TSX SCA 50 XGS Z24

Tap-off and adapter components for RS 485 serial link

| Description | Application | Item | Length | Reference | Weight kg |
|---|--|------|--------------|--|-----------|
| Tap isolation box Screw terminal block for main cable 2 x RJ45 for tap-off | - RS 485 line isolation (1) - Line end adapter (RC 120 Ω, 1nF) - Line pre-polarisation (2 R 620 Ω) - 24 V supply (screw terminal block) or - 5 V (via RJ45) Mounting on 35 mm D-sub | 1 | - | TWD XCA ISO | 0.100 |
| Tap junction box 1 x RJ45 for main cable 2 x RJ45 for tap-off | - Line end adapter (RC 120 Ω, 1nF) - Line pre-polarisation (2 R 620 Ω) Mounting on 35 mm D-sub | 2 | - | TWD XCA T3RJ | 0.080 |
| Modbus hub Screw terminal block for main cable 10 x RJ45 for tap-off | Mounting on 35 mm D-sub, on mounting plate or panel (2 x Ø 4 mm screws) | - | - | LU9 GC3 | 0.500 |
| T-junction boxes 2 x RJ45 for main cable | 1 integrated cable with RJ45 connector for Altivar variable speed controller dedicated tap-off | - | 0.3 m 1 m | VW3 A8 306 TF03 VW3 A8 306 TF10 | - |
| Passive tap junction box | - Line extension and single-channel tap-off on screw terminal block - Line end adapter | - | - | TSX SCA 50 | 0.520 |
| RS 232C/RS 485 line converter | - Flow rate 19.2 Kbit/s max. - Without modem signals - 24 V/20 mA supply, Mounting on 35 mm D-sub | - | - | XGS Z24 | 0.100 |

(1) Line isolation recommended for distances > 10 m.

Modicon M238 logic controller

Modbus and character mode serial link

Cabling system

References (continued)

| Connection cables for RS 485 serial link | | | | | | | | | | | |
|---|---|---|----------|-------------------------|-----------------------|---|---|-------------|-------|-----------------|---|
| Description | Application | Item | Length | Unit reference | Weight | kg | | | | | |
| Main cables double shielded twisted pair RS 485 | Modbus serial link, supplied without connector | 5 | 100 m | TSX CSA 100 | 5.680 | | | | | | |
| | | | 200 m | TSX CSA 200 | 10.920 | | | | | | |
| | | | 500 m | TSX CSA 500 | 30.000 | | | | | | |
| Modbus cordsets RS 485 | 2 x RJ45 connectors | 6 | 0.3 m | VW3 A8 306 R03 | 0.030 | | | | | | |
| | | | 1 m | VW3 A8 306 R10 | 0.050 | | | | | | |
| | | | 3 m | VW3 A8 306 R30 | 0.150 | | | | | | |
| | 1 x RJ45 connector and 1 end with free wires | - | 1 m | TWD XCA FJ010 | 0.060 | | | | | | |
| | | | 3 m | VW3 A8 306 D30 | 0.150 | | | | | | |
| | 1 mini-DIN connector for Twido controller and 1 RJ45 connector | - | 0.3 m | TWD XCA RJ003 | 0.040 | | | | | | |
| | | | 1 m | TWD XCA RJ010 | 0.090 | | | | | | |
| | | | 3 m | TWD XCA RJ030 | 0.160 | | | | | | |
| | 1 mini-DIN connector for Twido controller and 1 RJ45 connector (1) (2) | 7 | 0.3 m | TWD XCA RJP03 | 0.027 | | | | | | |
| | 1 mini-DIN connector for Twido controller and 1 RJ45 connector Dedicated programming protocol (2) (3) | - | 0.3 m | TWD XCA RJP03P | 0.027 | | | | | | |
| | 1 mini-DIN connector for Twido controller and 1 end with free wires | - | 1 m | TWD XCA FD010 | 0.062 | | | | | | |
| | | | 10 m | TSX CX 100 | 0.517 | | | | | | |
| Modicon M238 cordsets (SL1, SL2) to Magelis HMI terminal | 2 x RJ45 connectors | XBT N200/R400 XBT RT500/511 XBT GT11●●/1335 | 9 | 2,5 m | XBT Z9980 | 0,150 | | | | | |
| | | | | | | 1 x RJ45 connector and 1 x SUB-D 25-way connector | Small Panel XBT N401/410 XBT R410/411 | 8, 9 | 2,5 m | XBT Z938 | 0,210 |
| | | | | | | 1 x RJ45 connector and 1 x SUB-D 9-way connector | | | | | Advanced panel XBT GT2●●0...7340 XBT GK●●●0 |
| Cordsets for Magelis Small Panel | 2 x RJ45 connectors | Small panel XBT N200/R400 XBT RT500/511 | 8 | 3 m | VW3 A8 306 R30 | 0.150 | | | | | |
| Twido cordsets (terminal port) to Magelis Small Panel | 1 mini-DIN con. and 1 RJ 45 connector | Small panel XBT N200/R400 XBT RT500/511 | - | 2.5 m | XBT Z9780 | 0.180 | | | | | |
| | | | | | | 1 mini-DIN connector and SUB-D 25-way connector | Small panel XBT N401/410 XBT R410/411 | - | 2.5 m | XBT Z968 | 0.210 |
| Line end adapter | For RJ45 connector R = 120 Ω, C = 1 nf | - | | Order in multiples of 2 | VW3 A8 306 RC | 0.200 | | | | | |

| Connection cables for RS 232 serial link | | | | | |
|--|---|--------|------------------------|--------|----|
| Description | Application | Length | Reference | Weight | kg |
| Cordset for DTE terminal (printer) (4) | Serial link for terminal device (DTE) 1 x RJ45 connector and 1 x 9-way SUB-D female connector | 3 m | TCS MCN 3M4F3C2 | 0.150 | |
| Cordset for DCE terminal (modem, converter) | Serial link for point to point device (DCE) 1 x RJ45 connector and 1 x 9-way SUB-D male connector | 3 m | TCS MCN 3M4M3S2 | 0.150 | |

(1) Forcing the configuration of RS 485 integrated port with TwidoSuite programming protocol parameters.

(2) Carries 5 V voltage (supplied by RS 485 integrated port of Twido controller) for **TWD XCA ISO** tap isolation box (not using the 5 V external power supply).

(3) Allows the using of RS 485 integrated port with the parameters defined in configuration.

(4) If the terminal is equipped with a 25-way SUB-D connector, a SUB-D 25-way female/9-way male adapter **TSX CTC 07** must also be ordered.



SoMachine software platform

Presentation

SoMachine is the OEM solution software for developing, configuring and commissioning the entire machine in a single software environment, including logic, motion control, HMI and related network automation functions.

SoMachine allows you to program and commission all the elements in Schneider Electric's Flexible and Scalable Control platform, the comprehensive solution-oriented offer for OEMs, which helps you achieve the most optimized control solution for each machine's requirements.

Flexible and Scalable Control platforms include:

Controllers:

- HMI controllers:
 - XBT GC,
 - XBT GT/GK CANopen,
- Logic controllers:
 - Modicon M238,
 - Modicon M258,
- Motion Controller
 - Modicon LMC 058,
- Integrated Controller Card:
 - Altivar IMC,

HMI:

- HMI Magelis graphic panels:
 - XBT GT,
 - XBT GK.

SoMachine is a professional, efficient, and open software solution integrating Vijeo-Designer.

It integrates also the configuring and commissioning tool for motion control devices. It features all IEC 61131-3 languages, integrated field bus configurators, expert diagnostics and debugging, as well as outstanding capabilities for maintenance and visualisation.

SoMachine integrates tested, validated, documented and supported expert application libraries dedicated to applications in Packaging, Hoisting and Conveying.

SoMachine provides you:

- One software package,
- One project file,
- One cable connection,
- One download operation.

Visual graphic user interface

Navigation within SoMachine is intuitive and highly visual. Presentation is optimized in such a way that selecting the development stage of the desired project makes the appropriate tools available. The user interface ensures nothing is overlooked, and suggests the tasks to be performed throughout the project development cycle. The workspace has been streamlined, so that only that which is necessary and relevant to the current task is featured, without any superfluous information.

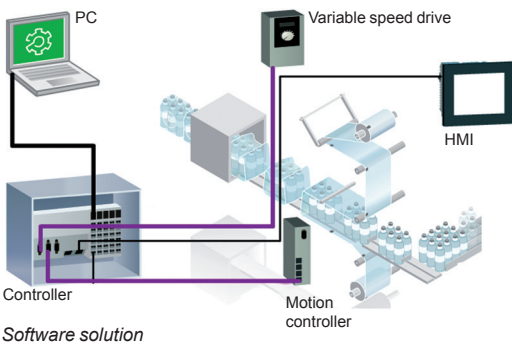
Learning centre

From the home menu, the learning centre provides several tools to get started with SoMachine. An animated file explains briefly the SoMachine interface and concept. An e-learning allows to run a self-training about SoMachine. A third section gives access to several documented examples of simple coding with SoMachine.

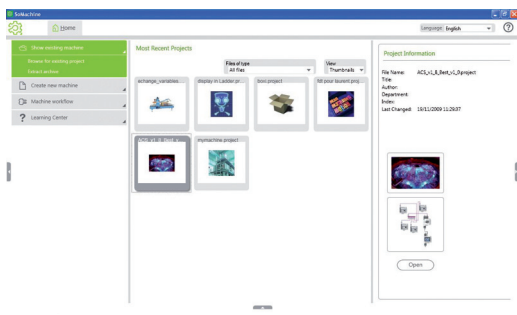
Projects management

The implemented project management principle allows to browse quickly the existing projects getting the relevant information without the need to open them before selection.

The user can create a new project, starting from several means: using Tested Validated and Documented Architectures, using the provided examples, using an existing project or from scratch. There is quick access to the most recently-used projects.



Software solution



Project management

Project properties

For each project, the user has the option to define additional information, through friendly forms. It's also possible to attach documents, a customer picture and a configuration picture.

Configuration

From the graphic user interface, the user can easily build his architecture and configure the devices of this architecture.

Description of the architecture

A graphic editor can be used to assemble the various elements easily by a simple drag & drop. A devices catalogue is displayed on the left of the screen. It is split into several sections: controllers, HMI, Miscellaneous and search.

Configuration of the device

Directly from the topologic view of the user interface, a simple click drives the user to the configuration screen of the selected device.

Programming and debug

Programming is an essential step, and the user has to carefully design it to be as efficient as possible. Advanced control and HMI functions cover all the needs of an OEM engineer in terms of creating the control and visualisation system. Powerful tools allow debug and functional tests such as simulation, step by step execution, break points, trace.

Commissioning

For an easy and fast diagnostic, the menu commissioning allows the user to check the online state of his architecture. Through the topologic view of the configuration, the devices display if you are logged in or not, as well as if they are in run or stop mode.

Documentation

Because a printed file of the project is an important element, it is possible to build and customize the project report:

- select the items to be included in the report,
- organize the sections,
- define the page layout
- and then launch the printing.

Transparency

SoMachine supports Device Type manager (DTM) because it is a field device tool (FDT) container.

With DTM's representing field device in SoMachine, direct communications are possible to every single device via SoMachine, the controller and the field bus CANopen, thus avoiding the lead for individual cable connections.

From the SoMachine unique environment, the remote devices can be set-up off-line and tuned on-line.

Dedicated OEM application libraries (AFB libraries)

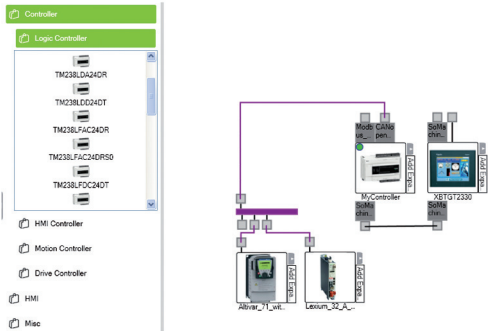
SoMachine can be extended through its solution extension CD. It integrates tested, validated, documented and supported expert application libraries dedicated to many OEM applications. Their simple configuration speeds up design, commissioning, installation and troubleshooting.

These libraries cover the following applications:

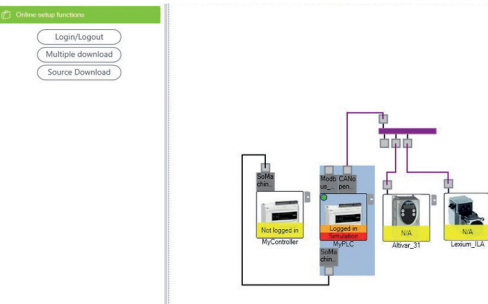
- Packaging,
- Hoisting,
- Conveying.

Tested Validated Documented Architectures (TVDA)

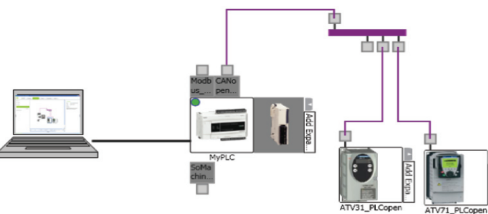
SoMachine provides a variety of preset projects with ready-to-use architectures you can adapt to individual requirements. Some of them are generic TVDA, they are based on controllers configuration. The solution extension CD brings solutions oriented TVDA's to SoMachine.



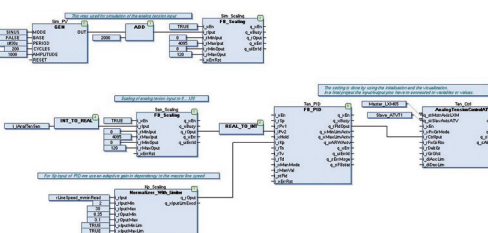
Configuration



Commissioning



Transparency



Application Function Blocks

SoMachine characteristics

| Overview | |
|-----------------------------------|--|
| IEC 61131-3 programming languages | <ul style="list-style-type: none"> ■ IL (Instruction List) ■ LD (Ladder Diagram) ■ SFC (Sequential Function Chart) ■ ST (Structured Text) ■ FBD (Function Block Diagram) ■ CFC (Continuous Function Chart) |
| Controller programming services | <ul style="list-style-type: none"> ■ Multi-tasking: Mast, Fast, Event ■ Functions (Func) and Function Blocks (FBs) ■ Data Unit Type (DUTs) ■ On-line changes ■ Watch windows ■ Graphical monitoring of variables (trace) ■ Breakpoints, step-by-step execution ■ Simulation ■ Visualization for application and machine set-up |
| HMI-based services | <ul style="list-style-type: none"> ■ Graphics libraries containing more than 4000 2D and 3D objects. ■ Simple drawing objects (points, line, rectangles, ellipses, etc ...) ■ Preconfigured objects (button, switch, bar graph, etc ...) ■ Recipes (32 groups of 256 recipes with max. 1024 ingredients) ■ Action tables ■ Alarms ■ Printing ■ Java scripts ■ Multimedia file support: wav, png, jpg, emf, bmp ■ Variable trending |
| Motion services | <ul style="list-style-type: none"> ■ Embedded devices configuration and commissioning ■ CAM profile editor ■ Sample application trace ■ Motion and drive function blocks libraries for inverters, servos and steppers ■ Visualization screens |
| Global services | <ul style="list-style-type: none"> ■ User access and profile ■ Project documentation printing ■ Project comparison (control) ■ Variable sharing based on publish/subscribe mechanism ■ Library version management |
| Integrated fieldbus configurators | <ul style="list-style-type: none"> ■ Control network: <ul style="list-style-type: none"> □ Modbus Serial Line □ Modbus TCP ■ Field bus: <ul style="list-style-type: none"> □ CANopen □ CANmotion □ AS-interface ■ Connectivity: <ul style="list-style-type: none"> □ Profibus-DP □ Ethernet IP |
| Expert and solutions libraries | <ul style="list-style-type: none"> ■ PLCOpen function blocks for Motion control <ul style="list-style-type: none"> □ Exemple: MC_MoveAbsolute, MC_CamIn, ServoDrive, ... ■ Packaging function blocks <ul style="list-style-type: none"> □ Exemple: Analog film tension control, rotary knife, lateral film position control, ... ■ Conveying function blocks <ul style="list-style-type: none"> □ Exemple: tracking, turntable, conveyor , ... ■ Hoisting function blocks <ul style="list-style-type: none"> □ Exemple: anti-sway, anti-crab, hoisting position synchronisation, ... |

Product offer

SoMachine software is delivered on a DVD, it is a product oriented version that includes all SoMachine features related to generic hardware (M238, M258, XBT GC), as well as generic TVDA

The solution features are added to SoMachine by installing its solution extension CD. It includes all SoMachine solutions hardware, plus all the dedicated application libraries and TVDA.

References

- SoMachine is available in 6 languages:
 - English
 - French
 - German
 - Italian
 - Spanish
 - Simplified Chinese.
- System Requirements:
 - Processor: Pentium 3 -1.2 GHz or higher
 - RAM Memory: 2 GByte; recommended: 3 GByte
 - Hard Disk: 3.5 GB, recommended: 4 GB
 - OS: Windows XP Professional, Windows Vista 32 Bit
 - Drive: DVD reader
 - Display: 1024 × 786 pixel resolution or higher
 - Peripherals: a Mouse or compatible pointing device
 - Peripherals: USB interface
 - Web Access: Web registration requires Internet access
- The documentation is supplied in electronic format: complete on-line help plus pdf version.

SoMachine software

| Supported controllers | TVDA | Reference | Weight kg |
|------------------------|--|----------------------|-----------|
| M238 M258 XBT GC | Optimized HW XBT GC Optimized HW M238 Optimized CANopen M238 Optimized AS-Interface M238 Optimized CANopen XBT GC/GT/GK Performance HW M258 Performance CANopen M258 | MSD CHNSFUV20 | – |

SoMachine solution extension

| Added controllers | Added TVDA | Added libraries | Reference | Weight kg |
|---|--|------------------------------------|-------------------------------|-----------|
| M238S M258S LMC 058 XBT GCS XBT GT/GK with control Altivar IMC | Optimized CANopen Altivar IMC Performance CANmotion LMC058 Hoisting Optimized CANopen M238 Conveying Performance CANmotion LMC058 | Hoisting Conveying Packaging | MSD CHNSFUS0V20 (1) | – |

(1) For this version, please contact Schneider electric.

Modicon M238 logic controller

Connection interfaces

Modicon Telefast ABE 7 pre-wired system

Connection sub-bases for discrete I/O extension modules

| | | | |
|--------------|------------------------------|---------|---------------------|
| Applications | Passive connection sub-bases | | Output adapter base |
| | Inputs | Outputs | |



| | | | |
|---|---|-----------------------------------|--|
| Compatibility | I/O extension modules of Modicon M238/Modicon OTB equipped with HE 10 connectors TM2 DDI 16DTK/32DTK and TM2 DDO 16DTK/32DTK | | |
| Relay amplification | - | | Electromechanical, fixed |
| Control voltage | ~ 24 V | | |
| Output voltage | ~ 24 V | | ~ 5...30 V, ~ 250 V (electromechanical) |
| Current per channel | Input 5 mA - | Output - 0.1 A | - 3 A |
| Modularity | 16 inputs | 16 outputs | |
| Type of inputs/outputs | 16 inputs (1 common/16 channels) | 16 outputs (1 common/16 channels) | 16 outputs with fuse protection LED indication 16 relay outputs (electromechanical) 1 N/O (1 common/4 channels) |
| Number of terminals per channel | 2, 3 (with optional snap-on terminal block) | | |
| Connection to Twido programmable controller | HE 10 connector, 20-way | | |
| Type of terminal | Fixed screw terminal block | | |
| Interface type | ABE 7E16EPN20 | ABE 7E16SPN20 | ABE 7E16SPN22 ABE 7E16SRM20 |
| Pages | 78 | 78 | 78 78 |

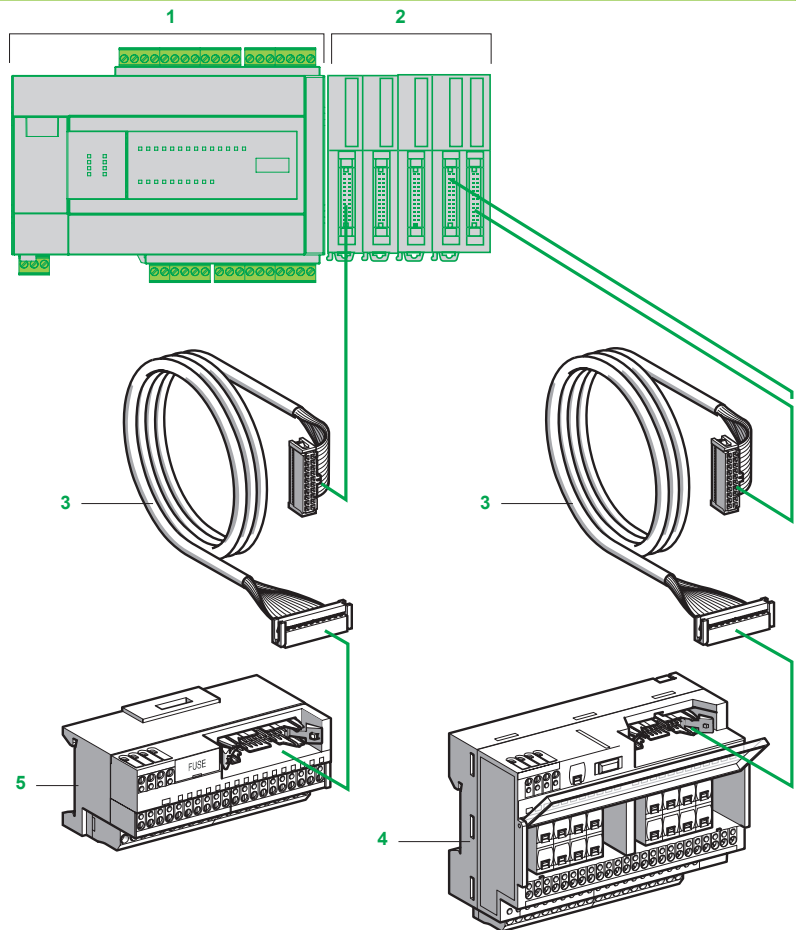
Modicon M238 logic controller

Connection interfaces

Modicon Telefast ABE 7 pre-wired system

Connection sub-bases for
discrete I/O extension modules

Presentation




- 1 Modicon M238 base controller.
- 2 Discrete I/O modules with 20-way HE 10 connectors. The modular sizes available are 16 or 32 I/O.
- 3 Cable (**ABF T20E●●0**) equipped with a 20-way HE 10 connector at each end. This cable is available in 0.5, 1, 2 and 3 m lengths (AWG 28/0.08 mm²).
- 4 16 channel sub-base (**ABE 7E16SPN22** or **ABE 7E16SRM20**) for output extension modules.
- 5 16 channel sub-base (**ABE 7E16EPN20** or **ABE 7E16SPN20**) for input or output extension modules.

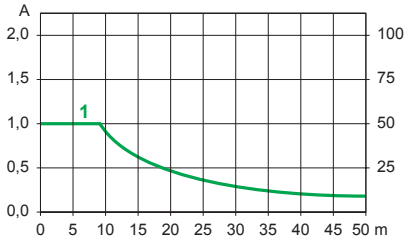
Compatibility with I/O extension modules

| | | Discrete I/O extension modules | |
|-------------------------------------|----------------------|-------------------------------------|----------------------------------|
| | | Inputs | Outputs (source) |
| | | TM2 DDI 16DK (16 inputs) | TM2 DDO 16TK (16 outputs) |
| | | TM2 DDI 32DK (32 inputs) | TM2 DDO 32TK (32 outputs) |
| Terminal block types | | HE 10 connectors, 20-ways | |
| Connection to I/O extension modules | | ABF T20E●●0 (HE 10, 20-ways) | |
| Passive connection sub-bases | | | |
| 16 channels | ABE 7E16EPN20 | | |
| | ABE 7E16SPN2● | | |
| Output adapter bases | | | |
| 16 channels | ABE 7E16SRM20 | | |

Compatible

| Environment characteristics | | | |
|---|---|-----------------|---|
| | | ABE 7E16●PN20 | ABE 7E16SPN2/SRM20 |
| Product certifications | | UL, CSA | |
| Degree of protection | Conforming to IEC 60529 | IP 2X | |
| Protective treatment | | "TC" | |
| Resistance to incandescent wire | Conforming to IEC 60695-2-11 | °C | 750 : extinction < 30 s |
| Shock resistance | Conforming to IEC 60068-2-27 | ms | 11 (half sine wave) 15 gn (acceleration) |
| Vibration resistance | Conforming to IEC 60068-2-6 | Hz | 10...150 2 gn (acceleration) |
| Resistance to electrostatic discharge | Conforming to IEC 61000-4-2 | | Level 3 |
| Resistance to radiated fields | Conforming to IEC 61000-4-3 | V/m | 10 (80 MHz à 2 GHz), level 3 |
| Immunity to fast transient currents | Conforming to IEC 61000-4-4 | | Level 3 |
| Surge withstand | Conforming to IEC 61000-4-5 | µs | 1,2/50 - 8/20 |
| Ambient air temperature | Conforming to IEC 61131-2 | °C | Operation: - 5...+ 60 |
| | | °C | Storage : - 40...+ 80 |
| Dielectric test voltage (for 1 minute) | | kV | 2 between terminals and mounting rails |
| Overvoltage category | Conforming to IEC 60664-1 | | Category II |
| Degree of pollution | Conforming to IEC 60664-1 | | 2 |
| Mounting | Conforming to IEC 60715 | | On standard  rail, height 15 mm, width 35 mm |
| Connection | Flexible cable without cable end | mm ² | 1 x 0.14...2.5, AWG 1 x 26...14 |
| | Flexible cable with cable end | mm ² | 1 x 0.09...1.5, AWG 1 x 28...16 |
| | Solid cable | mm ² | 1 x 0.14...2.5, AWG 1 x 26...12 |
| Tightening torque | | Nm | 0.6 (with 3.5 mm flat screwdriver) |
| Supply characteristics (controller side) | | | |
| Supply voltage | Conforming to IEC 61131-2 | ~ V | 19...30 (Un = 24) |
| Maximum supply current per sub-base | | ~ A | 2 |
| Voltage drop on supply fuse | | ~ V | 0.3 |
| Supply overload and short-circuit protection | | A | 2 by quick-blow fuse (included) |
| Characteristics of the control circuit for 1 channel (sensor/controller side) | | | |
| Sub-base type | Passive connection sub-bases for discrete signals | | Connection sub-bases with soldered relays |
| | ABE 7 E16EPN20 | ABE 7 E16SPN2● | ABE 7 E16SRM20 |
| Number of channels | 16 inputs | 16 outputs | 16 relay outputs |
| Rated voltage Ue | ~ V | 24 | |
| Min/max voltage | ~ V | 20.4/26.4 | 20,4/28,8 |
| Courant interne par voie à Ue | mA | – | 3,2 for ABE 7E16SPN22 |
| Etat 1 garanti | Relay output | V | – |
| Etat 0 garanti | Relay output | V | – |
| Conformité | Conforming to IEC 61131-2 | Type 1 | – |
| Output circuit characteristics (preactuator side) | | | |
| Number of channels | Passive output | | – |
| | Relay output | | 16 |
| Contact arrangement | Passive output | | – |
| | Relay output | | 16 |
| Rated voltage at Ue | Passive output | ~ V | 24 |
| | Relay output | ~ V | – |
| | Relay output | ~ V | – |
| Current switched per I/O channel | Entrée/Passive output | mA | 15/– |
| | Relay output | A | – |
| Maximum current per common | Passive output | A | – |
| | Relay output | A | – |
| Rated operational leakage current (60 °C max) (for 500 000 operations) | DC 12 | A | – |
| | DC 13 | A | – |
| | AC 12, relay | A | – |
| | AC 15, relay | A | – |
| Minimum current | | mA | – |
| Rated insulation voltage | | V | Not isolated |
| Maximum response time | From state 1 to state 0 Relay output | ms | – |
| | From state 1 to state 0 Relay output | ms | – |
| Channel fuse protection | | mA | – |
| Other characteristics (at ambient temperature of 20 °C) | | | |
| Permissible leakage current without illuminating the channel LED | | mA | – |
| Rated impulse withstand voltage (1.2/50) Relay output | | kV | – |
| Switching frequency | Relay output | Hz | – |
| Mechanical durability | In millions of operating cycles | | – |

Curves for determining the length of cable

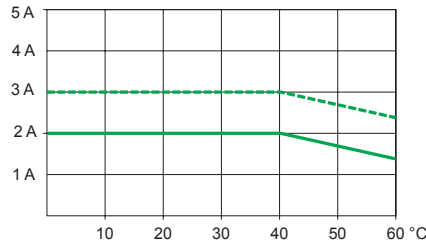


1 Cables ABF T2●●●●● c.s.a. 0.08 mm² (AWG 28)

Temperature derating curves

ABE 7E11SRM20, ABE 7E16SRM20

6 electromechanical relay outputs



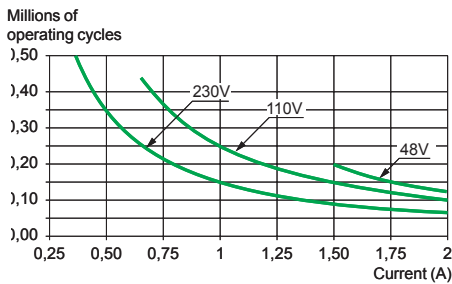
— 100 % of channels used
 - - - 50 % of channels used

Electrical durability (in millions of operating cycles, conforming to IEC 60947-5-1)

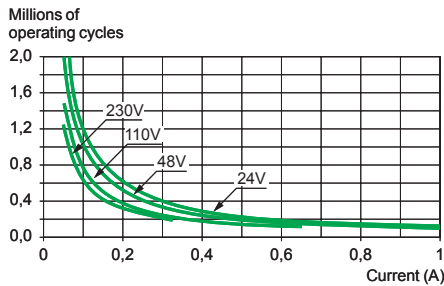
ABE 7E16SRM20

d.c. loads

DC 12 curves (1)

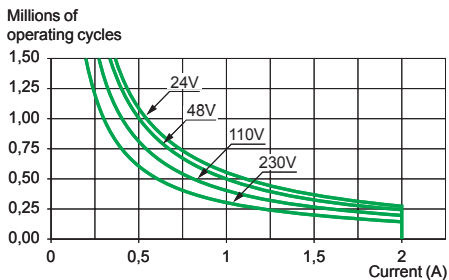


DC 13 curves (2)

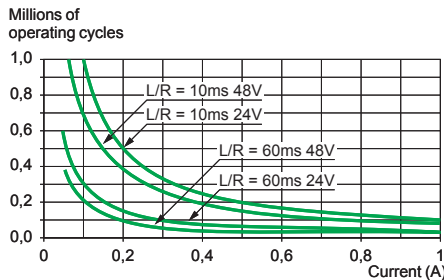


a.c. loads

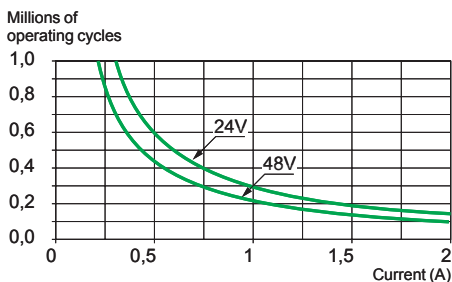
AC 12 curves (3)



AC 14 curves (4)



AC 15 curves (5)



- (1) DC 12: control of resistive loads and of solid state loads isolated by optocoupler, $L/R \leq 1$ ms.
- (2) DC 13: control of electromagnets, $L/R \leq 2 \times (U_e \times I_e)$ in ms, U_e : Rated operational voltage, I_e : rated operational current (with a protective diode on the load, DC12 curves must be used with a coefficient of 0.9 applied to the number in millions of operating cycles)
- (3) AC 12: control of resistive loads and of solid state loads isolated by optocoupler, $\cos \varphi \leq 0.9$.
- (4) AC 14: control of small electromagnetic loads ≤ 72 VA, make: $\cos \varphi = 0.3$, break: $\cos \varphi = 0.3$.
- (5) AC 15: control of electromagnetic loads > 72 VA, make: $\cos \varphi = 0.7$, break: $\cos \varphi = 0.4$.

Modicon M238 logic controller

Connection interfaces

Modicon Telefast ABE 7 pre-wired system

Connection sub-bases for discrete I/O extension modules



ABE 7E16EPN20



ABE 7E16SRM20

References

For discrete I/O extension modules

| Number of inputs | Type of inputs | Compatibility | LED per channel | Fuse | Reference | Weight kg |
|------------------|------------------|------------------------|-----------------|------|----------------------|-----------|
| 16 | Sink --- 24 V | TM2 DDI16DK/DDI32DK | No | No | ABE 7E16EPN20 | 0.430 |

| Number of outputs | Type of outputs | Compatibility | LED per channel | Fuse | Reference | Weight kg |
|-------------------|--|------------------------|-----------------|------|----------------------|-----------|
| 16 | Source --- 24 V | TM2 DDO16TK/DDO32TK | No | No | ABE 7E16SPN20 | 0.450 |
| | | | Yes | Yes | ABE 7E16SPN22 | 0.450 |
| | Relais --- 24/~ 250 V, DDO16TK/DDO32TK 3 A | TM2 | No | No | ABE 7E16SRM20 | 0.430 |

Connection cordset for discrete I/O extension modules

| Type of signal | Compatibility | Type of connection | | Gauge/ C.s.a. | Length (1) | Reference | Weight kg |
|-----------------------------|--|--------------------|------------------|--------------------------------|---------------|--------------------|--------------|
| | | TM2 side | Telefast side | | | | |
| Discrete inputs/ outputs | TM2 DDI16DK/ DDI32DK/ DDO16TK/ DDO32TK | HE 10 20-ways | HE 10 20-ways | AWG 28 0.08 mm ² | 0,5 m | ABF T20E050 | 0.060 |
| | | | | | 1 m | ABF T20E100 | 0.080 |
| | | | | | 2 m | ABF T20E200 | 0.140 |

Accessories

| Description | Number of shunted terminals | Characteristics | Sold in lots of | Unit reference | Weight kg |
|---|-----------------------------|-----------------|-----------------|--------------------|-----------|
| Optional snap-on terminal blocks | 20 | – | 5 | ABE 7BV20 | 0.060 |
| | 12 + 8 | – | 5 | ABE 7BV20TB | 0.060 |
| Quick-blow fuses for ABE 7E16SPN22 sub-bases 5 x 20, 250 V, UL | – | 0.125 A | 10 | ABE 7FU012 | 0.010 |
| | – | 0.315 A | 10 | ABE 7FU030 | 0.010 |
| | – | 1 A | 10 | ABE 7FU100 | 0.010 |
| | – | 2 A | 10 | ABE 7FU200 | 0.010 |

(1) For lengths > 2 m, please contact us.

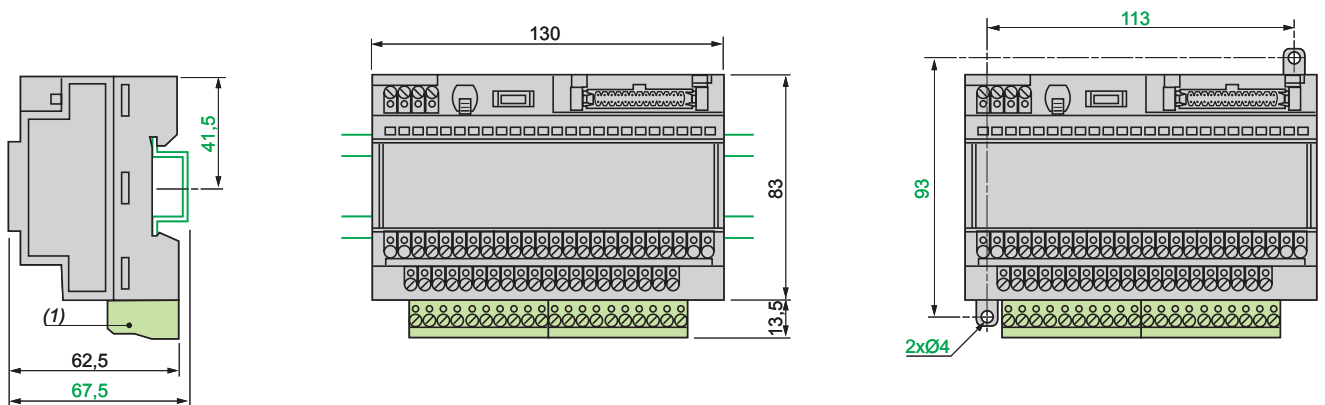
References (continued)

| Separate for connection components | | | | | | | |
|--|--------------------------------------|---------------------------------|-------------|-----------------------|---------------|-------------|--------|
| Description | Type | Compatibility | Reference | Weight | | | |
| Connectors Sold in lots of 5 | HE 10 female | TM2 | TWD FCN2K20 | — | | | |
| | 20-ways | DDI16DK/32DK/ DDO16TK/32TK | | | | | |
| Screw terminal blocks Sold in lots of 2 | 10-ways | TM2 | TWD FBT2T10 | — | | | |
| | 11-ways | DDI●DT/DAI8DT/ DDO8●T/DRA●RT | | | | | |
| | | TM2 | TWD FTB2T11 | — | | | |
| | | DMM8DRT/AMI●●T/ARI8HT | | | | | |
| Type of signal | Compatibility | Type of connection | | Gauge/ C.s.a. | Length (1) | Reference | Weight |
| Cables for discrete I/O | TM2 DDI16DK/32DK/ DDO16TK/32TK | HE 10 | Bare wires | AWG 22 | 3 m | TWD FCW30K | 0.405 |
| | | 20-ways | | 0.035 mm ² | 5 m | TWD FCW50K | 0.670 |
| Pre-formed cable, rolled | 20 conducteurs | — | — | AWG 28 | 20 m | ABF C20R200 | 1.310 |
| | | | | 0.08 mm ² | | | |

Dimensions

ABE 7E16SPN22, ABE 7E16SRM20

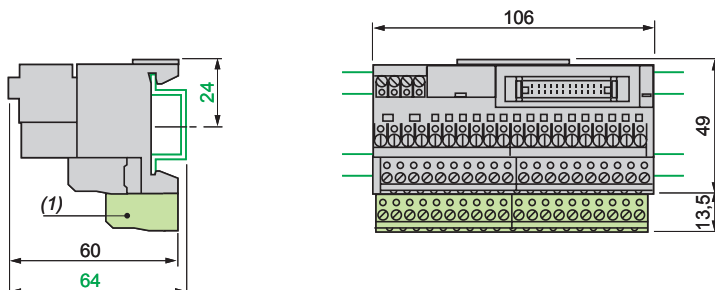
Mounting on 35 mm L rail or screw fixing (retractable lugs)



(1) ABE 7BV20, ABE 7BV20TB.

ABE 7E16EPN20, ABE 7E16SPN20

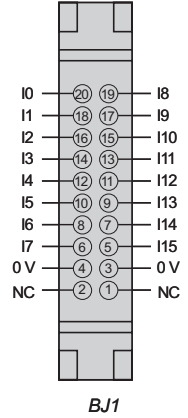
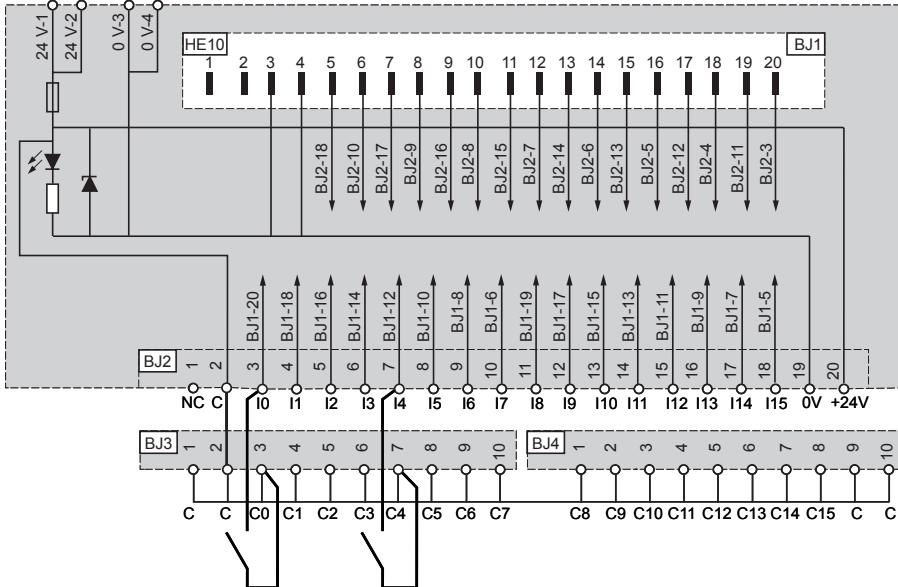
Mounting on 35 mm L rail



(1) ABE 7BV20, ABE 7BV20TB.

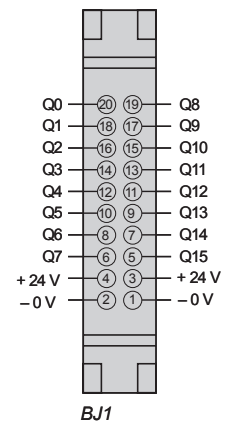
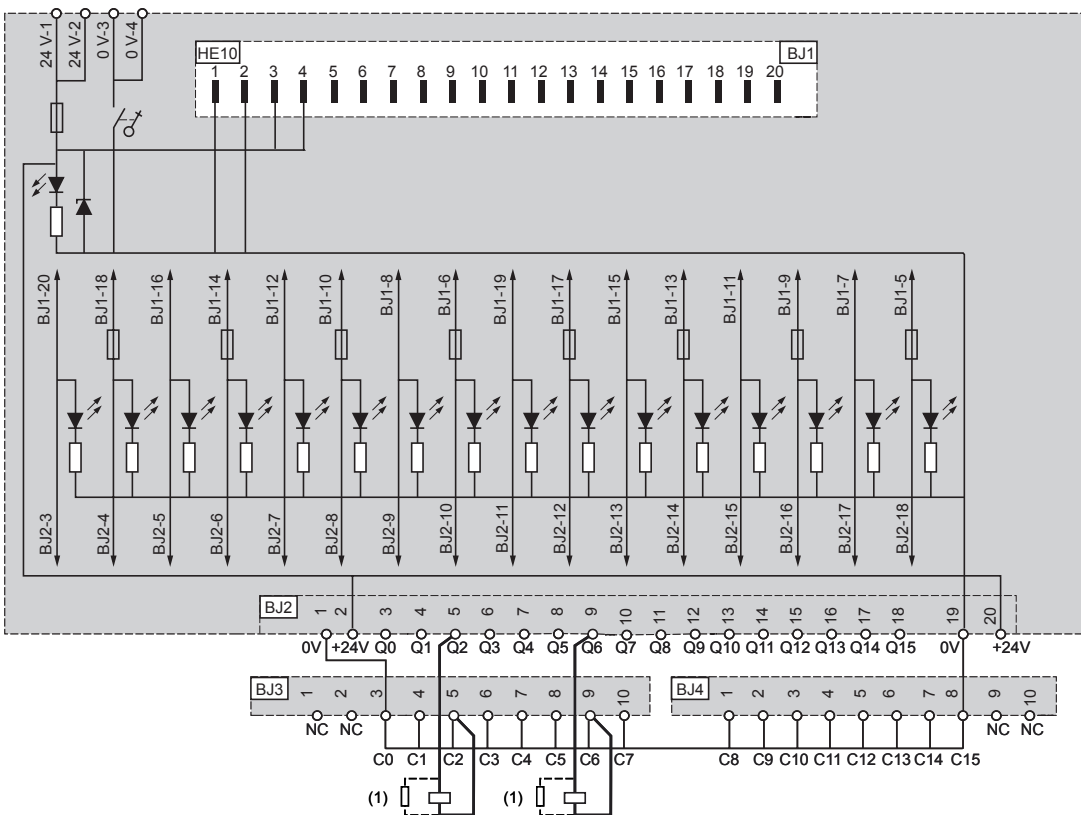
ABE 7E16EPN20

HE10, 20-way



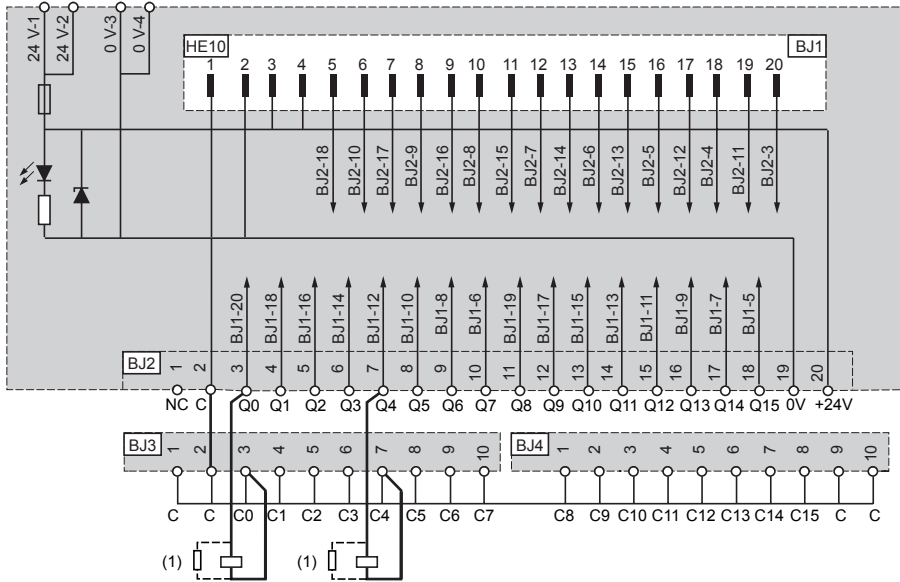
ABE 7E16SPN22

HE10, 20-way

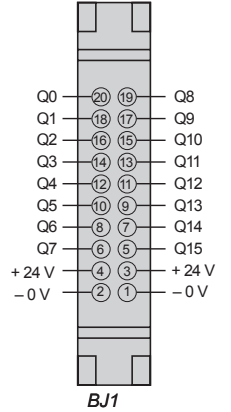


(1) Example of output connections.
When connecting an inductive load, include a diode or a varistor.

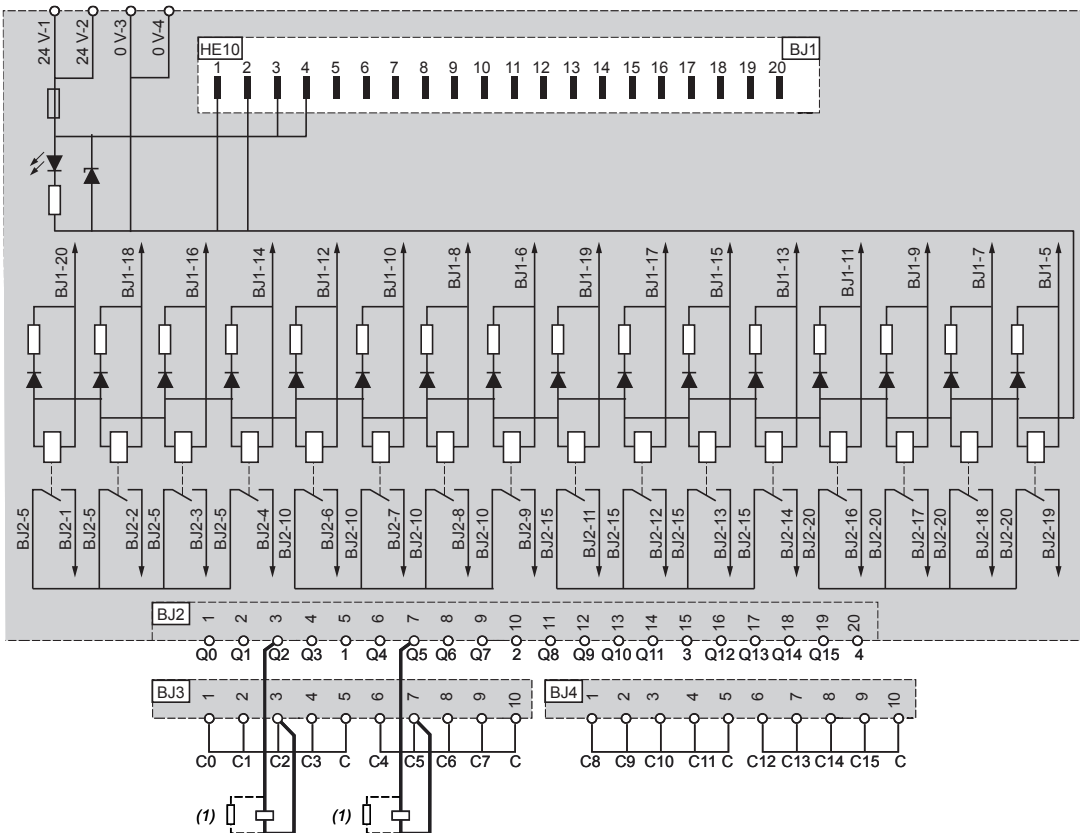
ABE 7E16SPN20



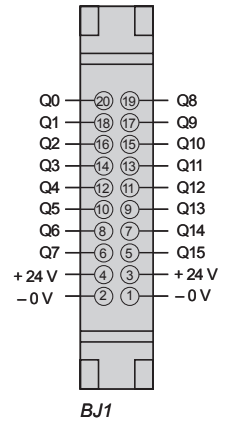
HE10, 20-way



ABE 7E16SRM20



HE10, 20-way



(1) Example of output connections.

When connecting an inductive load, include a diode or a varistor.

Modicon M238 logic controller

Discrete inputs modules and OsiSense® XS inductive proximity sensors

Temporary version

| OsiSense® XS inductive proximity sensors | | | Logic controller | | I/O extension modules | |
|--|--------------------|-------------------|--|--------------|-----------------------|--|
| | | | TM238 LDD24DT, TM238 LDA24DR, TM238 LFDC24DT, TM238 LFAC24DR | | TM2 DDI8DT | |
| | | | 6 standard inputs | 8 HSC inputs | 8 inputs | |
| | | | 24 VCC Sink/Source | 24 VCC Sink | 24 VCC Sink/Source | |
| | | | Type 1 | Type 1 | Type 1 | |
| 2 wires | ~ | XS1●●BLFA | | | | |
| | | XS7/8 C40FP | | | | |
| | | ⋮ | XS7 J/F | | | |
| | | | XS7 C/D/E | | | |
| | ~ / ⋮ | XS5 D/C A/B | | | | |
| | | XS7 T4DA | | | | |
| | | XS8 C/D/E | | | | |
| | | XS1/2 M●●M | | | | |
| | | XS6●●B1/B4M | | | | |
| | | XS2●●S/AMA | | | | |
| | ~ / ⋮ | XS4 230 | | | | |
| | | XSAV●V1●801 | | | | |
| | | XS7/8 C40M | | | | |
| | | XS7/8G12MA | | | | |
| 3 wires | | PNP | XS8 C/D/E A1P | | | |
| | | | XS7 C/D/E/J/F A1P | | | |
| | XS1 P 349 | | | | | |
| | XS5 B1P | | | | | |
| | XS4 P 340 | | | | | |
| | XS2●●S/AAP● | | | | | |
| | XS1/2 N06 P | | | | | |
| | XS1/2 L/N 04/05 P | | | | | |
| | XS6●●B1/4P | | | | | |
| | XS4 P 370 | | | | | |
| | XS6 B2P | | | | | |
| | XS1/2●●A/BLP | | | | | |
| | XS1/208A/BLP | | | | | |
| | XS1 M18PAS4/20 | | | | | |
| XSAV1●373 | | | | | | |
| XS7/8 G12P 140 | | | | | | |
| 4 wires NO + NC | PNP | XS7/8 G12P 440 | | | | |
| | | XS7/8 C40P 440/9 | | | | |
| | | XS1/2 L/M/N P 410 | | | | |
| 3 wires | NPN | XS8 C/D/E A1N | | | | |
| | | XS7 C/D/E/J/F A1N | | | | |
| | | XS1 N 349 | | | | |
| | | XS5 B1N | | | | |
| | | XS4 N 340 | | | | |
| | | XS2●●S/AAN● | | | | |
| | | XS1/2 N06 N | | | | |
| | | XS1/2 L/N 04/05 N | | | | |
| | | XS6●●B1/4N | | | | |
| | | XS4 N 370 | | | | |
| | | XS6 B2N | | | | |
| | | XS1/2●●A/BLN | | | | |
| | | XS1/208A/BLN | | | | |
| | | XS7/8 G12N 140 | | | | |
| 4 wires NO + NC | NPN | XS7/8 G12N 440 | | | | |
| | | XS7/8 C40N 440/9 | | | | |
| | | XS1/2 L/M/N N 410 | | | | |
| 4 wires prog. NO/NC | PNP + NPN | XS1/2 M●●KP | | | | |
| | PNP + NPN Factor 1 | XS KP M40 | | | | |

Compatible

Non compatible

Modicon M238 logic controller

Discrete inputs modules and OsiSense® XU photo-electric sensors

Temporary version

| OsiSense® XU photo-electric sensors | | | Logic controller | | I/O extension modules | | |
|-------------------------------------|---------|---------------------|--|---------------------|-----------------------|--|--|
| | | | TM238 LDD24DT, TM238 LDA24DR, TM238 LFDC24DT, TM238 LFAC24DR | | TM2 DDI8DT | | |
| | | | 6 standard inputs | 8 HSC inputs | 8 inputs | | |
| | | | 24 VCC Sink/Source | 24 VCC Sink | 24 VCC Sink/Source | | |
| | | | Type 1 | Type 1 | Type 1 | | |
| 2 wires solid-state output | ~ / --- | XULA | | | | | |
| | | XU2/5/8/9M | | | | | |
| 3 wires | PNP | XUB0/1/2/4/5/9/ P S | | | | | |
| | | XUM 1/5/6/9 P | | | | | |
| | | XUK 1/2/5/9 P | | | | | |
| | | XUX 1/2/5/9 P | | | | | |
| | | XUB0/1/2/4/5/9/ P S | | | | | |
| | | XUM2 P | | | | | |
| | | XUM●A●PCN●● | | | | | |
| | | XUM●B●●PN●● | | | | | |
| | | XUM0 P | | | | | |
| | | XUD A●P | | | | | |
| | | XULH | | | | | |
| | | XUAH | | | | | |
| | | XUBT P | | | | | |
| | | XU1/9/5N18P● | | | | | |
| | | XU2P●●DL | | | | | |
| | | XU2N18P● | | | | | |
| | | XUVH | | | | | |
| | | XUKC1P | | | | | |
| | | XURC3/4P | | | | | |
| | | XUKR1P | | | | | |
| | | XU5M18U1 | | | | | |
| | | XUY LCCLAR●●P | | | | | |
| | | XUY B/P ●●CO P | | | | | |
| | | 3 wires | NPN | XUB0/1/2/4/5/9/ N S | | | |
| | | | | XUM1/5/6/9 N | | | |
| | | | | XUK1/2/5/9 N | | | |
| | | | | XUX1/2/5/9 N | | | |
| XUM2 N | | | | | | | |
| XUM●A●NCN●● | | | | | | | |
| XUM●B●●N ●● | | | | | | | |
| XUM0 N | | | | | | | |
| XUD A●N | | | | | | | |
| XULJ | | | | | | | |
| XUAJ | | | | | | | |
| XUBT N | | | | | | | |
| XU1/9/5N18N● | | | | | | | |
| XU2N18N● | | | | | | | |
| XUVJ | | | | | | | |
| XUKC1N | | | | | | | |
| XURC3/4N | | | | | | | |
| XUKR1N | | | | | | | |
| XUY LCCLAR●●N | | | | | | | |
| XUY B/P ●●CO N | | | | | | | |
| 3 wires | PNP/NPN | | | XUC9/8AK | | | |
| | | | | XUK8AK | | | |
| | | | | XUC2AK | | | |
| | | | | XUK0AKS | | | |
| | | | | XUX0AKS | | | |
| | | | | XUKT1K | | | |
| | | | | XURU1 | | | |
| | | XURK0 | | | | | |
| | | XURK1 | | | | | |
| | | XUY PS | | | | | |
| | | XUY P 952/4 S | | | | | |
| | | 4 wires | PNP + NPN | XUMW1K | | | |
| | | | | XUY FAL/P/V | | | |
| XUY F | | | | | | | |
| XUVF 30/60 | | | | | | | |
| XUV/Y F 120/180/250 | | | | | | | |
| XUVK | | | | | | | |

Compatible

Non compatible

Modicon M238 logic controller

Discrete inputs modules and OsiSense® XG rotary encoders

Temporary version

| OsiSense® XG rotary encoders | | Logic controller | | I/O extension modules | |
|------------------------------|--|--|--------------|-----------------------|--|
| | | TM238 LDD24DT, TM238 LDA24DR, TM238 LFDC24DT, TM238 LFAC24DR | | TM2 DDI8DT | |
| | | 6 standard inputs | 8 HSC inputs | 8 inputs | |
| | | 24 VCC Sink/Source | 24 VCC Sink | 24 VCC Sink/Source | |
| | | Type 1 | Type 1 | Type 1 | |
| Incremental encoders | 5V, RS 422 | XCC 14●●●●R | | RS 422 (5 V) | |
| | Push/pull 11...30 V | XCC 14●●●●K | | | |
| | 5V, RS 422 | XCC 19●●●●RN | | RS 422 (5 V) | |
| | Push/pull 11...30 V | XCC 19●●●●KN | | | |
| | 5V, RS 422 | XCC 15●●●●X | | RS 422 (5 V) | |
| | Push/pull 11...30 V | XCC 15●●●●Y | | | |
| | 5V, RS 422 | XCC 15●●●●M●●●X | | RS 422 (5 V) | |
| Push/pull 11...30V | XCC 15●●●●M●●●Y | | | | |
| Absolute encoders | Push/pull 11...30 V | XCC 25●●●●KB (N) / KG (N) | | | |
| | SSI output without parity, clock 13 or 25 bits | XCC 25●●●●SB (N) / SG (N) | | SSI | |
| | Push/pull 11...30 V | XCC 29●●●●KB (N) / KG (N) | | | |
| | SSI output without parity, clock 13 or 25 bits | XCC 29●●●●SB (N) / SG (N) | | SSI | |
| | SSI output without parity, clock 13 or 25 bits | XCC 35●●●●SB (N) / SG (N) XCC 39●●●●SB (N) / SG (N) | | SSI | |
| | 11...30 V, CanOpen | XCC 35●●●●CB | | (CanOpen) | |
| | 11...30 V, Profibus | XCC 35●●●●FB | | (Profibus) | |

Compatible

Non compatible

Compatible with --- 100 Hz max. frequency

| | | | | | | Counter modules |
|------------|--------------------|--------------------|--------------------|--------------------|---------------------------|---------------------|
| TM2 DAI8DT | TM2 DDI16DT | TM2 DDI16DK | TM2 DDI32DK | TM2 DMM8DRT | TM2 DMM24DRF | TM200 HSC 206DT/DF |
| 8 inputs | 16 inputs | 16 HE10 inputs | 32 HE10 inputs | 4 inputs | 16 spring terminal inputs | 3 high-speed inputs |
| 120 VAC | 24 VCC Sink/Source | 24 VCC Sink/Source | 24 VCC Sink/Source | 24 VCC Sink/Source | 24 VCC Sink/Source | 24 VCC Sink |
| Type 1 | Type 1 | Type 1 | Type 1 | Type 1 | Type 1 | Type 1 |
| | | | | | | RS 422 (5 V) |
| | | | | | | |
| | | | | | | RS 422 (5 V) |
| | | | | | | |
| | | | | | | RS 422 (5 V) |
| | | | | | | |
| | | | | | | RS 422 (5 V) |
| | | | | | | |
| | | | | | | SSI |
| | | | | | | |
| | | | | | | SSI |
| | | | | | | SSI |
| | | | | | | SSI |
| | | | | | | (CanOpen) |
| | | | | | | (Profibus) |

Applications

Display of text messages

Type of terminal

Small Panels with keypad



| | |
|----------------|----------|
| Display | Type |
| | Capacity |

| |
|--|
| Green back-lit LCD, height 5.5 mm or Green, orange or red back-lit LCD, height 4.34...17.36 mm |
| 2 lines of 20 characters or 1 to 4 lines of 5 to 20 characters |

Data entry

Via keypad with
8 keys (4 customisable)

| | |
|------------------------|-----------------------------|
| Memory capacity | Application |
| | Expansion by PCMCIA type II |

| |
|--------------|
| 512 KB Flash |
| – |

| | |
|------------------|-----------------------------|
| Functions | Maximum number of pages |
| | Variables per page |
| | Representation of variables |
| | Recipes |
| | Curves |
| | Alarm logs |
| | Real-time clock |
| | Alarm relay |
| | Buzzer |

| |
|--|
| 128/200 application pages 256 alarm pages |
| 40...50 |
| Alphanumeric |
| – |
| – |
| Depending on model |
| Access to the PLC real-time clock |
| – |
| – |

| | |
|----------------------|--------------------------|
| Communication | Asynchronous serial link |
| | Downloadable protocols |
| | Printer link |

| |
|--|
| RS 232C/RS 485 |
| Uni-TE, Modbus and for PLC brands : Allen-Bradley, Omron, Mitsubishi, Siemens |
| RS 232C serial link (2) |

| | |
|-----------------------------|---|
| Development software | Vijeo Designer Lite (on Windows XP and Vista) |
| Operating system | Magelis |

| |
|---|
| Vijeo Designer Lite (on Windows XP and Vista) |
| Magelis |

Terminal type

XBT N

Pages

Please, consult our catalogue "Human/Machine interfaces"

- (1) Only XBT RT511.
- (2) Depending on model.

| | |
|--|---|
| Display of text messages Control and parametering of data | Display of text messages and/or semi-graphics Control and parametering of data |
|--|---|

| | |
|--------------------------|---|
| Small Panels with keypad | Small Panels with touch screen and keypad |
|--------------------------|---|



| | |
|--|--|
| Green, orange or red back-lit LCD, height 4.34...17.36 mm | Green, orange or red back-lit LCD (198 x 80 pixels), height 4...16 mm |
| 1 to 4 lines of 5 to 20 characters | 2 to 10 lines of 5 to 33 characters |

| | | |
|---|--|--|
| Via keypad with 12 function keys or numeric entry (depending on context) + 8 service keys | Via keypad with 4 function keys 8 service keys | Via touch screen and keypad with 10 function keys 2 service keys |
|---|--|--|

| | |
|-------------------|-------------------------|
| 512 KB Flash - | 512 KB Flash EPROM - |
|-------------------|-------------------------|

| | |
|---|---|
| 128/200 application pages 256 alarm pages 40...50 Alphanumeric - - Yes Access to the PLC real-time clock - - | 200 application pages 256 alarm pages 50 Alphanumeric, bargraph, buttons, lights - Yes Yes Yes (1) |
|---|---|

| |
|---|
| RS 232C/RS 485 Uni-TE, Modbus and for PLC brands : Allen-Bradley, Omron, Mitsubishi, Siemens RS 232C serial link (2) |
|---|

| |
|--|
| Vijeo Designer Lite (on Windows XP and Vista) Magelis |
|--|

| | |
|-------|--------|
| XBT R | XBT RT |
|-------|--------|

Please, consult our catalogue "Human/Machine interfaces"

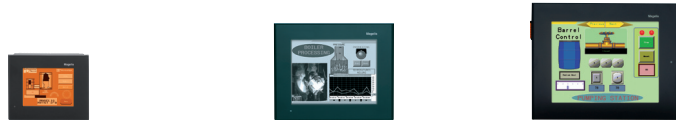
Modicon M238 logic controller

Operator dialogue terminals

Magelis Advanced Panels XBT GT, XBT GK, XBT GH and XBT GTW

| | |
|---------------------|--|
| Applications | Display of text messages, graphic objects and synoptic views Control and parametering of data |
|---------------------|--|

| | |
|-------------------------|-------------------------------------|
| Type of terminal | Touch screen Advanced Panels |
|-------------------------|-------------------------------------|



| Display | Type | Back-lit monochrome (amber or red mode) STN LCD (320 x 240 pixels) or TFT LCD | Back-lit monochrome or colour STN LCD or back-lit colour TFT LCD (320 x 240 pixels) | Back-lit colour STN LCD or TFT LCD (640 x 480 pixels) |
|---------|------|---|---|---|
| | Size | 3.8" (monochrome or colour) | 5.7" (monochrome or colour) | 7.5" (colour) |

| Data entry | Via touch screen |
|-----------------------|------------------|
| Static function keys | – |
| Dynamic function keys | – |
| Service keys | – |
| Alphanumeric keys | – |

| Memory capacity | Application | 32 MB Flash EPROM | 16 MB Flash EPROM | 32 MB Flash EPROM |
|-----------------|-------------|-------------------|---|-------------------|
| | Expansion | – | By 128, 256, 512 MB, 1, 2 or 4 GB CF card (except XBT GT2110) | |

| Functions | Maximum number of pages | Limited by internal Flash EPROM memory capacity | Limited by internal Flash EPROM memory capacity or CF card memory capacity | |
|-----------|-----------------------------|---|--|--|
| | Variables per page | Unlimited (8000 variables max.) | | |
| | Representation of variables | Alphanumeric, bitmap, bargraph, gauge, tank, tank level indicator, curves, polygon, button, light | | |
| | Recipes | 32 groups of 64 recipes comprising 1024 ingredients max. | | |
| | Curves | Yes, with log | | |
| | Alarm logs | Yes | | |
| | Real-time clock | Built-in | | |
| | Digital inputs/outputs | – | 1 input (reset) and 3 outputs (alarm, buzzer, run) | |
| | Multimedia inputs/outputs | – | 1 audio input (microphone), 1 composite video input (digital or analogue camera), 1 audio output (loudspeaker) (1) | |

| Communication | Downloadable protocols | Uni-TE (2), Modbus, Modbus TCP/IP (1) and for PLC brands: Mitsubishi, Omron, Allen-Bradley and Siemens | | |
|---------------|--------------------------|--|--|---|
| | Asynchronous serial link | RS 232C/RS 485 (COM1) | RS 232C/RS 422/485 (COM1) and RS 485 (COM2) | |
| | USB ports | 1 | 1 | 2 |
| | Bus and networks | – | Modbus Plus and Fipway with USB gateway, Profibus DP and Device Net with optional card | |
| | | Ethernet TCP/IP (10BASE-T/100BASE-TX) (1) | | |
| | Printer link | USB port for parallel printer | RS 232C (COM1) serial link, USB port for parallel printer | |

| Development software | Vijeo Designer (on Windows XP and Vista) | | |
|----------------------|--|----------------------------|----------------------------|
| Operating system | Magelis (200 MHz RISC CPU) | Magelis (133 MHz RISC CPU) | Magelis (266 MHz RISC CPU) |

| Terminal type | XBT GT11/13 | XBT GT21/22/23 | XBT GT42/43 |
|---------------|--------------------|-----------------------|--------------------|
|---------------|--------------------|-----------------------|--------------------|

| Pages | Please, consult our catalogue "Human/Machine interfaces" |
|-------|--|
|-------|--|

(1) Depending on model.
(2) Uni-TE version V2 for Twido controller and TSX Micro/Premium platform.

Touch screen Advanced Panels



Back-lit colour STN LCD or TFT LCD
(640 x 480 pixels)

10.4" (colour)



Back-lit colour TFT LCD (800 x 600 pixels)

12.1" (colour)



Back-lit colour TFT LCD (1024 x 768 pixels)

15" (colour)

Via touch screen

–
–
–
–

32 MB Flash EPROM

By 128, 256, 512 MB, 1, 2 or 4 GB Compact Flash card

Limited by internal Flash EPROM memory capacity or CF card memory capacity

Unlimited (8000 variables max.)

Alphanumeric, bitmap, bargraph, gauge, tank, tank level indicator, curves, polygon, button, light

32 groups of 64 recipes comprising 1024 ingredients max.

Yes, with log

Yes

Built-in

1 input (reset) and 3 outputs (alarm, buzzer, run)

1 audio input (microphone), 1 composite video input (digital or analogue camera), 1 audio output (loudspeaker) (1)

Uni-TE (2), Modbus, Modbus TCP/IP (1) and for PLC brands: Mitsubishi, Omron, Allen-Bradley and Siemens

RS 232C/RS 422/485 (COM1) and RS 485 (COM2)

2

Modbus Plus with USB gateway

Ethernet TCP/IP (10BASE-T/100BASE-TX)

RS 232C (COM1) serial link, USB port for parallel printer

Vijeo Designer (on Windows XP and Vista)

Magelis
(266 MHz RISC CPU)

XBT GT52/53

XBT GT63

XBT GT73

Please, consult our catalogue "Human/Machine interfaces"

Modicon M238 logic controller

Operator dialogue terminals

Magelis Advanced Panels XBT GT, XBT GK, XBT GH and XBT GTW

Applications

Display of text messages, graphic objects and synoptic views
Control and parametering of data

Type of terminal

Advanced Panels with keypad



| | |
|----------------|------|
| Display | Type |
| | Size |

| | |
|---|-----------------------------------|
| Colour TFT LCD (320 x 240 pixels) or monochrome STN LCD | Colour TFT LCD (640 x 480 pixels) |
| 5.7" (monochrome or colour) | 10.4" (colour) |

| | |
|-------------------|-----------------------|
| Data entry | Static function keys |
| | Dynamic function keys |
| | Service keys |
| | Alphanumeric keys |
| | |

| | |
|--|----|
| Via keypad and/or touch screen (configurable) and/or by industrial pointer | |
| 10 | 12 |
| 14 | 18 |
| 8 | |
| 12 | |

| | |
|------------------------|-------------|
| Memory capacity | Application |
| | Expansion |

| | |
|--|-------------------|
| 16 MB Flash EPROM | 32 MB Flash EPROM |
| By 128, 256, 512 MB, 1, 2 or 4 GB Compact Flash card | |

| | |
|------------------|-----------------------------|
| Functions | Maximum number of pages |
| | Variables per page |
| | Representation of variables |
| | Recipes |
| | Curves |
| | Alarm logs |
| | Real-time clock |
| | Digital inputs/outputs |
| | Multimedia inputs/outputs |
| | |

| | |
|---|---------------------|
| Limited by internal Flash EPROM memory capacity or CF card memory capacity | |
| Unlimited (8000 variables max.) | |
| Alphanumeric, bitmap, bargraph, gauge, tank, tank level indicator, curves, polygon, button, light | |
| 32 groups of 64 recipes comprising 1024 ingredients max. | |
| Yes, with log | |
| Yes | |
| Built-in | |
| - | 1 input - 3 outputs |
| - | - |

| | |
|----------------------|--------------------------|
| Communication | Downloadable protocols |
| | Asynchronous serial link |
| | USB ports |
| | Bus and networks |
| | Printer link |

| | |
|--|---|
| Uni-TE (2), Modbus, Modbus TCP/IP (1) and for PLC brands: Mitsubishi, Omron, Allen-Bradley and Siemens | |
| RS 232C/RS 422/485 (COM1) RS 485 (COM2) | |
| 1 | 2 |
| Modbus Plus, Fipway with USB gateway, Profibus DP and Device Net with optional card | |
| Ethernet TCP/IP (10BASE-T/100BASE-TX) | |
| RS 232C (COM1) serial link, USB port for parallel printer | |

| |
|-----------------------------|
| Development software |
| Operating system |

| |
|--|
| Vijeo Designer (on Windows XP and Vista) |
| Magelis (266 MHz RISC CPU) |

Terminal type

XBT GK 21/23 | **XBT GK 53**

Pages

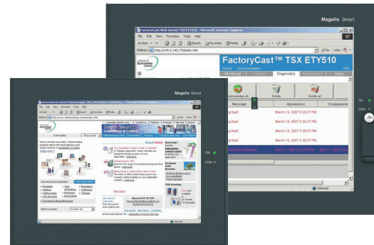
Please, consult our catalogue "Human/Machine interfaces"

(1) Depending on model.
(2) Uni-TE version V2 for Twido controller and TSX Micro/Premium platform.

**Display of text messages, graphic objects and synoptic views
Control and parametering of data**

Portable Advanced Panels

Open touch screen Advanced Panels



| | | | |
|--|--|--|---------------------------------------|
| Colour TFT LCD (640 x 480 pixels) | Colour TFT LCD (800 x 600 pixels) | Colour TFT LCD (800 x 600 pixels) | Colour TFT LCD (1024 x 768 pixels) |
| 5.7" (colour) | 8.4" (colour) | 12" (colour) | 15" (colour) |
| Via touch screen | Via touch screen | | |
| 11 | – | | |
| – | – | | |
| – | – | | |
| – | – | | |
| 32 MB Flash EPROM | 1 GB CF system card included with terminal, expandable to 4 GB | 2 GB CF system card included with terminal, expandable to 4 GB | |
| By 128, 256, 512 MB, 1, 2 or 4 GB Compact Flash card | | | |
| Limited by internal Flash EPROM memory capacity or CF card memory capacity | | | |
| Unlimited (8000 variables max.) | | | |
| Alphanumeric, bitmap, bargraph, gauge, tank, tank level indicator, curves, polygon, button, light | | | |
| 32 groups of 64 recipes comprising 1024 ingredients max. | | | |
| Yes, with log | | | |
| Yes | | | |
| Built-in | | | |
| – | | | |
| 1 audio output | | | |
| Uni-TE (2), Modbus, Modbus TCP/IP and for PLC brands: Mitsubishi, Omron, Rockwell Automation and Siemens | Uni-TE (2), Modbus, Modbus TCP/IP (1) and for PLC brands: Mitsubishi, Omron, Allen-Bradley and Siemens | | |
| RS 232C/RS 422-485 (COM1) | RS 232C (COM1) RS 232C (COM2) | RS 232C (COM1) | RS 232C (COM1) RS 232C (COM2) |
| 1 | 4 | 4 + 1 front mounted | |
| – | Modbus Plus with USB gateway | | |
| 1 Ethernet port (10BASE-T/100BASE-TX) | 1 Ethernet TCP/IP port (10BASE-T/100BASE-TX) and 1 Ethernet port (10BASE-T/100BASE-TX/1 GB) | | |
| – | RS 232C (COM1 or COM2) serial link, USB port for parallel printer | | |
| Vijeo Designer (on Windows XP and Vista) | | | |
| Magelis (266 MHz RISC CPU) | Windows XP Embedded | | |

XBT GH 2460

XBT GTW 450

XBT GTW 652

XBT GTW 750

Please, consult our catalogue "Human/Machine interfaces"

(1) Depending on model.

(2) Uni-TE version V2 for Twido controller and TSX Micro/Premium platform.

Modicon M238 logic controller

Power supplies for DC control circuits

Phaseo power supplies

Power supplies

Regulated switch mode
Phaseo Modular range and Optimum range industrial power supplies



| | |
|---|--|
| Input voltage | |
| Connection to world-wide line supplies | United States - 120 V (in phase-to-neutral) - 240 V (in phase-to-phase) Europe - 230 V (in phase-to-neutral) - 400 V (in phase-to-phase) United States - 277 V (in phase-to-neutral) - 480 V (in phase-to-phase) |

| |
|---|
| 100...240 V ~ 120...250 V --- |
| Single-phase (N-L1) or 2-phase (L1-L2) connection |
| Single-phase (N-L1) connection |
| – |

| |
|--|
| IEC 61000-3-2 conformity |
| Protection against undervoltage |
| Protection against overloads and short-circuits |
| Diagnostic relay |
| Compatibility with function modules |
| Power reserve (Boost) |

| | |
|--|----|
| Yes for ABL 7RP, not for ABL 8REM and not applicable for ABL 8MEM and ABL 7RM | |
| Yes | |
| Yes, voltage detection. Automatic restart on elimination on the fault | |
| – | |
| – | |
| 1,25 to 1,4 I _n during 1 minute, depending on model (with ABL 8MEM) | No |

| | |
|-----------------------|--|
| Output voltage | |
| Output current | 0.3 A 0.6 A 1.2 A 2 A 2.5 A 3 A 4 A 4.8 A 5 A 6 A 10 A 20 A 40 A |

| 5 V --- | 12 V --- | 24 V --- | 48 V --- |
|--------------------------------|--------------------------------|--------------------------------|------------------------------|
| | | ABL 8MEM24003 (Modular) | |
| | | ABL 8MEM24006 (Modular) | |
| | | ABL 8MEM24012 (Modular) | |
| | ABL 8MEM12020 (Modular) | | |
| | | ABL 7RM24025 (Modular) | ABL 7RP4803 (Optimum) |
| | | ABL 8REM24030 (Optimum) | |
| ABL 8MEM05040 (Modular) | | | |
| | ABL 7RP1205 (Optimum) | ABL 8REM24050 (Optimum) | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Pages

Please, consult our catalogue "Phaseo, Power supplies & transformers"

Regulated switch mode
Phaseo Universal range industrial power supplies

Regulated switch mode
Phaseo range AS-Interface for AS-Interface cabling system



| | | | | | |
|--|-------------------------------|-------------------------|--------------------------------|--|------------------|
| 100...120 V ~ and 200...500 V ~ (1) | 380...500 V ~ | 24 V --- | 100...240 V | | |
| Single-phase (N-L1) or 2-phase (L1-L2) connection | – | – | Single-phase (N-L1) connection | | |
| | 3-phase (L1-L2-L3) connection | – | Single-phase (N-L1) connection | | |
| | 3-phase (L1-L2-L3) connection | – | – | | |
| Yes | | – | No | Yes | |
| Yes | | – | – | Yes | |
| Yes, current limitation or undervoltage detection | | Yes, current limitation | Yes | | |
| Yes, depending on model | | | – | | |
| Yes with buffer module, battery and battery control modules, redundancy module and discriminating downstream protection module | | | – | | |
| 1,5 In during 4 secondes | | No | No | | |
| 24 V --- | | 5 V --- | 7...12 V --- | 30 V --- | 24 V --- |
| | | | | | |
| | | | | | |
| | | | ABL 8DCC12020 (2) | | |
| | | | | ASI ABLB3002 ASI ABLD3002 (3) ASI ABLM3024 (4) | |
| ABL 8RPS24030 | | | | | ASI ABLM3024 (4) |
| | | | | | |
| | | | | ASI ABLB3004 ASI ABLD3004 (3) | |
| ABL 8RPS24050 | | | | | |
| | | ABL 8DCC05060 (2) | | | |
| ABL 8RPS24100 | | | | | |
| ABL 8RPM24200 | ABL 8WPS24200 | | | | |
| | ABL 8WPS24400 | | | | |

Please, consult our catalogue "Phaseo, Power supplies & transformers"

(1) Except ABL 8RPM24200. ~ 100...120 V and ~ 200...240 V.

(2) ---/--- converter module, requires to be associated with the Phaseo Universal range power supply.

(3) With earth fault detection.

(4) One output 30 V --- and one output 24 V --- ± 5 %.

Schneider Electric Industries SAS

Head Office
35, rue Joseph Monier
F-92500 Rueil-Malmaison
France

www.schneider-electric.com

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein.

Design: Schneider Electric
Photos: Schneider Electric
Printed by: